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Impact of Economic Growth, Minimum Wage, and Human Development Index on Unemployment in India during the Post-Reform Era

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Abstract: Analyzing the Impact of Economic Growth, Minimum Wage, and Human Development Index on Unemployment in India during the Post-Reform Period (1990-2021), this study aims to examine the relationship between economic growth, minimum wage, and the Human Development Index (HDI) as independent variables, and the unemployment rate as the dependent variable in India. By employing quantitative techniques and utilizing secondary data, we investigate the short and long-term effects of these variables on unemployment. We employed the Vector Error Correction Model (VECM) as the analytical tool and focused on the post-reform period, spanning from 1990 to 2021. Economic growth, minimum wage, and HDI were identified as the key factors influencing the unemployment rate. The findings revealed a significant and positive impact of economic growth on the unemployment rate, both in the short and long term. On the other hand, the minimum wage variable exhibited a negative impact, albeit statistically insignificant, on the unemployment rate in the short term. Similarly, the HDI variable showed an insignificant impact on the unemployment rate in the long term. These results provide valuable insights for the government, suggesting that addressing the issue of unemployment in India requires a comprehensive approach that combines economic and social strategies. By leveraging the positive effects of economic growth and considering appropriate measures related to minimum wage and human development, policymakers can effectively tackle the challenge of unemployment in the country.

Keywords: unemployment rate, economic growth; minimum wage; human development index; vector error correction model.

JEL Classification: C22; C32; J64.

1. INTRODUCTION

1.1. Development and Economic Reform: India's Journey Towards Inclusive Growth

India is currently in the process of economic development, with the objective of fostering societal welfare by creating job opportunities that facilitate a more equitable

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distribution of income. However, there exists a significant disparity in job availability, as it lags behind the expanding workforce, resulting in the pressing issue of unemployment that directly impacts people's livelihoods. The unemployment challenge in India stems from various factors, including unfavorable economic activity, the substitution of labor for capital, and an increasing supply of the workforce. This issue emerged as early as the 1980s when the country was operating under a "one-sector growth model." To address this problem, India embarked on a series of economic reforms in the 1990s, characterized by a pro-market orientation. These reforms encompassed multiple aspects, such as fiscal policy reforms aimed at rationalizing the tax structure, reducing subsidies, and minimizing fiscal deficits. Financial sector reforms were also implemented, liberalizing interest rates, relaxing controls on capital issues, and opening up the banking and insurance sectors to domestic and private foreign entities. Industrial policies were liberalized, including the abolition of industrial licenses, while foreign trade and investment experienced reforms that aimed to facilitate trade in goods, services, and technology. Import licensing was eliminated, non-tariff barriers were reduced, and foreign direct and portfolio investments were made more accessible. Infrastructure sector reforms encouraged private investment in infrastructure and telecommunications. Additionally, agricultural reforms addressed both internal and external trade in agricultural commodities.

The primary objective of these reforms was to open the Indian market to international competition, reduce government control, encourage private investment and participation, liberalize access to foreign capital, and attract foreign investments. While these reforms were implemented to address the issue of capital inadequacy and stimulate stagnant growth, their implications fell short in terms of generating economic growth and employment, exacerbating the problem of unemployment. Economists have raised concerns about India's recent experience of "jobless growth" (Padder, 2018) (1). In a similar vein, research by Michael, Emeka, and Emmanuel (2016) (2) explored the Granger causality between economic growth and unemployment in Nigeria, finding a unidirectional relationship with causality running from real gross domestic product (RGDP) to unemployment. Rosin and Rosin (2014) (3) examined the strong negative relationship between unemployment and economic growth in the United States, analyzing data from 1977 to 2011.

1.2. Unemployment and its Impact on the Economy: Understanding the Challenges

Unemployment refers to the state of being without a job or actively seeking employment but unable to secure one, affecting a portion of the population that is capable of working. In emerging economies, such as India, various factors contribute to unemployment, including technological advancements, the participation of women in the labor force,

demographic changes, income disparities, and rural-to-urban migration driven by increasing demand for goods and services. The consequences of unemployment in developing countries, like India, pose significant challenges for individuals, society, and the overall economy. It directly impacts consumption, purchasing power, and the country's production capacity. A lack of job opportunities lowers the standard of living for communities, resulting in adverse effects on individuals and the surrounding environment. Reducing the unemployment rate has been a primary concern for policymakers in India since the inception of the planning process. Research has shown that numerous barriers exist within the labor market, preventing individuals from overcoming unemployment and earning a livelihood. These barriers disproportionately affect the poor, leading to marginalization, inequality, and further perpetuating poverty. However, it is crucial to understand the macroeconomic implications of India's unemployment situation. Labor market fluctuations have a profound impact on various aspects of the economy. They influence monetary policy, contribute to changes in the gross domestic product (GDP) through their effects on unemployment rates, and establish a relationship between unemployment and inflation in India (Sinha & Sinha, 2022; Sinha, 2022) (4-6).

1.3. Understanding the Link Between Economic Uncertainty and Unemployment

Economic uncertainty plays a crucial role in driving business cycles, making it an important indicator for evaluating the impact of socioeconomic factors on suicide prevention (Claveria, 2022) (7). Reduced job opportunities, which can be caused by a slow economy, diminished individual potential, loss of work skills, decreased income, and low levels of community welfare, contribute to the negative effects of economic uncertainty (Podi *et al.*, 2020) (8).

Unemployment has emerged as a significant economic issue, not limited to India but prevalent in many countries. It leads to a decline in community productivity and income, resulting in poverty and social problems (Hartanto & Masjkuri, 2017) (9). The role of government in the economy has been a subject of debate for a long time. One school of economists argues that government actions and interventions are necessary to steer the economy and prevent prolonged recessions and high unemployment rates. Conversely, others advocate for a smaller role for the government. As a result, the allocation of public expenditure for unemployment eradication and economic growth remains a topic of debate.

There are different approaches to understanding unemployment and government intervention:

(i) Classical Approach: Classical economists explain the concept of employment and unemployment based on the Walrasian general equilibrium model

{Sodipo & Ogunrinola, 2011 (10)}. They assume full employment of labor and resources, with prices and wages adjusting to achieve equilibrium. Unemployment is seen as temporary and attributed to government intervention, private monopolies, wrong calculations, artificial resistance, and flawed decisions (Walterskirchen, 1999) (12). Classical economists believe that the market, through the pricing system, will self-adjust and restore full employment equilibrium.

(ii) **Keynesian Approach:** The Keynesian School suggests that the government should intervene in the economy using appropriate policies. They propose government expenditure on public works, taxation measures to stimulate consumption and investment, deficit spending to boost effective demand, public work programs, social security measures, and lower direct taxes to encourage savings and investments (Somashekhar, 2003) (13). Fiscal policy is used to maintain full employment.

(iii) **Friedman Approach:** Friedman (1969) (14) criticized Keynes' analysis on two points. First, Keynesian theory neglects the influence of money supply on spending, and fiscal policy alone cannot affect aggregate demand if the money supply is insufficient to encourage private investment. Friedman emphasizes the importance of monetary policy and suggests that markets, without government interference, are more efficient in dealing with unemployment. Second, Friedman argues against the centrality of planned economies and the assumption that government spending is always best for the overall economy. He believes that recessions are caused by microeconomic factors and that centralized planning leads to inefficiencies and capital volatility. Friedman advocates for limited government intervention, allowing the market to operate more freely.

2. LITERATURE REVIEW

Economic growth is characterized by the increase in an economy's capacity to produce goods and services over a specific period. It is often measured through indicators such as gross domestic product (GDP) or per capita income. A growing economy indicates that the productive activities of its population contribute to increased output. Understanding the level of economic growth allows governments to plan for state revenues and future development (Baba, 2021) (15). Okun's law suggests that higher economic growth is expected to lead to a decrease in the unemployment rate. GDP data, measured in current and constant prices, is an important indicator for assessing a country's economic condition (Antipova, 2021) (16).

In 2020, the global unemployment rate increased rapidly due to the COVID-19 pandemic. Layoffs became a significant cause of rising unemployment rates. India experienced a contraction of -2.07% in economic growth in 2020, with the transportation and warehousing sector being the most affected (-15.04%). This contraction was the worst since the 1998 crisis (-13.16%). The decline in GDP compared to 2019 was mainly attributed to the impact of the pandemic (Baba, 2021) (15). Minimum wage policies also play a role in addressing the unemployment rate (Panjawa & Soebagiyo, 2014) (17). Areas with low minimum wages tend to have lower living standards and consumption levels, while those with higher regional minimum wages have higher standards of living and consumption levels (Gorry, 2013) (18).

Another important indicator in tackling unemployment is the human development index (HDI), which measures the quality of human life within a specific period. Enhancing human development through investments in education and health can increase productivity, leading to higher labor demand and a decrease in the unemployment rate (Kurnia & Septiani, 2021) (19). In India, the HDI value decreased from 0.645 in 2019 to 0.633 in 2021 due to falling life expectancy and other factors associated with the COVID-19 pandemic (UNDP, 2021).

Several studies have examined the determinants of unemployment in different regions. For example, Amrullah *et al.* (2019) (20) analyzed the determinants of the open unemployment rate in Java using variables such as minimum wage, GDP growth rate, and inflation rate. Mahihody *et al.* (2018) (21) investigated the effect of wages and the HDI on unemployment in Manado. Baba (2021) (15) studied the economic determinants of unemployment in Malaysia, considering variables such as GRDP, investment, inflation, and population. Tsaurai (2020) (22) examined the macroeconomic determinants of unemployment in Africa, including variables such as information and communication technology, human resources, and infrastructure.

In the context of India, this research investigates the determinants of unemployment during the COVID-19 pandemic using the VECM approach, focusing on the economic conditions and relevant factors affecting the labor market.

3. METHOD

3.A. Data and Sources

This study utilizes secondary quantitative time series annual data from 2001 to 2021. The data is sourced from the Ministry of Statistics and Programme Implementation (MoSPI) and other relevant departments of the Government of India. The selection of data from MoSPI is based on the comprehensive and reliable nature of their published data.

3.B. Operational Definition

The operational definitions used in this study are as follows:

(a) Unemployment: The number of individuals of working age who are not employed or have not been employed during the study period. It is represented as a percentage of the unemployment rate in India from 1990 to 2021.

(b) Minimum Wage: The lowest monthly wage set annually to serve as a safety net in a specific area. The minimum wage data for India from 2001 to 2021 is expressed in Indian rupees.

(c) Economic Growth: The increase in the value and quantity of goods or services produced in India within a specific period, approximated by India's Gross Regional Domestic Product (GRDP) from 1990 to 2021.

(d) Human Development Index: A measure of the quality of life in India based on several fundamental components, including health indicators, education levels, and economic indicators, spanning the period 1990 to 2021.

3.C. Data Collection

Data for this study were collected from published sources, including the MoSPI and other relevant departments of the Government of India.

3.D. Analysis

The Vector Error Correction Model (VECM), derived from the VAR (Vector Autoregression) model, is employed for the analysis in this study.

3.D.1. Data Stationarity Test

To test the stationarity of the data, the Augmented Dickey-Fuller (ADF) test is employed with a significance level of 5 percent. If the t-ADF value is smaller than the critical value, it indicates that the data used is stationary (lacking unit roots). The unit root test is performed up to the second difference. Stationary data tends to fluctuate around the mean value, while non-stationary data can result in spurious regression, which falsely suggests a significant relationship between variables.

3.D.2. Optimal Lag Determination

Determining the optimal lag is crucial in the analysis, as using a lag length that is too small renders the model unusable, while a lag length that is too large reduces effectiveness. The optimal lag, determined through analysis, is important as it determines the number of lagged endogenous variables used in the VAR model. An appropriate lag length helps address autocorrelation issues and enhances VAR stability analysis.

3.D.3. Cointegration Test

The cointegration test is employed to determine whether a group of non-stationary variables at the same levels meet the requirements for the integration process, indicating that all variables are stationary to the same degree. This test determines whether there is a long-term relationship among the variables under study. If cointegration is established, the analysis can proceed to the VECM step; otherwise, further VECM analysis is not possible.

3.D.4. Granger Causality Test

The Granger causality test is conducted to determine whether an endogenous variable can be considered an exogenous variable based on the understanding of the influence between variables. It helps ascertain whether there is a causal relationship between two variables, where one variable causes changes in the other, both variables influence each other, or there is no relationship between them.

3.D.5. Vector Error Correction Model (VECM)

The VECM is employed as a non-structural VAR model when time series data is non-stationary at the levels but stationary after differencing and exhibits cointegration, indicating a long-term relationship between variables. In VECM, there is a speed of adjustment from short-term to long-term dynamics. VECM is a restricted form of VAR that accounts for the non-stationary nature of series with cointegration. The general VECM model is as follows:

$$y_t = \mu_{0x} + \mu_{1xt} + \alpha\beta y_{t-1} + \Sigma_1^{k-1} \tau_k y_{t-1} + \varepsilon_t \quad (1)$$

In equation (1),

y_t: Vector containing the variables analyzed in the study,

μ_{0x}: Vector intercept, μ1x: regression coefficient vector,

t: time trend, α: Coefficient speed of adjustment,

β: Cointegration vector, y_{t-1}: Variable in-level,

τ_k : regression coefficient matrix, k-1 : VECM order of VAR,

k: lag, ε_t: error term.

3.D.6. Impulse Response Function (IRF)

The Impulse Response Function (IRF) is a technique used to analyze how an endogenous variable responds to shocks from specific variables and to observe the duration of the effects. It helps understand the impact of shocks on variables and the persistence of those effects. If a variable is not influenced by shocks, the specific shock's effect cannot be determined, but the general concept of shocks can still be understood.

3.D.7. Variance Decomposition (VD)

Variance Decomposition is a method employed to characterize the dynamics within a Vector Autoregression (VAR) model. It quantifies the estimation of the error variance in a variable, revealing the extent of variance changes before and after shocks originating from both the variable itself and other variables. Forecast Error Variance Decomposition (FEVD) provides insight into how innovations in one variable contribute to the variations in other variables within the VAR system. FEVD indicates the proportion of sequential movements explained by self-shocks and shocks from other variables, conveying valuable information about interrelationships between variables.

4. RESULTS

4.1. Stationarity Test

To assess the stationarity of the data, the ADF (Augmented Dickey-Fuller) test was employed with a significance level of 5 percent. If the t-ADF value is lower than the critical value, it can be inferred that the data used is stationary, indicating the absence of unit roots. The unit root test was conducted at different levels, up to the second difference. The findings are presented in Table 1.

Table 1: ADF Stationary Test at Level

Variable	*ADF statistics*		
	t -Statistics	*Critical value*	*Prob.*
Unemployment Rate	0.949	3.024	0.750
Economic growth	0.833	3.027	0.765
Minimum wage	1.234	3.042	0.634
HDI	2.404	3.027	0.156

Source: Author's calculation.

Based on the findings in Table 1, it can be observed that the ADF statistic values for the variables of unemployment, economic growth, minimum wage, and human development index are higher than the ADF t-statistic value, indicating that these variables are non-stationary. Consequently, it is crucial to apply the first difference to determine the stationarity of these variables. The results of the stationarity test at the first difference level are presented in Table 2 for further analysis.

Upon processing the data for the first difference, the results reveal that the variables of the unemployment rate, minimum wage, and the human development index exhibit stationarity at the first difference level. This is evident from the fact that the ADF t-statistic value surpasses the critical value. However, it should be noted that the economic growth variable remains non-stationary as the critical value of -3.040 still

Table 2: ADF Stationary Test at Level 1st difference

Variable	*ADF statistics*		
	t -Statistics	*critical value*	*Prob.*
Unemployment Rate	3.108	3.040	0.045
Economic growth	-1.527	3.040	0.502
Minimum wage	6.075	3.040	0.001
HDI	4.477	3.040	0.002

Source: Author's calculation

exceeds the ADF t-statistic value of -1.527. Therefore, to further assess the stationarity of all variables, a second difference process is conducted. The ADF stationary test outcomes at the second difference level are presented in Table 3 for further analysis.

Table 3: ADF Stationary Test at Level 2nd difference

Variable	*ADF statistics*		
	t -Statistics	*Critical value*	*Prob.*
Unemployment Rate	6.229	3.052	0.000
Economic growth	3.119	3.052	0.044
Minimum wage	9.575	3.052	0.000
HDI	7.598	3.052	0.000

Source: Author's calculation

The results presented in Table 3 demonstrate that all variables exhibit stationarity after the data processing, as indicated by the second difference unit root test. The probability of the ADF t-statistic for the unemployment rate variable is -6.229, surpassing the critical value of -3.052. Similarly, the economic growth variable displays stationary data at the second difference level, with a probability of the ADF t-statistic at -3.119, exceeding the critical value of -3.052. The minimum wage variable also exhibits stationary data at the second difference level, as the probability of the ADF t-statistic is -9.575, higher than the critical value of -3.052. Additionally, the Human Development Index (HDI) variable indicates stationary data at the second difference level, with a probability of the ADF t-statistic at -7.598, surpassing the critical value of -3.052. Consequently, it can be concluded that all variables, including the unemployment rate, minimum wage, economic growth, and human development index, display stationarity at the second difference level.

4.2. Optimal Lag Test Result

The results of the optimal lag test, as presented in Table 4, hold significance in determining the appropriate lag length for the VAR method. Optimal lag selection is crucial as it determines the lag length of the endogenous variable used as an independent variable in

the model. Employing an optimal lag helps address the issue of autocorrelation within the VAR system, contributing to VAR stability analysis. Therefore, the findings of the optimal lag test are provided in Table 4.

Table 4: Optimal Lag Test Results

Lag	*Log L*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-77.3659	NA	0.3072	10.1707	10.3638	10.1806
1	-51.2181	35.9532*	0.0941*	8.9022	9.8680*	8.9517*
2	-35.1895	14.0249	0.1555	8.8986*	10.6370	8.9877

* 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: Shewarz information criterion; HQ: Hannan information criterion. Source: Author's calculation

The lag selection in this study, as shown in Table 4, is determined based on the minimum value or the smallest lag. Additionally, the optimal lag can also be identified by the number of stars associated with each lag. Observing Table 4, it is evident that the recommended optimal lag length is lag 1.

4.3. Cointegration test

Moving on to the cointegration test, its purpose is to examine the long-term impact on the variables under investigation. The continuation of the VECM step relies on the presence of cointegration. If cointegration is confirmed, the VECM can proceed accordingly. However, if cointegration is not established, the VECM analysis cannot be continued.

Table 5: Johansen Cointegration Test Results

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistics*	*0.05 Critical Value*	*Prob.***
None*	0.9073	71.8018	47.8561	0.0001
At most 1*	0.6549	33.7386	29.7970	0.0167
At most 2*	0.5247	16.7156	15.4947	0.0376
At most 3*	0.2598	4.8140	3.8414	0.0282

Source: Author's calculation.

In Table 5, the trace statistic for none, at most 1, at most 2, and at most 3 is observed to be greater than the critical value at a significance level of 5 percent. The presence of a significant asterisk (*) on none, at most 1, at most 2, and at most 3 indicates that the equation needs to be solved using the VECM (Vector Error Correction Model) method. Therefore, it can be inferred that among the variables, namely the unemployment rate, economic growth, minimum wage, and HDI, there exists stability and long-term movement. In the short run, all variables adjust to achieve equilibrium in the long run.

4.4. Granger Causality Test

Moving on to the Granger causality test, its purpose is to determine the causal relationship between endogenous and exogenous variables. This test helps understand the influence between variables. In the context of two variables, y, and z, the Granger causality test explores whether y causes z, z causes y, both variables have a mutual influence, or there is no relationship between them. The results of the Granger causality test can be found in Table 6.

Table 6: Granger Causality Test Result

Null Hypothesis	*Observations*	*F-Statistics*	*Prob.*
i)GDP does not Granger cause Unemployment. ii)Unemployment does not Granger cause GDP	31	5.058 2.800	0.038 0.113
I) Log minimum wage does not granger cause unemployment. ii)Unemployment does not Granger cause Log minimum wage	31	4.116 1.141	0.059 0.301
i)HDI does not Granger cause Unemployment. ii)Unemployment does not Granger cause HDI	31	4.701 0.011	0.045 0.915
I) Log minimum wage does not granger cause GDP. ii)GDP does not Granger cause Log minimum wage	31	2.673 0.001	0.121 0.976
i)HDI does not Granger cause GDP. ii)GDP does not Granger cause HDI	31	0.874 2.463	0.363 0.136

Source: Author's calculation.

In Table 6, the influence between variables can be determined based on the probability values in the fourth column. If the probability value is below 0.05, it indicates that the variables have a statistically significant effect on each other. Conversely, if the probability value is above 0.05, it suggests that the variables do not influence each other.

Analyzing the results, it is observed that economic growth and HDI have a statistically significant effect on the unemployment rate, as their probability values are below 0.05. However, the reverse is not true, as the unemployment rate does not have a statistically significant effect on economic growth and HDI.

4.5. Vector Error Correction Model (VECM) Test

Moving on to the Vector Error Correction Model (VECM) test, it is employed in a non-structural VAR model when the time series data is not stationary at the levels but is stationary after taking the differences, and there exists cointegration, indicating a theoretical relationship between the variables. The outcomes of the long-term and short-term VECM estimates can be found in Table 7.

Table 7: Long-Term and Short-Term VECM Estimates

Variable	*Coefficient*	*t stat*	*t table*
Long -term			
Economic growth	59.3479	6.1471	1.7458
Minimum wage	-593.6873	-3.9882	
HDI	-40.0123	-7.6757	
Short- term			
CointEq1	0.0051	-1.6186	1.7458
Economic growth	0.4979	2.2171	
Minimum wage	-6.7352	-2.8113	
HDI	-0.3425	-2.5268	

Source: Author's calculation.

In the long term, economic growth has a positive and significant effect on the unemployment rate, as indicated by the t-statistic value being greater than the t-table value. However, the minimum wage and HDI variables show negative and insignificant results, as their t-statistic values are smaller than the t-table value.

Turning to the short-term VECM estimation results, economic growth exhibits a positive and significant impact, with a t-statistic value of 2.2171, exceeding the t-table value of 1.7458. Conversely, the minimum wage and HDI variables show negative results and do not have a significant pairwise Granger Causality Test outcome regarding the unemployment rate.

4.6. Impulse Response Function (IRF) Analysis

Moving on to the Impulse Response Function (IRF), analysis was conducted to examine the response of an endogenous variable to shocks from specific variables and to observe the duration of the effect. If a variable is not influenced by shocks, it implies that the specific shock cannot be identified, but the general shock can be observed. The results of this analysis are presented in Table 8.

Figure 1 in Table 8 illustrates the response of the unemployment rate variable (D(Unemployment)) to its own shock (D(Unemployment)). It provides insights into how the unemployment rate reacts to its own fluctuations over time.

Figure 2 in Table 8 displays the response of the unemployment rate variable (D(Unemployment)) to shocks in the economic growth variable (D(GDP)). It shows the positive or negative changes in the unemployment rate resulting from variations in economic growth.

Figure 3 in Table 8 exhibits the response of the unemployment rate variable (D(Unemployment)) to shocks in the minimum wage variable (D(LogMW)). It portrays

Table 8: Impulse Response Function (IRF) result.

Response of D (Unemployment)

Period	*D(Unemployment)*	*D(GDP)*	*D(LogMW)*	*D(HDI)*
	0.7153	0.0000	0.0000	0.0000
	0.4324	-0.0598	-0.1853	-0.0128
	0.7386	-0.0962	0.2441	0.3226
	0.5742	-0.5861	-0.6889	-0.0700
	0.5225	-0.3030	0.3561	0.1522
	0.6767	-0.4772	-0.3299	0.1152
	0.5564	-0.0996	-0.1201	0.0578
	0.5912	-0.1264	-0.0367	0.1128
	0.6167	-0.2424	-0.1762	0.0984
	0.5777	-0.1494	-0.1111	0.0814

Source: Author's calculation

the impact of changes in the minimum wage on the unemployment rate, highlighting positive or negative adjustments.

Figure 4 in Table 8 demonstrates the response of the unemployment rate variable (D(Unemployment)) to shocks in the human development index variable (D(HDI)). It visualizes the influence of variations in the human development index on the unemployment rate, indicating positive or negative alterations.

Overall, Table 8 and the associated figures provide a comprehensive understanding of how the unemployment rate variable responds to shocks in economic growth, minimum wage, and human development index variables over time.

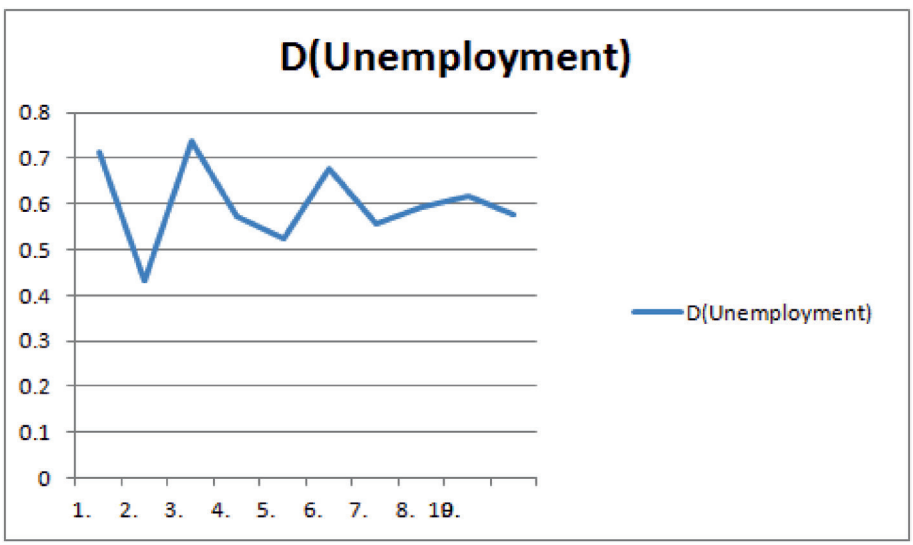

Figure 1

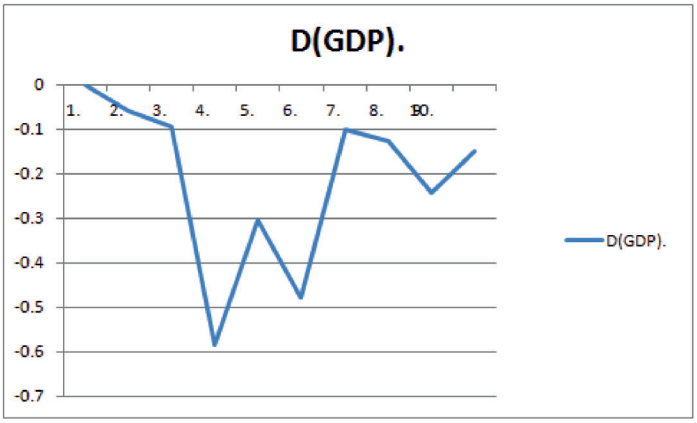

Figure 2

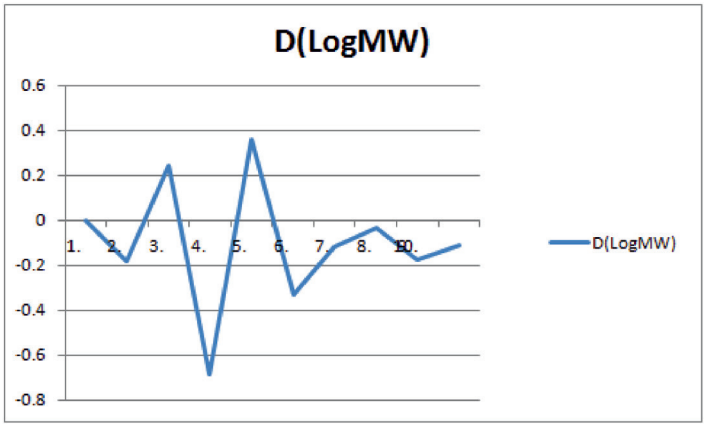

Figure 3

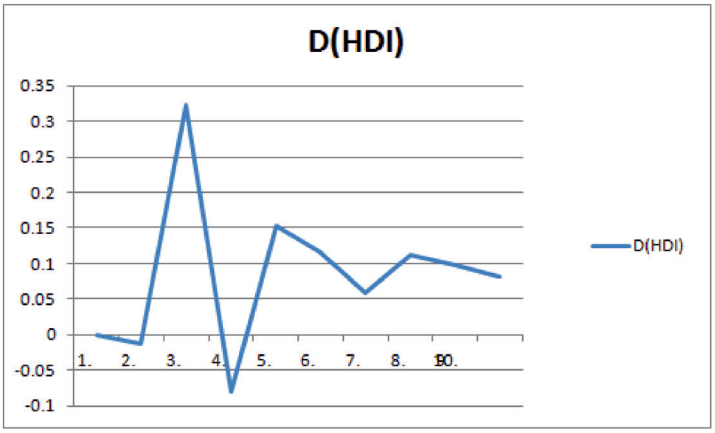

Figure 4

(i) Response of D(Unemployment) to D(Unemployment): The unemployment variable in Figure 1 exhibits a positive impact, indicated by its tendency above the horizontal line. This is because the unemployment rate influences itself, allowing for control over its impact. Additionally, the variable of economic growth demonstrates both negative and positive impacts, as shown by its tendency both below and above the horizontal line across different periods.

(ii) D(Unemployment) to D(GDP): Figure 2 illustrates the impulse response of economic growth to unemployment. The variable of economic growth displays both negative and positive impacts, as evident from its trend below and above the horizontal line across different periods. The shock value of -0.1494 in the 10th period signifies that an increase in economic growth leads to a reduction in the unemployment rate.

(iii) D(Unemployment) to D(LogMW): Figure 3 depicts the trend of economic growth, which shows both negative and positive impacts across different periods. The shock value of -0.1111 in the 10th period represents the influence of this variable.

(iv) D(Unemployment) to D(HDI): Figure 4 demonstrates the trend of economic growth, displaying both negative and positive impacts across different periods.

4.6. Variance Decomposition (VD)

Variance decomposition is a useful tool for estimating the error variance of a variable, quantifying the disparity between the variance before and after a shock occurs, whether from the variable itself or other variables. Forecast Error Variance Decomposition (FEVD) provides insights into the impact of innovation in one variable on the components of other variables within the VAR model. It reveals the proportion of sequential movements attributed to shocks originating from the variable itself or from other variables. The findings from this analysis are presented in Table 9.

Table 9 Variance Decomposition (VD) Results

Variance Decomposition of D(Unemployment)

Period	*SE.*	*D(Unemployment)*	*D(GDP)*	*D(LogMW)*	*D(HDI)*
1	0.7153	100.0000	0.0000	0.0000	0.0000
2	0.8583	94.8313	0.4853	4.6610	0.0224
3	1.2063	85.5017	0.8814	6.4542	7.1627
4	1.6152	60.3202	13.6583	21.7854	4.2361
5	1.7674	59.1306	14.3314	22.2576	4.2803
6	1.9827	58.6282	17.1793	20.4537	3.7386
7	2.0660	61.2486	16.0516	19.1752	3.5216
8	2.1559	63.7665	15.0867	17.6383	3.5078
9	2.2646	65.2138	14.8257	16.5922	3.3683
10	2.3459	66.8342	14.2210	15.6856	3.2592

Source: Author's calculation.

The findings from the variance decomposition test presented in Table 9 reveal interesting patterns. In the initial period, the unemployment rate is primarily influenced by its own fluctuations. However, as the period progresses, other variables gradually come into play, although their impact is relatively smaller compared to the influence of the unemployment rate itself. Among these variables, the minimum wage demonstrates the second largest effect after the unemployment rate. Initially, its impact is measured at 4.66, which increases steadily for three periods before gradually declining. By the end of the period, the minimum wage has an effect of 15.6 on the unemployment rate. On the other hand, the human development index variable exhibits the smallest impact on the unemployment rate, amounting to 3.26 percent at the end of the period. As for the economic growth variable, which ranks third in terms of influence according to the variance decomposition test, it has a 14.2 percent effect on the unemployment rate by the end of the period.

5. DISCUSSION

Economic Growth & Unemployment: The findings indicate a positive and significant relationship between economic growth and the unemployment rate in both the short and long term during the period 2001-2021. This contradicts the theory of Okun's Law and the hypothesis of this study, which proposed that an increase in economic growth would lead to a decrease in the unemployment rate. Instead, the results align with Anggoro's (2015) research, suggesting that positive economic growth without a corresponding increase in production capacity can result in a simultaneous rise in unemployment along with economic growth.

Minimum Wage & Unemployment: The analysis reveals that the minimum wage variable does not have a significant impact on the unemployment rate in both the short and long term. Contrary to Keynes's theory, which states that an increase in the wage rate leads to a decrease in the unemployment rate, this study finds that a rise in wages is associated with a decrease in unemployment. However, the study also notes that the relationship between the minimum wage and the unemployment rate is not significant, aligning with Amrullah *et al.*'s (2019) research, which suggests that an increase in the minimum wage does not necessarily result in a decrease in the unemployment rate. This implies that a higher minimum wage may not effectively absorb the existing workforce, leading to an unchanged unemployment rate.

Human Development Index & Unemployment: The analysis shows that the human development index variable does not have a significant impact on the unemployment rate in both the short and long term. According to Sanitra (2021), an increase in the human development index should lead to a decrease in the unemployment rate, while a decrease in the index should lead to an increase in the unemployment rate. The human development index comprises three dimensions: a long and healthy life, knowledge,

and a decent life. The study suggests that improvements in these dimensions, such as public health, education, and per capita expenditure, should lead to a decrease in unemployment. However, the findings indicate that the human development index does not have a significant effect on the unemployment rate. Latifah (2017) also suggests that unemployment is not solely influenced by the quality of human resources but also by a lack of job opportunities for unemployed graduates.

6. CONCLUSION

The study concludes that economic growth has a positive and significant impact on the unemployment rate in both the short and long term during the period 2001-2021. However, the minimum wage and human development index do not have a significant effect on the unemployment rate in the long run. In the short-term analysis, only economic growth shows a positive and significant impact on the unemployment rate, while the minimum wage and human development index do not exhibit significant effects. These findings provide valuable insights for the government in formulating effective policies to address the issue of unemployment in India from both economic and social perspectives. However, it is important to note that the data used in this study may be partially biased due to the COVID-19 pandemic and may not fully reflect the true state of unemployment in India.

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