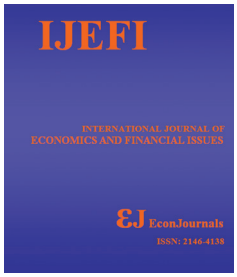

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Public Policy and Economic Misery Nexus: A Comparative Analysis of Developed and Developing World

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ABSTRACT

Minimizing the level of economic misery is one of the prime objectives of all economies for the last couple of decades. It is not individuals who can themselves control it, some public policy options provide roots to minimize economic misery. This article has examined the role of public policy in determining the level of economic misery among developed and developing countries from 1987 to 2019. The empirical findings of the article show level of domestic investment, foreign debt, and government revenue are discouraging economic misery among developing countries. Whereas economic development and the level of the population are encouraging economic misery among developing countries. The level of domestic investment is promoting economic misery in developed countries, but government revenue and economic development are reducing economic misery among developed countries. In the case of the whole sample analysis, the level of domestic investment and government revenues decreases the level of economic misery, but the level of population, foreign debt, and economic development depresses the economic misery. Thus, it is concluded that public policy plays important role in determining economic misery both in developed and developing countries. Developing countries should raise the level of domestic investment and government revenue to depress economic misery. Developed countries should raise government revenue and economic development to depress economic misery. So, for the reduction of economic misery in developed and developing countries, public policy must be strengthened.

Keywords: Public Policy, Economic Misery, Economic Development
JEL Classifications: E24, F63, J18, P24

1. INTRODUCTION

The literature of the last century is full of economic development theories and their implications, as the level of economic development determines the nature and conditions of economic issues related to the corporate body, business firms, trade unions, households, and individual and other decision-making bodies. Economic development theories have presented a fairly adequate framework for how a government can impact different economic issues following the nature of developing and developed countries. Dalton (1935) describes that public policies are a necessary part of the socioeconomic development of any economy. Richardo (1821), and Wicksell (1893) mention that revenue and spending by the public authorities and their adjustment need special attention from the policymakers. Pigou (1929) highlights the importance of public policies while explaining the theory of taxation. Keynes (1937) revolutionizes the concept, definition, and interpretation of public policies and the role of government. This is the period that was considered the emergence point of public finance, afterward, public policies have become an important tool for economic development.

Presently, undoubtedly, public policies have become an important determinant of the income and employment status of an economy. Following the ideology established by Keynes (1937), it is the

government that can diminish the strength of depression and raises the level of employment. When effective demand diminishes the production remains unsold which causes loss for the entrepreneurs. Thus, an investor will decrease the level of investment, and as a result, the level of unemployment increases this situation set the roots of depression in the economy. During the depression, the economy needs some iron hands of the government (Higgs, 2006; Haberler and Salerno, 2017). With the help of public policies, the government can raise the level of investment in specific and public welfare in general. So, full employment and stable inflation are impossible without the help of the government (Wray, 1997).

Public policies have a direct and indirect impact on the macroeconomic situation of an economy. Different indicators can be used to present the macroeconomic environment, but following extensive literature (Cohen et al., 2014; Shahbaz et al., 2016; Melnyk et al., 2018; Khan et al., 2019) economic misery is one of the main indicators to present the macroeconomic environment of the economy. This concept is introduced by Okun (1960), he measured economic misery with the help of inflation and unemployment. Inflation and unemployment are two crucial indicators for an economy, in the present era, every economy is caught in the trap of high inflation and unemployment (Leduc, 2003; Jones, 2007; Carlin and Soskice, 2018). Thus, the economic misery index has great importance from its measurement to its implications.

During the depression, the government uses effective fiscal policy and enhances public expenditure rather than public revenue (Tanzi and Schuknecht, 2000; Spilimbergo et al., 2009). The deficiency can be covered by deficit financing, i.e., by printing new currency notes and foreign debt (Mosler, 1995; Bell, 2000). The purchasing power of the people could be increased by deficit financing and subsidies. As a result, an increase in the aggregate demand for goods and services leads to a rise in the demand and supplies operationalize, the economy's depression situation tends to disappear and the economy moves towards a full-employment level (Farmer, 2017; Wray et al., 2018). On the other hand, whenever, there is a higher effective demand for goods and services the supply of money also increased, that will because of inflation in the country. For this reason, some economist prefers to have less role in the government (Stiglitz, 2002; Hausman and McPherson, 2008).

The conventional economic framework favors the public welfare foremost, inflation and unemployment are the main indicators to disturb public welfare (Scharpf, 1991; Starke et al., 2013). Public policy focuses on the government under which it allocates resources to an economy (Annabi et al., 2011). Every government has its aims to provide necessities to the masses at affordable prices. For this reason, public policies should be designed in such a way that can generate employment opportunities for the public (Chapin, 1995; Jaumotte and Pain, 2005). Moreover, Government should adopt such a policy that will help to control the inflation rate. In this study, we have to examine the role of public policies in determining the level of economic misery among developed and developing countries. We have also provided a comparative analysis of the developed world and developing world.

2. LITERATURE REVIEW

Economic growth and stability have been the top priority of developing and developed countries. In the present era without the government, the completion of this task is impossible. So, it is the responsibility of the government to develop such efficient public policy which maintained the mentioned targets. An efficient financial policy could support long-term economic growth and could be used as a tool to control inflation and unemployment in the country. Forstater (1999) argues that government should use its powers to fill its two great responsibilities regarding the economy, First the prevention of depression, and second the stability in the value of money.

The existing literature does not analyze the direct relationship between public policy and economic misery. In the past, economists have used these two major variables separately and tried to link them with different indicators of public policy. Szarowská (2016) examines that public finance has a direct impact on the economic growth of the country. King and Rebelo (1990) have also investigated the link between public policies and economic growth in the case of America. Another study by Chlichlia (1997) analyzed the link between unemployment and public finance in European countries. Phelps (2017) has examined the role of public policy to determine the level of inflation. In this study, he finds the component of tax as a public finance and its impact on inflation. Rendahl (2016) found that equilibrium unemployment dynamics significantly affect fiscal policy. Short-time increases in spending by the government can decrease the unemployment rate. Onodugo et al. (2017) also investigate the impact of government spending and private investment on unemployment. Vieira and Kawashita (2013) investigate the relationship between budget deficit and inflation. The study finds that budget deficit is an important component of public finance and inflation.

In another study, Hamburger and Zwick (1981) analyze the relationship between fiscal deficit and inflation. The empirical results reveal a strong relationship between the fiscal deficit and inflation and conclude that the budget deficit has an inflationary impact. Landau (1986) examines the relationship between government expenditure and economic growth in the economy of less-developed countries. The result show government expenditure excluded (military and educational expenditure) has a significant cause of a decrease in economic growth. While military expenditure has not had a significant impact on economic growth this outcome was against the anticipation, government expenditure on education has a significant correlation with economic development. Balassa (1993) analyzes the effects of the budget deficit, size of the government, private investment, and government investment on economic growth in the case of developed and developing countries. The empirical analysis notifies the negative correlation between capital expenditure (government expenditure to the GDP) and economic growth. Barro (1995) examines the impact of inflation on economic growth. The result describes the adverse impact of inflation on economic growth in the short run. Metin (1998) examines the relationship between inflation and budget deficit. The empirical result reveals that the budget deficit has an immediate positive relationship with inflation. Real income

growth is shown by the result hurting inflation for the short term but it became positive at the second lag with inflation.

Odedokun (2001) examines the effect of government expenditure, government revenue, and budget deficits on economic growth. The results of the empirical analysis show that an increase in capital expenditure harms economic growth in mineral exporting and high-income countries. De Mello and Barenstein (2002) investigate the effect of government spending on economic growth. The empirical analysis found a negative relationship between the population of municipalities and government expenditure. Government spending at the municipal level is affected by the size of the population of the municipality. Abu-Bader and Abu-Qarn (2003) investigate the relationship between government expenditure and economic growth. Empirical results show a bidirectional causal relationship between government expenditure and the economic growth of the country. Loizides and Vamvoukas (2005) examine the causal relationship between the size of the government and the growth of the economy. The empirical results found that the public expenditure of the country causes the growth in the GNP of the countries in the long run and short run in both cases.

Braşoveanu et al. (2008) examine the interconnection between fiscal policy and economic growth. The empirical result reveals that distortionary and non-distortionary revenues hurt the real growth rate of the economy, also be found a negative causality between economic growth and all type of fiscal revenues. Doménech and García (2008) examine the relationship between unemployment, taxation, and unemployment. The empirical results reveal that the unemployment level in any country depends upon the efficiency of the government expenditure it further found that labor taxes also affect the level of unemployment in the country. Young (2008) examines the role of public policy on unemployment and structural reforms of the product market. The statistical results support that fiscal expansion and sound public finance help to foster reforms.

Benos (2009) investigates the relationship between public policy and economic growth. The results reveal that government expenditure incurred on economic affairs, infrastructure, general public services, defense and military, property right protection, public safety, and law in order have a positive effect on economic growth. Saad and Kalakech (2009) investigate the impact of government expenditure and its growth on the economy of Lebanon. The result reveals a positive and significant impact of education expenditure on economic growth, but in the short run, the impact of educational expenditure was found negative on economic growth. Nurudeen and Usman (2010) examine the impact of government expenditure on the economic growth of the country. The empirical results show that government capital expenditure, total government recurrent expenditures, and government expenditure on education harm economic growth. Presbitero (2012) examines the effect of public debts on the economic growth of developing countries. The empirical result reveals that in low- and middle-income countries total public debts negatively impact economic growth accordant with the threshold of ninety percent of GDP, after which the effects become irrelevant.

Lin and Chu (2013) examine the relationship between fiscal deficit and inflation. The empirical results reveal that inflation is strongly associated with the fiscal deficit in the country. Mehrotra (2013) study the causal relationship between government recurrent expenditure and the growth of the economy. The result shows that there is an instant and unidirectional causal relationship between economic growth to government expenditure. In light of the analysis and results, it is to be revealed that the government expenditures need to reallocate so that they can play a significant role in the enhancement of economic growth in the economy of Iran. Fedeli and Forte (2012) investigate the long-term relationship between unemployment and public deficit. The empirical results show an overall increase in public expenditure causes an increase in the rate of unemployment. Khieu (2014) investigates the relationship between budget deficit, money supply, and inflation. The result shows that increase in the money supply has a positive relationship with inflation, but a budget deficit has no impact on the money supply. Nastansky and Strohe (2015) examine the relationship between government debts and inflation. The empirical analysis shows that after German reunification, in the long case a significant positive relationship was found between Inflation and public debt. On the opposite, the change in inflation has a restraining impact on public debt growth for a short period. It is also observed that inflation causes government profits in the short run but long and medium term the mutual relationship is perceived.

Van Bon (2015) investigates the relationship between public debts and inflation. The empirical result shows that developing countries of all-region like Asia, Africa, and Latin America do not surrender from borrowing to finance their financial debts which makes the debts a significant determinant of inflation in the economy. Effect inflation has a significant positive impact on economic growth but it has also an adverse effect if the inflation has larger than the threshold. Canale and Liotti (2015) examine the effects of structural budget adjustment on unemployment in the Eurozone. The empirical result shows that there is a positive relationship between unemployment and fiscal balance restructuring balance and also between the change in unemployment and adjustment in fiscal balance restructuring. It is also be concluded that tightness in the fiscal policy and cut down in public expenditure increased unemployment in the first phase of the eurozone. Szarowská (2016) examines the impact of public finance on economic growth. The results describe that financial variables of public finance have partly an impact on growth but growth is greatly influenced by the expenditure on human capital and trade openness. On the other hand, the government size, public debts, and budget deficit are not shown as statically significant. Veiga and Rodrigues, (2016) analyze the impact of public debt on economic growth and inflation. The overall result reveals that the restriction on public debts has negatively affected economic growth before a given level of debt, an inverse U behavior regarding the relationship between economic growth and public debt found in the empirical analysis.

Okunevičiūtė-Neverauskienė et al. (2017) examine the impact of taxation on labor; in the study, the relationship is to be analyzed between the taxation and unemployment rate in the context of Lithuania economy. Unemployment trap high taxation on low-

level wages earner and other social benefits to unemployed have a significant influence on the rate of unemployment, people elect to receive social benefits of the unemployed trap rather than do the job due to little difference between the low wage and the benefit that the perceived. The empirical result supports the significant co-relationship between the in-active population at age of (Twenty to sixty-four) and the unemployment trap indicator. A decrease in the tax on labor or an increase in the benefit level can boost the motivation of people to take a job. Lucifora and Moriconi (2017) investigated the relationship between taxation on income and unemployment. The empirical results show that there is a negative relationship between the tax burden and labor market performance. Wang et al. (2018) examine the relationship between government taxation and inflation. The analysis reveals that the tax increase directly affects inflation in the country. In simple words, more taxes by the government lead increase in inflation in the Chinese economy, and a reduction in the taxes causes control of prices in the country. Dadgar and Nazari (2018) analyze the relationship between the misery index and economic growth in Iran. The result shows that governance has a significant association with the misery index in the Iranian economy and also reveals by the result that the growth of the economy has a negative relationship with economic misery. Obioha (2018) examines the effect of the budget deficit on unemployment in the economy of Nigeria. The empirical result shows that the annual budget deficit in Nigeria has a significant and positive impact on unemployment.

3. THEORETICAL LINKS

Ricardo (1821) presents the famous theory, the Ricardian theory of Equivalence. This theory is based on the intervention of the government that may have no impact on economic growth. The inefficient fiscal policy of the government may not disturb the aggregate demand of the economy. This establishes the roots of the endogenous growth model theory which examines whether the public policy has an impact on the unemployment and inflation level or not (Romer, 1990; Grossman and Helpman, 1991; Howitt and Aghion, 1998). This theory mentions that public policy is an important determinant of economic growth.

The government collects taxes to meet its expenditure, as taxation is considered a primary source of income for any state (Ballard et al., 1985; Worlu and Nkoro, 2012). Government levy tax directly or indirectly on goods and services (Trotman-Dickenson, 1996; Jain, 2013; Hassija, 2017). Any change in public policy has a significant impact on unemployment (Garside, 2002; Thane, 2016). Okunevičiūtė-Neverauskienė et al., (2017), Canale and Liotti (2015), and Fedeli and Forte (2012) mention that public policy has a positive impact on the level of employment. But unnecessarily burden of taxes forces the manufacturers and employers to cut their costs down by reducing employment or less supply and production (Leibfritz et al., 1997; Joumard, 2001).

One of the main tools of public policy is foreign debt. Foreign debts are mostly taken by the government to meet the budget deficit (Beaugrand et al., 2002; Singh, 2013). For the redemption of debts, the government levy more direct or indirect taxes (Lucas and Stokey, 1983; Fritschy, 2008). If the level of debt increases from a certain level, it harms economic growth (Zagler and Dürnecker, 2003; Abbas et al., 2021). Metin (1998), Nastansky et al., (2014), Ahmed and Henry (2012), Van Bon (2015); Cassimon and VanCampenhout (2007) find that a rising budget deficit raises the amount of foreign debt which further increases the inflation rate in the economy. Some other studies examine the inverse relationship between foreign debt and the budget deficit (Atique and Malik, 2012; Lee and Ng, 2015). Keynes (1939) mentions that a lack of demand in production causes an increase in unemployment. Thus, the government has to play its role to boost the economy and decrease the unemployment level. Kaya and Yilmaz (2013) state that fiscal policy has a direct impact on the level of employment rate in the economy. On the other hand, Slavin (2008) states that fiscal policy can play important role in countering recession and depression. But the government that takes the loan to stabilize the economy may stuck in poverty and an inflationary trap (Friedman, 1977; Krugman et al., 1998; Eggertsson and Krugman, 2012). Thus, theoretical and empirical literature suggests a strong association between public policies, inflation, and unemployment. Following the existing studies (Phelps, 1969; Metin, 1998; Ali, 2015; Van Bon, 2015; Ali et al., 2015; Canale and Liotti, 2015; Ali and Rehman, 2015; Ali et al., 2016; Arshad and Ali, 2016; Okunevičiūtė-Neverauskienė et al., 2017; Lucifora and Moriconi, 2017; Ali and Naeem, 2017; Smith and Larimer, 2018; Obioha, 2018; Ali and Audi, 2018; Wang et al., 2018; Junankar, 2019; Roussel et al., 2021; Abbas et al., 2021; Ahmad et al., 2022), the model of our study becomes as:

$$MISERY_{it}=f(NI_{it}, POP_{it}, FDEBT_{it}, GREV_{it}, DEVELOP_{it}) \quad (1)$$

MISERY = economic misery index has been constructed with the help of principle Component analysis (PCA) with help of inflation and unemployment.
NI = level of domestic investment
POP = population of a country
FDEBT =Foreign debts
G REV = government revenue
DEVELOP = economic development
t = time period (1987-2016)
i= countries (31 developed and 35 Developing countries)

It is necessary to extract the econometrical model from its functional form to get empirical analysis and make a forecast:

$$MISERY_{it}= \alpha + \beta_1 NI_{it} + \beta_2 POP_{it} + \beta_3 FDEBT_{it} + \beta_4 GREV_{it} + \beta_5 DEVELOP_{it} + \mu_{it} \quad (2)$$

μ_{it} = white nose error

For this purpose, 66 developed and developing countries have been selected, among them, 35 are developing countries and 31 are developed countries. Data from 1987 to 2019 has been used. The source of data is World Bank and IMF, World Economic annual report April 2020.

3.1. Measurement of Economic Misery

Firstly, the economic misery index has been introduced by the American economist Okun (1960). This index is the composite index of unemployment and inflation in a country. After that there

is an extensive amount of literature is available to use this index as a measure of economic misery i.e., Cavanaugh (2002), Kohnert (2008), Bentley (2018), Ali et al. (2015), Shahbaz et al. (2016), Lorde et al. (2016). Based on the methodology by Okun (1960), we have constructed the economic misery index with the help of principle component analysis.

3.2. Measurement of Public Policy

Public policy plays important role in determining the socioeconomic development of a nation. A vast amount of literature is available to measure public policy. Sadka (1976), Parikh et al. (1990), Balassa (1993), Chlichlia et al. (1997), Odedokun (2001), Rosen (2004), Sapiei and Abdullah (2008), and Rendahl (2016) measure public policy with government revenue. Balassa (1993) has measured public policy with the help of government expenditure, budget deficit, and government investment. Odedokun (2001) has measured public policy by government expenditure, government revenue, and budget deficit. While Rosen (2004) has measured public policy by government expenditure and government revenue. Szarowská (2016) has also used government expenditure, government revenue, fiscal deficit, and government size to measure public policy. We have used government revenue, foreign debt, and level of domestic investment in the case of developed and developing countries.

4. ECONOMETRIC METHODOLOGY

Presently, applied econometrics has become the part and parcel of empirical analysis. This part of the study provides detailed information about the econometric methodologies used for empirical analysis. Nelson and Ploser (1982) mention that the stationarity of the variables is one of the main issues of time series and panel data. To determine the stationary of the variables, we have applied Levin, Lin and Chu t*, Im, Pesaran, and Shin W-stat, ADF - Fisher Chi-square, and PP - Fisher Chi-square. Levin et al. (2002) have offered a unit root test for panel data series, there are some unique properties of this test. LLC unit root test has also used homogeneity of the panel as compared to other tests. The methodology of the LLC unit root test is like the methodology of ADF. The methodology follows as:

$$\Delta y_{i,t} = \gamma_{0i} + py_{it-1+} \sum_{i-1}^{pi} \gamma_{1i} \Delta y_{i,t-j} + u_{i,t} \quad (3)$$

"γ_{0i} is the constant parameter in the eq. (3), this has exceptional properties for the cross-sectional units and p is the same for all the coefficients of autoregressive, however, γ_i presents the selected order of lags for the model, $\mu_{i,t}$ is the disturbance term, it is normally considered to be autonomous for all of the selected across of panel units. This eq. (3) is based on the Autoregressive Moving Average (ARMA) stationary procedure for respective cross-sections, then eq. can be presented as:

$$u_{i,t} = \sum_{j-0}^{\infty} \gamma_{1i} \Delta y_{i,t-j} + \varepsilon_{i,t} \quad (4)$$

Based on eq. (4), null and alternative hypotheses would be tested as:

H_0: $p_i = p = 0$

H_a: $p_i = p < 0$ for all i

The t-test can be utilized for the LLC model, where p is supposed to be fixed for the across and units, by following, the null and alternative hypothesis.

$$t_p = \frac{\overset{\Lambda}{p}}{\overset{\Lambda}{SE(p)}} \quad (5)$$

Throughout this process, it has been assumed that the error series is following all properties of white-noise error. Moreover, the panel eq. for regression has t_p test statistics, it shows the convergence of all selected standard normally distributed series, for example, N and $T \to \infty$ $\sqrt{\frac{N}{T}} \to 0$. On the opposite sideways, if some units of the section are not independent of each other, then the residual of the selected series would be corrected, as this raises the chances of auto-correlation. Because of such conditions LLC test assumes an alternative test statistic:

$$t_p = \frac{t_p - N\tilde{T}\hat{S}_N \hat{\sigma}^{-2}(p)u_m^*}{\sigma_m^*} \quad (6)$$

where u_m^* and σ_m^* are supposed to be augmented by the residual series, and its standard deviation, the coefficients of these estimates can be calculated with the support of Monte Carlo Simulation, our unit test LLC (2002) also followed this value.

Im et al. (2003) introduced another panel stationary test, under such conditions when the panel data have heterogeneity. This method has followed the procedures of ADF unit root, but this method had used a modest mean of all series, the main eq. of this test can be written as:

$$\Delta y_{i,t} = \bar{w}_i + py_{it-1+} \sum_{i-1}^{pi} \gamma_{1i} \Delta y_{i,t-j} + v_{i,t} \quad (7)$$

The IPS test permits the unit root process when we have heterogeneity in v_i values, then the IPS unit root test eq. would be written as:

$$\bar{t}_T = \frac{1}{N} \sum_{i-1}^{N} t_{1,i}(p_i) \quad (8)$$

where $t_{i,t}$ is the test statistic for ADF, lag order can be presented by p_i. The main procedures for the analysis would be followed as:

$$A_t - = \frac{\sqrt{N(T)}[\bar{t}_T - E(t_T)]}{\sqrt{Var(t_T)}} \quad (9)$$

4.1. Panel Autoregressive Distributive Lag Model

After the stationarity of the data has been established and each of the series is integrated into equal order either level or first difference and so on, the subsequent phase is to observe whether all of the selected series can be combined in a sole series, but for it, non-stationarity is also compulsory condition, which is identified

as co-integration. Co-integrated series follows the identical course for the long-run equilibrium, this kind of integration method has been developed and announced by Granger (1981) and further prolonged and augmented by Engle and Granger (1987). To control the issues that emerged in traditional methods, different scholars present the concept of panel co-integration, which makes the pools of both cross-sectional and time series data, when the connection amid the non-stationary variables I(1). Additional cointegration tests for panel data such as Westerlund (2007). Nevertheless, this test becomes invalid for our data set, as Westerlund himself confirmed that this test provides biased outcomes when the sample size is less than 100. Thus, following the weakness of traditional methods, this study has applied panel ARDL. The test is can have the following procedures:

Panel-v-statistic:

$$Z_v = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{\ell}_{i,t-1}^{2} \right)^{-1} \tag{10}$$

The panel t statistic:

$$Z_p = \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{\ell}_{i,t-1}^{2} \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{\ell}_{i,t-1} \Delta \hat{\ell}_{i,t} - \hat{\lambda}_{i} \right) \tag{11}$$

3 The panel t statistic (Non-parametric):

$$Z_i \equiv \left(\tilde{\sigma}_{N,T}^{2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{\ell}_{i,t-1}^{2} \right)^{-1\backslash 2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{\ell}_{i,t-1} \Delta \hat{\ell}_{i,t} - \hat{\lambda}_{i} \right) \tag{12}$$

The panel t statistic (parametric):

$$\underset{t}{\overset{*}{Z}} \equiv \left(\tilde{S}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{\ell}_{i,t-1}^{*2} \right)^{-1\backslash 2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{\ell}_{i,t-1}^{*} \Delta \hat{\ell}_{i,t}^{*} \right) \tag{13}$$

The group t statistic (parametric):

$$\underset{P}{\tilde{Z}} \equiv TN^{-1\backslash 2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{\ell}_{i,t-1}^{2} \right)^{-1} \sum_{t=1}^{T} \left(\hat{\ell}_{i,t-1} \Delta \hat{\ell}_{i,t} - \hat{\lambda}_{i} \right) \tag{14}$$

The group t statistic (non-parametric):

$$\underset{t}{\tilde{Z}} \equiv N^{-1\backslash 2} \sum_{i=1}^{N} \left(\hat{\sigma}_{i}^{2} \sum_{t=1}^{T} \hat{\ell}_{i,t-1}^{2} \right)^{-1\backslash 2} \sum_{t=1}^{T} \left(\hat{\ell}_{i,t-1} \Delta \hat{\ell}_{i,t} - \hat{\lambda}_{i} \right) \tag{15}$$

The group t statistic (parametric):

$$\underset{t}{\overset{*}{\tilde{Z}}} \equiv N^{-1\backslash 2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{S}_{i}^{*2} \hat{\ell}_{i,t-1}^{*2} \right)^{-1\backslash 2} \sum_{t=1}^{T} \left(\hat{\ell}_{i,t-1}^{*} \Delta \hat{\ell}_{i,t}^{*} \right) \tag{16}$$

where $\hat{\lambda}_i$ presents a steady estimator, which is based on long-run variance.

$$\begin{aligned} \hat{L}_{11}^{2} &= \frac{1}{T} \sum_{t-1}^{T} \hat{\eta}_{i,t}^{2} + \frac{2}{T} \sum_{s=1}^{ki} \left(1 - \frac{S}{K_1 + 1} \right) \\ \sum \hat{\eta}_{i,t} \hat{\eta}_{i,t-s,} \hat{\sigma}_{i}^{2} &= S_i + 2 \hat{\lambda}_{i}, \hat{S}_{i} = \frac{1}{T} \sum_{t=1}^{T} \eta_{it,} \\ \sigma_{N,T}^{2} &= \frac{1}{N} \sum_{t=1}^{N} \hat{L}_{11}^{2} \hat{\sigma}_{i}^{2} \hat{S}_{i}^{*2} = \frac{1}{t} \sum_{t=1}^{T} \hat{\eta}_{i,t}^{-2} \tilde{S}^{*2} \end{aligned} \tag{17}$$

And the residuals $\hat{\eta}_{I,t,\text{and}}$ $\hat{\eta}^{*}_{I,t}$ and $\hat{\eta}_{I,t}$ are measured with the help of the following regression:

$$\begin{aligned} \hat{\ell}_{i,t} &= \hat{\gamma}_{i} \hat{\ell}_{i,t-1} + \eta_{i,t}, \ell_{i,t}^{*} \hat{\gamma}_{i} \ell_{i,t-1} + \sum_{k=1}^{ki} \hat{\gamma} \Delta \ell_{i,t-k} + \hat{\eta}_{i,t}^{*}, \\ \gamma_{i,t} &= \sum_{M-1}^{N} \hat{b}_{mi} \Delta x_{mi,t} + \hat{\eta}_{i,t} \end{aligned} \tag{18}$$

Hence, the null hypothesis of no co-integration would be accepted when residuals are non-stationary. But, when the errors are stationary, there exists co-integration. To analyze ARDL regression for the panel dataset, the pooled mean group (PMG) method has been utilized. This method is recommended by Pesaran et al. (1997, 1999), it combines the pooling and the averaging of coefficients. This technique enables the constants, short-run estimates, and residual variances to vary independently crossways different sets. Along with this, PMG estimator constraints based on the likelihood procedure make the long-run estimates identical for all selected groups. Because of this estimates become consistent even in the presence of homogeneity restriction. As we have a small sample size, in this situation PGM estimator is lesser sensitive to all types of outliers and the issue of serial autocorrelation. Furthermore, this method is solving the issue of endogenous regressors with the help of appropriate lag order for explanatory and explained variables.

The panel ECM procedure can be applied to check the short-term relationship of the variables for different panels. Primarily, it has provided a baseline for all selected samples. It also gives a general platform to study the connection between the standards of human well-being and institutions.

4.2. Pairwise Dumitrescuhurlin Panel Causality

Granger (1969) establishes theoretical roots for examining the causal relationship among variables. Based on Granger's (1969)

methodology, we have applied Pairwise Dumitrescuhurlin Panel Causality to examine the causality of the variables. This test is based on individual heterogeneity of the variables, whic. is the main issue of the traditional panel granger causality test. This can also enhance the accuracy of the regression estimation. The granger causality test also can the duration of the factor and its outcome without aggregating bias. To empirically test the causality between the variables it can be written in the following form:

$$y_t = a_i + \sum_{k=1}^{k} \gamma_{ik}^{1} yit - k + \sum_{k=1}^{k} \beta_{ik} x_{i,t-k1} + \in_{i,t} \quad (5)$$

With i = 1,…….,*N* and t= 1,…., T where $x_{i,t}$ and $y_{i,t}$ used for the observations of stationary variables for individual i in period t. Coefficients are allowed to differ across individuals (note the i subscripts attached to coefficients) but are assumed time-invariant. The lag order K is assumed to be identical for all individuals and the panel must be balanced.

5. RESULTS AND DISCUSSION

This article has examined the role of public policy in determining the level of economic misery, for this purpose, three types of empirical analysis have been done: whole sample analysis of developed and developing countries. The intertemporal properties of the data have been checked with the help of des descriptive statistics. The descriptive statistic of the selected variables has been given in Appendix Tables 1-3. The descriptive statistic provides information about the kurtosis, skewness, standard deviation, minimum, maximum, median, and mean values of the variables. The estimated results reveal that the data of selected variables fulfill the requirements of the intertemporal properties of the variables. Moreover, data also fulfill all the requirements of the balanced panel data analysis.

To examine the degree of association between the selected variables, we applied a correlation matrix. The results of the correlation matrix have been given in Appendix Tables 4-6. The estimated results describe that most of the variables have significant correlations with each other, but all explanatory have not very strong correlations, which generates the issue of multi-collinearity among the explanatory variables. This show that the panel regression model meets the basic requirements of OLS and other advanced forms of panel OLS for empirical analysis.

To check the stationarity of the variables, panel unit root tests i.e., IP and S, PP-FC, ADF-FC, and LLC have been applied. The estimated results of unit root tests have been given in Appendix Tables 7-9. The outcomes of unit root tests describe that all three types of empirical models have mixed order of integration among the selected variables. In this situation is best to apply panel ARDL for examining the long run and short relationship.

Lag length is very important for empirical analysis, there are famous lag length criterions i.e., sequential modified LR test statistic, final prediction error, Akaike information criterion, Schwarz information criterion, and Hannan-Quinn information criterion. The results of the VAR length criterion have been given in Appendix Tables 10-12. Following the estimated outcomes of LR, FPE, AIC, and HQ maximum of 3 lags are allowed for all types of empirical analysis.

The long-run outcomes of ARDL for whole sample analysis, developed countries analysis, and developing countries analysis have been given in Table 1. The level of domestic investment has a negative and significant on economic misery. This shows that rising levels of domestic investment depress the economic misery in the case of the whole sample and developing countries. This means that rising investment enhances employment opportunities, moreover, rising investment also stable the inflation rate (Anyanwu, 2013; Shahbaz, 2013; Khan and Sattar, 2014). In the case of developed countries, the level of domestic investment has a positive and significant impact on economic misery. Developed countries have a minimum level of unemployment, which is near the natural rate of unemployment, and a stable inflation rate. So, as compared to the whole sample and developing countries, the developed countries have a positive relationship between the level of domestic investment and economic misery. These results support the results of De Long and Summers (1991) Balassa (1993), Ditta and Hassan (2017), Wang et al. (2019), and Naeem (2021).

The results show that the population of the country has a positive and significant impact on economic misery in the case of the whole sample analysis and developing countries. Following the basic economic theories, a rising population will increase the unemployed portion of the population in the economy (Altman, 2003; Stuckler et al. 2009; Zemtsov, 2020). The rising population increases the demand for goods and services and following the Philips curve rule, this rising demand creates demand-pull inflation in the economy (Totonchi, 2011; Sasongko et al., 2021; Purnomo, 2021). This further added to the overall economic misery of the country. The results show that the population of developed countries has a negative and insignificant impact on economic misery. The empirics show that most of the developed countries have population growth very close to the replacement rate, so the population has an insignificant impact on economic misery. Our results are consistent with the findings of Kuznets (1967), Daily et al. (1998), Alam et al. (2016), Nwani and Osuji (2020), and Dakila (2020).

The estimated outcomes of the long-run results show that foreign debt has a positive and significant impact on economic misery in the case of whole sample analysis and developed countries analysis. The rising foreign debt decreases the purchasing power

Table 1: ARDL long run results

Variables	Whole Sample	Developed countries	Developing countries
Dependent Variable: MISERY			
NI	−0.158142***	0.135709***	−0.112032***
POP	0.010650**	−0.011750	0.011041**
FDEBT	0.010119**	0.006684**	−0.013238
GREV	−0.016309***	−0.074896**	−0.016244***
DEV	0.789336***	−2.177365***	0.993302**
C	18.72004	14.07626***	38.69836

***,**,* present significance level 1%, 5% and 10% respectively

of the government as in the long run debt payments affect the employment schemes of the government as well as devalue the currency which becomes the cause of inflation in the economy (Obstfeld, 1988; Schwartz, 1998; Ito, 2010; Palley, 2015; Tatliyer, 2017). So, rising foreign debt impact positively economic misery of the economy. The estimated outcomes of the long-run results show that foreign debt has a negative and insignificant impact on economic misery in developing countries. These outcomes are contradictory to the whole sample analysis and developed countries' analysis.

The estimated results of the study show that government revenue has a negative and significant impact on economic misery in the case of all types of empirical analysis. This shows that if a government has a higher amount of revenues, it has higher resources for development expenditures (Bahl and Nath, 1986; Lin and Ali, 2009; Fisher, 2018). This also explains that if a government has enough resources, it can create new employment opportunities which lower the level of unemployment in the economy (Sherif, 2013; Kayode et al. 2014; Akai and Sakata, 2002). Moreover, with higher revenues, a government can easily stable inflation (Friedman, 1971). So, rising government revenues have an inverse relationship with economic misery (Cardoso, 1993; Clements et al., 2003; Agénor and Montiel, 2015).

The results show that economic development has a positive and significant impact on economic misery in the case of the whole sample and developing countries' analysis. Following the stages, and theories, most of the world is in the transition phase (Korotayev et al., 2015), so with high economic development, the economies face high unemployment with higher inflation (Kaldor, 1976; Epstein and Yeldan, 2008; Heintz and Ndikumana, 2011; Balakrishnan et al., 2016). Moreover, 70 percent population of the world belongs to developing countries (National Research Council and Committee on Population, 2005), so higher economic development is attached to higher economic misery. The results show that economic development has a negative and significant impact on economic misery in the case of developed countries. The developed countries have achieved a higher growth stage of development (Ruttan, 1965), so, with more economic development, economic misery comes down. These outcomes are contradictory to the whole sample analysis and developing countries' analysis.

The overall long-run results explain that population, foreign debt, and economic development are encouraging economic misery in the world, whereas the level of investment and government revenues are depressing economic misery in the whole sample case.

After estimating the long-run coefficients of the model of whole sample analysis. Now by using ECT, panel short-run dynamic can be estimated. The short-run estimates of the whole sample analysis, developed countries analysis, and developing countries analysis have been given in Table 2. The short-run outcomes show most of the explanatory variables have an insignificant short-run impact on economic misery in the case of whole sample analysis, developed countries analysis, and developing countries analysis over the selected period. The value and sign of ECT are the most concerning thing in short-run outcomes. The error correction term gives information that how the short-run converges in the long-run equilibrium path. The findings of ECT reveal that it is theoretically correct. This shows that the models of whole sample analysis, developed countries analysis, and developing countries analysis has a correct long-run relationship. ECT coefficient shows that 41 percent, 37 percent, and 47 percent short-run deviation are moving towards a long equilibrium path every year respectively for whole sample analysis, developed countries analysis, and developing countries analysis.

Pairwise Dumitrescu Hurlin Panel Causality test has been used for examining the causality among the variables. The estimated results of the Pairwise Dumitrescu Hurlin Panel Causality test of whole sample analysis, developed countries analysis, and developing countries analysis have been given in Table 3. The results of the whole sample analysis and developed countries analysis show that bidirectional causality is running between the level of domestic investment and economic misery. But outcomes of developing countries' analysis show that unidirectional causality is running from the level of domestic investment and economic misery. The results of all three models show that bidirectional causality is running between the level of population and economic misery, between the level of population and level of domestic investment, between government revenues and level of domestic investment, between economic development and level of domestic investment, between foreign debts and level of population, between government revenue and level of population,

Table 2: Short run results

Variables	Whole sample	Developed countries	Developing countries
Dependent Variable: MISERY			
D (NI)	2.292108	−0.994624	3.643008
D (POP)	−79.18237	44.63524*	−120.1328
D (FDEBT)	1.347314	−0.463448	2.003826
D (GREV)	−2.079070	0.565798	−3.396131
D (DEV)	49.10526	−4.051746	88.22123
ECT	−0.415089***	−0.373940***	−0.474170***

***,**,* present significance level 1%, 5% and 10% respectively

Table 3: Panel granger causality

Whole sample	Developed countries	Developing countries
NI↔MISERY	NI↔MISERY	NI↔MISERY
POP↔MISERY	POP↔MISERY	POP↔MISERY
FDEBT↔MISERY	FDEBT↔MISERY	FDEBT↔MISERY
GREV↔MISERY	GREV↔MISERY	GREV↔MISERY
DEV↔MISERY	DEV↔MISERY	DEV↔MISERY
POP↔NI	POP↔NI	POP↔NI
FDEBT↔NI	FDEBT↔NI	FDEBT↔NI
GREV↔NI	GREV↔NI	GREV↔NI
DEV↔NI	DEV↔NI	DEV↔NI
FDEBT↔POP	FDEBT↔POP	FDEBT↔POP
GREV↔POP	GREV↔POP	GREV↔POP
DEV↔POP	DEV↔POP	DEV↔POP
FDEBT↔GREV	FDEBT↔GREV	FDEBT↔GREV
FDEBT↔DEV	FDEBT↔DEV	FDEBT↔DEV
GREV↔DEV	GREV↔DEV	GREV↔DEV

between economic development and level of population, between foreign debt and government revenue, between foreign debt and economic development, between government revenue and economic development.

The results of the whole sample analysis and developed countries analysis show that bidirectional causality is running between foreign debt and the level of domestic investment. The results of the whole sample show that bidirectional causality is existed foreign debt and economic misery, whereas unidirectional causality is running from government revenue to economic misery, from economic development to economic misery. The results of developed countries' analysis show that bidirectional causality is existed between government revenue and economic misery, between economic development and economic misery, whereas unidirectional causality is running from economic misery to foreign debt. The results of developing countries' analysis show that unidirectional causality is running from foreign debt to economic misery, from foreign debt to the level of domestic investment, whereas no causality has existed between government revenue and economic misery. The overall results of the causality test show that most of the selected variables have a bidirectional causal relationship in the whole sample analysis, developed countries, and developing countries analysis.

6. CONCLUSION

This article has examined the impact of public policy on economic misery for the set of panel countries from 1987 to 2019. A panel of 66 countries has been selected for empirical analysis, among selected countries 31 are developed countries and 35 are developing countries. This article is based on three types of analysis, whole sample analysis, the developed countries analysis, and the developing countries analysis. The results of the whole sample analysis show that level of domestic investment and government revenue are depressing economic misery. The results show that level of population, foreign debt, and economic development are encouraging economic misery in the case of the whole sample analysis. The estimated outcomes show that level of domestic investment, and foreign debt has a positive and significant impact on economic misery in the case of developed countries. The results explain that government revenue and economic development have a negative and significant impact on economic misery in developed countries. The outcomes of developing countries explain that level of domestic investment, foreign debt, and government revenue have a negative and significant impact on economic misery. The results of developing countries also explain that level of population and economic development have a positive and significant impact on economic misery. The results of causality tests show that most of the variables have a causal relationship with each other.

The overall results conclude that public policy is playing important role in deciding economic misery among developed and developing countries. The results of the three models show that level of investment hurts economic misery in the case of the whole sample analysis and developing countries analysis, whereas the level of investment has a positive impact on economic misery in the case of developed countries. So, the governments of the developing country should use investment as a tool to overcome economic misery. The population has a positive and significant impact on economic misery in the case of the whole sample analysis and developing countries but the population has an insignificant relationship between population and economic misery in the developed countries analysis. So, the governments of the developing country should start family planning schemes and awareness programs, especially in Asian countries which are facing an explosive increment in population day by day. Foreign debt has a positive and significant impact on economic misery in the case of the whole sample so due to extra burden of debts and its services charges should be avoided by the government of the countries. Government revenues have a negative and significant impact on economic misery, so, the government can reduce economic misery through the wise use of its revenue for the welfare of the people, it can also reduce the economic misery.

The results of this article recommend that government revenue and investment have a significant and negative impact on economic misery and foreign debts and population have a positive impact on economic misery. So, the policy maker and authorizes should try to develop public policies in such a way that discourages economic misery.

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APPENDIX

Appendix Table 1: Descriptive statistic of whole sample

	MISERY	NI	POP	FDEBT	GREV	DEVELOP
Mean	−11.23609	23.24144	72.80691	57.76624	31.90872	8.812725
Median	1.593014	22.48800	12.30550	51.36900	29.45600	8.924482
Maximum	20.61700	53.94900	1382.710	450.3900	261.7830	11.69899
Minimum	−5286.656	−1.500000	0.244000	0.059000	5.538000	5.405853
SD	155.5366	7.093978	202.0355	45.03578	19.23182	1.490224
Skewness	−24.06972	0.601568	5.006941	3.406212	5.640652	−0.267696
Kurtosis	722.9166	4.701792	28.44352	22.48587	59.51957	1.996537
Jarque-Bera	42949280	358.3495	61681.19	35153.92	274042.7	106.7205
Sum	−22247.45	46018.05	144157.7	114377.2	63179.27	17449.19
Sum Sq. Dev.	47875262	99592.22	80779473	4013850.	731958.8	4394.898

Appendix Table 2: Descriptive statistic of developed countries

	MISERY	NI	POP	FDEBT	GREV	DEVELOP
Mean	12.29542	23.45145	30.15563	64.52124	39.79278	10.05309
Median	6.518775	22.85150	8.231500	54.12850	40.44150	10.17370
Maximum	1068.092	42.28800	323.2250	450.3900	62.25600	11.69899
Minimum	0.643868	−1.500000	0.244000	0.059000	12.52100	6.957402
SD	53.82016	4.912955	54.92458	57.37602	9.842113	0.792530
Skewness	16.12346	0.468266	3.463454	3.128124	−0.440055	−1.138198
Kurtosis	290.7065	5.151260	16.16451	16.37261	2.864381	4.906477
Jarque-Bera	3247827	213.3192	8574.852	8446.235	30.72825	341.6446
Sum	11434.74	21809.84	28044.74	60004.75	37007.28	9349.375
SumSq. Dev.	2690951	22423.39	2802523	3058276	89989.61	583.5084

Appendix Table 3: Descriptive statistic of developing countries

	MISERY	NI	POP	FDEBT	GREV	DEVELOP
Mean	−19.45038	23.05544	110.5838	51.78324	24.92571	7.714114
Median	0.018936	21.89500	20.54050	46.75000	20.79700	7.729467
Maximum	20.61700	53.94900	1382.710	170.1630	261.7830	9.755813
Minimum	−5286.656	0.693000	0.258000	3.879000	5.538000	5.405853
SD	207.3871	8.572658	267.0081	28.89038	22.54032	1.030186
Skewness	−18.82160	0.608925	3.660473	0.816763	7.388009	−0.097085
Kurtosis	427.9925	3.710561	15.38984	4.036116	67.92396	2.221198
Jarque-Bera	7956473	86.97738	9060.816	163.7099	193963.5	28.18525
Sum	−20403.45	24208.21	116112.9	54372.40	26171.99	8099.820
SumSq. Dev.	45073851	77091.49	74786714	875552.0	532961.3	1113.286

Appendix Table 4: Correlation matrix of whole sample

Variables	MISERY	NI	POP	FDEBT	GREV	Develop
MISERY	1.000000					
NI	0.053487**	1.000000				
POP	−0.002648	0.307424***	1.000000			
FDEBT	0.018115	−0.213823***	−0.029367	1.000000		
GREV	0.028484	0.017108	−0.160258***	0.099522***	1.000000	
DEVELOP	0.079032***	0.096352***	−0.238744***	0.089466***	0.45724***	1.000000

***,**,* present significance level 1%, 5% and 10% respectively

Appendix Table 5: Correlation matrix of developed countries

Variables	MISERY	NI	POP	FDEBT	GREV	DEVELOP
MISERY	1.000000					
NI	−0.183739***	1.000000				
POP	−0.039622	−0.049823	1.000000			
FDEBT	−0.058923*	−0.214654***	0.119012***	1.000000		
GREV	−0.072441**	−0.316568***	−0.219878***	0.200941***	1.000000	
DEVELOP	−0.298656***	−0.130510***	0.132129***	0.141045***	0.15661***	1.000000

***,**,* present significance level 1%, 5% and 10% respectively

Appendix Table 6: Correlation matrix of developing countries

Variables	MISERY	NI	POP	FDEBT	GREV	DEVELOP
MISERY	1.000000					
NI	0.043022	1.000000				
POP	0.007325	0.374745***	1.000000			
FDEBT	−0.013674	−0.314227***	−0.046069	1.000000		
GREV	−0.001235	0.078053**	−0.08448***	−0.041446	1.000000	
DEVELOP	0.024540	0.217653***	−0.19077***	−0.281569***	0.313709***	1.000000

***,**,* present significance level 1%, 5% and 10% respectively

Appendix Table 7: Unit root results of whole sample

Variables	Test	Statistic	Prob**	Cross-section
MISERYI (0)	Levin, Lin and Chu t*	−8.32691	0.0000	66
	Im, Pesaran and Shin W-stat	−9.59733	0.0000	66
	ADF - Fisher Chi-square	339.500	0.0000	66
	PP - Fisher Chi-square	351.620	0.0000	66
NI I (0)	Levin, Lin and Chu t*	−3.58274	0.0002	66
	Im, Pesaran and Shin W-stat	−5.52622	0.0000	66
	ADF - Fisher Chi-square	232.114	0.0000	66
	PP - Fisher Chi-square	196.709	0.0002	66
POPI (0)	Levin, Lin and Chu t*	1.45598	0.9273	66
	Im, Pesaran and Shin W-stat	11.2875	1.0000	66
	ADF - Fisher Chi-square	87.6070	0.9989	66
	PP - Fisher Chi-square	237.232	0.0000	66
FDEBTI (0)	Levin, Lin and Chu t*	1.40352	0.9198	66
	Im, Pesaran and Shin W-stat	3.48863	0.9998	66
	ADF - Fisher Chi-square	110.113	0.9174	66
	PP - Fisher Chi-square	89.9731	0.9980	66
GREV I (0)	Levin, Lin and Chu t*	−3.82980	0.0001	66
	Im, Pesaran and Shin W-stat	−4.90723	0.0000	66
	ADF - Fisher Chi-square	238.462	0.0000	66
	PP - Fisher Chi-square	245.067	0.0000	66
DEVELOPI (0)	Levin, Lin and Chu t*	−2.79030	0.0026	66
	Im, Pesaran and Shin W-stat	3.12931	0.9991	66
	ADF - Fisher Chi-square	95.8471	0.9924	66
	PP - Fisher Chi-square	135.340	0.4033	66
MISERYI (1)	Levin, Lin and Chu t*	−25.2144	0.0000	66
	Im, Pesaran and Shin W-stat	−28.1726	0.0000	66
	ADF - Fisher Chi-square	931.807	0.0000	66
	PP - Fisher Chi-square	1380.85	0.0000	66
NI I (1)	Levin, Lin and Chu t*	−20.3069	0.0000	66
	Im, Pesaran and Shin W-stat	−24.2427	0.0000	66
	ADF - Fisher Chi-square	799.135	0.0000	66
	PP - Fisher Chi-square	1236.13	0.0000	66
POPI (1)	Levin, Lin and Chu t*	4.40407	0.0097	66
	Im, Pesaran and Shin W-stat	−8.13769	0.0000	66
	ADF - Fisher Chi-square	390.028	0.0000	66
	PP - Fisher Chi-square	446.006	0.0000	66
FDEBTI (1)	Levin, Lin and Chu t*	−25.4784	0.0000	66
	Im, Pesaran and Shin W-stat	−22.4042	0.0000	66
	ADF - Fisher Chi-square	657.192	0.0000	66
	PP - Fisher Chi-square	710.928	0.0000	66
GREV I (1)	Levin, Lin and Chu t*	−38.5353	0.0000	66
	Im, Pesaran and Shin W-stat	−36.8440	0.0000	66
	ADF - Fisher Chi-square	1170.96	0.0000	66
	PP - Fisher Chi-square	1300.57	0.0000	66
DEVELOPI (1)	Levin, Lin and Chu t*	−23.4857	0.0000	66
	Im, Pesaran and Shin W-stat	−22.1080	0.0000	66
	ADF - Fisher Chi-square	709.867	0.0000	66
	PP - Fisher Chi-square	854.266	0.0000	66

Appendix Table 8: Unit root results of developed countries

Variables	Test	Statistic	Prob**	Cross-section
MISERY (0)	Levin, Lin and Chu t*	−2.13197	0.0165	31
	Im, Pesaran and Shin W-stat	−3.47784	0.0003	31
	ADF - Fisher Chi-square	103.016	0.0008	31
	PP - Fisher Chi-square	123.441	0.0000	31
NI (0)	Levin, Lin and Chu t*	−4.24028	0.0000	31
	Im, Pesaran and Shin W-stat	−4.46726	0.0000	31
	ADF - Fisher Chi-square	118.820	0.0000	31
	PP - Fisher Chi-square	75.2297	0.1207	31
POP (0)	Levin, Lin and Chu t*	−2.29469	0.0109	31
	Im, Pesaran and Shin W-stat	6.40098	1.0000	31
	ADF - Fisher Chi-square	52.8262	0.7904	31
	PP - Fisher Chi-square	69.3611	0.2432	31
FDEBT (0)	Levin, Lin and Chu t*	−0.17983	0.4286	31
	Im, Pesaran and Shin W-stat	1.90604	0.9717	31
	ADF - Fisher Chi-square	43.1388	0.9673	31
	PP - Fisher Chi-square	43.5199	0.9640	31
GREV (0)	Levin, Lin and Chu t*	−2.70551	0.0034	31
	Im, Pesaran and Shin W-stat	−2.37619	0.0087	31
	ADF - Fisher Chi-square	91.4531	0.0089	31
	PP - Fisher Chi-square	103.122	0.0008	31
DEVELOP (0)	Levin, Lin and Chu t*	−4.14662	0.0000	31
	Im, Pesaran and Shin W-stat	0.69582	0.7567	31
	ADF - Fisher Chi-square	39.8420	0.9872	31
	PP - Fisher Chi-square	74.4548	0.1334	31
MISERY (1)	Levin, Lin and Chu t*	−12.9396	0.0000	31
	Im, Pesaran and Shin W-stat	−17.7698	0.0000	31
	ADF - Fisher Chi-square	400.521	0.0000	31
	PP - Fisher Chi-square	631.556	0.0000	31
NI (1)	Levin, Lin and Chu t*	−13.6881	0.0000	31
	Im, Pesaran and Shin W-stat	−16.0838	0.0000	31
	ADF - Fisher Chi-square	363.413	0.0000	31
	PP - Fisher Chi-square	549.283	0.0000	31
POP (1)	Levin, Lin and Chu t*	7.40905	0.0000	31
	Im, Pesaran and Shin W-stat	−3.58141	0.0002	31
	ADF - Fisher Chi-square	120.425	0.0000	31
	PP - Fisher Chi-square	127.011	0.0000	31
FDEBT (1)	Levin, Lin and Chu t*	−4.39142	0.0000	31
	Im, Pesaran and Shin W-stat	−8.86112	0.0000	31
	ADF - Fisher Chi-square	196.104	0.0000	31
	PP - Fisher Chi-square	321.625	0.0000	31
GREV (1)	Levin, Lin and Chu t*	−9.74439	0.0000	31
	Im, Pesaran and Shin W-stat	−14.7055	0.0000	31
	ADF - Fisher Chi-square	327.077	0.0000	31
	PP - Fisher Chi-square	549.887	0.0000	31
DEVELOP (1)	Levin, Lin and Chu t*	−10.9655	0.0000	31
	Im, Pesaran and Shin W-stat	−11.8370	0.0000	31
	ADF - Fisher Chi-square	256.148	0.0000	31
	PP - Fisher Chi-square	400.913	0.0000	31

Appendix Table 9: Unit root results of developing countries

Variables	Test	Statistic	Prob**	Cross-Section
MISERY (0)	Levin, Lin and Chu t*	−7.95123	0.0000	35
	Im, Pesaran and Shin W-stat	−7.95738	0.0000	35
	ADF - Fisher Chi-square	194.343	0.0000	35
	PP - Fisher Chi-square	223.041	0.0000	35
NI (0)	Levin, Lin and Chu t*	−1.83336	0.0334	35
	Im, Pesaran and Shin W-stat	−3.38443	0.0004	35
	ADF - Fisher Chi-square	113.295	0.0008	35
	PP - Fisher Chi-square	121.480	0.0001	35
POP (0)	Levin, Lin and Chu t*	2.45102	0.9929	35
	Im, Pesaran and Shin W-stat	9.47599	1.0000	35
	ADF - Fisher Chi-square	34.7808	0.9999	35
	PP - Fisher Chi-square	167.871	0.0000	35
FDEBT (0)	Levin, Lin and Chu t*	−1.07024	0.1423	35
	Im, Pesaran and Shin W-stat	1.29173	0.9018	35
	ADF - Fisher Chi-square	61.7059	0.7498	35
	PP - Fisher Chi-square	49.9465	0.9666	35
GREV (0)	Levin, Lin and Chu t*	−2.59386	0.0047	35
	Im, Pesaran and Shin W-stat	−3.37359	0.0004	35
	ADF - Fisher Chi-square	118.692	0.0003	35
	PP - Fisher Chi-square	141.945	0.0000	35
DEVELOP (0)	Levin, Lin and Chu t*	0.00010	0.5000	35
	Im, Pesaran and Shin W-stat	4.19153	1.0000	35
	ADF - Fisher Chi-square	44.3063	0.9930	35
	PP - Fisher Chi-square	60.8853	0.7732	35
MISERY (1)	Levin, Lin and Chu t*	−23.3242	0.0000	35
	Im, Pesaran and Shin W-stat	−24.1173	0.0000	35
	ADF - Fisher Chi-square	585.801	0.0000	35
	PP - Fisher Chi-square	826.323	0.0000	35
NI (1)	Levin, Lin and Chu t*	−15.0124	0.0000	35
	Im, Pesaran and Shin W-stat	−18.1535	0.0000	35
	ADF - Fisher Chi-square	435.722	0.0000	35
	PP - Fisher Chi-square	686.842	0.0000	35
POP (1)	Levin, Lin and Chu t*	4.02658	0.0077	35
	Im, Pesaran and Shin W-stat	−5.81530	0.0000	35
	ADF - Fisher Chi-square	196.608	0.0000	35
	PP - Fisher Chi-square	335.581	0.0000	35
FDEBT (1)	Levin, Lin and Chu t*	−6.38263	0.0000	35
	Im, Pesaran and Shin W-stat	−9.19953	0.0000	35
	ADF - Fisher Chi-square	222.412	0.0000	35
	PP - Fisher Chi-square	389.303	0.0000	35
GREV (1)	Levin, Lin and Chu t*	−13.9484	0.0000	35
	Im, Pesaran and Shin W-stat	−17.4516	0.0000	35
	ADF - Fisher Chi-square	418.344	0.0000	35
	PP - Fisher Chi-square	750.679	0.0000	35
DEVELOP (1)	Levin, Lin and Chu t*	−8.76763	0.0000	35
	Im, Pesaran and Shin W-stat	−11.6630	0.0000	35
	ADF - Fisher Chi-square	271.551	0.0000	35
	PP - Fisher Chi-square	453.353	0.0000	35

Appendix Table 10: Var lag order selection criteria of whole sample

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−49454.76	NA	5.17e+16	55.51152	55.52999	55.51834
1	−27212.72	44309.35	775796.4	30.58891	30.71820	30.63666
2	−24406.28	5571.930	34623.50	27.47955	27.71965	27.56823
3	−24252.00	305.2570*	30319.58*	27.34681*	27.69773*	27.47641*

*Indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Appendix Table 11: Var lag order selection criteria of developed countries

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−19844.38	NA	1.60e+13	47.43222	47.46612	47.44521
1	−9238.818	21033.74	172.2812	22.17639	22.41373	22.26737
2	−8131.501	2180.239	13.31966	19.61649	20.05726	19.78545
3	−7985.235	285.8906*	10.23482*	19.35301*	19.99722*	19.59996*

*Indicates lag order selected by the criterion, LR: Sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Appendix Table 12: VAR lag order selection criteria of developing countries

Lag	LogL	LR	FPE	AIC	SC	HQ
0	−26255.94	NA	5.88e+16	55.63970	55.67053	55.65145
1	−15556.23	21240.74	9064165.	33.04710	33.26289	33.12934
2	−14092.24	2887.651	439966.1	30.02170	30.42246*	30.17444
3	−13979.13	221.6749*	373658.6*	29.85833*	30.44404	30.08156*

*Indicates lag order selected by the criterion, LR: Sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion