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Article

Role of uncertainty for FDI inflow: Panel econometric analysis of selected high-income nations

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Role of uncertainty for FDI inflow: Panel econometric analysis of selected high-income nations

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Abstract: The purpose of this study is to evaluate the influence of economic policy uncertainty in determining the FDI inflow for 19 economies with higher incomes between 2000 and 2021. Using the panel Ardl approach, the data were examined. The dynamic fixed effect approach was selected for assessing the necessary set of hypotheses based on the significance of the Hausman test. Increasing levels of economic policy uncertainty, exchange rate, and inflation rate discourage foreign investors from investing in the host country, whereas trade openness and real growth rate increase investors' confidence in increasing FDI inflow in the host country. The economic implications of the study include the political stability of the host country and the uniformity of government policies, particularly in favor of international investors. This study contributes to the existing body of knowledge on FDI by examining the long-term and short-term effects of uncertainty for the highincome group. The findings of the study apply to higher-income economies. In the future, comparative time-series analysis may be used to assess studies on an individual or regional basis for other groups as well.

Subjects: Econometrics; International Economics; Development Economics

Keywords: Economic Policy Uncertainty; FDI Inflow; Exchange Rate; Inflation; Trade Openness; Growth Rate

JEL Classification: C33; D81; E60; O50; P44

1. Introduction and background

Foreign direct investment (FDI) is a sort of international business in which an investor from one nation has long-term ownership in and substantial control over a company from another one (Blonigen, 2005). The significance of economic policy uncertainty grew with the occurrence of multiple economic and financial crises, which led to a decline in FDI inflows for host nations (Albulescu & Ionescu, 2018). The intensity of global uncertainty as a factor of FDI is greater for developing economies than for affluent ones for gross investment flow (Hlaing & Kakinaka, 2019). Economic policy uncertainty is distinct from global uncertainty in terms of its impact on FDI inflow. Investment flow for developed and developing nations exhibits varied characteristics for global uncertainty, and economic policy uncertainty (Suh & Yang, 2021). It is still a puzzle how economic policy uncertainty impacts the FDI inflow in the long run and short run for developed nations. Therefore, additional research is required to determine the effect of economic policy uncertainty on FDI inflow to high-income economies. The global financial crises and other economic crises in the past have highlighted the significance of economic policy uncertainty influencing future





investment inflow decisions (Chen et al., 2019). The FDI flow is regarded as the most consistent type of capital movement. However, certain types of uncertainty, such as economic policy uncertainty, may be detrimental due to the fixed costs associated with FDI (Choi et al., 2021). Similarly, the ambiguity surrounding national and international economic policies has the potential to limit the flow of international investment, goods, and services (Sinha & Ghosh, 2021).

The increase in FDI inflow is a significant factor in the development of high-income, middleincome, and low-income nations. A deficiency of incoming capital may retard the development of any nation (Ogbonna et al., 2022). Similarly, uncertainty may occur in financial and non-financial markets, along with general economies, due to changes in international ties, limits or prohibitions on imports, tariffs, laws, etc. (Zhang et al., 2022). Sometimes, limits on economic policies may have a negative impact on FDI inflows in the near term, but they may yield long-term benefits (Williams et al., 2022). Some trade or economic barriers may be loosened to increase foreign direct investment (Bao et al., 2022). Recent years have witnessed the emergence of economic policy uncertainty as one of the most influential determinants of FDI inflows in developed economies. Whether the FDI inflow will materialize in an uncertain climate characterized by economic policy is the central issue of contention. The study's novelty and originality consist of its examination of the influence of EPU on FDI inflow in high-income economies. Previous research studies have examined several sources of uncertainty for FDI inflow, such as global uncertainty, exchange rate uncertainty, pandemic uncertainty, geopolitical uncertainty, and political uncertainty. However, the present study adds new evidence to the previous literature about the effect of economic policy uncertainty on FDI inflow for a sample of high-income economies.

Figure 1 indicates the average trend line for all 19 higher-income countries' FDI inflow during 2000–2019. The graph depicts a random pattern exhibiting a rise and drop following a certain time. For instance, the FDI inflow reveals a falling tendency from 2000 to 2003, a rising trend from 2004 to 2007, followed by a decline, and so on. The final decline in FDI inflow for the target population was recorded between 2015 and 2019, following which it began to rise again. The appearance of COVID-19 around the end of 2019 has had a detrimental effect on the amount of FDI that is being brought in on a global scale (Khan et al., 2021).

Figure 2 depicts the average annual economic policy uncertainty in 19 countries with higher incomes from 2000 to 2021. Over the past 22 years, the figure indicates a rising tendency of uncertainty. It implies that emerging nations with greater incomes have been confronted with a persistently increasing amount of economic policy uncertainty over several years. Toward the



Figure 1. Trend of FDI inflow in high income nations (yearly).

Figure 2. Trend of uncertainty in high income nations (yearly).

global level, the spread of the Covid-19 pandemic at the end of 2019 has contributed to a rise in the overall level of uncertainty (Khan et al., 2021).

The rapid development of research on FDI attests to the fact's growing significance as both a corporate reality and an academic research issue. To attract more FDI, these nations utilize more capital and encourage more investment in financial institutions and financial markets. The highincome economies must maintain their rising income levels, which must attract more foreign capital (mostly FDI). To attract FDI, these nations open up to it more and enact laws that encourage it.

The purpose of this study is to examine the influence of economic policy uncertainty on FDI inflows in 19 high-income economies from 2000 to 2021. In addition, the study investigates the influence of exchange rate, inflation, trade openness, and growth rate on FDI influx for the target population. FDI inflows are foreign investments made in the host nation. FDI inflow is essential for developing nations to increase their savings, achieve economic growth, and preserve their standard of life and national income. The host nation must be politically and legally stable to attract substantial FDI inflows. The uncertainty of future economic policies may discourage foreign investors from investing in the host nation or from withdrawing their investments. The outcome may also show that future consideration of uncertainty is an essential component for gaining a clearer knowledge of how to attract FDI inflows in economies with higher incomes.

The study has strong and more relevant contributions to the literature as follows:

- It contributes to the existing body of knowledge that how economic policy uncertainty as the major source of uncertainty in high-income economies helps to determine their FDI inflow.
- It also contributes to how the exchange rate, inflation rate, trade openness, and growth rate determine the FDI inflow for high-income economies.
- Furthermore, the study also contributes in terms of methodology for using the panel ARDL as the method of estimation for explaining the long-term and short-term impacts of uncertainty on FDI inflow in high-income economies.

The remaining part of this research includes a literature review in the second chapter, data and methodology in the third chapter, and empirical analysis in the fourth chapter. Finally, the conclusions are discussed in chapter 5, and the policy implications and future suggestions are discussed in chapter 6.

2. Literature review

Economic policy uncertainty is a type of risk in which future government policies are uncertain, delaying an individual's investment or spending decision (Ogbonna et al., 2022). There is a possibility that a decline in the amount of foreign direct investment will occur if the level of economic policy uncertainty continues to rise (Smith, 2021). This uncertainty may be reduced by stable government policies, laws, etc., which may also lead to an increase in the flow of FDI (Yusuf et al., 2020).

2.1. Theoretical underpinning

This study derives its theoretical underpinnings from the eclectic theory in its various versions as formulated and evolved by Dunning (1977), Dunning (1980), and Dunning (1988). The theory asserted that when ownership, localization, and internationalization benefits make foreign manufacturing more cost-effective, domestic firms become global and invest in FDI. This suggests that the primary motivators for international investments are anticipated investment income, investment safety, and the opportunity to withdraw funds when necessary. These elements are highly influenced by the political and economic atmospheres, as well as the larger economic governance systems of the host nation. How overseas investors feel about FDI is determined by the host nation's socioeconomic circumstances and government laws, as well as the level of ambiguity around such projects.

2.2. Uncertainty and FDI inflow

One of the earliest studies to explain the connection between economic policy uncertainty and FDI was discovered by Ramasamy (2003) for the Malaysian economy. The study underscored the significance of economic uncertainty in attracting international investors. In times of uncertainty, reversibility and delay ability were found to have a significant impact on FDI inflow into the host economy. Uncertainty delays foreign investment or, in severe situations, causes withdrawals. Albulescu and Ionescu (2018) found that stable economic and financial conditions in a host country result in increasing the FDI inflow. They urged decision-makers to stabilize economic policies to reduce policy uncertainty and encourage foreign investment in the host nation.

Eregha (2019) concluded that an economy needs stable economic policies such as currency rate stability, investment risk reduction, export product diversification, etc. to attract foreign capital. Hlaing and Kakinaka (2019) underlined the importance of global uncertainty in determining the foreign capital flows of any economy. However, they discovered that the strength of this relationship differed significantly between developed economies and those that were still in the process of developing. Additionally, Chen et al. (2019) found a significant drop in the level of FDI, while the economic policy uncertainty increases. If there is political stability, including democracy, uncertainty will be reduced, increasing FDI. Furthermore, Zhu et al. (2019) found that politically unstable countries have substantial economic policy uncertainty, which causes capital flight, FDI outflow, and FDI inflow declines. They advised implementing a more democratic and stable political structure to reduce the uncertainty of economic policy on FDI inflows in the host country. They concluded that the negative impact of this uncertainty may be greater in some economies with high incomes. This means that the negative effect of economic policy uncertainty on FDI inflow in the host economy seems to be softened in countries with developed financial markets.

Sinha and Ghosh (2021) showed a stronger long-term impact of economic policy uncertainty on FDI inflow in India as compared to the short run. They advised establishing economic policies that are predictable to achieve the level of foreign direct investment (FDI) that was required. Ogbonna et al. (2022) found an inverse and highly significant impact of global economic policy uncertainty on FDI inflow for the African region. They proposed authorities implement consistent economic policies to reduce uncertainty and boost FDI in this region. In contrast, it could not be demonstrated that economic policy uncertainty was a significant factor in deciding China's FDI inflow (Zhang et al., 2022). The Chinese economy has moved from FDI inflow to FDI outflow; thus, the same is a big negative influence

on FDI outflow. Furthermore, Williams et al. (2022) observed that economic policy uncertainty has a negative and substantial short-run influence on FDI influx in Southern Africa, but a positive and weakly significant long-run impact. Additionally, Bao et al. (2022) discovered that a reduction in the uncertainty of economic and trade policies has the potential to increase the inflow of FDI into China. Regarding the economic climate, regulations, norms, technical development, and financial situation, there is a significant disparity between the countries in the high-income category. Nonetheless, regardless of geography or income level, the uncertainty of any type, has a negative effect on even high-income countries. Historical evidence reveals an inverse association between economic policy uncertainty and FDI inflow for the majority of high-income nations; thus, the following 1st hypothesis is anticipated.

 H_1 : There is a significantly negative impact of economic policy uncertainty on FDI inflow.

2.3. Exchange rate and FDI Inflow

FDI inflow for high-income host economies boosts demand for their currencies, such as the euro in Europe, the pound in the UK, and the dollar in the USA. The demand for these currencies raises the exchange rate, discouraging foreign investors from investing in high-income economies. A higher exchange rate reduces FDI inflow into these economies. Numerous historical studies have demonstrated a relationship between exchange rates and FDI primarily from wealthy nations. Foreign direct investment is sometimes discouraged in developed nations due to factors including the exchange rate depreciation caused by imperfect capital markets (Froot & Stein, 1991). In this situation, a negative relationship between the exchange rate (home per host currency) and FDI is expected. In the instance of the United States, the substantial negative impact of the devaluation of the host currency's exchange rate was also reported (Barrel & Pain, 1998; Blonigen & Feenstra, 1997).

The degree of the conversion requirement affects foreign direct investment (FDI) in a few different ways (Hadj Fraj et al., 2018). In contrast, the currency rate can occasionally influence FDI inflows to the advantage of one nation and the disadvantage of all others (Lin et al., 2020). It has led to low foreign currency, and the economic success of developing nations, like other rising regions, is dependent on foreign investment inflow (Maryam & Mittal, 2020). Theoretically and in the literature, the influence of the exchange rate on FDI is ambiguous (Gautam et al., 2020). There is no logical explanation for why the exchange rate affects FDI (Babubudjnauth & Seetanah, 2020). However, the majority of recent research indicates that exchange rate has a negative effect on FDI inflow in various world economies (e.g. Alshubiri, 2022; Eregha, 2020; Korsah et al., 2022; Moraghen et al., 2021, 2020; Nwosa, 2021; Tan et al., 2021). Increasing the exchange rate discourages foreign investors from investing in the host economy, resulting in a decline in foreign direct investment (FDI). The following 2nd hypothesis is formulated based on the bulk of findings in the historical literature and the theoretical perspective of the exchange rate impact on FDI inflow.

 H_2 : There is a significantly negative impact of the exchange rate on FDI inflow.

2.4. Inflation rate and FDI Inflow

A study conducted in several European nations demonstrated a potentially detrimental effect of inflation on FDI inflow determination (Özkan-Günay, 2011). The majority of studies provide evidence in support of the negative and statistically significant impact of inflation rate on FDI inflow in different economies. However, a study conducted in the Indian region indicated that the inflation rate has a negative but statistically insignificant effect on FDI inflow (Singhania & Gupta, 2011). Therefore, the divergent evidence still supported the negative impact of the inflation rate on FDI inflow. For example, a study conducted on the Indian nation indicated that inflation has a negative but significant effect on FDI inflow (Kaur & Sharma, 2013). In addition, a study conducted in the ASEAN region supported the detrimental impact of inflation on FDI inflow (Xaypanya et al., 2015). Similarly, research of BRICS nations utilizing the panel data analysis technique indicated a negative relationship between inflation rate and FDI inflow (Gupta & Singh, 2016). Furthermore, a study conducted on emerging nations found a negative and highly

significant influence of the inflation rate on FDI inflow (Kumari & Sharma, 2017). In addition, a study conducted in Vietnam found that the inflation rate had a negative and significant effect on the FDI inflow (Vi Dūng et al., 2018). A similar negative relationship between the inflation rate and foreign direct investment (FDI) inflow was found by some studies (Agudze & Ibhagui, 2021; Asiamah et al., 2019; Gnangnon, 2021; Jaiblai & Shenai, 2019; Khudari et al., 2023; Morshed & Hossain, 2022; Sabir et al., 2019; Tahir & Alam, 2022; Tien et al., 2022). High-income economies like Europe and the UK and the USA have varied macroeconomic, financial, and technical development compared to developing nations like India, Pakistan, etc. Therefore, the majority of research has shown discrepancies in the relevance of influence for the majority of macroeconomic indicators, such as inflation, in various locations. High-income, middle-income, and low-income economies all need domestic and foreign capitals for sustainable growth. The main distinction between the first two hypotheses is the level of relevance of the negative impact of inflation on FDI inflow, which provides the basis for the 3rd hypothesis.

 H_3 : There is a significantly negative impact of the inflation rate on FDI inflow.

2.5. Trade OPENNESS and FDI inflow

A time-series analysis undertaken in Mauritius revealed a statistically significant and positive relationship between trade openness and FDI inflow (Seetanah & Rojid, 2011; Yuxiang & Chen, 2011). Furthermore, Jiang et al. (2013) revealed a positive and statistically significant role of trade openness in determining the FDI inflow for China. Similarly, a study conducted in India revealed a statistically significant and positive relationship between trade openness and FDI influx (Kaur & Sharma, 2013). Additionally, market openness has a substantial effect on regional trade agreements (Sahoo et al., 2014). The same applies to host country financial experts; attractive investment climate and arrangements increase competition inside the country of origin and should fuel FDI surges to confront competitors in business sectors (Kishor & Singh, 2015). Similarly, some studies have revealed a positive and significant impact of the inflation rate on FDI inflow in various global locations (Dimitrova et al., 2020; Gupta & Singh, 2016; Jaiblai & Shenai, 2019; Korsah et al., 2022; Kumari & Sharma, 2017; Maryam & Mittal, 2020; Mousavian et al., 2021; Saini & Singhania, 2018; Smith, 2021). Regardless of their differences in the financial environment, income level, and technical development, all the studies under consideration demonstrate the favorable effects of trade openness. The main variation is the level of significance for the beneficial impact of trade openness on FDI inflow, which provides the basis for constructing the 4th hypothesis for highincome economies.

 H_4 : There is a significantly positive impact of trade openness on FDI inflow.

2.6. Real growth and FDI inflow

A rising real growth rate suggests that an economy is growing and sustaining itself, which encourages foreign investors to invest with confidence in the host economy. As a result, the FDI intake into these economies increases significantly. Research on Mexico and Brazil uncovered a possible positive effect of growth rate on FDI inflow (Castro et al., 2013). Additionally, Sahoo et al. (2014) also reported a positive and strong impact of growth rate on FDI inflow in South Asia. Furthermore, Kishor and Singh (2015) observed that an economy with a positive growth rate is more likely to attract foreign capital than one experiencing a recession. Similarly, Aziz and Mishra (2016) also reported a positive link between growth rate and FDI inflow in Arab nations. Developing nations must attract more FDI to increase their development rate (Kumari & Sharma, 2017). Numerous recent studies have demonstrated a positive relationship between real growth rate and FDI inflow (Azam & Haseeb, 2021; Camarero et al., 2020; Gopalan et al., 2019; Gupta, 2018; Korsah et al., 2022; Yimer, 2017). Historical literature shows a positive and large impact of real growth rates on FDI inflow, especially for most high-income nations, which forms the basis for the formation of the following 5th hypothesis.

 H_5 : There is a significantly positive impact of the real growth rate on FDI inflow.

3. Data and methodology

3.1. Data

The analysis comprises 22 years of data at an annual frequency, from 2000 to 2021, for 19 highincome economies. World development indicators (WDI) and economic policy uncertainty websites are utilized as data sources. FDI inflow, exchange rate, inflation rate, trade openness, and real growth rate are among the variables included in the statistics acquired from the WDI website. Additionally, the data obtained from the EPU website include the economic policy uncertainty index. This study requires investigating the impact of uncertainty on FDI inflow in higher-income nations. The EPU website gives economic policy uncertainty index data for higher-income economies only, thus researchers collected data from 2000 to 2021 for 19 nations (high-income group). The EPU data for other groups, such as middle- and low-income economies, were unavailable. As a result, this study focused on high-income economies. To ensure consistency in data collection procedures, the study additionally gathered data for the following variables using the same data availability range.

3.2. Variables

FDI inflow as a percentage of GDP is the study's output variable. The economic policy uncertainty index measures uncertainty as the independent variable. The remaining factors, exchange rate, inflation, trade openness, and real growth rate, are control variables. The control variables were chosen based on the most common FDI inflow factors identified in several significant international studies. This study necessitates the inclusion of a control variable based on the most significant factors of FDI inflow, which are primarily derived from historical research. Table 1 provides a summary of the study's measurements of all variables, including their data sources and references.

3.3. Method of estimations

The study compiles data for 19 high-income economies on an annual basis between 2000 and 2021. To increase the number of observations, efficiency, and reliability, the data were processed into a panel format. The panel data is advantageous to other data forms, such as cross-sectional

Table 1. Variable measurement						
Variable Name	Measurement	Data Source	Reference			
FDI Inflow	% age of Gross Domestic Product	WDI Website	(Nguyen & Lee, 2021; Ogbonna et al., 2022; Tien et al., 2022).			
Uncertainty	Economic Policy Uncertainty Index	EPU Website	(Canh et al., 2020; Nguyen & Lee, 2021; Ogbonna et al., 2022; Smith, 2021).			
Exchange Rate	Real Exchange Rate	WDI Website	(Alshubiri, 2022; Gautam et al., 2020; Tan et al., 2021).			
Inflation	% of GDP as a deflator	WDI Website	(Alshubiri, 2022; Nguyen & Lee, 2021; Smith, 2021).			
Trade Openness	% of Gross Domestic Product	WDI Website	(Alshubiri, 2022; Nguyen & Lee, 2021; Smith, 2021).			
Economic Growth	Real % age of Gross Domestic Product	WDI Website	(Korsah et al., 2022; Osei & Kim, 2020; Shahbaz et al., 2021).			

or time series (Mousavian et al., 2021). The panel data improve normality and mitigate the multicollinearity problem that typically affects other types of data (Nasir et al., 2017). The panel data of this study include N = 19, and T = 22. The panel data are considered as long-form panel data where T > N. Therefore, the data for the present study are long-form panel data. This involves descriptive statistics, a correlation matrix, a cross-sectional dependence test, panel unit root, and panel regression estimates. This study requires estimation approaches such as panel autoregressive distributive lag (ARDL); mean group (MG), pooled mean group (PMG), and dynamic fixed effect (DFE) as per the guidelines of similar research studies (Gupta & Singh, 2016). The selection of a suitable estimating method involves the satisfaction of specific criteria; the Hausman test is one of them (Sahin & Ege, 2015).

3.4. Modeling

This study must determine the effect of economic policy uncertainty on the FDI inflow of emerging high-income nations from 2000 to 2021. To achieve this purpose, the following economic model, Eq. 1, is constructed.

FDI Inflow
$$= \mathbf{f}(\text{Economic Policy Uncertainty})$$
 (1)

To evaluate the hypothesis using econometric estimations, the study requires the following basic model, which contains FDI inflow, uncertainty, and control variables: exchange rate, inflation rate, trade openness, and real growth as Eq. 2.

FDI Inflow =
$$\beta_0 + \beta_1$$
Uncertainty + β_2 Exchange Rate + β_3 Inflation Rate + β_4 Trade Openness
+ β_5 Real Growth + ϵ (2)

To achieve uniformity in the measured values of all the variables of the study, and to control for basic violations of regression assumptions; multicollinearity, heteroscedasticity, etc., a natural log for each variable was taken, and the following equation 3 is formed.

LnFDI Inflow =
$$\beta_0 + \beta_1 LnUncertainty_{it} + \beta_2 LnExchange Rate_{it} + \beta_3 LnInflation Rate + $\beta_4 LnTrade Openness + \beta_5 LnReal Growth + \varepsilon$ (3)$$

Based on the data formation as a panel, the study requires applying the relevant techniques for the estimation of data and the testing of the hypothesis. The following 4th equation as the panel regression equation is formed.

Finally, the study also requires estimating the data and testing the hypothesis using the panel ARDL model as per the guidelines of previous research studies (Ganda, 2019). The following equation 5th is formed for this purpose.

$$Y_{it} = \sum_{J=1}^{p} \lambda_{ij} Y_{i,t-j} + \sum_{J=0}^{q} \delta_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it}$$
(5)

4. Empirical analysis

The study estimates the impact of economic policy uncertainty on FDI inflow for the target population along with the exchange rate, inflation rate, trade openness, and economic growth rate. For this, the data were assembled into a panel, and estimation procedures such as descriptive statistics, correlation matrix, unit root, cross-sectional dependence, panel co-integration, optimal lag, and panel ARDL were used. Each one's description and interpretation are provided below.

Table 2. Descriptive statistics							
	Mean	STD	Kurtosis	Skewness	Min	Max	Ν
FDI	5.43	9.73	22.77	3.49	-37.71	86.48	418.00
UNC	136.58	78.00	8.64	2.50	37.60	588.37	418.00
EXR	231.14	619.18	11.26	3.30	0.50	3743.59	418.00
INF	2.42	2.85	34.57	3.72	-4.62	33.68	418.00
ТОР	82.09	77.56	7.51	2.75	19.56	437.33	418.00
EGR	2.62	3.73	4.54	0.24	-10.82	25.18	418.00

Table 2 presents the summary statistics and raw data for the variables of the study. During the 22 years (2000–2021), FDI inflows averaged 5.43% of GDP in 19 countries with high incomes. Likewise, the annual average for economic policy uncertainty is 137. In addition, the average exchange rate for the target group over the study period is around \$231. In addition, the inflation rate over this time for the target population is 2.42%. Trade openness as a proportion of GDP is reported to be roughly 82% on average. In the last 22 years, the higher-income economies have experienced an average growth rate of 2.62% (2000–2021).

Table 3 reports the correlation matrix for the variables of the study. The correlation matrix is used to quantify the relationship between research variables and to test for perfect and significant multicollinearity. The table shows that independent and control variables are not perfectly multi-collinear. The table shows a statistically significant negative connection between uncertainty, exchange rate, and FDI inflow. Finally, there is a positive and statistically significant correlation between trade openness, growth rate, and FDI inflow.

According to Bai et al. (2016), macro-panel data with a series of a long time; T > 20-30, may have the issue of cross-sectional dependence. Furthermore, De Hoyos and Sarafidis (2006) stated that long-form panel data assumes an absence of cross-sectional dependence when choosing between the generation of unit-root testing approaches. The absence of cross-sectional

Table 3. Correlation matrix							
	FDI	UNC	EXR	INF	ТОР	EGR	
FDI	1						
UNC	-0.094*	1					
	0.055						
EXR	-0.174***	-0.073	1				
	0.0003	0.1357					
INF	-0.135***	-0.091*	0.173***	1			
	0.0057	0.065	0.0004				
ТОР	0.529***	-0.036	-0.212***	-0.133***	1		
	0.0000	0.463	0.0000	0.0065			
EGR	0.190***	-0.096**	0.123**	0.130***	0.130***	1	
	0.0001	0.0495	0.0121	0.008	0.0079		

Table 4. Testing Cross-sectional dependence							
Required Test	Test Statistics	Pr-Value	Remarks				
Breusch-Pagan LM	26.176	0.130	No Cross-Sectional Dependence				
Pesaran's test	3.980	0.117	No Cross-Sectional Dependence				

dependence validates the first-generation stationarity testing using LLU, IPS, and Harris & Tzavalis (Sarafidis & Wansbeek, 2012). The long-form Panel data where T > N require Breusch-Pagan LM, and Pesaran's test for testing cross-sectional dependence (Pesaran, 2021). Table 4 reports the test statistics and p-values of the required set of these tests. The results confirm the absence of cross-sectional dependence and validate the first-generation unit root.

Table 5 indicates the stationarity testing using the panel unit root of the first generation. The analysis includes Levin-Lin-Chu, Harris & Tzavalis, and Im-Pesaran-Shin. The null hypothesis assumes a unit root, while the alternative hypothesis assumes stationarity. The table reports that all the variables have stationarity at the level, as well as at the first difference except for the exchange rate, which is stationary at the first difference only. This confirms that a mixed order of stationarity; I(0), I(1) exists in the data, which confirms the test of this hypothesis using Panel ARDL.

The estimation of panel ARDL requires estimating the optimal lag level. The present study considered 19 high-income countries as per the availability of EPU data. The optimal lag for each of these countries is indicated in Table 6. The AIC criterion was used to select the most optimal lag length for each country (pqqqqqq). "**p**" stands for the required number of optimal lags

	Level					
Variables	Levin-Lin-Chu	Harris & Tzavalis	Im-Pesaran-Shin			
FDI	-5.83***	-9.64***	-7.66***			
UNC	-5.61***	-4.71***	-4.87***			
EXR	2.15	-10.79***	-2.48			
INF	-3.36***	-11.52***	-8.16***			
ТОР	-3.30***	-0.82	-4.18***			
EGR	-4.10***	-13.32***	-8.60***			
	At First Difference					
FDI	-9.32***	-21.58***	-11.63***			
UNC	-5.44***	-16.21***	-10.33***			
EXR	7.85***	-13.90***	-4.62***			
INF	-7.06***	-22.37***	-11.90***			
ТОР	-4.80***	-15.35***	-10.13***			
EGR	-8.24***	-22.82***	-12.43***			

Table 5. Panel unit root

Table 6. Countrywide optimal lag (111,011)						
Countries	FDI	EPU	EXR	INF	ТОР	EGR
Australia	0	1	2	0	1	1
Brazil	1	1	1	1	1	0
Canada	0	1	2	1	1	1
Chile	1	1	2	0	1	0
China	1	1	2	0	2	1
Colombia	1	1	2	0	0	2
France	0	1	1	0	1	0
Germany	1	1	1	1	1	0
Greece	1	1	1	1	1	1
Ireland	0	1	1	0	1	1
Italy	0	1	1	1	1	0
Japan	1	1	2	1	1	0
Korea, Rep.	0	1	0	1	1	1
Netherlands	1	1	1	1	1	1
Singapore	2	1	2	2	2	2
Spain	0	1	1	0	0	0
Sweden	1	1	1	1	2	0
United Kingdom	1	0	1	0	1	2
United States	2	1	1	0	2	1
Mode	1	1	1	0	1	1

for the dependent variable, while "**q**" refers to the required number of optimal lags for independent variables, respectively. The most common optimal lags for FDI inflow, uncertainty, exchange rate, inflation, trade openness, and economic growth are 1,1,1,0, 1, and

The study requires evaluating panel co-integration as a prerequisite for the estimation of panel ARDL after determining the ideal lag duration. A co-integration test is required to determine whether the estimation includes spurious regression. The existence of co-integration validates the stability of the panel ARDL regression estimate. Using Pedroni and Westerlund's tests, the existence of co-integration must be determined for a long form of panel data. The null hypothesis of both tests assumes that the variables of the investigation are not co-integrated. Table 7 displays the results of both tests, rejects the null hypothesis, and concludes that the variables in the study are co-integrated.

To evaluate the required set of hypotheses, the study must estimate the panel ARDL model after validating the long-run co-integration. As estimation approaches, the panel Ardl model utilized pooled mean group (PMG), mean group (MG), and dynamic fixed effect (DFE). The ultimate selection of suitable procedures is determined using the Hausman test. The significance of the Hausman test validated the DFE method for evaluating the final panel ARDL model's null hypothesis. The panel ARDL DFE model estimates are presented in Table 8, together with the results of the Hausman test.

Table 7. Panel co-integration						
Pedroni Test	Test S	tatistic	Westerlund Test	Test Statistic	Remarks	
	Panel	Group				
V	-1.415		Gt	-10.292 ***	Co-integration	
Rho	1.114	2.811	Ga	8.820 ***	EXISTS	
t	-4.525 ***	-4.326 ***	Pt	5.785***		
Adf	.5764	5.741***	Pa	7.331***		

The table depicts a negative and statistically significant long-term impact of uncertainty on FDI inflow for selected economies with high incomes. The coefficient value for this negative link indicates that a 1% increase in uncertainty will decrease the FDI inflow by 0.3886%. The negative relationship between uncertainty and FDI inflow accepts the 1st hypothesis. However, in the short run, the same is positive and statistically insignificant. The negative and very significant long-term impact of uncertainty on FDI inflows is consistent with previous unfavorable findings in some influential research (Nguyen & Lee, 2021; Ogbonna et al., 2022; Sinha & Ghosh, 2021; Smith, 2021; Williams et al., 2022; Zhang et al., 2022). According to prior studies, increased uncertainty may cause foreign investors to delay or withdraw from their investments in the host nation. In addition, the table revealed a negative and statistically significant long-term impact of the exchange rate on FDI inflow for the target population during the study period. The coefficient value for this negative impact is 0.0268. It indicates that the FDI inflow declined by 0.0268% by increasing 1% in the exchange rate. This negative link accepts the 2nd hypothesis. Short-run estimations reveal a positive and highly significant influence of exchange rates on high-income FDI inflow. Some important studies show a long-run negative link between the exchange rate and FDI inflow for the target population and period (Alshubiri, 2022; Gautam et al., 2020; Tan et al., 2021). According to previous studies, a rising exchange rate makes foreign currency costlier for foreign investors, discouraging them from investing or motivating them to withdraw from the host country.

The table indicates a negative and statistically significant long-term impact of the inflation rate on FDI inflow for the population under study over the study period. The coefficient value for this negative relationship is 0.0907. It is inferred that a 1% increase in the rate of inflation decreases the FDI inflow by 0.0907%. The negative relationship between the rate of inflation and FDI inflow accepts the 3rd hypothesis. However, the short-term estimates imply that inflation has a positive and statistically significant effect on FDI inflows in high-income economies. The detrimental impact of inflation on FDI inflows over the long run is likewise consistent with prior research findings (Alshubiri, 2022; Nguyen & Lee, 2021; Smith, 2021). Increasing inflation makes it too expensive for foreign investors to invest, which discourages them and reduces FDI inflow. In addition, the table indicates that trade openness is the positive factor influencing FDI inflows for the target population during the study period. The coefficient value for this positive link is 0.5687. It means that a 1% increase in the level of trade openness strongly enhances the FDI inflow by 0.5687%. This positive relationship accepts the 4th hypothesis. However, short-term estimates imply that trade openness has a favorable but small effect on FDI inflows to high-income economies. The positive relationship between trade openness and FDI inflow for the target population throughout the study period is consistent with the findings from other studies (Alshubiri, 2022; Nguyen & Lee, 2021; Smith, 2021). This strong relation may be seen as the relaxation of trade restrictions and promotion of trade openness boosting the trust of foreign investors in the host nation, hence increasing the FDI inflow. Finally, the table reveals a positive and statistically significant long-term effect of the real growth rate on the FDI inflow for higherincome economies during the study period. The coefficient value for this positive link is 0.1181. It is inferred that increasing 1% in the real growth rate enhances the FDI inflow by 0.1181% for the

Table 8. Panel ARDL (DFE)						
	Variables	Coef.	SE	T-value	Prob	
Long Run						
	Uncertainty	-0.3886	0.1395	-2.79	0.015	
	Exchange Rate	-0.0268	0.0135	-1.98	0.056	
	Inflation Rate	-0.0907	0.0206	-4.39	0.001	
	Trade Openness	0.5687	0.2490	2.28	0.021	
	Growth Rate	0.1181	0.0350	3.38	0.015	
Short Run						
	ECT	-0.7258	0.0451	-16.1	0.000	
	Δ Uncertainty	0.1356	0.1443	0.94	0.347	
	$\Delta ExchangeRate$	0.7920	0.1310	6.04	0.000	
	Δ InflationRate	0.0937	0.0417	2.25	0.025	
	∆TradeOpenness	0.3886	0.5516	0.70	0.481	
	Δ GrowthRate	-0.0597	0.0416	-1.44	0.151	
	Constant	0.3285	0.1027	3.20	0.000	
Diagnostic Tests	5					
Hausman Test to choose between MG an		G and PMG	chi2(5) = 1.73, Prob>chi2 = 0.8854		= 0.8854	
Hausman Test to choose between DF		E and PMG	chi2(5)	= 6.23, Prob>chi2 =	= 0.0158	
Number of Obser	vations (N × T)				418	
N (High-Income	Countries)	19				
T (2000–2021)		22				

higher-income economies. The positive impact of the real growth rate of FDI inflow accepts the 5th hypothesis. However, short-term estimates imply a negative impact that is statistically insignificant on the growth rate of FDI inflows into high-income economies. This conclusion is consistent with comparable findings from several earlier studies (Korsah et al., 2022; Osei & Kim, 2020; Shahbaz et al., 2021). In keeping with prior research, one possible interpretation for this positive link between real growth rate and FDI influx is that it encourages foreign investors in the host country to increase the inflow of funds, which boosts the FDI inflow.

5. Conclusion

The purpose of this study was to examine the influence of economic policy uncertainty on FDI inflows for 19 economies with higher incomes throughout the period 2000–2021. The dependent variable was foreign direct investment (FDI) inflow, whereas the independent variable was economic policy uncertainty. The exchange rate, inflation rate, trade openness, and real growth rate were the control variables. The data were examined using the panel Ardl method. Based on the relevance of the Hausman test, the DFE method for testing hypotheses with the panel Ardl was finalized. Uncertainty, exchange rate, and inflation have a statistically significant negative influence on FDI inflow for higher-income economies over the study period. Trade openness and real growth rate have a statistically significant positive impact. Growing economic policy uncertainty, exchange rate, and inflation rate deter foreign investors from investing in the host country, but trade openness and real growth rate boost investor confidence in increasing FDI inflow.

6. Policy implications, limitations, and suggestions for future research

The stability of the host country's political environment and consistency in government regulations favoring foreign investors are economic consequences of the study. Therefore, the policymakers in highincome economies should recommend that governments and relevant authorities stabilize their laws and political environment and make a favorable economic environment for international investors that encourage them to enhance their investment in host economies. Strict laws and a difficult political and economic environment may discourage foreign investors, which ultimately decline their investment in host economies of high-income groups. The implications also include stabilizing the exchange rate, and inflation rate to attract more FDI inflow. In addition, governments must encourage trade openness and real growth in the world's higher-income economies to increase FDI inflows.

The study's outcomes apply to higher-income economies but not lower-income/middle-income nations since the level and source of uncertainty for these groups may be different from high-income economies. Future research may include a comparative analysis of economies with higher, middle, and lower incomes.

Acronyms list

FDI – Foreign Direct Investment EPU – Economic Policy Uncertainty MG – Mean Group PMG – Pooled Mean Group DFE – Dynamic Fixed Effect ARDL – Autoregressive distributed Lag EXR – Exchange Rate INFR – Inflation Rate TOP – Trade Openness RGR – Real Growth Rate WDI – World Development Indicators GDP – Gross Domestic Product

Availability of data and material

The datasets used and/or analyzed during the current study have been taken from the world development index (WDI) and economic policy uncertainty (EPU) websites and made available from the corresponding author on reasonable request.

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No potential conflict of interest was reported by the author(s).

Authors contributions

MAH: Conceptualization, Writing the original draft, Data collection, Data analysis, and Designing the methodology, **ZB**: Supervision and Conceptualization, **MUA**: Data analysis, Editing, and Revision, **NY**: Methodology, Revision, and Proofreading.

Ethics statement

This material is the authors' original work, which has not been previously published elsewhere. The paper is not currently being considered for publication elsewhere. Sincerely,

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