

# Impact of Inflation on Female Labor Force Participation: A Panel Study on The Countries of Indian Sub-Continent

By

Upoma Rahman Bhuiyan  
20275002

A thesis submitted to the Department of Economics and Social Science in partial fulfillment of the requirements for the degree of Master of Science in Applied Economics (MSAE)

Department of Economics and Social Science  
Brac University  
December 2022

© 2022. Brac University  
All rights reserved.

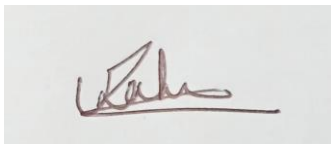
---

## **Declaration**

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at BRAC University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

**Student's Full Name & Signature:**



---

Upoma Rahman Bhuiyan

ID – 20275002

## Approval

The thesis/project titled “Impact of Inflation on Female Labor Force Participation: A Panel Study On The Countries Of Indian Sub-Continent” submitted by

UPOMA RAHMAN BHUIYAN, BRACU ID: 20275002

of Summer, 2022 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Masters of Science in Applied Economics on 21<sup>st</sup> December, 2022.

## Examining Committee:

Supervisor:  
(Member)



---

Dr. Gazi Mohammad Hasan Jamil  
Professor  
Department of Finance  
Dhaka University

Program Coordinator:  
(Member)



---

Dr. A S M Shakil Haider  
Assistant Professor  
Department of Economics and Social Sciences  
Brac University

External Expert Examiner:  
(Member)



---

Dr. A. M. Tanvir Hussain  
Associate Professor  
Department of Economics  
East West University

Departmental Head:  
(Chair)



---

Dr. Wasirur Rahman Khan  
Professor and Chairperson (acting)  
Department of Economics and Social Sciences  
Brac University

## **Abstract**

This paper has studied the impact of inflation on Female Labor Force Participation (flfp). This study was conducted on the Indian Sub-continental countries. Countries included in this study are still in the developing phase and participation of females in the labor market is very crucial for further economic development. Inflation affects the expenditure and real wage and overall household income, so it was tested if this economic shock of inflation affects the participation of female labor. Other explanatory variables were considered which might affect the flfp. Some explanatory variables could have been included in the regression, but the unavailability of the data has been a constraint. The overall empirical results support my hypothesis that with the increase/decrease in inflation, Net National income decrease/increase respectively and the relation between NNI and FLFP is inverse relation. Inflation can be used to understand the behavior of 'flfp' when the individual entity effect and time effect are taken into consideration.

## **Acknowledgement**

This thesis would not have been possible without the support of many people. Many thanks to my supervisor, DR. Gazi Mohammad Hasan Jamil, who read my numerous revisions and helped make some sense of the confusion. His point-of-view and comments motivated me to sharpen my thoughts and raised the caliber of my work.

Thanks to Brac University for giving me the opportunity to present this thesis. And finally, thanks to my husband and parents who endured this long process with me, always offering support and love.

## Table of Contents

Declaration -----	ii
Approval -----	iii
Abstract -----	iv
Acknowledgement -----	v
Table of Contents-----	vi
List of Tables-----	vii
List of Figures -----	viii
Chapter 1 Introduction-----	1
1.1 Study Context-----	1
1.2 Objective -----	2
1.3 Structure of this Paper-----	2
Chapter 2 Literature Review-----	3
2.1 Female Labor Force Participation(flfp) rate and Inflation -----	3
2.2 Female Labor Force Participation(flfp) rate and Unemployment -----	4
2.3 Female Labor Force Participation(flfp) rate and Education -----	5
2.4 Female Labor Force Participation(flfp) rate and Fertility-----	6
2.5 Female Labor Force Participation(flfp) rate and Husband’s Employment Status -----	7
Chapter 3 Methodology -----	9
3.1 Methodology-----	9
3.2 Model Specification -----	9
3.3 Data -----	9
3.4 Variables -----	10
Chapter 4 Exploratory Analysis in Light of the Six Countries -----	12
Chapter 5 Results and Discussion-----	19

5.1 Empirical Model .....	19
5.2 Empirical Results .....	19
5.3 Testing to choose the appropriate model .....	21
5.4 Addressing and rectifying issue of the chosen model .....	22
5.5 Employing Panel VAR and checking Impulse Response Function (IRF) .....	24
Chapter 6 Conclusion .....	27
References .....	28
Appendix 1 .....	33
Appendix 2 .....	34
Appendix 3 .....	36

## List of Tables

Table 1 List of Variables.....	10
Table 2 Basic Information of the six countries in the year 2000 and 2019 .....	12
Table 3 CPI and CPI adjusted Inflation .....	13
Table 4 Descriptive Statistics.....	19
Table 5 Pooled OLS, Fixed Effect, Time Fixed Effect and Random Effect method results .....	20
Table 6 Standard Errors and Robust Standard Errors .....	23
Table 7 Panel VAR Model.....	24
Table 8 Results of the eigenvalue stability condition .....	25
Table 9 Glimpse of the Panel data set.....	36



## List of Figures

Figure 1 Percent of Female in the population of each country .....	13
Figure 2 Rate of Inflation year to year from 2000-2019.....	14
Figure 3 Rate of Inflation adjusted to CPI year 2000 .....	14
Figure 4 Current NNI and CPI adjusted NNI for each year .....	15
Figure 5 FLFP rate from 2000-2019 for each of the six countries .....	16
Figure 6 Change in FLFP rate with the CPI adjusted NNI.....	16
Figure 7 Change in Unemployment rate with the change in Inflation rate.....	17
Figure 8 Response of FLFP rate with the change in Unemployment rate .....	18
Figure 9 Response of FLFP rate with the change in Literacy rate.....	18
Figure 10 Heterogeneity across Countries.....	22
Figure 11 Roots of the Companion Matrix .....	25
Figure 12 Orthogonalized Impulse Response Analysis .....	26

## **Chapter 1 Introduction**

### **1.1 Study Context**

In this paper, I analyze how inflation in countries of the Indian subcontinent (Bangladesh, India, Bhutan, Pakistan, Nepal, and Srilanka) affects the female labor force participation (FLFP) rate of women. Considering that many of these nations are still considered to be Least Developed or Developing, it is clear that the role of women in the workforce is essential to their progress.

The most common form of inflation is "hyperinflation", which means a rapid increase of price and reduces the power of buying commodities (Hart, 1957). Inflation measures the general increase or decrease in the cost of a standard basket of goods and services. With the help of inflation, one can see how much their income has changed over the years; a hundred dollars earned in the year 2000 would not buy the same amount of purchasing power in the year 2020.

To understand the forthright effect of inflation, I have taken Net National Income (NNI) data and adjusted the Net National Income (NNI) with inflation where year 2000 is my base year.

Inflation rates can be used to reconstruct the story of how the country's household income has evolved with the adjustment of inflation over time. Inflation can reduce the purchasing power of income, which in turn increases the cost of living and may necessitate the female to enter the labor force. As Tyson(1998) stated according to actual data, low-income individuals' income decreases as inflation rises, which causes their real minimum income to fall.

Besides inflation, few other independent variables are included in the study which may affect the rate of female labor force participation. Factors like education, childcare benefits, government donation, etc., might shape the extent to which women in a given country participate in the labor force. The correlation between women joining the workforce and these factors is intricate.

In countries where population ratio of male and female is almost same, then the contributions of women to the workforce are crucial to the growth of the economy. A weak economy is inevitable if a sizable proportion of the population is not engaged in labor. The availability of female labor is both a cause and a result of development. It concludes that FLFP growth and level have favorable effects on economic expansion. The potential for economies to grow more quickly in response to higher labor inputs increases as more women join the workforce. Ehsan(2015) mentioned in his paper that in 1990s, the female labor force in Pakistan saw a major improvement which caused

Pakistan's GDP growth to raise by 4.04%. Women's work is lifting low-income households from poverty by increasing family income and increasing consumption of products and services. In general, women's capabilities rise alongside a country's social and economic growth since traditional gender roles change and women are given more chances to earn income outside the home. World Bank Data shows an increasing trend in FLFP rate, especially in developing countries. "In OECD countries, female labor force participation has shown an increasing trend since the 1970's" (Ahn & Mira 2002).

## **1.2 Objective**

Numerous research studies have examined the factors influencing the female labor force participation rate. I want to focus mainly on the influence of inflation, which may be important in understanding the behavior of females' interest in participating in the labor force.

**Design and Research Question:** CPI/Inflation-adjusted Net National Income (NNI) is used to proxy the "inflation rate". So, to understand the impact of inflation on the behaviour of participation of females in the labor force, Inflation-adjusted Net National Income (NNI) is used as one of the regressors in the empirical model. Therefore, the main question I wanted to address is whether this regressor affects "flfp" positively or negatively. Statistical software R devised the analysis of the empirical models and figures. A panel data regression is conducted here, and both fixed and random effect models were tested.

**Hypothesis of this research:** The "flfp" rate will fall if the Inflation-adjusted Net National Income (NNI) increases. It is expected "inflation rate" and "flfp" will have a positive relation. Since, household consumption expenditure is contingent on Net National Income (NNI), therefore a reduced NNI will reduce family income in general, which may encourage women to enter the workforce, similarly the opposite effect is desired. Conversely, the "flfp" rate may be positively influenced by education level. The "flfp" rate is predicted to be negatively impacted by both the unemployment, male labor force participation rate and fertility rates.

## **1.3 Structure of this Paper**

This paper is parted in to six chapters. The first chapter is Introductory chapter followed by a chapter dedicate to detailed literature review. Third chapter discusses the overall methodology and

data. To get a descriptive and visualized form of data chapter four is a must read. Main findings of my paper are included in the fifth chapter. Finally, the paper ends with a chapter of conclusion.

## **Chapter 2 Literature Review**

The literature of this study can be categorized into two parts. The first part of the literature contains findings of any study directly related to inflation and “flfp”. Direct relation between inflation and "flfp" have received less attention in the academic literature. The second part of the literature contains results of previous studies that show any relation with the other explanatory variables and “flfp”.

### **2.1 Female Labor Force Participation(flfp) rate and Inflation**

Sulekha et al.(2019), study findings support economic theory and evidence that inflation raises the cost of lifestyle, commodity prices, and job prospects. A direct impact on household income and discretionary spending will be observed due to this predicament.

Neimi and Lloyd (1981), in their paper, tried to explore the possible effects of inflation on women's labor supply trends. They demonstrate the likely importance of inflationary expectations in supporting the long-term expansion of women's labor supply, particularly in the prime age group, by studying the primary sources of female labor growth in the recent decade and their consequences on the long-run labor supply. It was also stated that if the youth labor force wants to maintain a high standard of living in the future, the long-run real income of the family will increase as there will be a shift from “one-earner” to “two-earner,” as wives will be participating in the labor force.

Dynarski et al. (1997), found when a family experiences revenue fluctuations, the wife's contribution to the household's income helps stabilize the existing level of consumption.

Simler and Tella(1980), observed a positive relation between inflation rate and labor force participation rate. Their assumption that a rise in inflation causes working-age adults to alter their expectations downward and become more uncertain of them is supported by the regression results. The results corroborate the hypothesis that rising prices lead to reduced anticipations of future real rates of pay and substantially reduced expectations of future real nonlabor earnings among individuals.

The results show that consumers' views toward private consumption expenditures are negatively affected by inflation forecasts, even when such customers are in an extremely advantageous financial position. To maintain the current level of private consumption expenditure another member of the household might join the labor force.

Cunningham(2001), in his paper, has studied the decision-making process of an individual when there is an economic shock. According to the author, when there is inflation risk of losing jobs increases and real wage decreases, to compensate for decreased income, the household pulls from its own resources by sending the members who were not participating in the labor force during economic prosperity.

In their paper, Bibi & Afzal (2012) stated that one of the main causes for married women's high labor market involvement is their high expenditure rates. The participation rate rises in tandem with the increase in spending. Inflation decreases the buying power and thus increase the expenditure. Most women join the job force to help support their families' high expenditure.

According to Ijaz and Tasnim (2009), women who are married are forced into labor market when the household faces poverty. According to the authors' research, married women from low-income homes are 10% more likely to engage in economic activities. It reinforces the idea that poverty forces married women to work.

Evidence supporting women's work as a household coping mechanism is provided by the research of Bhalotra and Umana-Aponte (2010), who show that the employment of women in Asia and Latin America rises during recessions.

## **2.2 Female Labor Force Participation(flfp) rate and Unemployment**

As the unemployment rate rises, women leave the labor market deliberately because they are losing hope of finding work. This conclusion could alternatively be interpreted as a reversed discouraged worker effect, in which women may elect to join the workforce in large numbers during periods of low unemployment., as said by Altuzarra, Galvez and Gonzales (2018).

Unemployment (here it indicates “0” salary) has a substantial income effect in homes when the husband is unemployed, but it should have both income and substitution effects if the wife is unemployed. When women's participation rates are low, economic repercussions from the loss of

the husband's income should be more significant. This perception was observed by Ahn & Mira (2002).

The results of Barth (1968) provide strong evidence for the "discouraged worker effect" among men, however the size of this effect appears to be quite modest. With the unemployment rate having risen sharply in the prior quarter, fewer people are actively seeking employment now.

According to Ozerkek (2013), the unemployment rate has a detrimental impact on the percentage of women actively participating in the labor force. Therefore, there is a significant deterrent impact of female unemployment rates on the participation rates of females in the labor force. Ozerkek (2013) also discussed that during high unemployment rate, it can be discouraging for workers (for instance married women) to continue looking for work, thus they stop looking. However, when economic conditions worsen and male breadwinners lose their jobs or face unemployment themselves, wives often feel compelled to enter the workforce as well.

A higher unemployment rate means fewer available jobs. When the unemployment rate is high, people have to spend more money and mental engagement looking for work. Due to a greater sensitivity to these expenditures, women may be deterred from entering the workforce or even beginning their search, as stated by Tansel (2002).

Discouraged workers in the US labor market were found to have a negative correlation with unemployment and labor force participation by Apergis & Arisoy (2017). This finding demonstrates the widespread impact of discouraged laborers across the United States.

### **2.3 Female Labor Force Participation(flfp) rate and Education**

The findings of Psacharopoulos & Tzannatos (1989) agree that women's labor force participation drops during the transition from an agricultural economy but rises again once a key threshold of development has been reached. Increases in the number of women who are able to participate in the formal labor force in developing nations may result from increased access to education.

In both developed and developing nations, educational attainment is one of the most important factors in determining success in the labor market, as suggested by the findings of Cazes & Verick (2013).

Both the paper of Mason (1987) and Mason&Smith (2000), suggest that a higher level of educational attainment is associated with a higher rate of female labor force participation rate.

Hafeez & Ahmad (2002) conducted a study on the educated married women of a district in Punjab. Their study findings suggest that level of educational attainment is an impactful factor in participating the labor force.

Chamlou, Muzi & Hanane (2011) reveals that a higher level of education i.e. beyond secondary has a significant effect on FLFP, but a lower level of education does not. Furthermore, there is a strong inverse and statistically significant link between conventional social standards and women's labor force participation.

Women's labor force involvement grows with education, but the gains are greatest after high school, according to research by Evans & Helcio (1993) on the effect of Brazil's economic growth on women in the workforce.

Researchers Cameron et al. (2001) found a U-shaped association between schooling and female labor flow in their analysis of data from Indonesia, the Philippines, Korea, Thailand, and Sri Lanka. Whereas secondary education has a beneficial effect on women's engagement in the workforce, primary education has either an insignificant or neutral effect. Women who have completed post-secondary education are more likely to be in the labor force in all five of these nations.

A similar findings by Aslam et al. (2008) in Pakistan discover a robust connection between educational attainment and female workforce participation. Most young women who have completed up to eight years of education find no employment. However, the likelihood of working a job that pays well increases dramatically with post-secondary education.

The paper of Faridi et al. (2009) state that a Metric-level education is the very minimum requirement for women to enter the labor market.

#### **2.4 Female Labor Force Participation(flfp) rate and Fertility**

Fertility rate affects the labor participation of women strongly. There is a growing negative relationship between women working and the presence of small children in the home shown in the paper by Klasen and Pieters (2015).

Having a college degree, as Bratti (2003) claims, makes a woman more committed to her career. Women with a high of education have fewer children and are more likely to work.

As stated by He and Zhu (2016) in their paper, according to the ordinary least squares estimations, a woman's likelihood of working decreases by 6 and 9 percentage points after each additional child she has between the years 1990 and 2000.

The fertility rate of married women also strongly influences their rate of employment (Carrasco 2001).

According to Hyslop (1999) women leave the workforce when they have children and return when their children are of school age, suggesting that having children, particularly small children, tends to diminish women's engagement.

The findings of Bakar et al.(2014) states that an increase of one percentage point in the total fertility rate is associated with a decline of 0.44 percentage points in the female labor force participation rate across the countries of Asian-6.

By investigating the effects of unemployment rates on fertility in England Aksoy (2016), found that higher rates of female unemployment are correlated with more births, while higher rates of male unemployment are correlated with fewer births.

Ahn & Mira (2002) describe some remarkable trends after analyzing a panel of OECD aggregate fertility and labor market data from 1970 to 1995. Conforming to a well-known long-run pattern, both the total fertility rate (TFR) and the female participation rate (FPR) were decreasing. Throughout the 1970s and into the early 1980s, there was a negative and statistically significant association between TFR and FPR along the cross-sectional dimension.

Faridi & Rashid (2014) found that married women's earnings are negatively impacted by the number of children in the household because of the increased time and effort required to care for their children. A similar result was reported by Chaudhury et al. (2010).

## **2.5 Female Labor Force Participation(flfp) rate and Husband's Employment Status**

Rosenfield (1992) looked at how women's job affected their spouses' mental health. His findings indicate that men's mental health suffers when their wives work outside the home since doing so reduces their relative income and compels to get involved in domestic chores.



Staines et al. (1986) finds that husbands' job and personal satisfaction are negatively correlated with their spouses' employment for no obvious reason. The one explanation supported by the data shows that this dissatisfaction among spouses of working wives can be largely attributed to their perception of their own abilities as family breadwinners, compared to that of husbands of stay-at-home wives. This research provided further evidence that occupational context is crucial for understanding the unfavorable associations between wives' work and husbands' job and life happiness.

Ahmad and Hafeez (2007) present their findings, as the husband's income rises, the wife's need to work will decline. There is a similar effect when more people in the house are employed.

As per Bibi & Afzal (2012) the working condition of a woman's husband has a considerable impact on the probability that the woman will join the labor force after she has given birth. There is a correlation between women whose partners do not have jobs and the higher possibility that the woman will also seek employment herself.

Using data from both sources of male earnings fluctuation, Agarwal (2017) found that male earnings have a significant, negative impact on FLFP rates of married women in India. As men's incomes rise by 10%, author find that married women's labor force participation falls by about 0.6%.

Faridi, Sharif et al. (2009) found husband's ability to income is negatively associated with wives participation in the labor market.

## **Chapter 3 Methodology**

### **3.1 Methodology**

Using annual data for the six countries (countries of Indian sub-continent), this work builds a panel data regression model for the years 2000-2019. Inflation (consumer price) data is collected and the Net National Income (NNI) is adjusted with the inflation rate to understand the influence of inflation on flfp. Ordinary Least Squares, Fixed Effect and Random Effect model are used to determine which model best fits the data at hand, several other tests were performed.

### **3.2 Model Specification**

Pooled OLS regression, Fixed Effect regression and Random Effect regression are run on the dependent variable using all the explanatory variables.

Panel data regression Model:  $Y_{it} = \beta_0 + \beta_i * X_{it} + \epsilon_{it}$

Here,

Y = female labor force participation rate (flfp rate)

X<sub>1</sub> = log of inflation-adjusted Net National Income (NNI)

X<sub>2</sub> = fertility rate

X<sub>3</sub> = literacy rate

X<sub>4</sub> = percent of female completed post-secondary education

X<sub>5</sub> = male labor force participation rate

X<sub>6</sub> = unemployment rate

### **3.3 Data**

Data is collected for the six countries, Bangladesh, India, Pakistan, Bhutan, Nepal, and Srilanka. The data is annual and collected for 20 years (2000-2019). The source of data is "World Bank Open Data" website. The dependent variables are kept as it is i.e. in percentage while the log form of the explanatory variable inflation-adjusted Household Consumption Expenditure was used in the model.

### 3.4 Variables

**Dependent variable:** The only dependent variable here is Female Labor Force Participation, flfp. The female labor force as a percentage of the overall workforce indicates how active women are in the workforce. The labor force is made up of people aged 15 and up who provide labor for the production of products and services for a set period of time.

**Independent variables:** Six explanatory/independent variables are used in the model

All the variables are shown in the following table:

**Table 1 List of Variables**

<b>Dependent Variable</b>	<b>Represents</b>
FLFP	Female labor force participation rate
<b>Independent Variable</b>	<b>Represents</b>
ADJ_NNI	Inflation/CPI adjusted Net National Income (NNI)
FLIT	Female Literacy rate
MLFP	Male Labor Force Participation rate
POST_SEC	Rate of Female completed post-secondary education
FERTI	Fertility rate per female
UNEMP	Unemployment Rate

#### **Definition of the Explanatory Variables:**

**Household Income (adj\_NNI):** Adjusted net national income is GNI minus consumption of fixed capital and natural resources depletion.

**Fertility rate (ferti):** It is another variable in this study that expresses number of children per woman.

**Post-secondary Education(post\_sec):** The population ages 25 and over attained or completed post-secondary non-tertiary education.

**Female Literacy rate (flit):** The adult literacy rate refers to the percentage of the population having age above 15 and are able to read & write a brief, straightforward statement about topics they encounter on a daily basis.

**Male Labor Force Participation rate (mlfp):** The male labor force as a percentage of the overall workforce indicates how active men are in the workforce. The labor force consists of people aged 15 and up who provide labor for the production of products and services for a set period of time.

**Unemployment rate (unemp):** Unemployment rates measure the percentage of the working-age population that is currently unemployed but actively looking for work.

## Chapter 4 Exploratory Analysis in Light of the Six Countries

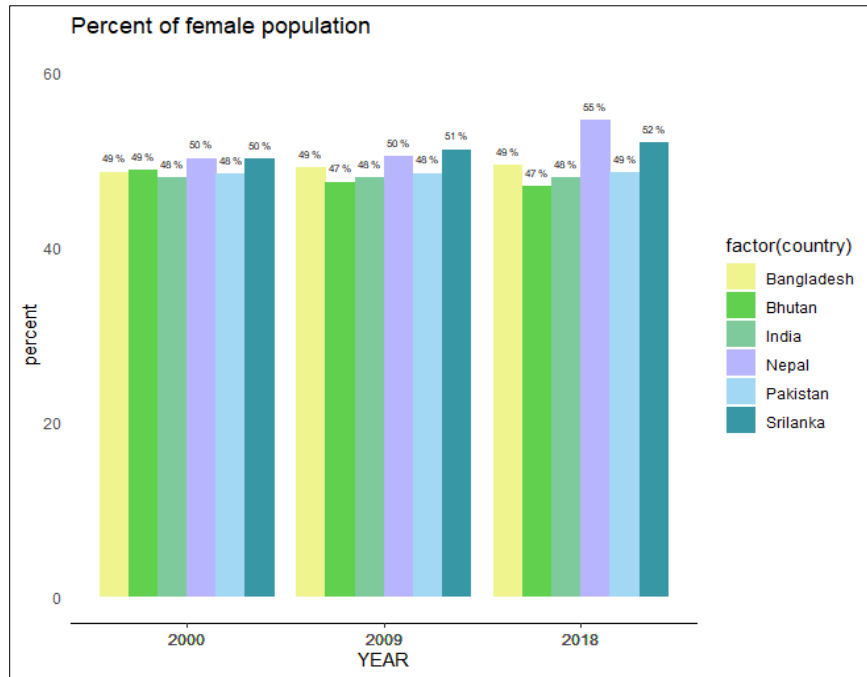
The time range for my data is 20 years, starting from 2000 till 2019. The following table provides a quick glimpse of the information for the year 2000 and 2019, related to the study topic. Readers can gain an idea how these factors have changed in the phase of long 20 years. As it can be seen that, population growth is substantial and noticeable in Bangladesh, India, and Pakistan. The country experiencing the highest growth in flfp is Bangladesh. Employment of female labors can be a plausible reason behind this growth. As Islam & Zahid (2012) mentioned it is widely acknowledged that the RMG industry is one of the primary employers of women in Bangladesh. More than eighty-five percent of production workers in this sector are women, making it the single most successful industry in the industrial sector for hiring female labors. The rate of inflation in these 20 years have not fluctuated immensely except in case of Pakistan. The change in household income is relatively high for all these six countries.

**Table 2 Basic Information of the six countries in the year 2000 and 2019**

Country	2000				2019			
	Population (million)	FLFP rate	NNI (in cr)	INF rate	Population (million)	FLFP rate	NNI (in cr)	INF rate
Bangladesh	130	28.34	5081	2.20	163.04	36.31	31240	5.59
India	1040	30.47	5123	2.08	1366.41	21.17	40870	3.72
Pakistan	140	16.12	5244	3.33	216.56	21.41	42470	10.57
Bhutan	2.163	60.91	5772	5.67	0.763	53.91	45100	2.72
Nepal	27.133	81.55	6272	7.59	28.60	82.49	53330	5.56
Srilanka	19.792	36.28	6690	7.05	21.32	32.94	61920	3.52

The proportion of female population is quite significant in each of the countries. Participation of this major part of population in the labor market is vital for the economic development of a country. Baerlocher et al. (2021) used a global panel and the system GMM method to conclude that an increase in FLFP has a significant and positive effect on GDP expansion. The availability of female labor is essential for a country's prosperity and socioeconomic development. The labor force participation rate is crucial in understanding economic growth and development. It also has a significant impact on poverty alleviation, according to Goldin (1995) and Pampel and Tanaka (1986).

The following figure shows the proportion of female population is significant in each of the countries for year 2000, 2009 and 2018. It is visible that about half of the population is female, so it is convincing that female participation is needed to accelerate female employment and economic development.



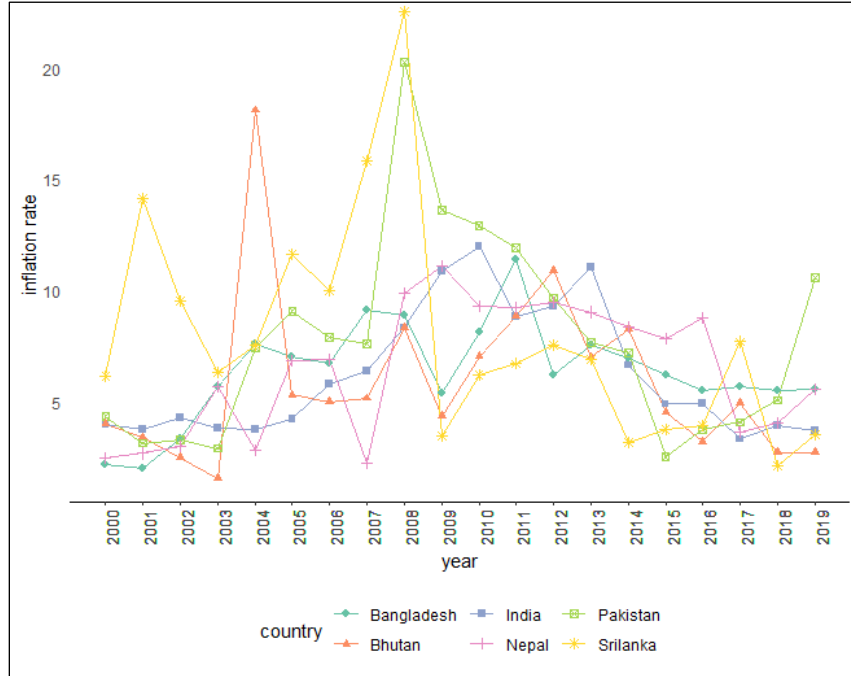
**Figure 1 Percent of Female in the population of each country**

By analyzing the collected data on inflation it can be observed that, there is irregular fluctuation of inflation year to year (2000-2019). But when I calculated the fictious inflation rate by using the CPI index (CPI 2000 as base index), it is observed that Inflation of each year with the base year 2000 shows a strong increasing trend. From data for Bangladesh CPI of 2000 ,2001 and 2002 is 53.91, 54.99 and 56.82 respectively. Following table shows the calculation of year to year fluctuation of Inflation rate and fluctuation of inflation rate considering CPI - 2000 as base year.

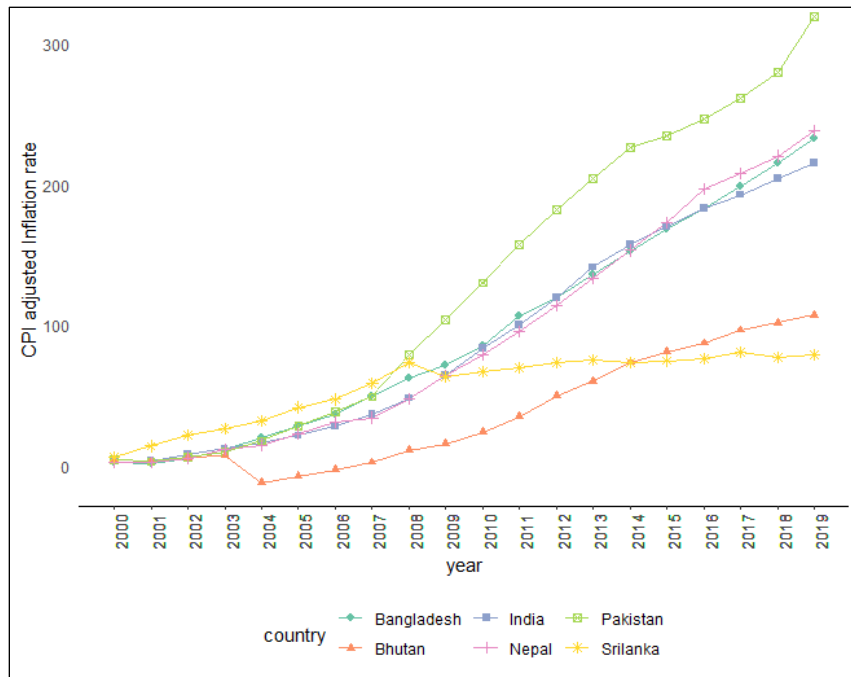
**Table 3 CPI and CPI adjusted Inflation**

Year	CPI	Inflation year to year	Inflation (CPI year 2000 base year)	\$100 income when adjusted to inflation rate(base year 2000)
2000	53.9091	2.2082	2.2082	\$100
2001	54.9911	2.0071	2.0071	98.0323
2002	56.82381	3.3325	5.4066	94.8706

In this paper, I have adjusted the Net National Income (NNI) with inflation rate (base year 2000). The following figures (2 & 3) clearly portraits the difference between inflation year to year and inflation with respect to base year 2000.

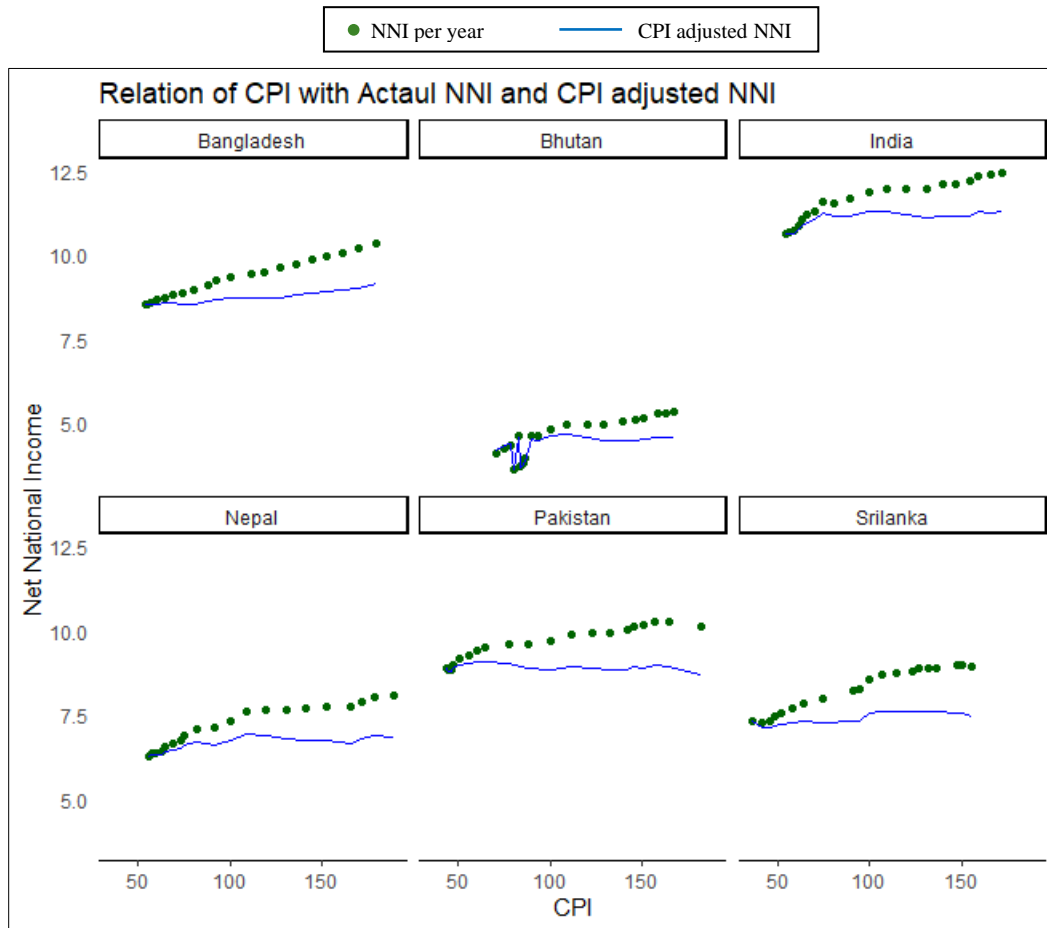


**Figure 2 Rate of Inflation year to year from 2000-2019**



**Figure 3 Rate of Inflation adjusted to CPI year 2000**

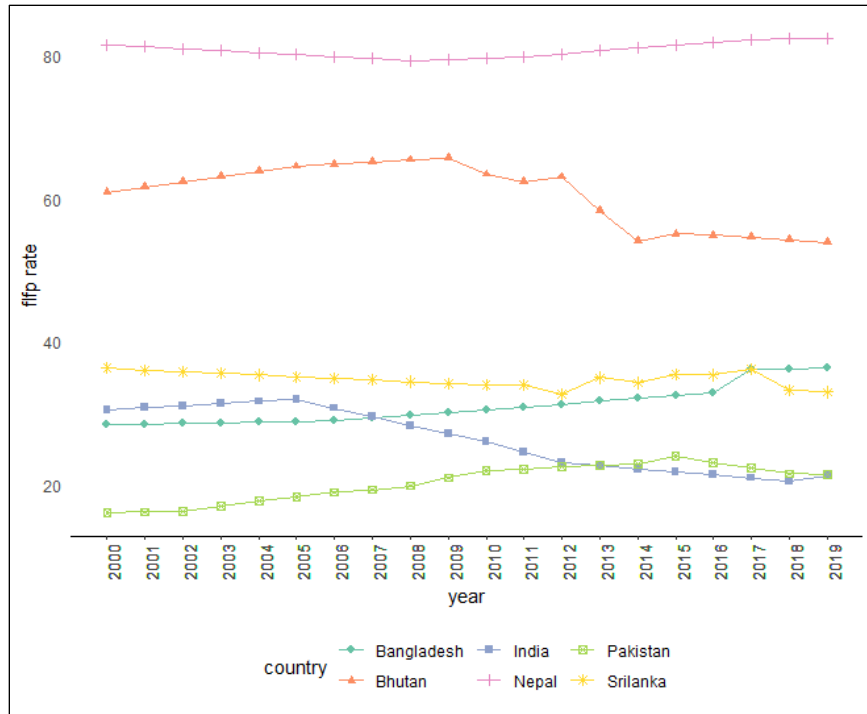
With the increase in CPI it might seem that income is increasing every year but when income of each year is adjusted with a base year (CPI adjusted / Inflation adjusted) then the income is expressed in that base year dollar.



**Figure 4 Current NNI and CPI adjusted NNI for each year**

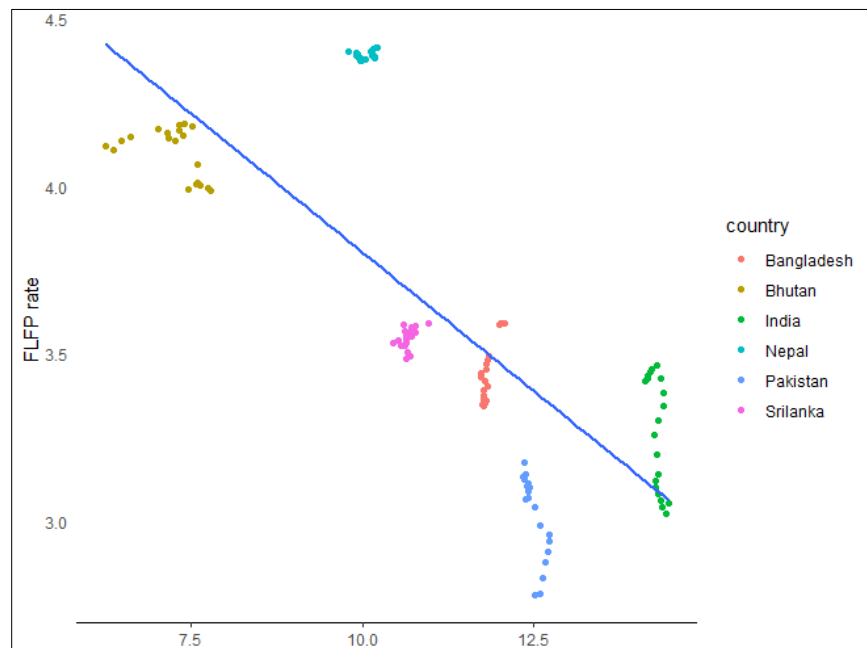
From the above figure it is seen that for each of the countries, the Net National Income (NNI) of each country is increasing with the increase in CPI, but when the income is adjusted with the CPI year 2000, the real income has not increased substantially. This effect of inflation, may exert pressure on the household members which might cause the female household members participate in the labor market.





**Figure 5 FLFP rate from 2000-2019 for each of the six countries**

Moving onto the data analysis of Female Labor Force Participation (flfp).it is observed figure 5 that flfp rate doesn't show any strong trend with time for any of the six countries



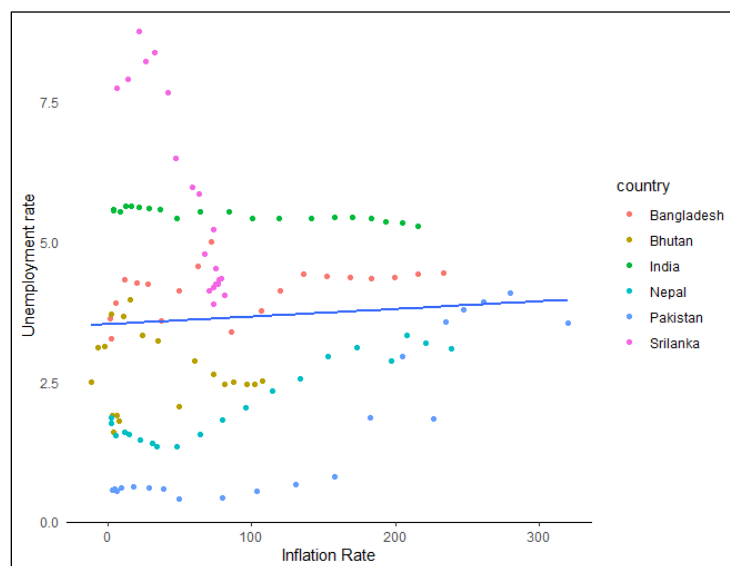
**Figure 6 Change in FLFP rate with the CPI adjusted NNI**

In the above figure 6, it is observed that with the increase in CPI adjusted NNI, flfp rate is showing a strong decreasing trend. This figure bolsters the hypothesis of my study.

FLFP rate can be influenced by Unemployment rate as well. As it can be derived from the literature that high unemployment rate might discourage new labors in the market. Evidence from Dagsvik et al.(2013) study demonstrates that a significant influence occurs when workers get demoralized. The paper suggests that around one-third of the non-working population is discouraged.

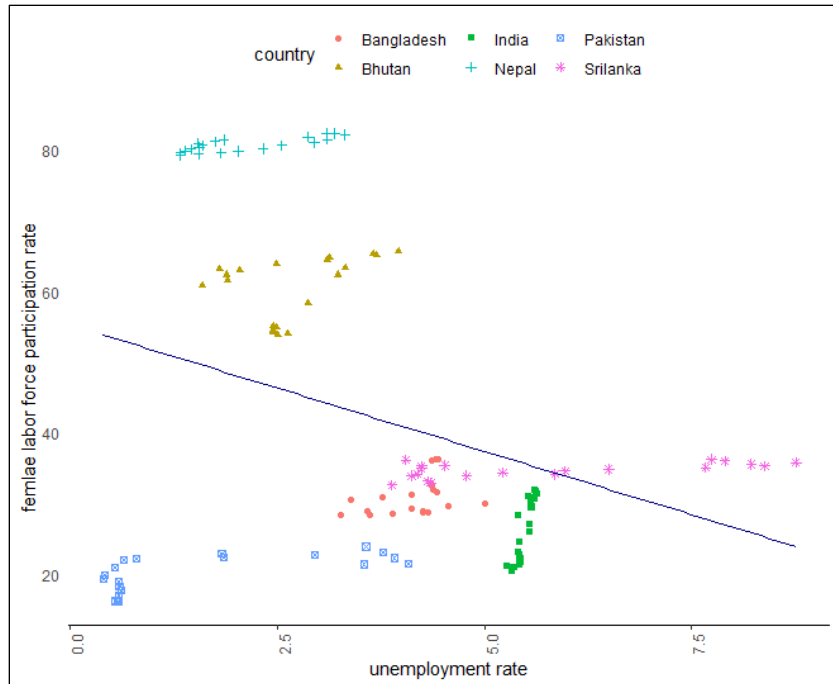
Through an analysis of the regional unemployment rate in connection to the labor force involvement of all married women, Gong(2010) also discover a sizeable discouraged worker effect.

Slesnic (1993) defines inflation as "the persistent rise in the price level of the economy," which has a major impact on GDP. Continuous increases in the cost of production, selling, manufacturing, advertising, and other factors contribute to a growing unemployment rate.



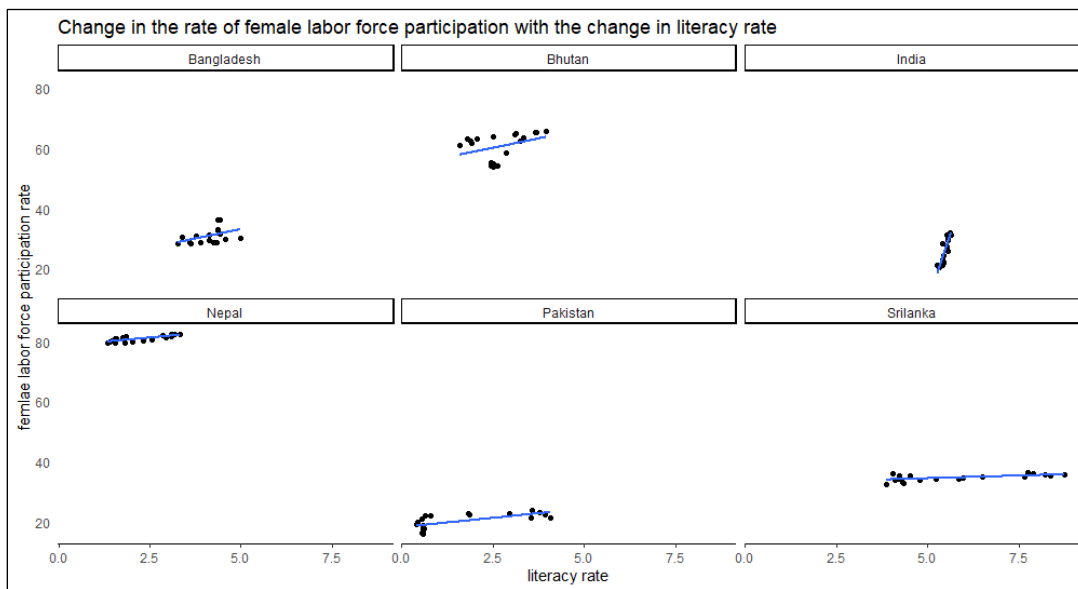
**Figure 7 Change in Unemployment rate with the change in Inflation rate**

Figure 7 supports the above statement of Slesnic(1993), that inflation raises unemployment and unemployment reduces flfp which is supported Gong(2010). Figure 8 is included to support the latter findings of author.



**Figure 8 Response of FLFP rate with the change in Unemployment rate**

The following figure 9, is pertinent to the literature we have already studied regarding the relation between education and flfp rate. Almost all the authors are unanimous that, high educational attainment can increase the flfp rate. For each of the six countries of this paper, the statement is added.



**Figure 9 Response of FLFP rate with the change in Literacy rate**

## Chapter 5 Results and Discussion

### 5.1 Empirical Model

#### Model:

$$Y_{FLFP} = \alpha + \beta_1 * \log (ADJ\_NNI) + \beta_2 * FERTI + \beta_3 * FLIT + \beta_4 * POST\_SEC + \beta_5 * MLFP + \beta_6 * UNEMP + \varepsilon$$

Where,

FLFP = Female labor force participation rate

ADJ\_NNI = CPI<sub>2000</sub> Net National Income of each year

FERTI = Fertility rate per female

UNEMP = Unemployment rate

POST\_SEC = Rate of female completed secondary education education

MLFP = Male Labor Force Participation rate

FLIT = Female literacy rate

### 5.2 Empirical Results

Table 4 Descriptive Statistics

Statistic	Mean	St. Dev.	Min	Max
<b>flfp</b>	42.3	21.7	16.1	82.5
<b>fertility</b>	2.8	0.8	1.9	5.0
<b>unemp</b>	3.6	1.9	0.4	8.8
<b>literacy_rate</b>	56.7	16.6	34.9	91.6
<b>adj_NNI</b>	35,090.1	58,388.1	51.5	192,516.9
<b>mlfp</b>	55.7	13.6	25.3	86.1
<b>post_sec</b>	10.0	9.4	2.1	35.7

Table 4 shows the descriptive statistics of all the variables, both dependent and independent. As we have countries belonging to different economic growth zones, so, the range of adjusted income is prominent. The mean of male labor force participation rate is higher than that of female. The standard deviation of flfp is higher than the sd of male labor force participation.

**Table 5 Pooled OLS, Fixed Effect, Time Fixed Effect and Random Effect method results**

<i>Dependent variable: flfp rate</i>				
	<b>PooledOLS</b>	<b>Entity Fixed Effect</b>	<b>Entity-Time Fixed Effect</b>	<b>Random</b>
<b>log_nni</b>	-8.2525*** (0.6373)	0.6817 (1.9257)	-1.6798 (2.1488)	-6.6705*** (0.9493)
<b>fertility</b>	-9.8331*** (2.1684)	2.4021** (1.1307)	6.1331*** (2.1786)	-1.8210* (1.0245)
<b>literacy_rate</b>	0.2980 (0.2606)	0.0892 (0.0800)	0.1634 (0.1040)	0.1530 (0.1031)
<b>post_sec</b>	-1.0920** (0.4374)	0.1431 (0.2848)	0.1526 (0.3232)	-0.5454** (0.2640)
<b>mlfp</b>	0.7220*** (0.0815)	-0.0156 (0.0519)	-0.0163 (0.0601)	0.1105* (0.0631)
<b>unemp</b>	0.6673 (0.8615)	1.3158*** (0.3354)	1.9099*** (0.4344)	0.5255 (0.3726)
<b>Constant</b>	85.7224*** (12.8146)			88.4298*** (10.3518)
Time fixed effect	No	No	Yes	No
Entity fixed effect	No	Yes	Yes	No
Observations	120	120	120	120
R <sup>2</sup>	0.8051	0.1854	0.2896	0.3391
Adjusted R <sup>2</sup>	0.7947	0.1024	0.0501	0.3040
F Statistic	77.7946***	4.0960***	1.4509	57.9688***

*Note:*

\*  $p < 0.1$   
\*\*  $p < 0.05$   
\*\*\*  $p < 0.01$

All of the models except Fixed Effect suggest that with the increase in adjusted Net National Income (NNI), flfp will fall.

Random effect was tested to check if any individual feature is being reflected through the error term.

Fixed Effect regression was run to check the individual feature of the entities that might affect the “flfp”. First model of FE without time-fixed effect was estimated to capture any effect caused by the entities(country). The estimation from Entity fixed Effect suggests that due to increase in adjusted income flfp will increase which gainsay my hypothesis

When fixed effect regression was run considering the time-fixed effect as well, the co-efficient of “log\_nni” suggests that with the increase in CPI adjusted Net National Income (NNI), the rate of flfp falls. Due to 1 unit increase in adjusted Net National Income (NNI), flfp reduces by 1.6798 percentage points.

### **5.3 Testing to choose the appropriate model**

#### **Bruesch- lagrange multiplier test to choose between RE model and OLS model:**

$H_0$ : OLS is the better model between RE model and OLS

By running “plmtest” in R studio, obtained p-value is (2.2e-16).

Since (2.2e-16)<0.05; rejecting the Null hypothesis and concluding that RE model is better than OLS Model.

#### **Hausman test to choose between RE model and FE model:**

$H_0$ : RE is the better model between RE model and FE model

By running “phptest” in R studio, obtained p-value is (0.001255).

Since (0.001255)<0.05; rejecting the Null hypothesis and concluding that FE model is better than RE Model.

#### **Individual F Test to choose between FE model and OLS:**

$H_0$ : OLS is the better model between FE model and OLS

By running “pftest” in R studio, obtained p-value is (2.2e-16).

Since (2.2e-16)<0.05; rejecting the Null hypothesis and concluding that FE model is better than OLS Model.

#### **Lagrange Multiplier Test - time effects (Breusch-Pagan):**

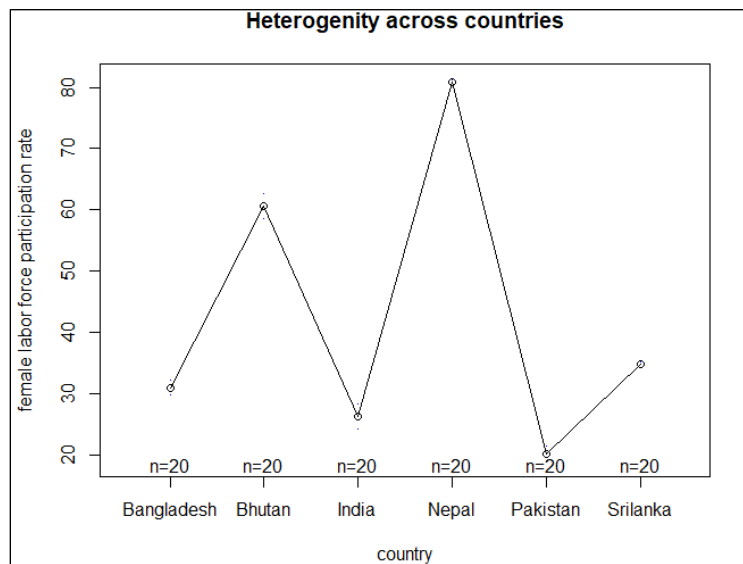
This test is run to make sure if the time-fixed is significant or not.

$H_0$ : Time-fixed effect is not needed

By running “plmest” in R studio, obtained p-value is (0.000532).

Since  $(0.000532) < 0.05$ ; rejecting the Null hypothesis and concluding that Time-fixed effect is significant

In OLS model, it is considered by default that the mean for each country is same. But that is not the case. We can visualize in figure 10 that there is heterogeneity across the six countries I have selected. So, OLS model won't a good fit for this panel data. To capture the individual entity effect I need to use fixed effect model.



**Figure 10 Heterogeneity across Countries**

#### **5.4 Addressing and rectifying issue of the chosen model**

Based on the above tests and graphical analysis, I have decided to choose Fixed Effect(both entity and time) model.

The assumption that the residuals are distributed with equal variance at each level of the predictor variable is one of the fundamental assumptions of linear regression. This property is known as the property of Homoscedasticity. But in most case when worked with a large sample and specially cross-sectional data, there is a strong possibility of Homoscedasticity is not present rather the model suffers from Heteroscedasticity. So, firstly I have checked if my Fixed Effect model has heteroscedasticity in it or not.

To check for the presence of Heteroscedasticity, I have run the “Breusch-pagan” test and the result is p-value =  $6.568e-06$ , so Heteroscedasticity is there in my chosen model.

<b>Breusch-Pagan test</b>		
BP = 35.605	df = 30	p-value = 6.568e-06

In panel data analysis, another problem which is noticed is the problem of Serial Correlation. When the error terms of one period is correlated with the errors of another period. To test the presence of serial autocorrelation in my model I have run the “Bruesch\_Pagan Godfrey test”.

<b>Breusch-Godfrey test for serial correlation of order up to 1</b>		
LM test = 72.927	df = 1	p-value < 2.2e-16

According, the P-value, we can't reject the Null Hypothesis (there is no serial correlation), so my model is suffering from the problem of serial correlation.

To rectify both the problems of Heteroscedasticity and auto correlation Heteroscedasticity- and autocorrelation-consistent (HAC) estimators of the variance-covariance matrix is used. To state simply, the model is corrected as HAC robust standard errors are used. The following table includes both the normal standard errors and Robust standard errors.

**Table 6 Standard Errors and Robust Standard Errors**

<b>Dependent variable: FLFP rate</b>			
	<b>Estimates</b>	<b>Standard Errors</b>	<b>Robust Standard Errors</b>
<b>log_nni</b>	-1.6798	(2.1488)	(2.995669)
<b>fertility</b>	6.1331***	(2.1786)	(3.493618)
<b>literacy_rate</b>	0.1634	(0.1040)	(0.107008)
<b>post_sec</b>	0.1526	(0.3232)	(0.222903)
<b>mlfp</b>	-0.0163	(0.0601)	(0.012472)
<b>unemp</b>	1.9099***	(0.4344)	(0.629049)

*Note:* \*\*\* p < 0.01

Fixed effect model with the inclusion of HAC robust errors is my ultimate chosen model. This model suggests with 1 unit increase of CPI adjusted Net National Income, female labor force participation rate will decrease by 1.6798 percentage points.



### 5.5 Employing Panel VAR and checking Impulse Response Function (IRF)

To account for dynamic endogeneity, this study uses a PVAR approach within a generalized method of moments (GMM) framework. The PVAR strategy is preferred because it has the characteristics of the conventional VAR model, which uses a panel-data estimating approach to treat all variables as endogenous. This shows that each cross-sectional dimension has fixed effects that enable adjusting for heterogeneity on an individual basis.

This model can be expressed as:  $Y_{it} = \mu_i + \Phi(I)Y_{it-1} + f_i + \varepsilon_{it}$

$Y_{it}$  is a vector of predicting variable,  $\Phi(I)$  is the polynomial in the lag operator, and  $f_i$  stands for country-specific effects.

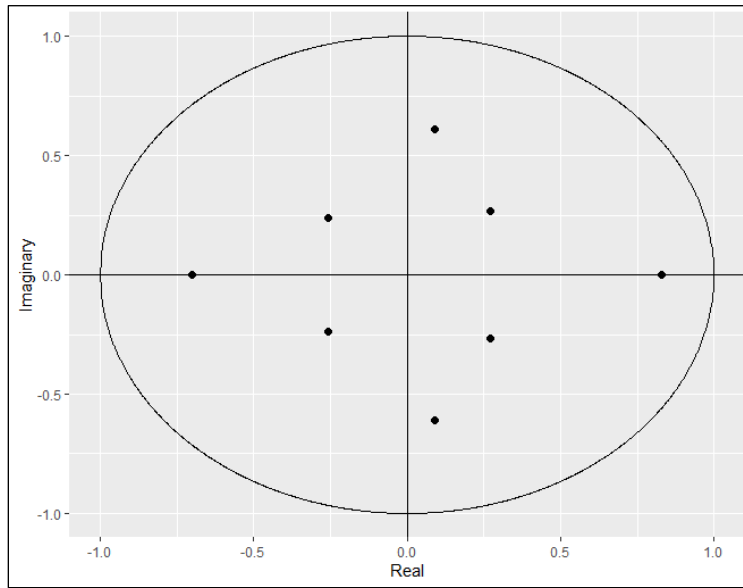
**Table 7 Panel VAR Model**

	<b>flfp</b>	<b>log_NNI</b>
<b>lag1_flfp</b>	0.3400***	0.1151***
<b>lag1_log_NNI</b>	0.0156	-0.0016***
<b>lag2_flfp</b>	0.1858***	0.0540***
<b>lag2_log_NNI</b>	0.0318***	-0.0039***
<b>lag3_flfp</b>	-0.0751***	-0.0534
<b>lag3_log_NNI</b>	0.0010***	-0.0031***
<b>lag4_flfp</b>	0.2140***	-0.0536
<b>lag4_log_NNI</b>	-0.0207***	-0.0128***
<b>flfp</b>	0.3231	0.0630
<b>log_NNI</b>	-0.0218***	0.0115***
<b>CPI_inf</b>	-0.0016	-0.0184
<b>const</b>	0.0035***	0.0004***
Hansen J statistics	5734.292	
Number of Instruments	1512	
Hansen J stat. P-value	0.00001	
<i>Note:</i>	* ** *** $p < 0.01$	

The results suggest that log\_NNI and depends negatively on their own lagged values. This might be due to the reason of increasing inflation which does not suffice the current increase in

expenditure of the household income as the real household income decreases. The increase in variable “CPI\_inf” suggests the same. A unit increase in CPI\_inf reduces the Net National Income. Moreover, a higher price in the last period reduces current sales.

Higher rate of flfp in the last period increases the rate of flfp in the next period. As expected, the rate of female employment in one period may work as encouraged worker effect in the next period. The most recent amount of NNI affects the flfp rate positively. The higher income act as a motivation for job seekers to enter the market.



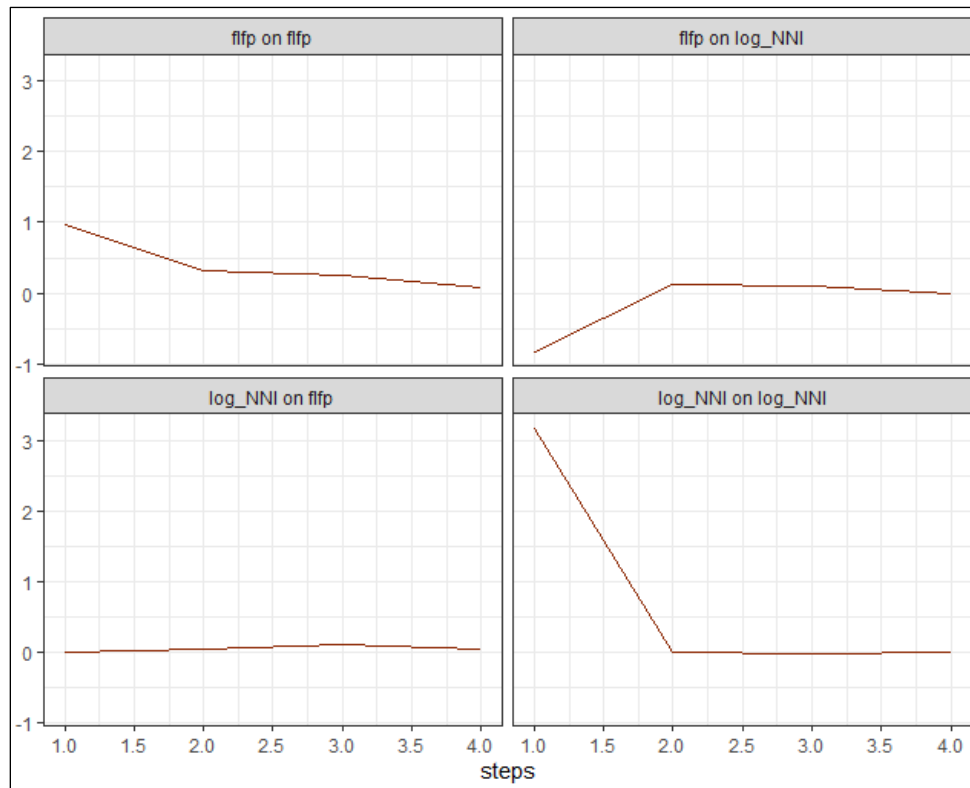
**Figure 11 Roots of the Companion Matrix**

The above figure 11, is evidence that the estimated PVAR model is stable. This property means that the moduli of the dynamic matrix’s eigenvalues are within the unit circle. The eigenvalue are shown in the following table.

**Table 8 Results of the eigenvalue stability condition**

eigenvalues		modulus
real	imaginary	
0.82965813937969	+0i	0.8296581
-0.701381690321655	+0i	0.7013817
0.088378926355194	+0.607613803988041i	0.6140076
0.088378926355194	-0.607613803988041i	0.6140076
0.272182897314239	+0.2654933693604i	0.3802240
0.272182897314239	-0.2654933693604i	0.3802240
-0.255513043248456	+0.236990562839953i	0.3484988
-0.255513043248456	-0.236990562839953i	0.3484988

An unexpected or unpredictable event that has an impact on the economy, either positively or badly, is referred to in economics as a shock. The IRF, which describes how one variable responds to a shock coming from another variable within a system, was used to measure the event while holding all shocks concurrently at zero value.(Love & Zicchino, 2006)



**Figure 12 Orthogonalized Impulse Response Analysis**

The above top-left figure demonstrates that the positive shock will increase flfp growth contemporaneously by 1 basis point but will later marginally decay within two years and eventually stabilize in the subsequent years. According to the top-right figure a one standard deviation in flfp will increase log\_NNI and causes to reach the peak within two years and then it gradually converges. This might happen due to the marginal productivity of labor.

The bottom-left figure shows that a one unit standard deviation in log\_NNI or a positive shock from log\_NNI will affect the flfp substantially at time period 3 and then it will gradually converge to 0. According to the bottom-right figure the positive shock of log\_NNI will affect itself sharply in the first period and then the effect will gradually decrease.

## **Chapter 6 Conclusion**

In this study, CPI adjusted Net National Income (acting as a proxy of the inflation rate) is the main independent variable and “female labor force participation rate” is the only dependent variable. Female Labor Force Participation was studied based on the change in inflation. The overall analysis has shown that inflation has a positive effect on female labor force participation when both entity and time fixed effect are taken into consideration. The study has faced some constraints due to data missing in the case of few explanatory variables. Few explanatory variables like ‘child care allowance’, ‘govt. expenditure on female education’, ‘govt. expenditure on vocational education’, ‘stipends for needy female students’ etc. could improve the regression model. But data for these variables were not available. There is a further scope of study to understand the impact of inflation on flfp combined with explanatory variables or any economic policy change.

## References

- 1] A.Sulekha, R. Francina Pracila Mary, Tharmaling(2019). *Impact of Inflation of the Household Spending Power*. International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-7 Issue-5S, January.
- 2] Agarwal, N. (2017). *An Explanation for the Puzzling Decline of Female Labor Supply in India*.
- 3] Ahmad, E., & Hafeez, A. (2007). *Labor supply and earning functions of educated married women: A case study of northern Punjab*. *Pakistan Development Review*, 46(1), 45–62.
- 4] Ahn, N., Mira, P. (2002). *A note on the changing relationship between fertility and female employment rates in developed countries*. *J Popul Econ* 15, 667–682. <https://www.jstor.org/stable/20007839>
- 5] Aksoy, C. G.(2016). *The effects of unemployment on fertility: Evidence from england*. *B.E. Journal of Economic Analysis and Policy*, 16(2):1123–1146.
- 6] Altuzarra, A., Gálvez Gálvez, C., & González Flores, A. (2018). *Unemployment and labour force participation in Spain*. *Applied Economics Letters*, 1–6. doi:10.1080/13504851.2018.1470312
- 7] Altuzarra, A., Gálvez-Gálvez, C., & González-Flores, A. (2019). *Economic development and female labour force participation: The case of European union countries*. *Sustainability*, 11(7), 1962.
- 8] Apergis, N. and Arisoy, I. A. (2017). *Unemployment and labor force participation across the US States: new evidence from panel data* *Nicholas.SPOUDAI Journal of Economics and Business*, 67(4), pp. 45–84.
- 9] Aslam, Monazza, Kingdon, G. and Soderbom, M.(2008). *Is Female Education a Pathway to Gender Equality in the Labor Market? Some Evidence from Pakistan*. In *Girls' Education in the 21st Century: Gender Equality, Empowerment, and Economic Growth*. Washington, DC: World Bank.
- 10] Ayhan, S. H. (2018). *Married women's added worker effect during the 2008 economic crisis—The case of Turkey*. *Review of Economics of the Household*, 16(3), 767-790.
- 11] Baerlocher, D., Parente, S. L., & Rios-Neto, E. (2021). *Female labor force participation and economic growth: Accounting for the gender bonus*. *Economics Letters*, 200, 109740.
- 12] Bakar, N., Haseeb, M., & Hartani, N. (2014). *The dilemma of female labour force participation (FLFP) and fertility rate in Asian-6 countries: A panel cointegration approach*. *Life Science Journal*, 11(8s), 584-590.

- 13] Barth, P. S. (1968). *Unemployment and Labor Force Participation*. Southern Economic Journal, 34(3), 375. doi:10.2307/1055500
- 14] Bibi, A., & Afzal, A. (2012). *Determinants of married women labor force participation in Wah Cantt: A descriptive analysis*. Academic Research International, 2(1), 599.
- 15] Bratti, M. (2003). *Labor Force Participation and Marital Fertility of Italian Women: The Role of Education*. Journal of Economic Population, Springer, Vol. 16, No. 3, pages 525-554, August 2003
- 16] Cameron, L. A., Dowling, J. M., and Worswick, C.(2001). *Education and Labor Market Participation of Women in Asia: Evidence from Five Countries*. Economic Development and Cultural Change 49 (3): 459-477.
- 17] Carrasco, R. (2001). *Binary Choice with Binary Endogenous Regressors in Panel Data: Estimating the Effects of Fertility on Female Labor Force Participation*. Journal Of Business and Economic Statistics, Vol. 19, No. 4, pages 385-394, October.
- 18] Cazes, S., Verick, S. (2013). *The Labour Markets of Emerging Economies: Has Growth Translated into More and Better Jobs?* Geneva and Basingstoke, UK: ILO and Palgrave Macmillan.
- 19] Chamlou, N., Muzi, S., & Hanane, A. (2011). *Understanding the Determinants of Female Labor Force Participation in the Middle East and North Africa Region*. In International Conference on (Vol. 3, p. 1).
- 20] Chaudhry, I. S., Faridi, M. Z., & Anjum, S. (2010). *The effects of health and education on female earnings: Empirical evidence from district Vehari*. Pakistan Journal of Social Sciences, 30(1), 109–124.
- 21] Cömert, Hasan and Yeldan, E. (2018) *A Tale of Three Crises in Turkey : 1994 , 2001 and 2008 – 09'*
- 22] Cunningham, W. (2001). *Breadwinner versus caregiver: Labor force participation and sectoral choice over the Mexican business cycle*. The economics of gender in Mexico: Work, family, state, and market, 85-132.
- 23] Dagsvik, J. K., Kornstad, T., & Skjerpen, T. (2013). *Labor force participation and the discouraged worker effect*. Empirical Economics, 45(1), 401-433.
- 24] Dynarski, S., Gruber, J., Moffitt, R.A, & Burtless, G. (1997). *Can Families Smooth Variable Earnings?* Brookings Papers on Economic Acitivity, 1997, 229-303. <https://doi.org/10.2307/2534704>

- 25] Ehsan, S. (2015). *Female Labor Force Participation, Its Determinants and Effect on GDP in Pakistan* (Master's thesis, Eastern Mediterranean University (EMU)-Doğu Akdeniz Üniversitesi (DAÜ)).
- 26] Evans, M.D.R., and Helcio, U.S.(1993). *Women's Labor Force Participation and Socioeconomic Development: Influences of Local Context and Individual Characteristics in Brazil*. *British Journal of Sociology* 44 (1): 25-51.
- 27] Faridi, M. Z., & Rashid, A. (2014). *The correlates of educated women's labor force participation in Pakistan: A micro-study*. *The Lahore Journal of Economics*, 19(2), 155.
- 28] Faridi, M. Z., Chaudhry, I. S., & Anwar, M. (2009). *The socio-economic and demographic determinants of women work participation in Pakistan: evidence from Bahawalpur District*. *A Research Journal of South Asian Studies*, Vol. 24, No. 2, pages 351-367, July.
- 29] Faridi, Z., Sharif, I., & Anwar, M. (2009). *The socioeconomic and demographic determinants of women work participation in Pakistan: Evidence from Bahawalpur district*. *South Asian Studies*, 24(2), 351–367.
- 30] Goldin C (1995) *The U-shaped female labor force function in economic development and economic history*. In: Schultz TP (ed) *Investment in women's human capital and economic development*, University of Chicago Press, pp 61–90.
- 31] Gong, X. (2010). *The added worker effect and the discouraged worker effect for married women in Australia*.
- 32] Hafeez, A., & Ahmad, E. (2002). *Factors Determining The Labour Force Participation Decision Of Educated Married Women In A District Of Punjab*. *Pakistan Economic and Social Review*, 40(1), 75–88. <http://www.jstor.org/stable/25825237>.
- 33] Hart, A. G. (1957). *What is Inflation?* *Challenge*, Vol. 6, No. 3 (DECEMBER 1957), pp. 8-12.
- 34] He, X., & Zhu, R. (2016). *Fertility and Female Labour Force Participation: Causal Evidence from Urban China*. *The Manchester School*, 84(5), 664-674.
- 35] Hyslop, R. (1999). *State Dependence, Serial Correlation and Heterogeneity in Intertemporal Labor Force Participation of Married Women*. *Econometrica*, *Journal of the Econometric Society*, Vol. 67, No. 6, pages 1255-1294, November.
- 36] Ijaz, R. and Tasnim, K. (2009). *Labor Force Participation of Married Women in Punjab (Pakistan)*. *Journal of Economic and Social Research*, 11(2) 2009, pages 77-106
- 37] Islam, M.K. and Zahid, D. (2012). *Socioeconomic Deprivation and Garment Worker Movement in Bangladesh: A Sociological Analysis*. *American Journal of Sociological Research* 2(4): 82-89.

- 38] Klasen, S., & Pieters, J. (2015). *What Explains the Stagnation of Female Labor Force Participation in Urban India?* *The World Bank Economic Review*, 29(3), 449–478.
- 39] Love, I.; Zicchino, L. Financial development and dynamic investment behavior: Evidence from panel VAR. *Q. Rev. Econ. Financ.* **2006**, 46, 190–210.
- 40] Mason, K. O. (1987). *The impact of women's social position on fertility in developing countries.* *Sociological Forum*, 2(4), 718–745.
- 41] Mason, K. O., & Smith, H. L. (2000). *Husbands' versus wives fertility foals and use of contraception: The influence of gender context in five asian countries.* *Demography*, 37(3), 299–311.
- 42] Niemi, Beth T & Lloyd, Cynthia, B. (1981). *Female Labor Supply in the Context of Inflation.* *American Economic Review*, American Economic Association, vol. 71(2), pages 7075, May.
- 43] Olusola, B. , Chimezie, M. , Shuuya, S. and Addeh, G. (2022). *The Impact of Inflation Rate on Private Consumption Expenditure and Economic Growth—Evidence from Ghana.* *Open Journal of Business and Management*, 10. 1601-1646. doi: 10.4236/ojbm.2022.104084.
- 44] Ozerkek, Y. (2013). *Unemployment and labor force participation: A panel cointegration analysis for European countries.* *Applied Econometrics and International Development*, 13(1), 67-76.
- 45] Pampel, F. C., & Tanaka, K. (1986). *Economic development and female labor force participation: A reconsideration.* *Social forces*, 64(3), 599-619.
- 46] Psacharopoulos, G., & Tzannatos, Z. (1989). *Female Labor Force Participation: An International Perspective.* *The World Bank Research Observer*, 4(2), 187–201. doi:10.1093/wbro/4.2.187
- 47] Rosenfield, S. (1992). *The costs of sharing: Wives' employment and husbands' mental health.* *Journal of Health and Social Behavior*, 213-225.
- 48] Simler, N. J., Tella, A.(1980). *Inflation and Labor Force Participation.* *Stagflation: The Causes, Effects and Solutions*, vol(4), pp. 155-167.
- 49] Slesnick, D.T (1993). *Gaining Ground: Poverty in the Postwar.* United States.*Journal of Political Economy*, vol.101 (no.1), pp.1-38, February.
- 50] Staines, G. L., Pottick, K. J., & Fudge, D. A. (1986). *Wives' employment and husbands' attitudes toward work and life.* *Journal of Applied Psychology*, 71(1), 118–128. doi:10.1037/0021-9010.71.1.118.



- 51] Tansel, A. (2002). *Economic development and female labor force participation in Turkey: Time-Series evidence and cross-province estimates*. ERC Working Papers in Economics 01/05T.
- 52] Tyson L.(1998). *Commentary: How Can Economic Policy Strike a Balance between Economic Efficiency and Income Equality?* *Income Inequality: Issues and Policy Options*: 337- 343.
- 53] Verlagsgesellschaft, N., Affairs, S. and Europe, E. (2010). *Impacts of 2001 internal and recent global economic crises on youth unemployment in Turkey*. *Journal for Labour and Social Affairs in Eastern Europe* , 2010 , Vol . 13 , No . 4 , *Varieties of Capital'*, 13(4), pp. 515–537.

## Appendix 1

### **Entity Fixed Effect model:**

$$\text{flfp}_{it} = \alpha_1 + \alpha_2 * D_{bd} + \alpha_3 * D_{ind} + \alpha_4 * D_{pk} + \alpha_5 * D_{bhu} + \alpha_6 * D_{nep} + \beta_1 * \log(\text{adj\_nni})_{it} + \beta_2 * \text{ferti} + \beta_3 * \text{flit} + \beta_4 * \text{post\_sec} + \beta_5 * \text{mlfp} + \beta_6 * \text{unemp} + \epsilon_{it};$$

Entity Fixed Effect regression was run to check the individual feature of the entities that might affect the “flfp”

### **Entity and Time Fixed Effect model:**

$$\text{flfp}_{it} = \alpha_1 + \alpha_2 * D_{bd} + \alpha_3 * D_{ind} + \alpha_4 * D_{pk} + \alpha_5 * D_{bhu} + \alpha_6 * D_{nep} + \beta_1 * \log(\text{adj\_hhi})_{it} + \beta_2 * \text{ferti} + \beta_3 * \text{flit} + \beta_4 * \text{post\_sec} + \beta_5 * \text{mlfp} + \beta_6 * \text{unemp} + \lambda_2 * Y_{2001} + \lambda_3 * Y_{2002} + \lambda_4 * Y_{2003} + \dots + \lambda_{20} * Y_{2001} + \epsilon_{it}$$

For the above model  $D_{bd} = 1$  if the country is Bangladesh; otherwise 0. It is a dummy variable.

For the above model  $Y_{2001} = 1$  if the year is 2001; otherwise 0. It is a dummy variable.

Time Fixed Effect regression was run to check the individual feature of the time period that might affect the “flfp”

### **Random Effect Model:**

Random effect was tested to check if any individual feature is being reflected through the error term.

$$\text{flfp}_{it} = \alpha + \beta_1 * \log(\text{adj\_hhi})_{it} + \beta_2 * \text{ferti} + \beta_3 * \text{flit} + \beta_4 * \text{post\_sec} + \beta_5 * \text{mlfp} + \beta_6 * \text{unemp} + \mu_{it}$$

Here,  $\mu_{it} = \alpha_i + \epsilon_{it}$  is the individual specific error component.

**Appendix 2**  
**Manipulation of the data**

1	2	3	4	5	6	7
year	country	Net National Income(in cr)	year to year Inflation rate	CPI index	CPI adjusted inflation*	CPI adjusted (NNI)
2000	Bangladesh	5081	2.208	53.909	2.208	5081
2001	Bangladesh	5123	2.007	54.991	2.007	5022
2002	Bangladesh	5244	3.333	56.824	5.407	4975
2003	Bangladesh	5772	5.669	60.045	11.382	5182
2004	Bangladesh	6272	7.588	64.601	19.833	5234
2005	Bangladesh	6690	7.047	69.153	28.277	5215
2006	Bangladesh	6927	6.765	73.831	36.955	5058
2007	Bangladesh	7748	9.107	80.555	49.428	5185
2008	Bangladesh	9052	8.902	87.726	62.730	5563
2009	Bangladesh	10190	5.423	92.484	71.556	5940
2010	Bangladesh	11470	8.127	100.000	85.497	6183
2011	Bangladesh	12710	11.395	111.395	106.635	6151
2012	Bangladesh	13270	6.218	118.321	119.483	6046
2013	Bangladesh	14850	7.530	127.231	136.010	6292
2014	Bangladesh	16830	6.992	136.127	152.511	6665
2015	Bangladesh	19050	6.194	144.559	168.153	7104
2016	Bangladesh	21470	5.514	152.529	182.937	7588
2017	Bangladesh	23800	5.702	161.226	199.071	7958
2018	Bangladesh	26290	5.544	170.164	215.650	8329
2019	Bangladesh	31240	5.592	179.680	233.301	9373

To prepare our data for this paper, I calculated the data of column 6 and column 7. Rest of the data is collected from data source. As I wanted to find how the income per capita has changed with time, so I adjusted the income by considering CPI of Year 2000 as the base CPI index. Then CPI of each year was adjusted to CPI<sub>2000</sub> to get the CPI adjusted Inflation. That CPI adjusted inflation was further used to calculate the CPI<sub>2000</sub> adjusted income.

Calculation of CPI adjusted Inflation:

$$CPI_{2000} = 53.909 \quad ; \quad CPI_{2001} = 54.991 \quad ; \quad CPI_{2002} = 56.824$$

$$CPI_{2001} \text{ adjusted to } CPI_{2000}, \text{ adj\_}CPI_{2001} = \frac{CPI_{2001} - CPI_{2000}}{CPI_{2000}} * 100 = 2.007\%$$

$$CPI_{2002} \text{ adjusted to } CPI_{2000}, \text{ adj\_}CPI_{2002} = \frac{CPI_{2002} - CPI_{2000}}{CPI_{2000}} * 100 = 5.407\%$$

Calculation of CPI adjusted NNI:

$$NNI \text{ in } 2001 = 393.692 \quad ; \quad NNI \text{ in } 2002 = 395.984$$

NNI of 2001 converted to NNI of year 2000 by using CPI adjusted inflation rate of year 2001.

$$\text{Adjusted } NNI_{2001} = (NNI_{2001} * 100) / (\text{adj\_}CPI_{2001} + 100) = 385.946$$

$$\text{Adjusted } NNI_{2002} = (NNI_{2002} * 100) / (\text{adj\_}CPI_{2002} + 100) = 375.673$$

### Appendix 3

A glimpse of the Panel data set. 5 years of data for each country is shown in the table.

**Table 9 Glimpse of the Panel data set**

year	country	flfp	adjusted NNI	fertility	unemployment	mlfp	post secondary	literacy rate
2001	BD	28.466	5022	3.07	3.617	n/a	3.487440109	3.617
2002	BD	28.582	4975	2.973	3.898	n/a	n/a	3.898
2003	BD	28.689	5182	2.876	4.320	69.930	n/a	4.320
2004	BD	28.785	5234	2.782	4.261	n/a	n/a	4.261
2005	BD	28.876	5215	2.691	4.250	n/a	n/a	4.250
2001	IND	30.771	5058	3.244	5.576	53.590	n/a	5.576
2002	IND	31.065	5185	3.176	5.530	n/a	n/a	5.530
2003	IND	31.362	5563	3.109	5.643	n/a	n/a	5.643
2004	IND	31.658	5940	3.041	5.629	n/a	n/a	5.629
2005	IND	31.955	6183	2.972	5.613	62.200	n/a	5.613
2001	PAK	16.167	6151	4.904	0.565	n/a	n/a	0.565
2002	PAK	16.212	6046	4.774	0.548	70.180	n/a	0.548
2003	PAK	16.975	6292	4.648	0.590	n/a	n/a	0.590
2004	PAK	17.758	6665	4.528	0.613	70.450	n/a	0.613
2005	PAK	18.328	7104	4.416	0.593	n/a	2.104170084	0.593
2001	BHU	61.650	7588	3.342	1.900	n/a	n/a	1.900
2002	BHU	62.415	7958	3.183	1.889	n/a	n/a	1.889
2003	BHU	63.179	8329	3.037	1.800	n/a	n/a	1.800
2004	BHU	63.902	9373	2.906	2.490	n/a	n/a	2.490
2005	BHU	64.557	40870	2.788	3.100	53.670	n/a	3.100
2001	NEP	81.295	40923	3.772	1.746	n/a	n/a	1.746
2002	NEP	81.032	41667	3.593	1.544	n/a	2.691950083	1.544
2003	NEP	80.765	47464	3.422	1.595	86.100	n/a	1.595
2004	NEP	80.495	53109	3.263	1.554	n/a	n/a	1.554
2005	NEP	80.224	58655	3.118	1.458	n/a	n/a	1.458
2001	SRI	36.044	63451	2.246	7.900	n/a	35.73408127	7.900
2002	SRI	35.806	77057	2.254	8.760	n/a	n/a	8.760
2003	SRI	35.570	68892	2.263	8.220	57.090	n/a	8.220
2004	SRI	35.337	70711	2.271	8.380	55.210	n/a	8.380
2005	SRI	35.105	78573	2.276	7.670	54.140	n/a	7.670

BD= Bangladesh IND=India SRI=Srilanka NEP= Nepal BHU=Bhutan PAK=Pakistan