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Research Article

Impact of foreign direct investment on economy, environment, technology, productivity and energy of the countries

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ABSTRACT

In today's world, attracting Foreign Direct Investment (FDI) is one of the essential tasks of governments. But what effect will the absorption of Foreign Direct Investment have on that society? Based on the review of 18 articles, the researcher has categorized these effects into the following 5 factors. These factors belong to Economy, Environment, Technology, Productivity, and Energy. Following the results of previous studies, the impacts of the five factors mentioned on communities in the effect of FDI are reviewed. The Boolean search methodology is chosen as the methodology, also the finding of the researcher is mentioned in the paragraphs below. FDI not only aids in the development of this industry, but it also has a substantial impact on the micro and macro levels. FDI has a favorable impact on the growth rate of per capita GDP. In addition, the African continent saw significant economic expansion. The impact of financial systems may explain why developing-country correlations are low while developed-country saving-investment correlations are strong. the impact of GDP and energy usage on Carbon dioxide emissions are significant, whereas the impact of FDI on Carbon dioxide emissions is positive but minor. Industrial SO2 emissions will increase by 0.098 percent for every 1% growth in FDI capital stock. FDI rising emissions in middle-income countries in the near term while reduces them in high-income nations. FDI from TMH areas has a substantial beneficial influence on the productivity of the wood products industry at the industrial level. On energy consumption, FDI revealed a negative scale impact, a structural effect, and a positive technical impact. In the end, the impact of foreign direct investment on worker productivity is positive. The researcher recommends that politicians make every effort to improve their country's political and judicial conditions to attract more FDI to their countries.

Keywords: *Foreign Direct Investment; Economy; Environment; CO2 Emission; Pollution*

1. INTRODUCTION

In this review, the researcher tries to find out the Effects of Foreign Direct Investment in five categories. This category includes Environments, Energy Consumption, Economy, productivity, and Technology Impact. These factors have a huge impact on the daily life of the human race or even effects the quality of the environment in which all species live.

So, the researcher limits the articles to only this category and try to summarize the finding and results of these studies. Also, these abstracts collect from 2021 to 2001. This study is not limit to only on a Regine or a country.

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Foreign Direct Investment (FDI) is a critical factor for promoting economic growth and the technical progress in emerging nations, as we all know. Despite the numerous benefits that industrialization and FDI can bring to an economy, they also have a high potential for degrading the environment because the majority of their activities involve the extraction of natural resources and manufacture. It is hardly unexpected; however, that data on (CO2) emissions show an increasing trend in the post-liberalization period, during which the area has also witnessed huge FDI inflows.

Summarised China's energy-related foreign direct investment strategy, arguing that foreign direct investment is a key factor in China's energy efficiency.

Foreign investment will also saturate the domestic market, boosting rivalry among businesses. Domestic businesses must study modern technologies in order to raise their technical level and increase their production efficiency (Zhu et al., 2017).

2. LITERATURE REVIEWS

This study tries to summarize the finding of other researchers. The researcher first finds out 25 articles identified through database searching; Additional 11 articles records identified through other sources. So, 36 articles by keyword of Foreign Direct Investment impacts were found by the researcher and 13 Articles were excluded based on title and abstract relevance. 23 Articles screened based on title and abstract relevance, and unfortunately, 5 Full-text articles were excluded. So, in the end, 18 Full-text articles were assessed for eligibility. The researcher put these articles in five different categories, but some of them cover two or more factors or only one factor. These factors are belonged to Economy (7 direct articles and 1 indirect articles), Environment (6 direct articles and 2 indirect articles), Technology (2 direct articles and 2 indirect articles), Productivity (2 direct articles and 1 indirect articles), Energy (2 direct articles and 1 indirect articles),

2.1. TECHNOLOGY IMPACT

According to Hu et al., (2021), structural change and technological advancement have boosted Africa's total factor productivity (TFP). As a result, the latter captures pure technical change better than TFP. Secondly, Chinese foreign direct investment in Africa has had a beneficial and considerable impact on the region's technical advancement, but non-Chinese foreign direct investment has failed to live up to our expectations of greater technological advantage for emerging economies when foreign direct investment comes from another countries. Finally, countries showed negative spatial technical dependency, suggesting a competitive rather than cooperative connection among African countries.

Yu et al., (2021) investigated the influence of spatial agglomeration of foreign direct investment on the green total factor productivity of Chinese cities by measuring the microscopic green total factor productivity of 285 regions from 2003 to 2017 in China. The following conclusions were reached: Green total factor productivity in Chinese cities has grown at a steady pace between 2003 and 2017, with an average yearly growth rate of 2.44 percent. Furthermore, the technology advancement index is typically greater than the

technology efficiency index in terms of its components, showing that technological development is essential in increasing cities' green TFP.

Furthermore, the complementing impact of foreign direct investment and human capital is stronger for technology-intensive foreign direct investment than for labor-intensive foreign direct investment, according to Su & Liu, (2016).

2.2. Environment Impact

Wang et al., (2021) stated that FDI is one of the factors driving China's current emissions rise. However, the "inverted-U" connection between foreign direct investment and emissions is nonlinear; that is, as the ratio of foreign direct investment to GDP grows, the promotion impact of FDI on emissions rises first, then declines. Furthermore, by boosting energy intensity, FDI might indirectly raise carbon emissions. They also discovered that the ETS had a considerable negative impact on carbon emissions, with emissions in emissions trading system pilot zones being much lower than in non-pilot zones. Furthermore, while the emissions trading system can help to minimise the rise in carbon emissions generated by Foreign direct investment, it can't change the way FDI influences emissions from energy intensity.

The findings demonstrate that FDI has a detrimental impact on the environment by raising carbon dioxide emissions and total Greenhouse gases. In general, the environmental impact of industrialization has been determined to be statistically negligible (Opoku & Boachie, 2020).

The Pollution Haven Hypothesis is supported by Marques and Caetano's (2020) finding that FDI reduces pollution in high-income nations while enhancing them in middle-income countries in the short term. Nonetheless, for middle-income nations to succeed in the long run, their ability to absorb technology is critical. In middle-income nations, regulation has a significant impact on trade openness. An evaluation of pollutants from the industrial sector offered a robustness check, as our goal is to identify the transfer of polluting industries. It also found that politicians do not appear to be paying enough attention to the environmental damage caused by this industry or innovation.

First Doytch, (2020) asserted that FDI has a consumption-related ecological impact in high-income nations, but it has a production-related ecological impact in low- and middle-income countries. Second, Middle-Income nations carry a disproportionate share of the ecological footprints of FDI-generated exports. Third, financial services FDI decreases the environmental footprints of production in high-income nations. Finally, FDI in non-financial services is much more environmentally harmful than FDI in manufacturing.

According to Zhu et al., (2017), FDI has a considerable positive influence on SO2 emissions, leading to an increase in foreign direct investment inflows will result in higher levels of air pollution in the Beijing-Tianjin-Hebei zone. Furthermore, foreign direct investment inflows in the surrounding areas have an impact on the air quality of local cities.

The long-run ratio of the ARDL model, according to Seker et al., (2015) show that the influence of FDI on CO2 emissions is positive but modest, whereas the effects of gross domestic product and energy consumption on carbon dioxide emissions are significant.

2.3. Economy Impact

Nejati and Bahmani, (2020) demonstrated that Iran has a promising future for attracting foreign direct investment in the gas and oil industry. Foreign capital inflows to the gas and oil sector can have both good and bad repercussions, including the spread of Dutch economy disease and production spillovers. In Iran, there has been few research on the influence of foreign direct investment in technological spillover. Nonetheless, the goal of this research is to determine the impact of indirect and direct FDI inflows into the gas and oil industry on the Iranian economy. The data support the improvement in Booming Tradable Sectors and Non-Booming Tradable Sectors output and employment. The production behavior in Non-Booming Tradable Sectors is not the same. As a result, production has risen in certain tradable sectors, such as food, and petroleum while falling in others, such as mining and agriculture. The effect of resource migration may be seen in the negative increase of employment in Non-Booming Tradable Sectors. A rise in prices and the actual exchange rate is another intriguing effect. As a result, the Iranian economy suffers from Dutch disease, as seen by a rise in imports and a drop in exports.

As proven (Wang & Jiayu, 2019) FDI not just to plays a critical role in the growth of this industry, but also has important macroeconomic and microeconomic impacts.

According to Su & Liu, (2016), the growth rate of per capita gross domestic product (along the road to the steady-state income level) is inversely linked with population expansion and directly correlated with physical and human capital investment rates. We discover that Foreign direct investment has a favorable influence on per capita gross domestic product growth, amplified by the city's human capital endowment.

During the era of interest, FDI inflows had a major influence on economic expansion in the African area. It also discovers that, while a lack of human resources had no effect on the impact of FDI, the impact of FDI on economic expansion was positive from 1995 to 2009 and negative from 1980 to 1994 (Gui-Diby, 2014).

Employees working at businesses with greater levels of investment in China are much more likely to quit the company, according to Tsou et al., (2013) than workers employed at companies with lower or zero levels of investment in China. We show that foreign growth in China reduces worker job security at parent businesses, especially for low-skilled employees. Employer-to-employer transitions are strongly linked to pay losses, with the largest wage consequences for low-skilled individuals who switch industries. Furthermore, we find little evidence that FDI in China helps parent businesses upgrade their skills.

To show how asymmetric knowledge affects investment when saving, assistance, and direct investment inflows are present. According to the model that links a company's net worth to investment, the relative effect of various financial sources is influenced by governance infrastructure, financial structure, and a country's income level. Using panel

data from 64 developing nations, we measure the effect of each source. The findings support the notion that net worth matters and imply that financial institutions' effect may explain why developed-country saving-investment correlations are strong while developing-country correlations are low (Kasuga, 2007).

He, (2006) proposed that by bringing recursive dynamism to the simultaneous system, FDI entrance decisions are based on the previous period's economic development and environmental regulation strictness.

According to He, (2006) the total impact of foreign direct investment on industrial sulfur dioxide emissions is low when exerted through several channels. Industrial sulfur dioxide emissions will climb by 0.098 percent for every 1% growth in FDI capital stock. The rise in emissions owing to FDI's influence on economic development and composition transformation balances out the reduction in emissions due to foreign direct investment's impact on environmental regulatory enforcement.

2.4. Energy Consumption Impact

Using panel data from 1986 to 2014, Waqih et al., (2019) discovered the influence of economic expansion, FDI, and energy consumption in rising carbon dioxide concentrations in the South Asian area. Because non-renewable energy sources account for a large part of energy generation in South Asian nations. These nations intend to fulfil their energy needs in the future via non-renewable energy sources, which will release more CO2 into the environment.

2.5. Productivity Impact

FDI is classified into two groups, capital from TMH (Taiwan, Macau, and Hong Kong) areas and capital from non-TMH areas. The influence of FDI on the forest product industry's productivity is complex. FDI from TMH areas has a substantial beneficial influence on the productivity of the wood products sector at the industrial level. Regarding forwarding effects, FDI from non-TMH areas and TMH regions have a similar influence on the forest products industry's productivity but a distinct impact regarding backward effects.

FDI has a beneficial influence on labor productivity in recipient industries through direct introduction of managerial skills, technology, and capital, as well as indirect spillover effects on local businesses, according to Liu, (2001).

3. METHODS

This study regard issues which happened with the impact of FDI on the countries. It's about the effects of that on the society and is not limited to one specific area, and the result collected based on the topic correlation.

The studies' inclusion and exclusion criteria were established before the search. The papers in this literature study are primarily published in international Elsevier publications with authorship and English writing accessible. These papers are also accessible as full-length articles. The study also used articles from the last 20 years in timeframes (from 2001 to 2021)

for the literature review. This researcher used the UTM off-campus database. The Boolean search methodology is chosen as the methodology, and research may be restricted to articles that the researcher can access. How to collect the articles shows by the Prisma flow chart diagram (See Fig. 1)

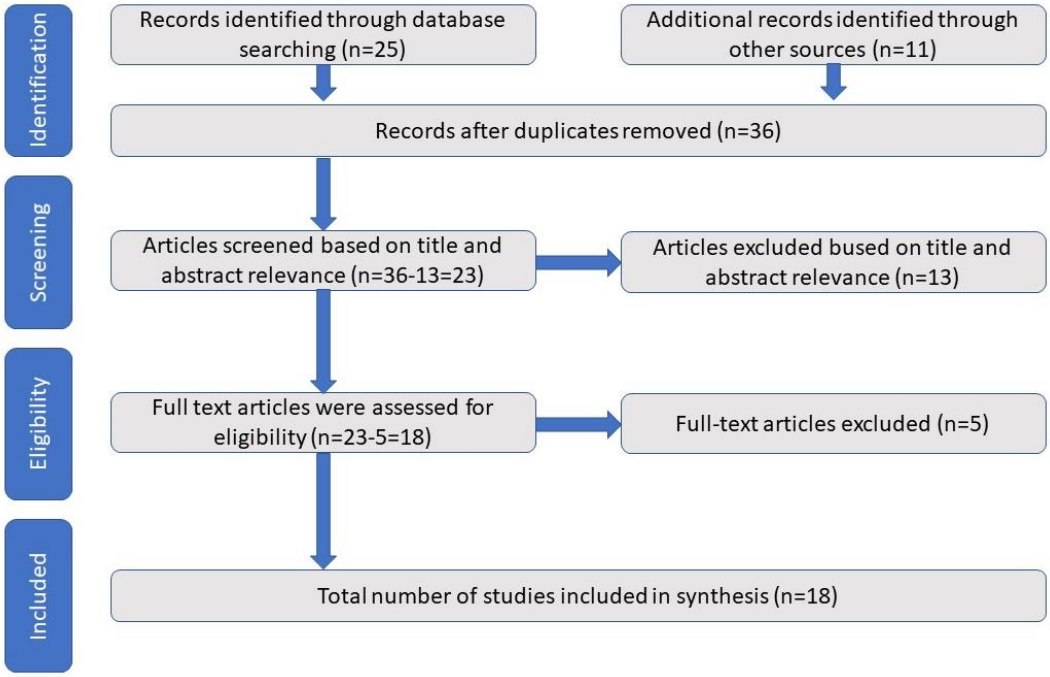

Fig. 1. Prisma flow chart diagram

4. RESULT & DISCUSSION

Table 1. Literature Review Summary

No	Author(S), Abstract Title, and Year	Study	Finding	Theme
1	Hu, D., You, K., & Esiyok, B. (2021). Foreign direct investment among developing markets and its technological impact on host: Evidence from spatial analysis of Chinese investment in Africa. *Technological Forecasting and Social Change*, *166*(January 2020), 120593. https://doi.org/10.1016/j.techfore.2021.120593	Empirical analysis Spatial analysis	developing the host economy's markets	Technological Impact
2	Wang, Y., Liao, M., Xu, L., & Malik, A. (2021). The impact of foreign direct investment on China's carbon emissions through energy intensity and emissions trading system. *Energy Economics*, *97*, 105212. https://doi.org/10.1016/j.eneco.2021.105212	Spatial analysis	In the mechanism of FDI impacting carbon emissions, energy intensity plays a mediating role.	Environmental Impact
3	Yu, D., Li, X., Yu, J., & Li, H. (2021). The impact of the spatial agglomeration of foreign direct investment on green total factor productivity of Chinese cities. *Journal of Environmental Management*, *290*(April), 112666. https://doi.org/10.1016/j.jenvman.2021.112666	Spatial analysis	The improvement of cities' green (TFP) total factor productivity is aided by technological advancement.	Technological Impact

No	Author(S), Abstract Title, and Year	Study	Finding	Theme
4	Nejati, M., & Bahmani, M. (2020). The economic impacts of foreign direct investment in oil and gas sector: A CGE analysis for Iranian economy. *Energy Strategy Reviews*, *32*(October 2019), 100579. https://doi.org/10.1016/j.esr.2020.100579	Quantitative and Empirical Evaluations	Foreign direct investment not only aids in the development of this industry, but it also has a substantial impact on the micro and macro levels.	Economy Impact
5	Opoku, E. E. O., & Boachie, M. K. (2020). The environmental impact of industrialization and foreign direct investment. *Energy Policy*, *137*(June 2019), 111178. https://doi.org/10.1016/j.enpol.2019.111178	Empirical Model and Strategy	Increases CO2 emissions and total GHGs, which has a detrimental impact on the environment.	Environments Impact
6	Marques, A. C., & Caetano, R. (2020). The impact of foreign direct investment on emission reduction targets: Evidence from high- and middle-income countries. *Structural Change and Economic Dynamics*, *55*, 107–118. https://doi.org/10.1016/j.strueco.2020.08.005	dynamic empirical model ARDL model (Autoregressive Distributed lag)	FDI rising emissions in middle-income countries in the near term while reduces them in high-income nations.	Environments Impact
7	Doytch, N. (2020). The impact of foreign direct investment on the ecological footprints of nations. *Environmental and Sustainability Indicators*, *8*(November), 100085. https://doi.org/10.1016/j.indic.2020.100085	dynamic empirical model	First, FDI has a consumption-related ecological impact in High-Income nations, but FDI has a production-related ecological impact in Low- and Middle-Income countries. Second, financial services FDI decreases the Production EF in high-income nations. Finally, FDI in non-financial services is more environmentally harmful than FDI in manufacturing.	Environments, Economy, and Technology Impact
8	Lin, B., Du, R., Dong, Z., Jin, S., & Liu, W. (2020). The impact of foreign direct investment on the productivity of the Chinese forest products industry. *Forest Policy and Economics*, *111* (September 2019), 102035. https://doi.org/10.1016/j.forpol.2019.102035	empirical model	FDI from TMH areas has a substantial beneficial influence on the productivity of the wood products industry at the industrial level. In terms of forward effects, FDI from non-TMH and TMH regions has a similar influence on the forest products industry's productivity, but a distinct impact of backwards effects.	productivity and Environments Impact
9	Wang, C., & Jiayu, C. (2019). Analyzing on the Impact Mechanism of Foreign Direct Investment (FDI) to Energy Consumption.	regression model and simultaneous	On energy consumption, FDI revealed a negative scale impact, a structural	Energy Consumption Impact

No	Author(S), Abstract Title, and Year	Study	Finding	Theme
	Energy Procedia, *159*, 515–520. https://doi.org/10.1016/j.egypro.2018.12.006	equations model	effect, and a positive technical impact.	
10	Waqih, M. A. U., Bhutto, N. A., Ghumro, N. H., Kumar, S., & Salam, M. A. (2019). Rising environmental degradation and impact of foreign direct investment: An empirical evidence from SAARC region. *Journal of Environmental Management*, *243*(May), 472–480. https://doi.org/10.1016/j.jenvman.2019.05.001	Nascent techniques, panel ARDL (Autoregressive Distributed lag), and FMOLS	Energy consumption, foreign direct investment, and economic growth all have a role in rising carbon dioxide concentrations in the South Asian area.	Economy and Energy Consumption Impact
11	Zhu, L., Gan, Q., Liu, Y., & Yan, Z. (2017). The impact of foreign direct investment on SO2 emissions in the Beijing-Tianjin-Hebei region: A spatial econometric analysis. *Journal of Cleaner Production*, *166*, 189–196. https://doi.org/10.1016/j.jclepro.2017.08.032	spatial econometric model (Spatial Lag Model (SLM))	Increased foreign direct investment inflows would result in higher levels of air pollution.	Environments Impact
12	Su, Y., & Liu, Z. (2016). The impact of foreign direct investment and human capital on economic growth: Evidence from Chinese cities. *China Economic Review*, *37*, 97–109. https://doi.org/10.1016/j.chieco.2015.12.007	empirical model	FDI has a favorable impact on the growth rate of per capita GDP.	Economy Impact
13	Seker, F., Ertugrul, H. M., & Cetin, M. (2015). The impact of foreign direct investment on environmental quality: A bounds testing and causality analysis for Turkey. *Renewable and Sustainable Energy Reviews*, *52*, 347–356. https://doi.org/10.1016/j.rser.2015.07.118	empirical analysis Co-integration analysis, panel ARDL (Autoregressive Distributed lag)	the impact of GDP and energy usage on Carbon dioxide emissions are significant, whereas The impact of FDI on Carbon dioxide emissions is positive but minor.	Environments Impact
14	Gui-Diby, S. L. (2014). Impact of foreign direct investments on economic growth in Africa: Evidence from three decades of panel data analyses. *Research in Economics*, *68*(3), 248–256. https://doi.org/10.1016/j.rie.2014.04.003	empirical model system generalized method of moment (SYS-GMM) (augmented Solow model)	During this time, the African continent saw significant economic expansion.	Economy Impact
15	Tsou, M. W., Liu, J. T., Hammitt, J. K., & Chang, C. F. (2013). The impact of foreign direct investment in China on employment adjustments in Taiwan: Evidence from matched employer-employee data. *Japan and the World Economy*, *25–26*, 68–79. https://doi.org/10.1016/j.japwor.2013.01.007	empirical model	especially for low-skilled employees reduces worker job security at parent firms	Economy Impact
16	Kasuga, H. (2007). Evaluating the impacts of foreign direct investment, aid and saving in developing countries. *Journal of International Money and Finance*, *26*(2), 213–228. https://doi.org/10.1016/j.jimonfin.2006.11.002	empirical model open-economy model	The impact of financial systems may explain why developing-country correlations are low while developed-country saving-investment correlations are strong.	Economy Impact
17	He, J. (2006). Pollution haven hypothesis and environmental impacts of foreign direct investment: The case of industrial emission	empirical model system generalized	FDI has a negligible influence on industrial SO2 emissions. Industrial	Economy and Environment Impacts

No	Author(S), Abstract Title, and Year	Study	Finding	Theme
	of sulfur dioxide (SO2) in Chinese provinces. *Ecological Economics*, *60*(1), 228–245. https://doi.org/10.1016/j.ecolecon.2005.12.008	method of moment (SYS-GMM)	SO2 emissions will increase by 0.098 percent for every 1% growth in FDI capital stock.	
18	Liu, X., Parker, D., Vaidya, K., & Wei, Y. (2001). The impact of foreign direct investment on labour productivity in the Chinese electronics industry. *International Business Review*, *10*(4), 421–439. https://doi.org/10.1016/S0969-5931(01)00024-5	empirical model 3SLS model (productivity spillover model)	The impact of foreign direct investment on worker productivity is positive.	productivity Impact

The 18 publications included a mix of primary and secondary research. Seven of them were concerned with the economy, six with the environment, and five with technology, productivity, and energy implications. The influence of foreign direct investment on those five topics is the focus of these articles.

The themes go across all of the studies. The economics, environment, technology, productivity, and energy impacts on countries are recognized as major effects within the topics.

5. CONCLUSION

Creating a balance between economic growth and pollution is one of the significant challenges most developing countries face. When they take advantage of their existing resources and profits to progress, they might increase the rate of global warming and climate change. At the various phases, developing nations have a significant problem with decreasing their carbon dioxide emissions, creating an obstacle to achieving their global goals in reducing exhausting fumes. As an illustration, China has implicated a policy guideline to the other developing countries to achieve this goal.

Moreover, with the influence of the FDA in various countries, politicians have made different efforts to improve the political and judicial conditions, which absorb more FDA in their countries and considering the positive aspects of FDI and its values for all developing countries.

To sum up with after reviewing the previous articles, the researcher concluded that FDI increases GDP, technology, awareness, energy consumption, production, and pollution (in the short term), and reduces the pollution, poverty, and unemployment are considered as long term profits.

Reference:

Doytch, N. (2020). The impact of foreign direct investment on the ecological footprints of nations. *Environmental and Sustainability Indicators*, 8(November), 100085. https://doi.org/10.1016/j.indic.2020.100085

Gui-Diby, S. L. (2014). Impact of foreign direct investments on economic growth in Africa: Evidence from three decades of panel data analyses. *Research in Economics*, 68(3), 248–256. https://doi.org/10.1016/j.rie.2014.04.003

He, J. (2006). Pollution haven hypothesis and environmental impacts of foreign direct investment: The case of industrial emission of sulfur dioxide (SO2) in Chinese provinces. *Ecological Economics*, 60(1), 228–245. https://doi.org/10.1016/j.ecolecon.2005.12.008

Hu, D., You, K. & Esiyok, B. (2021). Foreign direct investment among developing markets and its technological impact on host: Evidence from spatial analysis of Chinese investment in Africa. *Technological Forecasting and Social Change*, 166(January 2020), 120593. https://doi.org/10.1016/j.techfore.2021.120593

Kasuga, H. (2007). Evaluating the impacts of foreign direct investment, aid and saving in developing countries. *Journal of International Money and Finance*, 26(2), 213–228. https://doi.org/10.1016/j.jimonfin.2006.11.002

Lin, B., Du, R., Dong, Z., Jin, S. & Liu, W. (2020). The impact of foreign direct investment on the productivity of the Chinese forest products industry. *Forest Policy and Economics*, 111(September 2019), 102035. https://doi.org/10.1016/j.forpol.2019.102035

Liu, X., Parker, D., Vaidya, K. & Wei, Y. (2001). The impact of foreign direct investment on labour productivity in the Chinese electronics industry. *International Business Review*, 10(4), 421–439. https://doi.org/10.1016/S0969-5931(01)00024-5

Marques, A. C. & Caetano, R. (2020). The impact of foreign direct investment on emission reduction targets: Evidence from high- and middle-income countries. *Structural Change and Economic Dynamics*, 55, 107–118. https://doi.org/10.1016/j.strueco.2020.08.005

Nejati, M. & Bahmani, M. (2020). The economic impacts of foreign direct investment in oil and gas sector: A CGE analysis for iranian economy. *Energy Strategy Reviews*, 32(October 2019), 100579. https://doi.org/10.1016/j.esr.2020.100579

Opoku, E. E. O. & Boachie, M. K. (2020). The environmental impact of industrialization and foreign direct investment. *Energy Policy*, 137(June 2019), 111178. https://doi.org/10.1016/j.enpol.2019.111178

Seker, F., Ertugrul, H. M. & Cetin, M. (2015). The impact of foreign direct investment on environmental quality: A bounds testing and causality analysis for Turkey. *Renewable and Sustainable Energy Reviews*, 52, 347–356. https://doi.org/10.1016/j.rser.2015.07.118

Su, Y. & Liu, Z. (2016). The impact of foreign direct investment and human capital on economic growth: Evidence from Chinese cities. *China Economic Review*, 37, 97–109. https://doi.org/10.1016/j.chieco.2015.12.007

Tsou, M. W., Liu, J. T., Hammitt, J. K. & Chang, C. F. (2013). The impact of foreign direct investment in China on employment adjustments in Taiwan: Evidence from matched employer-employee data. *Japan and the World Economy*, 25–26, 68–79. https://doi.org/10.1016/j.japwor.2013.01.007

Waqih, M. A. U., Bhutto, N. A., Ghumro, N. H., Kumar, S. & Salam, M. A. (2019). Rising environmental degradation and impact of foreign direct investment: An empirical evidence from SAARC region. *Journal of Environmental Management*, 243(May), 472–480. https://doi.org/10.1016/j.jenvman.2019.05.001

Wang, C. & Jiayu, C. (2019). Analyzing on the Impact Mechanism of Foreign Direct Investment (FDI) to Energy Consumption. *Energy Procedia*, 159, 515–520. https://doi.org/10.1016/j.egypro.2018.12.006

Wang, Y., Liao, M., Xu, L. & Malik, A. (2021). The impact of foreign direct investment on China's carbon emissions through energy intensity and emissions trading system. *Energy Economics*, 97, 105212. https://doi.org/10.1016/j.eneco.2021.105212

Yu, D., Li, X., Yu, J., & Li, H. (2021). The impact of the spatial agglomeration of foreign direct investment on green total factor productivity of Chinese cities. *Journal of Environmental Management*, 290(April), 112666. https://doi.org/10.1016/j.jenvman.2021.112666

Zhu, L., Gan, Q., Liu, Y. & Yan, Z. (2017). The impact of foreign direct investment on SO2 emissions in the Beijing-Tianjin-Hebei region: A spatial econometric analysis. *Journal of Cleaner Production*, 166, 189–196. https://doi.org/10.1016/j.jclepro.2017.08.032