Effect of foreign direct investment on sustainable development goals? Evidence from Eurasian countries.

Does Foreign direct investment have a major potential impact on Sustainable Development Goals? Evidence from Eurasian countries

Abstract:

Public and private sector financing is essential in the movement of capital to achieve all seventeen Sustainable Development Goals (SDGs) by the United Nations members by 2030. Foreign direct investment (FDI) is considered the primary source of external financing in the private sector. FDI accelerates the economic growth of any country by mobilising capital, increasing labour productivity, technological advancements, etc. The present paper aims to study the potential effect of FDI on Sustainable Development in Eurasian countries.
Our research considers a sample of 78 Eurasian countries, further distinguished by their income classes. We applied a fixed effects regression model to investigate the relation between FDI and SDG index. Our findings reveal that there is a positive and significant effect of FDI on the SDG index. Furthermore, our results also indicate that the role of FDI is more decisive and fundamental the lower the income class of the countries. Our research contributes to the current literature on Sustainable Development. We believe that our research paper will serve as a base for policy recommendations and future research studies on the influence of FDI on sustainable development for Eurasian countries.

***Keywords*:** External Financing, Sustainable Development, Foreign Direct Investment, Eurasian Countries

1.Introduction

In September 2015, the Agenda for Sustainable Development was launched as an action plan by all 193 members of the United Nations (UN) to transform the world by 2030. The Sustainable Development Goals are an integrated framework of human, social, and environmental development which promote peace and prosperity for people and the planet, for current and future generations. Sustainable Development Objectives consist of 17 goals with 169 targets and 232 specific indicators. The global action plan for the 17 Sustainable Development Goals (SDGs) encourages all countries, whether developed or developing, for a collaborative partnership. To better support governments to accelerate Progress towards ending poverty, improving health and education, protecting the natural environment, reducing inequality, and stimulate economic growth simultaneously tackling climate change and protecting our oceans and forests (United Nations, 2015). The UN 2030 Agenda introduces the concept of *''policy coherence for sustainable development''* which underlines the importance of coherent political solutions at national and international levels to achieve sustainable development worldwide. In fact, it is both challenging and necessary to create coherence and effective policy measurements for the achievement of the SDGs (Nordbeck and Steurer, 2016; Verschaeve et al., 2016; Coscieme et al., 2019).

The adoption of the Agenda for 2030 Sustainable Development by the UN members introduced a general ranking system called ''*The SDG Index and Dashboards''* to assess the Progress of countries towards the achievement of SDGs or their specific targets. The purpose of this platform is to track the Progress of countries towards achieving all Sustainable Development goals. The indicators for the overall SDG index are chosen from the global indicator framework on a scale of 0 to 100. The assigned values of the SDG indicate the country's position between 0 (the worst) and 100 (the best) possible score among all seventeen SDGs (Sachs et al, 2019). Addressing these identified shared goals will require priority investment and global challenges, calling for action in the international communities, and developing and developing countries for strong collaboration and partnership. While the role of the public and private sector is essential in mobilising capital to invest in SDG projects. Given that, FDI plays an important role particularly for developing countries (UNCTAD, 2014).

FDI inflows to Europe were 172 billion USD in 2018, a sharp decrease of 72%, compared to the value of 612 billion USD in 2016. Several important host FDI countries in Europe, such as Switzerland and Ireland, reported negative inflows of FDI for 87 billion and 66 billion USD, respectively in 2018. This trend was mainly due to Europe's repatriation and

a considerable decline in FDI flows to the United Kingdom because of Brexit. As equity investments declined by 50 per cent to 40 billion USD, FDI flows shrunk by 36 percent to 64 billion USD in 2018. While the biggest recipient region of FDI flows, Asia registered 4 percent to 512 billion USD worth FDI in 2018. China, the biggest FDI recipient economy among developing countries, attracted FDI flows of 139 billion USD in 2018, a rise of 4 percent compared to 2017. FDI inflows to South-East Asia reported at a record level of 149 billion USD (UNCTAD, 2019).

SDSN & IEEP (2019) report that none of the European Union (EU) members has achieved or is on track to achieve all the SDGs by 2030. The performance of the countries of Northern Europe - Denmark, Finland and Sweden are the highest among all 193 nations. However, even these nations have yet to overcome major challenges in achieving several important SDG goals and are not on track to reach all the SDGs by 2030. The performance of the Southern and Eastern European countries is the poorest in Europe. The European Union and its member states perform the worst results in respect to SDG2 (no hunger and sustainable agriculture), SDG12 (responsible consumption and production), SDG13 (climate action), SDG14 (life below water), SDG15 (life on land). Obtaining ‘’green’’ ratings remain challenging throughout European Union as no single country in Europe have done so far towards these underlined goals. Additionally, the contribution of the EU to world greenhouse gases, pollution and waste is significant. On the one hand, this concerns the fundamental questions on the long-term sustainability of Europe’s development model and the need for further efforts to reduce greenhouse gas emissions in line with full decarbonisation by 2050. On the other hand, it is argued that Asia will likely miss all 17 SDGs by 2030 at the current rate of progress. To achieve the United Nations 2030 Agenda's ambition, Asia needs to accelerate the Progress towards all Sustainable Development Goals. The progress for the past years towards achieving these goals is too weak to produce meaningful transformation and desired outcome by 2030. Asia has performed the worst results in respect to ending hunger (Goal 2), supporting industry, innovation and infrastructure (Goal 9), reducing inequalities (Goal 10), building sustainable cities and communities (Goal 11), combating climate change (Goal 13), protecting life below water (Goal 14) and life on land (Goal 15), supporting peace, justice and strong institutions (Goal 16). Furthermore, Asia registered negative trends towards.

The achievement of clean water and sanitation (Goal 6), ensuring decent work and economic growth (Goal 8). Also, it supports responsible consumption and production (Goal 12) (United Nations & ESCAP, 2019).

Flow of FDI is seen as significant source of developing countries. In spite of, neoclassical theory, some authors highlight the evidence of negative impact of FDI flows on social and environmental development of host economy e.g. Iamsiraroj and Ulubas oglu, (2015); Reiter and Steensma, (2010). Previous literature only focused on the key role of FDI on economic growth or environmental consequences of FDI, the research paper by Aust et al., (2020), is a notable exception. They studied the effect of FDI on Sustainable Development Goals. However, their research was limited to only African countries.

Thus, this study fills the gap in the literature by examining the potential effect of FDI on the achievement of SDGs in Eurasian countries. Given that, the main aim of this study is to investigate the relationship between inward FDI stocks and SDG index in Eurasian countries. We applied fixed effects model to assess the influence of FDI stocks on the achievement of SDG in a sample of 78 Eurasian countries. Moreover, we class their income to explore the pace of progress resulted by FDI in different income groups.

First, in this paper we discuss the previous background and propose our hypotheses; second we design our research methodology and provide our sample selection procedure as well as validity and reliability of the data used in this paper; third we present and discuss descriptive statistics, correlation analysis and empirical findings. Lastly, we draw the conclusion, highlight the limitations of the study and we propose further research avenue for future studies on the influence of FDI on Sustainable Development Goals.2. Literature review

2. **Research Background**

2.1. Sustainable Development Goals and FDI

The agreement on Sustainable Development Goals by the members of United Nations to achieve by 2030 presents important policy measurements to be adopted for the assessment of social, environmental and economic development and guidance on future scenarios (United Nations, 2015; Ripple et al., 2017).

Since United Nations General Assembly updated their long term targets to achieve for the next 15 year in 2015, a few attempts have been made e.g. Marques, Fuinhas and Pais, (2018); Rickels et al., (2019); O and Kim, (2019); Aust et al., (2020); with the purpose of measuring the progress over and against the specific and overall SDG goals and associated targets. Rickels

et al., (2019) document the status of maintaining the natural assets base specifically ocean resources and services for Sustainable Development. O and Kim (2019) argue the importance of achieving Sustainable Development Goal (SDG 7) (affordable and clean energy), for human well-being, economic development, and the achievement of the climate change 2 °C goal.

The SDGs are integrated, unbreakable and do not suggest any prioritisation of one goal over the others (United Nations, 2015). According to Harris et al., (2018); Russell, Lee and Clift (2018), the 17 SDGs are interrelated to each other in a systematic way although they all represent separate goals. The achievement of one SDG is believed to have a positive or negative impact toward the accomplishment of another goal (Pradhan, 2019; Singh et al., 2018). Omer and Noguchi (2019) further provide evidence that building materials can have considerable impact on the achievement of SDG13, their framework suggest that building materials has direct positive impact on the achievement of SDG 3, SDG 7, SDG 9, SDG 11, SDG 12, SDG 13, and SDG 15 whereas the effect of building materials is invisible in SDG 2, SDG 5, SDG10 and SDG16. Furthermore, their framework also suggests of indirect and negative relationship between SDGs. Indeed, the overall goal of '*a prosperous, high quality of life that is equitably shared and sustainable'* is obtainable by balanced progress and simultaneous actions towards all goals of SDG (Costanza et al., 2016). The SDGs are a collection of 17 global goals, each of them includes several targets and indicators. Targets specify the actions, and indicators are represented by metrics to measure the progress and track if actions are on the right path to achieve sustainable development goals (Ritchie and Mispy, 2018). Moyer and Hedden, (2019) evaluated the progress towards the achievement of human development SDGs based on target value of nine indicators. Their findings suggest, the world will make constrained progress towards the achievement of SDGs between 2015 and 2030, along with existing policy priorities.

The United Nations Sustainable Development Goals (SDGs) represent major policy changes to be implemented towards identified common goals to address globally faced challenges as an example of climate change, poverty, hunger etc. Although, coherence of policy measurements to achieve sustainable development is dependent upon coherence amongst goals of SDG. In fact, progress towards one goal should not damage the progress towards another. In the context of SDG, assigning GDP per capita as an indicator of SDG8 ("Decent Work and Economic Growth") is in contradiction with evidence that with limited natural resources of our planet it is impossible to produce infinite economic growth. To pursue to achieve SDG8 by constant increase in GDP will unable to succeed in the achievement of other goals and put the environmental sustainability at risk (Coscieme et al., 2019). Kynčlová, Upadhyaya and Nice

(2020) argue that economic growth should be accompanied by technological advancements and efficient management of natural resources.

In accordance with the recent worldwide survey conducted by The World Business Council for Sustainable Development WBCSD, and DNV GL (2018) to examine if corporations are performing their activities in line with the SDGs. 250 companies from 43 countries have participated on the survey. The results of the survey point to the conclusions that companies are the most concerned about climate changes and ranked SDG 13 (climate action) as the most important goal than other. In contrast, companies are least concerned about SDG 14 (life below Water). The SDG 12 (The responsible consumption and production goal) is ranked the highest in Europe and Asia Pacific regions while the SDG8 (Decent Work and Economic Growth) is considered to be the most important task in north Latin Americas.

World Commission on Environment and Development (1987) defines sustainable development as *"to meet the needs of the present without compromising the ability of future generations to meet their own"*. Marques, Fuinhas and Pais (2018) have investigated an interesting empirical study examining the relationship between food consumption, economic growth and sustainable development for a sample of 77 countries further distinguished by their income levels, for the period from 1995 to 2013. Their findings suggest consumption of meat effects economic growth and sustainable development differently for different income groups of countries. There is evidence that meat consumption has positive effect on economic growth and negative effect on sustainable development. They highlight the importance of how to achieve sustainability, by means of reducing negative environmental externalities and health diseases while maintain required rate of economic growth. Recent research by Xu et al., (2021) found a negative association between FDI and income. According to their findings both FDI and income relation with inequality are statistically significant.

Aust et al., (2020) have performed empirical research to study the relationship between FDI and the achievement of Sustainable Development Goals (SDGs) for 44 emerging African economies, further distinguished by regions for the period between 2015 and 2018. Their findings suggest the FDI flows have positive impact on the achievement of Sustainable Development goals. However, they also highlight that the presence of FDI can also have adverse impact on environment for recipient countries of FDI. The evidence reported on their paper suggest that there is a negative impact of FDI on the achievement of SDG13 (Climate action). They conclude that the presence of FDI increases the probability of achieving overall score for SDG index in Africa which encourages further investment into Africa. However, the authors also acknowledge adverse effect of FDI on environmental consequences.

There is a considerable amount of literature examining the impact of FDI on economic development. For example, previous research by Güngör et al., (2014) documents that FDI and financial development have been drivers of economic growth over employing several financial sector substitutions for a long-term in Turkey.

The majority of the research papers provide evidence of positive relationship between FDI and economic growth, however some authors highlight the evidence of negative impact of FDI flows on social and environmental development of host economy e.g. Iamsiraroj and Ulubas oglu, (2015); Reiter and Steensma, (2010). The neoclassical theory of FDI suggests that FDI will lead to economic growth in recipient country through flows of capital injections, higher labour growth and productivity and technological advancements e.g. Malikane and Chitambara, (2017); Borensztein et al (1998); Zhang (2014); Ridzuan et al. (2017).

2.2. A conceptual FDI attractiveness model

Borensztein et al (1998) were among one of the first to prove a positive impact of FDI on economic growth by using panel data of 69 emerging country economies. More recent evidence (Zhang, 2014) reveals that FDI flows have significant positive impact on industrial performance of China. Malikane and Chitambara (2017) carried out an empirical research by using panel data of eight South African countries to examine the direct effect of FDI on economic growth. Their finding confirms the previous studies that FDI has a direct positive impact on economic development of recipient economy. In contrast, empirical findings provided by Kardos (2014); Reiter and Steensma (2010) significantly differ from previous results reported in the literature.

On the subject of the impact on environmentally consequences of FDI, the literature divides into two groups. The first group identified as well-known *Pollution Haven Hypothesis* suggests that FDI from economies with higher income to the economies with comparatively weak environmental position can be harmful for recipient of FDI since it shift polluting industries, services and technologies which put at risk of environmental sustainability (Sarkodi and Strezov, 2019). Khan et al. (2019) asserts that high levels of economic growth is linked to high industrial pollution. Abdouli and Hammami (2018) states that FDI effects environment negatively by boosting economic growth in the MENA region. In another study by Fatima et al., (2021) focus on the ecological footprints factor and its impact on the FDI through the international tourism arrivals based on the energy usage and water resources. Their finding shoes that ecological footprint was infected significantly by energy usage, water resources and

FDI, international tourism arrivals in Vietnam. More recent study by Adedoyin et al., (2022) demonstrates that Economic policy in uncertain situation impacts significantly on the Real gross domestic product (RGDP) negatively both in the short and long-run.

In comparison, the Environmental Kuznets Curve (EKC) hypothesis suggests first phase of economic growth results in environmental deterioration which follows by a next phase of improvement. Sarkodi and Strezov (2019) validate both hypotheses, however it is dependent upon the countries being investigated (as cited in Aust et al., 2020).

Bokpin (2017) confirms FDI inflows are negatively correlated with environmental sustainability for Africa however, presence of government policy reduces this externality. From the perspective of government and public, research finds that recurrent expenditures of public and the government debt can impact negatively on economic growth (Onifade et al., 2020).

In comparison, findings of empirical research by Ridzuan et al. (2017) suggest that FDI inflows are positively correlated with economic growth and leads to higher environmental sustainability. The role of FDI is important in particular for emerging country economies, as it attracts external financing in large amount (UNCTAD, 2017). Caiado et al., (2018) argue that effective sustainable development can be achieved by strong partnership among developed and developing countries.

Iamsiraroj and Ulubas¸oglu, (2015) states that the challenging issue in developing economies is political and economic instability, higher levels of market and political monopolization and corruption and low political transparency which unable these economies to better use of natural assets. In this context, we have discussed the 17 SDGs aimed at improving lives of human well-being in our planet with three pillars of sustainability. To achieve these targets and goals, each nation must raise financial sources to promote sustainable growth (Jayasooria, 2016). From the perspective of raising funds, the role of FDI is fundamental in the achievement of SDGs.

There is a lack of research investigating the potential effect of FDI on the achievement of SDG index, the research paper by Aust et al., (2020), is a notable exception. Our study investigates the impact of FDI on the achievement of SDGs across different income group of countries in Europe and Asia. Therefore, our research questions and proposed hypothesis are as follows:

-Does FDI has a major potential impact on the achievement of Sustainable Development Goal (SDG) index in Eurasia?

-How does the effect of FDI differ across different income groups of Eurasia?

H0: There is no potential effect of FDI on the Sustainable Development Goal (SDG)

Ha: There is a positive potential effect of FDI on Sustainable Development Goal (SDG)

3. Research Design

3.1. Methodology

Following an empirical model developed by Aust et al., (2020), regression equation to be measured to study the relationship between inward FDI stocks and the achievement of SDGs, is specified below:

$$SDG_i = \beta_0 + \beta_1 LnFDI_i + \beta_2 GDP_i + \beta_3 LnPOP_i + \beta_4 GOVCONS_i + \beta_5 HEALTHEXP_i + \beta_6 MILEXP_i + \beta_7 FREEINDEX_i + \beta_8 INCOMECLASS_i + \varepsilon_j \quad (1)$$

Where, i refers to the Eurasian countries. The SDG is the percentage of achievement for a country towards overall Sustainable Development Growth. We use SDG as depended variable due to the economic development. To achieve economic development of SDG it is required a substantial financing effort from the public sector (Sarkodie et al., 2019; Aust et al., 2020). Therefore, in this study

we consider variables related with government expenditures to predict a positive association between the independent variables and the dependent variable as SDG index. In equation (1), FDI indicates as a relevant factor to sustainable development and is defined as the natural log of the inward FDI stock. We expect positive association between FDI stocks and SDG score. GDP refers to the real growth rate of Gross Domestic Product. Economic growth defined as an indicator for sustainable development which is expected to be positive (Mainali et al., 2018), we expect a positive association between GDP and SDG index. We employ the annual average over the sample period for the macroeconomic variables such as POP, GOVCONS, GDP, HEALTHEXP, MILEXP and FDI. Independent variable POP refers to the natural log of the population, because higher population size is a negative function of economic development Aisen and Veiga, (2013), we expect a negative relation between POP and the achievement of SDG. GOVCONS is the final consumption spending of the general government as a percent of GDP. HEALTHEXP is defined as the domestic. MILEXP is military expenditure spending as a percentage of the central government general expenditure. Public financing of government infrastructure is important in the achievement of SDGs. Thus, we predict these variables that require government expenditure to have a positive impact on SDG score.

Following previous study by Malikane and Chitambara (2017), we use the independent variable FREEINDEX as the cumulative annual score of political freedom that ranges from 0 (least free) to 100 (most free) (Freedom House, 2020). Higher coefficient of the index specifies more freedom and civil rights; therefore, we expect a positive association between the freedom score and the SDG index. Variables are measured for the period between 2016 and 2018. INCOMECLASS is the dummy variable which equals to one by income class: Low-income class, Lower-middle class, Upper middle-income class and high-income class.

Additionally, we investigate the potential impact of FDI on the progress towards achieving SDG index for all sampled countries of Eurasia in equation two below. Where variables are the same as specified in equation one.

$$SDG_i = \beta_0 + \beta_1 LnFDI_i + \beta_2 GDP_i + \beta_3 LnPOP_i + \beta_4 GOVCONS_i + \beta_5 HEALTHEXP_i + \beta_6 MILEXP_i + \beta_7 FREEINDEX_i + \varepsilon_j \quad (2)$$

As panel data is in use we must choose between fixed effects or random effects models. Hence, we conduct Hausman test (specification test of the appropriate model between random and fixed effects model). Based on the (p-value=0.000) of chis-square test, we accept the alternative hypothesis about fixed effect model as an appropriate model. Hausman test is attached to Appendix Table B.

3.2 Sample Selection and Data

This section provides information regarding variables used, reliability and validity of the data constructed in this study. Considering the availability and consistency of data for our regression model, the sample period is from 2016 to 2018. Our multivariate analysis consists of 78 Eurasian countries further distinguished by their income groups. The List of countries are attached to Appendix Table A. The data was collected annually for all the variables and the same data measurement method was applied across all the countries in this paper. We provide a summary of descriptive statistics in Table 1. The data involved in our research study include: one dependent and eight independent variables.

The dependent variable of our regression model is SDG index. The index represents the percentage of achievement for a country towards the sustainable development growth

(SDG). The source of the data is Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).

Similar to Aust et al., (2020), Sarkodie and Strezov (2019), to measure inward FDI, we employed inward FDI stocks measured at US dollar at current price in millions and we converted stock of FDI into logarithm form in the same way as previous studies.

To meet the outlined objectives, the research employs the data for the rest of the macroeconomic variables: GOVCONS, POP, GDP, MILEXP, HEALTHEXP from World Development Indicators (World Bank, 2018). We measured GDP as annual rate of growth in Gross Domestic Product. The same as Aust et al., (2020), We converted population (POP) into natural logarithm form for every country. General government final consumption expenditure (GOVCONS) is measured as a percentage of GDP. Military expenditure (MILEXP) is measured as a percentage of general government expenditure. Domestic general government health expenditure (HEALTHEXP) is measured as a percentage of general government expenditure. Due to the unavailability of data for HEALTHEXP variable for 2017 and 2018, missing data points are filled with Microsoft Excel compounded annual growth rate (CAGR) model by considering last 3 years (2014, 2015, 2016) growth rates.

The data for political freedom variable (FREEINDEX) is published by Freedom House. The coefficient of the data is the aggregate annual score of political rights and civil liberties.

3.3 Descriptive Statistics and Correlation analysis

We provide the summary of descriptive statistics in Table 1 for SDG index, FDI coefficient as well as other macroeconomic control variables from our regression model. We also present the statistics by individual SDG goals in Eurasia to analyse information on the achievement of each goal.

Sweden presents the highest achievement of overall Sustainable Development level of 85.61% in 2017 while the least percentage achievement of 36.5% was observed in Afghanistan in 2016. The average score of SDG index amongst 72 nations is 69.77%.

United Kingdom, Netherlands and China are the largest recipient economies of foreign direct investment among the sampled countries. United Kingdom attracted a record of 1,89 trillion million USD worth of inward FDI stocks in 2018. Inward FDI stock is defined as the accumulated capital value of foreign entities operating in the UK

(Department for International Trade, 2019). The rise in the value of FDI positions in the UK in 2018 was primarily due to the investment into the production and services industries (Robinson, 2020). Netherlands and China attracted inward FDI stocks worth 1,673 and 1,627 trillion USD respectively in 2018.

The mean value of annual rate of growth in GDP is 3.52% among all countries, the highest rate of growth, 15.21%, was observed in Iraq in 2016 whereas negative growth rate of -4.71% was reported in Kuwait in 2017. Oman presents (29.76), the highest general government final consumption expenditure (GOVCONS), as a percentage of its GDP in 2016. In comparison, Cambodia reported the lowest figure of 4.93%. The average value of GOVCONS is 16.81% among all the countries. The highest domestic general government health expenditure (HEALTHEXP) of 23.91% was observed in Japan in 2018. Whereas the lowest figure of expenditure is reported in Iraq in 2018. The average value of the variable is 11.72% throughout the sample of countries. Belarus presents the highest military expenditure (MILEXP) of 31.9%, as a percentage of general government expenditure. The average military expenditure in Eurasia was reported as 7%. The average value of freedom coefficient in Eurasian countries is 64.65%. Norway, Finland, Sweden and Iceland are reported to be the most politically free nations with the values of 100% freedom while Saudi Arabia is reported to have the least political rights and civil liberties in the sample with the value of 7%.

The average percentage achievements by goals in Eurasian nations are : 1-No poverty (98.31%), 2-Zero hunger (60.45%), 3-Good health and well-being (81.99%), 4-Quality education (84.34%), 5-Gender equality (66.06%), 6-Clean water and sanitation (83.11%), 7-Affordable and clean energy (79.81%), 8-Decent work and economic growth (72.35%), 9-Industry, innovation and infrastructure (48.14%), 10-Reduced inequalities (73.62%), 11-Sustainable cities and communities (78.64%), 12-Responsible consumption and production (63.55%), 13-Climate action (80.53%), 14-Life below water (47.72%), 15-Life on land (60.91%), 16-Peace, justice and strong institutions (70.02%), 17-Partnership for the goals (60.53%).

Table 1: Descriptive statistics

Variables	*Mean*	*Std.Dev.*	*25th Percentile*	*Median*	*75th Percentile*	*Skewness*	*Kurtosis*
SDG SCORE	69.77	9.10	64.33	70.71	76.75	-0.78	3.64
Goal 1 Score	98.31	5.53	98.64	99.56	99.90	-7.47	63.95

Goal 2 Score	60.45	11.55	51.86	62.55	69.06	-0.34	2.42
Goal 3 Score	81.99	12.51	76.44	83.74	92.67	-1.07	3.96
Goal 4 Score	84.34	14.34	82.20	88.39	92.26	-2.88	13.19
Goal 5 Score	66.06	14.87	57.57	68.46	76.35	-0.68	3.08
Goal 6 Score	83.11	15.03	80.73	87.20	93.36	-1.75	5.66
Goal 7 Score	79.81	14.01	76.66	84.81	88.07	-1.59	5.26
Goal 8 Score	72.35	14.45	62.80	74.99	83.06	-0.67	2.77
Goal 9 Score	48.14	23.39	26.80	46.23	66.95	0.22	2.03
Goal 10 Score	73.62	17.60	61.04	75.34	86.92	-0.37	2.37
Goal 11 Score	78.64	17.51	71.95	83.44	90.72	-1.69	6.60
Goal 12 Score	63.55	12.82	54.99	66.71	72.99	-0.67	2.89
Goal 13 Score	80.53	9.58	75.33	82.82	87.60	-1.29	4.96
Goal 14 Score	47.72	12.46	43.50	48.42	54.52	-0.58	4.20
Goal 15 Score	60.91	14.79	50.88	60.74	74.58	-0.22	2.31
Goal 16 Score	70.02	11.60	62.48	69.21	78.91	-0.04	2.98
Goal 17 Score	60.53	15.19	51.05	58.31	68.88	0.63	3.68
FDI	23.20	39.149	17,76	65.35	22.41	2.47	8.55
GDP	3.52	2.39	2.08	3.14	4.76	0.69	6.53
POP	6.92	2.25	4.16	9.92	4.67	5.35	30.94
GOVCONS	16.81	4.96	13.14	16.69	19.80	-0.12	2.64
HEALTHEXP	11.72	5.03	8.29	11.80	14.82	0.23	2.72
MILEX	7.00	6.22	2.73	4.59	10.15	1.72	6.04
FREEINDEX	64.65	29.76	37.00	71.00	94.00	-0.40	1.68
lnPOP	16.38	1.71	15.24	16.11	17.66	0.34	3.12
lnFDI	10.77	3.21	9.78	11.09	12.32	-4.67	32.93

The SDG index is the percentage of achievement for a country towards overall Sustainable Development. Goal scores represent the percentage of achievement towards each SDG goals. FDI is the stock of inward Foreign Direct Investment measured at US dollar at current price in millions. GDP is the real growth rate of Gross Domestic Product. LnPOP defines as the natural log of the population. GOVCONS refers to the final consumption spending of the general government as a percent of GDP. MILEXP is military expenditure spending as a percentage of the central government general expenditure. HEALTHEXP is the domestic health spending of the general government as a percentage of general government expenditure. FREEINDEX is the total annual score of political freedom.

Table 2 presents the coefficients of Spearman correlation above the diagonal and Pearson correlations below the diagonal between the SDG score and different independent variables of our regression equation. Consistent with prior studies, e.g. Aust et al., (2020), the relations between our sample variables provide comparability with previous studies. Both Spearman and Pearson correlations provide similar findings. As expected, FREEINDEX and HEALTHEXP have a positive impact on SDC score and are significant. The coefficient of Pearson correlation between FREEINDEX and HEALTHEXXP, FREEINDEX and MILEX, LnFDI and HEALTHEXXP are above 0.50. Therefore, similar to prior researches, e.g. Aust et al., (2020), we calculate the variance inflation factors (VIFs) to check the severity of multicollinearity. Computed values of VIFs which are less than 2.46 indicate there is no issue of multicollinearity. The calculation of VIFs is attached to Appendix in Table C.

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Table 2: Pearson and Spearman correlation Matrix

	SDG	lnFDI	GDP	lnPOP	GOVCONS	HEALTHEXP	MILEX	FREEINDEX
SDG		0.281	-0.247	-0.190	0.495	0.725	-0.612	0.779
		0.000	*0.000*	*0.005*	*0.000*	*0.000*	*0.000*	*0.000*
lnFDI	0.110		-0.216	0.289	0.286	0.365	0.051	0.224
	0.107		*0.001*	*0.000*	*0.000*	*0.000*	*0.453*	*0.001*
GDP	-0.245	-0.196		0.016	-0.459	-0.267	0.053	-0.142
	0.000	*0.004*	.	*0.818*	*0.000*	*0.000*	*0.435*	*0.038*
lnPOP	-0.261	0.165	0.123		-0.145	-0.093	0.306	-0.200
	0.000	*0.015*	*0.072*		*0.035*	*0.171*	*0.000*	*0.003*
GOVCONS	0.466	0.211	-0.406	-0.208		0.404	-0.289	0.431
	0.000	*0.002*	*0.000*	*0.002*	.	*0.000*	*0.000*	*0.000*
HEALTHEXP	0.704	0.052	-0.180	-0.111	0.362		-0.539	0.669
	0.000	*0.445*	*0.008*	*0.103*	*0.000*		*0.000*	*0.000*
MILEX	-0.429	0.094	-0.067	0.193	-0.116	-0.364		-0.720
	0.000	*0.168*	*0.331*	*0.004*	*0.092*	*0.000*		*0.000*
FREEINDEX	0.676	0.034	-0.087	-0.226	0.360	0.583	-0.643	
	0.000	*0.616*	*0.204*	*0.001*	*0.000*	*0.000*	*0.000*	

Table 2 provides Spearman correlation (above diagonal) and Pearson correlation (below diagonal). Table 2 also provides the P-value of each variable regarding the coefficient to illustrate the level of significance. The sample consists of 215 country-year observations from 2016 to 2018.
Note: the significance levels of coefficients are shown in *italics*. The upper right triangle data contains *Spearman* coefficients and the lower triangle contains *Pearson* coefficients. Two reported correlation coefficients, linear (e.g. Pearson) and rank (e.g. Spearman), are commonly used to measure linear and general relationships between two variables. This research focuses on Pearson (linear correlation

4. Results and Discussion

In Table 3 we presented the output from three multivariate regression analysis with regarding to the contribution of foreign direct investment (FDI) on the achievement of Sustainable Development (SDG) score in high income class (HIC), upper middle-income class (UMIC), low middle-income class (LMIC) countries of Eurasia. FDI and POP variables are estimated using logarithmic forms, accordingly we can interpret the coefficients of these variables as elasticities.

Table 3: Regression analysis

	(1)	(2)	(3)
	HIC	UMIC	LMIC
LnFDI	6.533***	17.072***	38.471***
	(0.005)	*(0.000)*	*(0.002)*
GDP	-0.028	-0.332	0.539
	(0.874)	*(0.109)*	*(0.518)*
LnPOP	1.644	22.683	1.910
	(0.936)	*(0.705)*	*(0.144)*
GOVCONS	-1.148	-0.925	1.187
	(0.006) ***	*(0.270)*	*(0.531)*
HEALTHEXP	0.634	2.717	-1.209
	(0.416)	*(0.112)*	*(0.603)*
MILEX	0.455	-1.281	-0.821
	(0.145)	*(0.056)* *	*(0.381)*
FREEINDEX	-0.126	-0.264	0.311
	(0.515)	*(0.146)*	*(0.804)*
Constant	-2.777	-478.523	-380.117
	(0.993)	*(0.634)*	*(0.018)* **
Observations	110	59	40
R-squared	*0.381*	*0.552*	*0.538*

The fixed effects regression models are based on the data from 2016 to 2018. The P-value of each variable is provided regarding the coefficient to illustrate the level of statistical significance. Note: the significance levels of coefficients are shown in *italics*.

The first econometric fixed effects regression model contains 110 country year observations for the sample of HIC countries. The results of this regression model indicate that there is a

positive relationship between FDI and SDG score signifying the presence of foreign direct investment is fundamental in achieving sustainable development in high income class countries. Based on the results of F test (p-value=0.000), we are 99 percent confident that FDI is statistically significant and positive function of SDG score. In fact, 0.381, R-squared value of the first regression model indicate that 38.1% of variation in SDG score is explained by FDI. The sign of only three out of seven independent variables of our model specification meet our prior expectation and only two of them are statistically significant namely: FDI and GOVCONS. The coefficient of FDI is 6.53, which is both statistically and economically significant at 1% significance level. In fact, one percentage increase in FDI stocks leads to 6.53 percentage increase in the coefficient of SDG score. Regarding other independent macroeconomic variables such as GDP, POP, HEALTHEXP, MILEX and FREEINDEX, we conclude that these variables are statistically insignificant and do not have any impact on SDG index. However, p-value of GOVCONS variable which is equal to 0.006 indicate that the variable is statistically significant at 1% significance level. However, the sign of this variable does not meet our prior positive expectation. In fact, it signals one-point increase in government consumption expenditure will lead to 1.14-point decrease in the coefficient of SDG score.

The second econometric fixed effects regression model contains 59 country year observations for the sample of UMIC countries. The second regression analysis presents the outcome of multivariate regression analysis in respect to the effect of foreign direct investment on the achievement of SDG in upper middle-income class countries of Eurasia. The results of this regression model show that there is a positive association between FDI and SDG index indicating the presence of foreign investors plays crucial role in achieving SDG in upper middle-income class countries of Eurasia. Based on F test results (p-value=0.000), we can conclude that we are 99 percent confident that FDI is statistically significant and positive indicator of SDG score. In fact, R-squared value of the regression model of 0.552 indicate 55.2% of variation in SDG index can be explained by the FDI. The sign of only two variables (FDI and HEALTHEXP) is the same as prior expectations and only two variables (FDI and MILEX) are statistically significant. The coefficient of FDI is both statistically and economically significant at 1% level and the coefficient is equal to 17.07. Which can be interpreted as one percentage increase in the value of FDI stocks lead to 17.07 percentage rise in the value of SDG score. In respect to other explanatory variables, based on the p-values of the t-test we accept null hypothesis that GDP, POP, GOVCONS, HEALTHEXP and FREEINDEX are statistically insignificant and do not have any explanatory power. Although, the p-value of MILEX variable, (0.056), is statistically significant at 10 percentage significance

level. It signals negative impact on SDG score. In fact, one-point increase in MILEX reduces SDG score by 1.28 point.

The third econometric fixed effects regression model contains 40 country year observations for the sample LIC countries and presents the outcome of multivariate regression analysis in respect to the effect of foreign direct investment on the achievement of SDG in lower income class (LIC) countries of Eurasia. The result of the third regression model reveal that we can reject the null hypothesis of no potential impact of FDI on SDG score in lower middle income class countries of Eurasia at 1% significance level as p-value of our F test (p-value=0.008) is less than (*** *p<0.01,* ** *p<0.05,* * *p<0.1)* . R-squared of 53.8 indicate that FDI variable has explanatory power on SDG score. In fact, 53.8 percentage of variation in SDG score is explained by the FDI. We are 99% confident that FDI is both statistically significant and positive major determinant of SDG score. The coefficient of FDI indicates that the variable is economically significant as well. As one percentage point increase in FDI stocks will increase the value of SDG score by 38.47 point. The results of the 3rd regression model show that there is a positive considerable association between FDI and SDG index, indicating the presence of foreign investors is high importance in lower middle-class countries of Eurasia in particular. Our finding also indicate that all other macroeconomic variable is statistically insignificant at all levels. Therefore, we conclude there is not sufficient evidence to support alternative hypothesis about potential impact of macroeconomic variables on the SDG score, as these variables do not have any impact on SDG index.

Table 3 reveals that the null hypothesis of no potential impact of FDI stocks on SDG score is rejected at 1% significance level for all 3 tests. Our finding is consistent with prior studies by Aust et al., (2020). Furthermore, there is not sufficient evidence to support the alternative hypothesis on positive impact on the HEALTHEXP, GOVCONS and MILEXP in all three income group countries. These findings are similar to prior research Aust et al., (2020). However, surprisingly we can't accept the alternative hypothesis regarding the potential positive impact of FREEINDEX and GDP on SDG score as they do not have statistical significance at all levels. We conclude that variables of public financing, civil rights and liberties is not a major determinant of Sustainable Development. In fact, they do not have any impact on sustainable development.

Due to the unavailability of sufficient number of observations for low income class (LIC) countries of Eurasia, we were unable to run regression analysis in respect to the potential effect of FDI on Sustainable Development in LIC countries of Eurasia. Therefore, we run regression analysis on the potential impact of FDI on SDG score for all sampled countries in

Eurasia to incorporate the effect of LIC countries in our analysis.

Table 4: Fixed Effects Model

LnFDI	14.56***
	(0.000)
GDP	-0.115
	(0.337)
LnPOP	2.264***
	(0.000)
GOVCONS	-0.644
	(0.173)
HEALTHEXP	0.692
	(0.477)
MILEX	-0.238
	(0.429)
FREEINDEX	-0.153
	(0.153)
Constant	-109.4**
	(0.001)
Observations	211
Adjusted R^2	0.326

Note: * p < 0.05, ** p < 0.01, *** p < 0.001 Significant at 10, 5 and 1% levels, respectively. See Table II for variable definitions. The sample consists of 211 country-year observations from 2016 to 2018. The fixed effects regression models are based on the data from 2016 to 2018. The P-value of each variable is provided regarding the coefficient to illustrate the level of statistical significance. Note: the significance levels of coefficients are shown in *italics*.

Table 4 illustrates the results of fixed effects model on the potential effect of FDI on SDG score for all sampled countries (HIC, UMIC, LMIC, LIC). We run the regression analysis for all the Eurasian countries and the analysis consider 211 country year observations. The results of the regression analysis are robust, meaning standard errors are corrected for autocorrelation and heteroskedasticity. Adjusted R-squared of 0.326 indicates, 32.6% variation in SDG score value is explained by our independent variables. FDI and POP variables have statistical significance

at 1% significance level. The coefficient of FDI is 14.56 indicating a percentage point increase in the coefficient of FDI followed by 14.56-point increase in the value of SDG score in all sampled Eurasian countries. The sign of POP variable does not meet our prior expectation and contradict with the theory of high population as the negative function of economic development (Aisen and Veiga, 2013). Regarding other macroeconomic variables, we conclude that they do not have statistical significance at all levels ($p < 0.05$, ** $p < 0.01$, *** $p < 0.001$) and thus do not have explanatory power. Based on the results of all regression analysis, we conclude that the effect of FDI is statistically significant at the 1% level in all models. We conclude that attracting foreign entities to invest into the economy will likely to promote Sustainable Development goals (SDGs) in all nations regardless of the income class. Regarding the difference of results between different class of countries, we find out that the presence of foreign investors is more important as the lower the income class of the country. Indicating the role of FDI is crucially important in emerging economies and developing nations of Eurasia as FDI is fundamental source of external financing in those countries.

Our results are consistent with the findings of distinguished income class analysis and in line with previous results e.g. Aust et al., (2020). Furthermore, the result is confirmation of stated alternative hypotheses about a positive effect of inward FDI stocks on Sustainable Development. Therefore, we reject the null hypotheses of "There is no potential effect of FDI on Sustainable Development Goal (SDG)". Regarding population size, our results provide contradiction with stated literature of negative association between SDG and economic development by Aisen and Veiga, (2013).

Our research paper contributes to the current literature by investigating the contribution of FDI in promoting sustainable of Eurasian countries. We also analysed the effect of FDI on the achievement of SDGs in different income groups of Eurasia. Our finding shows to the policymakers that the FDI has positive major impact on sustainable development of all nations in Eurasia. Moreover, the results of distinguished income class analysis reveal that the impact is the more decisive and fundamental the lower the income class of the country. However, one would argue to consider potential environmental damage can be caused to developing nations by this type of investment. Lastly, we believe this study may be useful for international organisations engaged in the promotion of foreign direct investment.

5. Conclusion and Summary

5.1. Conclusion

This paper has empirically investigated the relationship between inward FDI stocks and SDG index. We applied fixed effects model to assess the influence of FDI stocks on the achievement of SDG in a sample of 78 Eurasian countries for the period from 2016 to 2018. Our results are controlled for multicollinearity and provide robust standard errors. Our findings from fixed effects regression model indicate that the role of foreign investors is important in the achievement of sustainable development in Eurasian countries. The results from distinguished income class regression analysis also reveal that the role of FDI is more fundamentally important as the lower the income class of countries. Similar to the previous study (Sarkodi and Strezov, 2019; Aust et al., 2020) our finding indicates there is a high demand for the presence of foreign investors in the achievement of SDGs in emerging and emerging parts of Eurasia in particular. It signifies the role of FDI is more important as the lower the income class of the country. The findings of this research paper approve the alternative hypothesis about the existence of a positive association between inward FDI stocks and SDG and appear to be well supported by the theories developed in the literature. Our results are in line with previous findings e.g. Aust et al., 2020). We are of the opinion that the significant and positive effect of FDI on the achievement of SDGs confirms the validity of theories developed in the literature e.g. Borensztein et al (1998); Zhang, (2014); Malikane and Chitambara, (2017); Ridzuan (2017).

Although the role of FDI is decisive and significant in the achievement of SDG goals however, most of the explanatory variables of the regression models appear to be statistically insignificant in all income class groups of our sample and provide opposite sign of association. We argue that this might be due to the mixture of statistics by poor and accountable institutions. Initially we gathered the data for all Eurasian countries however, because of the unavailability of the data for macroeconomic explanatory variables of all sampled Eurasian countries we reduced our multivariate regression analysis from 90 to 78 countries. Another limitation of the paper is non-availability of sufficient number of observations for (LIC) countries thus, we could not run regression analysis for a sample of LIC countries. Additionally, it is also evident to suggest that countries with high SDG index and available dataset is likely to attract high foreign investment.

5.2 policy recommendation

We believe that our research paper will serve as a base for policy recommendations and future research studies on the influence of FDI on sustainable development for Eurasian countries. To the best of our knowledge, our research is one of the first papers that analyse the contribution of FDI in the achievement of SDG for different income class countries in general. Our sample collection method may provide useful investigation not only in Eurasia but in different income class countries of the world. We propose that further research should be undertaken in the following areas: The impact of FDI on the achievement of specific goals in low class countries (LIC), such as: eliminating poverty (SDG1), ending hunger (SDG2), creating job opportunities for young generation (SDG8), advancing infrastructure and innovation (SDG9), reducing inequality (SDG goal 10). Based on future research avenues, possible policy recommendations can be suggested on implementing those goals by directing FDI to the right sectors of the economy. However, the lack of sufficient data may be possible obstacle to conduct research on this area.

The purpose of this research analysis is to test the relationship between inward FDI and SDG for a sample of 78 Eurasian different income class countries and empirically answer to the objectives of the paper. Based on our findings we are to conclude that inward FDI stocks contribute to the improvement of sustainable development in Eurasia overall as well as in all three (HIC, UMIC, LMIC) different income class groups of Eurasia. Furthermore, it is important to note that the role of foreign investment is fundamentally more important as the lower the income class of the country.

5.3 Limitations of the study and future recommendation

This study is subject to less availability of the data on Eurasian countries that finally reduced our sample to 78 Eurasian different income class. Further research is recommended to focus on the other economies that likely to employ new methods in econometrics.

6. Appendices

Table A: List of Variables

HIC	**LIC**
1.Austria	38.Afghanistan
2.Bahrain	**LMIC**
3.Belgium	39.Armenia
4.Croatia	40.Bangladesh
5.Cyprus	41.Cambodia
6.Czech Republic	42.Cambodia
7.Denmark	43.India
8.Estonia	44.Indonesia
9.Finland	45.Kyrgyz Republic
10.France	46.Moldova
11.Germany	47.Mongolia
12.Greece	48.Myanmar
13.Hungary	49.Pakistan
14.Iceland	50.Philippines
15.Ireland	51.Sri Lanka
16.Israel	52.Ukraine
17.Italy	**UMIC**
18.Japan	53.Vietnam
19.Korea, Rep.	54.Albania
20.Kuwait	55.Azerbaijan
21.Latvia	56.Belarus
22.Lithuania	57.Bosnia and Herzegovina
23.Luxembourg	58.Bulgaria
24.Malta	59.China
25.Netherlands	60.Georgia
26.Norway	61.Iran, Islamic Rep.
27.Oman	62.Iraq
28.Poland	63.Jordan
29.Portugal	64.Kazakhstan
30.Saudi Arabia	65.Lebanon
31.Singapore	66.Malaysia
32.Slovak Republic	67.Montenegro
33.Slovenia	68.North Macedonia
34.Spain	69.Romania
35.Sweden	70.Russian Federation
36.Switzerland	71.Serbia
37.United Kingdom	72.Thailand
	73.Turkey

Table B: Hausman Test

Hausman (1978) specification test

	Coef.
Chi-square test value	74.943
P-value	*0.0000*
Prob>chi2 = 0.0000	

Table C: VIF

Variable	VIF	1/VIF
FREEINDEX	2.460	0.406
MILEX	1.810	0.552
HEALTHEXP	1.760	0.567
GOVCONS	1.440	0.692
LNPOP	1.260	0.795
lnFDI	1.220	0.822
GDP	1.110	0.903
MEAN VIF	1.580	

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