THE EFFECT OF MACROECONOMIC FACTORS ON FEMALE LABOR FORCE PARTICIPATION IN DEVELOPING-8 (D8) COUNTRIES: A DEMAND-SIDE ANALYSIS

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ABSTRACT

The past few decades have witnessed decreasing trends in female labor force participation (FLFP) around the developing countries, particularly in D-8 countries (Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey) despite substantial expansion of female education, sharp fertility decline, and favorable economic conditions. Thus, the main objective of this study is to examine the effect of demand-side macroeconomic factors on FLFP in D-8 countries. Factors included are economic growth (GDP), trade openness (TOP), foreign direct investment (FDI), urbanization, and tourism, involving the interactive effect of cultural diversity, religious diversity, political environment, level of education and infrastructure. This study incorporated the Structural Change theory and Feminization U hypothesis, using two panel data streams from 1980-2018, 1995-2018, and annual time-series data from 1980-2018. The Pooled Mean Group (PMG) and Autoregressive Distributed Lags (ARDL) findings revealed the statistically significant and positive effect of GDP and tourism on FLFP, while TOP, FDI, and urbanization registered mixed evidences. Although primary enrolment, ICT, and transport infrastructure enhanced the positive impact of economic growth on FLFP; ethnolinguistic, religious diversity, political environment, secondary and tertiary enrolment, and electricity impeded those positive effects. Indeed, the feminization U test revealed that most D-8 countries experienced nonlinear associations between GDP per capita and FLFP, with only Egypt, Nigeria, and Turkey registered the traditional U-shape of the Feminization U hypothesis. As a conclusion, the macroeconomic structure is vital to enhance the opportunities for FLFP. Hence, inclusive macroeconomic policies including trade orientation, proper diffusion of technologies, skill development training programs, access to infrastructure and political reforms are highly recommended to enhance labor policy that fully reaps the FLFP potentials in D-8 countries.

Keywords: female labor force participation, economic growth, demand side factors, feminization U, cultural diversity, infrastructure.

ABSTRAK

Beberapa dekad kebelakangan ini menyaksikan penurunan tren penyertaan tenaga kerja wanita (FLFP) di negara-negara membangun, terutamanya di negara-negara D-8 (Bangladesh, Mesir, Indonesia, Iran, Malaysia, Nigeria, Pakistan, dan Turki), di sebalik pertambahan pesat jumlah wanita yang berpendidikan, penurunan kadar kesuburan, dan persekitaran ekonomi yang baik. Justeru, objektif utama kajian ini adalah untuk meneliti kesan faktor-faktor makroekonomi dari sisi permintaan ke atas FLFP di negara-negara D-8. Faktor-faktor yang terlibat adalah pertumbuhan ekonomi (KDNK), keterbukaan perdagangan (TOP), pelaburan langsung asing (FDI), urbanisasi dan pelancongan, termasuklah kesan interaktif kepelbagaian budaya, agama, persekitaran politik, tahap pendidikan dan kemudahan infrastruktur. Kajian ini menggabungkan teori Perubahan Struktur dan hipotesis U Feminisasi, menggunakan dua aliran data panel dari 1980-2018, 1995-2018, serta data siri masa tahunan dari 1980-2018. Hasil analisis *The Pooled Mean Group (PMG)* dan *Autoregresif Distribusi Lag (ARDL)* menunjukkan kesan statistik yang signifikan dan positif faktor KDNK dan pelancongan terhadap FLFP. Bagaimana pun, faktor TOP, FDI, dan urbanisasi menunjukkan bukti bercampur-campur. Walaupun enrolmen sekolah rendah, ICT dan infrastruktur pengangkutan melonjakkan kesan positif KDNK ke atas FLFP, faktor-faktor etnolinguistik, kepelbagaian agama, persekitaran politik, enrolmen menengah dan pendidikan tinggi serta elektrik membantutkan kesan positif berkaitan. Malahan, ujian U feminisasi membuktikan bahawa kebanyakan negara D-8 merekodkan hubungan tidak linear di antara KDNK per kapita dan FLFP. Hanya negara Mesir, Nigeria, dan Turki yang mencatatkan bentuk U tradisional sejajar dengan hipotesis Feminisasi U. Kesimpulannya, struktur makroekonomi sangat penting ke arah meningkatkan peluang-peluang FLFP. Maka, dasar makroekonomi inklusif seperti orientasi perdagangan, penyebaran teknologi yang tepat, program-program latihan pengembangan kemahiran, akses terhadap infrastruktur dan reformasi politik dilihat sesuai untuk membentuk dasar buruh yang mampu memanfaatkan sepenuhnya potensi FLFP di negara-negara D-8.

Kata kunci: penyertaan tenaga kerja wanita, pertumbuhan ekonomi, faktor sisi permintaan, feminisasi U, kepelbagaian budaya, infrastruktur.

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LIST OF ABBREVIATIONS

ADF	Augmented Dicky Fuller
ARDL	Autoregressive Distributed Lag
CEDAW	The Convention on The Elimination of All Forms of Discrimination Against Women
CL	Civil Liberties
CUSUM	Cumulative Sum
CUSUMSQ	Cumulative Sum of Squares
D-8	Developing-8
ECM	Error Correction Mechanism
ECT	Error Correction Term
ED	Ethnic Diversity
FDI	Foreign Direct Investment
FLFP	Female Labor Force Participation
FLFPR	Female Labor Force Participation Rate
GDP	Gross Domestic Product
GII	Gender Inequality Index
ILO	International Labor Organization
LD	Language Diversity
MDGs	Millennium Development Goals
MLFPR	Male Labor Force Participation Rate
OIC	Organization of Islamic Cooperation
PCA	Principal Component Analysis
PMG	Pooled Mean Group
PR	Political Rights
SDGs	Sustainable Development Goals
TOP	Trade Openness
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNWTO	United Nations World Tourism Organization
USA	United States of America
WDI	World Development Indicators
WTO	World Trade Organization
WTTC	World Travel and Tourism Council
TEPAV	*Türkiye Ekonomi Politikaları Araştırma Vakfı*
SESRIC	The Statistical Economic and Social Research and Training Centre for Islamic Countries
MENA	Middle East & North African

CHAPTER ONE

INTRODUCTION

1.1 Background

Sustainable economic development hinges in the country's available resources and her ability to fully utilize these resources, whether physical or human capital. Therefore, it is indispensable for progress to better utilize human resources. Human resources are considered as the talent pool to compete in the integrating world. This talent can be utilized for fostering economic growth and creating opportunities for future generations by lessening the burden on the economy. Yet, inadequate use of resources especially human capital can put a greater risk of efficiency and productivity loss. The most serious costs of underutilization of human resources are not taking care of gender equality through the misuse of talent (Global Gender Gap Report, 2016).

In the United States of America, a 15 % to 20 % growth in aggregate output has been increased by the efforts of alleviating the misallocation of resources (gender inequality) during the last 50 years (Hsieh et al., 2019). Mckinsey Global Institute released a report "*The Power of Parity"* claimed that women occupy an identical role in the labor market as men's and can contribute 28 trillion US $ or 26 % of global GDP by 2025 (Woetzel et al., 2015). Moreover, World Bank reports that globally 42% of a gender gap exists in women participation in the workforce, there is the alarming cost of this low segment of females in earnings, 160.2 trillion US $ and 23,620 US $ per capita globally conferring to the recent report *"Unrealized Potential"* (Wodon & De La Brière, 2018).

Although, males and females are not meant to similar according to the gender equality concept, or they are treated exactly alike, but it is a basic human right that gives equal rights and resources, opportunities, and protections to all men and women (UNICEF, 2011). Even though, sustainable economic prosperity cannot be maintained without females and males having equal involvement in economic activity. Yet, females are lagging far behind their male counterparts in this battle around the globe.

The wave of women empowerment dates back to the era of the 1960s from the US civil rights movement. Later the United Nations emphasized the human rights of women by extending its human rights bill "The International Bill of Human Rights" by strengthening women's rights. The General Assembly of the United Nations has implemented "The Convention on the Elimination of All Forms of Discrimination against Women" (CEDAW)[1] in 1979 which is amongst its 10 core human rights instruments (UN General Assembly, 1979). It came into practice in 1981 with 64 state signatories. Furthermore, 186 states of the world ratify with rectifications of the partial protocol including 99 signatories by 2010 (UN Women, 2015).

International Labor Organization (ILO) took many initiatives to enhance women's rights in the labor market. They designed the special policies e.g. "*The women at work initiative*" and "*Decent Work*" agenda aim at delivering better opportunities, no discrimination, equal pay, safe environment at the workplace. Moreover, United Nations Conference on Trade and Development (UNCTAD) especially considers the dimension of women in the trade policy formulation on the regional and bilateral levels in the view that policies affect different segments of the society differently. On the

[1] Article 1 & 11

same token, World Trade Organization (WTO) also recognizes the importance of women's empowerment through trade. In that case, WTO puts its emphasis on building more inclusive policies that favor women. Millennium Development Goals (G3) and Sustainable Development Goals 2030 (G5) also stresses on the delivery of equal access to male and female not only in health and education but also in "Decent-work" and "political-economic decision-making" process. This in turn fosters sustainable economic development that springs its long-term beneficial impacts on society and humanity.

However, regardless of the well-documented laws and well-established policy framework against the discrimination of women, gender inequality still exists almost everywhere (UN 2016: Kim, 2017). These inequalities occur in multiple dimensions like social, political, cultural, and economic. Nevertheless, the underutilization of women in a formal work, lack of educational and economic opportunities puts most serious costs of production and efficiency loss (Jacobsen, 2011). Current pervasive disparities between genders more specifically in economic participation can be attributed to the misallocation of talent which in turn hampers the maximum productivity gains and lowers economic growth (Tanaka & Muzones, 2016).

According to the World Bank (Doing Business Report, 2017), 40 % of per capita productivity around the world can be increased through the removal of all kinds of discrimination against men and women. Considering this fact, several countries have been struggling to lessen these gaps and took many initiatives to overcome the problem. However, some improvements are seen in education, the number of females is increasing in universities yet, women's labor force participation is still low (World

Development Report, 2012). The problem of low FLFP is seriously prevalent in D-8 countries.

1.1.1 Developing - 8 (D-8) Countries: Establishment and Objectives

The developing 8 (D-8) group of 8 developing countries who have Muslim populations predominantly and all are affiliates of the "Organization of Islamic Cooperation" (OIC). These countries have an alliance for economic cooperation within the OIC. The group is comprising of Bangladesh, Egypt, Indonesia, Iran, Malaysia, Nigeria, Pakistan, and Turkey.

The Istanbul Declaration (June 15, 1997) of the summit of heads of states and Government formally disseminated the formation of Developing-8 (D-8). It is a trans-regional, intergovernmental global setting from South East Asia to Africa which aimed at building an organization based on friendship, solidarity to foster collaboration and sustainable development. Areas of cooperation amongst D-8 countries are particularly, agriculture and food security, trade, transportation, industry, energy and minerals, health tourism, etc. The hierarchy of D-8 organizational structure is as follows.

- The Summit: composed of heads of state/government gathered once in every two years.
- The council: comprised of Ministers of foreign affairs of member states responsible for political decision making and coordination of the issues.
- The commission: authority for the national coordination of the individual country which is consisted of senior officials recruited by their own government, respectively.

- Secretariat: responsible for monitoring and implementation of all D-8 activities and meetings.

1.1.2 Population, GDP and Labor Market Performance Of D-8 Countries

D-8 countries have a significant share in the global economy and more specifically in OIC in terms of human capital, economic growth, and trade and investment (D-8 economic outlook, 2017). D-8 countries are the most populated countries in the world. Half of the countries in the group are amongst the top 10 most populous while, all D-8 countries are amongst the top 50 most populated countries in the world, and 7 countries except Malaysia are amongst the top 20 most populous countries all over the world. D-8 population and its global ranks by size of population are shown in Table 1.1.

Table 1.1.

D-8 Population (Total in Numbers) By Country and Global Rank

SR. NO	Country	Population	World Rank
1	Indonesia	269,152,113	4
2	Pakistan	204,069,202	6
3	Nigeria	200,250,300	7
4	Bangladesh	167,826,820	8
5	Egypt	100,916,229	14
6	Turkey	82,824,605	17
7	Iran	82,708,670	18
8	Malaysia	32,394,861	45

Source: World Population Prospects, 2019 by United Nations (recent estimates)

D-8 population makes around 1.03 billion people which is roughly 14.6 % of the world population (The Statistical Economic and Social Research and Training Centre for Islamic Countries [SESRIC], 2017) abundant with vibrant labor force building a huge market with abundant natural resources. As shown in Table 1.1, half of the D-8 countries (Bangladesh, Indonesia, Nigeria, and Pakistan) are amongst the top 10 most populous countries of the world (U.S. Census Bureau, 2019) and the rest (Egypt, Iran, and Turkey) are amongst top 20 except Malaysia. On the same account, the D-8 population is above 60 % of the overall OIC population-based upon (SESRIC,2017) data.

These facts show that these countries have the potential to create a huge market with a dynamic labor force with around 15 % of the total world population according to the recent estimates by the UN. Regarding the overall performance, according to the recent estimates GDP of D-8 countries when calculated together is around 3.79 trillion US dollars (SESRIC, 2017) based upon IMF calculations. Alone D-8 GDP makes a 56 % share of OIC GDP amongst 57 countries based upon the calculation. However, the share of D-8 countries in world GDP is significantly lower which stood at 9 % of world GDP. Comparative to single country cases like the USA and China, D-8 performance is even lower as a group.

The GDP of each D-8 country is shown in Table 1.2. In the D-8 organization, GDP per capita, the composition of GDP by sector, and their relative economic size differ considerably across countries. The largest economy amongst the D-8 is Indonesia having GDP above 1 trillion (1119.2 Billion) US $ followed by Turkey, the second-

largest economy of D-8 with (754.4 Billion) US $ while Pakistan is the smallest economy which stood at only (278.2 Billion) US $.

Table 1.2

GDP Of D-8 Countries, GDP by Sector (2019) and GDP per capita

Sr. No	**Country**	**GDP (Billion US $)**	**GDP share by major Sector(%age)**				**GDP per capita in thousand US $**
			Agri	**Industry**	**Manufacturing**	**Services**	
1	Bangladesh	302.571	13	30	19	52.8	1.856
2	Egypt	303.2.	11	36	16	50.5	3.020
3	Indonesia	1119.2	13	39	20	44.2	4.136
4	Iran	458.5	9	35	12	54.4	5.506
5	Malaysia	364.702	7	37	21	54.2	11.415
6	Nigeria	448.12	22	27	12	49.7	2.230
7	Pakistan	278.222	22	18	12	53.9	1.285
8	Turkey	754.412	6	28	19	55.9	9.042

Source: World Bank national accounts data & WDI, 2019

According to recent estimates of GDP per capita (See Table 1.2), Malaysia records the highest GDP per capita in the D-8 group which stood at (US$ 11.4 thousand) followed by Turkey (US $9.04 thousand) and Iran (US$ 5.50 thousand). The rest of D-8 countries are GDP per capita below (US$ 5 thousand) and Pakistan and Bangladesh are least performer GDP per capita even below (US $2 thousand).

The main driving force in GDP of D-8 countries in the services sector followed by industry, Pakistan, and Nigeria have a relatively larger share in agriculture. D-8 also has a 5 % share in global trade, accounting for exports of US$ 739 Billion (*Türkiye Ekonomi Politikaları Araştırma Vakfı* [TEPAV][2] , 2016 calculations). Malaysia is the largest exporter in the D-8 group followed by Indonesia and Turkey. Moreover, Turkey

[2] The Economic Policy Research Foundation of Turkey

followed by Malaysia and Indonesia are the largest Importers in D-8 countries, while Iran, Bangladesh, Nigeria, Egypt, and Pakistan have a low share in exports and imports, respectively. Having a significant share in the world's trade, D-8 is also an attractive destination for foreign investors and holds a 10 % share in total foreign investment flows in the world, and inflows exceed their outflows (TEVPAV, 2018). The FDI inflows in D-8 countries generated more than 2 million jobs. This shows that D-8 countries have expanded their share in the global economy yet, they still have not achieved their true potential with reverence to their share in the global population.

This is because, despite dynamic labor abundant countries, D-8 countries' labor market performance is not promising. According to Global Competitive Report, amongst all D-8 countries "Labor Market Inefficiency" remained the least performing indicator amongst all pillars of the Global Competitive Index (World Economic Forum [WEF], 2017). D-8 labor force participation rate was 57.8 % in 2015(D-8 Economic outlook, 2017) and further declined to 55.08 in 2017 (SESRIC, 2017). It shows a descending trend, which is not only lower than the average of other OIC countries (59.9 %), but it is also lower than the world average (62.5 %), developed countries (60 %), and other non-OIC developing countries (65.0 %) in 2015(D-8 Economic outlook, 2017).

Instead, in the case of male labor force participation (MLFP), D-8 countries performed slightly better and stood at (77.6 %) on average, which is higher than the world average (76.1 %) and slightly higher than the developed countries (67.2%). However, in terms of FLFP in the case of D-8 countries which recorded (37.9 %) in 2015, a slight upward trend has been observed since 2000 which recorded (37.3 %), however, it significantly remained lower than the world (49.6%) on average and comparative to other OIC (42.0

% average) and developed (53.1% average) or Non-OIC developing countries (52.1% average), (D-8 economic outlook, 2017 & SESRIC, 2017).

Table 1.3

Gender Inequality Index and Female and Male Labor Force Participation Rate(out of 149 countries)

SR. NO	Country	overall score	Rank	FLFPR	MLFPR	Inequality of LF
1	Bangladesh	0.721	48	34.8	81.9	135
2	Egypt	0.614	135	24.1	77.7	141
3	Indonesia	0.691	85	52.9	83.7	118
4	Iran	0.589	142	17.9	75.2	145
5	Malaysia	0.676	101	54.7	80.6	103
6	Nigeria	0.621	133	50.3	59.9	61
7	Pakistan	0.550	148	26.3	85.8	142
8	Turkey	0.628	130	36.1	77.4	133

Source: Global Gender Gap Report, 2018 by World Economic Forum

Global Gender Gap Report (2018) revealed that most of the countries in the D-8 group are amongst the least case of Gender Inequality especially in terms of female labor force participation rate (FLFPR) presented in Table 1.3. This shows that almost all countries in the D-8 group fall below 100 on the rank of 149 in terms of FLFP except Nigeria. This is an alarming situation for this group and needs to reinvestigate the factors affecting female participation in these countries.

The prominent reason behind these gaps is the economic transition from rural to urban, and from agriculture to services, industrial or manufacturing, increased activity of the private sector, caused a similar decomposition of employment. According to a recent estimate, almost 51 % of the total population of D-8 countries are living in urban areas and the rest in rural areas. It can be observed from Table 1.2, the share of the agriculture sector is smallest as compared to industry or services. Employment in agriculture activities also dropped significantly. Moreover, the share of informal non

agriculture employment in developing countries increased significantly. In addition, the share of women in informal employment is higher than men in developing countries for instance 92 % for women and 87 % of men (Bonnet et al., 2019).

The modernization of the productive sector creates more jobs on the one hand, but it also generates unemployment on the other hand. The technological advancement changes the future of work where the usage of ICT increased by 80 % in D-8 countries, machines are replaced by humans, and labor markets experienced major transitions. This poses a great challenge for D-8 countries to manage wisely, otherwise, these transitions could lead to a greater risk of skill shortage, increasing inequalities, and displacements (WEF, 2018).

The total unemployment in D-8 country is significantly higher stood at 6 % comparative to developed countries which experience 3 to 4 %. (ILO, 2017: TEPAV calculation). Youth unemployment is even higher and in double digits in most D-8 countries. This shed a light on the demand for job generation in D-8 economies. Although, there is a demographic dividend due to a higher proportion of youth in the total population is a window of opportunity, however, youth unemployment remains a challenge.

As mentioned above, the female share is almost equaling in the total population as male does, however low level of FLFP is a common problem in D-8 countries that need to be addressed. The greatest challenge not reaping the full potential and low productivity of D-8 countries is reported as the worst performance of labor market inefficiency, more specifically women to men labor force participation ratio (Global

Competitive Index, 2017). More so, trends of FLFP in D-8 countries are persistent at their level, in some cases declining, not significant improvement is seen in the last 10 years. (See Appendix A).

These gaps in the FLFPR can be translated into many socio-economic and political factors on the one hand and some country-specific cultural factors on the other hand. The ongoing literary debate on the issue of female labor or employment mostly considered the supply side individual-level factors like women education, wage structure, marriage, childcare, mobility, fertility, norms, culture religion, such as Roopnarine and Ramrattan (2012), Hosney (2016), Klasen et al. (2018) and Shittu and Abdullah (2019) amongst others. In contrast, Garces-Ozanne and Singh (2017) and Klasen and Pieters (2015) suggested that both demand and supply-side factors are responsible for low female labor force participation.

While less emphasis is given towards the demand-side macro-level factors. It is argued that if the improvements are seen in education, as in various parts of the world, females are more in numbers in educational institutes Assaad et al. (2018), then there should be a simultaneous increase in women's economic activities. So, it is proposed that if demand-side opportunities suggested by (Assaad et al., 2018), are available for women, for instance, better jobs, easy access to transportation and communication, and better infrastructure, then the role of supply-side constraints like social norms and stereotypical attitude will be minimal.

1.2 Problem Statement

Based upon the above said discussion, it can be identified that female labor force participation (FLFP) is low around and lower in D-8 countries (37.9 %) in 2015 even below the world average (49.6 %) in 2015. More so, trends of FLFP in D-8 countries are persistent at their level, in some cases declining, no significant improvement is seen during the last few decades. Despite the well-documented gender equality laws as discussed in the previous section, some improvements are seen in education and health outcomes, the number of females is increasing in universities, female formal labor market participation remains lower or stagnant around the globe.

Policymakers identified several contributing socio-cultural and economic factors in determining women's participation in economic activity. They emphasized on various micro and macro level supply-side or individual level factors like reproductive health, women education, wage structure, marriage, childcare, mobility, fertility, norms, culture religion, etc. However, it is argued that the above-mentioned constraints have been largely overcome and are no longer a major obstacle. Evidence shows that women's education has increased considerably in most parts of the world, the fertility rate is also declined, and cultural and social norms do not limit highly educated women from work participation (Dhanaraj & Mahambare, 2017; Assaad et al, 2018; Klasen, 2019 and Desai & Joshi, 2019).

On the other hand, recent scholarly debate emphasizes the other factors like structural change and link women participation with the process of economic development and global economic integration. Women's employment decision making, not solely affected by the household or individual characteristics. Women also being an

economic agent and part of society and community. Therefore, the macro-economic structure of a country is also crucial in shaping the behavior of women in employment decision making. For instance, the composition of the productive sector, the trade policy, technological advancement, urban development, and globalization are held responsible for employment generating demand-side opportunities. However, these affect women differently as compared to men due to the skill level differences between males and females. Due to the gender-differentiated effects of these policies, it is desired to give special attention to the gender role while framing the policy, otherwise, the policy will be called gender-blind or gender-biased.

Therefore, this study aims to research the above-mentioned macroeconomic demand-side factors that affect female labor force participation. Little is known about macroeconomic demand-side factors of female participation in Developing-8 countries which can generate labor demand. Investigating these macroeconomic demand-side factors is imperative to valuable inputs to better policy formulation to gain productivity and economic growth of D-8 countries. On the other hand, if they are not taken care of, these countries will further be surrounded by slow growth (Currently around 9 % of the global GDP which is significantly lower as the whole group of eight countries as compared to a single country such as USA and China).

In addition, amongst the demand-side factors, the tourism sector is one of the key employments generating labor-intensive sector. The fact cannot be denied that globally tourism has contributed to 330 million jobs (World Travel & Tourism Council [WTTC], 2019). Secondly, the significance of the tourism sector for female employment is that it does not require high skill workers. So, it would be pertinent to

study the impact of tourism development on FLFP both theoretically and empirically which is still lacking. Still, scarce studied incorporated tourism sector and FLFP in the macroeconomic environment best of knowledge.

The structural change and economic integration also affect the, culture, and religious composition of a country by mingling of diverse ethnicities and religions due to globalization. These are also pertinent in determining the level of FLFPR because these factors can generate economic opportunities, competition, entrepreneurial activities on the one hand, and discrimination, and biasedness on the other. However, few studies documented these factors in determining the FLFPR yet, religious, cultural diversity as well as their interrelationships to socio-economic change remain unanswered. Especially, the interactive effect of cultural, religious diversity in determining the relationship between economic structure and FLFPR is lacking in the previous literature.

The political environment is crucial in determining female labor force participation through direct channels of stabilizing economy and indirect channels of regulatory framework and discouraging informal economy. It is evident that the size of shadow economy or informal economy is higher in developing countries and share of women in informal employment is higher than men in most of the developing countries (Bonnet et al, 2019). In official GDP in developing economies, the share of shadow economy reaches up to one third on average (Buehn and Schneider, 2012). This issue arises when formal sector is not able to provide employment opportunities due some socio-political and weak institutional structure. For instance, in the existence of the direct democracies the share of shadow economy is low (Teobaldelli & Schneider,

2013). Thus, keeping in view the important role of political institutions, and their indirect and direct effect on formal and informal economic activities, present study incorporated interactive role of political environment and economic growth on FLFP.

Infrastructure is also a crucial in devising the labor market. On the demand side perspective, the worldwide workforce demand landscape has changed the future of work significantly. With the advent of technology, more companies choose outsourcing programs or labor saving technologies for their significant works to the potential freelancers in the informal economy. Women with family or other commitments may opt for joining the demand side informal sectors such as unregistered SMEs or online business. The interaction effect of ICT, electricity, and transport infrastructure with economic growth incorporated in the present study to see their impact on FLFPR that is missing in the previous literature. Furthermore, the inclusion of education and as the interacting variable is justified by their importance in effecting FLFP recognized by international organizations. So, it would be imperative to examine the role of education in driving the relationship between economic growth and FLFP.

However, on the theoretical side, there exists two different approaches amongst the economist suggested by (Luci, 2009) on the relationship between the economic growth and women participation based upon linear "Neo-Classical Approach" (Becker, 1957) and nonlinear "Feminization U hypothesis" (Boserup, 1970). There exists a controversy amongst the researchers on the relationship between economic development and FLFP, whether it is linear or non-linear. Furthermore, (Gaddis & Klasen, 2014) suggested that nonlinear "Feminization U" depends upon the data set

used especially, it disappears under dynamic panel estimations. Moreover, previous studies used short time period maximum 10 to 15 years. Thus, time series analysis of "Feminization U" is still lacking in the literature as indicated by Verme (2015) and Altuzarra et al. (2019). Hence, the present study reexamines the Feminization U, incorporating large time-series data for each D-8 country separately from 1980-2018.

1.3 Research Questions

Given the problem statement above, the present study endeavors to estimate the demand-side macroeconomic factors which can create employment opportunities for female. The main purpose is to ascertain, how economic growth (LNGDP), trade openness (TOP), foreign direct investment (FDI), urbanization (URBAN), and tourism development (TOUR) influence the female labor force participation rate (FLFPR). Accordingly, to fill the research gap and to achieve the research objectives, this study establishes four main research questions:

1. How do the demand-side macro-economic factors like economic growth, trade openness, foreign direct investment, urbanization, and tourism development contribute to female labor force participation?
2. How do religious diversity, language diversity, ethnic diversity and political environment interact between economic growth and female labor force participation?
3. What is the role of education and infrastructure in driving the association between economic growth and female labor participation?
4. Does GDP per capita have a nonlinear (Feminization U hypothesis) relationship with female labor force participation in each D-8 country?

1.4 Research Objectives

The general objective is to determine the demand-side macro-economic factors of female labor force participation in D-8 countries. The specific objectives are:

1. To estimate the effect of demand-side macro-economic factors (economic growth, trade openness, foreign direct investment, urbanization, and tourism development) on the female labor force participation.
2. To estimate the interactive effect of (religious diversity, language diversity, ethnic diversity, and political environment) with economic growth on female labor force participation.
3. To estimate the effect of education and infrastructure in driving the relationship between economic growth and female labor force participation.
4. To test the nonlinear (Feminization U shape) relationship between GDP per capita and female labor force participation in each D-8 country.

1.5 The Scope of the Study

The present study only focusses on the effect of demand-side macroeconomic factors of female labor force participation in D-8 countries. The choice of D-8 countries is justified based on their existence as an economic alliance (established in, 1997) as well as their social, economic, political importance in the Organization of Islamic Cooperation (OIC). The main objective is to estimate the effect of demand-side macro-economic factors including economic growth, trade openness, foreign direct investment, urbanization on female labor force participation.

This study also incorporated the effect of cultural diversity (ethnic and language), religious diversity, political environment (POLITY2, civil liberties and political rights), infrastructure indices (ICT, electricity, and transport) calculated through Principal Component Analysis, and education (Gross enrolment at primary, secondary and tertiary levels) as interaction term with economic growth on FLFP. GDP per capita is also included to measure the Feminization U shape in each D-8 country separately due to the reason that GDP per capita is mainly used as the measure of better living standard, and widely used in the previous studies to examine the Feminization U shape. Panel data from 1980 -2018 and 1995-2018 for objective 1, panel data from 1980-2018 for objective 2-3 and time series data from 1980-2018 for objective 4 utilized.

1.6 Significance of the Study

This study bridges the research gaps, the previous studies largely discussed supply-side determinants of FLFPR such as Roopnarine and Ramrattan (2012), Hosney (2016) and (Shittu & Abdullah, 2019), including others. There is a scarcity of research on demand-side macroeconomic determinants of FLFP suggested by Klasen and Pieters (2015), Assaad et. al. (2018), and Verick (2018). The present study hopes to make significant contributions both theoretically and practically.

1.6.1 Theoretical Contribution

Over the past few decades, globalization has increased rapidly that also increases information dissemination and the world is shifting from the traditional economy to the knowledge economy which benefits all despite their biological or demographic status. However, the participation of women in formal remunerated work is still low or stagnant in many countries of the world which attracts greater attention, especially

in developing countries. This led to several empirical studies on the phenomenon of determining the factors affecting the FLFPR. However, most of the previous studies on the issue capture supply-side factors of female labor FLFPR namely, household income, fertility, cultural norms, and level of education, etc. (Roopnarine & Ramrattan, 2012; Shittu & Abdullah, 2019).

On the other hand, evidence shows that female education is increasing significantly. Conferring to the report published by (WEF, 2017) the number of women in universities and higher education is greater than their male counterparts. In their study, (Assaad et al., 2018) on Middle East & North African (MENA) countries, they called it the MENA paradox because according to them female education is high while FLFP is stagnant. If this is the case, culture is no more problem, as suggested by (Dhanaraj & Mahambare, 2017) who claim that women with better education levels are not constrained from cultural and social norms. This scenario leads towards the conception that there might be problems in market opportunities for female employment. So, there is dire need to reinvestigate the demand-side factors of female employment suggested by (Fletcher et al., 2017; Klasen et al., 2018 & Assaad et al., 2018). Therefore, this study makes a significant contribution to the literature of labor economics by incorporating the demand-side macro-economic factors of the FLFPR that is a useful addition for readers.

This study provides valuable insight to the future researcher and readers of economics literature with new evidence on factors affecting FLFP with wider data set from1980 to 2018 in D-8 countries which are not previously studied in this area best of

researcher's knowledge. This may support in shaping the significant literature on identifying the factors relevant to the FLFP in these countries.

Moreover, the theoretical underpinning of the present study meets with the structural change theory (Lewis, 1954) followed by the Feminization "U" hypothesis (Boserup, 1970). The previous scholarly debate produced mixed results based upon these two theories (Tam, 2011; Gaddis & Klasen, 2011; Eastin & Prakash, 2013; Lechman & Kaur, 2015; Mujahid et al., 2019; Altuzarra et al., 2019) and more. The present study is an effort to reconsider these issues with a different methodology by adopting a wider data set and new sample of study which would be a momentous addition in the existing literature.

1.6.2 Practical Contribution

The present study hopes to provide significant input to the government of D-8 countries on the issue of FLFP. Moreover, this study benefits the policymakers, the ministry of human resource development, and trade policymakers especially of the developing countries to consider the gender dimension while framing the policies so that they can implement the pace, scope, and sequencing of the right policies. This study also constructed infrastructure indices for ICT, Electricity and Transportation from 1980 to 2018 for D-8 countries. This is a valuable addition in terms of data collected through different sources and readily available index for infrastructure measure which was previously not available. Moreover, this sheds light on the future of work (employment) and lead to enhance the better policies for utilizing these facilities in labor market.

This work is hoped to deliver the information and knowledge on the demand-side macroeconomic factors which help in creating opportunities for female labor force participation and evidence on the "Feminization U" hypothesis. The validity of the "U" hypothesis in D-8 countries help infer the trends of women's participation in these countries and to devise a better policy. This helps in allocating the resources for female job opportunities and improves the status of female employment based upon the results of the study. The results of this study are also hoped to benefit society through information dissemination and changing norms which helps to raise the status of females in general.

1.7 Organization of study

The structure of this study is organized in five chapters. Chapter one provides the introduction of the study containing study background, problem statements, research questions, study objectives, research significance, and scope. Chapter two provides a thorough analysis of previous literature on the subject chosen. Chapter three clarifies planned study methods. Chapter four introduces all the review of findings of study time-series and panel data analysis. Finally, chapter five describes the summary of the findings of the study and policy suggestions proposed by the researcher.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The following chapter delivers a comprehensive review of the literature concerning the factors that are held responsible for improving the status of women in the labor market. The female labor force participation (FLFP) depends upon the women's choice to be part of the income-generating activities. The decision of women to be a part of economic activity depends upon several economic, cultural, sociological, and individual factors (Seguino, 2013).

The previous debate in the literature on this issue can be divided into micro-level supply-side factors and macro-level demand-side factors (Fatima & Sultana, 2009; Rodríguez, 2018). Micro factors are individual-level factors, for instance, fertility, childcare, wages, mobility, marriage, age, education, etc. On the other hand, macro-level factors include demand-related factors like economic development, trade openness, foreign direct investment, urbanization, etc. These can generate demand for labor, these factors are explained in the proceeding sections in detail.

The first section dwells on the supporting concepts, definitions, and theories that employ supply-side and demand-side factors that can enhance women's participation. The second section offers a comprehensive evaluation of the studies in empirical literature involving the factors that determine female labor force participation. The proceeding section presents the transmission mechanism amongst the explained and explanatory variables under consideration. The final section concludes the review of the literature.

2.2 Definition and Measure Female Labor Force Participation

The labor force of a country can be properly defined as the "proportion of a country's working-age population that engages actively in the labor market, either by working or looking for work;" which can further breakdown in female and male (Kapsos et al., 2014). The proper estimation of "labor force" is complex generally, it is considered as remunerated work or paid employment, often excluded those who are unpaid family workers, due to complexities in definition varies by country to country (Psacharopoulos & Tzannatos, 1989).

The choice of women whether to involve in economic activity or to stay at home is attributed to the socio-cultural environment of a country. Those who are not actively seeking work or not interested, are not considered as part of workforce participation (Key Indicators of the Labor Market[KILM] 1, 2015). There is also a chance, a person might be a part of workforce participation for some time or might be in the past but not in the future. Women are mostly disadvantageous in terms of labor force participation, either engaged in informal work, unpaid work, or not considered due to lack of information.

However, the female Labor force participation rate (FLFPR) is a standard measure of female labor force participation (FLFP) which is generally considered all over the world with few modifications. However, this rate varies from country to country. The ILO defines FLFPR as "the proportion of the working-age female population that is economically active". It can be disaggregated according to age, normally it is measured between 15-64 years of age, but it can be different in different countries according to their own laws. The rate here refers to the ratio or proportion of employed plus

unemployed to the working-age population. Employed are those who are categorized as employed or engaged with paid activity either by their private employment or business or by doing any job during the reference period. On the other hand, unemployed are those who are not having any self-employment, not engaged in any paid employment or business during the reference period. The reference period also varies from country to country according to their policy (Kapsos et al., 2014; ILOSTAT, 2015).

2.3 Theoretical Review

The issue of high gender inequality and low FLFP, especially in developing economies, has been extensively studied in the literature and became a well-recognized problem. Not only because of the sociological point of view, but it has several economic implications too. FLFP can increase the countries growth by lessening the burden of dependency and efficiency loss. However, FLFP depends upon several factors including, demand-side (job opportunities created by economic development, safe environment, ease of access, easy mobility, etc.) and supply-side factors (Fertility, wages, household income, household responsibilities, etc.) The next section briefly reviews the theories.

2.3.1 Structural Change Theory

The major concern about how the labor market alters with the process of structural change of an economy remained the interest of economists. Structural change refers to the shift from the traditional subsistent agricultural sector to the more modern industrialized sector, "Dual Economy Approach" (Lewis, 1954). However, the process of change of structure involves some interrelated developments by "*which*

underdeveloped economies transform their domestic economic structures from a heavy emphasis on traditional subsistence agriculture to a more modern more urbanized and more industrially diverse manufacturing and service economy" including, changes in terms of production, allocation of factors, demographic changes, location, and from protective trade to more liberalized trade. This whole process is called structural transformation (Chenery et al., 1986). The depiction of structural transformation and their outcomes is provided in Figure 2.1 and Figure 2.2.

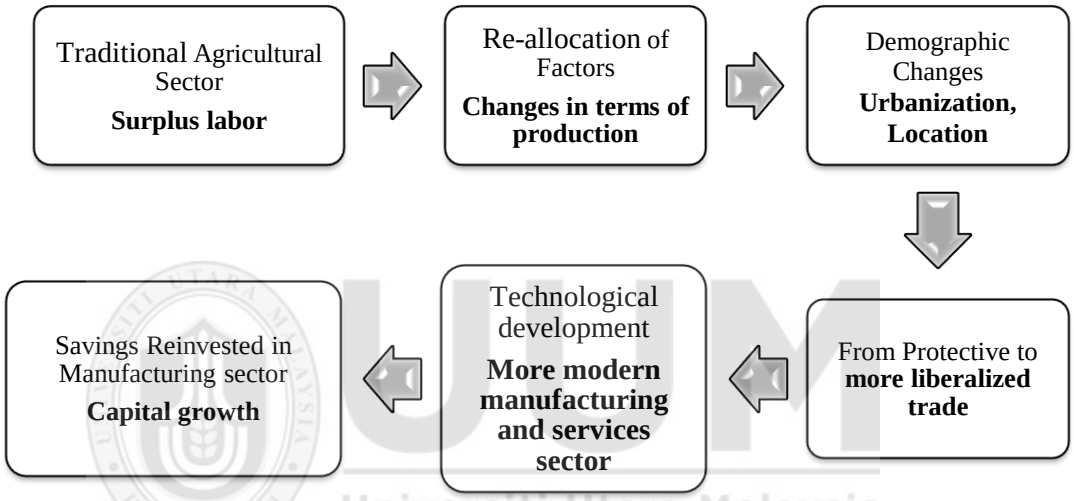


Figure 2.1
Process of Structural Transformation

The structural transformation in the process of development changes the whole functioning of the economy which can generate gains for the labor force. There are twofold gains that occur from this transformation, static and dynamic. The former can increase the overall productivity of labor in a country which results in increasing their share in the more productive sector. The latter gives them an incentive to enhance their skill and education which leads to an increase in their likelihood of participation in the labor market due to access to better technology and innovation.

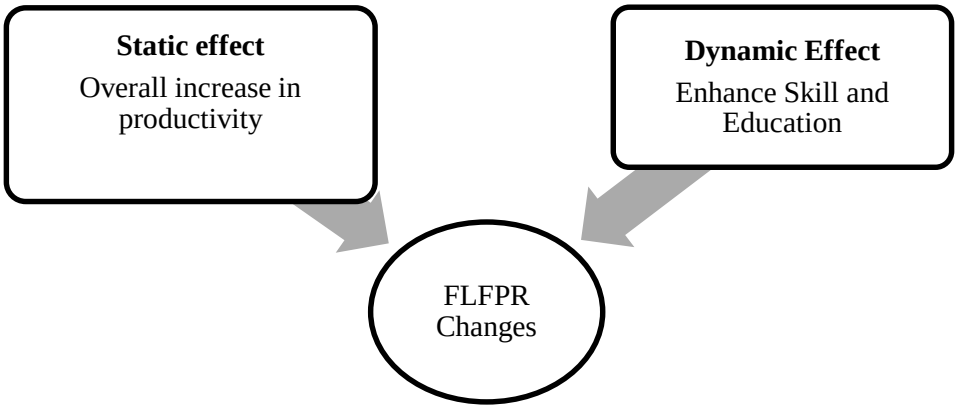


Figure 2.2
Outcomes of Structural Transformation

This sectoral adjustment has correspondingly a significant implication for female labor force participation. These consequences are associated with the rise or fall of women's participation in economic activity depending upon the sector. For instance, according to Goldin (1990, 1994) and Boserup (1970), women's participation increases as a result of rising demand for the agricultural and services sector, whereas industrial sector growth may stagnant or decline the women's economic activity. Recently, the drivers of structural change considered many changes like globalization, infrastructure, urbanization, trade, etc.

2.3.2 The Feminization U Hypothesis

Following structural change theory, (Sinha, 1967; Goldin, 1990, 1994) the "Feminization U" hypothesis is simply referred to as the linkage between FLFP and economic development. However, they associate the female labor market activity with different phases of economic development. It tells the mechanism of change of labor outcomes through the process of economic development.

Conferring to this theory, initially, agriculture was greatly considered as the main source of income generation of population, as income was low most women engage themselves in earning activities in the early process of economic development. As women are also abode by childcare activities due to high fertility rates, they are constrained to work on family farms or household enterprises so that they can also perform their domestic duties.

In the next phase of economic development, the production process changes from agriculture to industrial, which discourages female participation due to the low level of skill, education, and wages accompanied by some socio-cultural factors that put some restrictions on the mobility of females outside the home. This results in lowers the capabilities of women to take advantage of emerging opportunities offered by the newly industrialized sector. These constraints are normally associated with marriage and children under school age, this is possibly reinforced by "*social stigma*" and prescribed constraint against indusial work (Boserup, 1970; Goldin, 1994).

The rise in FLFPR is observed in the third phase of development again. This is associated with a higher level of post-primary education accompanied by the emergence of the services sector as a society becomes richer. This white-collar sector proposes new prospects of employment of women in addition to the part-time work and access to the services of daycare for children. This shift lessens the role of stigmatization which makes women able to carry outdoor activities combined with taking care of children. At this phase, "*the substitution effects*" dominates "*the income effect*" due to the higher wage rate which exhibits that FLFP is positively associated

with per capita income level (Psacharopoulos & Tzannatos, 1989), (Goldin, 1990, 1994) and (Mammen & Paxson, 2000).

Furthermore, an adverse income effect on female labor can also be seen, because of the overall rise in productivity and household income which is also consistent with basic labor economic theory. Current theoretical work is also influenced by the feminization U hypothesis (Rees & Riezman, 2012). They developed a framework that increases the gender-specific labor demand with the exogenous process of globalization. They presume that if the requirement of the evolving sector is largely male labor the economy converges towards low FLFP, less human capital steady-state, and low-income level, and vice versa.

The above-mentioned theories help explain the factors affecting female labor force participation in the long run. These theories mainly explain how macro-economic changes effects FLFP such as the size of the economy, production process, living standard, per capita income, fertility, trade policies, reallocation of resources, technological development, urbanization, capital/saving reinvestment, education, etc alters female labor force participation. The foundation of the present study is grounded on the above-mentioned theories, the variables included in the study are GDP as a proxy for the size of the economy, trade openness, FDI, and urbanization. The present study also incorporated GDP adjusted for per capita to test the validity of the feminization U hypothesis. The detailed description, proxies used are presented in Chapter three. The next section provides an empirical review of the factors affecting FLFP.

2.4 Empirical Review

The empirical literature on FLFP is categorized into two main broad divisions. The first collection of literature is devoted to the determinants or drivers of FLFP, further divided into demand-side macro-level and supply-side micro-level studies of FLFPR. The second cluster of literature is more interested in examining the linkage between economic development and FLFP supported by the famous "Feminization U" hypothesis.

2.4.1 Determinants of Female Labor Force Participation

FLFP being the hot issue among researchers, however, female participation in earning based activities remain low or stagnant in many parts of the world. There are several studies conducted on the determinants of low FLFP, identified various supply-side individual factors and demand-side factors either micro or macro level. The supply-side determinants such as fertility, education, number of children, household income, marriage, household responsibilities, and socio-cultural norms shape the behavior of women labor market decision studied by Adebiyi and Onifade (2014), Wu and Zhou (2015), Shittu & Abdullah (2019), etc.

In addition, there is another group of researchers who suggested demand-side determinants such as GDP, technological advancement, institutional and social reforms, structural adjustment, tax rate, educational policies, urbanization studied by (Moghadam, 2015; Schaner & Das, 2016; Garces-Ozanne & Singh, 2017), etc. Another group of researchers studied both demand and supply-side factors of FLFP for instance, Klasen & Pieters (2015), Hendy (2015), and Tong and Chiu (2017).

However, there is scant literature that discusses the demand-side behavior of women participation at the macro level.

2.4.1.1 Demand Side Factors

This section reviews the studies that incorporated the demand-side aspects of FLFP. Women are not only part of the household or community; the lives of women are also affected by the macroeconomic condition of that country. For instance, the relationship between FLFPR and structural adjustment is investigated by Karshenas and Moghadam (2001) in the Middle East and North Africa (MENA) region. They advanced a new hypothesis related to low female participation in MENA and economic adjustment. They found that in MENA countries female socioeconomic roles are not well-suited with the existing economic certainties in the age of globalization which is evident that most MENA countries sealed themselves into family structures in the oil boom epoch. They argue that women's socio-economic role is an important relationship that can explain better the puzzle of economic adjustment in the MENA region.

The structure of the economy is crucial in shaping the job opportunities for both males and females. Schaner and Das (2016) took time series data for more than 20 years to study the trends of FLFP years from Indonesia's labor force survey. They found that the FLFP of young women is high in urban areas and low in rural areas. The main cause behind this difference is that in urban areas, there are more opportunities for wage employment and rural areas do not offer these opportunities. This shows that the main wage job is in high demand however some other factors like household chores impede women to enter the labor market.

Recently, the modernization of the agriculture sector brings FLFP down in the case of India studied by (Garces-Ozanne & Singh, 2017). This happened due to security risk and decreased demand for female workers and increased demand for male workers after the introduction of new machines. They used time-series data from 1980 to 2013 and used VAR models. They found that major determinants of FLFPR in India are a share of agriculture to GDP, the mechanization of agriculture, and security risks. They suggest that female education in India is still low, so govt should devise policies to promote female education and labor market regulations for women.

Cameron et al. (2019) studied the drivers of FLFP in the Indonesian case. Survey-based data were collected from several resources including the National Socioeconomic Survey (Susenas) and the Village Potential Statistics (Podes). The time frame was considered from 1996 to 2013 for cohort analysis. The change in women's participation over a lifetime is associated with small changes in participation is offset by an increase in population. In addition, changes in social norms to support women is counterbalanced by the transformation in industrial structure.

The aforesaid analysis reveals that there are numerous supply and demand-side factors that alter the decision of women to enter a labor market. However, the literature on macroeconomic demand-side factors is scant especially long term and for developing countries cases. Keeping in view these aspects, the present study intends to reexamine these demand-side factors to fill this gap in the literature in the case of D-8 countries.

2.4.1.1.1 Trade Openness and Female Labor Force Participation

An extensive body of literature could be found in the relationship between trade openness and FLFP. Trade openness generates new employment opportunities both for male and female through reallocation of resources; it improves the new and advanced technologies from abroad and knowledge spillover which enhances the capabilities of human capital which in turn affect the female also. Recent work on the effects of trade liberalization on FLFP is conducted by (Mukhopadhyay, 2018; Assaf, 2018; Juhn et al., 2013). However, the previous studies produced mixed results on the relationship between these variables. On the positive side of this relationship, the studies by (Green et al., 2001; Juhn et al., 2013; Cooray et al., 2017) and (Gozgor, 2017) are considerable. On the negative side, studies are listed as (Hyder & Behrman, 2012; Sauré & Zoabi, 2014; Mukhopadhyay, 2018), etc.

Menon and Rodgers (2009) studied the trade policy reforms on the labor market in the case of India. Their results confirm the adverse effect of reform policies on gender-related labor market activities in the manufacturing sector of India. They found that the Female labor market activities are adversely affected by the rise in openness policies due to occupational segregation and discrimination against women.

In the case of Pakistan Hyder and Behrman (2012) found a negative linkage between trade openness and FLFP in broad occupational categories using historical data since 1951. Another study in the Pakistani case is conducted by Jaffri et al. (2015) on the relationship between trade openness and FLFP. The methodology they used was based on ARDL and OLS for the period from 1982 to 2012. They found that increased trading activities in the country enhanced female labor demand. Their results are

inconsistent with the findings of (Hyder & Behrman 2012) by employing different methodologies.

Juhn et al. (2013) worked on the effects of trade liberalization on wage inequality for Mexico. They employed regression analysis by considering survey level data for the period from 1992 – 2002. Their results show that tariff reduction increased employment and wage bills. Sauré and Zoabi (2014) have studied the relationship between trade and the FLFPR by employing OLS from 1990 through 2007 for the USA and Mexico. They used survey level data from different sources. Their findings show that trade with poor economies lowers the FLFPR in the case of rich economies. Mukhopadhyay (2018) found that tariff cut adversely affects the FLFP in case of India. There is another group of researchers who found the positive impacts of trade liberalization policies on FLFP.

The early work of Green et al. (2001) for the case of Brazil found a favorable effect of trade liberalization for women. The researcher examined the labor market conditions before and after trade liberalization. The empirical findings show the positive relationship between trade liberalization and FLFP. The findings also show that trade liberalization is favorable for expansion in college education and an increase in labor force participation of educated workers which is important as compared to social impacts.

Black and Brainerd (2004) also tried to check the connection between globalization and female employment. By employing Becker's theory of discrimination researchers tried to examine the performance the labor market of the United States from 1976 to

1993 in the manufacturing sector. Comparing concentrated versus competitive industries of US researchers found that international trade openness is beneficial for female workers.

Gaddis and Pieters (2012) examined the relationship between trade liberalization and the FLFPR for the case of Brazil. They used a fixed-effect model for the period from1987 to 1994. They found that the FLFPR had increased as a result of tariff reduction. They employed alternative measures to check the robustness of results and found that trade liberalization is highly significant in increasing the FLFPR whether it is region time or trade protection measures.

Trade openness can also pose a mix of results, both positive and negative on FLFP (Rahman, 2014). The study was conducted in Bangladesh's ready-made garment industry to capture the effect of trade liberalization on the gender gap. As the garment industry in Bangladesh is a major source of export earnings and having a significant share in GDP along with the largest number of female laborers working in this industry. The study found that female workers get more benefit from trade openness five-time higher as compared to male in case of employment opportunities, but still, the income gap is not reduced amongst men and women to the amount that it should be due to low level of education and skill of women, working times and attitudes, and beliefs towards female employment are the main hindrance of this differentiation.

Banerjee and Veeramani (2015) have investigated the role of several, trade, and technology-related aspects in shaping the female employment concentration in India. They used the Logit and Tobit model for a time span of 1998 to 2008. They included

125 manufacturing industries in their sample of the unbalanced panel. They found a strong association between tariff reductions with female employment opportunities. Moreover, their findings show that the growth of unskilled labor-intensive industries where India has a comparative advantage increase female employment in India as a contrast to adopting new technology and capital-intensive industry.

However, in a recent study, Gaddis and Pieters (2017) came up with different results for a similar country case. They studied the impact of liberalized policies of trade on gender-related behavior in the labor market in the case of Brazil. They employed individual-level microdata, through regression analysis. Their findings show that trade liberalization reduced the labor force participation rate for both males and females; however, the reduction in male labor is larger as compared to female labor. Yet they find no evidence of welfare gains from trade liberalization in the case of the female while comparing to their male counterparts in proportionate terms. Their results are opposite (Green et al., 2001; Gaddis & Pieters, 2012).

Kis-Katos et al. (2018) studied the gender-related properties of trade liberalization in the case of Indonesia. They considered work participation, hours of work, and primary domestic duties education, and marital status by using micro-level panel data. They found that reduction in tariff on input increased hours of work and work participation of women having low education and decreased domestic duties younger than 20 years of age.

The above review of the literature suggests that there is high controversy among researchers on the relationship between trade-related policies and women's labor

market activities. Additionally, the above-quoted studies are single-country case studies either micro-based survey level or macro level. Therefore, it would be worth mentioning the cross-country analysis that perhaps give more elaboration on the existing phenomena.

Meyer (2006) took global data from 1971 to 1995 for 120 countries to observe the influence of trade liberalization on the participation of women in the national labor market. The OLS results indicated that female employment has increased significantly after the introduction of trade policies; however, this participation depends upon the status of the country at national and international levels.

Contessi et al. (2014) did a study on MENA countries to measure the behavior of international trade on the gendered labor market. They used qualitative and quantitative, primary, and secondary firm-level data. According to their study, in MENA countries, the FLFPR in the context of employment and entrepreneurship is disproportionately influenced by trade openness. Their results are also consistent with other Authors; however, these results may not be generalizable to the other countries due to country-specific factors.

Kizilirmak et al. (2014) tried to find the impact of changing trade patterns on the employment behavior of manufacturing outputs. The author gathered data from 21 OECD and 9 in OECD countries from 1995 to 2006 of 23 manufacturing industries. The results of factor content analysis revealed that trade has a strong opposing impact on overall employment in general and female employment in specific in all 30 countries.

A study on 38 Sub Saharan African countries on the exploration of trade structure and its effect on women relative access to work by (Wamboye & Seguino, 2015). The panel data were collected for a fixed effect random effect and 2SLS for the period from 1991 to 2010. Their findings are also consistent with other authors that trade liberalization has gender employment effects. However, they found that the infrastructure of a country is more important in gendered labor market outcomes.

Mukhopadhyay (2015) conducted a study on the issue of gender inequality in the labor market for developing countries. The researcher tried to build a theoretical background on gender-related trade policies in the labor market by considering the interaction between, trade policy, and FLFPR, and wage differentials. The study found that a decrease in the tariff rate may lessen the gender wage gap and increase the labor force participation rate. The findings also show that labor market deregulations and foreign capital inflows can be deteriorating in determining the level of FLFP.

Cooray et al. (2017) conducted a study on trade openness and labor force participation with the interaction of the quality of institutions in the case of Sub-Saharan African countries. The data period covered by their study was from 1985 to 2012, they employed a fixed effect and system GMM. They discovered that trade openness positively affected labor force participation, however, it depends upon institutional settings, whether it is democratic or authoritarian. The former is strengthening g the positive relationship between the two.

In contrast, some studies found a negative association between trade openness and women's employment outcomes. For instance, Selwaness and Zaki (2017) tried to

examine the labor market outcomes by considering the interaction between trade reform and labor market regulations in the case of MENA countries. Two different time spans were considered from data collection from 1950 to 1954 and from 2000 to 2004. The researcher employed a fixed effect regression model for empirical analysis. The interesting findings of their study exhibit that the employment of women was not affected positively by trade liberalization comparative to men due to labor market rigidities in these countries.

One more similar study for the case of 100 countries is done by (Yang & Zoli, 2018). Gender equality in education and employment was examined through the change in fiscal and structural policies in this study. By using secondary data from 1980 to 2014, they applied OLS and Bayesian Model Averaging. They found a positive association between the level of protection and labor force participation gaps. Higher protection leads to widening gender gaps and vice versa.

Another study on the relationship between trade liberalization and women empowerment was done by (Audi & Ali, 2018) for the case of some SAARC countries. The researcher used the pooled OLS from 2000 to 2014. Their results are different from some other authors, which show that trade liberalization does not reduce the gender gap, and female to male labor force participation goes down.

The above analysis shows that there are divergent results amongst the association between trade and FLFP. This reaches no conclusion, and still the work on this area going on. As women are an important part of society and greatly affected by the policies, this area needs to re-investigate especially in developing countries cases.

2.4.1.1.2 Foreign Direct Investment and Female Labor Force Participation

Studies conducted on the determinants of FLFP considered foreign direct investment crucial for determining the technological progress and employment generation. However, the effects of FDI on female participation is twofold, either positive or negative. On the positive side, technology transfer can be gained from developed countries to developing countries which can, in turn, create new employment opportunities in general. On the other hand, FDI can negatively affect female participation due to the discouraged worker's effect in developing countries. As women are not acquired the latest skills and technologies, it takes time and cost to learn these skills, especially in developing countries.

Previous studies also found mixed evidence on the relationship between FLFP and FDI. Gray et al. (2006) contributed their work for 180 high incomes and developing countries to examine the influence of FDI along with other variables on the female share of the labor force. The time period covered by their study was from 1975 to 2000. They employed a panel fixed-effect model for estimation. They found that FDI has no significance in determining FLFP.

Meyer (2006) also generates some similar results considering 120 countries. The time period covered from 1971 to 1995 in their study disaggregating the data for income levels and regions. The methodology adopted by them was simple OLS with static and dynamic models. They found that FDI is insignificant in terms of FLFP in a static model. On the other hand, FDI has a significant positive impact on FLFP in a dynamic model. Pradhan (2006) in India examined the employment gap between males and females. He deployed plant-level data for manufacturing between 1999-2000 and

2000- 20001. Using pooled OLS he found that FDI is insignificant in defining the employment gap between males and females.

Siegmann (2006) investigated the gendered labor market effect of FDI in the Indonesian case. He used a mixed methodology for empirical analysis. He tried to identify both positive and negative influences of FDI on FLFP and found that the negative effect is dominant. Their findings show the mixed evidence for quantitative analysis. It shows that female participation is decreased due to low skill and low level of women education which also lowers their bargaining power and increases the wage gap, especially in manufacturing and hotels. On the other hand, results from the qualitative method show a positive link between FDI and FLFP.

Vacaflores (2009) explored the impact of FDI on employment in the case of 17 Latin American Countries. The time frame covered understudy was 1980 to 2002. she employed the Generalized Method of Moments for empirical estimation. Her study found the positive influence of FDI on overall employment, on the one hand, a stronger relationship between FDI and FLFP on the other hand. The above said discussion shows the mixture of evidence between FDI and FLFP, which would be pertinent to re-examine as a part of the present study.

Aguayo-Tellez et al. (2010) conducted a study in Mexico using census and survey level data for manufacturing for the time span of 1990 to 2000. They utilized decomposition analysis inter and intra-industry shifts. They found that FDI deregulation increases female employment. Another study in Mexico is conducted by

(Dell, 2005) using an employment survey from 1987 to 1999. They utilized state-level data for FLFP and found that FDI has no separate effect on FLFP.

In the case of 80 developing countries, Cooray et al. (2012) studied the impact of FDI as one of the measures of globalization on FLFP. They employed a linear model with a country-specific cohort for every five years' intervals considering global shock at every point. The results from their study show that FDI has a negative impact on FLFP, however, these effects are mainly seen in young women since young women invest more in education and skill due to the skill premia effect of globalization. In addition, they also found that the structure of the economy is crucial for the direction of this relationship.

Timmermans (2014) was interested in examining the impact of FDI on FLFP and the ratio of female to male labor force participation. The sample period consisted of 1990 to 2009 for 43 Sub-Saharan African countries. The researcher adopted the Ordinary Least Square Regression Method for generating results. The study explored that there is a positive significant relationship between FLFP and FDI. However, the results show a variation between different income groups. It is positive for countries with low initial values and mineral-rich countries.

Maqsood and Samiullah (2014) also examined the impact of FDI on FLFP. The sample of her study consisted of SAARC countries from 1990 to 2011. They employed a panel fixed effect and panel random effect techniques for empirical analysis. They found that FDI has increased FLFP in SAARC countries during the period under study. Another similar study in the case of Pakistan with opposing results conducted by Jaffri

et al. (2015). Considering the time span between 1982 to 2012, they used ARDL and OLS methodology. Their findings show that FDI has significantly reduced female participation in Pakistan during the period under study.

2.4.1.1.3 Urbanization and Female Labor Force Participation

Urban development is considered as imperious for women's empowerment in terms of employment opportunities. It can enhance women's opportunities to participate in the labor market through various channels. However, the literature found that there is paradoxical evidence on the relationship between urbanization and FLFP. One strand of evidence shows the positive effect that in urban areas there are more opportunities for paid work. Resultantly, due to increased opportunities and modernization women are in a better position in urban areas compared to rural areas. According to (Ghosh & Roy, 1997) Indian women were able to enter new professions and more skilled occupations due to the outcomes of urbanization like modernization, social change, and rise in education. In addition, the norms against working women were also changed over time in urban zones. They also reported that in India women are now commonly recognized as a social reality in public services and the tertiary sector.

Urbanization can also negatively affect the FLFP due to the discouraged worker effect. Tansel (2002) studied the relationship between economic development and FLFP along with urbanization as one of the key determinants of FLFP. The panel data covered 67 provinces of Turkey for 1980, 1985, and 1990. By using Pooled OLS the results found a highly significant and negative coefficient for urbanization and FLFP. This shows that with the increased urbanization FLFP decreases significantly. They found that it is due to the substantial discouraged worker effect.

As highlighted in Chant (2013), despite some advantages enjoyed by urban women comparative to rural women, women still suffer from a variety of inequalities in urban areas like unequal access to decent work, lack of security and safety, mobility, and lack of access to assets. These inequalities limit their access to formal remunerated work in the labor market.

Another Study by Jaffri et al. (2015) presented empirical evidence on the relationship between urbanization and FLFP in the case of Pakistan. The time frame considered was from 1982 to 2012. The autoregressive distributive lags (ARDL) and Error Correction (ECM) Model were applied to analyze the results. The results from their study show that urbanization has a drastic impact on FLFP in Pakistan during the time under consideration.

Klasen et al. (2019) explore the micro-level determinants of labor force participation of married women in urban areas of eight low- and middle-income countries. The data period ranges from 2000 to 2014 for the macro-economic level and 800, 000 urban married women between the ages of 25-54. They found that FLFP varies across the country. However, some characteristics of urbanization like rising in education, the decline in fertility rate increased female participation substantially, while the rise in household income is negatively related to female participation.

2.4.1.1.4 Tourism and Female Labor Force Participation

The literature on the relationship between female labor participation and tourism development is scant even though tourism is a big employment generation sector.

Despite tourism provides greater occupational choice for women, the issues related to employment status and remuneration remained the challenge.

Wilkinson and Pratiwi (1995) examined the impact of tourism on women employment status in an Indonesian village. The gender analysis approach has been used to carry the analysis of FLFP. The analysis was carried through a qualitative approach by formulating an open-ended questionnaire. The results found that more women participate in labor market activities, however despite multiple responsibilities more women become self-employed, and increased informal labor market activities.

Obadic and Maric (2009) also stressed the significant role of tourism in employment generating sector for women. They presented evidence that tourism help women in a variety of channels. They reported that in 2007 the share of women employment in the tourism accommodation sector of EU-27 was 60 %. The results also revealed that tourism provides the best work-family life balance for women. However, the nature of the job still remains the question.

Duffy (2015) investigated the employment status of women in the tourism sector of the Dominican Republic. The primary research was conducted through semi-structured individuals, coupled, and group interviews in 12 different coastal communities. The findings from their study show mixed results. Women are in an economically advantageous state by gaining social and economic independence. Contrary, more conflicts have arisen on the negotiation of gender roles, the double workload for women, and tension due to employment.

Soria and Teigeiro (2019) examined the capacity of the European Union tourism industry in generating employment opportunities for females. They employed a two-stage methodology. At the first stage, they calculated the employment multiplier by using Leontief input-output tables. In the second stage, they estimated the determinants of female employment in the hospitality sector through a regression model. The findings from their study show the significant variation in the job capacity of the hotel and tourism sector across the European Union community. They also suggested that institutional factors are also vital in determining the level of FLFP.

2.4.1.1.5 Infrastructure and Female Labor Force Participation

Basic system and services like energy, transportation, information and communication technology, water and sanitation, and other facilities that are part of basic infrastructure crucial for economic development especially for human development. Access to these facilities is crucial for women's time allocation in household chores and the labor market.

As discussed by (Agénor & Canuto, 2012), lack of access to infrastructure significantly limits the role of women of rural areas in economic participation in developing countries. Their analysis was based upon the interaction between infrastructure, women's time allocation, and economic growth in developing countries. The gender-based Computable Overlapping Generation Model (OLG) was used for the quantitative part. They suggest that to enhance women's participation in the labor market, it is essential to reduce the barriers to access to infrastructure that would help women to reduce their time in household activities and devote their time to paid work.

Another study by Wamboye and Seguino (2012) examined the influence of economic and trade structure on women's comparative entry to labor. Their sample was composed of 38 Sub-Saharan African countries disaggregated by the mineral exporter, non-oil, and non-mineral exporter from 1991 to 2010. Using unbalanced panel data, they adopted a fixed effect and two-stage least squares estimation technique. The findings of their study show that in SSA countries since the early 1990s, gender labor market outcomes were largely determined by the country's infrastructure.

Amongst the other factors, transportation remained a big challenge for women in developing countries which limit their mobility and access to workplaces both in urban and rural areas such as Pakistan (Tanaka & Muzones, 2016). Access to public transport can reduce transportation costs and ease of access to the workplace. Evidence shows that countries with poor infrastructure have low FLFP. According to Mehrotra and Sinha (2019), low FLFP is attached to some policy issues in India. They suggested that to increase the participation of women in the economic sphere it is pertinent to provide them with a safe transportation facility.

Access to energy and electricity is another important driver of women's time allocation among households and paid work (Agénor & Canuto, 2012). On a similar note, Cubas (2016) conducted a study on the difference between FLFP amongst developing countries like Latin American countries and the United States. The time period considered in the study was from 1980 to 2005. The author reported that countries with higher household access to infrastructure have higher FLFP and vice versa.

Infrastructure facilities like information and communication technology have played a vital role in improving the status of women by allowing them to access the latest information and distance education and work from home (Suhaida, 2013). Similarly, Nikulin (2017) conducted a study for 60 developing countries to find the impact of ICT on FLFP. Panel data ranged from 2000 to 2014 collected by the researcher. The methodology used in their study was panel Random effect with GLS. The results from their findings show that ICT access is significantly and positively related to FLFP in developing countries.

Efobi et al. (2018) examined the link between ICT advancement and women's participation in formal work. Data used in their study consisted of 48 Sub Saharan African (SSA) countries covering the period between 1990 to 2014. They employed OLS, panel fixed effect, and Generalized Method of Moments (GMM) regression. The results from their study show the significant positive link between ICT and female economic participation in SSA countries. This implies that these technologies are crucial for women's entry to formal work.

2.4.1.2 Supply-Side Factors

This section discusses the collection of those studies that conducted supply-side analysis i-e. education, fertility, household responsibilities, and child-rearing activities are considered as the most important determinants of FLFP by most of the authors. The reason behind this association is a higher number of children increases the household responsibilities for women because of the prevailing household division of labor in many areas of the world.

Hosney (2016) examined the effect of educational attainment on FLFP in Egypt and Germany. The survey level data was drawn from a panel survey in 2012, by using the Probit model technique for both countries. They reported that higher educational attainment is positively related to FLFP and marriage and a number of children are negatively associated with women's labor market participation. Evidence also shows that age, being married and a number of children have a great marginal impact on German on the other hand years of schooling have a greater marginal influence on Egyptian FLFP.

Similar results were found by Roopnarine and Ramrattan (2012) in the case of Trinidad and Tobago found that the presence of children in the household is negatively associated with FLFP while being a single, age, headship of household and level of schooling is positively associated. They also found a negative association between chronic illness and social security programs with women's participation. By utilizing survey-based household-level data, they employed a Probit Model Technique for empirical estimation.

Tong and Chiu (2017) also measure the trends and determinants of FLFP in Hong Kong. They used census data from 1991, 1996, 2001, 2006, and 2011. Women's labor force participation was studied with respect to marketability, availability, market demand, and new household economic theory. The results disclosed the increasing trend of FLFPR of married women during the time period under consideration. Although, child-rearing activities hampers them to make them available for economic activities.

Abraham et al. (2017) conducted a study in Ghana to see the behavior of FLFP after institutional and social reforms. They draw data from Ghana's 2010 Population and Housing Census. They employed logit regression and multinomial logit techniques for empirical findings. The findings from their study show that female participation was weakened substantially in 2005. The main determinant of female participation in Ghana was education.

Cai (2018) also confirmed that the presence of under school-age children alters the behavior of women labor market participation in Australia. The researcher utilized panel data of the first 13 waves of Australia's household income and labor dynamics (HILDA). The other factors identified are education, age, immigration status, and health of women who shape the labor market behavior of Australian women.

Although, the above-mentioned studies confirm the indirect relationship between high fertility and FLFPR, however, these are mostly micro-level short term studies that used survey level data for a single country case. In contrast, long-term studies or cross-country studies produce different results. For example, Adebiyi and Onifade (2014) examined the association between FLFPR and fertility in Nigeria. Time series data from 1998 to 2011 were collected from World Development Indicator. The method employed for empirical estimation was simple OLS. The results indicate that the link between fertility and FLFPR is positive but insignificant. Besides, literacy rate and use of contraceptives positively related to fertility while GDP per capita showed a negative association.

Hendy (2015) examined the trends and factors that distress FLFP in the Egyptian labor market from 1998 to 2012. The data used in the study were drawn from the Egypt Labor Market Panel Survey (ELMPS) 2012. The panel analysis includes three different points in time, 1998, 2006, and 2012. The analysis shows that women labor participation remained low even with the rise in female education as compared to male education. The analysis was done based on pre-and post-revolution and found that the January 25 revolution has adversely affected women's participation. The results indicate that marriage is a significant factor of low FLFP which increases household responsibilities and child-rearing activities. The employment structure is another contributing factor that shows that women still prefer public sector employment rather than private-sector employment. However, due to decreased public sector hiring leads women to remain inactive. These results suggest that education, household responsibilities along with child-rearing activities are being the main hindrance of low FLFP. So, the policies need to reformulate at the market level to provide childcare facilities and educational opportunities.

Qinfen (2017) investigated the possible contributing factors of FLFP in Malaysia. The researcher collected time-series data from 1980 to 2015. She employed the ARDL Bound test approach for empirical estimation. Their results show that FLFP in Malaysia is positively associated with GDP and education in the long run and negatively associated with fertility rates in the long run. women labor force participant rate function also show constancy after integration of the CUSUM and CUSUMSQ tests during 1980 to 2015.

A study by Osuna (2018) tried to examine the factors related to the FLFP of married women in Spain. The data period covered from 1994 to 2008. The Kaygusuz model of household labor market participation was employed and data from Eurostat to standardize the model and estimate its validity. the results from their study postulate that change in tax rate and education distribution are the main drivers of the rise in female participation in the late nineteenth. Whereas, during the 2000s the rise in female participation was mainly due to the childcare facilities and earning profiles.

Shittu and Abdullah (2019) explored the relationship between fertility, female education, and female labor participation in ASEAN-7 countries including Brunei, Indonesia, Malaysia, Thailand, Myanmar, Vietnam, and the Philippines. They gathered the panel data for the period between 1990 and 2015. They employed a pooled mean group, OLS technique, and common correlated effects for dynamic variables. They came up with mixed findings which revealed that there exists both positive and negative association between FLFP and fertility in the long run, which maintains both the "incompatibility hypothesis" and the "societal response hypothesis". Similarly, female education has both negative and positive signs which support both the human capital theory and parking lot hypothesis. However, no causal relationship exists between female education and the total fertility rate. Despite increasing growth, fertility reduction, and advancement in education level, the FLFP of married women remained low.

Another most common factor identified by several researchers is the household level of income on the supply side determinants. Klasen and Pieters (2012) examined the drivers of FLFP in urban India covering the time span 1987 to 2004. They used unit

level data and employed a Probit model for empirical estimation. The results suggest that FLFP is driven by necessity rather than economic opportunities at a lower level of education. Their study confirmed that most of the FLFP with a low level of education has resulted in economic push factors and social standing effect. The study also found that the pull factor is only seen with the highest level of education which draws women into the labor market with decent jobs and attractive salaries, however, this proportion was very small and only until 2004. The study concludes that the labor market condition s for women did not improve even after its economic boom.

Such as, Wu and Zhou (2015) investigated the contributing factors of women's labor force participation in urban China. They utilized time-series data from 1990 to 2010 drawn from surveys and mini-census. They discovered that during the period under consideration women's labor force participation has altered and decreased considerably in urban China especially in the 1990s and 200s. However, in 2003 women labor force participation increased gradually. Women's labor force participation is affected by income from other family members since 2003, especially women from poorer families. The author argued that diverse socio-economic powers drove the women labor supply in urban China historically. From 1990 to 2003, the institutional transformation was held responsible for a sharp decline in women's labor supply. On the other hand, the gradual increase of female participation was caused by high living costs.

Klasen and Pieters (2015) conducted a study in urban India. They collected the cross-sectional data from five large micro-level surveys and the period covered from 1987 to 2011. They applied the Probit estimation for decomposition analysis. This

stagnation is mainly due to both supply and demand-side factors. Household income and husband's education are the main supply-side aspects, yet the less expansion of female-oriented sectors is held responsible for decreasing the participation of females. In Sri Lanka, along with domestic responsibilities, women's engagement in studies, high levels of household income are common factors of low women participation in urban and rural areas (Semasinghe, 2017). Instead of applying micro or macro level methodology, the researcher used a mixed-method for analysis. The results from survey-based and time-series data found that, in addition to the supply side factors, there exist some state-level factors that held responsible for low FLFP in Sri Lanka for the period 1990 to 2014.

2.4.2 Other Factors: Culture, Religion, and Political Environment

Literature has identified several socio-political factors that are critical in driving the relationship between FLFP with other demand-side factors. For instance, economic development alone is not adequate if the country is suffering from political instability or benefit from some policies cannot be extracted in a political conflict situation. Furthermore, the ability of women to participate in formal paid work can also be affected by cultural constraints. Those include cultural norms, religious affiliations, gender role and attitude, stereotypical behavior, education of women, and some country-level factors like political environment, freedom, etc.

Most of the previous research argued that religion is an important factor that hinders women's ability to participate in the workforce. Psacharopoulos and Tzannatos (1989) studied the behavior of women's participation in the labor market from an international perspective. They examined the influence of religion as one of the determinants of

FLFP. By doing the statistical analysis they reported that countries with strong religious views have less labor force participation of women.

Lehrer (1995) examined the influence of religion on the labor participation of married women. He used survey level data from 1987-1988 from a national survey of families and households. They analyzed different stages depending on life cycle stages for 3 three different periods. For period one, they analyzed separately through dichotomous variable, and for periods 2 and 3 they used multinomial logit estimation. The results from their study suggest that religion is an important determinant of FLFP.

Read (2004) conducted a study on the labor force participation of immigrants specifically Arab-American women. She collected data from a national mail survey of Arab-American women and US census data and questionnaire for the year 2000. She applied logistic regression for empirical analysis. The results from her study revealed that the labor force participation of Arab-American women is lowest amongst other immigrant groups and this is mainly attributed to the cultural norms that restrict them to fulfill family responsibilities instead of work outside the home.

Feldmann (2007) examined the impact of religion (Protestantism) on women's labor market participation. He used data for 80 countries from the CIA world factbook for the year 2005. He controlled for a variety of country-specific variables. The results from regression analysis indicate that highly religiously (protestants) affiliated countries have higher labor market outcomes and women participation.

Ross (2008) performed a study on oil, Islam, and women. The author claimed that in the middle east low level of FLFP is due to oil production, not the religious factor (Islam). The data collected for 169 states oil-rich and oil-poor countries. Panel fixed effect and cross-sectional estimation were employed. For the first set of estimations, pooled data for 169 states from 1960 to 2002 were utilized. On the other hand, for cross-sectional estimation, all states covered in the most recent set of data from 1993 to 2002. The results from different techniques found that in oil-producing countries, the women labor force participation rate significantly reduced. The author suggested that Islam is not a hindrance to women's labor market participation, it is the growth strategy of a country that determines the role of women in economic activities.

H'madoun (2010) examined the link between religiosity and FLFP using the cross-section data for 48 countries. The results from their study after controlling some variables show that religious women are less in the labor force compared to less-religious women. The religion became insignificant when they applied the country's fixed effect. On the basis of these results, the researcher concluded that socioeconomic structure and political institutions are crucial in aligning the relationship between religiosity and FLFP.

Likewise, Eastin and Prakash (2013) studied the relationship between economic development and gender equality. They controlled the democratic regime in the view that democracy tends to raise women's participation because it respects human rights including women's rights. They took data from 146 countries for the time span between 1980 to 2005. They found that the relationship between economic development and FLFP is not straight forward. There is a significant role of social

political and cultural factors in determining this relationship and these factors vary across the country.

Besamusca et al. (2015) examined the link between economic conditions, families, education, and gender ideologies on women's labor force participation. The sample size consists of 117 countries for the period between 1990 to 2010. By adopting country-level effects, they found that FLFP is higher in less religious countries, higher enrolment in pre-primary, and presence of paid maternity leave.

For instance, Koyuncu and Eda (2017) examined the impact of religion, ethnicity, and language and cultural diversity on the FLFPR. He gathered cross-section data for 109 countries and the time span considered was 2000 to 2009. The methodology adopted for empirical estimation was multivariate regression analysis. The findings of their study show the positive link between FLFP and diversification in ethnicity, language, and religion. This implies that countries with high diversity in these factors have more FLFPR.

Female involvement in economic activity is also affected by country-specific factors such as the political environment of that country. The political atmosphere is crucial for taking benefit from policies too. For instance, Cooray et al. (2017) studied how political institutions drive the relationship between trade openness and labor force participation. By taking data from 48 sub-Saharan African countries for the time period of 1985 to 2012 they employed time fixed effect and system GMM based dynamic panel estimators. The results from their study show that political institutions like, democracy, political rights, and civil liberties are crucial in increasing labor market

activity for both MLF and FLF in Sub-Saharan African countries for the time period under consideration.

The low level of female labor force participation is also associated with the increased activities of the informal sector/shadow economy (Schneider, 2012). It is also reported more women participated in informal economy than men in developing countries (Bonnet et al., 2019). The ILO defines the informal sector as those self-governing enterprises that are not formally registered under government authority (ILO, 1993). The political environment is crucial in shaping formal and informal economic activities. These consequences can be demonstrated by prevailing political circumstances in many countries (Torgler & Schneider, 2007). For instance, Teobaldelli and Schneider (2013) examined the effect of direct democracy on the shadow economy theoretically and empirically. They proposed a model that predicts that the implementation of fiscal policies is supported by direct democracies and direct democracies discourage the practice of people to work in the informal sector.

Maulida and Darwanto (2018) analyze the impact of institutional quality on the shadow economy in seven developing countries of the ASEAN region. They utilized the MIMIC approach from the period from 2007-2016. Their study shows the significant increase in shadow economy in ASEAN during the underlying period. They also found that there exists an indirect relationship between the quality of institutions and the development of the shadow economy except for regulatory quality. The shadow economy tends to reduce with an increase in voice and accountability, political stability, control of corruption, and absence of violence. Therefore, it can be encapsulated that political environment or quality of institutions, the shape of

government is crucial in influencing the female labor force participation through various channels through regulating the labor markets and formal and informal activities.

2.4.3 Economic Development and Female Labor Force Participation: Feminization U Hypothesis

The widespread theoretical literature is available on the association of FLFP and economic development since the era of the 1950s and 1960s. Therefore, there are two strands of literature that prevail in this issue. The first strand of literature is based upon neoclassical (Becker, 1957) which suggests a direct relationship between the two that is FLFP increases with all phases of economic development.

On the other hand, the second strand of literature submits the presence of nonlinearity among economic development and FLFP. That is in the case of underdeveloped economies, the initial phase of economic development brings a downward trend in FLFP followed by an increase at the later stage in accordance with the Feminization "U" hypothesis based upon (Boserup, 1970). The feminization "U" is an outcome of structural change theory (Lewis, 1954). Previous empirical work on these variables dates back to the pioneering work of (Sinha, 1967; Boserup, 1970) followed by (Pampel & Tanaka, 1986; Goldin 1990, 1995; Çağatay and Özler 1995; Mammen and Paxson 2000 and Luci 2009; Tam, 2011).

The early work of Psacharopoulos and Tzannatos (1989) is remarkable in this context. He examined this relationship by using 136 countries data for the early 1980s. They found that FLFP substantially decreased in the early period of development. The rate

of reduction is higher than the rate of industrialization, that further confines opportunities of women due to increased urbanization and discouraged worker factor. However, they found that education is a key determinant of increase in FLFP. Similarly, (Goldin, 1994 also examined this relationship. The main findings from their study show the changing patterns of FLFP with every changing phase of economic development.

Çağatay and Özler (1995) used a cross country pooled data for 1985 and 1990 to analyze the relationship between women's labor force participation and long-standing economic development and macroeconomic fluctuations related to structural adjustment. The findings from their study show that there exists a U-shape relationship between long-term development and women's labor participation. They also exposed that the feminization of the labor force is associated with structural adjustment policies through increased openness and falling income distribution when controlled for the feminization U.

Mammen and Paxson (2000) also tried to explore the relationship between female labor force participation and economic development in cross country analysis. They found that the status of women is low as compared to their male counterparts in most of the developing countries in terms of absolute and relative welfare. The reasons suggested for this status was low female education, high mortality, and limited access to land resources in these countries. On a similar note, Tansel (2002) also found the positive impact of education on FLFP. In addition, findings from her study confirmed the U-shape relationship between economic development and FLFP.

Dessing (2008) tested the validity of feminization U curve in less developed countries. The findings from this study show that the total supply of labor is negatively related to the low wage level for both men and women in rural areas except in peak seasons. The results are opposite in urban areas, positive relation is found between the higher wage rate and labor force participation of women. Therefore, the findings are consistent with the S-shaped labor supply schedule.

Numerous cross-country studies confirm the validity of U-hypothesis. For instance, a panel study for 130 countries for the time period 1950 to 1980 was conducted by (Tam, 2011). They also verified a "U" shape relationship between GDP per capita and the FLFPR by employing different techniques of GMM.

Lechman and Kaur (2015) conducted a study for 162 countries worldwide for the period from 1990 to 2012. They employed a panel fixed effect and GMM for empirical analysis. Their result shows the confirmation of the U-shape relationship. However, they reported that there was high variability across countries irrespective of GDP level. In addition, their findings show that female labor participation is not solely influenced by economic growth. There are some other socio-cultural and political factors that determine the level of FLFP. Verme (2015) conducted a study for 172 countries from the period 1990 to 2012 with an unbalanced panel. The study found no clear evidence of U-shape in terms of the main drivers of the hypothesis in the MENA region.

Choudhry and Elhorst (2018) done similar work for 40 countries for the duration of 1960 to 2005 by also considering 10 different age groups. They also found the presence of U-shape relationships in these countries. In addition, their findings suggest that in

the long run, the gap between male and female participation can be reduced with reduced fertility, enhancement of the services sector, and economic development.

Luci (2009) also estimated the impacts of economic growth on the dynamics of female labor market activity. She tested the feminization U hypothesis for a panel dataset of 184 countries for the time frame of 1965 to 2004. She found that the U hypothesis is significant in the case of economic growth and the FLFPR.

There is another strand of literature conducted on a single country case that gives divergent conclusions. A different approach in the case of Pakistan was designed by (Fatima & Sultana, 2009). They took province wise data, pooled it for 1996-97 and 2001-02, and used the fixed-effect model. They also confirm the presence of a U-shape in the case of Pakistan. The findings also show the positive influence of education and economic development on FLFP and the negative influence of marital status and unemployment rate on FLFP.

Mujahid and Zafar (2012) also contributed to this field by conducting their work for Pakistan from the period between 1980 to 2010. They confirmed the presence of "U" shape with FLFP and GDP per capita by applying the ARDL bound test approach in the case of Pakistan. Their results are consistent with (Fatima & Sultana, 2009). Present study adopted the similar methodology conducted by Mujahid and Zafar (2012). However, the present study included various demand side control variables, and applied advanced technique for testing the validity of feminization U hypothesis in addition to the wide data set from 1980-2018.

Lahoti and Swaminathan (2013) conducted a study in the case of India. They adopted a different approach by taking state-level data from 1983 to 2010. For empirical analysis, they applied a dynamic panel technique for a set of independent variables including, GDP, net state domestic product, and education. They came up with no U-shape association for FLFP and explanatory variables.

Motkuri (2016) examined the "U" shape hypothesis in India with different methodologies. She adopted a cross-sectional technique for the year 2009-2010 with regression analysis. She used average monthly per capita consumption expenditure as a proxy for economic development, and the average wage rate of females. She found the inverted U-shape relationship between explained and explanatory variables.

A similar study was done in the case of Turkey exhibit different results (Doğan & Akyüz, 2017). They took the time series quarterly data for the period of 2000Q1 to 2013Q4 and employed ARDL for analysis. Findings from their study show that there exists a reverse "U" shape in the case of Turkey.

In addition to the conventional "U" shape, there are some studies that tried to explore the other possibilities of this relationship, for example, GKZ or S shape. For example, a study by Eastin and Prakash (2013) tried to examine the relationship between economic development and female labor force participation on the theoretical basis of the Kuznets hypothesis. Their analysis was based upon a panel of 146 countries from 1980 to 2005. They estimated two threshold points, a transition from the first to the second phase and a transition from the second to the third stage allowing for quadratic and cubic specifications. The researcher employed a linear mixed effect and country,

random effect model. The findings from their study are consistent with their assumption of GKC S-shape curvilinear relationship between economic development and gender equality with all alternative measures.

Similarly, Kýlýnç et. al. (2013) examined the GKC hypothesis, its nature whether quadratic or cubic for each G7 which includes Canada, France, Germany, Italy, Japan, United Kingdom (UK), the United States of America (USA) countries for the long run. They employed the ARDL Bound Test approach over the period 1955 to 2010. The results from their research show that there is a cubic inverted S-shaped GKC relationship for France and S-shaped for Japan. On the other hand, a quadratic inverted U-shape GKC relationship for Canada, the United Kingdom, and the United States.

On the other hand, Klasen et. al. (2011, 2013, 2015, 2020) has published a series of papers with their fellows on issues related to FLFP in developing countries, and other country-specific cases. For instance, Gaddis and Klasen (2011) re-examined the feminization U hypothesis for different sets of data drawn by ILO. Mostly their data covered from 1980, 1990-2010 for 191 countries worldwide. They used data for sector-specific growth to test the effect of structural change on women's economic activity. The results from their study show that each sector like, agriculture, mining, manufacturing, and services shows different dynamics for the FLFPR, but the effects are minor in size. They conclude that there is small importance of the "Feminization U" hypothesis for developing countries today, especially its declining portion.

Klasen et al. (2018) investigated the Feminization U using micro-level determinants of labor force participation of urban married women. They took the data from eight

low and middle economies including Bolivia, Brazil, India, Indonesia, Jordan, South Africa, Tanzania, and Vietnam. Their research found mixed results for different countries which shows a significant difference in women's participation across countries. For instance, in the case of Brazil and South Africa, they found a linear and positive relationship between women's education and labor force participation. On the other hand, India, Jordan, and Indonesia exhibit nonlinear feminization U or J shaped and mixed of both for Bolivia, Vietnam, and Tanzania. They also found that the rise in education and reduction in fertility is positively related to female participation, while household income e is negatively related to women's participation in relatively poor countries.

The above analysis revealed that either cross country or country-specific study, most of the studies used the conventional method of estimating the U-shape relationship by incorporating squared term of economic development irrespective of what measurement included. However, there exist some methodological issues in previous literature, suggested that data is very sensitive to the outcomes of Feminization "U" by (Tam, 2011) and Gaddis and Klasen, (2013). The former suggests that cross-section data is insufficient whereas the latter suggests that the dynamic panel is failed to explore this relationship. They argued that U-shape vanishes in a dynamic panel data approach and also sensitive to the dataset. Moreover, the time-series evidence on "Feminization U" is still lacking for a long period as suggested by Verme (2015) and Altuzarra et al. (2019). Considering these views, the present study intends to apply a different methodology for each D-8 country separately from1980-2018.

2.5 Summary of Theoretical Framework

This section provides a summary of the theoretical framework which identified several factors contributing to the FLFPR extracted from the review of existing theories and empirical work. These factors are mainly divided into two broad categories of supply-side and demand-side factors. Supply-side factors are considered as push factors that enforce women to participate in the labor market. These supply-side factors are further divided into individual characteristics, household income, and cultural factors. The demand-side factors can be categorized as market-level factors and macro-economic structure which pull the demand for female labor. Some institutional factors can be supply and demand. The summary of the theoretical framework is provided d in Figure 2.3.

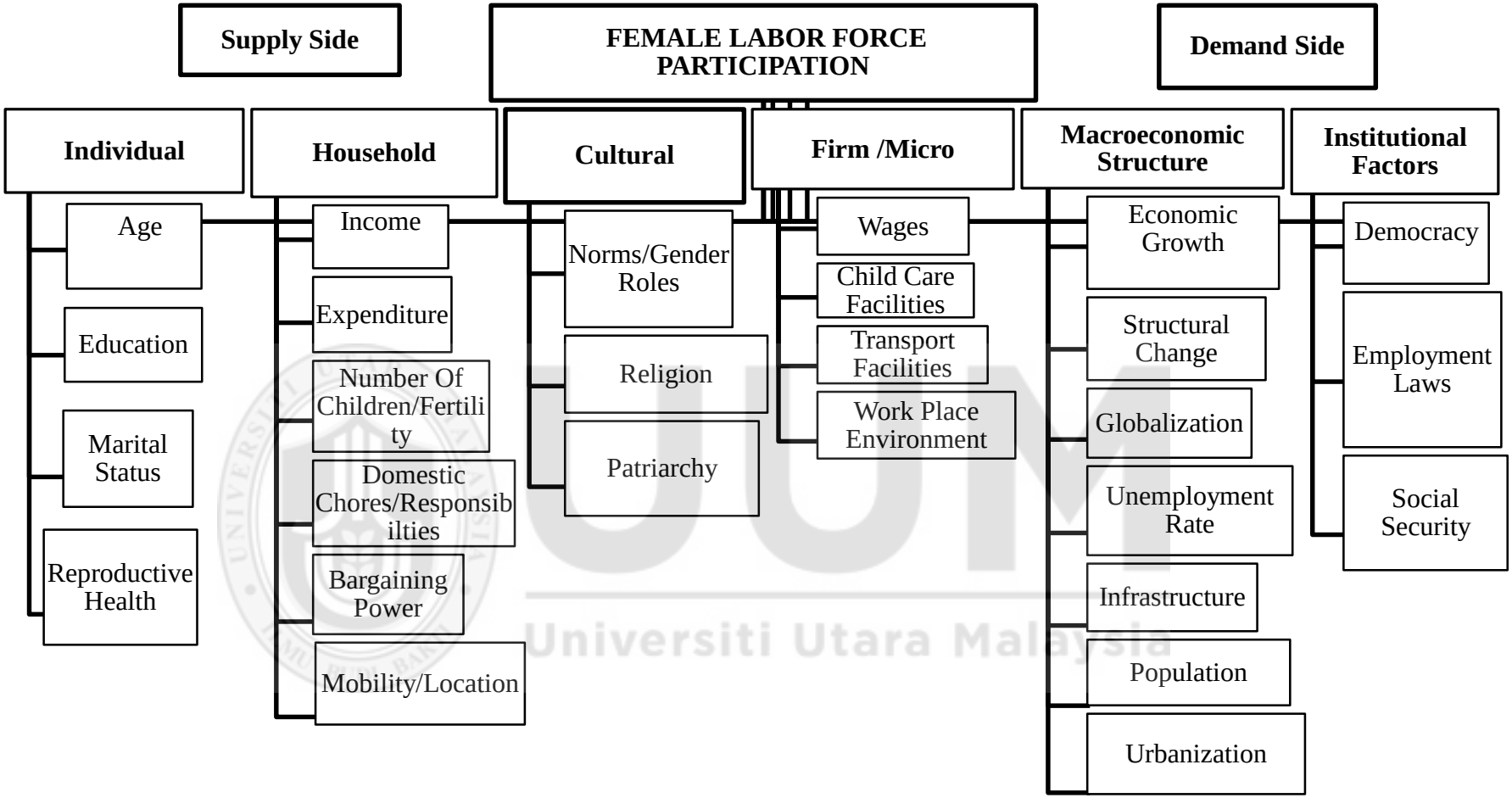


Figure 2.3
Theoretical Framework

2.6 Literature Gap

There is a large body of literature available on the issue of FLFP and its determinants. Although the research on the demand-side macroeconomic determinates is voluminous yet, this area is still inconclusive. The literature on the relationship between tourism and female labor force participation at the aggregate level is scant, limited studies such as (Soria & Teigeiro, 2019) amongst others, have considered tourism as a determinant of FLFP at the macroeconomic level.

Moreover, there is a lacuna in previous literature on the relationship between ethnolinguistic diversity, religious diversity, political environment. Few studies incorporated the interaction terms in driving the relationship between GDP and female labor force participation. The large body of literature incorporated infrastructure as an important determinant of FLFP, however, the comprehensive infrastructure measure is still lacking especially in D-8 countries and for long time series.

Moreover, studies conducted on the (Boserup, 1970) hypothesis or structural change theory produced mixed results or lacks methodological issues. A large body of literature available on the examination of the "Feminization U" hypothesis. However, there exist some methodological issues in previous literature, suggested that data is very sensitive to the outcomes of Feminization "U" by (Tam, 2011) and Gaddis and Klasen, (2013). The former suggests that cross-section data is insufficient whereas the latter suggests that the dynamic panel is failed to explore this relationship. Moreover, the time-series evidence on "Feminization U" is still lacking for a long period as suggested by Verme (2015) and Altuzarra et al. (2019). Considering these views, the

present study intends to apply a different methodology for each D-8 country separately from1980-2018.

The above analysis revealed that most studies used conventional methods to test the validity of U-shaped between female labor force participation and economic development except few, such as Altuzarra et al. (2019) and Gaddis & Klasen (2011). However, there is a well-established test developed by Lind and Mehlum (2010) and known as Sasabuchi–Lind–Mehlum (SLM-U test) to formally test the U shape, several studies applied the SLM-U test to validate of U shape relationship such as (Dong et al., 2018; Baloch et al., 2018; Dhanora et al., 2020). The present study intends to apply this advanced test to validate the U shape relationship between economic development and female labor force participation in D-8 countries that is missing in the previous studies more specifically, time series studies such as (Fatima & Sultana, 2009) and Mujahid and Zafar (2012) best of researcher's knowledge.

Lastly, few previous studies had been conducted in the D-8 countries on the issue of FLFP and its determinants. The present study would bridge these gaps (previous studies mainly focused on the supply side/micro level factors of FLFP) in following ways. This study differs from previous studies incorporating demand side factors of FLFP and several interaction terms such as cultural, religious diversity, political environment, infrastructure, and education. Moreover, there is no proper measure of infrastructure available, especially for D-8 countries, the present study incorporated comprehensive infrastructure index.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology and conceptual framework of the study. The focal intention is to determine the demand-side macro-economic factors of female labor force participation (FLFP) in a panel of D-8 countries and to test the validity of the Feminization "U" hypothesis in each D-8 country.

For these purposes, the study employed 14 estimation models, incorporating the two panel data streams from 1980-2018 and 1995- 2018, and time series from 1980-2018. Model 1 answers RQ1 (How do the demand side macroeconomic factors: economic growth, trade openness, foreign direct investment urbanization, and tourism development contribute to female labor force participation). Model 2 to Model 7 answers the RQ2 (How do cultural diversity, religious diversity, and political environment interact between economic growth and female labor force participation). Model 8 to 13 answer the RQ3 (What is the role of education and infrastructure in driving the association between economic growth and female labor participation). Model 14 answers RQ4 (Does GDP per capita have a non-linear (U-hypothesis) relationship with female labor force participation in each D-8 country) The detailed research framework, justifications of variables, and methodologies are presented in the proceeding sections.

3.2 Research Framework

The study utilized the underpinning theory of "Structural Change" (Lewis, 1954) followed by Feminization "U" (Boserup, 1970) which was discussed in the previous

chapter. The illustration begins from the basic Lewis dual-sector model of structural change followed by (Chiswick, 1986; Chiswick, 2018) with modifications. According to Lewis (1954), there are two main sectors of the economy. The subsistence agriculture sector and modern industrialized sector. There are three different divisions of labor in Lewis's economy. That is,

[3.1] $$L = L_1 + L_2 + L_0$$

Where L refers to the total labor in a country. The agriculture sector will hire L_1, while the modern industrialized sector will employ L_2. But on the other hand, there is another group of people represented by L_0 surplus labor which are either unemployed or underemployed. According to this theory, the production function of the subsistence sector only requires one factor of production which is labor Y_A is here represents the output or production of the agriculture sector. So, the production function of this sector can be written as:

[3.2] $$Y_A = g\,(L_1)$$

On the other hand, in the modern industrialized sector, production requires two inputs labor (L_2) and capital (K_2), and investment would be directed towards capital formation in the process of industrialization. Y_M refers to the production of the modern sector. So, the production function of the modern sector can be written as:

[3.3] $$Y_M = f\,(L_2, K_2)$$

Combining [3.2] and [3.3] the aggregate production function is

[3.4] $$Y = Y_M + Y_A = [f\,(L_2, K_2) + g(L_1)]$$

Where Y is overall economic growth, which can be approximated by the sum of shares of growth of modern Y_M and subsistence sector Y_A . This shows how the structure of growth matters for female economic activity that depends upon the sector-specific labor intensity of production. This helps explain how structural shift can affect employment opportunities for female and alters the FLFPR. For instance, the capital-intensive growth sector (Modern sector) may not create similar or equal job opportunities for male and female labor force participation. It depends upon the labor intensity of that specific sector in the gender framework. For example, the manufacturing (mining) sector may require more men labor force as compared to female labor (Gaddis and Klasen, 2014).

Moreover, the employment level in subsistence (Agriculture sector) also depends upon the shifts in sectoral segregation and some other socio-political sectors. Whether women begin to become more active in some sectors during the growth phase depends on changes in sectoral work segregation, because women in rural areas are more affected by socio-cultural norms, and clustered in some specific sectors.

3.3 Model Specification

In the Lewis model, the marginal productivity of the subsistence sector is zero. So, the only condition left for an increase in labor force participation is a shift in technology or an increase in capital stock. Here some modifications are applied, the original Lewis model assumes that the given stock of technology is fixed and only two factors of production, labor, and capital in the modern sector. Here technology is allowed to vary across countries. Any external shock to the economy can bring changes to the economy. The above-discussed model was the overall model showing the total

employment or labor in a country. The researcher augments the Lewis model with the gender factor referring to the female labor force participation following the similar approach conducted by (Gaddis and Klasen, 2014).

Based upon the previous discussion, it can be identified that an expansion of the modern sector absorbs labor from the subsistence sector on the one hand, or overall employment depends upon the growth of the modern sector on the other hand. The higher the rate of growth of the modern sector higher will be the level of employment.

[3.5] $$E = f\ (Y) \qquad \text{where} \quad E = E_M + E_F$$

Where E is the overall employment rate that is the ratio of the employed population to the total population and Y is the total growth of a country. From here the analysis is decomposed for males and females, following (Gaddis & Klasen, 2014). The expansion of the modern industrialized sector increases the overall employment on the one hand, which also increases opportunities for female employment or discourage female employment. On the other hand, labor migration from the subsistence sector to the modern sector creates space for women's employment in the subsistence sector.

The male employment rate (E_M)is the ratio of employed male (e_m)to the total male population(P_M) and female employment rate(E_F) is equal to the ratio of employed female (e_f) to the total female population (P_F). For simplicity of analysis, it is assumed that men and women have an equal share in the total population that is:$\left(P_F = P_M = \frac{1}{2} P\right)$. Where P represents the total population, hence it is obtained:

[3.6] $$\varepsilon_F = \frac{E_F}{P_F} = 2\frac{E_F}{P} = \frac{E_F}{E}\frac{E}{P} = 2\psi_F E$$

Where ψ_F is the intensity of female employment in the overall employment. The proportionate change in female employment depends on the GDP elasticity of female employment (Gaddis & Klasen, 2014). It is expressed in Equation [3.7].

[3.7] $$\frac{dE_F}{E_F} = \left(\frac{dE_F}{E_F}\ \frac{Y}{dY}\right)\frac{dY}{Y} = \mathcal{E}\ E_F Y\ \frac{dY}{Y}$$

Applying log on both sides, Equation [3.8] is obtained.

[3.8] $$dlnE_F = \varepsilon\ E_F Y\ dln\ Y$$

Substituting [3.6] into the Equation [3.8], the following approximation is obtained for GDP elasticity of female employment which shows the proportionate change in female employment share divided by proportionate change in GDP.

[3.9]

$$\varepsilon\ E_F Y = \frac{\frac{dE_F}{dy}}{\frac{E_F}{Y}} = \frac{\frac{d(2\psi E_F)}{dy}}{\frac{(2\psi E_F)}{y}} = \frac{\frac{d\psi E_F}{dy}E + \psi F\frac{de}{dy}}{\frac{\psi E_F}{y}} = \frac{\frac{d\psi E_F}{dy}}{\frac{\psi E_F}{y}} + \frac{\frac{dE}{dY}}{\frac{E}{Y}}$$

$$= \mathcal{E}\psi\ FY + \mathcal{E}\ EY$$

Considering the overall GDP growth rate that can be estimated by taking the sum of share-weighted growth rates of the different economic sectors (n=1….. N), Equation [3.9] substituted into [3.8] and get [3.10].

[3.10]

$$dlnE_F = \sum_{n=1}^{N}(\mathcal{E}\psi\ FYn + \mathcal{E}\ EY\ n)S_n dln\ YN$$

The proportionate change in female employment may exist depending upon the proportionate change in economic growth. This also represent how the structure of growth matters for female economic activity. However, the purpose of this configuration is not to establish a structural model, but simply used to establish the theoretical framework for the current study that can subsequently be used to analyze and interpret the empirical findings.

Therefore, the expansion of the modern industrialized sector increases the overall employment on the one hand, which also increases opportunities for female employment or discourage female employment. On the other hand, labor migration from the subsistence sector to the modern sector creates space for women employment in the subsistence sector. Therefore, the proportionate change in female employment may exist depending upon the proportionate change in economic growth.

This shows that FE is a function of total growth because an increase in total growth alters the female employment status either increasing the participation of women due to the general increase in employment level or decrease due to discouraged worker effect. Interchangeably, any change occurs in the modern sector (increase in growth), either open the doors for female employment or worsens female employment due to increased demand for male employment.

Female labor force participation rate (FLFPR) is substituted in FE as a dependent variable, and economic growth is proxied through natural log of GDP (LNGDP) as independent variable. However, the linear increase in female participation with structural change is questioned (Tam, 2011; Lechman & Kaur, 2015; Choudry &

Elhorst, 2018; Altuzarra et al., 2019). The outcome of this structural change for female labor force participation is the feminization "U" hypothesis. This theory states that women's economic activity changes with the stages of development. In the initial phase of economic development through the expansion of the modern sector female employment decreases due to the discouraged worker effect. Because the introduction of newer technologies requires higher skills.

In the next phase of economic growth, women acquire skills and education which raises their employment, and at the last phase, an economy moves to the more modern and more industrialized state, culture, and norms also changed, and the female employment level increases. So, by incorporating these prepositions the two models are built, first assess the direct relationship with economic growth and female labor force participation with introducing new variables. Structural change alters the whole functioning of the economy and brings changes in most of the other macro-economic variables like economic growth, trade openness, FDI, urbanization, and tourism. An illustration of the research framework is provided in Figure 3.1.

Figure 3.1. shows the interrelationship between independent variables (LNGDP, TOP, FDI, URBAN, TOUR), dependent variable FLFPR and interaction terms. When underdeveloped economies change their structure from subsistence agriculture sector to a modern industrialized sector, through closed to open economy, more urbanization, more FDI, attracting newer technologies through development in information and communication technology, building infrastructure, expansion of the services sector including the tourism sector creates two-fold benefits of women participation dynamic and static. It also shows how cultural factors interact with this relationship.

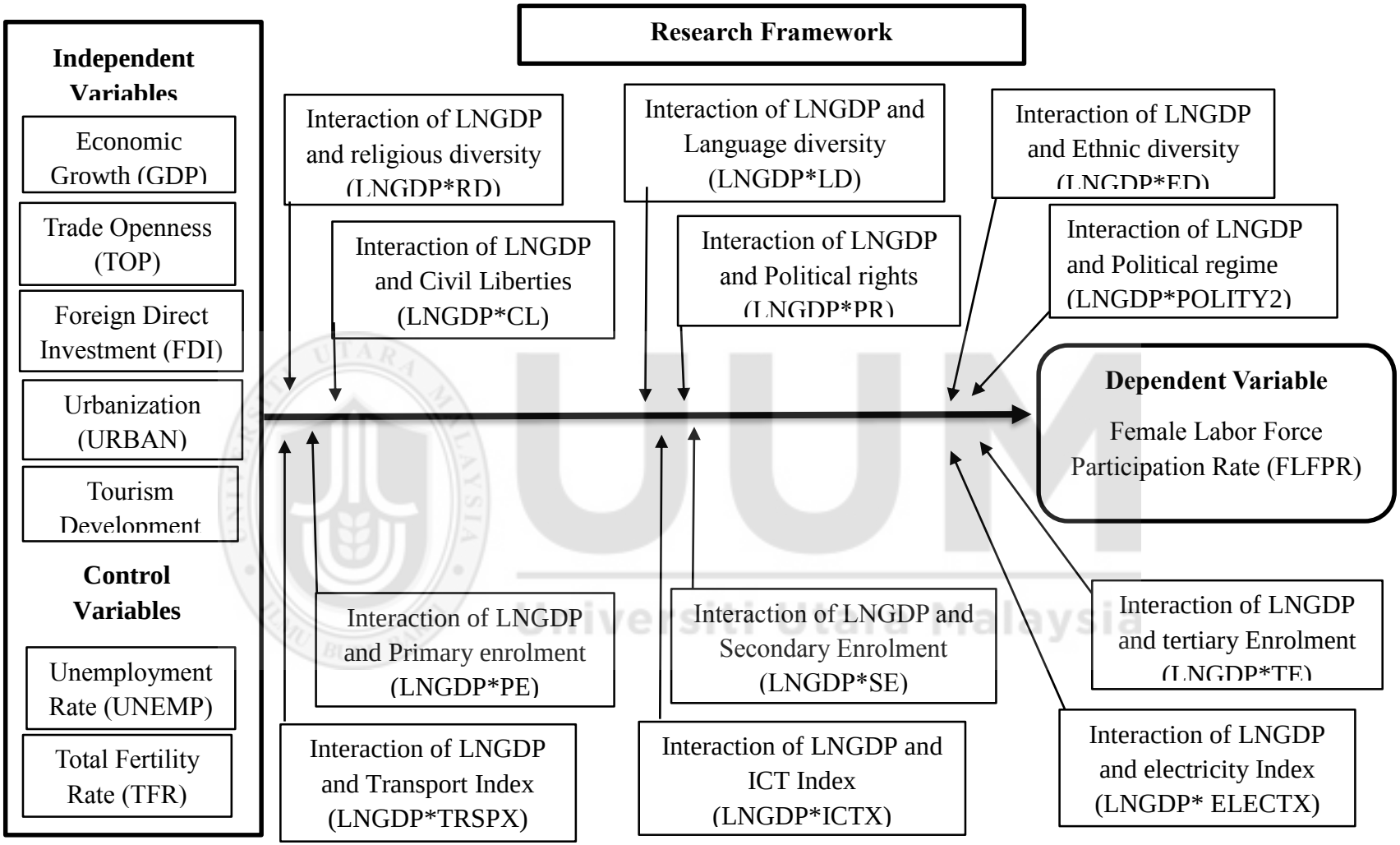


Figure 3.1
Research Framework

3.4 The Econometric Model

This section discusses the formulation of an econometric model of 14 separate models developed based on the RQ1 to RQ4 as discusses previously. The detailed description is given below.

[3.11] $$FLFPR = f\ (\text{LN}GDP, X)$$

Transforming this into an econometric model in Equation [3.12]:

Model 1

[3.12]

$$FLFPR_{it} = \beta_0 + \beta_1\, LNGDP_{it} + \beta_k \sum_{K=2}^{K} X_{kit} + \varepsilon_{it}$$

Here FLFPR is the female labor force participation rate for country i at time t is dependent variable and LNGDP is log of GDP for country i at time t is independent variable. Where, β_0 is intercept, β_1 and β_{k} are slope coefficients, i is the ith of eight countries (i= 1, 2, 3, ……,8), t represents the time period and X_{kit} is the kth explanatory variable, those are (TOP, FDI, URBAN, TOUR) and control variables UNEMP and TFR in the mode of country i at time t. ε_{it} is error term of country i at time t.

FLFPR = Female Labor Force Participation Rate

LNGDP = Log of Gross Domestic Product

TOP = Trade Openness

FDI = Foreign Direct Investment

URBAN = Urbanization

TOUR = Tourist arrivals

UNEMP = unemployment rate

TFR = total fertility rate

This Model is extended further by introducing interaction terms that enter one by one in each equation.

3.4.1 Interaction Terms

The interaction terms are incorporated in this study method given by Aiken and West (1991), through running auxiliary regression where the product of two variables is regressed on the same variables individually and then residuals are generated based on estimated regression. These residuals are used as interaction term in this study. The advantage of using this approach is that the degree of multicollinearity tends to be lower as compared to traditional approach that is explained in (Gujarati, 2004) by simple product of two variables using as independent variable (Shittu et al., 2020). The following are the interaction terms that enter each model one by one.

RD = Religious Diversity

LD = Language diversity

ED = Ethnic Diversity

POLITY2 = Polity2

CL = Civil Liberties

PR = Political Rights

PE = primary enrolment

SE = Secondary Enrolment

TE = Tertiary enrolment

ICTX = Information and Communication Technology Index

ELECTX = Electricity Index

TRSPX = Transport Index

The reasons of introducing interaction terms one by one in each model, and only regress with economic growth instead of all independent variables are manifolds. Firstly, it is based on the objectives 2 & 3 of study. Secondly, all variables are grounded on the theory of structural change, which mainly describes the relationship between economic growth and FLFPR. To examine the interaction effect of some socio-cultural variables in D-8 countries is based on the fact that, the socio-political environment of the developing countries became a noticeable issue that eroded all aspects of development on FLFPR. These assertions have been documented by previous studies (Beneria & Sen, 1981; Mahmud & Bidisha, 2018) amongst others.

Hence logically it is necessary to examine the interaction effect of these variables in D-8 countries that is previously lacking. Finally, the most important reason of including one by one in each model is rooted in the efficiency of model. Including too many parameters in the model can create the problem of overfitting model as suggested by Hardt et al. (2012) amongst others. It can also increase the risk of multi-collinearity, and downward bias. (Hawkins,2004; Zhang, 2014).

The interaction of religious, cultural diversity and economic growth is estimated and used in estimating Model 2, Model 3 and Model 4. As diversity is measured using three indicators, RD, LD, and ED. Therefore, the interaction of cultural diversity and economic growth is modeled in Equation [3.13], Equation [3.14] and Equation [3.15].

[3.13] $$(LNGDP * RD)_{it} = \alpha_0 + \alpha_1 LNGDP_{it} + \alpha_2 RD_{it} + \upsilon_{it}$$

[3.14] $$(LNGDP * LD)_{it} = \beta_0 + \beta_1 LNGDP_{it} + \beta_2 LD_{it} + \omega_{it}$$

[3.15] $$(LNGDP * ED)_{it} = \gamma_0 + \gamma_1 LNGDP_{it} + \gamma_2 ED_{it} + \varepsilon_{it}$$

Where υ_{it}, ω_{it} and ε_{it} are the white noise error terms, which means that $\upsilon_{it} \sim iid\ (0, \sigma_{\upsilon}^2)$, $\omega_{it} \sim iid\ (0, \sigma_{\omega}^2)$ and $\varepsilon_{it} \sim iid\ (0, \sigma_{\varepsilon}^2)$.

Similarly, the interaction of political environment and economic growth is estimated and used in estimating Model 5, Model 6 and Model 7. The political environment is measured using three indicators POLITY2, CL and PR. Thus, the interaction of political environment and economic growth is modeled in Equation [3.16], Equation [3.17] and Equation [3.18].

[3.16] $$(LNGDP * POLITY2)_{it} = \lambda_0 + \lambda_1 LNGDP_{it} + \lambda_2 POLITY2_{it} + \varphi_{it}$$

[3.17] $$(LNGDP * CL)_{it} = \phi_0 + \phi_1 LNGDP_{it} + \phi_2 CL_{it} + \zeta_{it}$$

[3.18] $$(LNGDP * PR)_{it} = \theta_0 + \theta_1 LNGDP_{it} + \theta_2 PR_{it} + \psi_{it}$$

Where υ_{it}, ω_{it} and ε_{it} are the white noise error terms, which means that $\varphi_{it} \sim iid\ (0, \sigma_{\varphi}^2)$, $\zeta_{it} \sim iid\ (0, \sigma_{\zeta}^2)$ and $\psi_{it} \sim iid\ (0, \sigma_{\psi}^2)$.

Likewise, the interaction of education and economic growth is estimated and used in Mode 8, Model 9 and Model 10. The level of education is measured using three indicators PE, SE and TE. So, the interaction of education and economic growth is presented in Equation [3.19], Equation [3.20] and Equation [3.21].

[3.19] $$(LNGDP * PE)_{it} = \chi_0 + \chi_1 LNGDP_{it} + \chi_2 PE_{it} + \tau_{it}$$

[3.20] $$(LNGDP * SE)_{it} = \rho_0 + \rho_1 LNGDP_{it} + \rho_2 SE_{it} + \epsilon_{it}$$

[3.21] $$(LNGDP * TE)_{it} = \Phi_0 + \Phi_1 LNGDP_{it} + \Phi_2 TE_{it} + \varrho_{it}$$

Where υ_{it}, ω_{it} and ε_{it} are the white noise error terms, which means that $\tau_{it} \sim iid\ (0, \sigma_{\tau}^2)$, $\epsilon_{it} \sim iid\ (0, \sigma_{\epsilon}^2)$ and $\varrho_{it} \sim iid\ (0, \sigma_{\varrho}^2)$.

Furthermore, this study incorporated the interaction effect of infrastructure and economic growth and utilized in Model 11, Model 12 and Model 13. As infrastructure is measured using three distinct indices like, ICTX, ELECTX and TRSPX. Consequently, the interaction of infrastructure and economic growth is modeled in Equation [3.22], Equation [3.23] and Equation [3.24].

[3.22] $$(LNGDP * ICTX)_{it} = \mu_0 + \mu_1 LNGDP_{it} + \mu_2 ICTX_{it} + \varpi_{it}$$

[3.23] $$(LNGDP * ELECTX)_{it} = \delta_0 + \delta_1 LNGDP_{it} + \delta_2 ELECTX_{it} + \vartheta_{it}$$

[3.24] $$(LNGDP * TRSPX)_{it} = \propto_0 + \propto_1 LNGDP_{it} + \propto_2 TRSPX_{it} + \xi_{it}$$

Where υ_{it}, ω_{it} and ε_{it} are the white noise error terms, which means that $\varpi_{it} \sim iid\ (0, \sigma_{\varpi}^2)$, $\vartheta_{it} \sim iid\ (0, \sigma_{\vartheta}^2)$ and $\xi_{it} \sim iid\ (0, \sigma_{\xi}^2)$.

MODEL 1.1 & 1.2

Equation [3.25] and [3.26] consist of a dependent variable (FLFPR) and set of independent variables, LNGDP, TOP, FDI, URBAN, and control variables UNEMP and TFR for Model 1.1 and inclusion of TOUR for Model 1.2, to answers the RQ1.

MODEL 1.1 [3.25] $$FLFPR_{it} = \alpha_0 + \alpha_1 LNGDP_{it} + \alpha_2 TOP_{it} + \alpha_3 FDI_{it} + \alpha_4 URBAN + \alpha_5 UNEMP_{it} + \alpha_6 TFR_{it} + \mu_{it}$$

MODEL 1.2 [3.26] $$FLFPR_{it} = \beta_0 + \beta_1 LNGDP_{it} + \beta_2 TOP_{it} + \beta_3 FDI_{it} + \beta_4 URBAN + \beta_5 TOUR_{it} + \beta_6 UNEMP_{it} + \beta_7 TFR_{it} + \varepsilon_{it}$$

Where, α_s and β_s are coefficients, μ_{it} and ε_{it} are error terms, respectively.

MODEL 2-7: RQ2

RQ2 of the study (How do cultural diversity, religious diversity, and political environment interact between economic growth and female labor force participation) answered through Model 2-7. Model consists of a dependent variable (FLFPR), set of independent variables (LNGDP, TOP, FDI, URBAN) with control variables (UNEMP, TFR), and an interaction term. Each interaction term calculated through Equation [3.13] to Equation [3.18] and enters one by one in equation [3.25]. Three proxies incorporated for diversity measures as interaction term religious diversity (RD) and economic growth (LNGDP) that is (LNGDP*RD) in Model 2, the interaction term, language diversity (LD) and economic growth (LNGDP) that is (LNGDP*LD) in Model 3, the interaction term, ethnic diversity (ED) and economic growth (LNGDP) that is (LNGDP*ED) in Model 4 respectively.

Moreover, three proxies incorporated for political environment as interaction term, political regime (POLITY2) and economic growth (LNGDP) that is (LNGDP*POLITY2) in Model 5, the interaction effect of civil liberties (CL) and economic growth (LNGDP) that is (LNGDP*CL) in Model 6, and the interaction effect of political rights (PR) and economic growth (LNGDP) that is (LNGDP*PR) in Model 7 incorporated, respectively. The resultant equations are from [3.27] to [3.32].

MODEL2[3.27] $$FLFPR_{it} = \partial_0 + \partial_1 LNGDP_{it} + \partial_2 TOP_{it} + \partial_3 FDI_{it} + \partial_4 URBAN_{it} + \partial_5 RD_{it} + \partial_6 (LNGDP * RD)_{it} + \partial_7 UNEMP_{it} + \partial_8 TFR_{it} + \xi_{it}$$

MODEL 3 [3.28] $$FLFPR_{it} = \gamma_0 + \gamma_1 LNGDP_{it} + \gamma_2 TOP_{it} + \gamma_3 FDI_{it} + \gamma_4 URBAN_{it} + \gamma_5 LD_{it} + \gamma_6 (LNGDP * LD)_{it} + \gamma_7 UNEMP_{it} + \gamma_8 TFR_{it} + \omega_{it}$$

MODEL 4[3.29] $FLFPR_{it} = \theta_0 + \theta_1 LNGDP_{it} + \theta_2 TOP_{it} + \theta_3 FDI_{it} + \theta_4 URBAN_{it} + \theta_5 ED_{it} + \theta_6 (LNGDP * ED)_{it} + \theta_7 UNEMP_{it} + \theta_8 TFR_{it} + \varsigma_{it}$

MODEL 5[3.30] $FLFPR_{it} = \emptyset_0 + \emptyset_1 LNGDP_{it} + \emptyset_2 TOP_{it} + \emptyset_3 FDI_{it} + \emptyset_4 URBAN_{it} + \emptyset_5 POLITY2_{it} + \emptyset_6 (LNGDP * POLITY2)_{it} + +\emptyset_7 UNEMP_{it} + \emptyset_8 TFR_{it} + \psi_{it}$

MODEL 6[3.31] $FLFPR_{it} = \delta_0 + \delta_1 LNGDP_{it} + \delta_2 TOP_{it} + \delta_3 FDI_{it} + \delta_4 URBAN_{it} + \delta_5 CL_{it} + \delta_6 (LNGDP * CL)_{it} + \delta_7 UNEMP_{it} + \delta_8 TFR_{it} + \nu_{it}$

MODEL 7[3.32] $FLFPR_{it} = \lambda_0 + \lambda_1 LNGDP_{it} + \lambda_2 TOP_{it} + \lambda_3 FDI_{it} + \lambda_4 URBAN_{it} + \lambda_5 PR_{it} + \lambda_6 (LNGDP * PR)_{it} + +\lambda_7 UNEMP_{it} + \lambda_8 TFR_{it} + \varrho_{it}$

Where, ∂_s, γ_s, θ_s, $\emptyset_s$, δ_s and λ_s are coefficients and ξ_{it}, ω_{it}, ς_{it}, ψ_{it}, ν_{it} and ϱ_{it} are error terms for Model 2 to Model 7, respectively.

Model 8-13: RQ3

Model 8-13 intends to answer RQ3 (What is the role of education and infrastructure in driving the association between economic growth and female labor participation). Model consists of a dependent variable (FLFPR), set of independent variables (LNGDP, TOP, FDI, URBAN) with control variables (UNEMP, TFR), and an interaction term. Every Single interaction term calculated through [3.19] to [3.24]and joins one by one the equation [3.25]. In order to measure the interactive role of education, three proxies as interaction term are incorporated, primary enrolment (PE) and economic growth (LNGDP) that is (LNGDP*PE) in Model 8, secondary enrolment (SE) and economic growth (LNGDP) that is (LNGDP*SE) in Model 9, and tertiary enrolment (TE) and economic growth (LNGDP) that is (LNGDP*TE) in Model 10, respectively. Furthermore, to measure the interactive effect of infrastructure, the interaction term ICT index (ICTX) and economic growth that is

(LNGDP*ICTX) in Model 11, the interaction term electricity index (ELECTX) and economic growth (LNGDP) that is (LNGDP*ELECTX) in Model 12, and the interaction term transport index (TRSPX) and economic growth (LNGDP) that is (LNGDP*TRSPX) in Model 13. The resultant equations are [3.33] to [3.38]:

MODEL 8 [3.33] $FLFPR_{it} = \mathsf{C}_0 + \mathsf{C}_1 LNGDP_{it} + \mathsf{C}_2 TOP_{it} + \mathsf{C}_3 FDI_{it} + \mathsf{C}_4 URBAN_{it} + \mathsf{C}_5 PE_{it} + \mathsf{C}_6 (NGDP * PE)_{it} + \mathsf{C}_7 UNEMP_{it} + \mathsf{C}_8 TFR_{it} + \tau_{it}$

MODEL 9 [3.34] $FLFPR_{it} = \chi_0 + \chi_1 LNGDP_{it} + \chi_2 TOP_{it} + \chi_3 FDI_{it} + \chi_4 URBAN_{it} + \chi_5 SE_{it} + \chi_6 (LNGDP * SE)_{it} + \chi_7 UNEMP_{it} + \chi_8 TFR_{it} + o_{it}$

MODEL10 [3.35] $FLFPR_{it} = \varphi_0 + \varphi_1 LNGDP_{it} + \varphi_2 TOP_{it} + \varphi_3 FDI_{it} + \varphi_4 URBAN_{it} + \varphi_5 TE_{it} + \varphi_6 (LNGDP * TE)_{it} + \varphi_7 UNEMP_{it} + \varphi_8 TFR_{it} + \eta_{it}$

MODEL 11 [3.36] $FLFPR_{it} = \Psi_0 + \Psi_1 LNGDP_{it} + \Psi_2 TOP_{it} + \Psi_3 FDI_{it} + \Psi_4 URBAN_{it} + \Psi_5 ICTX_{it} + \Psi_6 (LNGDP * ICTX)_{it} + \Psi_7 UNEMP_{it} + \Psi_8 TFR_{it} + \rho_{it}$

MODEL 12 [3.37] $FLFPR_{it} = \Omega_0 + \Omega_1 LNGDP_{it} + \Omega_2 TOP_{it} + \Omega_3 FDI_{it} + \Omega_4 URBAN_{it} + \Omega_5 ELECTX_{it} + \Omega_6 (LNGDP * ELECTX)_{it} + \Omega_7 UNEMP_{it} + \Omega_8 TFR_{it} + \varpi_{it}$

MODEL 13 [3.38] $FLFPR_{it} = \Phi_0 + \Phi_1 LNGDP_{it} + \Phi_2 TOP_{it} + \Phi_3 FDI_{it} + \Phi_4 URBAN_{it} + \Phi_5 TRSPX_{it} + \Phi_6 (LNGDP * TRSPX)_{it} + \Phi_7 UNEMP_{it} + \Phi_8 TFR_{it} + \ell_{it}$

Where, C_s, χ_s, φ_s, Ψ_s, Ω_s, and Φ_s are coefficients, and τ_{it}, o_{it}, η_{it}, ρ_{it}, ϖ_{it} and ℓ_{it} are error terms for Model 8 to Model 13, respectively.

Model 14: RQ 4

Model 14 intends to answer RQ4 (Does GDP per capita have a nonlinear ("U" hypothesis) relationship with female labor force participation in each D-8 country). This Model is examined through the time series data instead of panel data for each member of D-8 countries separately in order to examine the Feminization "U" theory. Previous studies in this area (Gaddis and Klasen, 2013; Mujahid et al., 2019) amongst others. The econometric model for time series data is presented in Equation [3.39]:

Model 14

[3.39] $$FLFPR_t = \Theta_0 + \Theta_1 LNGDPPC_t + \Theta_2 LNGDPPC_t^{\,2} + \Theta_k \sum_{k=3}^{k} X_{kt} + \sigma_t$$

Where LNGDPPC is log of per capita gross domestic product.

And X is a vector of control variables which include, trade openness, FDI, and unemployment rate t is time period and βs are the parameters.

If $\Theta_1 = negative \;\; or < 0 \quad and \quad \Theta_2 = positive \; or > 0$

The outcome parabola is "U" and vice versa.

3.4.2 Summary of Models

This sub-section provides a summary of all models used in order to fulfill all 4 RQ & RO for this study as presented in Table 3.1. Objective 1 has two models for the test of demand-side factors on female labor force participation. Model 1.1 is the main model of the study for panel data from 1980 -2018. Model 1.2 is the test of demand-side factors on female labor force participation with the inclusion of TOUR for panel data from 1995 – 2018.

Table 3.1
Summary of Models

Equation	Model	Panel Data Analysis
		Objective 1
[3.25]	1.1	$FLFPR_{it} = \alpha_0 + \alpha_1 LNGDP_{it} + \alpha_2 TOP_{it} + \alpha_3 FDI_{it} + \alpha_4 URBAN + \alpha_5 UNEMP_{it} + \alpha_6 TFR_{it} + \mu_{it}$
[3.26]	1.2	$FLFPR_{it} = \beta_0 + \beta_1 LNGDP_{it} + \beta_2 TOP_{it} + \beta_3 FDI_{it} + \beta_4 URBAN + \beta_5 TOUR_{it} + \beta_6 UNEMP_{it} + \beta_7 TFR_{it} + \varepsilon_{it}$
		Objective 2
[3.27]	2	$FLFPR_{it} = \partial_0 + \partial_1 LNGDP_{it} + \partial_2 TOP_{it} + \partial_3 FDI_{it} + \partial_4 URBAN_{it} + \partial_5 RD_{it} + \partial_6 (LNGDP * RD)_{it} + \partial_7 UNEMP_{it} + \partial_8 TFR_{it} + \xi_{it}$
[3.28]	3	$FLFPR_{it} = \gamma_0 + \gamma_1 LNGDP_{it} + \gamma_2 TOP_{it} + \gamma_3 FDI_{it} + \gamma_4 URBAN_{it} + \gamma_5 LD_{it} + \gamma_6 (LNGDP * LD)_{it} + \gamma_7 UNEMP_{it} + \gamma_8 TFR_{it} + \omega_{it}$
[3.29]	4	$FLFPR_{it} = \theta_0 + \theta_1 LNGDP_{it} + \theta_2 TOP_{it} + \theta_3 FDI_{it} + \theta_4 URBAN_{it} + \theta_5 ED_{it} + \theta_6 (LNGDP * ED)_{it} + \theta_7 UNEMP_{it} + \theta_8 TFR_{it} + \varsigma_{it}$
[3.30]	5	$FLFPR_{it} = \emptyset_0 + \emptyset_1 LNGDP_{it} + \emptyset_2 TOP_{it} + \emptyset_3 FDI_{it} + \emptyset_4 URBAN_{it} + \emptyset_5 POLITY2_{it} + \emptyset_6 (LNGDP * POLITY2)_{it} + +\emptyset_7 UNEMP_{it} + \emptyset_8 TFR_{it} + \psi_{it}$
[3.31]	6	$FLFPR_{it} = \delta_0 + \delta_1 LNGDP_{it} + \delta_2 TOP_{it} + \delta_3 FDI_{it} + \delta_4 URBAN_{it} + \delta_5 CL_{it} + \delta_6 (LNGDP * CL)_{it} + \delta_7 UNEMP_{it} + \delta_8 TFR_{it} + \nu_{it}$
[3.32]	7	$FLFPR_{it} = \lambda_0 + \lambda_1 LNGDP_{it} + \lambda_2 TOP_{it} + \lambda_3 FDI_{it} + \lambda_4 URBAN_{it} + \lambda_5 PR_{it} + \lambda_6 (LNGDP * PR)_{it} + +\lambda_7 UNEMP_{it} + \lambda_8 TFR_{it} + \varrho_{it}$
		Objective 3
[3.33]	8	$FLFPR_{it} = \mathrm{C}_0 + \mathrm{C}_1 LNGDP_{it} + \mathrm{C}_2 TOP_{it} + \mathrm{C}_3 FDI_{it} + \mathrm{C}_4 URBAN_{it} + \mathrm{C}_5 PE_{it} + \mathrm{C}_6 (NGDP * PE)_{it} + \mathrm{C}_7 UNEMP_{it} + \mathrm{C}_8 TFR_{it} + \tau_{it}$
[3.34]	9	$FLFPR_{it} = \chi_0 + \chi_1 LNGDP_{it} + \chi_2 TOP_{it} + \chi_3 FDI_{it} + \chi_4 URBAN_{it} + \chi_5 SE_{it} + \chi_6 (LNGDP * SE)_{it} + \chi_7 UNEMP_{it} + \chi_8 TFR_{it} + o_{it}$
[3.35]	10	$FLFPR_{it} = \varphi_0 + \varphi_1 LNGDP_{it} + \varphi_2 TOP_{it} + \varphi_3 FDI_{it} + \varphi_4 URBAN_{it} + \varphi_5 TE_{it} + \varphi_6 (LNGDP * TE)_{it} + \varphi_7 UNEMP_{it} + \varphi_8 TFR_{it} + \eta_{it}$
[3.36]	11	$FLFPR_{it} = \Psi_0 + \Psi_1 LNGDP_{it} + \Psi_2 TOP_{it} + \Psi_3 FDI_{it} + \Psi_4 URBAN_{it} + \Psi_5 ICTX_{it} + \Psi_6 (LNGDP * ICTX)_{it} + \Psi_7 UNEMP_{it} + \Psi_8 TFR_{it} + \rho_{it}$
[3.37]	12	$FLFPR_{it} = \Omega_0 + \Omega_1 LNGDP_{it} + \Omega_2 TOP_{it} + \Omega_3 FDI_{it} + \Omega_4 URBAN_{it} + \Omega_5 ELECTX_{it} + \Omega_6 (LNGDP * ELECTX)_{it} + \Omega_7 UNEMP_{it} + \Omega_8 TFR_{it} + \varpi_{it}$
[3.38]	13	$FLFPR_{it} = \Phi_0 + \Phi_1 LNGDP_{it} + \Phi_2 TOP_{it} + \Phi_3 FDI_{it} + \Phi_4 URBAN_{it} + \Phi_5 TRSPX_{it} + \Phi_6 (LNGDP * TRSPX)_{it} + \Phi_7 UNEMP_{it} + \Phi_8 TFR_{it} + \ell_{it}$
		Objective 4 (Time Series Data)
[3.39]	14	$FLFPR_t = \Theta_0 + \Theta_1 LNGDPPC_t + \Theta_2 LNGDPPC_t{}^2 + \Theta_k \sum_{k=3}^{k} X_{kt} + \sigma_t$

Model 2 to Model 13 were also based on Model 1.1 with an addition of the interaction term in each model one by one. Model 14 is based on objective 4 of the study for testing the feminization U hypothesis through time-series data from 1980 to 2018 for each D-8 country.

3.5 Justification of Variables

The present section provides the justifications and definitions for dependent and independent variables included in the study.

3.5.1 Female Labor Force Participation (FLFP)

Female labor force participation (FLFP) is the dependent variable of the study. Female participation can be measured by the female labor force participation rate (FLFPR). This study adopted the ILO (2015) definition of FLFP. That is defined as follows. The participation of women in work is a measure of the proportion of the working-age population of a country active in a labor market, whether by working or looking for work, indicating the size of the supply of women's work available in relation to the working-age population to produce goods and services. (Kapsos et al., 2014; ILO, 2015). it can be calculated as:

$$\text{FLFPR}\ (\%) = \frac{\text{female Labor Force}}{\text{female working} - \text{age population}} \times 100$$

Working-age is defined as all 15 years and above. The data collected from ILO and world bank country estimates official websites.

3.5.2 Economic Growth (GDP)

An increase in GDP is an indication of economic growth. It is a useful measure of the size of the economy and economic growth. According to the World Bank. The variable is measured as:

"GDP (constant 2010 US$)"

Economic growth is an increase in the production of economic goods and services, compared from one period of time to another. In present study, the natural log of real GDP is used as a proxy for economic growth, taking log of a variable gives relative or percentage change over time. Better economic conditions are expected to increase the opportunities for a female to participate in economic activities. However, whether this relationship is straightforward or consistent is still questionable. Considering both possibilities, it is expected either a positive linear or nonlinear "U" shape relationship. For that purpose, separate models are developed to measure the two distinct relationships and this study incorporates GDP for RQ1 to RQ3 and GDP adjusted for per capita for RQ4 only. For this study, the proxies considered GDP and GDP per capita constant 2010 and take a logarithm for both measures based on objectives. Data were drawn from the World Bank's, World Development Indicator (WDI). Previous studies on the relationship between GDP per capita and FLFP are Tam (2011); Lechman and Kaur (2015); Klasen et al. (2020).

3.5.3 Trade Openness (TOP)

Trade openness (TOP) is defined as an economies' trade concentration which states that increased trade openness is associated with expansion in the size of the country's trading sector. In a more precise way, openness is linked with the extent of barriers imposed by a country on its trade relations with other countries (Stensnes, 2006).

Numerous measures of trade openness have been considered in the previous literature, for example, outcome measure, and policy measures including tariff and non-tariff barriers, etc (Squalli & Wilson, 2006). For the present study, it is considered the most basic and common measure of trade openness related to trade as a share of GDP. According to the World Bank (WDI, 2017) "Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product". The formula for measuring TOP is as under:

$$\text{TOP} = \frac{Exports + Imports}{GDP} \times 100$$

The relationship between FLFPR and trade openness is widely discussed in the theoretical literature. The bases of this relationship meet with the underpinning theory of the Heckscher-Ohlin model (Heckscher, 1919). But the evidence is mixed on the above relationship. However, the level of FLFPR may be increased by adopting a suitable trade openness policy.

Trade openness has multiple direct and indirect effects on general employment level and female employment specifically in developing countries through changes in relative prices and redistribution of resources Gaddis and Pieters (2012); Cooray et. al. (2012). This gives the insight to increase the openness policy to increase employment opportunities for a female to lessen the problem of low female labor force participation rate. So, based upon the above view from the literature the study hypothesizes that there is a significant relationship between trade openness on the female labor force participation rate. The data on trade openness drawn from WDI, World Bank. Previous studies on the relationship between trade openness and FLFP are Green et al. (2001); Juhn et al. (2013); Cooray et. al. (2017) and (Gozgor, 2017).

3.5.4 Foreign Direct Investment (FDI)

Foreign direct investment (FDI) is attributed to holding the foreign possession of productive resources. broadly speaking, demand for skilled labor can be increased through FDI by fueling domestic investment following in increased demand for inputs and consumption. This could be advantageous for women in developing countries giving an incentive to invest in human capital which tends to raise education and health outcomes. In that consequence, the employment level would rise for females by improvement in productivity and efficiency (Ouedraogo, & Marlet, 2018). The measure of FDI adopted for the present study as follows:

$$\text{FDI} = \frac{Foreign\ direct\ Investment, net\ inflows}{GDP} \times 100$$

It is hypothesized that FDI has a significant influence on female labor force participation. The previous studies conducted on this Aguayo-Tellez et. al. (2010); Cooray et al. (2012) Maqsood and Samiullah (2014) and Jaffri et al. (2015).

3.5.5 Urbanization (URBAN)

Urbanization (URBAN) plays a vital role in devising the lives of the people. According to the World Bank (2017) “Urban population refers to people living in urban areas as defined by national statistical offices.”. Urban areas are more efficient because it is more convenient to provide basic facilities in urban areas like health, education water, sanitation, and transportation. Yet, the relationship between urban development and women's labor participation is vague in literature. It can generate both opposing effects, positive by added worker effect and negative by discouraged worker effect. however, the positive influence is dominant because urbanization provides greater

access and opportunities to the female to acquire knowledge skills and enhance their abilities, more job opportunities, and easy mobility. It can be measured as:

"Urban population (% of total)"

Previous studies on the relationship between FLFP and urbanization are, Tansel (2002), Chant (2013), and Jaffri et al. (2015) found mixed evidence of urbanization in creating prospects for women employment. The present study hypothesized that urbanization has a significant impact on female labor force participation.

3.5.6 Tourism Development (TOUR)

According to the United Nations agency of the World Tourism Organization (UNWTO)

"Tourism comprises the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business, and other purposes."

Tourism is fastest growing sector (World Travel and Tourism Council, 2018) account for 10.4 % of global GDP and considered a big source of employment generation (created 313 million jobs) for all in general due to its multiplier effect (Soria & Teigeiro, 2019) and for women in specific. Because it is brain-based rather than brawn which does not require physical strength and duties involved in this sector are generally an extension of household work like, cleaning, cooking, laundry, etc. (Wilkinson & Pratiwi, 1995) which does not require higher skills.

Tourism can help women employment directly by engaging women in the tourism industry and indirectly through home-based entrepreneurial activities. For the purpose of the present study. It is expected that a positive association between TOUR and FLFP. The proxy adopted for tourism in the context of the present study is as follows:

"International tourism, number of arrivals"

3.5.7 Infrastructure (ICTX, ELECTX, TRSPX)

In order to function properly, infrastructure (ICT, electricity, and transport) facilities are considered as the backbone of the economy which refers to basic systems and services. These include transportation, energy, information, and communication technology, water, sanitation, and other facilities in which an economy operates. According to Hirschman (1958) infrastructure refer to as

"capital that provides public services."

In their study, Wamboye and Seguin (2012) found that infrastructure is an important determinant of gender-based labor market outcomes in Sub Saharan African countries. Better quality of infrastructure can increase the opportunities for female labor force participation. Though the quality of infrastructure varies by country and it determines the labor market outcomes. To measure this variable, three distinct infrastructure indices like ICT, Electricity, and transport are created.

Previous studies include Agénor and Canuto (2012); Cubas (2016); Mehrotra and Sinha (2019) discovered that most the areas of the world women are constrained by lack of infrastructure facility due to its poor quality. The study hypothesized that better access and quality of infrastructure can promote FLFP.

3.5.8 Cultural Diversity (LD, ED)

Culture can be defined in multiple ways, however, there is no universal definition of culture, according to the Cambridge English dictionary:

"the way of life, especially the general customs and beliefs, of a particular group of people at a particular time"

Webster dictionary describes culture as "the customary beliefs, social forms, and material traits of a racial, religious, or social group" in the context of the present study it is intended to examine how cross-country culture influence the relationship between demand-side opportunities and female labor force participation. To measure this variable, this formula is considered.[3]

[3.40] $$ELF = 1 - \sum_{k=1}^{K} p_k^2$$

Where ELF stands for ethnolinguistic fractionalization, which is used to measure cultural diversification. Consider a country composed of $K \geq 2$ different groups. p_1, p_2, p_3….. p_k is the share of the population in the ethnic group.

The method by (Fearon, 2003; Bossert et al. 2011; Koyuncu & Eda, 2017) was adopted in the present study. Variable by giving ranks between 1 to 8 depends upon highly diverse culture = 1 and completely homogenous = 0. The closer is value to the 1, the country would be considered highly diverse in terms of culture and given the rank 1. The lowest diversified or completely homogenous was considered the country whose value was close to zero and given lower rank, for example in 8 groups

[3] Elf is ethnic language fractionalization followed by (fearon, 2003)

of countries the value was given 8. It would be worth mentioning that only nominal measures of diversity are considered instead of deeper diversity followed by (Patsiurko et al., 2012). The proxies used to measure this variable are as follows.

Ethnic groups are followed by (Fearon, 2003; Koyuncu & Eda, 2017) which means "a community or population made up of people who share a common cultural background or descent". The greater number of ethnic groups in a country resembles with greater cultural diversity.

Similarly, this research adopts the language as another proxy for measuring cultural diversity followed by (Fearon, 2003; Koyuncu & Eda, 2017). Language can be defined as "a system of communication used by a particular country or community".in his study (Fearon, 2003) states that a similar language spoken by different ethnic groups of the country resembles smaller cultural diversity. Here the author is considering language and ethnicity separately followed by (Patsiurko et al., 2012). In the previous studies for example, (Patsiurko et al., 2012; Koyuncu & Eda, 2017) considered these variables as independent variables, but for the present study, these are considered as interaction terms.

Koyuncu and Eda (2017) found that higher language and ethnic diversity is associated with higher FLFP. So based upon previous studies, this study expects that higher cultural diversity has a significant influence in determining the relationship between FLFPR and other factors because interaction diverse culture augments the FLFPR. Data on these variables are drawn from the CIA world factbook.

3.5.9 Religious Diversity (RD)

Amongst other factors, religion can also affect female labor force participation. "Religion referred to as a cultural arrangement of designated behavior and practices that relate humanity to supernatural elements". The relationship between religious practices and FLFPR is widely discussed in the previous literature. For instance, Lehrer (1995) also found that the important role of religion in determining the female labor force participation rate. Feldmann (2007) found that religion (protestant) is associated with a higher FLFPR.

In a similar context, (H'madoun, 2010) found the significant difference between the labor force participation of religious and non-religious women. On the other hand, (Read, 2004) examined the women labor force in the case of Arab- American immigrants and found that the employment rate of Arab American women stands lowest amongst other immigrant groups. They attributed it with their socio-cultural and religious networks that limit their role in the labor market due to gender norms. However, (Korotayev et al., 2015) found that a low level of FLFP in the Near and Middle East is due to distinct foundations of Arab culture and not directly attributed to Islam.

The ongoing discussion shows that there is no consensus on the relationship between female labor and religion. For instance, two opposing arguments generated by (Ross, 2008) and (Besamusca et al., 2015). According to, (Besamusca et al., 2015) low FLFP amongst the age group of 25 and 55 is a result of higher religious faithfulness in the case of 117 countries.

On the other hand, Ross (2008) suggested that low female participation in oil-producing countries is due to oil production, not Islam (religion). He made the argument the economic structure or growth strategy is responsible for female participation rather than religious factors. Conversely, one might think about the prevalence of religion in society. According to (Psacharopoulos & Tzannatos, 1989), the countries that exhibit strong religious views are confronted with lower FLFP. On the other hand, Evidence also suggests that highly diversified societies have more interaction with other religions and more FLFP (Koyuncu & Eda, 2017). Following (Koyuncu & Eda, 2017), the present study incorporated the religious diversity to examine the influence of religion amongst economic factors and FLFP suggested by (Ross, 2008).

It is expected that the significant role of religious diversity in determining the relationship between demand-side macro-economic factors and female FLFP is followed by (Psacharopoulos & Tzannatos, 1989; Koyuncu, 2017). The data on religious diversity collected from the CIA World Factbook.

The diversity of religion was calculated through the same methodology presented in section 3.5.8 by calculating the fractionalization for different religious groups in a country instead of ethnic or language groups. The data is available in the form of population groups by religion. The higher religiously diversified country is given a higher rank which is 1 and lower diversification leads toward 8.

3.5.10 Level of Education (PE, SE, TE)

Education is a process of acquiring systematic knowledge through some formal means. Education is the engine of economic growth and is considered as a basic need, in addition, education can promote women empowerment through various channels. It can devise the behavior and attitude of women, its decision on reproductive and family planning, decrease fertility, household bargaining power, enhances skill and capabilities, and gives rise in employment opportunities. The level of education is measured by total gross enrollment.

"School enrollment, primary, secondary, tertiary (% gross)"

However, the relationship between the level of education and FLFP is widely discussed but economist disagrees upon the outcomes of education and FLFP. According to (Psacharopoulos & Tzannatos, 1989) there is ambiguity between education and women participation. On the opposite note, (Klasen et al. 2018) found the positive relationship between rising education and women participation. Shittu and Abdullah (2019) found mixed results for these two variables however, Bakar and Abdullah (2007) found that an increase in the year of schooling has a positive effect on female participation. It is hypothesized that a higher level of education can strengthen the positive relationship between FLFP and demand-side factors.

3.5.11 Political Environment (PR, CL, POLITY2)

The political environment of a country is crucial for economic development and prosperity. It refers to as

"Political Environment is the state, government and its institutions and legislations and the public and private stakeholders who operate and interact with or influence the system".

Countries follow different political regimes according to their political environment. The difference in the political environment has differential effects on the economic and social status of that country. For instance, the Democratic regime has more respect for human rights including women's rights. Previous studies on this relationship are. Eastin and Prakash (2013) and Cooray et. al. (2017). It is hypothesized that the political environment of a country is a significant contributor to female labor force participation. This variable is measured by POLITY 2, Civil liberties index, and Political rights index. The detail on the description of variables is given in appendix D.

3.5.12 Control Variables (UNEMP, TFR)

This study also incorporated the control variables, such as the unemployment rate and total fertility rate. The variables are measured as follows.

"Unemployment, total (% of the total labor force)"

"Fertility rate, total (births per woman)"

The detailed description of all variables, definitions, proxies used, and sources are provided in appendix D.

3.6 Types and Sources of Data

Time series data for a panel of D-8 countries collected through secondary sources. Data on female labor force participation rate collected from ILO official databases and WDI. Data on cultural variables resourced through the CIA world factbook all editions

from 1980 to 2018 and this study also uses the HIEF[4] dataset. Data on three indices of infrastructure including ICT, Electricity, and transportation collected through multiple sources, detail on variable description, and data sources are provided in the Appendix C. Data on all other variables accessed through WDI. Data period was covered from 1980 to 2018 which makes 39 years' time-series data. Data on tourism indicator collected from WTTC official website.

To achieve objectives 1 to 3, the annual data on a panel of D-8 countries for the period 1980 to 2018 and 1995 to 2018 collected from multiple sources including, ILO, WDI, CIA World Factbook, and World bank open sources, and WTTC. To achieve objective 4, annual time series data from 1980 to 2018 collected for each D-8 country separately to test the validity of the feminization "U" hypothesis from WDI (World Bank). The choice of the time period is twofold. First, most of the developing countries adopted liberalization policies during the era of the 1980s that is associated with the transformation of economic structure. Secondly, due to the availability of macro-economic data.

The choice of D-8 countries is justified by the existence of the D-8 group an economic alliance established on June 15, 1997. These countries are chosen purposively due to their social, economic, political importance in the Organization of Islamic Cooperation (OIC). Secondly, as the best of the researcher's knowledge, there is a scarce study on the factors affecting FLFP in D-8 countries been carried previously.

[4] Historical Index of Ethnic Fractionalization Dataset (HIEF) retrieved from https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/4JQRCL

3.7 Methods of Analysis

The analysis of the present study based upon both annual panel techniques for all D-8 countries from 1980 to 2018 and 1995 to 2018 and annual time series for each D-8 country for the period 1980 to 2018. The choice of estimation technique is based upon the objectives of the study. Moreover, the nature and behavior of data also assist in choosing the appropriate estimation technique. The study utilized several approaches for analysis; those involves Principal Component Analysis (PCA) in 3.7.1, Panel Data Analysis in 3.7.2, and Time Series Analysis in 3.7.3, respectively; the detail procedure of estimation technique is described in proceeding sections. The next section describes the method of Principal Component Analysis for the construction of Infrastructure indices.

3.7.1 Principal Component Analysis.

The present study incorporated principal component analysis (PCA) for the construction of the different dimensions of infrastructure for instance, transport (TRSPX), electricity (ELECTX) and information and communication technology (ICTX). Since there are several methods available for data dimensionality reduction, for instance, factor analysis and principal component analysis and both serves as the dimensionality reduction teqhniques.

However, the most noticeable distinction is that, PCA is associated with the total variation represented in the matrix of correlations, while FA deals with the correlation in the division of the total variation referred to as the common component. PCA is a powerfull statitscal tool used for minimizing the dimensionality of large data. PCA takes the orthogonal linear combination of P random correlated variables and

transform the into the q uncorelated variables (Dunteman, 1989). A component score is calculated based upon the linear combination of original varibale that gives the largest variance (Rencher, 2002).

Consider a set of p numeric variables with q principal component scores and can be expressed a X= (X1…., Xp) is a set of random variables whose covariance matrix is Σ and the eigenvalues of Σ can be expressed as $\lambda 1 \geq \cdots \geq \lambda_p \geq 0$. The objective of PCA is to form a new variable Z1, ..., Z_p by taking p different linear combinations of the X_j variables:

[3.41]

$$\begin{aligned} Z_1 &= \alpha_1' X = \alpha_{11}X_1 + \alpha_{21}X_2 + \alpha_{p1}X_p \\ Z_2 &= \alpha_2' X = \alpha_{12}X_1 + \alpha_{22}X_2 + \alpha_{p2}X_p \\ &\vdots \\ Z_p &= \alpha_p' X = \alpha_{1p}X_1 + \alpha_{2p}X_2 + \alpha_{pp}X_p \end{aligned}$$

Where, $\alpha_k' = (\alpha_{1k} \ldots \ldots \ldots \alpha_{pk})$ is the kth linear vector.

Note that the random variable $Z_k = \alpha_k' X$ has the properties:

[3.42] $$Var\,(Z_k) = \alpha_k' \sum \alpha_k \qquad k = 1, \ldots\ldots p$$

[3.43] $$Cov\,(Z_k, Z_l) = \alpha_k' \sum \alpha_l \qquad k, l = 1, \ldots\ldots p$$

The principal components are the uncorrelated linear combinations of (Z_1, . . ., Zp) whose variances are as large as possible (Johnson & Wichern, 2002). The largest

variance can be demonstrated through the eigenvalues. The leading eigenvalues values indicate that the first component has the highest proportion, and all corresponding components have a progressively smaller proportion of the remaining variance. Kaiser (1974) and (Slesman et al., 2015) suggested the criteria for retaining the component if the eigenvalue is greater than 1 and those less than 1.

3.7.2 Method of Panel Data Analysis

This section comprises of a detailed description of panel data analysis. The stepwise procedure is followed, first testing the stationarity of variables through panel unit root tests followed by Pooled Mean Group for short and long run estimation.

3.7.2.1 Panel Unit Root Test

To determine the appropriate model and preventing misleading results, it is important to test for the stationarity of the panel data to avert obtaining spurious results (Asteriou & Hall, 2007). Numerous tests were available to check the stationarity of the variables. The present study considered Levin et al. (2002) known as (LLC) and Im, Pesaran, and Shin (2003) known as IPS and which is used for balanced panel and also famous for heterogeneous panel unit root test due to their statistical power. The IPS test suggests that each of the cross-sections can be estimated by adopting different estimation along with different specifications in terms of lag length, parametric values, and residual variance. The following model for IPS unit root test is as below:

[3.44]

$$\Delta Y_{\boldsymbol{i,t}} = \partial_{\mathbf{i}} + \rho_i Y_{i,t-1} + \sum_{k=1}^{\rho_i} \emptyset_{ik}\, \Delta Y_{i,t-k} + \varepsilon_{it}$$

$$\text{where}, i = 1, 2, \dots\dots\dots N, t = 1, 2, \dots\dots., T$$

Where Y denotes each of FLFPR, GDP, TOP, FDI, URBAN, UNEMP, TFR and TOUR, RD, ED, LD, PR, CL, POLITY2, PE, SE, TE, ICTX, ELECTX, and TRSPX.

The T is presumed to be the same for all cross-sections under the framed model of IPS (2003). The IPS model implemented by but not limited to the economists include, Sarantis and Stewart (1999); Chou and Suk-Yee Lee (2003), and Olawale and Hassan (2016). The mean of t-statistics and t-statistics for IPS used in panel unit root analysis is given below.

[3.45]

$$t_{IPS} = \frac{\sqrt{\mathrm{N}}\left(\overline{t} - \frac{1}{N}\sum_{i=1}^{N} E\left(\overline{t}_{iT}\left(\rho_i\right)\right)\right)}{\sqrt{N^{-1}\sum_{i=1}^{N} Var\left(\overline{t}_{iT}(\rho_i)\right)}} \qquad N(0,1)$$

[3.46]

$$\overline{t} = \frac{\left[\sum_{i=1}^{N} \overline{t}_{iT}\left(\rho_i\right)\right]}{N}$$

Hypothesis: $\mathbf{H_0}$: $\rho_i = 0 \quad vs \quad \mathbf{H_1}$: $\rho_i < 0$ for at least one i (stationary).

3.7.2.2 Panel Coefficient Estimation Technique

The estimation technique for the panel data, this study implemented the dynamic panel form of ARDL developed by Pesaran et al. (1999) which maintained the panel model with large N and T. This model assumes the heterogeneity of slope parameters across cross-sections (Pesaran & Smith, 1995). The large N and T dynamic panels

incorporating the traditional assumption of homogeneity may produce misleading inconsistent and inappropriate results. To solve this issue, Pesaran et al. (1999) developed Mean Group (MG) and Pooled Mean Group (PMG) estimators with different asymptotic features giving the non-stationarity assumption of large N and T.

In the PMG model, the basic assumption implies the combination of both pooling and averaging the coefficients. Consequently, the parameters of intercept, slope, and error correction variance possibly differs across different groups. For simplicity, the PMG assumes that in the long-run coefficients are constrained to be the same, however, they may vary in the short run. It also reveals the adjustment between sort-run and long-run dynamics. The Authors adopted this technique amongst others are Blackburne and Frank (2007) and Siddique et. al. (2015). The following model is developed based upon the unrestricted specification for Autoregressive distributed lags (ARDL), the selection criteria for lag lengths for each cross-section by using the Akaike information criterion (AIC) (Pesaran & Smith, 1995). The detailed description is provided in (Pesaran et al. 1999; Asteriou & Hall, 2007; Mahyideen et al., 2012).

[3.47]

$$Y_{it} = \sum_{j=1}^{m} \rho_{ij} Y_{i,t-j} + \sum_{j=0}^{n} \phi_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it}$$

Where i= 1, 2, 3, ……. N for cross-sections and t= 1, 2, 3, ……. T for time series. Here, Y_{it} is scalar dependent variable, ρ_{ij} are the scalars, X_{it} is a $k \times 1$ vector of independent variables and ϕ_i are $k \times 1$ vectors of coefficients. μ_i is group specific effect and ε_{it} is error term. T is presumed to be sufficiently large to improve the

robustness of model, while it is also possible to use time-trends as well as other fixed regressors.

Notably, the cointegrated variables are responsive to any deviation from the path of convergence is their one of the characteristics. The short run dynamics are being influenced by the level of divergence from equilibrium, that entails an error correction model. Therefore, the above model can be re-parametrized in the error correction form and formulated as below:

[3.48]

$$\Delta Y_{it} = \psi_i(y_{i,t-1} - \acute{\beta}_i X_{i,t}) + \sum_{j=1}^{m-1} \rho_{ij}\, \Delta Y_{i,t-j} + \sum_{j=0}^{n-1} \phi_{ij}\, \Delta X_{i,t-j} + \mu_i + \varepsilon_{it}$$

From the above specification, it is expected that disturbance terms $\varepsilon_{it}s$ are independently distributed across i and t with variance $\sigma^2 > 0$, and mean zero. Furthermore, it is also assumed that $\psi_i < 0$ for all i's. Hence, the long run relationship exists between Y_{it} and X_{it} that is explained further.

[3.49]

$$Y_{it} = \theta X_{it} + \lambda_{it}\; i = 1, 2, \ldots\ldots N; t = 1, 2, \ldots\ldots T$$

Where $\theta_i = -\acute{\beta}_i / \theta_i$ is the $k \times 1$ vector of the long run coefficients, and λ_{it} are stationary with probably non zero means, further description is given in Equation [3.50] as below:

[3.50]

$$\Delta Y_{it} = \psi_i \lambda_{i,t-1} + \sum_{j=1}^{m-1} \rho_{ij}\, \Delta Y_{i,t-j} + \sum_{j=0}^{n-1} \phi_{ij}\, \Delta X_{i,t-j} + \mu_i + \varepsilon_{it}$$

Were $\lambda_{i,t-1}$ is the error correction term and ψ_i is the coefficient of error correction term that measures the speed of adjustment towards the long run equilibrium and assumed to be less than 1, negative and significant across all cross sections. The special characteristics of PMG model is that it allows the short run dynamics including intercept and error variance to differ across cross sections, however, impose the restriction on the long run coefficients to be equal for all cross sections. The maximum likelihood estimation (MLE) applied by Pesaran et al. (1999) to estimate the common long run and short run coefficients further assuming the disturbance terms are normally distributed, the following specification is given:

[3.51]

$$\hat{\psi}_{PMG} = -(1 - \sum_{j-1}^{m} \rho_{ij})$$

[3.52]

$$\hat{\beta}_{PMG} = \sum_{j=0}^{n} \phi_{ij}$$

[3.53]

$$\hat{\rho}_{jPMG} = -\sum_{p=j+1}^{m} \rho_{ij} \qquad j = 1, \ldots\ldots, m-1$$

[3.54]

$$\hat{\phi}_{jPMG} = -\sum_{p=j+1}^{n} \phi_{ij} \qquad j = 0, \ldots\ldots\ldots. n-1$$

and $\hat{\theta}_{PMG} = \tilde{\theta}$, If the error term is zero, it shows that there is no long run stable relationship exist, hence it should be negative, less than 1 and significant.

3.7.3 Method of Time Series Analysis

Time series data involves various steps of measurement. For objective 4 of the study which is to test the validity of the feminization "U" hypothesis in each D-8 country

case, this study applied time-series data, the stepwise estimation procedure is followed involving the test of stationarity. Moreover, the study adopted the ARDL bound test approach developed by Pesaran et al. (2001). Previous studies used this technique include amongst others (Kalai & Zghidi, 2019). The choice of model is based upon the nature of data, as this study incorporated the time period between 1980 to 2018 which makes 39 years for each country. It is found that the data is nonstationary at a level for all variables. For this kind of data, ARDL is the most appropriate technique. The stepwise procedure is followed, first testing the stationarity of variables through unit root tests, followed by ARDL for short and long run estimation, SLM-U test for validity of U shape and Diagnostic tests.

3.7.3.1 Stationary Test

The nature and behavior of data determine the appropriate technique of measurement. To determine the nature of data various pretesting is involved in the initial steps before applying standard techniques. The economic analysis suggests that a long-run relationship exists between the variables. This implies that further analysis data should be stationary. To test the stationarity and non-stationarity of the data, unit root test by using Augmented Dickey-Fuller (ADF) test and Philips Perron (PP) test is discussed in detail. According to ADF test, if time series hold first order autoregressive process, written as

[3.55] $$y_t = \alpha + \lambda y_{t-1} + \varepsilon_t$$

This implies that disturbance term is independently distributed with zero mean and constant variance that is $\mathcal{E} \sim iid\ (0, \sigma^2)$. By subtracting (yt-1) on both sides, the resultant equation is [3.56].

[3.56] $$\Delta y_t = \alpha + \lambda y_{t-1} + \varepsilon_t$$

Here, Δ represents the $(y_t - y_{t-1})$ difference between the two terms and λ refers (ρ – 1). In addition, in the expression presented in Equation [3.57] to detect any deterministic trends in data is modified with t as time trend.

[3.57]

$$\Delta Y_t = \alpha_1 + \lambda t + \lambda Y_{t-1} + \sum_{k=1}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t$$

The joint hypothesis is stated as:

$H_0: \lambda = 0$ $(\rho = 1)$, implies that y_t is non-stationary and integrated of order 1 I (1).

$H_1: \lambda < 0$ $(\rho < 1)$, implies that y_t is stationary and integrated of order 0 I (0).

Where, Y denotes each of the FLFPR, GDPPC, TOP, FDI, and UNEMP. The step-wise estimation procedure was adopted in the study. The first step is to test the stationarity of the variables. The standard Augmented Dickey-Fuller (ADF) developed by (Dickey and Fuller, 1981) and Philips and Perron (1988) (PP) tests are utilized to test the stationarity of data.

3.7.3.2 ARDL Bound Test

The next step is to examine the presence of cointegration relationship among variables. The Autoregressive Distributed Lag (ARDL) method was applied developed by Pesaran et al. (2001). Having confirmed the existence of cointegration, the long and short-run relationship between female labor force participation and independent variables is determined by employing ARDL methodology. The ARDL procedure

further involves various steps, this study uses ordinary least square (OLS) and F test as follows:

[3.58]

$$\Delta(FLFPR)_t = \beta_0 + \sum_{k=1}^{p} \beta_1^{\cdot} \Delta(FLFPR)_{t-k} + \sum_{k=1}^{p} \beta_2^{\cdot} \Delta(LNGDPPC)_{t-k} \sum_{k=1}^{p} \beta_3^{\cdot} \Delta(LNGDPPC)_{t-k}^2 + \sum_{k=1}^{p} \beta_4^{\cdot} \Delta(TOP)_{t-k} + \sum_{k=1}^{p} \beta_5^{\cdot} \Delta(FDI)_{t-k} + \sum_{k=1}^{p} \beta_6^{\cdot} \Delta(UNEMP)_{t-k} + \theta ECT_{t-k} + \gamma_1 FLFPR_{t-k} + \gamma_2 LNGDPPC_{t-k} + \gamma_3 (LNGDPPC)_{t-k}^2 + \gamma_4 TOP_{t-k} + \gamma_5 FDI_{t-k} + \gamma_6 UNEMP_{t-k} + \mu_t$$

Where Δ is the difference operator, β_0 represents the drift component, p indicates the maximum lag length whereas the white noise error term presented by μ_t. $\beta_1^{\cdot} - \beta_6^{\cdot}$ represents the error correction dynamics, and $\gamma_1 - \gamma_6$indicates the long-run relationship between variables.

The null hypothesis is no long-run relationship amongst variables is H_0:

$$H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$$

An alternative hypothesis for the existence of a long-run relationship is:

$$H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$$

Two critical bounds have been developed by Pesaran et al. (2001) known as upper critical bound and lower critical bound asymptotically. If the outcome value for the computed F-test became lower than the lower critical bound and remain inconclusive if the computed value lies between two bounds. The existence of cointegration confirmed if the computed value becomes greater than the upper bound.

3.7.3.3 Error Correction Form of the Model

[3.59]

$$\Delta(FLFPR)_t = \beta_0 + \sum_{k=1}^{p} \beta_1^{\cdot} \Delta(FLFPR)_{t-k} + \sum_{k=1}^{p} \beta_2^{\cdot} \Delta(LNGDPPC)_{t-k} \sum_{k=1}^{p} \beta_3^{\cdot} \Delta(LNGDPPC)^2{}_{t-k} + \sum_{k=1}^{p} \beta_4^{\cdot} \Delta(TOP)_{t-k} + \sum_{k=1}^{p} \beta_5^{\cdot} \Delta(FDI)_{t-k} + \sum_{k=1}^{p} \beta_5^{\cdot} \Delta(UNEMP)_{t-k} + \theta ECT_{t-k} + \mu_t$$

Where θECT is the error correction term, that is an alternative approach to confirm the presence of cointegration if the estimated value became negative, less than 1, and statistically significant. (Rafindadi & Ozturk, 2016; Dong et al., 2018). The speed of adjustment from the short run shock to the long-run path captured by the ECT term. To assure the goodness of fit of the model, several diagnostics tests are also employed conducted by (Pesaran and Pesaran, 2009). For instance, serial correlation, autoregressive conditional heteroscedasticity, sum (CUSUM), and the cumulative sum

of squares (CUSUMSQ) tests introduced by Brown et. al. (1975) to check for stability is also applied.

3.7.3.4 SLM-U

This also incorporated the SLM-U test as mentioned above, the conventional methods using ARDL incorporates a quadratic form of GDP per capita that may increase the chances of multi-collinearity, however, it is the necessary condition to accomplish this objective but not sufficient (Lind & Mehlum,2010). The following model for Sasabuchi–Lind– Mehlum (SLM) u test can be expressed as follows:

$$[3.60] \quad FLFPR_t = \Theta_0 + \Theta_1 LNGDPPC_t + \Theta_2 LNGDPPC_t^{\,2} + \Theta_k \sum_{k=3}^{k} X_{kt} + \sigma_t$$

The joint hypothesis can be stated as

$$H_0: (\Theta_0 + \Theta_1 2LNGDPPC_{min} \leq 0) \cup (\Theta_0 + \Theta_1 2LNGDPPC_{max} \geq 0)$$

$$H_1: (\Theta_0 + \Theta_1 2LNGDPPC_{min} > 0) \cup (\Theta_0 + \Theta_1 2LNGDPPC_{max} < 0)$$

Where, $LNGDPPC_{min}$ and $LNGDPPC_{max}$ show the maximum and minimum values of per capita GDP growth, respectively. This validates the existence of the U-shaped if the null hypothesis is rejected.

3.7.3.5 Diagnostic Tests

A series of diagnostic checking such as the Breusch-Godfrey Serial Correlation LM Test, Autoregressive Conditional Heteroscedasticity (ARCH) Test, and Ramsey RESET test suggested by (Nkoro & Uko, 2016) as well as CUSUM and CUSMQ test conducted to make sure all the variables in ARDL model are valid and accurate. This implies that variables are not having the problem of heteroscedasticity, or

multicollinearity, etc. Each of the empirical test's results is discussed with a full detailed interpretation in chapter four.

3.8 Conclusion

This chapter discussed a detailed procedure on modeling, variable justification, data collection, estimation procedure, and techniques for both time series and panel data. Two sets of panel data from 1980 to 2018 and 1995 to 2018 and time series analysis from 1980 to 2018 were used to answer 4 distinct objectives. Objective 1 to objective 3 uses panel data for estimation of demand-side factors affecting female labor force participation rate, and interaction terms included in each model. Objective 4 utilizes time-series data to test the validity of the feminization u hypothesis in each D-8 country separately. The next chapter discusses the results and findings.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results based on four main objectives of this study. Objective 1 determine the effect of demand-side factors on female labor force participation rate by employing two streams of panel data analysis from 1980-2018 and 1995-2018 (tourism data was only available from 1995 to 2018). Objective 2 and 3 examined the interaction effect of economic growth with cultural diversity, religious diversity, political environment, level of education and infrastructure on female labor force participation rate (FLFPR) based on panel data from 1980 to 2018. Finally, objective 4 test the feminization U hypothesis, by applying time series analysis from 1980 to 2018 in each D-8 country. Specifically, the panel data analysis was done by a Pooled Mean Group and ARDL Bound test were applied for time-series data.

Section 4.2 presents the descriptive analysis, section 4.2.1 presents Principal Component Analysis (PCA) while Section 4.2.2 descriptive statistics. Section 4.2.3 presents the correlation analysis. Section 4.3 consists of the panel data analysis results for data stream 1 and 2, which include: the cross-sectional dependence test, the unit root test result, panel coefficient estimation the long-run relationship and the short-run analysis. Section 4.4 provides the results of time series analysis, which comprises of the test of stationarity, ARDL model specification, ARDL bound test, SLM-U test, ARDL diagnostic test and Cumulative Sum of Recursive Residuals (CUSUM), Cumulative Sum of Recursive Residuals Square (CUSUMQ) to test the stability of the models. Section 4.5 concludes the chapter.

4.2 Descriptive Analysis

Descriptive analysis presents the preliminary characteristics of the data. The first step is the construction of the Infrastructure indices for its three dimensions including ICT index (ICTX), Electricity Index (ELECTX), and Transport Index (TRSPX) through Principal Component Analysis (PCA). The next step is the presentation of a summary of descriptive statistics (mean median, minimum, maximum, and standard deviation) for all D-8 countries for time series and panel data. Moreover, correlation matrix computed for the correlation analysis for all the variables for time series and panel data. The analysis is divided into three parts, two streams of panel data from 1980-2018 and 1995-2018 and time-series data from 1980-2018, respectively.

4.2.1 Measurement of Infrastructure (PCA)

While measuring overall infrastructure is not an easy task, however, several studies such as Donaubauer et al. (2016) and Kodongo & Ojah, (2016) and Rehman et al. (2020) explained different measures for overall infrastructure based upon quality and access. The present study incorporates proxies to construct infrastructure index suggested by Donaubauer et al. (2016). However, present study incorporated three distinct dimensions of infrastructure only transport, energy, and ICT whereas Donaubauer et al. (2016) used four dimensions transport, energy, ICT, and finance. Each index in this study constructed through factor analysis of principal component (PCA) from 1980 to 2018, previously used by Babalola and Shittu (2020). Each of the three indices is calculated separately and results are presented in Table 4.1 Table 4.2 and Table 4.3, respectively.

Table 4.1 represents the results of the transport index calculated through PCA. Thus, the results show that the first three components were retained and the remaining six were skipped. The results also indicated, these components have 42%, 17 % and 11% of total retained variance, respectively that is 71.6% accumulatively.

Table 4.1

The Principal Component of Transport Infrastructure.

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.835	2.252	0.426	0.426
Comp2	1.583	0.559	0.176	0.602
Comp3	1.024	0.113	0.114	0.716
Comp4	0.911	0.116	0.101	0.817
Comp5	0.795	0.275	0.088	0.905
Comp6	0.519	0.310	0.058	0.963
Comp7	0.209	0.119	0.023	0.986
Comp8	0.090	0.056	0.010	0.996
Comp9	0.034	.	0.004	1.000

A similar approach was employed for electricity and ICT indices ((Refer T4.2 & T4.3). The electricity index was based on 3 components. Only the first component retained, representing 62 % of the total retained variance.

Table 4.2

The Principal Component of Electricity Infrastructure

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	1.864	1.145	0.621	0.621
Comp2	0.719	0.301	0.240	0.861
Comp3	0.417	.	0.139	1.000

The ICT index were based on 5 components, with only component 1 retained (60 % of the retained variance). The results of component rotations for each index are provided in appendix E.

Table 4.3

The principal component of ICT infrastructure.

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.011	2.134	0.602	0.602
Comp2	0.877	0.306	0.176	0.778
Comp3	0.571	0.193	0.114	0.892
Comp4	0.378	0.216	0.076	0.968
Comp5	0.162	.	0.032	1.000

4.2.2 Descriptive Statistics

Table 4.4 summarized the descriptive statistics of panel data stream 1 from 1980 to 2018, comprising set of panel data T= 39 for eight countries n = 8, with total observations N = 312.

The variable involved are, FLFPR (dependent variable) and LNGDP, TOP, FDI, URBAN (independent variables) along with UNEMP and TFR (control variable) for all 13 separate Models. However, 12 interaction terms included which enter one by one in every 12 Models separately, consisting of PE, SE, TE, CL, PR, POLITY2, RD, LD, ED, ICTX, ELECTX, TRSX.

Table 4.4

Summary of descriptive statistics Panel data stream 1

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
FLFPR	0.325	0.330	0.674	0.033	0.158
LNGDP	25.995	26.039	27.847	24.078	0.850
TOP	0.547	0.420	2.204	0.091	0.428
FDI	0.015	0.010	0.093	-0.028	0.017
URBAN	0.451	0.431	0.760	0.149	0.160
UNEMP	0.074	0.066	0.280	0.009	0.045
TFR	3.840	3.464	6.783	1.807	1.527
PE	0.954	0.991	1.212	0.492	0.143
SE	0.549	0.544	1.092	0.137	0.231
TE	0.181	0.118	1.200	0.018	0.183
CL	4.731	5.000	7.000	3.000	0.910
PR	4.497	4.000	7.000	2.000	1.405
POLITY2	0.555	3.000	9.000	-7.000	5.966
RD	0.245	0.181	0.646	0.004	0.213
LD	0.496	0.618	0.850	0.023	0.316
ED	0.511	0.600	0.862	0.006	0.311
ICTX	0.000	-0.867	9.054	-1.102	1.735
ELECX	0.000	-0.175	4.186	-3.041	1.365
TRSX	0.000	-0.478	7.840	-2.151	1.958

In summary, the study found the evidence of positive mean values of all the variables included here. Most of the variables included here shown high dispersion as their standard deviation is significantly different from standard means. On the other hand, FDI, UNEMP, TE have closer standard deviation and mean values which show less dispersion.

Table 4.5 presents the summary statistics for panel data stream 2 from 1995 to 2018. This Model includes FLFPR as a dependent variable and LNGDP, TOUR TOP, FDI, URBAN as independent, and UNEMP, TFR as control variables. The time for this set of data is calculated as T = 24, the number of countries n = 8, and the total number of

observations N = 192. The range of data presented by the two columns such as minimum and maximum.

Table 4.5

Descriptive Statistics for Panel Data Stream 2

Variable	**Mean**	**Median**	**Maximum**	**Minimum**	**Std. Dev.**
FLFPR	0.337	0.312	0.572	0.105	0.145
LNGDP	26.327	26.302	27.847	24.692	0.739
LNTOUR	15.036	15.410	17.639	11.736	1.532
TOP	0.600	0.452	2.204	0.207	0.467
FDI	0.017	0.013	0.093	-0.028	0.016
URBAN	0.498	0.444	0.760	0.217	0.159
UNEMP	0.078	0.075	0.226	0.024	0.039
TFR	3.192	2.617	6.262	1.807	1.299
T =24		N =192			n=8

All the variable included in the Model has positive mean values. All variables included here shown high dispersion as their standard deviation is significantly different from standard means except FDI.

Table 4.6 presents the summary statistics of time series data for D-8 countries. The results present the mean, median, standard deviation minimum, and maximum values. The deviation values for FLFPR, LNGDPPC, LNGDPPC^2, TOP, and UNEMP are much different from their corresponding mean values, however, in case of FDI, the mean and standard deviation are closer to each other for D-8 countries for an underlying time-period.

Table 4.6

Summary of Descriptive Statistics of Time Series Data.

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
Bangladesh					
FLFPR	0.368	0.342	0.674	0.033	0.188
LNGDPPC	6.327	6.231	7.093	5.885	0.360
$LNGDPPC^2$	40.156	38.828	50.307	34.628	4.632
TOP	0.294	0.279	0.481	0.167	0.099
FDI	0.005	0.003	0.017	0.000	0.005
UNEMP	0.030	0.031	0.050	0.009	0.012
Egypt					
FLFPR	0.193	0.217	0.300	0.058	0.055
LNGDPPC	7.543	7.549	7.975	7.005	0.282
$LNGDPPC^2$	56.973	56.986	63.600	49.072	4.245
TOP	0.502	0.483	0.745	0.302	0.113
FDI	0.024	0.017	0.093	-0.002	0.021
UNEMP	0.092	0.090	0.132	0.050	0.024
Indonesia					
FLFPR	0.496	0.506	0.542	0.371	0.034
LNGDPPC	7.712	7.705	8.363	7.116	0.365
$LNGDPPC^2$	59.606	59.372	69.936	50.634	5.633
TOP	0.533	0.523	0.962	0.374	0.103
FDI	0.010	0.010	0.029	-0.028	0.013
UNEMP	0.046	0.044	0.084	0.017	0.019
Iran					
FLFPR	0.132	0.126	0.192	0.090	0.031
LNGDPPC	8.553	8.490	8.869	8.200	0.183
$LNGDPPC^2$	73.190	72.077	78.665	67.237	3.131
TOP	0.395	0.413	0.544	0.141	0.098
FDI	0.004	0.002	0.027	-0.003	0.006
UNEMP	0.118	0.120	0.142	0.091	0.015

Table 4.6 (Continued)

Malaysia					
FLFPR	0.464	0.464	0.547	0.351	0.037
LNGDPPC	8.768	8.838	9.403	8.107	0.395
$LNGDPPC^2$	77.024	78.108	88.409	65.722	6.905
TOP	1.577	1.549	2.204	1.051	0.366
FDI	0.039	0.038	0.088	0.001	0.018
UNEMP	0.039	0.034	0.083	0.025	0.014
Nigeria					
FLFPR	0.45	0.46	0.57	0.36	0.06
LNGDPPC	7.45	7.37	7.85	7.19	0.24
$LNGDPPC^2$	55.53	54.26	61.61	51.68	3.56
TOP	0.33	0.34	0.53	0.09	0.13
FDI	0.02	0.02	0.06	-0.01	0.01
UNEMP	0.11	0.09	0.28	0.03	0.07
Pakistan					
FLFPR	0.166	0.162	0.242	0.070	0.048
LNGDPPC	6.723	6.709	7.088	6.320	0.200
$LNGDPPC^2$	45.243	45.017	50.244	39.944	2.681
TOP	0.334	0.337	0.389	0.253	0.033
FDI	0.009	0.007	0.037	0.001	0.008
UNEMP	0.063	0.060	0.152	0.031	0.029
Turkey					
FLFPR	0.323	0.306	0.462	0.231	0.070
LNGDPPC	9.026	8.988	9.620	8.515	0.322
$LNGDPPC^2$	81.571	80.777	92.552	72.497	5.847
TOP	0.416	0.454	0.604	0.171	0.100
FDI	0.010	0.005	0.037	0.000	0.009
UNEMP	0.093	0.090	0.126	0.065	0.016

4.2.3 Correlation Analysis

Correlation matrix computed the correlation analysis for all the variables. The results of the correlation test between the dependent variable and the independent variables proved to be very useful in pre-estimation analysis especially with regard to the potential relationship suggested by the theory. Thus, this study conducted a correlation analysis for both panel data streams and time-series to analyze the mutual association among variables and presented in Appendix F (Table1 - Table 3). This preliminary correlation analysis reveals that there is possibly no multicollinearity exists among the explanatory variables employed in the study. However, to further ensure the nonexistence of multicollinearity, the variance inflation factor test (VIF) also conducted for both panel data and time series data, that also confirms the nonexistence of multicollinearity. The VIF tables for panel data are presented in Appendix I (Table 1-Table 14) and time series data are presented in Table 4.21.

4.3 Panel Data Analysis

The panel data analysis is conducted to answer the objectives 1 to 3. Objective 1 is the examination of demand-side macro-economic factors on female labor force participation rate. The analysis of objective 1 involves two-panel data streams from 1980-2018 and 1995-2018. Objective 2 and 3 is to measure the interaction effect of religious diversity, ethnic diversity, language diversity, political environment level of education and infrastructure in determining the relationship between demand-side factors and female labor force participation rate. To proceed further for coefficient estimation, some pretesting of data is carried after the presentation of the description of data. The proceeding sections dwell upon the panel data analysis including cross-sectional dependence test, panel unit root, and Pooled Mean Group results.

4.3.1 Cross-Sectional Dependence (CD Test)

To determine the appropriate panel unit root test, the common measure is the Cross-sectional Dependence (CD) test. In the presence of cross-sectional dependence, the first-generation unit root test may not be sufficient (Guillaumin, 2009). This study implemented Lagrange Multiplier (LM) test, developed by Breusch and Pagan (1980) and Pesaran (2004) CD test. The former is suitable when T >N and N is less than 10, and later has properties to handle all types of panel, with large cross-sections and large time, small cross-sections, and large time and small cross-sections and small-time as well as for balanced panel (De Hoyos & Sarafidis, 2006) and (Tugcu, 2018). Results for panel data stream 1 and panel data stream 2 are presented in Table 4.7. The probability value 0.132 & 0.199 for data stream 1, and 0.774 & 0.634 for panel data stream 2 does not support the evidence of cross-sectional dependence in the prescribed Models. Having confirmed the nonexistence of cross-sectional dependence, this study employed first generation unit root tests, with subsequent results presented in section 4.3.2.

Table 4.7

Cross-Sectional Dependence Test

Test	Statistic	Prob.
Pane Data Stream 1: 1980-2018		
Breusch-Pagan LM	36.433	0.132
Pesaran CD	1.285	0.199
Panel Data stream 2: 1995-2018		
Breusch-Pagan LM	22.151	0.774
Pesaran CD	0.471	0.638

4.3.2 Panel Unit Root Test

To determine the stationarity of the data, the unit root test was conducted for panel data 1980-2018 and 1995-2018, based upon the CD test results which suggest that there is no cross-sectional dependence and first-generation unit root tests are sufficient. Table 4.8 and Table 4.9 presents the summary of results of Levin et al. (2002) known as (LLC) and Im, Pesaran, and Shin (2003) known as (IPS) tests.

Table 4.8

Summary of Unit Root Test Results: Panel Data Stream 1

Variable	**Order of Integration**
FLFPR	I (0)
LNGDP	I (1)
TOP	I (1)
FDI	I (0)
URBAN	I (0)
UNEMP	I (0)
TFR	I (0)
PE	I (1)
SE	I (1)
TE	I (1)
CL	I (1)
PR	I (1)
POLITY2	I (0)
RD	I (0)
LD	I (0)
ED	I (0)
TRSX	I (1)
ELECX	I (1)
ICTX	I (1)

The results reveal that the null hypothesis of the presence of unit root for all variables at 5% and 10 % cannot be rejected for all variables. However, the null hypothesis of the existence of the unit root is completely rejected at first difference. The results of both tests give almost similar results.

Table 4.9

Summary of Unit root: Panel data stream 2

Variable	Order of Integration
FLFPR	I (1)
LNGDP	I (1)
TOP	I (1)
FDI	I (0)
URBAN	I (0)
TFR	I (0)
UNEMP	I (1)
TOUR	I (1)

This implies that the variables exhibit a mixed order of integration. The detailed description of the panel unit root is given in the Appendix G (Table 1- Table 2). The reported results indicate that all variables are stationary either I (0) or I (1) and none of the variables follow I (2).

4.3.3 Panel Coefficient Estimation

This section provides a detailed stepwise panel coefficient analysis. Based on the unit root results of the previous section, the given mixed order of integration of variables the Pooled Mean Group (PMG) method is employed. This section presents the estimated results of data stream1 (1980-2018) and data stream 2 (1995 – 2018). This Model is based on objective 1 that is to examine the effect of demand side macro-economic factors on FLFPR. Since structural change theory and PMG is long-run analysis in principle, therefore, more attention is derived towards long-run results.

Model 1.1 & 1.2: Long-Run and Short-Run Results of PMG

This section explains the long-run and short-run results of Model 1.1 and Model 1.2 as presented in Table 4.10 and Table 4.11, respectively. The main purpose is to answer RO 1 that is to estimate the effect of demand-side macro-economic factors (economic

growth, trade openness, foreign direct investment, urbanization, and tourism development) on the female labor force participation. Table 4.10 revealed that the coefficient of LNGDP is positive and significant at a 5 % for Model 1.1, which implies that 1% increase in LNGDP brings a 0.05 % increase in the FLFPR. The LNGDP coefficient is positive and significant for Model 1.2 at 1 % level, 1 % increase in LNGDP brings 0.06% increase in FLFPR.

On the other hand, the coefficient of trade openness is negative and significant at a 10 % level of significance for Model 1.1 and remains insignificant for Model 1.2, indicating that a 1 % increase in trade openness share of GDP resulted a reduction of 0.06 % and .009 % in the FLFPR, respectively.

Table 4.10

PMG Results of Model 1.1 & Model 1.2: Long-Run

Variable	**Model 1.1 (1980-2018)**	**Model 1.2 (1995-2018)**
LNGDP	0.050 (0.006) **	0.062 (0.003) ***
TOP	-0.064 (0.080) *	-0.009 (0.852)
FDI	0.681 (0.005) **	1.425 (0.000) ***
URBAN	-0.189 (0.093) *	-0.201 (0.446)
UNEMP	-0.194 (0.263)	-0.421 (0.003) ***
TFR	-0.012 (0.010) **	0.156 (0.000) ***
LNTOUR	_	0.058 (0.001) ***

Note: ***, **, ** indicate the level of significance at1%, 5 % and 10 % respectively.
Probability values are given in ().

The coefficient of FDI is also positive and significant at 5 % and 1% level of significance for Model 1.1 and Model 1.2 respectively, implies that arise in the share FDI net inflows are positively related with FLFPR for both models resulting for 1 % increase in FDI net inflows in GDP brings 0.68 % (Model 1.1) and 1.42 % (Model 1.2), respectively.

The coefficient of URBAN is negative for both models but only significant at the 10 % level for Model 1.1, reveals that a 1 % increase in urbanization brings female labor force participation down by 0.18 %. The coefficient of the unemployment rate is negative for both model but only significant for Model 1.2 at 1%, implies that 1% rise in unemployment brings FLFPR down by 0.42 % for Model 1.2, However it does not show any significance in Model 1.1. The coefficient of TFR shows mixed results, positive and significant at 5 % for Model 1.1, demonstrates that a child (birth) increase by per women reduces female labor force participation by 0.012 %.

On the other hand, it is significant at 1% and positive for Model 1.2, reveals that a child (birth) increases by per women, increases FLFPR by 0.15 %. Likewise, the coefficient of TOUR is significant and positive at a 1 % level of significance for Model 1.2. This implies that 1 % increase in tourist arrivals brings 0.05% increase in FLFPR. This shows that higher tourist arrivals will create opportunities for women to engage in the market.

Table 4.11
PMG Results of Model 1.1 & Model 1.2: Short-Run

Variable	**Model 1.1 (198-2018)**	**Model 1.2 (1995-2018)**
ECT	-0.377	-0.302
	(0.002) ***	(0.042) **
D LNGDP	-0.155	0.199
	(0.134)	(0.692)
D TOP	-0.017	-0.050
	(0.248)	(0.285)
D FDI	0.023	-0.001
	(0.935)	(0.998)
D URBAN	-8.143	1.657
	(0.180)	(0.754)
D UNEMP	-0.131	-0.362
	(0.622)	(0.306)
D TFR	0.052	-0.004
	(0.447)	(0.947)
DLNTOUR	_	-0.020
		(0.015) **
C	-0.302	-0.544
	(0.011) **	(0.053) *

Note: ***, **, * indicate the level of significance at 1%, 5 % and 10 % respectively.
Probability values are given in ().

Table 4.11 presents the short-run results for Model 1.1 and Model 1.2. The first thing to observe in the short-run Model is the coefficient of error correction term (ECT). According to Banerjee et. al. (1998), the ECT demonstrates the speed of adjustment to restore the equilibrium in the long run. The value of ECT coefficient determines that how quickly variable converge/diverge towards long run equilibrium. The condition for the significance of ECT is, it must be less than 1, with negative sign and significant. The short-run coefficient of ECT is significant at a 1 % level of significance, less than one and negative meets the condition for convergence hypothesis.

The coefficient value of ECT is 0.37 and 0.30 for Model 1.1 and Model 1.2, which implies that the rate of convergence to the long-run equilibrium is 37 % and 30 %,

respectively. The short-run coefficient of ECT is less than one, significant and negative at 1% and 5 % meet the condition of the convergence hypothesis. However, none of the other variables show any significance in the short-run in both models except tourism. This is considered as moderate speed of adjustment and show the balance long run relationship in the model.

Model 2-7: Long-Run and Short-Run Results of PMG

This section provides the empirical results of Model 2-7 based on RO 2 (to examine how do cultural diversity, religious diversity, and political environment interact between economic growth and female labor force participation). To examine the interaction effect of cultural diversity, three distinct proxies incorporated including, language diversity (LD) for Model 2, religious diversity (RD) for Model 3, and ethnic diversity (ED) for Model 4, respectively.

Furthermore, three proxies for the political environment were incorporated for three distinct Models, such as polity2 for Model 5, civil liberties (CL) for Model 6, and political rights (PR) for Model 7, respectively. These Models are tested using Pooled Mean Group Estimation (PMG) for a panel of D-8 countries from 1980 - 2018. The PMG long run and short run results are presented in 4.12 and 4.13, respectively.

The long-run results are presented in Table 4.12 including six distinct model based on RO2. These results reveal that coefficient of LNGDP is positive and significant in 5 out of 6 Models at either 1 % or 5% level of significance. The coefficient of TOP is positive and significant in 2 out of 6 Models and negative and significant in 2 out of 6

Models, at 1 %, 5% or 10 % level of significance. However, the remaining 2 are insignificant, remain inconclusive.

Table 4.12

PMG Results of Model 2-7: Long-Run

Variable	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
LNGDP	0.162 (0.000) ***	0.042 (0.043) **	0.105 (0.000) ***	0.042 (0.019) **	0.034 (0.173)	0.133 (0.000) ***
TOP	-0.228 (0.000) ***	0.140 (0.000) ***	0.116 (0.000) ***	-0.057 (0.098) *	0.044 (0.199)	-0.030 (0.527)
FDI	-0.825 (0.122)	1.252 (0.000) ***	0.646 (0.001) ***	-1.947 (0.000) ***	1.685 (0.000) ***	1.162 (0.000) ***
URBAN	1.811 (0.000) ***	0.780 (0.000) ***	0.476 (0.027) **	0.070 (0.573)	-0.061 (0.555)	-0.974 (0.000) ***
UNEMP	-0.782 (0.057) *	-0.207 (0.038) **	-0.121 (0.054) *	-1.355 (0.000) ***	0.217 (0.162)	-0.233 (0.165)
TFR	0.072 (0.000) ***	0.021 (0.000) ***	0.038 (0.013) **	-0.010 (0.203)	-0.002 (0.700)	0.000 (0.992)
RD	1.645 (0.000) ***	_	_	_	_	_
LNGDP*RD	-0.754 (0.000) ***	_	_	_	_	_
LD	_	0.778 (0.000) ***	_	_	_	_
LNGDP*LD	_	-0.256 (0.001) ***	_	_	_	_
ED	_	_	0.842 (0.039) **	_	_	_
LNGDP*ED	_	_	-0.143 (0.029) **	_	_	_
POLITY2	_	_	_	0.008 (0.000) ***	_	_
LNGDP*POLITY2	_		_	-0.005 (0.001) ***	_	_
CL	_	_	_	_	-0.022 (0.000) ***	_
LNGDP*CL	_	_	_	_	-0.022 (0.011) **	_
PR	_	_	_	_	_	-0.028 (0.000) ***
LNGDP*PR	_	_	_	_	_	-0.027 (0.000) ***

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

The coefficient of FDI is positive and significant in 4 out of 6 Models, negative and significant in 1 out of six Models and negative and insignificant in 1 out of 6 Models at any admissible level of significance 1%, 5% and 10% respectively. The coefficient of URBAN is positive and significant in 4 out of 6, positive but insignificant in 1 out of 6, and negative and significant in 1 out of 6 Models at any permissible level of significance at 1 %, 5% and 10%, respectively.

The coefficient of the control variable UNEMP is significant in 4 out of 6 Models but negative in all Models at given criteria. The coefficient of TFR is positive and significant in 3 out of 6 Models at a given criteria of 1 %, 5% and 10% however rest of the 3 remain insignificant either positive or negative.

The coefficient of RD in Model 2 is positive and significant at 1 %. This show that countries with higher religious diversity have higher FLFP because, interaction with other religions brings, harmony, moderation, and respect. This induces women to participate in economic activities. These results are in line with Koyuncu et. al. (2017). On the other hand, the coefficient of interaction term is negative and significant at 1%, demonstrates that higher religious diversity reduces or even eliminate the positive effect of LNGDP on the female labor force participation rate.

The coefficient attached to interaction of RD and LNGDP is negative and significant implies that higher RD impedes or even eliminate positive effect of LNGDP on FLFPR. The total effect of LNGDP on FLFPR can be presented as (0.162-0.754TH) this means that high RD increases the element of harmony amongst different religious groups creates better economic environment, that leads to increase the productivity of

LNGDP on FLFPR. However, it can also create opposing effects, which demonstrates that an increase in RD results in a decrease in the positive effect of LNGDP on FLFPR. This is mainly due to the biasedness and discrimination on the basis of religion. Moreover, the hiring process also became discriminatory, racism in diverse environment discourage women to join labor market. This indicates that higher religious diversity and increased economic growth works as substitutes.

The total effect of RD on FLFPR is (1.654 - 0.754LNGDP), this means that better economic conditions lead to increase the harmony amongst different religious groups and that results in increase the productivity of RD on FLFPR. However, it can have opposite effect on the relationship of RD and FLFPR due to increased competition, discrimination and racism resulted by increased economic growth.

The coefficient of LD in Model 3 is significant and positive at a 1 % level of significance. The coefficient attached to the interaction of LD and LNGDP is negative and significant at 5% level, implies that an increase in LD obstructs the positive impact of LNGDP on the FLFPR. The total effect of LNGDP in Model 3 can be presented as (0.042 – 0.256LD), this means that an increase in LD results in a decrease in the positive effect of LNGDP on FLFPR.

The total effect of LD on FLFPR can be presented as (0.778 - 0.256LNGDP), this shows that better economic conditions increase coherence amongst different cultural groups and leads to increase the output of LD on FLFPR, however it can create opposing effect due to higher competition increased by economic growth, that resultantly impedes the positive effect of LD on FLFPR.

The coefficient of ED in Model 4 is significant and positive implying that the ethnic diversity has promising effect on the FLFPR. In other words, multi-ethnic countries possess more opportunities through interacting with other cultures that induces women to join labor market, as suggested by Koyuncu et. al. (2017). Meanwhile, the interaction term of ED and LNGDP coefficients' is negative and significant at 5 % revealing that an increase in ED eliminates the positive effect of LNGDP on FLFPR.

The total effect of LNGDP on FLFPR is (0.105 – 0.143ED) which shows that an increase in ED induces the positive effect of LNGDP on FLFPR on the one hand, but it eliminates the positive effect of LNGDP on FLFPR. The total effect of ED can be presented as (0.842-0.143LNGDP), demonstrates that an increase in LNGDP results in a decrease in the positive effect of ED on FLFPR.

The results of Model 5 are presented with the inclusion of POLITY2 as the interaction term with LNGDP, the coefficient of POLITY2 (score between -10[autocracy], and +10[democracy]) implying a positive and significant at 5 %. On the other hand, coefficient of the interaction term attached with LNGDP and POLITY2 is negative and significant at 5 % implying that democracy and economic growth serve as substitutes.

The total effect of LNGDP on FLFPR is (0.042 – 0.005POLITY2) demonstrates that direct democracy reduces the positive effect of LNGDP on FLFPR. These results are parallel at supported study by Bayanpourtehrani and Sylwester, (2013) who argued that democracies promote the freedom that induces to follow norms that results in lower FLFPR as compared to complete autocracies.

Moreover, direct democracies increase informal activities, and higher tendency of women to participate in informal activities is evidenced in developing countries, reduces the formal participation of women in labor market. These results are supported by Elbahnasawy et al. (2016) who stated that political reforms that shifts the institutional setting from autocratic to democratic increases informal economic activity if it creates political instability. The total effect of POLITY2 on FLFPR as presented by (0.008-0.005LNGDP), implies that higher economic growth reduces the positive effect of POLITY2 on FLFPR.

The results of Model 6 are presented with the inclusion of civil liberties (CL) as an interaction term that ranges from 1 (strong liberties) to 7(weak liberties). The negative and significant coefficient of interaction term of LNGDP and CL, implies that the least liberties negatively affect FLFP. The total effect of LNGDP on FLFP is (0.034 - 0.022CL) implies that more freedom increases women's labor force participation and less freedom even reduce the positive impact of LNGDP on FLFPR.

Similarly, the total effect of CL on FLFPR can be represented as (-0.022 - 0.022 LNGDP). This shows that 1% increase in GDP further increases the negative impact of weak civil liberties on FLFPR. This suggests that to get full benefit from increased economic growth on FLFPR, it is necessary to enhance the civil liberties and freedom.

The Model 7 represents the interactive role of political rights (PR) and LNGDP. Political rights index (PR) is measured on a scale of 1 (strong) to 7(weak). The coefficient of PR is negative and significant at 1 % level of significance, implies that

that less freedom or weak political rights are inversely related with FLFPR when calculated individually.

The negative coefficient of interaction term of PR and LNGDP explains that weak PR reduce the positive effect of LNGDP on FLFPR. The total effect of LNGDP on FLFP (0.133 – 0.27PR) which means that weak PR tends to eliminate the positive effect of LNGDP on FLFPR. Therefore, if a country wants to enjoy the benefits of economic growth for the labor force participation of women, it should also give equal political rights to the women, for instance, the right to vote and political participation.

This can empower women to take part in decision making, and that would help them to decide for their career advancement as well. The total effect of PR on FLFPR can be presented as (-0.028 – 0.027), exhibits that 1 % increase in LNDGP further stimulates the negative impact of weak political rights on FLFPR. This suggests that to acquire full benefit of increased economic growth for FLFPR the strong political rights are necessary to enhance women participation in economic decision making.

Table 4.13 presents the short run results of model 2 -7. The first thing to observe in the short-run estimates is the error correction term (ECT). As discussed above, the condition for the ECT term for the convergence hypothesis must be negative significant and less than 1. The coefficient of ECT fulfills all conditions, less than 1, negative and significant at any admissible level of 1%, 5 % and 10% for all 6 models. The rate of adjustment to the long-run equilibrium can be observed by the value of ECT coefficient that is 23 %, 32 % and 38% for Model 2, 3 and 4 and 64%, 24% and 33% for Model 5, 6 and 7, respectively. None of the other variable show any

significance in the short run except TOP in Model 3 and 6, LNGDP in Model 7, FDI in Model 5 and TFR in Model 2.

Table 4.13

PMG Results of Model 2-7: Short-Run

Variable	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
ECT	-0.226 (0.044) **	-0.321 (0.009) **	-0.389 (0.034) **	-0.645 (0.001) ***	-0.247 (0.008) **	-0.332 (0.033) **
DLNGDP	0.519 (0.659)	18.295 (0.331)	-0.144 (0.931)	0.197 (0.535)	-0.080 (0.601)	-0.252 (0.050) *
DTOP	-0.927 (0.351)	-0.059 (0.005) **	-0.040 (0.187)	-0.024 (0.787)	-0.051 (0.053) *	-0.007 (0.876)
DFDI	0.236 (0.373)	-0.048 (0.879)	0.258 (0.701)	-0.499 (0.075) *	-0.049 (0.861)	0.019 (0.864)
DURBAN	-1.647 (0.886)	-8.863 (0.266)	-6.827 (0.219)	0.424 (0.258)	-0.119 (0.639)	-7.761 (0.354)
DUNEMP	-0.655 (0.402)	-0.158 (0.506)	-0.263 (0.426)	-0.068 (0.996)	-3.452 (0.316)	-0.121 (0.783)
DTFR	-0.235 (0.086) *	-0.004 (0.942)	-0.107 (0.261)	-0.008 (0.930)	0.050 (0.544)	-0.014 (0.890)
DRD	10.634 (0.112	_	_	_	_	_
DLNGDP*RD	-6.536 (0.326)	_	_	_	_	_
DLD	_	566.167 (0.321)	_	_	_	_
DLNGDP*LD	_	50.544 (0.283)	_	_	_	_
DED	_	_	4.281 (0.267)	_	_	_
DLNGDP*ED	_	_	-5.210 (0.148)	_	_	_
DPOLITY2	_	_	_	-0.007 (0.018) **	_	_
DLNGDP*POLITY2	_	_	_	-0.030 (0.108)	_	_
DCL	_	_	_	_	-0.152 (0.355)	_
DLNGDP*CL	_	_	_	_	-0.112 (0.388)	_
DPR	_	_	_	_	_	-0.008 (0.443)
DLNGDP*PR	_	_	_	_	_	0.022 (0.211)
C	-1.209 (0.047) **	-0.513 (0.011) **	-1.247 (0.035) **	-0.405 (0.001) ***	-0.142 (0.019) **	-0.881 (0.035) **

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

Model 8-13: Long-Run and Short-Run Results of PMG

This section presents the long-run and short-run PMG results of Model 8-13 based on RO 3 that is to assess the role of education and infrastructure in driving the relationship between economic growth and female labor force participation. To determine the interactive role of the level of education in driving the relationship between economic growth and female labor force participation, the three Models were tested by incorporating three proxies i-e. primary enrolment (PE) in Model 8, secondary enrolment (SE) in Model 9, and tertiary enrolment (TE) in Model 10, respectively.

Furthermore, to determine the interactive role of Infrastructure facilities and economic growth three dimensions of infrastructure such as ICT index (ICTX) in Model 11, Electricity index (ELECTX) in Model 12, and Transport index (TRSPX) in Model 13 were incorporated as interaction terms. The estimation procedure in these models is based on PMG for a panel of D-8 countries from 1980 - 2018. The long-run and short-run results of 6 Model 8-13 are presented in Table 4.14 and 4.15, respectively.

The estimation results of Table 4.14 show that the coefficient of LNGDP is positive and significant at any level of significance at 1 %, 5% and 10 % in all 6 Models. The coefficient of TOP is positive and significant in 3 out of 6 Models, negative in 2 out of 6 but negative significant in only 1 out of 6 Models.

The coefficient of FDI is also positive 5 out of 6, and significant in 4 out of 6 at any acceptable level of 1%, 5% and 10% in models but negative and significant in 1 out of 6 Models. The coefficient of URBAN is negative and significant in 4 out of 6 Models, however the rest of the 2 are insignificant. The coefficient of control variables UNEMP is significant in 4 out of 6 remain negative in all Models except positive and

insignificant in Model 12. The coefficient of TFR is negative and significant only in Model 9 and Model 10.

Table 4.14

PMG Results of Model 8-13: Long-Run

Variable	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13
LNGDP	0.186 (0.000) ***	0.191 (0.000) ***	0.048 (0.001) ***	0.253 (0.000) ***	0.033 (0.083) *	0.093 (0.001) ***
TOP	0.227 (0.000) ***	0.198 (0.000) ***	0.015 (0.557)	0.226 (0.000) ***	-0.149 (0.000) ***	-0.013 (0.797)
FDI	1.006 (0.001) ***	0.995 (0.002) ***	0.688 (0.006) **	1.481 (0.000) ***	0.157 (0.531)	-1.087 (0.002) ***
URBAN	-0.789 (0.000) ***	-1.123 (0.000) ***	-0.007 (0.944)	-1.350 (0.000) ***	0.112 (0.378)	0.189 (0.338)
UNEMP	-0.499 (0.000) ***	-0.854 (0.000) ***	-0.091 (0.441)	-0.724 (0.000) ***	0.154 (0.443)	-0.448 (0.037) **
TFR	0.003 (0.798)	-0.053 (0.000) ***	-0.006 (0.015) **	0.012 (0.137)	-0.001 (0.743)	-0.011 (0.340)
PE	-0.263 (0.000) ***	_	_	_	_	_
LNGDP***PE	0.116 (0.017) **	_	_	_	_	_
SE	_	-0.509 (0.000) ***	_	_	_	_
LNGDP*SE	_	-0.240 (0.000) ***	_	_	_	_
TE	_	_	-0.161 (0.000) ***	_	_	_
LNGDP*TE	_	_	-0.266 (0.003) ***	_	_	_
ICTX	_	_	_	-0.033 (0.001) ***	_	_
LNGDP*ICTX	_		_	0.024 (0.088) *	_	_
ELECTX	_	_	_	_	0.016 (0.075) *	_
LNGDP*ELECTX	_	_	_	_	-0.001 (0.000) ***	_
TRSPX	_	_	_	_	_	0.004 (0.539)
LNGDP*TRSPX	_	_	_	_	_	0.010 (0.073) *

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

Model 8 presents the interactive role of (LNGDP * PE). The coefficient of PE is negative and significant at 1 % implies that there exists indirect relationship between

PE and FLFPR. However, the coefficient of the interaction term of LNGDP and PE is positive and significant at 5 % level of significance shows that, as enrolment at primary level increases, it strengthens the positive impact of LNGDP on female labor force participation. That is total effect of LNGDP on FLFP can be presented as (0.186 + 0.116PE) that means increase in PE enhances the positive effect of LNGDP on FLFPR due to increased opportunities of employment in schools on the one hand, and reduced household burden for women with school going children on the other hand. The total effect of PE on FLFPR is (-0.263 + 0.116LNGDP), explains that 1 % increase in LNGDP reduces the negative impact of PE on FLFPR.

Model 9 presents the interaction term (LNGDP * SE). The individual effect of SE on FLFP is negative and significant at 1% level of significance. Likewise, the interaction effect of SE and LNGDP is also negative that reduces the positive impact of LNGDP on FLFPR. This implies that higher secondary enrolment and higher LNGDP work as substitutes and the total effect of LNGDP on FLFPR (0.191 – 0.240SE).

This shows that increase in SE reduces the positive effect of LNGDP on FLFPR. On the other hand, the total effect of SE on FLFPR can be presented as (-0.509 – 0.240LNGDP). This shows the increased economic growth induces women to acquire education, that leads women to enroll in schools by switching from the labor market, and further enhances the negative effect of SE on FLFPR.

Model 10 is based on inclusion of (LNGDP* TE) as interaction term. TE, and LNGDP*TE are also negative and significant at 1 % level of significance. The negative coefficient of TE implies that there is a negative relationship between tertiary

enrolment and female labor force participation. The negative interaction term demonstrates that LNGDP and TE work as substitutes, that is higher tertiary enrolment reduces the positive effect of LNGDP on FLFP and total effect of LNGDP on FLFPR is presented as (0.048 – 0.266TE).

The total effect of TE on FLFPR is presented as (-0.161 – 0.266 LNGDP) demonstrates that, an increased level of economic growth induces women to enhance their skills and knowledge due to the increased advancements on the one hand and rise in income and living standards on the other hand, enhances the negative effect of TE on FLFPR. It may well be attributed to increased economic growth triggering women to obtain education and eventually moving women from the job market and increases tertiary enrollment.

Model 11 is representation of (LNGDP*ICTX) as interaction term. The coefficient of ICTX is significant and negative at a 1 % level of significance. This shows that ICT technologies are negatively effecting FLFPR in developing countries. This is due to the increasing trend of GIG economy and outsourcing, robotic technologies.

As women in developing countries are not fully equipped or have less access to the latest ICT technologies, due to lack of information and access to these resources they cannot meet the requirement of advanced technologies, remain underprivileged and get less opportunities of employment created by newer technologies hence lower their participation in labor market. Moreover, the manpower is replaced by computers and technologies, women are more affected because they are usually involved in these jobs like computer operator, marketing accounting, etc.

On the other hand, the coefficient of the interaction term of LNGDP and ICTX is positive and significant at 10 % level of significance determines that increased ICT technologies stimulates the positive effect of LNGDP on FLFPR. The total effect of LNGDP on FLFPR can be stated as (0.253 + 0.024ICTX) reveals that improvement in ICT infrastructure enhances the positive effect of LNGDP on FLFPR. The total effect of ICTX on FLFPR can be expressed as (-0.033 + 0.024LNGDP) shows that higher economic growth reduces the negative impact of ICTX on FLFPR.

Model 12 includes (LNGDP * ELECTX) as interaction term. The coefficient of ELECTX is positive and significant at 10 % describes the positive association between electricity infrastructure and FLFPR due reduced time burden on household chores through adoption of household electrical appliances.

However, the coefficient of LNGDP and ELECTX is negative and significant at 1 %. This means an improvement in electricity infrastructure along reduces the positive impact of LNGDP on FLFP and the total effect of LNGDP on FLFPR is (0.033 – 0.001ELECTX) indicates that improvement in electricity infrastructure reduces the positive effect of LNGDP on FLFPR.

However, the magnitude of coefficient is very small that shows a small segment is affected by this, those who are poor and cannot afford the electrical appliances or electricity bill and or those who have not access to the latest electrical appliances due to higher prices. The total effect of ELECTX on FLFPR can be shown as (0.016 –

0.001LNGDP), shows that higher economic growth reduces the positive effect of ELECTX on FLFPR.

Model 13 is based on TRSPX and LNGDP as interaction terms. The coefficient of TRSPX does not show any significance in the model. The coefficient of interaction term LNGDP and TRSPX is significant and positive at 10 % level of significance implies that better access to transport infrastructure enhances the positive effect of LNGDP on FLFPR.

The total effect of LNGDP on FLFPR is (0.093 + 0.010TRSPX) which shows that improvement in TRSPX stimulates the positive impact of LNGDP on FLFPR through easy mobility and ease of access to the job place etc. The total effect of TRSPX on FLFPR is (0.004 + 0.010 LNGDP) entails that higher economic growth induces the positive effect of TRSPX on FLFPR by providing better transportation facilities and access to the distant place with more job opportunities.

Table 4.15 presents the short-run results of Model 8-13. The coefficient of ECT is negative less than 1 and significant in all 6 models from 8-13 at permissible level of either 1%, 5% or 10 %. The speed of adjustment towards long-run equilibrium for Model 8, Model 9, and Model 10 is 49 %, 56 %, and 49 % while for Model 11, Model 12 and Model 13 is 66 %, 51% and 53% respectively. The highest rate of adjustment is 66 % that is considered as fast speed of convergence.

Table 4.15

PMG Results of Model 8-13: Short-Run

Variable	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13
ECT	-0.496 (0.057) *	-0.566 (0.052) *	-0.491 (0.005) **	-0.667 (0.015) **	-0.515 (0.006) ***	-0.535 (0.007) **
DLNGDP	0.298 (0.294)	-0.357 (0.284)	0.027 (0.721)	0.078 (0.501)	0.368 (0.092) *	0.413 (0.023) **
DTOP	0.013 (0.775)	-0.111 (0.140)	-0.043 (0.073) *	0.122 (0.352)	-0.080 (0.274)	0.141 (0.021) **
DFDI	-0.352 (0.531)	-0.097 (0.766)	0.414 (0.561)	0.687 (0.703)	0.245 (0.669)	1.271 (0.464)
DURBAN	-9.270 (0.266)	-0.696 (0.958)	-3.690 (0.532)	2.617 (0.841)	-2.461 (0.626)	-9.711 (0.276)
DUNEMP	-0.373 (0.408)	1.475 (0.060) *	-0.074 (0.844)	1.248 (0.019) **	-0.469 (0.170)	-0.862 (0.422)
DTFR	-0.019 (0.889)	-0.854 (0.684)	0.001 (0.981)	-1.722 (0.453)	-0.398 (0.068) *	1.176 (0.030) **
DPE	-0.143 (0.455)	_	_	_	_	
DLNGDP*PE	0.102 (0.806)	_	_	_	_	
DSE	_	-0.136 (0.645)		_	_	
DLNGDP*SE	_	-0.073 (0.886)		_	_	
DTE	_	_	2.895 (0.025) **	_	_	
DLNGDP*TE	_	_	2.635 (0.012) **	_	_	
DICTX	_	_	_	0.713 (0.079) *	_	
DLNGDP*ICTX	_	_	_	0.429 (0.194)	_	
DELECTX	_	_	_	_	-0.080 (0.013) **	
DLNGDP*ELECTX	_	_	_	_	-0.003 (0.082) *	
DTRSPX	_	_	_	_	_	0.100 (0.332)
DLNGDP*TRSPX	_	_	_	_	_	0.022 (0.717)
C	-1.991 (0.056) *	-2.047 (0.060) *	-0.450 (0.011) **	-3.890 (0.014) **	-0.297 (0.019) **	-1.164 (0.007) **

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

4.3.4 Discussion of Results: Panel Data

Discussion of results revealed that demand-side factors such as economic growth (LNGDP), foreign direct investment (FDI) jointly affect female labor force

participation (FLFP) through generating more opportunities for jobs, advanced technologies, knowledge transformation. On the other hand, trade openness (TOP), urbanization (URBAN) also affects female labor force participation negatively by creating competition and discouraged worker effect.

This study employed 14 distinct Models for panel data analysis. The above analysis reveals that coefficient of economic growth (LNGDP) is positive and significant in 13 out of 14 models in the long run. The reason for the positive sign of LNGDP is that an increase in the stock of GDP is associated with the expansion of the production sector of the economy. Resultantly, demand for manpower increases accompanied by an increase in the general level of employment. This leads to increased employment opportunities in general. The female also takes benefit from these opportunities and participate in the labor market.

Secondly, due to increased economic growth, the provision of public goods including basic needs and social services became easy for the government to provide in addition to take care the human rights. So, it became easy for women to acquire skills and education to cope up with the market demand. This enhances their participation in the labor market. Another reason is the expansion of the services sector due to increased growth, and women mostly engage themselves in the services sector as it seems feasible for them to join these employments which requires less skill and physical efforts. One more possible reason for this positive relationship is that, due to economic development, the provision of childcare facilities also increases, which does not restrain women to enter in the labor market.

On the other hand, trade openness produced mixed results in this study, positive and significant in 5 out of 14 Models and negative and significant in 4 out of 14 models and remain insignificant in the rest of Models in the long run. The direct relationship between TOP and FLFP is an indication of increased employment opportunities for women in developing countries due to the expansion of trade and economic integration. This is due to the anti-discriminatory environment created by competition and integration that increases prospects for women employment, resultantly induces them to join labor market. These results are in line with (Green et. al., 2001) and (Black & Brainerd 2004). However, the negative sign of trade openness is due to increased competitiveness through trade openness, as women tend to low skills, they cannot compete with the new business environment easily. The skill biased technologies also hamper them to enter in the labor market. This study remains inconclusive in terms of trade policy effectiveness on women employment opportunities.

Similarly, the coefficient of FDI is positive and significant in 10 out of 14 models in the long run. The positive sign of FDI is also an indication of job creation, through technological transfer from the developed world to the developing countries. An increase in the general employment level also induces females to join the labor market. Hence this study concludes that positive effect of FDI is dominant in D8 countries that is in line with Maqsood and Samiullah (2014), however in few cases it is negative that is concedes with Cooray et al. (2012).

The results of urbanization factor also produced mixed evidence. The coefficient of URBAN in the long-run remains negative and significant in 6 out of 14 models and positive and significant in 4 out of 14 models, rest remain insignificant. Here the

negative effect dominates the positive effect of URBAN on FLFP suggests that women in D8 countries generally faces discouraged worker effect instead of added worker. This is associated with the surplus labor due to substantial increase in urban population, hence less opportunities for new entrants. These results were also supported by Tansel (2002). However, the positive effect of urbanization also cannot be ignored, as it creates more opportunities, only right policies needed to adjust women in competitive environment.

Few studies documented tourism with FLFP in the macro-economic framework. The positive sign of TOUR indicates that as a number of tourist arrival increases in a host country increases the community development at tourist places, this encourages women to engage in economic activities including hotel services, cleaning, cooking, sale of handmade products, and also increases the demand for services for the hotel industry, mostly women are employed in these services. For instance, hosting, receptionist, cleaners, cooks, etc.

However, this study found interesting results that the total fertility rate is positively associated with female labor force participation. This is because, as the number of children increases, the expenditures also increase. To meet the expenditures of the middle class and poor families, both males and females have to earn to feed their children. Therefore, it can be stated that amongst the other factors, demand-side factors also held responsible for alteration in female labor force participation as stated by Klasen and Pieters (2015) that, several supply and demand-side factors affect female labor force participation.

The above results show that ethno-linguistic and religious diversity has positive impact on FLFP individually, all three Models produce similar results. On the other hand, an interaction term for all three dimensions produces the same negative impact jointly with LNGDP. The reason for this negative impact might be the diverse environment induce the element of biasedness, competitiveness, language barrier, and discrimination. The men tend to absorb the cultural consequences as they are more exposed to perform their activities outside, on the other hand, females normally stay at home, this confined them to adopt new culture or intermingle in other cultures. This consequently reduces their ability to learn the language of other cultures. This makes it difficult for women to adjust to the labor market with diverse cultures.

One argument based on the results is that where there is diversity, there is a high element of rigidity instead of flexibility because it means where there are more cultural groups, they are more stick to their values, that is why they are divided into so many subgroups, and where there is less diversity meaning that they absorb other cultures easily. This shows the element of biasedness and discrimination in hiring process as normally shown by job advertisement. This discourages women to enter in the labor market as they are generally more stick to their norms and values. Furthermore, due to increased competition they are less able to adjust in the market.

This all leads to the victimization of women because they are more affected as compared to men. For instance, if a male does not find employment opportunities within their residing location they can easily migrate, but women generally do not, which in effect limits their ability to find a job, thereby decreasing the overall female labor force participation.

Another possible outcome of diversity is that with increased economic development, the diverse environment attracts more market-level opportunities, new companies, and businesses of diverse backgrounds. In consequence, this leads towards increasing the element of competition. As women in developing countries are less equipped with advanced skills, they are normally disadvantaged in terms of job opportunities. Few studies documented cultural diversity with female labor force participation, such as Koyuncu and Eda (2017).

The results are consistent with this study while observing the individual impact, however, the results of interaction term are contrasting. Hence, it can be stated that the countries who have higher ethno-linguistics, religious diversity, would get less benefit for women employment prospects from increased economic growth in the long run due to higher competitive environment. So, a comprehensive gender-based policy framework is needed in order to meet the changing pattern of economic structure for women employment.

Furthermore, the above analysis revealed that the countries who enjoy more freedom of rights including political rights, civil liberties have greater chances of FLFP and vice versa. On the other hand, democracy effect positively FLFPR, but interacting with LNGDP it is affecting negatively showing that complete democracy will decrease the positive effect of LNGDP on FLFP. This shows that direct democracies induce informal economic activities, resultantly reduces the positive effect of economic growth on FLFPR. But marginal impact remains higher which shows that LNGDP is a significant contributor in enhancing FLFP even in the weak political environment or institutional quality.

The results of this study are consistent with Cooray et. al. (2017) who stated that political institutions like, democracy, political rights, and civil liberties are crucial in increasing female labor force participation. Likewise, the results also support the findings of Eastin and Prakash (2013), who stated that role of social political and cultural factors in determining this relationship between economic development and female labor force participation. Hence it is appropriate to suggest some political reforms to get benefit from the female workforce, as it enhances their ability to participate in the labor market.

The results of the interaction effect of different enrolment levels and LNGDP on FLFP reveals that as economic growth increases, it provokes women to acquire education and skills to meet the demands of new opportunities. It is found that secondary and tertiary school enrolments are more crucial to alter FLFPR as compared to Primary enrolment. One possible reason of low participation of women both individually and combined with LNGDP is that when women achieve a certain level of education, they expect to get a better position, however, the market opportunities are not favorable for women, mostly they are adjusted in low paid and low position jobs, this demotivates most of the women to enter in the labor market. Only those women join the market who are compelled by their burden of family expenditure and low income.

The above results of infrastructure facilities stats that infrastructure facilities are crucial for women employment behavior. For instance, the individual effect of ICT index on FLFP is negative and significant. Rapid diffusion of ICTs in past few decades replaced by manual works, increasing trend of GIG and outsourcing labor saving technologies reduces demand for manpower labor. Women are less likely to adopt

these technologies comparative to men. This is associated with mismatch of ICT skill level of women in developing countries resultantly low FLFP. The negative impact of ICT on FLFP is consistent with the study of Samargandi et. al. (2019). On the other hand, the interactive effect of ICT and economic growth is positive. Thus, it can be implied that, countries with high diffusion of ICTs, can also enjoy high FLFP only with increased economic growth and, vice versa.

The results of ELECTX reveals that ELECTX has positive influence on FLFP in the long run. The results are consistent with Cavalcanti and Tavares (2008), who found the positive impact of electrical appliances on female labor force participation. However, the interaction coefficients are negative. There are two reasons for this negative coefficient. Firstly, with increased economic growth and ELECTX, the manpower was replaced by new machinery and electrical appliances. Women in developing countries are usually engaged in jobs like agriculture, cleaning, housemaids, etc. The induction of new machinery has lessened their role and they are affected negatively and participate less in the labor market. Secondly, the electrical appliances are costly in developing countries especially for poor women. This might be the reason of performing all domestic chores manually leave them busy and confine them to participate in the work outside home.

The results of TRSPX show that both individual and interactive effects are positive. However, the individual effects are not significant in the long run but, interactive effects are significant. The reason of insignificance of the TRSPX is the proxies incorporated to measure transport index in this study are not directly related to female employment. But it represents the overall infrastructure of country their relative

importance cannot be denied. That is why, the interactive effect is positive and significant implies that FLFP can only be enhanced with higher economic growth if country infrastructure is strong and vice versa. Thus, it can be concluded that infrastructure facilities can drive FLFP in both directions, however, the interaction effects of these indices with LNGDP left the marginal impact of LNGDP same for all Models, implying that economic growth is a significant factor of FLFPR.

4.4 Time Series Analysis

This section provides the analysis based on time series of D-8 countries. This estimation carried for objective 4 that is to test the validity of nonlinear U- shape hypothesis in each of the D-8 country separately. This section presents the results of test of stationarity of the data and ARDL Model estimation results. The detail stepwise procedure is given in the proceeding sections.

4.4.1 Test of Stationarity

To test the behavior of time series data, the test of stationarity is conducted by checking the unit root of the variable. The summary of the results of ADF and PP tests are presented in Table 4.16. The results from both tests indicate that all variables are not stationary at level, either integrated of level I (0) or integrated of order I (1). FLFPR is stationary at level either constant/trend stationary at I (0) for all countries and FDI is stationary at a level I (0) for all countries except Iran and Turkey. Similarly, TOP is also stationary at the level I (0) for only Indonesia, Egypt, Nigeria, and Turkey. Rest of the variables are stationary at I (1) for all D-8 countries.

Table 4.16

Summary of Unit Root: Time Series Data (1980-2018)

COUNTRY	FLFPR	LNGDPPC	$LNGDPPC^2$	TOP	FDI	UNEMP
Bangladesh	I (0)	I (1)	I (1)	I (1)	I (0)	I (1)
Egypt	I (0)	I (1)	I (0)	I (0)	I (0)	I (0)
Indonesia	I (0)	I (1)	I (1)	I (0)	I (0)	I (1)
Iran	I (0)	I (1)	I (1)	I (1)	I (1)	I (1)
Malaysia	I (0)	I (1)	I (1)	I (1)	I (0)	I (1)
Nigeria	I (1)	I (1)	I (1)	I (0)	I (0)	I (1)
Pakistan	I (0)	I (1)	I (1)	I (1)	I (0)	I (1)
Turkey	I (1)	I (1)	I (1)	I (0)	I (1)	I (1)

This implies that null hypothesis of stationarity cannot be rejected at a level for all variables due to the insignificant p-value at any admissible critical values at 5 % and 10%. On the other hand, all variables are stationary at the first difference I (1) for all countries. It is also evident that no variable is stationary at the second difference I (2). Therefore, the order of integration is mixed either I (0) or I (1). The mixed order of integration leads towards the selection of the ARDL Model for the long-run and short-run estimation. The detailed results of unit root are presented in Appendix G (Table 3). The detailed stepwise procedure of ARDL is presented in the next section.

4.4.2 Optimal ARDL Model Selection

The observation made from the above said unit test in the preceding section that order of integration is mixed for all countries both at first difference and level. this suggests that ARDL is an appropriate technique for this type of data. Hence, the ARDL Model selected for the present study, which involves several steps. At the first step, optimal

lags for the ARDL Model are selected based upon the Akaike information criterion (AIC) and SC.

The results of selected Models are attached in Appendix H (Table 1-Table 8) for each country, respectively. The selected optimal ARDL Model for each country are: ARDL (1, 1, 1, 0, 1, 1), ARDL (1, 3, 3, 0, 0, 0), ARDL (2, 3, 1, 2, 0, 1), ARDL (2, 3, 3, 3, 3, 2), ARDL (2, 4, 4, 0, 2, 4), ARDL(1, 3, 3, 0, 1, 2), ARDL(2 3 3 3 3 3 3), ARDL (1, 1, 1, 1, 1, 1) for Bangladesh, Egypt Indonesia, Iran Malaysia, Nigeria Pakistan and turkey respectively selected based upon the aforementioned criterion.

4.4.3 The ARDL Bound Test

To validate the incidence (or non-existence) of a long-run relationship among dependent and independent variables, the cointegration analysis applied through Bound test based on previously examined unit root having mixed order of integration of series I (0) and I (1).

Table 4.17 presents the results of the Bound test. The calculated value of F-statistics is higher than the lower bound I_0 critical values for all country cases at a level of significance either 10%, 5%, 2.5%, and 1 %. Similarly, the calculated value of F-statistics remains higher than the upper bound for all country cases at each of the levels of significance discussed above. Therefore, the results of F-statistics confirmed the existence of a long-run relationship amongst the variable. In order to examine the significance, signs of coefficients of the short-run, and long-run results of ARDL are presented in the next section.

Table 4.17

The ARDL Bound Test

Test Statistic	Value	K	Significance	I0 Bound	I1 Bound
Bangladesh				Critical Bounds	
F-statistic	6.061	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Egypt					
F-statistic	4.441	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Indonesia					
F-statistic	4.314	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Iran					
F-statistic	6.101	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Malaysia					
F-statistic	4.749	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68

Table 4.17 (continued)

Nigeria					
F-statistic	3.938	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Pakistan					
F-statistic	4.182	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68
Turkey					
F-statistic	4.432	5	10%	2.26	3.35
			5%	2.62	3.79
			2.50%	2.96	4.18
			1%	3.41	4.68

Model 14: Long-Run and Short-Run Results of ARDL

This section provides the long run and short run results of ARDL results. Since the objective of this analysis was to validate the existence of the U-shape hypothesis in D-8 countries, and the U-shape is a long-run phenomenon the more attention is given to the long-run estimates. Having examined from the preceding discussions that almost all Models confirm the existence of cointegration, the long-run estimates of the ARDL model are shown in Table 4.18.

The coefficient of LNGDPPC is significant and positive for Bangladesh, Indonesia Iran, Malaysia, and Pakistan at the permissible level of significance either 5% or 10 %. On the other hand, the coefficient of LNGPPC is negative and significant for Egypt, Nigeria, and Turkey at a level of significance either 5 or 10%.

Likewise, the coefficient of quadratic term $LNGDPPC^2$ is also significant at either of each level of significance at 5% or 10%. The coefficient of $LNGDPPC^2$ is negative in the case of Bangladesh, Indonesia Iran, Malaysia, and Pakistan and positive for Egypt, Nigeria, and Turkey. The opposite signs of both terms in each country case confirm the existence of nonlinear relationships amongst economic growth and female labor force participation. However, there exists an inverted U-shape in the case of Bangladesh, Indonesia, Iran, Malaysia, and Pakistan, and U-shape in the case of Egypt, Nigeria, and Turkey given the estimates of the positive and negative coefficient of LNGDPPC and $LNGDPPC^2$ and vice-versa.

Moreover, the coefficient of control variables including TOP, FDI, and UNEMP also presented here. The coefficient of TOP is significant and negative in Bangladesh, Indonesia, Iran, Malaysia, and Pakistan and positive for Egypt, Nigeria, and Turkey. The coefficient of FDI is significant and positive only in Iran and Nigeria and remains insignificant for rest of the countries. The coefficient of the UNEMP is significant and negative for all countries except Egypt (insignificant) and turkey (positive but insignificant).

Table 4.18

ARDL Results of Model 14: Long-Run

Variable	**Bangladesh**	**Egypt**	**Indonesia**	**Iran**	**Malaysia**	**Nigeria**	**Pakistan**	**Turkey**
LNGDPPC	59.796	-6.596	3.303	7.786	1.131	-6.047	9.721	-11.906
	(0.031) **	(0.068) *	(0.006) **	(0.000) ***	(0.029) **	(0.065) *	(0.018) **	(0.000) ***
$LNGDPPC^2$	-4.615	0.433	-0.215	-0.448	-0.108	0.411	-0.667	0.645
	(0.038) **	(0.065) *	(0.006) **	(0.000) ***	(0.036) **	(0.059) *	(0.022) **	(0.000) ***
TOP	-6.069	0.078	-0.323	-0.280	-0.275	0.201	-0.806	0.228
	(0.071) *	(0.521)	(0.014) **	(0.001) ***	(0.035) **	(0.000) ***	(0.023) **	(0.055) *
FDI	91.705	0.710	-0.235	4.064	-0.899	3.109	2.928	-0.294
	(0.177)	(0.289)	(0.698)	(0.000) ***	(0.548)	(0.002) ***	(0.227)	(0.689)
UNEMP	-77.840	-0.325	-0.802	-0.838	-15.245	-0.604	-1.601	0.006
	(0.014) **	(0.799)	(0.046) **	(0.001) ***	(0.046) **	(0.001) ***	(0.087) *	(0.984)
C	-189.263	25.341	-11.948	-33.509	-29.032	22.633	-34.694	55.074
	(0.026) **	(0.069) *	(0.009) **	(0.000) ***	(0.087) *	(0.066) *	(0.015) **	(0.000) ***

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

The short-run results of ARDL given in Table 4.19. The first thing to observe in the turn results is error correction term which is an indication of co-integration on the one hand, and speed of convergence to the long-run equilibrium on the other hand. The condition for the presence of convergence is that the coefficient of error correction term must be negative, significant, and less than 1.

The reported results indicate that the coefficient of ECT is significant at 5%, less than 1, and negative for all D-8 countries. However, the speed of convergence can be observed by the value of the coefficient. For instance, the rate of convergence is 12.1 % for Bangladesh, 69.9 % for Egypt, 77.5 % for Indonesia, 64.1 % for Iran, 35.4 % for Malaysia, 52.0 % for Nigeria, 87.8 % for Pakistan and 52.1 % for Turkey. The highest rate of convergence observed for Pakistan 87.8 %, followed by Indonesia 77.5 %, Egypt 69.9 % and Iran 64.1 % considered as fast rate of convergence to the long-run equilibrium. The lowest speed of convergence is for Bangladesh 12.1 % while Malaysia exhibits comparatively moderate speed of convergence and Turkey and Nigeria show good speed of convergence.

Table 4.19

ARDL Results of Model 14: Short-Run

Variable	**Bangladesh**	**Egypt**	**Indonesia**	**Iran**	**Malaysia**	**Nigeria**	**Pakistan**	**Turkey**
ECT	-0.121	-0.699	-0.775	-0.641	-0.354	-0.520	-0.878	-0.521
	(0.033) **	(0.000) ***	(0.000) ***	(0.000) ***	(0.016) **	(0.001) ***	(0.000) ***	(0.002) ***
DLNGDPPC	-26.760	-16.459	0.053	-1.659	-15.077	4.826	53.547	-10.433
	(0.177)	(0.204)	(0.814)	(0.143)	(0.006) ***	(0.066) *	(0.014) **	(0.000) ***
$DLNGDPPC^2$	2.182	1.053	-0.280	0.189	0.823	-0.321	-3.982	0.562
	(0.177)	(0.227)	(0.114)	(0.019) **	(0.008) **	(0.071) *	(0.014) **	(0.000) ***
DTOP	-0.732	0.054	-0.133	0.145	-0.097	0.105	-0.340	-0.015
	(0.009) **	(0.519)	(0.082) *	(0.005) **	(0.000) ***	(0.002) ***	(0.065) *	(0.759)
DFDI	6.468	0.496	-0.182	0.726	0.569	0.881	0.027	-0.918
	(0.076) *	(0.271)	(0.701)	(0.011) **	(0.121)	(0.001) ***	(0.985)	(0.041) **
DUNEMP	-4.334	-0.227	0.645	0.369	-6.267	-0.292	-0.451	-0.627
	(0.025) **	(0.795)	(0.275)	(0.022) **	(0.000) ***	(0.015) **	(0.026) **	(0.026) **

Note: ***, **, * indicate the level of significance at 1%, 5 % and 10 % respectively. Probability values are given in ()

4.4.4 SLM U Test

Table 4.20 presents the results of SLM- U test to validate the presence of U pattern. The main thing to observe here is the sign of slope coefficients at upper and lower bounds and their level of significance, respectively. These results show that slope coefficient at lower bound is significant and positive for Bangladesh, Indonesia, and Pakistan, significant and negative for Malaysia, Nigeria, and Turkey, and insignificant for Egypt and Iran.

On the other hand, slope coefficients at upper bound reveal that it is negative and significant for Bangladesh, Indonesia, and Pakistan, positive and significant for Malaysia, Nigeria, and Turkey, and remain insignificant for Egypt and Iran. This shows that there exists inverse U shape in case of Bangladesh, Indonesia and Pakistan and traditional U shape in Malaysia, Nigeria, and Turkey.

The results of SLM -U test are somehow different from ARDL test results. Looking at the sign of slope coefficients, it produced similar results except Malaysia where it shows opposing signs. On the other hand, looking at the level of significance, (Bangladesh, Indonesia, Pakistan) exhibit inverse U and (Malaysia, Nigeria, and Turkey) exhibit traditional U 6 out of eight D-8 countries shows a significant nonlinear relationship between FLFPR and GDP per capita either U or inverted U except Egypt and Iran. Hence these results also confirms that feminization U theory has little empirical support.

Table 4.20

SLM U Test Results

Variable	**Bangladesh**	**Egypt**	**Indonesia**	**Iran**	**Malaysia**	**Nigeria**	**Pakistan**	**Turkey**
Slope at lower bound	2.450	-0.108	0.234	0.036	-0.078	-0.017	1.630	-0.695
	(0.000) ***	(0.254)	(0.002) ***	(0.145)	(0.056) *	(0.433)	(0.078) *	(0.000) ***
Upper bound	-0.917	0.114	-0.111	-0.010	0.179	0.348	-1.574	0.418
	(0.005) **	(0.150)	(0.049) **	(0.349)	(0.01) **	(0.01) **	(0.077) *	(0.000) ***
Extreme point	6.764	7.478	7.961	8.718	8.500	7.220	6.711	9.205

Note: ***, **, * indicate the level of significance at1%, 5 % and 10 % respectively. Probability values are given in ().

4.4.5 Discussion of Results: Time Series Data

This sub section discusses the above time series results. This analysis was based on RO4 to test the validity of feminization U hypothesis in D-8 countries. The analysis conducted for 8 members of D-8, separately. The results reveal that there exist inverted U between economic growth (LNGDPPC) and FLFP in 5 out of 8 countries (Bangladesh, Indonesia, Iran, Malaysia, and Pakistan), and traditional "U" for 3 out of 8 (Egypt, Nigeria, and Turkey) D-8 countries according to traditional approach of introducing quadratic term in ARDL model.

However, the formal test of U shape SLM-U test reveal that there exist inverse U in 3 out of 8 (Bangladesh, Indonesia, and Pakistan) and U shape in 3 out of 8 (Malaysia, Nigeria, and Turkey). These results show consistency with the assumption of a nonlinear relationship between economic growth and female labor force participation however, this study does not confirm the traditional U-shape for all D-8 countries as suggested by Feminization U theory. These results are in line with (Gaddis &Klasen, 2011), who stated that Feminization U has little relevance for most of developing countries. The results of this study also coincide with Lechman and Kaur (2015) who did not verify U-shape for low-income countries.

The reasons for heterogeneous pattern amongst economic growth and FLFP are country specific factors. For instance, the composition of production sector is important to consider. Secondly, the income distribution is also an important factor, the U-shape pattern does not hold true for the extremely poor segment of population. As most of the low-income countries are occupied with extremely poor population, the changing pattern of economic growth does not affect their socio-economic conditions

at large. Finally, the cultural and religious distribution, composition of labor, and demand side opportunities amongst other factors also crucial in altering the behavior of women employment.

4.4.6 The ARDL Diagnostic Test

This section presents the numerous post estimation diagnostic checks including Ramsey Regression Equation Specification (RESET) for Model specification, Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) test for the occurrence of autocorrelation, and Breusch-Pagan-Godfrey (BPG) test for checking the possibility of heteroscedasticity and variance inflation factor (VIF) to test the multi-collinearity in the Model to validate the results reported above. The summary of these results is presented in Table 4.21.

Results of the Ramsey RESET test conducted for each country show that the Model is correctly specified given by the probability values of t-statistics and F-statistics are insignificant at a 5 % level of significance. So, this study accepts the null hypothesis that the Model is correctly specified. Similarly, the results of the autocorrelation test (Breusch-Godfrey Serial Correlation LM test) showed that Model is not suffering from serial correlation as can be observed by the probability values of both F-statistics and t- statistics are insignificant at 5 % level of significance. Therefore, the null hypothesis of no serial correlation cannot be rejected, and it can be said residuals are serially independent and not correlated in each period.

Table 4.21

The ARDL Diagnostic Tests

Countries	**Ramsey Reset Test**		**Serial Corr Test**		**Hetero- Tests**		**VIF**
	t-stat	F-statistics	F-statistics	Obs*R-squared	F-statistic	χ2-statistic	Mean
Bangladesh	1.531 (0.138)	2.345 (0.138)	1.653 (0.212)	4.438 (0.109)	1.019 (0.454)	10.411 (0.405)	6.61
Egypt	1.526 (0.141)	2.328 (0.141)	1.047 (0.369)	3.265 (0.195)	1.698 (0.133)	16.912 (0.153)	2.62
Indonesia	1.826 (0.083) *	3.335 (0.083) *	0.003 (0.955)	0.006 (0.939)	1.220 (0.331)	16.145 (0.305)	2.45
Iran	1.386 (0.189)	1.922 (0.189)	0.508 (0.614)	2.810 (0.245)	1.149 (0.403)	22.780 (0.356)	1.81
Malaysia	0.515 (0.615)	0.265 (0.615)	0.455 (0.639)	1.155 (0.561)	1.256 (0.343)	23.442 (0.321)	1.70
Nigeria	0.727 (0.476)	0.528 (0.476)	0.256 (0.777)	0.997 (0.608)	1.070 (0.436)	16.030 (0.380)	1.28
Pakistan	0.160 (0.875)	0.026 (0.875)	0.997 (0.388)	3.323 (0.190)	1.484 (0.233)	25.746 (0.263)	1.86
Turkey	0.996 (0.329)	0.993 (0.329)	1.462 (0.252)	4.127 (0.127)	1.913 (0.085)*	16.998 (0.108)	2.95

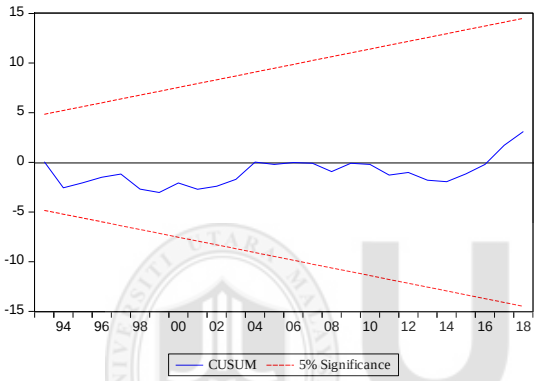
Note: ****, **, * indicate the level of significance at1%, 5 % and 10 % respectively Probability values are given in (). Only Indonesia, and Turkey has a significant value at 10 %, which considered as negligible for continuity of analysis.

Likewise, to test the presence of heteroscedasticity, the Breusch-Pagan-Godfrey heteroscedasticity test was conducted in each country. The results are reported based on F-statistic χ2-statistic; the probability values of both tests are insignificant at 5 % level of significance for each country. Therefore, the hypothesis for homoscedasticity is accepted with the conclusion of the constant variance of the residuals in the Model-free from heteroscedasticity.

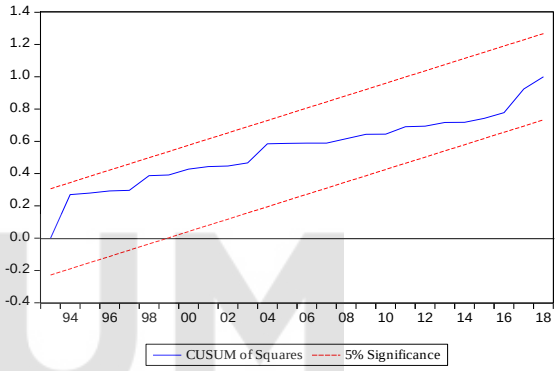
In addition, the results of VIF are also presented here to check the possibility of multi-collinearity. The mean value of VIF is less than 10 for all variables in all country cases confirmed that the Model is not suffering from multi-collinearity when excluding the quadratic term from the Model.

4.4.7 Stability Test of the Model

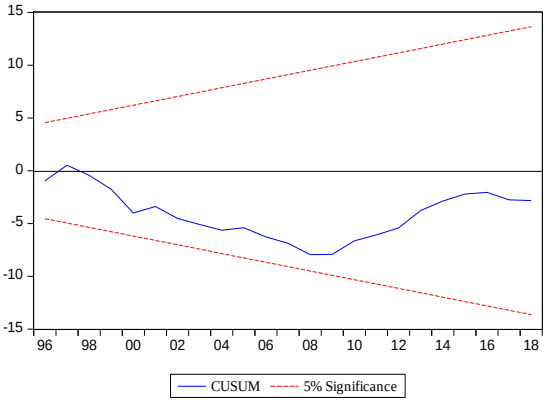
CUSUM and CUSUMQ tests were performed to examine the stability of the Model. these results of these tests are presented in graphical form in Fig 4.1 for each D-8 country. The graphs show that stability lines in both CUSUM and CUSUM of squared lie between the critical bounds, therefore the Model is said to be stable in each country case.



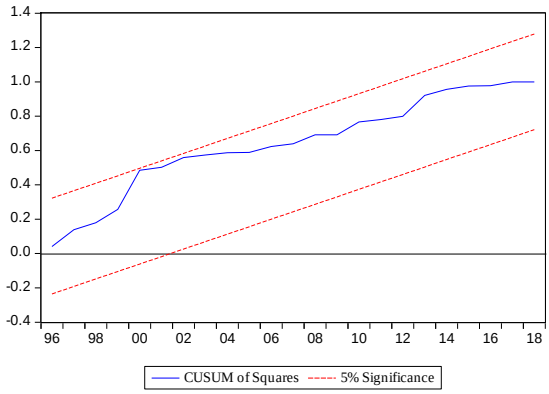
Bangladesh



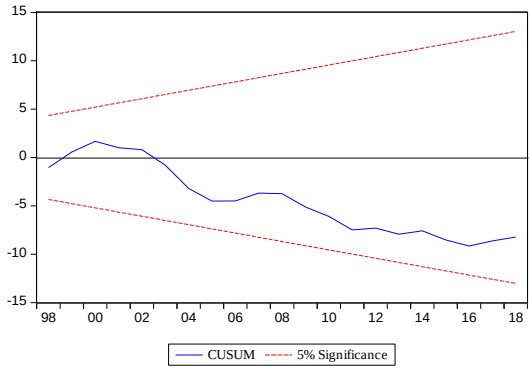
Bangladesh



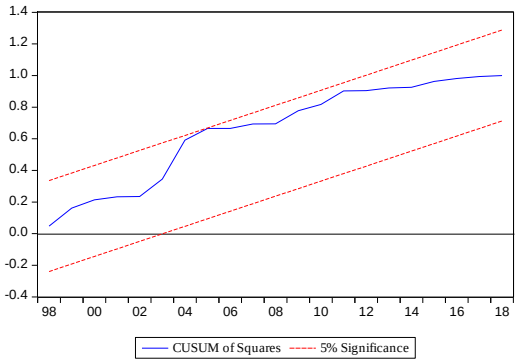
Egypt



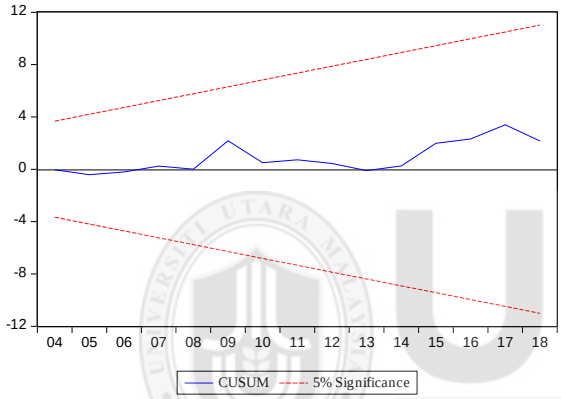
Egypt



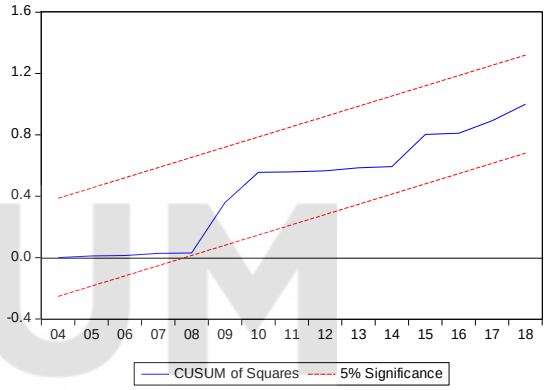
Indonesia



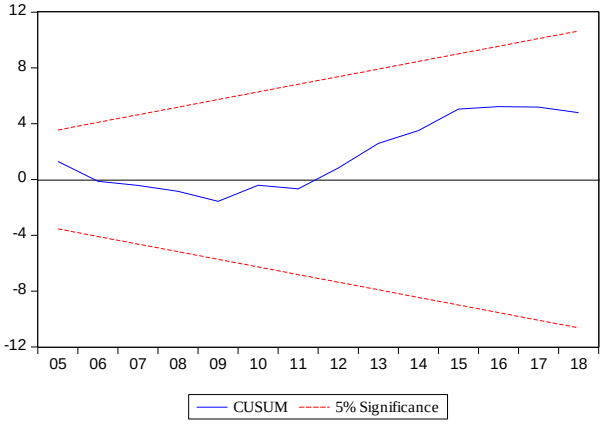
Indonesia



Iran



Iran



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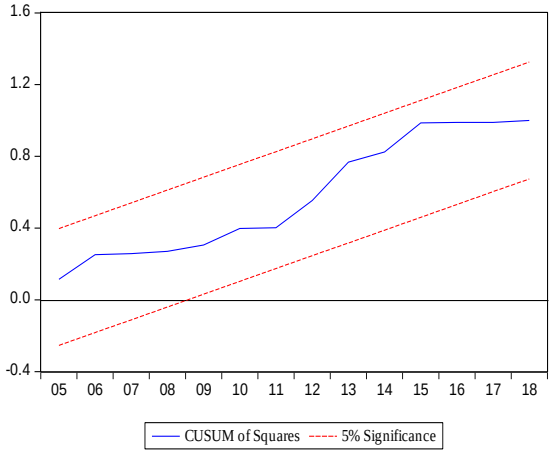

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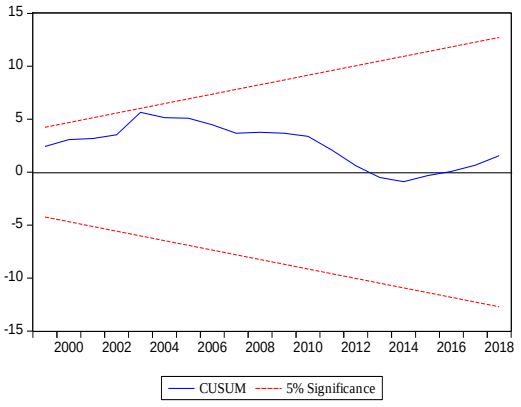

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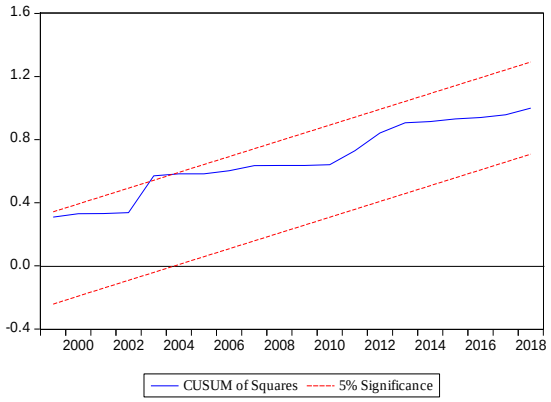

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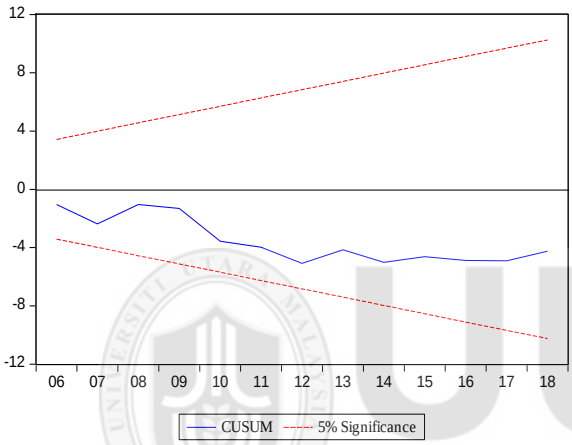
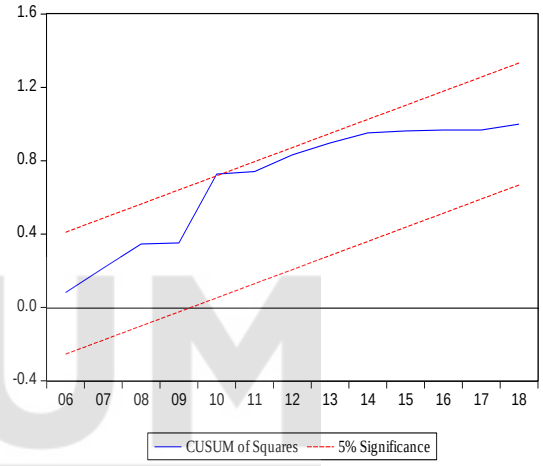


Pakistan



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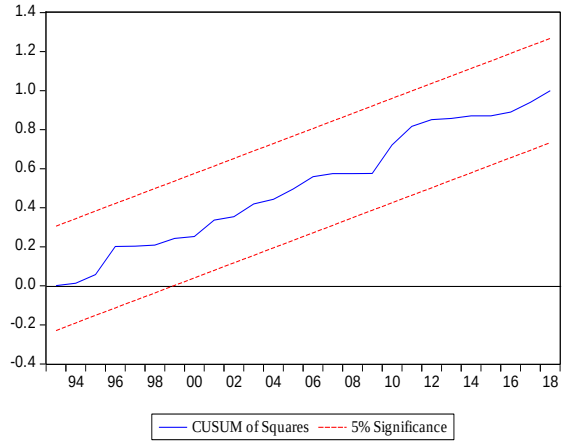
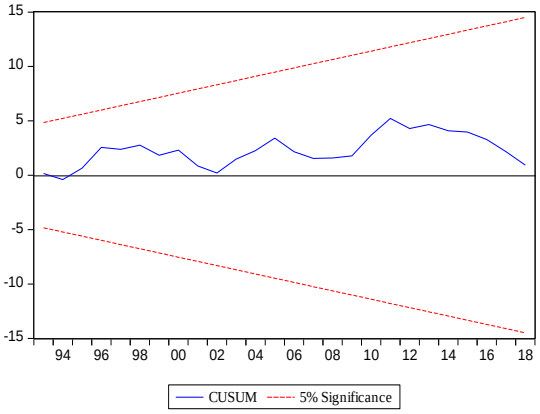


Turkey



Turkey

Figure 4.1

The CUSUM and CUSUMQ for the Model Stability

4.5 Conclusion

This study has four objectives. Objective 1 examined the effect of demand side factors on female labor force participation. The results of the present study are in accordance with the underpinning theory of structural change and feminization U hypothesis. The positive coefficient of LNGDP in all Models of panel data explains that FLFP increases with increased economic growth. This implies that macro-economic conditions are crucial in altering FLFP in D-8 countries.

In the case of FDI and trade openness, the results are mixed, in some cases, positive while in other cases it shows a negative effect on female labor force participation, hence remain significant. This implies that globalization also affect the labor force participation behavior due to fluctuation in labor demand. The second and third objective examined the interaction effect of diversity, political environment, and infrastructure on FLFPR. The interaction term included in the Model shows a significant impact on female labor force participation. The Model 1.2 of panel data shows that tourism is also a significant factor of FLFP. This shows that demand-side factors are held responsible for determining FLFP amongst others.

The last objective observed the nonlinear relationship between FLFPR, and economic growth achieved through time series data. The results of time series data for testing the nonlinear relationship between economic growth and FLFP also prove the validity of the nonlinear relationship between female labor and economic growth. However, the nature and extent of relationship may vary in each country such as it is inverse U shape in case of Bangladesh, Indonesia, Iran, Malaysia, and Pakistan and U-shape for Egypt,

Nigeria, and Turkey when applied ARDL model. On the other hand, it is inverse U shape in Bangladesh, Indonesia and Pakistan, U shape in Malaysia, Turkey and Nigeria when applied SLM-U test. In case of Egypt and Iran the sign of slope coefficients is same as in ARDL model but remained insignificant.

CHAPTER FIVE

CONCLUSION AND POLICY RECOMMENDATIONS

5.1 Introduction

This study has 4 objectives, the first objective examined the effect of demand-side macroeconomic factors (Economic Growth, trade openness, FDI, urbanization, and tourism development) on female labor force participation. This objective was achieved through Model 1.1 and Model 1.2. The effect of LNGDP and FDI on FLFP is positive while trade openness contributed negatively. However, the effects of Urbanization are found to be mixed. The effect of tourist arrivals on FLFP is positive and significant. These results are in line with the theory of structural change, which states that structural change alters the whole functioning of the economy.

The second objective examined how do cultural diversity, religious diversity, and political environment interact between economic growth and female labor force participation. This objective was achieved through the inclusion of six interaction terms with LNGDP enter one by one Model 2 to model 7. It is found that all three dimensions of diversity have a positive impact on FLFP. The impact of interaction terms of diversity and economic growth impedes the positive effect of economic growth on FLFP. Similarly, democracy has a positive impact on FLFP. However, the interactive effect of democracy and GDP reduces the positive effect of GDP on FLFP. Similarly, strong civil liberties and strong political rights have a positive influence on FLFP.

Objective three assess the role of education and infrastructure in driving the relationship between economic growth and female labor force participation. It is found that level of education at secondary and tertiary levels have negative while primary level has positive impact on FLFPR. The interaction between economic growth and different enrolment levels reduces the positive effects of economic growth on FLFP. These results are in line with structural change theory and feminization U theory. The diffusion of ICTs is negatively associated with FLFP. However, FLFPR can be stimulated by joint increase in ICT and economic growth. On the other hand, positive association between electricity infrastructure and FLFP show that access to electricity and electricity consumption can help women to manga their time to perform household work and work outside home. But with the increased economic growth and consumption of electrical appliances at large, both at domestic level and for manufacturing purposes can affect the employment of poor women, because their work typically replaced by machines and they can lose their jobs. On the other hand, access to quality transport infrastructure jointly with economic growth can stimulate women participation in labor activities and vice versa.

Objective four tested the nonlinear ("U" shape) relationship between GDP per capita and FLFP in each D-8 country. The study concluded that Bangladesh, Indonesia Iran, Malaysia, and Pakistan experienced an inverse U-shape. On the other hand, Egypt, Nigeria, and Turkey had a U-shape. These results concede the nonlinear relationship between economic growth and FLFP. However, these results did not confirm the conventional U shape in all cases that suggested by the feminization U hypothesis. This pattern represented that FLFP drops in initial stage of economic growth and gradually increases as country advances its economy.

5.2 Policy Implications

Keeping in view that women are an integral part of human resources, they should not deprive of their basic rights, including employment opportunities. Ironically, the current pandemic (COVID 19) has taught us serious lessons, that countries should not rely only on external resources, along with that the internal available resources should not remain idle or under-utilized. The participation of females is an eminent example in this scenario. While there is no concrete legislation for women's employment in D-8 countries. This study proposes some policy implications based on the findings.

5.2.1 Macro-Economic Demand Side Factors and Female Labor Force Participation

This study aims to assess the effect of macroeconomic demand-side factors on FLFPR in D-8 countries. Considering the positive impact of GDP as main demand-driven factor of female labor force participation, a macroeconomic female-friendly policy framework for D-8 countries, is required to facilitate, equip, and enable women to access the labor market as well as to cope up with the recent demands of newer technologies generated by trade openness, FDI and Urbanization. Although, the government has made several efforts towards facilitating women, however, more efforts are required.

Considering the positive impact of GDP, as main demand driven factor for FLFP, an inclusive macro-economic female friendly policy framework for D-8 countries is required. For example, economic growth enables government to the provision of public services that could enhance female participation through providing them better

workplace environment, microfinance for entrepreneurial activities, vocational training, computer literacy, and quotas for women employees.

The mixture evidence from TOP, FDI, and Urbanization indicated that women are facing discouraging workers effect due to skill-biased technologies, and the high demand for newer technologies and higher competition. Thus, the government should consider gender role while framing trade and investment policies. The government could enhance policies related to workplace including "on job training programs for women", women's access to better high paid jobs, childcare facilities near the workplace, transportation allowance and flexible working hours. In addition, it is also required an effective regulatory framework to promote a favorable workplace environment for women such as special pay schedule, healthcare facilities, medical allowances, maternity pay leaves, etc.

5.2.2 Ethno-Linguistic, Religious Diversity and Female Labor Force Participation

This study suggested that a diverse environment has a dual effect on female labor force participation, firstly all diversity measures are positively associated with FLFPR. On the other hand, when they interact with economic growth, the ethnolinguistic and religious diversity impedes the positive effect of economic growth on FLFPR. This designates that integration of diverse culture increases the competitive and discriminatory environment, women in these countries face challenges of the language barrier, cross-culture discrimination, and religious restriction. It is highly desirable that the government should facilitate women with short term language courses instead of advertising jobs specifically for certain language groups. The role of the private sector

and multinational companies is also very important in this case; it should be part of their CSR policies to remove the language barriers in accordance with the principle of moderation.

Secondly, there should be a flexible policy for all ethnicities and religious groups. On the government level, it is accomplished somehow, but the role of the private sector is highly important. There should be special quotas for every ethnicity, minorities, and specifically for females, labor market regulation is highly important.

5.2.3 Political environment and Female Labor Force Participation

This study also incorporated the role of the political environment in determining the relationship between FLFP and the economic environment. It is evident that institutions have a strong influence in directing the female labor force participation. The strong political reforms are required to ensure the protection of rights for every individual, especially female. The government should further enhance the legislations such as the right to vote, political participation, employment laws, freedom of movement, safety, and security at the workplace especially focusing anti-harassing laws for women, choice of occupation, etc. This is a necessary step for the empowerment of women to strengthens their bargaining power at the household level and the workplace.

5.2.4 Education and Female Labor Force Participation

The findings show that enrolment is negatively associated with female labor force participation, indicating that women in developing countries tend to increase their education and skill due to economic growth and the introduction of advanced

technologies. This shows their potentiality to enter in the labor market. However, when women get a certain level of education, they expect better jobs, but they are failed to get a job according to their abilities either low paid or low level. The government should ensure the minimum wage policy for a certain level of education especially for women who are disadvantaged in terms of finding a better position, but this should not reduce the number of employments.

Educated women in developing countries mostly segregated in some specific professions, for instance, teaching, nursing, etc. it is highly demanded that the government should ensure the availability of daycare centers and pre-schools near the workplace, most importantly in universities and schools.

5.2.5 Infrastructure Facilities and Female Labor Force Participation

The findings show that ICT infrastructure has a negative relationship with FLFP when measured individually. This shows that advent of newer technologies increased the Gig Economy, labor saving technologies, outsourcing, and free lancing etc. The government should ensure the proper dissemination of new technologies to the poor women and training programs to cope with new technologies.

On the other hand, the interactive effect of ICT and GDP enhances the positive effect of economic growth on female labor force participation and vice versa. Thus, taking benefit from the expanded production sector, the development of ICT infrastructure is necessary. The government should take responsibility for the proper diffusion of ICT technologies for communities in large and provide special training programs such as computer literacy and greater access to newer technologies for poor and

underprivileged women. The private sector and multinational companies should also introduce short term courses and on job training programs to enhance the capabilities of women so that they should not be deprived and discriminated.

It is also found that electricity infrastructure has a positive impact when estimated individually but reduces the positive effect of economic growth on FLFP when estimated as an interaction term. The negative sign of interaction term implies that women of these countries are not fully equipped or have access to electricity and electrical appliances. The access to electricity and electrical appliances will help them to manage time between household and workplace. The government should regularize the price ceiling for electricity bills for the poor especially women who are separated widowed and low level of family income with a large number of children.

5.2.6 Feminization U and Female Labor Force Participation

The study suggests that feminization U shape has little empirical support for all countries because it depends upon the structure of production, distribution of income and composition of labor. These countries required quick actions to retain and promote their female participation as evidenced by the current pandemic, the high uncertainties, collapse of major industries, and stagnant production sector that may further halt labor market activities. The government of D-8 countries should introduce home-based entrepreneurial activities by providing microcredits, provision of electrical appliances on subsidized rates, production of handmade products, exhibitions of handmade products, food preparation, and packaging from home can facilitate more women to generate income, even those who are not highly skilled and highly educated.

5.3 Limitations of The Study and Recommendations for The Future

While the study tried the most to achieve all objectives, however, some inevitable limitations remain. Firstly, this study only incorporated three out of four dimensions of infrastructure index such as ICT, Electricity, and Transport, due to limited data availability thus, provide certain limitations. For instance, this study cannot incorporate the financial infrastructure and public transport dimensions, which might be very relevant. Future studies should incorporate such factors.

Secondly, variables chosen for this study are mainly grounded on structural change theory and demand-side macro-economic factors. Future studies should also conduct other socio-economic variables in order to see the impact of those variables on female labor force participation such as international migration, remittances, women reproductive health and gender diversity, etc. To deepen the coverage of the study which currently focuses on the macro-level demand-side variables, the sectoral level study of FLFP such as a separate study for the manufacturing and industrial or services sector would be a useful addition.

5.4 Conclusion

This study examined the impact of demand-side macro-economic factors on female labor force participation and the interactive role of ethnic, language, religious diversity, political environment, level of education, and infrastructure in determining the relationship between economic growth and FLFP in D-8 countries. In addition, this study also analyzed the nonlinear U-shape relationship between economic growth and female labor force participation.

The conclusion revealed that demand-side macro-economic factors are an important determinant of FLFPR. In order to minimize the loss of efficiency and productivity, the female labor force can be utilized by designing an inclusive macroeconomic policy framework with a female-friendly job environment. It would be a hopeful desire that the govt of D-8 should consider the policy recommendations of this study to promote and enhance FLFP for their respective countries.

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Appendix A
Last 10 Years Trend of Female Labor Force Participation

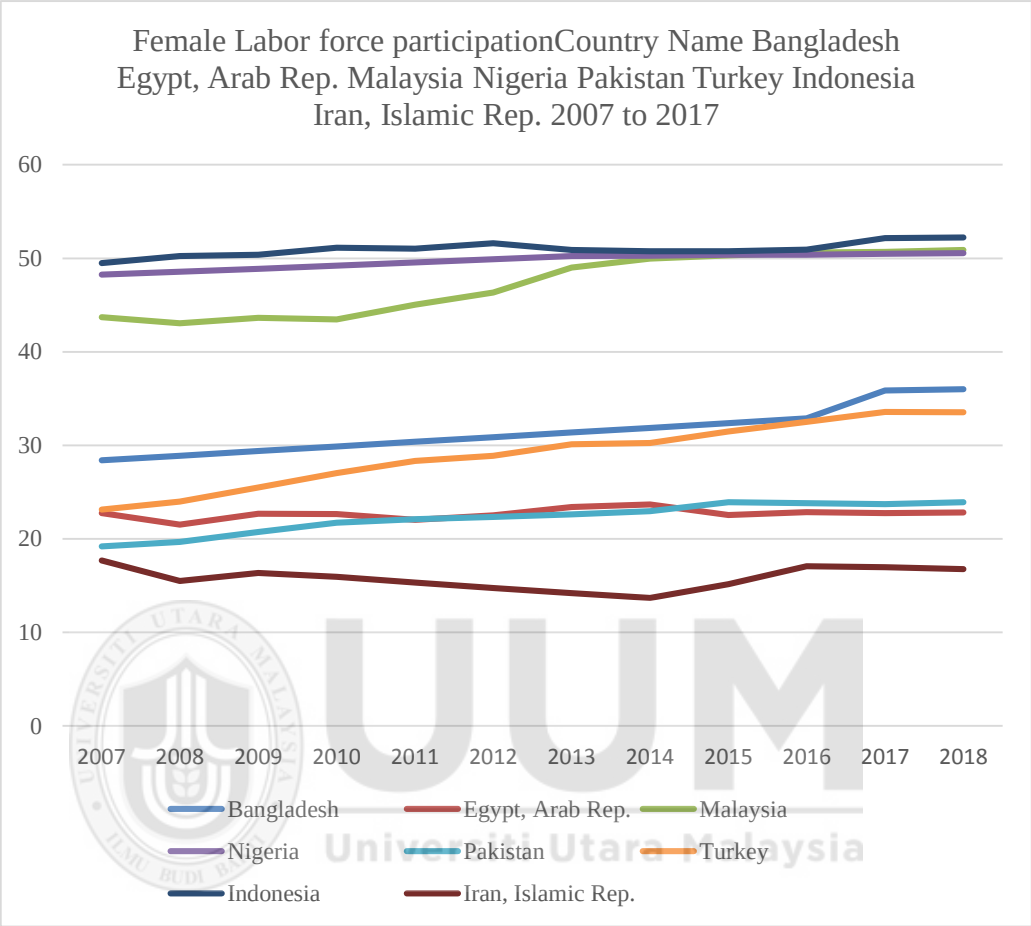


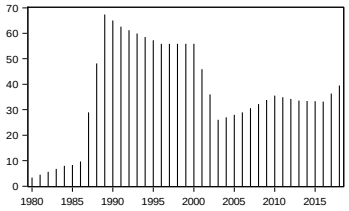
Figure 1.1
Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate) Source: World Bank Open source created by Author

Appendix B

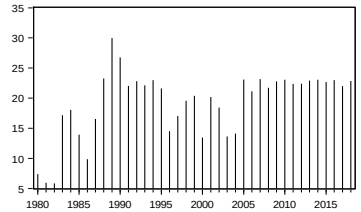
Historical trends of data, 1980 – 2018(source: created by Author, data retrieved from WDI, World Bank)

Female Labor Force Participation Rate

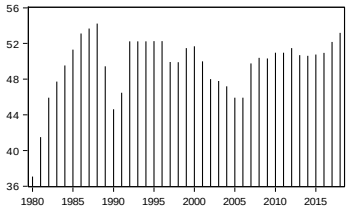
Bangladesh



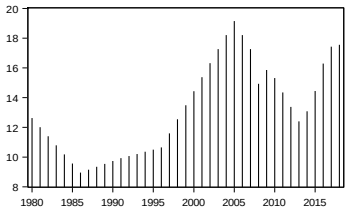
Egypt



Indonesia



Iran



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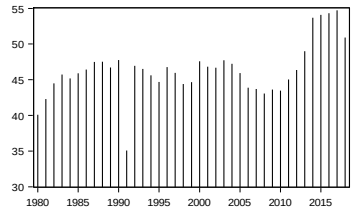

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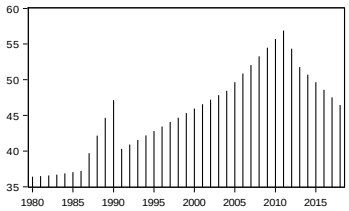

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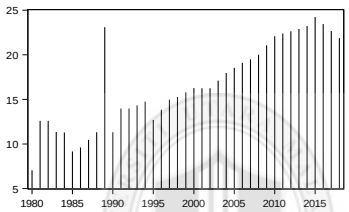

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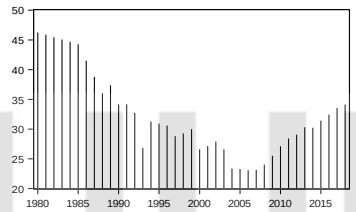
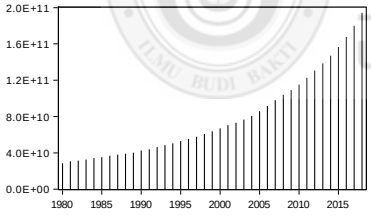


GDP

Bangladesh



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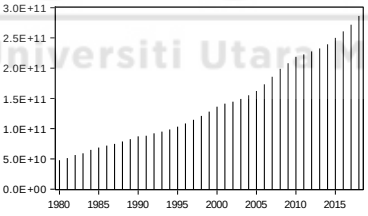

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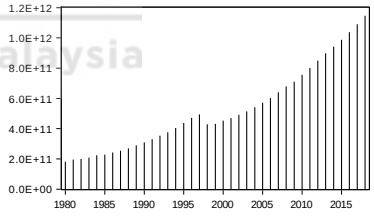

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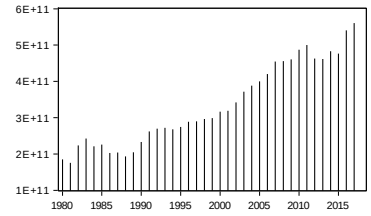

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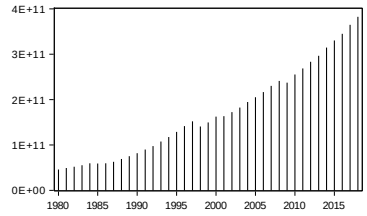

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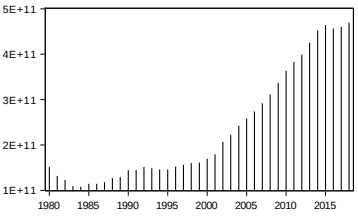

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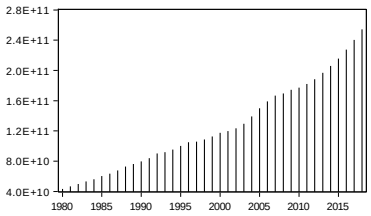

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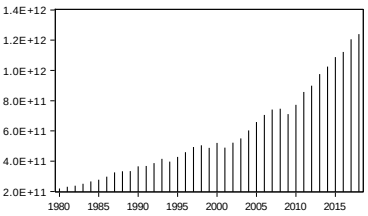
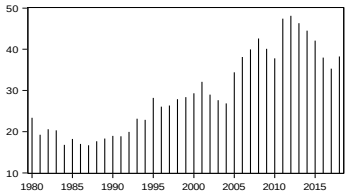


TOP

Bangladesh



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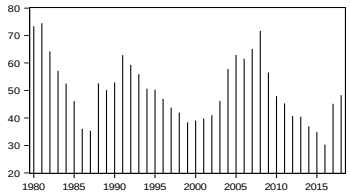

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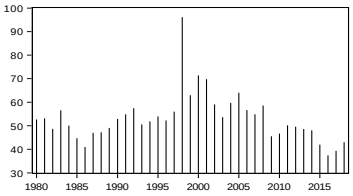

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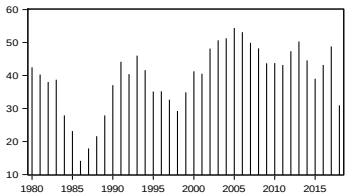

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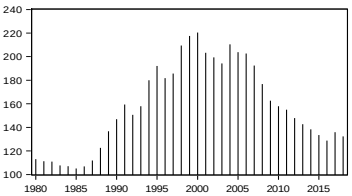

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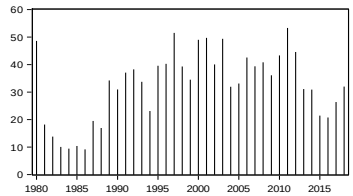

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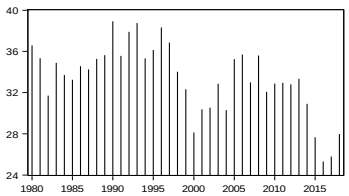

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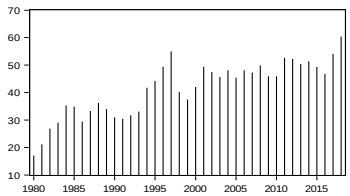
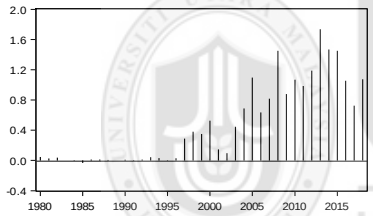


FDI

Bangladesh



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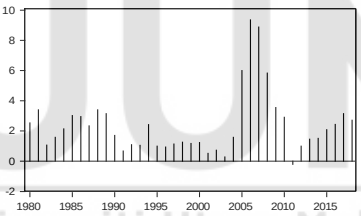

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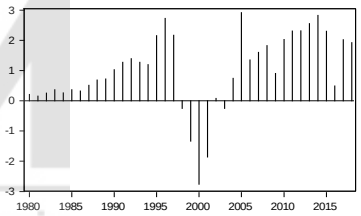

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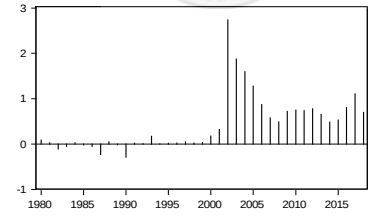

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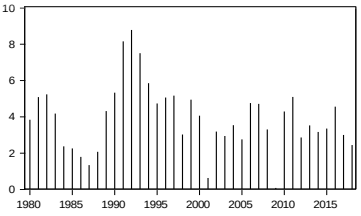

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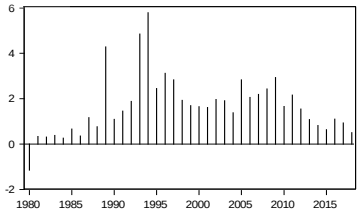

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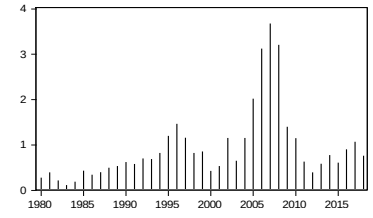

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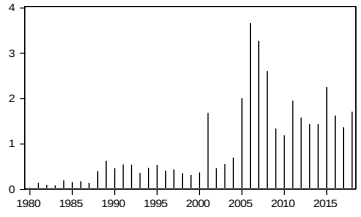
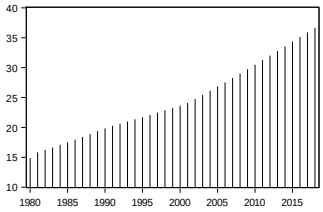


Urban Development

Bangladesh



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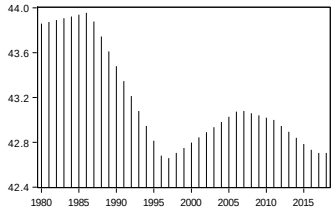

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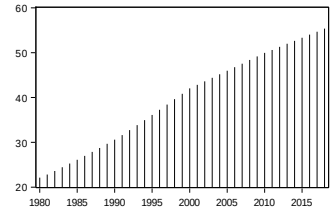

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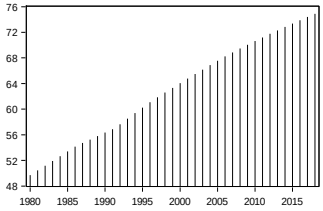

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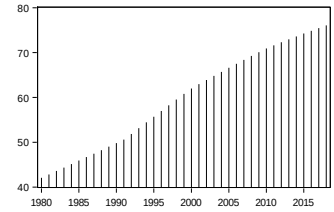

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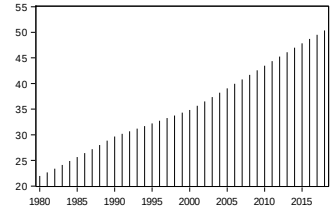

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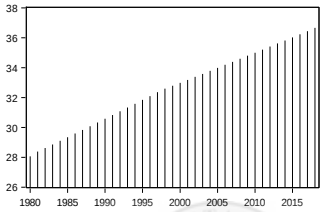

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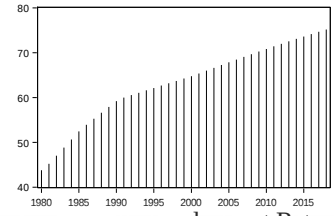
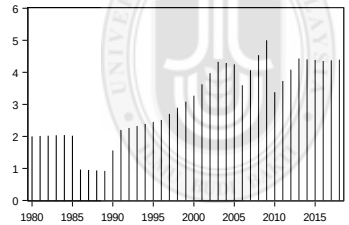


unemployment Rate

Bangladesh



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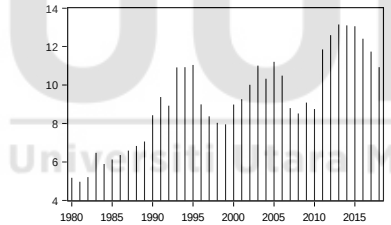

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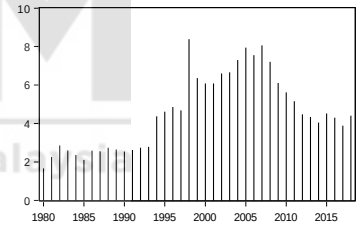

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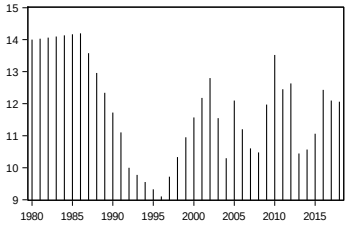

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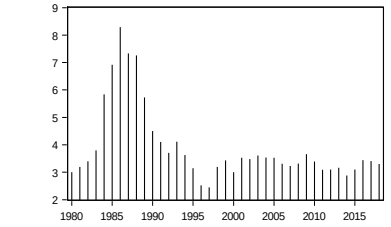

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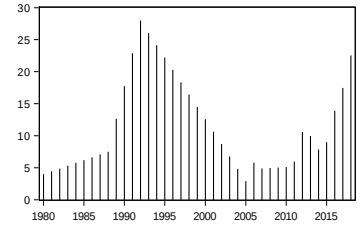

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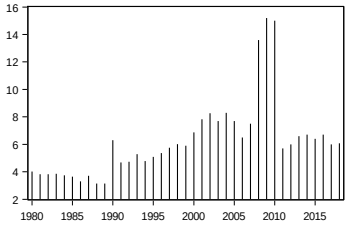

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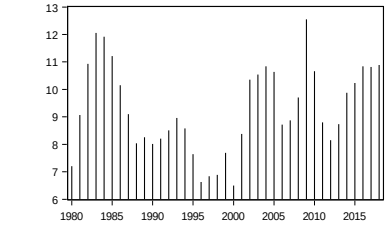
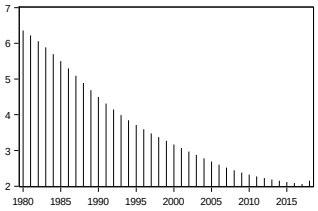


Total Fertility Rate

Bangladesh



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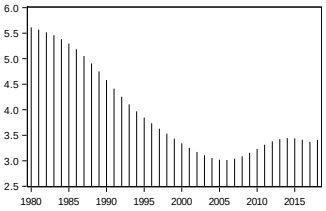

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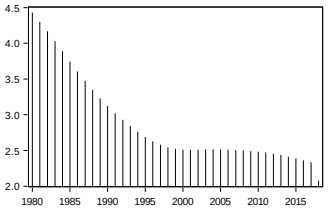

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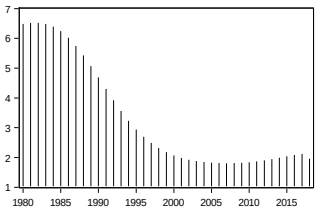

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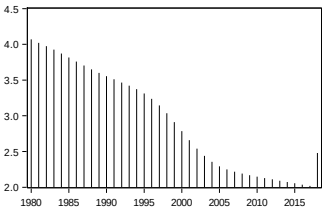

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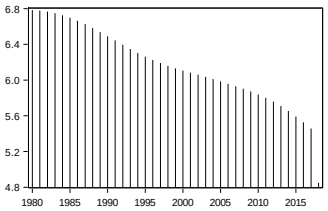

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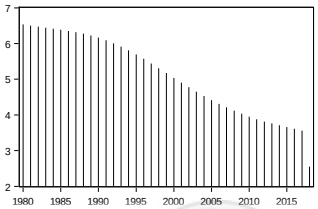

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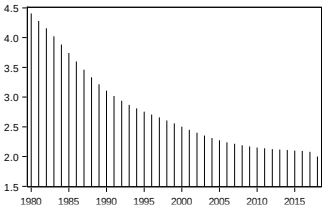

Appendix C
Infrastructure Indices Proxies and Data Sources

Variable	Description	Source
	Transport Index	
Air	Air transport, freight (million ton-km)	World Bank
	Air transport, registered carrier departures worldwide	World Bank
Railway	Rail lines total length km	SESRIC, CIA World Fact Book,
	Railways, passengers carried (million passenger-km)	World Bank
	Railways, goods transported (million ton-km)	World Bank
Roads	Roads total network	CIA World Fact Book
	Roads paved	CIA World Fact Book
Sea	Merchant Shipping: Fleets (Dead Weight Tons in Thousands)	UNCTAD
	Total fleet (Percentage of total world)	UNCTAD
	Electricity Index	
	Production of Electricity (Billion Kilowatt Hours)	World Bank, CIA WORLD FACT BOOK
	Electric power consumption (kWh per capita)	World Bank, CIA World Fact Book
	Electric power transmission and distribution losses (% of output)	World Bank
	ICT Index	
	Mobile cellular subscriptions	World Bank
	Fixed telephone subscriptions	World Bank
	Fixed broadband subscriptions	World Bank
	Internet Bandwidth, International (megabytes/sec)	World Bank
	Individuals using the Internet (% of population)	World Bank

Appendix D
Variables, Definitions and Proxies

Variable	Proxy	Definition	Source	Web Link
FLFPR	Labor force participation rate, male (% of male population ages 15+) (national estimate)	The female labor force participation rate is a measure of the proportion of a country's working-age population that engages actively in the labor market, either by working or looking for work; it indicates the size of the supply of female labor available to engage in the production of goods and services, relative to the population at working age	ILO, WDI	https://www.ilo.org/ilostat-files/Documents/description_LFPR_EN.pdf
GDP	GDP (constant 2010 US$)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 2010 U.S. dollars. Dollar figures for GDP are converted from domestic currencies using 2010 official exchange rates.	WDI	https://data.worldbank.org/
TOP	Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI	https://data.worldbank.org/
FDI	Foreign direct investment, net inflows (% of GDP)	Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors and is divided by GDP.	WDI	https://data.worldbank.org/

Appendix D (continued)

URBAN	Urban population (% of total population)	Urban population refers to people living in urban areas as defined by national statistical offices. The data are collected and smoothed by United Nations Population Division.	WDI	https://data.worldbank.org/
TOUR	International tourism, number of arrivals	"International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited" (WDI, 2017).	WDI	https://data.worldbank.org/
POLITY 2	Polity2 (Polity IV)	"Polity IV Project: Political Regime Characteristics and Transitions, 1800–2002 data set.58 These data are ordinal and range from –10 (strongly autocratic) to +10 (strongly democratic)" "(Revised Combined Polity Score is a modified version of the POLITY variable added in order to facilitate the use of the POLITY regime measure in time-series analyses. It modifies the combined annual POLITY score by applying a simple treatment, or "fix," to convert instances of "standardized authority scores" (i.e., -66, -77, and -88) to conventional polity scores (i.e., within the range, -10 to +10)".)"	Freedom House	https://freedomhouse.org/report/freedom-world
CL	Civil liberties index	"The Civil Liberties index from the Freedom House evaluates the following: freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Civil liberties index ranges from 1 to 7. 1 is the highest rank which means strong liberties and 7 is lowest which means weak no liberties".	Freedom House	https://freedomhouse.org/report/freedom-world
PR	Political rights index	"The Political Rights ratings from the Freedom House evaluate three categories: electoral process, political pluralism and participation, and the functioning of government. The index ranges from 1 (strong rights) to 7 (weak rights)".	Freedom House	

Appendix D (continued)

PE	School enrollment, primary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Primary education provides children with basic reading, writing, and mathematics skills along with an elementary understanding of such subjects as history, geography, natural science, social science, art, and music.	WDI	https://data.worldbank.org/
SE	School enrollment, secondary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Secondary education completes the provision of basic education that began at the primary level and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.	WDI	https://data.worldbank.org/
TE	School enrollment, tertiary (% gross)	Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.	WDI	https://data.worldbank.org/

Appendix E: PCA Rotation Results

Table 1
Rotated components of Transport Infrastructure

Variable	comp1	comp2	comp 3	unexplained
Freight	0.370	0.065	-0.250	0.461
Air Departure	0.367	0.266	-0.135	0.185
Rail line	-0.128	0.522	0.222	0.363
Rail_Psngr	-0.373	0.414	-0.040	0.508
Rail_goods	0.031	0.015	0.905	0.159
Road_Network	0.126	0.440	-0.012	0.340
Roads_paved	0.125	0.524	-0.076	0.102
Merchant_ship	0.529	0.056	0.072	0.125
Total_fleet	0.511	-0.100	0.196	0.317

Table 2
Rotated components of electricity infrastructure

Variable	Comp1	Unexplained
Elec_production	0.609	0.309
Elec_consumption	0.619	0.286
Elec_loss	-0.496	0.541

Table 3
Rotated components of ICT infrastructure

Variable	Comp1	Unexplained
Mob_sub	0.4166	0.4774
Fixed_tel_sub	0.3285	0.6751
Fixed_bb_sub	0.5286	0.1587
Internet bandwidth	0.472	0.3291
Internet users	0.4652	0.3484

Appendix F: Correlation Analysis

Table 1

*Correlation Analysis of Panel Data Stream **1***

CORR	**FLFPR**	**LNGDP**	**TOP**	**FDI**	**URBAN**	**UNEMP**	**TFR**	
Model 1								
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
Model 2								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	RD
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
RD	0.595	-0.181	0.509	0.416	-0.096	-0.097	0.255	1.000
Model 3								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	LD
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
LD	0.225	0.266	0.110	0.004	0.022	0.091	0.256	1.000
Model 4								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	ED
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
ED	0.178	0.417	0.084	-0.010	0.172	0.191	0.183	1.000
Model 5								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	POLITY2

Table 1 (continued)

FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
POLITY2	0.374	0.251	0.185	0.078	0.196	-0.201	-0.247	1.000
Model 6								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	CL
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
CL	-0.424	-0.019	-0.121	-0.139	0.087	0.344	0.058	1.000
Model 7								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	PR
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
PR	-0.418	-0.119	-0.058	0.057	-0.030	0.300	0.162	1.000
Model 8								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	PE
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
PE	0.387	0.598	0.151	0.043	0.390	0.076	-0.611	1.000
Model 9								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	SE
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			

Table 1 (continued)

UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
SE	-0.002	0.577	0.414	0.294	0.793	0.097	-0.796	1.000
Model 10								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	TE
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
TE	-0.079	0.611	0.197	0.157	0.721	0.175	-0.589	1.000
Model 11								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	ICTX
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
ICTX	0.073	0.641	0.082	0.123	0.539	0.091	-0.510	1.000
Model 12								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	ELECTX
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
ELECTX	-0.061	0.622	0.432	0.228	0.846	0.032	-0.769	1.000
Model 13								
CORR	FLFPR	LNGDP	TOP	FDI	URBAN	UNEMP	TFR	TRSPX
FLFPR	1.000							
LNGDP	0.173	1.000						
TOP	0.309	0.014	1.000					
FDI	0.196	-0.009	0.581	1.000				
URBAN	-0.082	0.678	0.435	0.223	1.000			
UNEMP	-0.264	0.312	-0.273	-0.011	0.268	1.000		
TFR	-0.156	-0.540	-0.345	-0.136	-0.591	0.124	1.000	
TRSPX	0.129	0.787	0.193	0.063	0.635	-0.006	-0.594	1.000

Table 2

Correlation Analysis Panel Data Stream 2

Correlation	**FLFPR**	**LNGDP**	**LNTOUR**	**TOP**	**FDI**	**URBAN**	**UNEMP**	**TFR**
FLFPR	1.000							
LNGDP	0.105	1.000						
LNTOUR	0.157	0.678	1.000					
TOP	0.342	-0.039	0.448	1.000				
FDI	0.151	-0.015	0.368	0.485	1.000			
URBAN	-0.112	0.682	0.746	0.440	0.166	1.000		
UNEMP	-0.434	0.226	0.101	-0.402	-0.109	0.121	1.000	
TFR	0.164	-0.358	-0.302	-0.274	0.014	-0.559	0.214	1.000

Table 3

Correlation Analysis for Time Series Data

Correlation	FLFPR	LNGDPPC	$(LNGDPPC)^2$	TOP	FDI	UNEMP
Bangladesh						
FLFPR	1.000					
LNGDPPC	0.030	1.000				
$(LNGDPPC)^2$	0.022	1.000	1.000			
TOP	-0.002	0.893	0.887	1.000		
FDI	-0.088	0.886	0.883	0.911	1.000	
UNEMP	-0.049	0.852	0.844	0.861	0.817	1.000
Egypt						
FLFPR	1.000					
LNGDPPC	0.535	1.000				
$(LNGDPPC)^2$	0.530	1.000	1.000			
TOP	-0.220	-0.379	-0.375	1.000		
FDI	0.156	0.162	0.163	0.438	1.000	
UNEMP	0.550	0.808	0.805	-0.409	-0.088	1.000
Indonesia						
FLFPR	1.000					
LNGDPPC	0.366	1.000				
$(LNGDPPC)^2$	0.362	1.000	1.000			
TOP	-0.176	-0.175	-0.188	1.000		
FDI	0.134	0.496	0.499	-0.418	1.000	
UNEMP	0.072	0.512	0.499	0.542	-0.006	1.000
Iran						
FLFPR	1.000					
LNGDPPC	0.752	1.000				
$(LNGDPPC)^2$	0.751	1.000	1.000			
TOP	0.687	0.613	0.610	1.000		
FDI	0.772	0.537	0.535	0.616	1.000	
UNEMP	-0.101	-0.030	-0.029	-0.341	-0.040	1.000
Malaysia						
FLFPR	1.000					
LNGDPPC	0.488	1.000				
$(LNGDPPC)^2$	0.494	1.000	1.000			
TOP	-0.142	0.430	0.415	1.000		
FDI	-0.279	-0.127	-0.132	0.104	1.000	
UNEMP	-0.016	-0.579	-0.576	-0.501	-0.325	1.000
Nigeria						
FLFPR	1.000					
LNGDPPC	0.683	1.000				
$(LNGDPPC)^2$	0.683	1.000	1.000			
TOP	0.553	0.191	0.188	1.000		
FDI	0.262	-0.227	-0.228	0.320	1.000	
UNEMP	-0.165	-0.264	-0.261	0.164	0.441	1.000

Table 3 (continued)

Pakistan						
FLFPR	1.000					
LNGDPPC	0.883	1.000				
$(LNGDPPC)^2$	0.884	1.000	1.000			
TOP	-0.543	-0.524	-0.531	1.000		
FDI	0.323	0.459	0.456	0.085	1.000	
UNEMP	0.507	0.555	0.552	-0.215	0.500	1.000
Turkey						
FLFPR	1.000					
LNGDPPC	-0.641	1.000				
$(LNGDPPC)^2$	-0.628	1.000	1.000			
TOP	-0.709	0.854	0.849	1.000		
FDI	-0.606	0.722	0.721	0.621	1.000	
UNEMP	0.166	0.148	0.155	0.074	0.123	1.000

Appendix G :Unit Root Results

Table 1

Unit Root pane data stream 1 (1980 to 2018)

	LLC						**IPS**			
	Level			First difference			Level		First difference	
Variable	None	Intercept and trend	Individual intercept	None	Intercept and trend	Individual intercept	Intercept and trend	Individual intercept	Intercept and trend	Individual intercept
FLFPR	0.228	-0.763	-2.601	-11.034	-8.169	-8.455	-1.332	-2.727	-8.715	-9.495
	(0.590)	(0.222)	(0.004)***	(0.000)***	(0.000)***	(0.000)***	(0.091)***	(0.003)***	(0.000)***	(0.000)***
LNGDP	12.079	1.653	0.876	-0.934	-5.396	-5.948	0.135	4.648	-7.465	-7.716
	(1.000)	(0.950)	(-0.809)	(0.175)	(0.000) ***	(0.000) ***	(0.553)	(1.000)	(0.000) ***	(0.000) ***
TOP	-0.640	0.821	-0.598	-12.533	-3.666	-5.510	-0.754	-1.148	-8.511	-9.776
	(0.261)	(0.794)	(0.274)	(0.000)***	(0.000)***	(0.000)***	(0.225)	(0.125)	(0.000)***	(0.000)***
FDI	-3.675	-1.779	-2.156	-13.228	-6.936	-8.632	-2.616	-2.911	-8.854	-10.427
	(0.000)***	(0.037)**	(0.015)**	(0.000)***	(0.000)***	(0.000)***	(0.004)**	(0.001)***	(0.000)***	(0.000)***
URBAN	0.739	-3.612	-1.505	-8.957	1.871	0.007	-0.734	2.744	1.092	-0.127
	(0.770)	(0.000)***	(0.066)*	(0.185)	(0.969)	(0.503)	(0.231)	(0.997)	(0.862)	(0.449)
UNEMP	-0.594	-0.540	-1.629	-10.309	-5.419	-6.499	-0.866	-1.693	-5.788	-7.434
	(0.275)	(0.294)	(0.051)*	(0.000)***	(0.000)***	(0.000)***	(0.193)	(0.045)**	(0.000)***	(0.000)***
TFR	0.198	6.873	-3.636	2.165	17.496	4.163	9.594	2.165	9.055	5.241
	(0.578)	(1.000)	(0.000) *	(0.984)	(1.000)	(1.000)	(1.000)	(0.984)	(1.000)	(1.000)
PE	2.573	0.239	0.304	-10.442	-5.517	-6.717	-1.373	0.724	-7.697	-8.964
	(0.995)	(0.594)	(0.619)	(0.000)***	(0.000)***	(0.000)***	(0.084)*	(0.765)	(0.000)***	(0.000)***
SE	4.753	1.849	-1.0717	-7.176	-4.221	-5.151	1.231	1.694	-4.693	-6.054
	(1.000)	(0.967)	(0.141)	(0.000)***	(0.000)***	(0.000)***	(0.890)	(0.954)	(0.000)***	(0.000)***
TE	5.877	2.741	5.527	-4.019	-1.581	-1.699	3.520	7.752	-3.122	-3.610
	(1.000)	(0.996)	(1.000)	(0.000)***	(0.056)*	(0.044)**	(0.999)	(1.000)	(0.000)***	(0.000)***
CL	-0.559	-0.131	-0.288	-11.345	-4.975	-5.101	-1.452	-3.033	-7.564	-9.025
	(0.287)	(0.447)	(0.386)	(0.000)***	(0.000)***	(0.000)***	(0.073)*	(0.001)***	(0.000)***	(0.000)***
PR	-0.669	-0.896	-0.865	-12.838	-13.120	-10.413	-1.151	-1.736	-5.856	-12.153
	(0.251)	(0.185)	(0.193)	(0.000)***	(0.000)***	(0.000)***	(0.124)	(0.041)**	(0.000)***	(0.000)***
POLITY 2	-1.710	-0.194	0.026	-12.879	-12.962	-11.481	-0.101	-0.581	-10.948	-12.081
	(0.043)**	(0.422)	(0.510)	(0.000)***	(0.000)***	(0.000)***	(0.459)	(0.280)	(0.000)***	(0.000)***
RD	-1.483	-1.270	-3.276	-3.245	-1.101	-1.566	-0.215	-4.761	-0.492	-2.165
	(0.068)*	(0.102)	(0.000)***	(0.000)***	(0.135)	(0.058)*	(0.414)	(0.000)***	(0.311)	(0.026)**
LD	0.430	-0.934	-3.219	-11.375	-19.406	-12.964	1.474	-2.164	-14.018	-11.520

Table 1 continued

	(0.666)	(0.175)	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.929)	(0.015)**	(0.000)***	(0.000)***
ED	-2.705	15.706	3.092	-0.817	-0.130	4.923	8.770	3.454	1.112	3.688
	(0.003)***	(1.000)	(0.999)	(0.206)	(0.448)	(1.000)	(1.000)	(0.999)	(0.867)	(0.999)
TRSX	-0.420	0.372	2.720	-11.953	-12.801	-12.970	0.877	4.284	-9.587	-10.178
	(0.337)	(0.645)	(0.996)	(0.000)***	(0.000)***	(0.000)***	(0.810)	(1.000)	(0.000)***	(0.000)***
ELECX	5.955	2.834	8.257	-5.438	-15.981	-12.117	1.665	7.200	-13.080	-10.170
	(1.000)	(0.997)	(1.000)	(0.000)***	(0.000)***	(0.000)***	(0.952)	(1.000)	(0.000)***	(0.000)***
ICTX	1.685	-3.998	3.683	-1.041	-4.664	-11.993	1.646	-0.324	-14.626	-12.213
	(1.000)	(1.000)	(0.999)	(0.148)	(0.000)***	(0.038)**	(0.950)	(0.372)	(0.000)***	(0.000)***

Table 2

Unit Root Panel Data stream 2 (1995 to 2018)

Variables	**IPS test**			
	Level		**First Difference**	
	w-stat	**P-Values**	**w-stat**	**P-Values**
FLFPR	-0.9580	0.1690	-4.0678	0.0000***
LNGDP	6.5618	1.0000	-1.9379	0.0263 ***
TOP	-0.6820	0.2476	-6.8762	0.0000 ***
FDI	-2.8056	0.0025 ***	-	-
URBAN	-	-	-	-
TFR	3.9207	1.0000	6.2486	1.0000
UNEMP			_	_
TOUR	4.0017	1.0000	-3.6682	0.0001***
Trend & intercept				
FLFPR	0.1639	0.5651	-4.9383	0.0000***
LNGDP	0.9474	0.8283	-6.9391	0.0000***
TOP	-1.9365	0.0264	_-	-
FDI	-2.8018	0.0025	-	-
URBAN	-	-	-	-
TFR	8.0182	1.0000	7.2468	1.000
UNEMP	1.4272	0.9232	-4.0820	0.0000***

Table 2 (continued)

TOUR	1.0245	0.8472	-3.9244	0.0000***
		LLC test		
FLFPR	0.1176	0.5468	-7.2705	0.0000
LNGDP				
TOP	-4.0815	0.1142	-10.9453	0.0000***
FDI	-6.7598	0.0001***	-	-
URBAN	-	-	-	-
TFR	-7.2083	0.0000***		
UNEMP				
TOUR	-0.9897	0.9902	7.1586	0.8222
Trend & Intercept				
FLFPR	0.1176	0.5468	-7.2705	0.000***
LNGDP	-5.8708	0.0059***	-	-
TOP	-8.1036	0.0015***	-	-
FDI	-8.7072	0.0000***	-	-
URBAN	-7.2440	0.0000***	-	-
TFR	-2.0485	0.8914	-	-
UNEMP	-4.201	0.1582	-10.6354	0.0000
TOUR	-4.8779	0.9928	-5.7774	0.0000***

Table 3

Unit Root Time Series Data 1980 To 2018

	FLFPR	LNGDPPC	$LNGDPPC^2$	TOP	FDI	UNEMP
Bangladesh			**ADF**			
At Level						
Constant	-2.757	9.426	11.170	-0.794	-1.357	-0.544
	(0.074) *	(1.000)	(1.000)	(0.809)	(0.593)	(0.870)
Constant & Trend	-2.661	1.277	2.046	-2.608	-3.297	-2.547
	(0.258)	(1.000)	(1.000)	(0.279)	(0.082)*	(0.305)
None	-0.702	1.545	1.955	0.510	-0.574	0.523
	(0.406)	(0.968)	(0.986)	(0.821)	(0.462)	(0.824)
At First Difference						
Constant	-2.750	-0.866	-0.498	-5.868	-2.969	-6.082
	(0.076)*	(0.788)	(0.880)	(0.000) ***	0.049	(0.000) ***
Constant & Trend	-2.785	-7.775	-7.119	-5.785	-2.852	-4.459
	(0.212)	(0.000) ***	(0.000) ***	(0.000) ***	(0.191)	(0.006)**
None	-2.743	0.799	1.115	-5.787	-7.365	-6.022
	(0.007)**	(0.881)	(0.928)	(0.000) ***	(0.000) ***	(0.000) ***
	PP Test					
At Level						
Constant	-1.991	9.414	11.060	-0.794	-1.357	-0.744
	(0.290)	(1.000)	(1.000)	(0.809)	(0.593)	(0.823)
Constant & Trend	-1.808	1.327	2.081	-2.718	-3.297	-2.485
	(0.681)	(1.0000	(1.000)	(0.235)	(0.082)*	(0.334)
None	-0.364	6.027	6.283	0.510	-0.404	0.892
	(0.547)	(1.000)	(1.000)	(0.821)	(0.531)	(0.897)
At First Difference						
Constant	-2.486	-1.796	-1.128	-5.873	-8.417	-6.576
	(0.127)	(0.377)	(0.694)	(0.000) ***	(0.000) ***	(0.000) ***
Constant & Trend	-2.446	-7.569	-6.966	-5.785	-8.289	-6.426
	(0.352)	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***

Table 3 (continued)

None	-2.486	-0.311	0.143	-5.790	-7.896	-6.067
	(0.014)	(0.567)	(0.722)	(0.000) ***	(0.000) ***	(0.000) ***
EGYPT			**ADF**			
At Level						
Constant	-2.995	-0.858	-0.706	-4.233	-3.414	-1.749
	(0.044)**	(0.790)	(0.832)	(0.002)***	(0.017)**	(0.399)
Constant & Trend	-3.081	-3.799	-3.983	-4.412	-3.463	-3.906
	(0.125)	(0.028)**	(0.018)**	(0.007)**	(0.059)*	(0.022)**
None	0.267	2.607	2.662	-1.128	-2.107	0.531
	(0.758)	(0.997)	(0.997)	(0.231)	(0.035)**	(0.826)
At First Difference						
Constant	-5.979	-3.847	-3.202	-4.707	-4.370	-5.250
	(0.000) ***	(0.006)**	(0.028)**	(0.001)***	(0.001)***	(0.000) ***
Constant & Trend	-6.098	-3.864	-3.170	-4.762	-4.314	-5.263
	(0.000) ***	(0.024)**	(0.107)	(0.003)**	(0.008)**	(0.001)**
None	-5.911	-2.110	-2.032	-4.732	-4.432	-5.192
	(0.000) ***	(0.035)**	(0.042)**	(0.000) ***	(0.000) ***	(0.000) ***
			PP TEST			
Constant	-3.005	-1.593	-1.317	-2.734	-2.509	-1.833
	(0.043)**	(0.476)	(0.612)	(0.078)*	(0.121)	(0.360)
Constant & Trend	-2.707	-2.710	-2.607	-2.592	-2.517	-2.517
	(0.240)	(0.239)	(0.280)	(0.286)	(0.319)	(0.319)
None	0.302	5.996	5.919	-1.086	-1.660	0.404
	(0.768)	(1.000)	(1.000)	(0.247)	(0.091)*	(0.795)
At First Difference						
Constant	-7.697	-3.717	-3.675	-4.687	-4.134	-5.244
	(0.000) ***	(0.008)**	(0.009)**	(0.001)***	(0.003)***	(0.000) ***
Constant & Trend	-8.538	-3.864	-3.650	-4.803	-4.058	-5.257
	(0.000) ***	(0.024)**	(0.039)**	(0.002)***	(0.015)**	(0.001)***
None	-6.686	-1.928	-1.857	-4.711	-4.222	-5.234

Table 3 (continued)

	(0.000) ***	(0.052)*	(0.061)*	(0.000) ***	(0.000) ***	(0.000) ***
Indonesia	**ADF**					
At Level						
Constant	-3.315	0.165	0.454	-3.169	-2.335	-1.792
	(0.022)**	(0.967)	(0.983)	(0.030)**	(0.167)	(0.379)
Constant & Trend	-3.228	-2.272	-2.170	-3.179	-2.561	-1.410
	(0.095)*	(0.438)	(0.492)	(0.104)	(0.299)	(0.842)
None	0.561	5.826	5.874	-0.591	-1.617	-0.198
	(0.833)	(1.000)	(1.000)	(0.455)	(0.099)*	(0.608)
At First Difference						
Constant	-5.413	-4.662	-4.602	-9.314	-5.803	-7.366
	(0.000) ***	0.001	0.001	(0.000) ***	(0.000) ***	(0.000) ***
Constant & Trend	-5.292	-4.640	-4.625	-9.232	-5.720	-7.507
	(0.001)	0.004	0.004	(0.000) ***	(0.000) ***	(0.000) ***
None	-5.421	-3.082	-3.024	-9.431	-5.871	-7.426
	(0.000) ***	0.003	0.004	(0.000) ***	(0.000) ***	(0.000) ***
	PP					
At Level						
Constant	-4.384	0.165	0.454	-3.198	-2.468	-1.732
	(0.001)***	(0.967)	(0.983)	(0.028)**	(0.131)	(0.408)
Constant & Trend	-4.070	-1.953	-1.824	-3.200	-2.727	-1.258
	(0.015)**	(0.607)	(0.673)	(0.100)	(0.232)	(0.883)
None	0.789	5.826	5.874	-0.602	-1.702	-0.198
	(0.879)	(1.000)	(1.000)	(0.450)	(0.084)*	(0.608)
At First Difference						
Constant	-5.606	-4.656	-4.629	-9.549	-5.803	-7.361
	(0.000) ***	(0.001)***	(0.001)***	(0.000) ***	(0.000) ***	(0.000) ***
Constant & Trend	-5.094	-4.636	-4.618	-10.049	-5.720	-7.516
	(0.001)***	(0.004)***	(0.004)	(0.000) ***	(0.000) ***	(0.000) ***
None	-4.820	-2.987	-2.920	-9.669	-5.871	-7.419

Table 3 (continued)

	(0.000) ***	(0.004)***	(0.005)**	(0.000) ***	(0.000) ***	(0.000) ***
Iran	**ADF**					
At Level						
Constant	-1.366	-0.450	-0.423	-1.709	-2.352	-2.000
	(0.588)	(0.890)	(0.895)	(0.419)	(0.162)	(0.286)
Constant & Trend	-3.551	-2.170	-2.158	-1.917	-2.929	-1.781
	(0.050)*	(0.492)	(0.498)	(0.626)	(0.165)	(0.694)
None	0.316	0.960	0.971	-0.717	-1.784	-0.625
	(0.772)	(0.907)	(0.909)	(0.400)	(0.071)*	(0.440)
At First Difference						
Constant	-3.236	-5.716	-5.731	-4.266	-6.957	-5.542
	(0.026)**	(0.000) ***	(0.000) ***	0.002	(0.000) ***	(0.000) ***
Constant & Trend	-3.210	-5.673	-5.693	-4.134	-6.851	-5.577
	(0.098)*	(0.000) ***	(0.000) ***	0.013	(0.000) ***	(0.000) ***
None	-3.204	-5.583	-5.591	-4.334	-7.042	-5.599
	(0.002)***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***
	PP					
At Level						
Constant	-0.900	-0.527	-0.496	-2.027	-2.352	-2.047
	(0.777)	(0.875)	(0.881)	(0.275)	(0.162)	(0.267)
Constant & Trend	-2.122	-2.258	-2.243	-2.322	-2.929	-1.840
	(0.517)	(0.446)	(0.453)	(0.413)	(0.165)	(0.665)
None	0.401	0.960	0.971	-0.738	-1.784	-0.638
	(0.794)	(0.907)	(0.909)	(0.390)	(0.071)	(0.434)
At First Difference						
Constant	-3.221	-5.737	-5.752	-4.240	-7.346	-5.525
	(0.027)**	(0.000)***	(0.000)***	(0.002)***	(0.000)***	(0.000)***
Constant & Trend	-3.207	-5.706	-5.724	-4.129	-7.214	-5.719
	(0.099)*	(0.000)***	(0.000)***	(0.013)**	(0.000)***	(0.000)***
None	-3.204	-5.583	-5.591	-4.307	-7.246	-5.586

Table 3 (continued)

	0.002	(0.000) ***	(0.000)***	(0.000) ***	(0.000)***	(0.000)***
Malaysia	**ADF**					
At Level	-3.113	-0.478	-0.227	-1.446	-2.936	-1.457
Constant	(0.034)**	(0.885)	(0.926)	(0.550)	(0.051)*	(0.544)
	-3.529	-1.818	-1.950	-0.324	-3.011	-2.124
Constant & Trend	(0.051)*	(0.676)	(0.609)	(0.987)	(0.143)	(0.516)
	0.639	6.073	6.086	0.059	-1.264	-0.706
None	(0.850)	(1.000)	(1.000)	(0.696)	(0.186)	(0.404)
At First Difference						
Constant	-8.813	-5.145	-5.229	-4.052	-6.674	-3.907
	(0.000) ***	(0.000) ***	(0.000) ***	0.003	(0.000) ***	0.005
Constant & Trend	-8.686	-5.073	-5.154	-4.484	-6.578	-3.879
	(0.000) ***	(0.001)***	(0.001)***	(0.005)**	(0.000) ***	(0.023)**
None	-8.835	-1.472	-1.419	-4.100	-6.759	-3.963
	(0.000) ***	(0.130)	(0.143)	(0.000) ***	(0.000) ***	(0.000) ***
At Level	**PP**					
Constant	-3.124	-0.483	-0.246	-1.261	-3.002	-1.958
	(0.033)**	(0.884)	(0.924)	(0.637)	(0.044)**	(0.303)
Constant & Trend	-3.610	-2.011	-2.139	-0.521	-3.083	-2.459
	(0.042)**	(0.577)	(0.508)	(0.978)	(0.125)	(0.345)
None	0.678	5.678	5.728	-0.032	-1.225	-0.568
	(0.858)	(1.000)	(1.000)	(0.666)	(0.199)	(0.465)
At First Difference						
Constant	-9.128	-5.145	-5.229	-4.103	-6.785	-3.982
	(0.000) ***	(0.000) ***	(0.000) ***	0.003	(0.000) ***	(0.004)**
Constant & Trend	-8.998	-5.073	-5.154	-4.307	-6.676	-3.960
	(0.000) ***	(0.001)***	(0.001)***	(0.008)**	(0.000) ***	(0.019)**
None	-8.930	-3.101	-3.112	-4.153	-6.876	-4.036

Table 3 (continued)

	(0.000) ***	(0.003)**	(0.003)**	(0.000) ***	(0.000) ***	(0.000) ***
Nigeria	**ADF**					
At Level	-1.564	-1.222	-1.215	-2.673	-3.620	-1.848
Constant	(0.491)	(0.654)	(0.657)	(0.088)*	(0.010)**	(0.352)
	-0.618	-2.274	-2.225	-3.239	-3.441	-1.770
Constant & Trend	(0.972)	(0.436)	(0.462)	(0.092)*	(0.061)*	(0.699)
	0.767	1.796	1.774	-1.173	-1.801	-0.317
None	(0.875)	(0.981)	(0.980)	(0.216)	(0.069)*	(0.564)
At First Difference						
Constant	-4.809	-4.212	-4.237	-7.829	-8.595	-2.564
	(0.000) ***	(0.002)**	(0.002)**	(0.000) ***	(0.000) ***	(0.109)
Constant & Trend	-5.013	-3.565	-3.536	-3.052	-8.653	-2.531
	(0.001)***	(0.048)**	(0.051)*	(0.136)	(0.000) ***	(0.312)
None	-4.781	-2.972	-2.977	-7.963	-8.719	-2.499
	(0.000) ***	(0.004)***	(0.004)***	(0.000) ***	(0.000) ***	(0.014)**
At Level	**PP**					
Constant	-1.579	-0.829	-0.809	-2.887	-3.564	-1.461
	(0.484)	(0.799)	(0.805)	(0.056)*	(0.011)**	(0.542)
Constant & Trend	-0.888	-4.026	-4.022	-3.513	-3.361	-1.523
	(0.947)	(0.016)**	(0.016)**	(0.052)*	(0.072)*	(0.804)
None	0.641	0.256	0.241	-1.173	-1.650	-0.204
	(0.851)	(0.755)	(0.751)	(0.216)	(0.093)*	(0.606)
At First Difference						
Constant	-4.809	-4.266	-4.303	-8.601	-12.009	-2.582
	(0.000) ***	(0.002)***	(0.002)***	(0.000) ***	(0.000) ***	0.106
Constant & Trend	-5.007	-3.957	-3.970	-9.167	-23.061	-2.542
	(0.001)***	(0.019)**	(0.019)**	(0.000) ***	(0.000) ***	(0.307)
None	-4.775	-4.174	-4.199	-8.737	-12.017	-2.514
						(0.013)**
	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	(0.000) ***	

Table 3 (continued)

Pakistan						
	ADF					
At Level						
Constant	-0.429	-0.266	-0.098	-2.026	-2.828	-2.295
	(0.893)	(0.921)	(0.942)	(0.275)	(0.064)*	(0.179)
Constant & Trend	-3.839	-2.433	-2.384	-2.741	-2.955	-2.631
	(0.025)**	(0.358)	(0.382)	(0.227)	(0.158)	(0.270)
None	1.845	2.752	2.719	-0.788	-1.687	-0.751
	(0.982)	(0.998)	(0.998)	(0.368)	(0.086)*	(0.385)
At First Difference						
Constant	-10.551	-3.726	-3.649	-7.649	-4.091	-5.586
	(0.000)***	(0.008)**	(0.009)**	(0.000)***	(0.003)***	(0.000)***
Constant & Trend	-3.669	-3.605	-3.542	-7.597	-4.054	-5.529
	(0.040)**	(0.043)**	(0.049)**	(0.000)***	(0.015)**	(0.000)***
None	-2.996	-2.292	-2.217	-7.670	-4.152	-5.661
	(0.004)**	(0.023)**	(0.027)**	(0.000)***	(0.000)***	(0.000)***
	PP					
At Level						
Constant	-2.253	-0.918	-0.686	-2.078	-1.900	-2.189
	(0.192)	(0.772)	(0.838)	(0.254)	(0.329)	(0.214)
Constant & Trend	-5.914	-2.481	-2.359	-2.832	-1.830	-2.463
	(0.000)***	(0.335)	(0.394)	(0.195)	(0.670)	(0.344)
None	1.087	5.180	5.129	-0.788	-1.092	-0.576
	(0.925)	(1.000)	(1.000)	(0.368)	(0.244)	(0.461)
At First Difference						
Constant	-26.502	-3.729	-3.660	-7.649	-4.056	-8.757
	(0.000)***	(0.008)**	(0.009)**	(0.000)***	(0.003)**	(0.000)***
Constant & Trend	-25.301	-3.604	-3.545	-7.643	-4.012	-9.295
	(0.000)***	(0.043)**	(0.049)	(0.000)***	(0.017)**	(0.000)***
None	-12.636	-2.104	-2.025	-7.703	-4.119	-8.117
	(0.000)***	(0.036)**	(0.042)**	(0.000)***	(0.000)***	(0.000)***

Table 3 (continued)

Turkey						
	ADF					
At Level						
Constant	-2.095	0.209	0.374	-1.985	-2.037	-2.351
	(0.248)	(0.970)	(0.979)	(0.292)	(0.271)	(0.162)
Constant & Trend	-0.338	-2.258	-2.062	-4.397	-2.942	-3.189
	(0.987)	(0.445)	(0.550)	(0.007)**	(0.162)	(0.102)
None	-1.463	4.414	4.436	1.062	-1.023	0.157
	(0.132)	(1.000)	(1.000)	(0.922)	(0.270)	(0.726)
At First Difference						
Constant	-6.129	-6.535	-6.445	-5.536	-5.655	-4.614
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.001)***
Constant & Trend	-7.447	-6.509	-6.459	-5.437	-5.572	-4.549
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.004)***
None	-6.041	-4.531	-4.480	-5.334	-5.705	-4.685
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
	PP					
At Level						
Constant	-2.088	0.472	0.679	-1.859	-1.890	-2.726
	(0.251)	(0.984)	(0.990)	(0.347)	(0.333)	(0.079)
Constant & Trend	-0.338	-2.294	-2.090	-3.439	-2.654	-2.707
	(0.987)	(0.427)	(0.535)	(0.061)*	(0.260)	(0.240)
None	-1.409	5.649	5.652	1.994	-0.864	0.320
	(0.145)	(1.000)	(1.000)	(0.988)	(0.335)	(0.773)
At First Difference						
Constant	-6.200	-6.693	-6.470	-6.685	-10.699	-6.408
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Constant & Trend	-7.492	-6.703	-6.918	-6.555	-10.406	-7.555
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
None	-6.141	-4.708	-4.656	-5.351	-7.111	-6.486
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***

Appendix H: Optimal ARDL Models

Table 1
The Optimal ARDL Model for Bangladesh
Selected Model: ARDL(1, 1, 1, 0, 1, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FLFPP	0.879	0.054	16.377	0.000
LNGDPPC	-26.760	19.300	-1.386	0.177
LNGDPPC(-1)	33.968	20.181	1.683	0.104
LNGDPPC2	2.182	1.573	1.387	0.177
LNGDPPC2(-1)	-2.738	1.657	-1.652	0.110
TOP	-0.732	0.261	-2.798	0.009
FDI	6.468	3.501	1.848	0.076
FDI	4.587	3.481	1.318	0.199
UNEMP	-4.334	1.824	-2.376	0.025
UNEMP(-1)	-5.050	2.179	-2.318	0.028
C	-22.816	6.555	-3.481	0.002

R-squared	0.965	Mean dependent var	0.377
Adjusted R-squared	0.952	S.D. dependent var	0.182
S.E. of regression	0.040	Akaike info criterion	-3.377
F-statistic	74.930	Durbin-Watson stat	1.613
Prob(F-statistic)	0.000		

*Note: p-values and any subsequent tests do not account for model selection.

Table 2
The Optimal ARDL Model for Egypt
Selected Model: ARDL(1, 3, 3, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FLFPP(-1)	0.301	0.158	1.912	0.068
LNGDPPC	14.006	14.180	0.988	0.334
LNGDPPC(-1)	-31.454	20.175	-1.559	0.133
LNGDPPC(-2)	-3.619	18.675	-0.194	0.848
LNGDPPC(-3)	16.459	12.595	1.307	0.204
LNGDPPC2	-0.950	0.949	-1.001	0.327
LNGDPPC2(-1)	2.098	1.363	1.539	0.137
LNGDPPC2(-2)	0.206	1.267	0.163	0.872
LNGDPPC2(-3)	-1.053	0.849	-1.241	0.227
TOP	0.054	0.083	0.656	0.519
FDI	0.496	0.440	1.129	0.271
UNEMP	-0.227	0.863	-0.263	0.795
C	17.703	9.613	1.842	0.079
R-squared	0.557	Mean dependent var		0.204

Table 2(continued)

Adjusted R-squared	0.325	S.D. dependent var	0.041
F-statistic	2.406	Durbin-Watson stat	1.725
Prob(F-statistic)	0.034		

*Note: p-values and any subsequent tests do not account for model selection.

Table 3
The Optimal ARDL Model for Indonesia
Selected Model: ARDL(2, 3, 1, 2, 0, 1)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFP(-1)	0.783	0.170	4.606	0.000
FLFP(-2)	-0.558	0.158	-3.536	0.002
LNGDPPC	-8.681	7.046	-1.232	0.232
LNGDPPC(-1)	11.013	7.298	1.509	0.146
LNGDPPC(-2)	-0.053	0.221	-0.239	0.814
LNGDPPC(-3)	0.280	0.170	1.649	0.114
LNGDPPC2	0.552	0.461	1.199	0.244
LNGDPPC2(-1)	-0.719	0.479	-1.501	0.148
TOP	-0.133	0.073	-1.824	0.082
TOP(-1)	-0.013	0.063	-0.213	0.833
TOP(-2)	-0.104	0.065	-1.599	0.125
FDI	-0.182	0.469	-0.389	0.701
UNEMP	0.645	0.576	1.121	0.275
UNEMP(-1)	-1.267	0.580	-2.186	0.040
C	-9.258	3.961	-2.337	0.029

R-squared	0.746	Mean dependent var	0.503
Adjusted R-squared	0.577	S.D. dependent var	0.023
F-statistic	4.416	Durbin-Watson stat	1.954
Prob(F-statistic)	0.001		

*Note: p-values and any subsequent tests do not account for model

Table 4
The Optimal ARDL Model for Iran
Selected Model: ARDL(2, 3, 3, 3, 3, 2)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFP(-1)	0.157	0.248	0.634	0.536
FLFP(-2)	0.202	0.175	1.154	0.268
LNGDPPC	-1.659	1.07	-1.551	0.143
LNGDPPC(-1)	2.224	1.286	1.729	0.106
LNGDPPC(-2)	1.219	1.145	1.065	0.305

Table 4 (continued)

LNGDPPC(-3)	3.204	1.215	2.638	0.02
LNGDPPC2	0.103	0.062	1.645	0.122
LNGDPPC2(-1)	-0.129	0.075	-1.735	0.105
LNGDPPC2(-2)	-0.071	0.067	-1.066	0.304
LNGDPPC2(-3)	-0.189	0.071	-2.644	0.019
TOP	0.005	0.022	0.245	0.81
TOP(-1)	0.018	0.035	0.505	0.621
TOP(-2)	-0.057	0.039	-1.48	0.161
TOP(-3)	-0.145	0.043	-3.353	0.005
FDI	0.726	0.249	2.922	0.011
FDI(-1)	0.728	0.287	2.537	0.024
FDI(-2)	0.668	0.28	2.39	0.031
FDI(-3)	0.481	0.288	1.669	0.117
UNEMP	0.369	0.143	2.571	0.022
UNEMP(-1)	-0.366	0.165	-2.212	0.044
UNEMP(-2)	-0.54	0.194	-2.777	0.015
C	-21.468	5.483	-3.915	0.002
R-squared	0.992	Mean dependent var		0.133
Adjusted R-squared	0.98	S.D. dependent var		0.032
F-statistic	83.963	Durbin-Watson stat		2.294
Prob(F-statistic)	0			

*Note: p-values and any subsequent tests do not account for model

Table 5
The Optimal ARDL Model for Malaysia
Selected Model: ARDL(2, 4, 4, 0, 2, 4)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFP(-1)	0.546	0.143	3.808	0.002
FLFP(-2)	0.180	0.183	0.985	0.343
LNGDPPC	5.634	6.477	0.870	0.400
LNGDPPC(-1)	-24.050	9.731	-2.471	0.028
LNGDPPC(-2)	8.632	8.105	1.065	0.306
LNGDPPC(-3)	-4.037	7.488	-0.539	0.599
LNGDPPC(-4)	15.370	4.858	3.164	0.008
LNGDPPC2	-0.316	0.371	-0.851	0.410
LNGDPPC2(-1)	1.365	0.560	2.436	0.030
LNGDPPC2(-2)	-0.495	0.464	-1.067	0.306
LNGDPPC2(-3)	0.183	0.429	0.428	0.676
LNGDPPC2(-4)	-0.840	0.277	-3.029	0.010
TOP	-0.113	0.044	-2.571	0.023
FDI	0.141	0.539	0.262	0.798
FDI(-1)	0.135	0.517	0.262	0.798

Table 5 (continued)

FDI(-2)	-0.553	0.357	-1.548	0.146
UNEMP	-6.015	1.465	-4.105	0.001
UNEMP(-1)	6.583	1.715	3.838	0.002
UNEMP(-2)	-4.146	1.600	-2.591	0.022
UNEMP(-3)	-6.243	1.818	-3.434	0.004
UNEMP(-4)	4.628	1.355	3.415	0.005
C	-5.071	12.420	-0.408	0.690

R-squared	0.913	Mean dependent var	0.467
Adjusted R-squared	0.771	S.D. dependent var	0.037
F-statistic	6.465	Durbin-Watson stat	2.094
Prob(F-statistic)	0.001		

*Note: p-values and any subsequent tests do not account for model selection.

Table 6

The Optimal ARDL Model for Nigeria

Selected Model: ARDL(1, 3, 3, 0, 1, 2)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFP(-1)	0.480	0.126	3.806	0.001
LNGDPPC	3.759	2.947	1.276	0.217
LNGDPPC(-1)	-9.881	5.200	-1.900	0.072
LNGDPPC(-2)	7.806	4.587	1.702	0.104
LNGDPPC(-3)	-4.826	2.482	-1.945	0.066
LNGDPPC2	-0.250	0.201	-1.239	0.230
LNGDPPC2(-1)	0.663	0.356	1.863	0.077
LNGDPPC2(-2)	-0.521	0.314	-1.660	0.113
LNGDPPC2(-3)	0.321	0.169	1.904	0.071
TOP	0.105	0.030	3.484	0.002
FDI	0.881	0.211	4.172	0.001
FDI(-1)	0.735	0.220	3.344	0.003
UNEMP	-0.292	0.109	-2.668	0.015
UNEMP(-1)	0.199	0.183	1.086	0.290
UNEMP(-2)	-0.221	0.121	-1.822	0.083
C	11.764	5.204	2.261	0.035

R-squared	0.983	Mean dependent var	0.462
Adjusted R-squared	0.969	S.D. dependent var	0.055
F-statistic	74.989	Durbin-Watson stat	2.045
Prob(F-statistic)	0.000		

*Note: p-values and any subsequent tests do not account for model selection.

Table 7
The Optimal ARDL Model for Pakistan
Selected Model: ARDL (2 3 3 3 3 3 3)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFP(-1)	-0.144	0.122	-1.179	0.260
FLFP(-2)	0.266	0.138	1.927	0.076
LNGDPPC	-4.204	18.195	-0.231	0.821
LNGDPPC(-1)	75.603	39.654	1.907	0.079
LNGDPPC(-2)	-9.317	11.174	-0.834	0.419
LNGDPPC(-3)	-53.547	18.894	-2.834	0.014
LNGDPPC2	0.321	1.356	0.237	0.816
LNGDPPC2(-1)	-5.585	2.953	-1.891	0.081
LNGDPPC2(-2)	0.696	0.842	0.827	0.423
LNGDPPC2(-3)	3.982	1.405	2.834	0.014
TOP	-0.340	0.168	-2.020	0.065
TOP(-1)	-0.146	0.125	-1.160	0.267
TOP(-2)	0.072	0.159	0.455	0.657
TOP(-3)	-0.294	0.185	-1.589	0.136
FDI	0.755	0.492	1.534	0.149
FDI(-1)	0.610	0.664	0.919	0.375
FDI(-2)	-0.027	1.387	-0.019	0.985
FDI(-3)	1.233	2.062	0.598	0.560
UNEMP	-0.451	0.179	-2.521	0.026
UNEMP(-1)	-0.373	0.492	-0.759	0.462
UNEMP(-2)	-0.157	0.242	-0.649	0.527
UNEMP(-3)	-0.424	0.370	-1.147	0.272
C	-30.462	9.424	-3.232	0.007
R-squared	0.918	Mean dependent var		0.171
Adjusted R-squared	0.779	S.D. dependent var		0.046
F-statistic	6.616	Durbin-Watson stat		2.387
Prob(F-statistic)	0.001			

*Note: p-values and any subsequent tests do not account for model selection.

Table 8
The Optimal ARDL Model for Turkey
Selected Model: ARDL(1, 1, 1, 1, 1, 1)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
FLFPP(-1)	0.479	0.149	3.225	0.003
LNGDPPC	-10.433	2.299	-4.538	0.000
LNGDPPC(-1)	4.233	2.840	1.491	0.148
LNGDPPC2	0.562	0.127	4.419	0.000
LNGDPPC2(-1)	-0.226	0.157	-1.439	0.162
TOP	-0.015	0.049	-0.310	0.759
TOP(-1)	0.134	0.052	2.557	0.017
FDI	-0.918	0.427	-2.150	0.041
FDI(-1)	0.765	0.418	1.830	0.079
UNEMP	-0.627	0.266	-2.355	0.026
UNEMP(-1)	0.630	0.235	2.684	0.013
C	28.678	7.144	4.014	0.001
R-squared	0.982	Mean dependent var		0.320
Adjusted R-squared	0.974	S.D. dependent var		0.067
F-statistic	129.077	Durbin-Watson stat		2.318
Prob(F-statistic)	0.000			

*Note: p-values and any subsequent tests do not account for model selection.

Appendix I: VIF Tables Panel Data

Table 1

VIF Results Model 1.1

VARIABLE	**VIF**	**1/VIF**
URBAN	3.44	0.290939
TOP	2.64	0.378241
LNGDP	2.55	0.392385
TFR	2.00	0.499313
UNEMP	1.63	0.611735
FDI	1.60	0.625197
MEAN VIF	2.31	

Table 2

VIF Results Model 1.2

VARIABLE	**VIF**	**1/VIF**
LNTOUR	3.84	0.260332
LNGDP	3.77	0.265467
URBAN	3.65	0.273716
TOP	3.26	0.307092
FDI	1.49	0.669949
UNEMP	1.47	0.681316
MEAN VIF	2.91	

Table 3

VIF Results Model 2

VARIABLE	**VIF**	**1/VIF**
TOP	4.27	0.234212
URBAN	4.07	0.245908
LNGDP	3.05	0.328257
TFR	2.65	0.377722
RD	2.28	0.439343
UNEMP	1.67	0.597552
FDI	1.63	0.612760
LNGDP*RD	1.17	0.856010
MEAN VIF	2.60	

Table 4

VIF Results Model 3

VARIABLE	VIF	1/VIF
LNGDP	4.17	0.240035
URBAN	3.89	0.256755
TOP	3.36	0.297751
TFR	3.01	0.331945
LD	1.92	0.520288
UNEMP	1.66	0.600940
FDI	1.65	0.607420
LNGDP*LD	1.17	0.857369
MEAN VIF	2.60	

Table 5

VIF Results Model 4

VARIABLE	VIF	1/VIF
LNGDP	4.53	0.220877
URBAN	3.61	0.277244
TOP	3.25	0.307341
TFR	3.10	0.322648
ED	2.15	0.465118
UNEMP	1.71	0.584066
FDI	1.65	0.605366
LNGDP_ED	1.16	0.861405
MEAN VIF	2.65	

Table 6

VIF Results Model 5

VARIABLE	VIF	1/VIF
URBAN	3.50	0.285572
TOP	2.72	0.367014
LNGDP	2.70	0.370459
TFR	2.11	0.473083
UNEMP	1.80	0.554232
FDI	1.61	0.620564
POLITY2	1.19	0.839798
LNGDP*POLITY2	1.10	0.912785
MEAN VIF	2.09	

Table 7
VIF Results Model 6

VARIABLE	VIF	1/VIF
URBAN	3.44	0.290834
LNGDP	2.68	0.372672
TOP	2.65	0.377795
TFR	2.15	0.464667
UNEMP	1.82	0.550089
FDI	1.62	0.615739
PR	1.17	0.856232
LNGDP*PR	1.10	0.909711
MEAN VIF	2.08	

Table 8
VIF Results Model 7

Variable	VIF	1/VIF
URBAN	3.50	0.285597
LNGDP	2.71	0.369482
TOP	2.66	0.376258
TFR	2.05	0.487933
UNEMP	1.82	0.548515
FDI	1.64	0.608877
CL	1.22	0.817998
LNGDP*CL	1.04	0.964544
Mean VIF	2.08	

Table 9
VIF Results Model 8

Variable	**VIF**	**1/VIF**
URBAN	3.78	0.264412
LNGDP	3.17	0.314967
TOP	2.80	0.356513
TFR	2.51	0.398176
PE	2.08	0.481683
UNEMP	1.91	0.522219
FDI	1.63	0.614815
LNGDDP*PE	1.25	0.798602
Mean VIF	2.39	

Table 10
VIF Results Model 9

VARIABLE	**VIF**	**1/VIF**
SE	5.34	0.187131
URBAN	4.99	0.200556
TFR	3.59	0.278566
TOP	3.00	0.333304
LNGDP	2.59	0.385826
UNEMP	1.83	0.545807
FDI	1.72	0.582908
LNGDP*SE	1.22	0.819198
Mean VIF	3.04	

Table 11
VIF Results Model 10

Variable	**VIF**	**1/VIF**
URBAN	4.50	0.222269
TOP	2.82	0.354828
TE	2.70	0.370723
LNGDP	2.67	0.374723
TFR	2.37	0.421885
UNEMP	1.71	0.585987
FDI	1.65	0.604664
LNGDP*TE	1.38	0.724966
Mean VIF	2.47	

Table 12
VIF Results Model 11

VARIABLE	**VIF**	**1/VIF**
URBAN	3.59	0.278351
LNGDP	2.93	0.340879
TOP	2.81	0.355862
TFR	2.21	0.452334
ICTX	1.96	0.510485
UNEMP	1.73	0.577621
FDI	1.67	0.599197
LNGDP*ICTX	1.13	0.883329
MEAN VIF	2.25	

Table 13
VIF Results Model 12

VARIABLE	**VIF**	**1/VIF**
ELECTX	6.18	0.161905
URBAN	6.06	0.165055
TFR	2.84	0.351790
TOP	2.81	0.356434
LNGDP	2.58	0.387930
UNEMP	1.72	0.581357
FDI	1.64	0.609531
LNGDP*ELECTX	1.11	0.899940
MEAN VIF	3.12	

Table 14
VIF Results Model 13

VARIABLE	**VIF**	**1/VIF**
LNGDP	4.38	0.228221
TRSPX	3.69	0.270787
URBAN	3.56	0.280533
TOP	3.25	0.307724
TFR	2.02	0.494543
UNEMP	1.89	0.527788
FDI	1.70	0.589799
LNGDP*TRSPX	1.46	0.685845
MEAN VIF	2.74	