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Does Financial Development Lower Energy Intensity in India?

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ABSTRACT

Although the relationship between finance and growth is gaining significant attention, little is known about how financial development indicators affect energy intensity in emerging nations. Given the complexity of the growth effects of financial development and energy intensity dynamics, the present paper investigates the effect of financial development and economic growth on energy intensity in India using Autoregressive Distributed Lag (ARDL) bounds testing approach. The result indicates that financial development indicators and economic growth had a long-run relationship with energy intensity. Besides, the empirical results reveal that financial development and economic growth had a negative and significant impact on energy intensity in the short and long-run, inferring that financial development and economic growth lower energy intensity in the country. The findings are helpful for India's policymakers in order to maintain the complementarity between financial development and energy intensity.

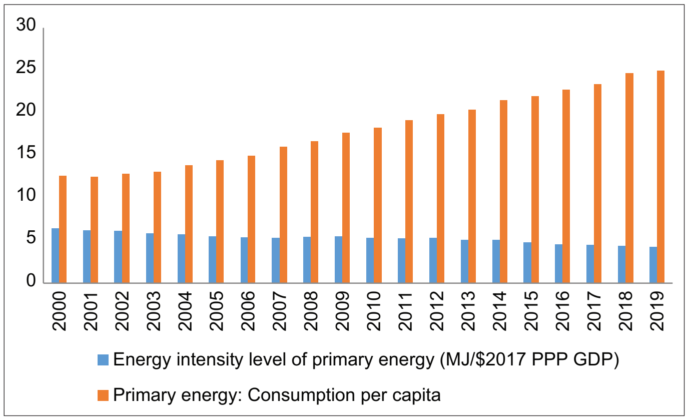
Keywords: Energy Intensity, Finance Development, Economic Growth, ARDL Model, India
JEL Classifications: E44, G20, Q43

1. INTRODUCTION

Economic growth of the country has fuelled the demand and supply of energy. India's energy intensity has improved over the past two decades, implying less energy required to produce an additional unit of economic output. However, energy consumption had increased significantly with an imminent global climate change threat. Figure 1 depicts the economy's energy intensity decreasing compared to the energy consumption per capita. This reduction is due to the rapid development in the services sector and a shift from inefficient biomass to modern fuels. As one of the most significant and rapidly growing developing countries with a wide array of manufacturing industries, attaining the desired energy efficiency with low energy intensity levels needs particular focus. Existing studies primarily focused on determinants of energy prices (Fisher-Vanden et al., 2004; Metcalf, 2008; Mirza and Fatima, 2014) and energy consumption (Payne 2010a; Payne 2010b; Omri 2014a; Omri 2014b; Sebri, 2015; Jackovic, 2018; Gozgor et al., 2018; AlKhars et al., 2019). Recent literature emphasised that the financial markets play a significant role in promoting energy efficiency investments. Financial development enhances investments in the firms' input efficiency, thereby lowering energy intensity. Besides, the development of the financial sector may relax credit constraints and ease investments in energy-efficient technologies, which could further optimise the production processes' technical aspects and lower energy intensity (Adom et al., 2020).

Despite the apparent link between financial development and energy intensity, limited empirical studies such as Amuakwa-Mensah et al. (2018); Chen et al. (2019); Canh et al. (2020); Adom et al. (2020); Rakpho et al. (2021) had conducted to investigate the impact of financial development on energy intensity in the emerging nations. For instance, Amuakwa-Mensah et al. (2018) studied the impact of performance indicators of commercial banks on energy intensity in sub-Saharan Africa, using the system generalized method of moments. The study found that the banking performance indicators enhance the foster energy efficiency in sub-Saharan Africa in the short and long run. Using a two-way fixed-effect model, Chen et al. (2019) found that financial development exerts a significant adverse effect on energy intensity

Figure 1: Energy intensity and energy consumption per capita



Source: World development indicators, World Bank and BP statistical review of world energy

for non-OECD countries. However, financial development has a limited impact on energy reduction for OECD countries due to the established financial systems of these developed economies. Canh et al. (2020) examined the multidimensional impact of financial development on consumption energy intensity and production energy intensity for the sample of 29 high-income economies (HIEs), 21 upper-middle-income economies (UMEs) and 31 low and lower-middle-income economies (LMEs). The authors found that financial development leads to a decrease in production energy intensity in HIEs. However, it has increasing effects in UMEs and mixed effects in LMEs. Besides, financial development induces higher consumption of energy intensity in LMEs, UMEs and HIEs. Adom et al. (2020) investigated the effect of financial development on energy intensity in Ghana, and the findings revealed that financial development lowers energy intensity. Rakpho et al. (2021) investigate the impact of financial development on energy security in Asia-16 countries using the Panel Smooth Transition model. The authors found that financial development reduces the energy inefficiency in the economy.

From the existing literature on the subject, no attention has been paid to investigating the effect of financial development on energy intensity in India. Moreover, the energy intensity is a better indicator than energy consumption to study whether the economy has efficiency used the energy in production and consumption processes (Pan et al., 2019; Chen et al., 2019). Despite the favourable credit policies, several small enterprises in India remain credit constrained (Nikaido et al. (2015). This raises an empirical research question: does financial development lower energy intensity in the country? A study of this kind provides the answer to the research question and valuable insights into comprehending the financial development-energy intensity nexus in the country. The findings have important implications for designing energy efficiency policies concerning financial sector development.

2. DATA AND METHODOLOGY

2.1. Autoregressive Distributed Lag Model (ARDL) Approach

The stationarity properties of the time-series variables are assessed by applying the Augmented Dickey-Fuller test. Besides, the Autoregressive Distributed Lag Model (ARDL) bound testing approach, proposed by Pesaran et al. (2001), was applied to investigate the long-run association between energy intensity, financial development and economic growth. Regardless of whether the underlying variables are I(0), I(1), or partially integrated, the bounds F-statistics is employed to test a null hypothesis of no cointegration among the variables. The ARDL bounds test is expressed in Equations (1):

$$\Delta EI_t = \alpha_o + \sum_{i=1}^{n} \alpha_1 \Delta EI_{t-1} + \sum_{i=1}^{n} \alpha_2 \Delta FI_{t-1} + \sum_{i=1}^{n} \alpha_3 \Delta GDPPC_{t-1} + \beta_1 EI_{t-1} + \beta_2 FI_{t-1} + \beta_3 GDPPC_{t-1} + \beta_4 CO_t + \beta_5 D_t + \varepsilon_{1t} \quad (1)$$

where EI is energy intensity; FI is financial development index; GDPPC is GDP Per Capita; CO represents the control variables, i.e., Gross Fixed Capital Formation (GFCF), Labour Force (LF), Openness (OPEN), Urbanisation (URBAN) and Inflation (INF) and D is the structural break dummy variables. To examine the short-run impact of financial development and economic growth on energy intensity, the ARDL specification of the error correction model is applied and formulated as follows:

$$\Delta EI_t = \alpha_o + \sum_{i=1}^{n} \alpha_1 \Delta EI_{t-1} + \sum_{i=1}^{n} \alpha_2 \Delta FI_{t-1} + \sum_{i=1}^{n} \alpha_3 \Delta GDPPC_{t-1} + \alpha_4 \Delta CON_t + \alpha_5 D_t + \gamma_1 Z_{t-1} + \varepsilon_{1t} \quad (2)$$

γ_1 is the error correction term. The short-run effect is assessed based on the significance of the coefficients of each lagged regressor. The cumulative sum of recursive residuals (CUSUM) and cumulative sum of square of recursive residuals (CUSUMQ) plots are used to evaluate the stability of the estimated ARDL models.

2.2. Data

Based on the availability of the dataset, the study considered the annual data from 2000 to 2019. All the necessary variables have been collected from the World Bank World Development Indicators. Following Rousseau and Wachtel (1998); Xu (2000), Fase and Abma (2003), Rioja and Valev (2004), Rahman (2004), Tahir (2008) and Hye (2011), the study constructed the financial development index using the principal component analysis (PCA). The key indicators of financial development represent both the development of the banking sector and the stock market. Banking sector development indicators include: (1) the financial depth (BTOT), proxied by the ratio of commercial bank assets to the sum of the commercial bank plus central bank assets to GDP (%). It measures the advantage of financial intermediaries in channeling savings to investments, monitoring firms, influencing corporate governance and undertaking risk management relative to the central bank. (2) the bank size (M3), proxied by the ratio of liquid liabilities to GDP (%), also known as broad money or M3. Liquid liabilities is a key indicator used to measure the size, relative to the economy, financial intermediaries, including three types of financial institutions: the central bank, deposit money banks and other financial institutions, and (3) the financial accessibility (ACCESS), proxied by the Commercial Bank branches per

100,000 adults. It measures the more accessible access to financial institutions and makes greater use of financial services. The stock market indicators include (1) stock market size (MC), measured by the total value of all listed shares of the stock market as a % of GDP, and (2) stock market liquidity (VST), proxied by the value of shares traded (VST). It is a measure of liquidity on an economy-wide basis, calculated as the total value of shares traded in a stock market exchange as a % of GDP. Energy intensity is measured as the level of primary energy (megajoules per constant 2017 PPP GDP). The energy intensity level of primary energy is the ratio between energy supply and gross domestic product measured at purchasing power parity. GDPPC is the GDP per capita (constant 2015 US$) measure the economic growth. The control variables *viz*. labour force (LF), measured as population ages 15-64 (% of the total population), Gross fixed capital formation (% of GDP) (GFCF), trade openness (OPEN) measured as the sum of exports and imports of goods and services (% of GDP), urbanization (URBAN) as proxied by the urban population (% of the total population) and inflation (INF) as measured by the GDP Deflator.

3. RESULTS AND DISCUSSION

Figure 2 shows that the energy intensity level of primary energy (megajoules per constant 2017 Purchasing Power Parity GDP) had fallen over two decades. This decline is due to the high growth in the services sector and or improvements in the economy's energy efficiency. The figure depicts components of financial development indicators viz. broad money as a % of GDP (M3), the ratio of deposit money banks domestic assets to deposit money bank plus central bank domestic assets (BTOT), commercial bank branches per 100,000 adults (ACCESS), the market capitalization of listed domestic companies as % of GDP (MC) and the value of shares traded as % of GDP (VST) are steadily increasing during the sample period. Notably, the financial development index increases sharply till 2007, then rises moderately. This implies the positive changes in financial development that took place in India during the study period.

The statistical properties of the variables are presented in Table 1. The descriptive statistics reveal that the variables are either positively or negatively skewed, with values close to zero. This reflects the normal distribution. Moreover, the Jarque-Bera normality test statistics for all the variables are statistically insignificant, indicating the series are normally distributed.

Table 2 depicts the unconditional correlation matrix. We observed the negative correlation between key variables of interest (GPPPC and FI) and energy intensity (EI). It may imply a high economic growth and financial development lowers the energy intensity. Moreover, the correlation coefficients among the variables are not strongly associated, signifying the absence of multicollinearity.

Prior to estimation, the Augmented Dickey-Fuller (ADF) test in the presence of break with both innovative outliers (IO) and additive outliers (AO) was performed to determine the order of integration of underlying data series and the results are depicted in Table 3. The empirical results reveal that the variables are found to be stationary either at level, I(0) or first difference, I(1),

Figure 2: Energy intensity, GDPPC and financial development indicators

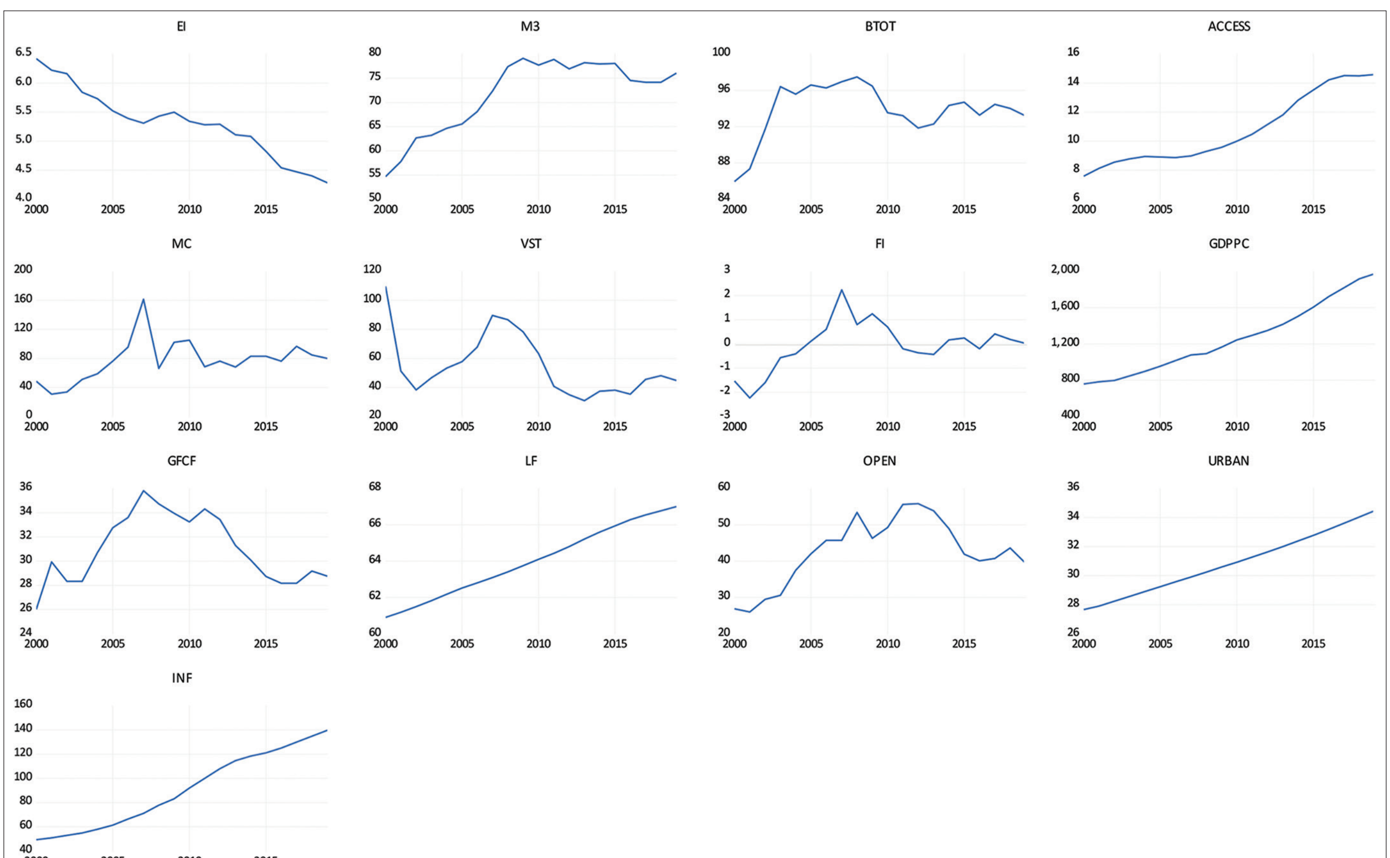


Table 1: Summary statistics

	EI	M3	BTOT	ACCESS	MC	VST	FI	GDPPC	GFCF	LF	OPEN	URBAN	INF
Mean	5.3065	71.578	93.766	10.753	77.110	54.847	–0.0466	1260.5	30.977	63.993	42.636	30.856	90.519
Median	5.3250	74.348	94.155	9.7850	76.125	47.251	0.0591	1203.4	30.394	63.925	42.800	30.758	87.588
Max.	6.4200	79.075	97.466	14.580	161.23	109.48	2.2261	1972.7	35.812	67.003	55.793	34.472	139.68
Min.	4.2800	54.645	85.932	7.5800	30.646	30.752	–2.2403	757.66	26.021	60.908	25.993	27.667	49.457
Std. Dev.	0.6010	7.6142	2.9992	2.4234	28.587	21.454	1.0022	390.39	2.7894	1.9668	9.1444	2.1089	31.461
Skewness	0.0038	–0.8661	–1.2030	0.5122	0.9513	1.1091	–0.1410	0.4157	0.1151	0.0153	–0.3496	0.1298	0.1191
Kurtosis	2.3613	2.4583	4.1206	1.7250	5.0569	3.3148	3.5451	1.9664	1.7823	1.7228	2.2258	1.8384	1.5076
JB Stat.	0.3399	2.7455	2.8705	2.2293	2.5426	4.1831	0.3139	1.4661	1.2798	1.3599	0.9069	1.1805	1.9032
	(0.843)	(0.253)	(0.243)	(0.328)	(0.237)	(0.123)	(0.854)	(0.480)	(0.527)	(0.506)	(0.635)	(0.554)	(0.386)

Table 2: Unconditional correlation matrix

	EI	FI	GDPPC	LF	GFCF	OPEN	URBAN	INF
EI	1							
FI	–0.48661	1						
GDPPC	–0.96311	0.32162	1					
LF	–0.96347	0.38285	0.38687	1				
GFCF	0.03019	0.52566	–0.18532	–0.08431	1			
OPEN	–0.45946	0.50821	0.38522	0.50439	0.30977	1		
URBAN	–0.96702	0.37381	0.39336	0.49801	–0.10107	0.47751	1	
INF	–0.93079	0.29497	0.48349	0.39259	–0.14061	0.47886	0.49120	1

Table 3: Unit root test with a breakpoint

Variables	Level	TB_1	First Difference	TB_1	Order of Integration
	t-statistics		t-statistics		
Innovative outlier (IO) model					
EI	–2.83505 (0.7704)	2014	–4.18553*** (0.0921)	2008	I (1)
FI	3.66168 (0.3009)	2007	–8.52155* (0.0000)	2007	I (1)
GDPPC	0.58297 (0.9999)	2013	–3.54094*** (0.0649)	2014	I (0)
LF	–3.11201 (0.6197)	2008	–2.89909*** (0.0794)	2016	I (0)
GFCF	–2.99703 (0.6877)	2012	–5.54806* (0.0000)	2007	I (1)
OPEN	–2.42536 (0.9207)	2003	–5.16684* (0.0000)	2014	I (1)
URBAN	0.34152 (0.9311)	2010	–5.04666* (0.0000)	2013	I (0)
INF	–3.43425 (0.4223)	2015	–4.49227*** (0.0649)	2018	I (0)
Addictive Outlier (AO) model					
EI	–4.37706*** (0.0600)	2010	–4.45713** (0.0484)	2008	I (1)
FIS	–3.33622 (0.4826)	2011	–8.59063* (0.0000)	2007	I (1)
GDPPC	–4.73397 (0.0219)	2008	–5.17652* (0.0000)	2008	I (0)
LF	–2.87625 (0.7499)	2008	–4.00733*** (0.0817)	2016	I (0)
GFCF	–2.91410 (0.7321)	2010	–10.6912* (0.0000)	2012	I (1)
OPEN	–2.97334 (0.7012)	2011	–5.19055* (0.0001)	2013	I (1)
URBAN	–1.49189 (0.9102)	2007	–3.03265*** (0.0808)	2019	I (0)
INF	–3.14902*** (0.0975)	2016	–3.01292 (0.1285)	2008	I (0)

*, ** and ***Denotes significance at 1%, 5% and 10% level, respectively. The lag length was chosen based on the Schwarz Information Criterion. The breakpoint selection method was based on the Dickey-Fuller minimization of t-statistic. The figures in brackets are p-values. The reported p-values are asymptotic one-sided P values taken from Vogelsang (1993)

indicating the order of integration is a mixture of I(0) and I(1), thus making ARDL the preferred approach. For robust ARDL approach, the study identified the potential structural breaks in the energy intensity series using Bai and Perron (1998) test, and the results are shown in Table 4. The findings indicate significant breakpoints in 2004, 2013 and 2016.

Following Kisswani et al. (2017), Dube et al. (2018) and Srinivasan et al. (2022), the study estimates the ARDL bounds testing approach to cointegration by incorporating the structural breaks that occurred during March 2013 and May 2017. The ARDL Bounds test is used to assess the long-run relationship between energy intensity, financial development indicators and economic growth, and the results are shown in Table 5. Since the calculated F-statistics exceed the upper critical F-value at

Table 4: Bai–Perron multiple structural breaks test for energy intensity

Break test	F-Statistic	Critical value	Break date
0 vs. 1**	31.0236	8.58	2004
1 vs. 2**	25.4935	10.13	2013
2 vs. 3**	21.5282	11.14	2016
3 vs. 4	2.96491	11.83	

**Denotes significance at 5% level. The critical values are obtained from Bai and Perron (2003)

Table 5: ARDL bounds test for cointegration

F-Statistic	95% Lower bound	95% Upper bound
4.1678**	2.72	3.83

**Denotes significance at 5% level. The critical values are determined by Pesaran *et al.* (2001)

Table 6: ARDL estimates

Variables	Coefficient	t-Statistic	Prob.
Panel A: Long-run estimates			
EI_{t-1}	–0.89352**	–2.32580	0.0485
FI_t	–0.08794***	–1.85472	0.0907
$GDPPC_t$	–0.00355***	–2.08544	0.0705
Panel B: Short-run estimates			
Variables	**Coefficient**	**t-Statistic**	**Prob.**
ΔFI_t	–0.09842***	–2.12794	0.0660
$\Delta GDPPC_t$	–0.00397**	–2.55823	0.0337
ΔLF_t	–0.01530	–0.29025	0.7790
$\Delta GFCF_t$	0.03914	1.56540	0.1561
$\Delta OPEN_t$	–0.02019***	–1.74793	0.0986
$\Delta URBAN_t$	0.27176***	1.76624	0.0953
ΔINF_t	0.01590***	1.83850	0.0933
D_1	–0.01150	–0.11927	0.9080
D_2	–0.12151	–1.20255	0.2635
D_3	–0.16881***	–1.81401	0.0972
Z_{t-1}	–0.89352**	–2.85123	0.0214

* and **Denotes significance at 5% and 10% level, respectively. The optimum lag length is determined based on the Schwarz Information Criterion (SIC). Z is the error correction term that measures speed of adjustment and is derived from the long-run cointegrating relationship

Table 7: Diagnostic checks

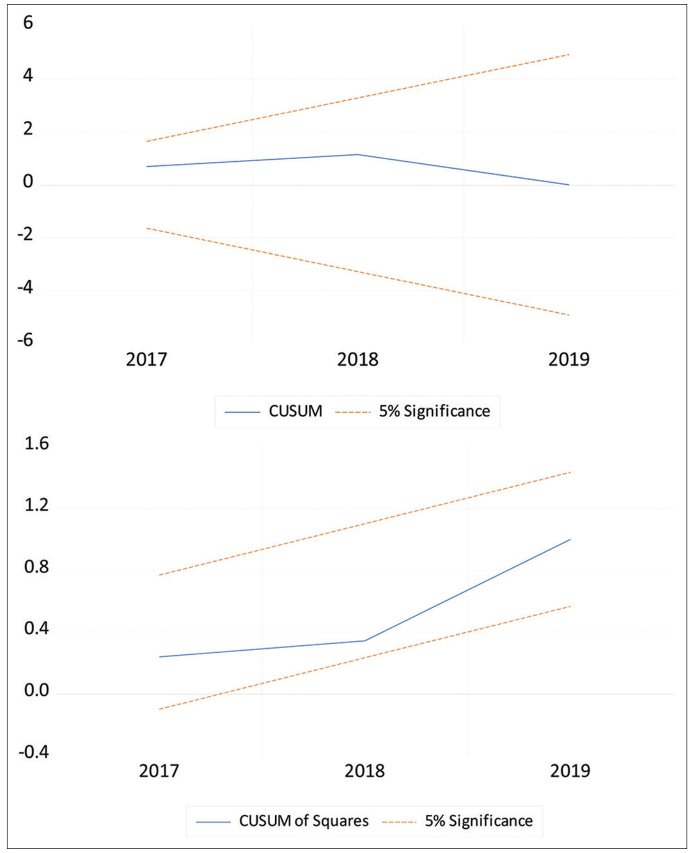
	test statistic	Prob. value
Breusch-Godfrey Serial Correlation LM test	0.22429	0.8055
Jarque-Bera Normality test	0.65331	0.7213
ARCH-LM Heteroscedasticity test	0.73640	0.4035
Ramsey RESET Specification test	0.87961	0.5250

5% significance level, there is evidence of a level relationship. Thus, the added financial development and economic growth can be treated as the 'long-run forcing' variables explaining energy intensity in the country. The null hypothesis is rejected, and a long-run relationship exists between the energy intensity, financial development indicators and economic growth.

Table 6 depicts the long-run and short-run coefficients of the ARDL approach. Long-run estimate reveals that the financial development index (FI) had a negative and significant impact on energy intensity. Given that other factors remain equal, one unit increase in FI results in 0.087 unit decrease in energy intensity. Similarly, the short-run estimate reveals negative and significant impact on energy intensity. Keeping other factors constant, 1% increase in FI results in 0.0984 % decrease in energy intensity. The evidence reveals that financial development lowers energy intensity in the country. This might be due to the development of the financial sector that removes credit constraints and facilitates investments in energy-efficient technologies. This enhances the technical processes in the production and consumption sectors and lowers energy intensity. It is observed that the growth coefficient (GDPPC) had a negative and significant impact on energy intensity in the short and long-run, implying that economic growth lowers energy intensity in the country.

The diagnostic tests were employed to check the robustness of the estimated ARDL approaches, and the results are shown in Table 7. The ARDL estimates passes all diagnostic tests. Besides,

Figure 3: Parameters stability test



the CUSUM and CUSUMQ statistics plot lie between the critical bounds at 5% significance level (Figure 3). This confirms that estimated coefficients from the ARDL approach are parametrically stable over the sample period.

4. CONCLUSION

This study examines the impact of financial development and economic growth on energy intensity using the ARDL approach in India from 2000–2019. Using the principal component analysis, we have constructed the index to measure financial development—the primary indicators of financial development representing both the development of the banking sector and the stock market. Banking sector development indicators include the ratio of liquid liabilities to GDP (%), the ratio of commercial bank assets to the sum of the commercial bank plus central bank assets to GDP (%) and commercial bank branches (per 100,000 adults). The stock market development indicators include stock market capitalization to GDP (%) and the total value of shares traded in a stock market to GDP (%). The result indicates that financial development indicators and economic growth had a long-run relationship with energy intensity. Besides, the empirical results reveal that financial development and economic growth had a negative and significant impact on energy intensity in the short and long-run, implying that financial development and economic growth lower energy intensity in the country. The study suggests that the simultaneous development of banks and stock markets is essential to an economy's energy intensity. Government should implement policies to enhance the financial sector development that effectively complement to current energy efficiency policies and lower energy intensity in the country. To acquire the benefits of this complementarity, the government should relax credit constraints and encourage investments in energy-efficient technologies that improve the technical processes in the production and consumption sectors and lower energy intensity.

REFERENCES

Adom, P.K., Appiah, M.O., Agradi, M.P. (2020), Does financial development lower energy intensity? Frontiers in Energy, 14(3), 620-634.

AlKhars, M., Miah, F., Jiang, Y., Ozturk, I., Ahmad, F. (2019), Asystematic review of relationship between energy consumption and economic growth in GCC countries. Sustainability, 12, 38-45.

Amuakwa-Mensah F., Klege R.A., Adom P.K., Amoah, A., Hagan, E. (2018), Uneveiling the energy saving role of banking performance in sub-Saharan Africa. Energy Economics, 74, 828-842.

Bai, J., Perron, P. (2003), Computation and analysis of multiple structural change models. Journal of Applied Econometrics, 18(1), 1-22.

Canh, N.P., Thanh, S.D., Nasir, M.A. (2020), Nexus between financial development and energy intensity: Two sides of a coin? Journal of Environmental Management, 270, 110902.

Chen, Z., Huang, W., Zheng, X. (2019), The decline in energy intensity: Does financial development matter? Energy Policy, 134, 110945.

Dube, A.K, Ozkan, B., Govindasamy, R. (2018), Analyzing the export performance of the horticultural sub-sector in Ethiopia: ARDL bound test cointegration analysis. Horticulturae, 34(4), 34.

Fase, M.M.G., Abma, R.C.N. (2003), Financial environment and economic growth in selected Asian countries. Journal of Asian Economics, 14(1), 11-21.

Fisher-Vanden, K., Jefferson, G.H., Hongmei, L., Quan, T. (2004), What is driving China's decline in energy intensity? Resource and Energy Economics, 26(1), 77-97.

Gozgor, G., Lau, C.K.M., Lu, Z. (2018), Energy consumption and economic growth: New evidence from the OECD countries. Energy, 153, 27-34.

Hye, Q.M.A. (2008), Financial innovation and demand for money in Pakistan. The Asian Economic Review, 51(2), 219-228.

Jakovac, P. (2018), Causality between Energy Consumption and Economic Growth: Literature Review. In: 5th International Conference on Education and Social Science, Instabul, Turkey.

Kisswani, K.M. (2017), Evaluating the GDP-energy consumption nexus for the ASEAN-5 countries using nonlinear ARDL model. OPEC Energy Review, 41(4), 318-343.

Metcalf, G.E. (2008), An empirical analysis of energy intensity and its determinants at the state level. The Energy Journal, 29, 1-26.

Mirza, F.M., Fatima, N. (2014), Drivers of Energy Intensity in Pakistan: An Assessment using Index Decomposition Methods. Working Paper No. 03/2014, Institute of Public Policy. Pakistan: Beacon house National University.

Nikaido, Y., Pais, J., Sarma, M. (2015), What hinders and what enhances small enterprises' access to formal credit in India? Review of Development Finance, 5(1), 43-52.

Omri, A. (2014a), An international literature survey on energy-economic growth nexus: Evidence from country-specific studies. Renewable and Sustainable Energy Reviews, 38, 951-959.

Omri, A. (2014b), Causal relationships between energy consumption, foreign direct investment and economic growth: Fresh evidence from dynamic simultaneous equations models. Energy Policy, 67, 913-922.

Payne, J.E. (2010a), Survey of the international evidence on the causal relationship between energy consumption and growth. Journal of Economic Studies, 37(1), 53-95.

Payne, J.E. (2010b), A survey of the ELEC-growth literature. Applied Energy, 87, 723-731.

Pesaran, M.H, Shin, Y., Smith, R.J. (2001), Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326.

Rahman, M.H. (2004), Financial development economic growth nexus: A case study of Bangladesh. The Bangladesh Development Studies, 30(3-4), 113-120.

Rakpho, P., Yamaka, W., Puttachai, W., Maneejuk, P. (2021), Role of financial development for solving the energy insecurity in Asia. The Singapore Economic Review, 66(02), 413-434.

Rioja, F., Valev, N. (2004), Does one size fit all? A reexamination of the finance and growth relationship. Journal of Development Economics, 74, 429-447.

Rousseau, P.L, Wachtel, P. (1998), Financial intermediation and economic performance: Historical evidence from five industrialized countries. Journal of Money, Credit and Banking, 30(4), 657-678.

Sebri, M. (2015), Use renewables to be cleaner: Meta-analysis of the renewable energy consumption-economic growth nexus. Renewable and Sustainable Energy Reviews, 42, 657-665.

Srinivasan, P., Maity, B., Krishna Kumar, K. (2022), Macro-financial parameters influencing bitcoin prices: Evidence from symmetric and asymmetric ARDL models. Review of Economic Analysis, 14(1), 143-175.

Tahir, M. (2008), An investigation of the effectiveness of financial development in Pakistan. The Lahore Journal of Economics, 13(2), 27-44.

Vogelsang, T.J. (1993), Essays on Testing for Nonstationarities and Structural Change in Time Series Models. United States: Princeton University. p 9407125.

Xu, Z. (2000), Financial development, investment, and economic growth. Economic Inquiry, 38(2), 331-344.