ASSESSMENT OF THE IMPACT OF FOREIGN CAPITAL FLOWS ON ECONOMIC GROWTH IN ALGERIA

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Purpose. This study aims to measure and assess the impact of foreign capital flows, including foreign direct investment, external loans, foreign aid, and remittances from migrants, as independent variables on real GDP as a dependent variable in Algeria during the period 1990–2021 using the Autoregressive Distributed Lag (ARDL) time series regression model.

Results. The study found the existence of a long-term relationship between the selected economic variables and their impact on real GDP in Algeria, both in the short and long term. Additionally, there is a positive effect of both independent variables representing foreign direct investment and migrant remittances on real GDP. However, there is a negative impact of external loans on real GDP, which can be explained by the misallocation of these loans, with a significant portion directed towards non-productive sectors, negatively affecting the long-term economic growth in Algeria.

Scientific novelty. The primary contribution of this study is its comprehensive elucidation of all major forms of foreign capital flows to Algeria and their impact on the Algerian economy, including FDI, foreign aid, external loans, and remittances. This is important because different types of foreign capital flows have different effects on the Algerian economy. In addition, the evolution of foreign capital flows to Algeria over a long period of time, from 1990 to 2021, is studied. This made it possible to identify trends and patterns in foreign capital flows that may not be apparent in short-term studies.

Practical value. The results of this study can help policymakers to design policies that maximize the benefits of foreign capital flows while minimizing the risks. And Foreign capital flows can play an important role in helping Algeria to address these challenges and achieve its economic development goals.

Key words: foreign direct investment, external loans, foreign aid, remittances, real GDP, sustainable economic development.

Introduction. Foreign capital inflows are indeed one of the most important factors contributing to the development of economies in emerging countries. They do so by increasing the efficiency of capital allocation, supporting local financial
resources, and raising capital accumulation rates. Additionally, they provide the necessary foreign exchange to finance a country’s import needs. Generally, underdeveloped and developing countries cannot assure the economic development only with the internal capitals as the developed countries.

In the case of Algeria, the country embarked on economic reform programs in the early 1990s by moving away from a centrally planned economy towards a market-oriented system. This shift included trade liberalization and financial liberalization, which encompassed the liberalization of capital flows to and from Algeria. This recent direction aligns with Algeria’s aim to leverage scientific and technical capabilities, as well as financial resources, especially through foreign direct investment (FDI).

From the above, the problem of this research has been formulated in the following main question: Did foreign capital inflows, in their various components, impact the real Gross Domestic Product (GDP) growth in the Algerian economy during the period 1990–2021?

**Review of literature.** Several studies have explored the impact of international capital flows on economic growth in different countries.

Study of Sharafat (2014) is focused on the examination of effects of these flows on economic growth in Pakistan. Johansen cointegration technique and Granger causality test has been used for the analysis for the sample period of 1972–2013. The results reveal negative impacts of these flows on economic growth of the economy in long run. Short run analysis confirmed unidirectional causality running from debt service, FDI, inflation and literacy rate to growth. Causality from domestic investment is not concluded but it run from growth to domestic investment. Bidirectional causality between remittances and growth has been found.

In a study by Benanaya & Bakdi (2017) in Algeria from 1980 to 2014, it was suggested that foreign direct investment (FDI) acted as a catalyst for economic growth, with an increase of one unit in FDI leading to a 5% increase in GDP. Study of Akinwale & Adekunle (2019) investigated the effect of foreign capital inflows on economic growth in Nigeria. Their findings indicated mixed effects on economic growth, both in the short run and long run, as foreign direct investment, foreign portfolio investment, external debt, and savings all had varying impacts. Study of Aschale Gashu (2022) examined the impact of capital flow on economic growth in Ethiopia using time series data from 1980 to 2010. The study revealed that all variables were statistically significant, indicating that capital flow had an impact on economic growth in both the short and long run, with bidirectional causality between gross capital flow and economic growth.

Finally, in a study by Djalab & Said (2023) conducted in Algeria from 1990 to 2018, it was found that all channels of international capital flows, including foreign direct investment, official development assistance, personal remittances, and external debt stock, were not statistically significant in the short and long run, except for foreign direct investment.
1. Definition of foreign capital inflows: foreign capital inflows are defined as the influx of external resources into the local of capital resources for the purposes of investment, trade and business production. On the other hand, investment is the funds committed into economic activity with the hope of making benefits from future returns over a period of time. By this assertion (Djalab & Said, 2023) foreign capital inflows are defined as the transfer of rights associated with capital from an individual or a group of individuals, whether legal or natural persons, civil or official institutions, from one country to another. This passage defines “capital” in this context as encompassing all forms of capital, including money, bonds, certificates, or other financial instruments. It clarifies that the term does not refer to the transfer of specific physical capital goods from one country to another. Instead, it refers to the transfer of purchasing power that has not been designated for consumption from one country to another. In other words, it signifies the movement of capital in various forms, both financial and non-physical, from individuals (legal and natural persons) and projects from one country to another. Forms of foreign capital inflows into developing countries include:

Foreign Direct Investment (FDI): typically, foreign investment is considered direct when the foreign investor holds a stake of at least 10% in the ownership of the enterprise within the host country (IMF, 2003). According to the Arab Investment and Export Credit Guarantee Corporation, Foreign Direct Investment (FDI) is a type of international investment that reflects a resident entity, referred to as the direct investor, having a lasting interest in a resident enterprise, known as the direct investment enterprise, in another economy. Foreign Direct Investment (FDI) can take the following forms according to the ownership criterion (Zeqiri & Bajrami, 2016):

- Greenfield investments: these are investments made by a foreign investor in the establishment of a new company in a host country.
- Acquisitions: these are investments made by a foreign investor in the purchase of an existing company in a host country.
- Joint ventures: these are investments made by a foreign investor in cooperation with a local investor in the establishment of a new company in a host country.

Foreign Portfolio Investment (FPI): this source of financing tends to flow into countries that possess relatively advanced financial markets, financial intermediation mechanisms, and liberalized investment regimes. FPI are further split between debt and equity investments and recently financial derivatives has been added as part of portfolio investments, which include options contracts, futures contracts, and swaps (Danja, 2012). Compound instruments, on the other hand, consist of a combination of stocks and bonds, and this is what we refer to as a securities portfolio.

External loans: is a tool which is used to bridge the gap between government expenditures and government revenues. It is not only used for budgetary support but also promotes investment in recipient countries (Rehman & Ahmad, 2016). It refers to funds borrowed by a country from external entities beyond its borders. This debt is
typically utilized within the country to finance various projects or endeavors without
the involvement of domestic production, ordinary citizens, corporations, or
individuals. It represents the sum of obligations owed to external sources, such as
foreign corporations, governments, or international financial institutions. These loans
and their associated interest payments must be repaid in the currency in which they
were received to ensure the borrower’s fulfillment of their financial commitments.
Additionally, to provide a comprehensive financial overview, the outstanding balance
owed to external lenders must be incorporated (Ogbonna et al., 2021).

Foreign aid, also known as grants or assistance, refers to the support provided by
foreign countries to a developing nation in the form of either cash in convertible
currencies or in-kind aid in the form of consumable goods and services. This means
of support does not impose a burden on the productivity of the recipient country, as it
does not carry any subsequent commitment to repay. However, foreign aid is not a
complete or reliable solution by itself, and it cannot be solely relied upon. The
volume and flow of foreign grants and assistance are often influenced by the political
relations between the donor country and the recipient country. Additionally, many
developing countries have been criticized for misusing or misallocating foreign aid,
which can divert it away from economic development.

Remittances: represent certain transactions that are initiated by individuals
living or working outside their country of birth or origin and related to their migration
(Reinke, 2007). If migrants have lived in the host country for one year or more, they
are considered residents regardless of their migrant status. However, if they have
lived in the host country for less than one year, the funds they receive are considered
compensation for labor. Remittances refer to the net value of what migrants transfer
from one country to another when they migrate (a period of at least one year).

2. The impact of foreign capital inflows on economic growth. Economic growth
takes a top priority in shaping economic policies, as it represents one of the most
significant economic phenomena with the greatest impact on the lives of both present
and future individuals. According to the neoclassical growth model, an increase in the
available capital stock in the host economy leads to an increase in production, which
then corresponds to an increase in the growth rate of output.

The most compelling argument in favor of international capital mobility,
championed by economists, is that it promotes an efficient global allocation of
savings, directing financial resources towards their most productive applications,
thereby fostering economic growth and prosperity worldwide. However, substantial
capital inflows pose a significant challenge for economic policymakers in
implementing macroeconomic policies. Efforts to curb exchange rate appreciation
through monetary policy tightening may inadvertently attract even more foreign
capital into the domestic economy, as higher interest differentials signal higher
returns, further exacerbating exchange rate pressures. Even if international capital
flows do not induce excessive volatility in domestic financial markets, large capital
inflows can still trigger inflation under a fixed exchange-rate regime (Balogun et al.,
Studying the relationship between foreign capital inflows and real GDP requires us to examine each form of foreign capital inflows and its connection to economic growth.

FDI plays a fundamental role in achieving economic growth in both developing and developed countries. The most significant advantage for developing countries is FDI’s contribution to bringing and introducing new technology, skills, training, and other relevant and essential materials to their economy. Additionally, a crucial benefit for the host nation is the possibility of employment (Nur Mohamed & Abdulle, 2023). Foreign direct investment can also give foreign investors enormous benefits, the most significant of which are cost savings on transportation (for both inputs and finished goods), reduced labor costs, accessible infrastructure, and customs savings. Also, contributions to imported goods, a closed position to clients, the possibility for quick and effective delivery with data accessibility, preferences, and the potential for quick product adaption to market demands. Moreover, there are three categories of FDI: fund stocks, invested income, and intra-company credits (International tax, 2022). However, there can also be negative effects on the economic performance of host countries due to FDI (Benghoul et al., 2019). These flows may substitute for local savings, leading to crowding out of domestic investments and the transfer of outdated and traditional technologies. Additionally, the use of technology that replaces labor can reduce job opportunities. Moreover, there may be a reverse flow of profit repatriation when considering transfer pricing practices and significant concessions granted by host countries to attract such investments.

Many recent empirical studies have highlighted the strong link between the development of capital markets and the flow of portfolio investments and economic growth. This is achieved by ensuring the mobilization of savings, strengthening corporate governance, managing financial risks, reducing the cost of information, and pricing it efficiently. However, some argue that foreign indirect investment can have negative effects on economic growth, especially in the event of a financial or economic crisis. During such crises, portfolio investments can be volatile and subject to sudden withdrawals, which can lead to instability in financial markets and a negative impact on economic growth. Portfolio investment is frequently depicted as the least reliable type of flow.

Foreign loans play a crucial role in achieving economic growth as they provide the necessary financing for various local investments and projects. The key lies in how these loans are utilized and directed towards productive sectors to maximize returns and generate a surplus that ensures the repayment of these loans according to the specified period and installments. However, a high level of accumulated debt may negatively affect investment and economic growth. Krugman (1988) defined the debt overhang as “the presence of an existing inherited debt sufficiently large that creditors do not expect with confidence to be fully repaid”. However, the extent to which investment is discouraged by a debt overhang depends on the government’s
ability to generate resources to finance debt service obligations (Abouelfarag & Abed, 2020). In addition, higher debt service can raise the government’s interest bill and the budget deficit, reducing public savings; this may either raise interest rates or crowd out credit available for the private investment, dampening economic growth; this channel is known as the “crowding-out” effect (Abouelfarag & Abed, 2020).

Foreign aid has been an essential resource for accelerating developing and less developed countries’ economic growth throughout history. Therefore, foreign aid has the potential to contribute to different economic areas of countries, such as social and economic infrastructures, production and service sectors, education, agriculture, rural development, and food security (HeeYiew & Lau, 2018). There are two views in the economics literature about the impact that foreign aid can have on economic growth. According to the first view, aid from abroad will contribute positively to developing and less developed countries’ economic growth and development. Because in developing and underdeveloped countries, foreign aid contributes to macro and microeconomic factors and closes the foreign exchange deficit. On the other hand, according to the second view, foreign aid causes deterioration of the internal income distribution in recipient countries and interferes with the country’s economic and political policies (Golder et al., 2021).

Migrants’ remittances are considered an important source of international financial flows to the recipient countries for alleviating poverty, through financing consumption and improving the living standards of households, and promoting economic growth, via filling domestic saving-investment gapes, they can positively, negatively, or neutrally influence economic growth depending on their use and the channels through which they are allocated. Remittances may enhance growth if they are invested in human capital development, via financing the education and training activities (Fathy Abdelgany, 2022). Other literature adds evidence on several indirect positive effects of remittances on economic growth, such as their resultant financial development. The neutral or weak influence of remittances on economic growth assumption denotes the situation where the altruistic motive dominates the nature of remittances to most developing and least-developed receiving countries. In other words, the majority of these remittances are used to finance the consumption of food, housing, land, and luxuries (Alhannom & Mushabeb, 2021).

Materials and methods. This study aims to measure and assess the impact of foreign capital inflows, including foreign direct investment, external loans, foreign aid, and remittances from migrants, as independent variables on real GDP as a dependent variable in Algeria during the period 1990–2021 using the Autoregressive Distributed Lag (ARDL) time series regression model.

To test the research hypothesis regarding the response of the real Gross Domestic Product (GDP) to various foreign capital flows, we employed the Auto Regressive Distributed Lag time-series regression model. This method, developed by (Pesaran & Shin, 1999) offers several advantages compared to previous cointegration methods such as the Engle-Granger technique and the ARDL bounds testing
approach.

The ARDL model does not require all variables under study to be integrated at the same order. It can be applied when all variables are integrated of the first order, integrated of zero order, or when there is a mix of variables integrated at the first and second orders, with the dependent variable not being integrated of zero order. The ARDL model is relatively more efficient in cases of small or limited samples. Additionally, it allows for obtaining unbiased estimates in a long-run framework.

*Presentation of variable.* This study was carried out based on annual data for the two variables hereunder.

**Dependent Variable:** Real Gross Domestic Product (GDP) at constant prices for the year 2015 in million dollars, represented as “GDP”.

**Independent Variables:**
- FDI: Foreign Direct Investment, representing the net inflows of foreign direct investments, which includes new investment flows minus withdrawals, in million dollars.
- AID: Foreign Aid, including concessional loans and grants provided by official institutions in members of the Development Assistance Committee, as well as contributions from multilateral institutions and other aid flows, in million dollars.
- ED: External Debt, which is the total external debt obligations of non-residents that are repayable in foreign currency. It includes public and publicly guaranteed debt, as well as private long-term and short-term debt not guaranteed by the government, in million dollars.
- RMT: Remittances, encompassing all received transfers, including personal remittances and compensation of employees, involving both residents and non-residents, in million dollars.

The data for this study was obtained from annual sources spanning 32 observations from 1990 to 2021, retrieved from the World Bank website. The model takes the following form:

\[ GDP = f(FDI, AID, ED, RMT) \] (1)

This equation represents the relationship between the Gross Domestic Product (GDP) and the independent variables: Foreign Direct Investment (FDI), Foreign Aid (AID), External Debt (ED), and Remittances (RMT).

The standard methodology used in this study involves several steps before estimating the ARDL model and analyzing its results. If we summarize the standard methodology, it would involve the following steps:
- study of the stability of time series;
- constructing an unrestricted Error Correction Model (ECM);
- selecting the optimal lag periods for the variables included in the estimation of an ARDL model;
- the Bounds Test;
- the estimations of the long-term parameters;
- estimating the short-run parameters and the error correction model;
- the validity of an ARDL model.
Results and discussion. The structure of foreign capital inflows to Algeria from 1990 to 2021. We will attempt to analyze the evolution of the structure of foreign capital inflows into Algeria for the period (1990–2021) as depicted in Figure 1.

![Figure 1. The structure of foreign capital inflows into Algeria for the period 1990–2021](Image)


External Loans: they accounted for the largest share of foreign capital inflows at 97% of total inflows in 1990, and remained around that level until 2002 when it decreased to 90% of total inflows. This can be attributed to Algeria’s external debt crisis in 1986 due to a drop in oil prices, which led to a reliance on new loans from international financial institutions. External loans continued to dominate the structure of foreign capital inflows into Algeria even after the period of reforms, as their repayment periods extended to ten years or more. During 2016, there was a slight increase after Algeria obtained its first external loan from the African Development Bank since the end of the 1990s to finance energy projects. The consecutive deficits in the balance of payments had led to a significant decline in foreign exchange reserves. However, Algeria maintained low levels of foreign loans from 2017 until 2021, relying on non-traditional financing to cover budget deficits. Despite the minor decrease in their contribution, other capital inflows remain weak compared to external loans.

Migrant Remittances: experienced fluctuating trends during the period from 1990 to 2000, which can be attributed to a combination of economic factors resulting from Algeria’s implementation of economic reforms supported by international institutions. Additionally, social factors, such as high unemployment and poverty rates, contributed to an increase in migrant remittances due to their social nature. This period also witnessed a rise in the number of migrants due to instability and security concerns. Since the beginning of the third millennium, remittances reached their lowest level in 2001, gradually increasing until 2004. Subsequently, there was a decline in remittances during the period from 2005 to 2013, driven by improvements in economic and
financial conditions, overall economic stability, and the return of many migrants to Algeria following improvements in political and security situations. Generally, the volume of remittances flowing into Algeria does not exceed USD 2 billion under the best circumstances. This is due to several obstacles, including the weakness of the financial and banking system in Algeria, high costs of remittances from abroad, and the preference of most Algerian migrants for the parallel foreign exchange market for transferring their money, as well as the unfavorable investment climate in Algeria.

Foreign Direct Investment (FDI): recorded significant development after the implementation of various economic reforms and the transition from a planned economy to a market economy. However, it witnessed a decline in 1999 and 2000 due to the oil crisis. After the issuance of Order No. 01/03 related to investment development, which granted several privileges to foreign investors, coupled with improvements in the political and security situation and financial conditions, foreign direct investment flows increased in 2001 and 2002. Subsequently, there was a generally positive trend in FDI inflows, with exceptions in certain years such as 2010 when FDI experienced a decline, mainly due to changes in Algerian legislation governing foreign investments. One of these legislative changes included limiting the maximum share of the foreign partner in any project in Algeria to 49%, with the remaining 51% of the company’s capital allocated to national parties. In 2015, there was a significant decline in FDI inflows due to the decrease in oil revenues, considering that the oil sector is the most attractive sector for foreign direct investment. In 2018, there was an increase in FDI inflows; however, subsequent years, including 2019, 2020, and 2021, witnessed a decline in the volume of Algerian foreign investment. This decline occurred despite the abolishment of the 51/49 rule imposed on foreign investment in Algeria, particularly for non-strategic investments, according to the 2020 Finance Law. Overall, foreign direct investment in Algeria has not exceeded a 1.85%.

Foreign Aid: its share was relatively low, with the highest value recorded in 1998 at approximately USD 0.42 billion, accounting for 1.28%. Since 2010, foreign aid has witnessed a decline. It’s worth noting that Algeria has focused on net flows of bilateral grants from donor countries as members of the Development Assistance Committee. These net payments represent the official development assistance (ODA) or official aid provided by members of the Development Assistance Committee.

Indirect Foreign Investment: completely non-existent according to the data from the international bank, mainly due to the weakness of the stock market in Algeria. The Algerian stock exchange comprises only 5 companies and records negligible changes.

Study of the stability of time series. The unit root test aims to examine the characteristics of time series data to ensure the stationarity of the series. We will test the stationarity of the time series data using the Augmented Dickey-Fuller (ADF) test. The results of this test can be summarized in Table 1.

After conducting unit root tests for both levels and first differences, we observed that the computed test statistics are greater than the critical values at the 1%, 5%,
and 10% significance levels. Consequently, we reject the null hypothesis and accept the alternative hypothesis, which suggests the absence of a unit root. Therefore, the variables under study are stationary at the first difference and at the level, indicating they are integrated of order I(0) and I(1).

**Table 1**

Results of the unit root test using the Augmented Dickey-Fuller (ADF)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>/</td>
<td>-4.4509***</td>
<td>-4.3765***</td>
<td>-1.0993</td>
</tr>
<tr>
<td>FDI</td>
<td>/</td>
<td>-8.5230***</td>
<td>-8.5193***</td>
<td>-8.6409***</td>
</tr>
<tr>
<td>AID</td>
<td>-3.5068**</td>
<td>-3.4266***</td>
<td>-0.6460</td>
<td>-10.0498***</td>
</tr>
<tr>
<td>ED</td>
<td>/</td>
<td>-3.5998**</td>
<td>-3.5480*</td>
<td>-0.6460</td>
</tr>
<tr>
<td>RMT</td>
<td>-2.6369*</td>
<td>-2.6654***</td>
<td>-1.0753</td>
<td>-6.5348***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>First Difference</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-4.4509***</td>
<td>-4.3765***</td>
<td>-1.0993</td>
<td>I(1)</td>
</tr>
<tr>
<td>FDI</td>
<td>-8.5230***</td>
<td>-8.5193***</td>
<td>-8.6409***</td>
<td>I(1)</td>
</tr>
<tr>
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<td>-3.5068**</td>
<td>-3.4266***</td>
<td>-0.6460</td>
<td>-10.0498***</td>
</tr>
<tr>
<td>ED</td>
<td>-3.5998**</td>
<td>-3.5480*</td>
<td>-0.6460</td>
<td>-6.5348***</td>
</tr>
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<td>-1.0753</td>
<td>-6.5348***</td>
</tr>
</tbody>
</table>

*Note: *, ** et *** indicate significance at 1%, 5% et 10% levels, respectively.

Source: prepared based on the output of EViews 11.

Constructing an unrestricted Error Correction Model is a specialized form of the ARDL model based on the results of the stationarity tests for the variables. Using the Bounds test of cointegration, it is determined that an ARDL model is the most suitable for the sample size used in this study, consisting of 32 observations. The ARDL model is formulated as follows:

\[
\Delta GDP_t = c + \beta_1 GDP_{t-1} + \beta_2 FDI_{t-1} + \beta_3 AID_{t-1} + \beta_4 ED_{t-1} + \beta_5 RMT_{t-1} + \sum_{i=1}^{q_1} \alpha_1 GDP_{t-i} + \sum_{i=0}^{q_2} \alpha_2 FDI_{t-i} + \sum_{i=0}^{q_3} \alpha_3 AID_{t-i} + \sum_{i=0}^{q_4} \alpha_4 ED_{t-i} + \sum_{i=0}^{q_5} \alpha_5 RMT_{t-i} + \epsilon_t
\]

The parameter representing the lagged dependent variable for one period on the left side of the equation is denoted as \(\beta\), representing the long-term relationship parameters. On the other hand, the first difference parameters are denoted as \(\alpha\) and represent the short-term parameters. \(\epsilon\) and \(c\) represent the error term and the intercept, respectively.

Selecting the optimal lag periods for the variables included in the estimation of an ARDL model. In order to determine the optimal lag lengths, the Akaike Information Criterion (AIC) was used, which is the most commonly used criterion for lag length selection. The goal was to test different lag lengths to identify the ones that result in the lowest AIC values. Table 2 illustrates the optimal lag selection for the dependent variable and the independent variables (p, p_1, p_2, p_3, p_4).

The appropriate lag lengths are selected automatically using the Eviews11 software, where the program considers several models for the dependent and explanatory variables with different lag lengths. It then presents the best 20 models based on the lowest Akaike Information Criterion (AIC) values. The Table above illustrates the optimal model out of the 20 given models, which is the (1,1,1,0,1) ARDL model.
Table 2

Results of the optimal lag length test

<table>
<thead>
<tr>
<th>The ARDL model</th>
<th>p</th>
<th>p1</th>
<th>p2</th>
<th>p3</th>
<th>p4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The optimal lags according to the AIC criterion</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: prepared based on the outputs of Eviews 11.

The Bounds Test: is designed to determine whether there is evidence of a long-term relationship between variables by testing the null hypothesis that there is no long-term relationship between the variables under study. The results of this test are presented in Table 3.

Table 3

<table>
<thead>
<tr>
<th>F-statistics</th>
<th>Significance level</th>
<th>Bound Critical Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.551601</td>
<td></td>
<td>I(0)</td>
</tr>
<tr>
<td></td>
<td>1%</td>
<td>3.29</td>
</tr>
<tr>
<td></td>
<td>5%</td>
<td>2.56</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Source: prepared based on the outputs of Eviews 11.

The F-statistic for the Bounds Test is 5.551601, which is significantly greater than the critical value at the 1% level. Therefore, the null hypothesis that there is no long-term relationship between the variables is rejected. This test provides evidence of a long-term relationship between the study variables.

The estimations of the long-term parameters. The results of the estimation of the long-term parameters are shown in Table 4.

Table 4

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Parameters</th>
<th>t-statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI</td>
<td>0.021308</td>
<td>1.808833</td>
<td>0.0842</td>
</tr>
<tr>
<td>AID</td>
<td>-0.154588</td>
<td>-1.935074</td>
<td>0.0659</td>
</tr>
<tr>
<td>ED</td>
<td>-0.001481</td>
<td>-1.862291</td>
<td>0.0760</td>
</tr>
<tr>
<td>RMT</td>
<td>0.018276</td>
<td>2.330805</td>
<td>0.0293</td>
</tr>
<tr>
<td>C</td>
<td>160.0027</td>
<td>5.553646</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: prepared based on the outputs of Eviews 11.

When estimating the long-term parameters, the equation for the long-term relationship is formulated as follows:

\[ GDP = 0.0213FDI - 0.1546AID - 0.0015ED + 0.0183RMT + 160.0027 \]  \( (3) \)

The positive sign for foreign direct investment and migrant remittances indicates that they are both drivers of economic growth. Foreign direct investment provides capital and new technologies that can help domestic businesses grow and expand. Migrant remittances can be a source of important income for poor families, and they can help to stimulate local economic growth.

The negative sign for external debt indicates that it has a negative impact on economic growth. External debt can be a burden on the economy if it is not used wisely. It can lead to increased interest payments and debt service, which can crowd...
out spending on other important priorities.

*Estimating the short-run parameters and the error correction model.* The results of the estimation of the short-run parameters and the error correction model are shown in Table 5.

Based on the results shown in the table, we conclude that real GDP in the short run is affected by its previous positive and negative values. The results of the error correction coefficient also showed a high significance of 0.0000 at the 5 % level and a negative sign of (-0.170500).

### Table 5

**Short-term parameter estimates and error correction term**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Parameters</th>
<th>t-statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI(-1)</td>
<td>0.003633</td>
<td>1.842658</td>
<td>0.0789</td>
</tr>
<tr>
<td>AID(-1)</td>
<td>-0.026357</td>
<td>-1.973955</td>
<td>0.0611</td>
</tr>
<tr>
<td>ED**</td>
<td>-0.000252</td>
<td>-1.089017</td>
<td>0.2879</td>
</tr>
<tr>
<td>RMT(-1)</td>
<td>0.003116</td>
<td>1.445159</td>
<td>0.1625</td>
</tr>
<tr>
<td>CointEq(1-)</td>
<td>-0.170500</td>
<td>-6.393744</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

*Source:* prepared based on the outputs of Eviews 11.

This confirms the accuracy of the long-run equilibrium relationship and that the error correction mechanism exists in the model. This parameter reflects the speed at which the model adapts to transition from short-run imbalances to long-run equilibrium. This means that deviations in real GDP in the short run are corrected in the following year to return to the long-run equilibrium.

*The validity of an ARDL model.* The validity of an ARDL model is essential to ensure the accuracy and reliability of the results. A number of tests are typically conducted to assess the validity of an ARDL model, including Diagnostic tests. These tests are shown in Table 6.

### Table 6

**Results of the residual analysis of the model**

<table>
<thead>
<tr>
<th>Diagnostic tests for the model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of test</td>
</tr>
<tr>
<td>LM (F) Test (P-Value)</td>
</tr>
<tr>
<td>Heteroskedasticity (F) Test (P-Value)</td>
</tr>
<tr>
<td>CUSUM</td>
</tr>
<tr>
<td>CUSUMSQ</td>
</tr>
</tbody>
</table>

*Source:* prepared based on the outputs of Eviews 11.

To detect the presence of autocorrelation, we use the LM TEST. For the problem of non-constant variance, we use the Breusch-Pagan-Godfrey test. For the model, the errors of the model must be independent in a sequential manner. This is evident from Table 7 that the value of (2)Prob Chi-square is greater than 5 %, i.e., 0.05<0.7023, at the correlation degree test of 2.

We note from Table 6 that the value of Prob Chi-square (1) is greater than 5 %, i.e., 0.1896<0.05. This confirms the null hypothesis, namely the existence of a problem of non-constant variance of errors.

In order to ensure that the data used in this study is free of any structural
changes, it is necessary to use one of the appropriate tests, such as the cumulative sum of the recursive residuals (CUSUM), and the cumulative sum of the squares of the recursive residuals (CUSUM of Square). These two tests are considered to be the most important tests in this field, as they clarify two important things: the identification of any structural change in the data, and the degree of stability and consistency of the long-term parameters with the short-term parameters.

The structural stability of the estimated parameters for the error correction form of the distributed lag autoregressive model is achieved if the graphical representation of both the CUSUM and CUSUM of Square tests falls within the critical limits at a significance level of 5%. In other words, if the error curve falls within the range of two standard deviations (2SE), then we reject the null hypothesis H0 at a significance level of 5% that the parameters are stable throughout the study period.

Discussion. Based on the Table 4 of long-term parameter estimates and based on the above estimated equation, we note the positive effects of both foreign direct investment and migrant remittances on real GDP in the long term. These results are consistent with economic theory, which states that capital flows to the host country positively affect real GDP and thus economic growth in the country. However, this effect is very weak for all independent variables. With regard to foreign direct investment flows, they are concentrated mainly in the oil sector, which in Algeria is not considered to be a promising sector because it does not transfer foreign expertise or employ a large number of workers. If the circle of sectors that receive foreign investment were expanded, this would contribute to economic diversification, the transfer of expertise, the employment of workers, and the creation of added value. In addition, Algeria's low ranking in the World Investment Climate Report does not make it a popular destination for foreign capital due to bureaucracy and constant delays that force foreign investors to abandon the idea of investment. As for external loans, they are not directed to real investments and development projects, but rather towards infrastructure and reconstruction and towards unproductive productive trends. This is consistent with the inverse relationship between them and real GDP.

We note from the upper part of Table 5, which expresses the error correction model (short-term relationship), and the results indicate that there is a direct relationship between foreign direct investment and economic growth (real GDP), but it is very weak (non-significant). Therefore, foreign direct investment and migrant remittances cannot affect GDP in the short term. The explanation for this is that foreign direct investment in its early stages is with the implementation of privatization programs, it has turned to nationalize existing projects without going to establish new projects. As for foreign loans, they indicate a very weak inverse relationship in the short term on GDP, which is due to the misuse of these loans by directing a large portion of them to unproductive sectors. Considering official aid and assistance, which also has a weak positive relationship in the short term. And the same is the case for migrant remittances, which indicate a weak positive relationship, as they are in the short term aimed at meeting consumption needs and buying homes.
and properties, and over time they can be directed to establish productive projects.

The results also showed that the error correction coefficient is significant at 0.0000 at the 5 % level and with a negative sign (-0.170500). This confirms the accuracy of the long-term equilibrium relationship and that the error correction mechanism is present in the model. This parameter reflects the speed at which the model adapts to the transition from short-term imbalances to long-term equilibrium.

The parameter (-0.170500) in our research model indicates that real GDP converges towards its equilibrium value by 17.05 %. In other words, when economic growth deviates from its long-term equilibrium value in period (t-1), it is corrected by 17.05 % in the current period (t).

**Conclusions.** In conclusion, foreign capital flows are of great importance, especially after the confirmation of their important role in raising economic growth rates in theory. In Algeria, they can be considered an important source that has not achieved the desired goal of mobilizing savings to support economic development programs, especially in light of the decline and inadequacy of self-financing sources, coinciding with the collapse of oil export prices, which led to the exacerbation of crises and the continuation of structural imbalances.

From this standpoint, some recommendations can be proposed that would maximize Algeria’s benefit from these flows, especially foreign direct investment:

- **Work to create a good investment climate.** A good investment climate is one of the most important factors affecting the investor’s decision to invest his money in the host country. It is also necessary to use tax incentives to direct investment companies to less developed regions that need more investment to achieve their economic development, to ensure balanced regional development, to relieve population pressure on major cities, and to create new centers of attraction for labor.

- **Create trust in the legal and regulatory environment.** This is one of the main characteristics of any country, and these considerations are much more important than other considerations such as low tax rates and labor costs. In addition to providing legal protection from political and regulatory risks such as confiscation of property, currency exchange ban and restrictions on transfer, and lack of transparency in dealing with government agencies.

- **Work to provide effective investment incentives that are capable of attracting foreign direct investment that investors differentiate between similar locations to choose a new base for their exports.** When the motivation for investment is the desire to access a local market or extract natural resources, these incentives become generally ineffective.

- **The need to provide the necessary infrastructure for investment and develop financial markets and banking and facilitate payment and transfer mechanisms for funds from and to the country.**

- **Reform and develop the financial system in Algeria in order to increase the capabilities of countries receiving remittances to mobilize migrant savings and direct them towards real investment.**
Benefit from the experiences of countries that have managed to emerge from developing countries and catch up with developed countries, by exploiting many factors and pursuing economic policies, especially those related to maximizing the benefit from foreign capital flows and providing the appropriate investment environment for them.

We would also like to mention the limitations of the research. The study’s focus on aggregate foreign capital flows limits the exploration of their differential impacts on Algeria’s diverse economic sectors. Disaggregating data by sector or industry would provide a more nuanced understanding of how foreign capital flows influence economic growth across various sectors. Moreover, the study overlooks the role of institutional factors in shaping the relationship between foreign capital flows and economic growth. Institutional factors, such as governance quality, the rule of law, and property rights protection, significantly impact the effectiveness of foreign capital in promoting economic growth. Furthermore, the study fails to address the potential endogeneity of foreign capital flows. Economic growth itself may attract foreign capital inflows, making it challenging to isolate the causal effect of foreign capital flows on economic growth.

Unveiling the nuanced effects of foreign capital flows necessitates a deeper exploration of their differential impact across specific sectors or industries. Elucidating the mediating role of institutional factors in shaping the relationship between foreign capital inflows and economic growth is paramount. To tackle the potential endogeneity of foreign capital flows, more sophisticated econometric methodologies should be employed.

References


