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The Impact of Economic Dependence on Economic Growth in Egypt

An Empirical Analysis (1977–2021)

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Abstract

The dearth of empirical research on economic dependence in Egypt since the 1980s underscores the significance of this study, which investigates the relationship between economic dependence and economic growth in Egypt from 1977 to 2021. Utilizing the autoregressive distributed lag (ARDL) model, this study examines the effects of trade, investment, debt, and aid dependence on economic growth. The findings reveal that investment and aid dependence have a positive impact on economic growth, while trade and debt dependence have a negative impact. These outcomes are compared with the arguments of dependency and neoclassical economics theory to provide a comprehensive analysis of the implications. Moreover, the study provides policy recommendations to mitigate the negative impacts of economic dependence and promote self-reliant development, including prioritizing local development goals in global relations, diversifying the sources of aid, reducing debt used in financing investment projects, and restructuring the economy to prioritize national interests. These policies can help Egypt achieve higher rates of growth while mitigating the negative effects of economic dependence.

Keywords: Dependency Theory, Capitalist World Economy, Africa, Middle East

The phenomenon of economic dependence has remained a central concern within development studies, particularly since the rise of dependency theory in the 1960s and 1970s. This theoretical framework emerged as a critical response to modernization and neoclassical development paradigms, both of which posited that developing countries could achieve sustainable economic growth by adopting Western capitalist models (Rostow 1960; Friedman 1976). In contrast, dependency theorists argued that such perspectives overlook the persistent historical and structural inequalities between developed and developing nations, highlighting the exploitative nature of global economic relations (Frank 1969; Amin 1971).

In Egypt's context, debates on economic dependence gained renewed relevance following the October 1973 war. The subsequent policy shift under President Anwar Sadat, marked by the "Infitah" (open-door) policies, represented a significant departure from the inward-oriented, state-led development strategies of the Nasser era. During the 1950s and 1960s, Egypt pursued policies aimed at nationalizing foreign assets, reducing external dependence, and implementing centralized economic planning. In contrast, Sadat's reforms reoriented Egypt towards a liberalized market economy, emphasizing foreign investment, privatization, and reducing the state's direct role in economic activities.

This study seeks to critically examine the relationship between economic dependence and economic growth in Egypt over the period 1977–2021. The selection of 1977 as a starting point is both methodologically and historically significant. Beyond data availability, this year symbolizes Egypt's strategic realignment with the Western bloc, epitomized by Sadat's historic visit to Israel and his well-known assertion that "The U.S. holds 99% of the cards in the Middle East." (Jewish Telegraphic Agency 1977) This realignment had far-reaching implications for Egypt's economic trajectory and patterns of external dependence.

The primary objective of this research is to empirically assess the impact of multiple dimensions of economic dependence—namely trade, foreign investment, external debt, and foreign aid—on Egypt's economic growth. To achieve this, the study employs the Autoregressive Distributed Lag (ARDL) model, a robust econometric approach well-suited for small-sample time series data. The ARDL framework facilitates the analysis of both short-run dynamics and long-run equilibrium relationships, providing a comprehensive understanding of how economic dependence influences growth over time.

Additionally, this study addresses a critical gap in the literature. While existing research has largely concentrated on Egypt's economic dependence during the 1970s and 1980s, few empirical studies have extended their analysis beyond these decades. By examining the period from 1977 to 2021, this research offers a longitudinal perspective that captures the evolving nature of Egypt's external economic engagements and their implications for growth.

The remainder of this paper is organized as follows: it begins with a review of the theoretical and empirical literature on economic dependence, followed by the research hypotheses derived from the theoretical framework. The methodological approach and data sources are then outlined, after which the empirical findings and analysis are presented. The paper concludes with a summary of key results and policy implications.

Literature Review

Theoretical Overview

Marxism. Early Marxist analysis viewed global economic relations as rooted in exploitation established during the era of **primitive accumulation**. Marx (1848) argued that capitalist development in Europe was jump-started by the seizure of wealth from Asia, Africa, and the Americas, and that capitalism continually requires new markets and resources abroad. This process would eventually integrate all nations into a global system, destroying pre-capitalist structures and forcing underdeveloped regions to follow the path of the advanced economies. Lenin (1917) later elaborated that imperialism—characterized by the export of capital and competition for colonies—was a crucial stage of capitalism, enabling industrialized countries to extract profits from the periphery. He posited that imperialist powers keep poorer nations underdeveloped and indebted, benefiting from an unequal relationship. Lenin also foresaw shifts in the centers of capitalist power, suggesting that dominance could eventually move away from early-industrializing Europe toward other regions.

Dependency Theory. Dependency theory built upon Marxist and Leninist ideas by examining how the penetration of advanced capitalism into peripheral economies could **impede** development rather than foster it. Frank (1969) famously described this as the "development of underdevelopment," arguing that economic ties between core and periphery nations lead to the **extraction of surplus** from the latter. When foreign investment enters a peripheral country, profits and interest are repatriated to the core, resulting in capital accumulation in rich countries and underdevelopment in the poor ones. Amin (1973) similarly showed how "**unequal exchange**" in trade—stemming from wage and price disparities—transfers value from the periphery to the core. In such exchanges, peripheral commodities are undervalued relative to those from the core, allowing wealth to flow outward and concentrate in dominant capitalist nations. Dependency scholars also highlight **structural distortions** in peripheral economies caused by external orientation. Dos Santos (1970) and Sunkel (1973) have noted that peripheral economies often specialize in raw material exports with little diversification, have infrastructure built to serve export sectors rather than integrate the domestic economy, and develop political alliances between local elites and foreign interests that perpetuate the status quo. These distortions can lead to weaker industrial bases, vulnerability to commodity price swings (Prebisch 1950), and extreme income inequalities (Sunkel 1973). In summary, dependency theory contends that close links with the global economy, under unequal terms, stifle autonomous development in peripheral countries by enabling continuous resource extraction and sustaining imbalanced economic structures.

Classical economics. In contrast to dependency views, classical economic theorists emphasize the mutual benefits of trade and specialization. Smith (1776) introduced the concept of **absolute advantage**, arguing that countries should specialize in producing goods where they are most efficient and trade for others, thereby increasing overall productivity and welfare. Ricardo (1817) advanced this idea with **comparative advantage**, meaning even a country less efficient in absolute terms can gain by specializing in goods it produces relatively more efficiently (at lower

opportunity cost) and trading for others. From a classical perspective, international trade is a positive-sum game: by focusing on their comparative advantages, all nations can achieve higher output and growth than in autarky.

Neoclassical economics. Neoclassical theorists similarly view external engagement as beneficial, particularly through capital flows and aid. Friedman (1976), for example, held that **unrestricted international capital flows** can spur growth in developing countries by providing capital, technology, and managerial know-how that may be scarce domestically. In this view, foreign direct investment (FDI) is an engine of growth, and reducing barriers to capital and trade—while maintaining sound market policies—will optimize resource allocation. This perspective aligns with **modernization theory** (Rostow 1960), which sees development as a process in which developing countries transition through stages by adopting modern techniques and integration into the global economy. Likewise, early development models like **Chenery and Strout's two-gap model** (1966) argued that foreign aid can fill savings and foreign exchange gaps, financing investment in infrastructure and industry needed for growth. Modernization theorists stress the importance of **technology transfer** and institutional reform via contact with developed economies: foreign investment and aid are viewed as catalysts that help less-developed countries industrialize and achieve sustained growth, essentially by imitating and linking with the advanced economies.

Modernization theory. (Closely related to the neoclassical outlook), modernization theory holds that underdeveloped countries progress by **bridging the gap** with developed nations through adoption of modern practices. Rostow (1960) proposed that nations pass through linear stages of growth, from traditional society to "take-off" and eventually mass consumption, provided they embrace industrialization and secular, meritocratic institutions. A key implication is that **external support**—investment, technical assistance, and cultural influence from developed countries—can help jump-start this process. Modernization theorists therefore see external economic links (whether trade, FDI, or aid) as largely positive: they bring in advanced technology and know-how, promote efficient resource use, and encourage the social and economic transformations required for development. In summary, the classical, neoclassical, and modernization frameworks generally contend that greater integration with the global economy (through trade openness, foreign investment, and aid) should foster growth, in stark contrast to the dependency view which warns that such dependence can inhibit development.

Empirical Overview

Empirical studies have explored various dimensions of economic dependence—trade, investment, debt, and aid—and their impacts on growth. Researchers have developed several indicators to quantify *dependence* in each domain and have reached mixed conclusions regarding their effects on economic performance.

Trade dependence. Common measures of trade dependence include the trade **openness ratio** (total exports plus imports as a share of GDP) and indicators of export concentration. A higher trade openness ratio indicates a greater reliance on international trade for a country's income. Other metrics track **commodity concentration** (the share of a few primary commodities in total exports)

and **trading partner concentration** (the share of exports going to a country's top one or two trade partners). A highly concentrated export basket or market can signal vulnerability and dependence. For example, studies have measured the share of the top 2–3 export commodities in total exports (Tyler and Wogart 1973; Kaufman, Chernotsky, and Geller 1975; Bradshaw 1985) or the share of exports to key trading partners (McGowan and Smith 1978; London and Williams 1990). Generally, a broad export base and diversified markets indicate lower dependence.

Empirical findings on trade dependence and growth are **mixed**. Some studies find that heavy reliance on external trade, especially in primary commodities, correlates with **slower** growth. For instance, Alschuler (1976) found a negative relationship between commodity export concentration and per capita growth in a sample of Latin American countries, and Huang and Słomczyński (2003) show that primary-product exports have a significant negative effect on growth. These results support the dependency theory argument that trade based on primary commodities and unequal terms can hinder development. However, other studies report the opposite: Kaufman, Chernotsky, and Geller (1975) and McGowan and Smith (1978) found that greater trade openness was associated with **higher** economic growth, suggesting that integration into international markets can stimulate development. In short, trade dependence can be a double-edged sword—countries focused on a narrow range of exports may suffer from price shocks and limited industrialization, while those that successfully leverage trade for diversification and technology transfer may experience faster growth.

Investment dependence. Foreign investment dependence is often gauged by the stock of **foreign direct investment (FDI)** relative to the economy (e.g., FDI stock as a percentage of domestic capital stock or GDP). High ratios indicate significant foreign ownership of the productive assets. Because comprehensive data on foreign ownership are not always available, studies have used proxies such as the number of foreign-owned firms (Evans 1972) or the profits repatriated abroad (Chase-Dunn 1975a; Rubinson 1977). More recent work commonly measures FDI penetration as total FDI stock as a share of GDP (Bradshaw 1985; Huang and Słomczyński 2003). A related metric is the **Multinational Corporation (MNC) penetration index** (Bornschier and Chase-Dunn 1985), which compares foreign-owned capital to total capital.

Empirical evidence on the growth impact of investment dependence is notably **inconclusive**. Several cross-national studies have found that FDI inflows or stocks correlate positively with economic growth. For example, Papanek (1973) and Huang and Słomczyński (2003) report that higher foreign investment is associated with higher growth, presumably via capital provision and productivity gains. On the other hand, many studies influenced by dependency theory find **negative** effects of high foreign investment penetration on growth (Bornschier 1975; Chase-Dunn 1975a; Bornschier and Ballmer-Cao 1978). These scholars argue that foreign-controlled capital can crowd out domestic investment, enclave the economy, and extract profits, thereby impeding long-term development. Some nuanced analyses suggest the effect of FDI can change over time: for instance, Kentor (1998) found that foreign capital had a short-term positive impact on mid-twentieth century growth, but a lagged negative impact in later decades. A recent network analysis by Kentor and Clark (2023) similarly indicates that while embeddedness in global FDI networks

can boost growth for most countries, in the poorest economies heavy inward FDI is associated with slower growth. Finally, a few studies find no clear relationship either way (Bradshaw 1985; Bradshaw and Huang 1991). In summary, the growth consequence of investment dependence appears context-dependent: FDI can bring growth-enhancing resources, but excessive reliance or unfavorable forms of FDI may hinder development by facilitating external profit extraction or creating vulnerabilities.

Debt dependence. External debt dependence is typically measured by the stock of **external debt as a percentage of GDP** (or GNI) and the **debt service ratio** (annual debt service payments as a percentage of export earnings). A country with a high debt/GDP ratio or a high fraction of export income devoted to debt repayment is considered heavily dependent on foreign credit. Some researchers also account for **debt distress** factors: Bradshaw and Huang (1991), for example, incorporated indicators of IMF stabilization programs and debt rescheduling occurrences as proxies for severe debt dependence and its consequences. Others disaggregate debt by source (multilateral, bilateral, private) to assess nuanced effects (Huang and Słomczyński 2003).

The evidence overwhelmingly indicates that **high external debt burdens are detrimental** to economic growth. In cross-country studies, greater debt dependence is associated with lower growth rates. Chase-Dunn (1975a) first noted this pattern, and subsequent analyses confirmed a significant negative impact of external debt on growth (Bradshaw and Huang 1991; Shen and Williamson 2001; Huang and Słomczyński 2003). Heavy debt servicing diverts resources away from domestic investment and social spending, acting as a drag on growth. Moreover, countries with high debt are often forced to undergo austerity or structural adjustments that can constrain development in the short to medium term. Thus, consistent with dependency theory expectations, debt dependence tends to **restrain** growth potential by creating a cycle of financial outflows and vulnerability to creditor demands.

Aid dependence. Researchers measure aid dependence primarily as the ratio of **official development assistance (ODA)** to GDP (or GNI). Some studies combine public and private capital inflows to gauge overall external assistance (Griffin and Enos 1970; Kaufman, et al. 1975), while others focus on official aid separately (Papanek 1973; Stoneman 1975). Alternative measures include cumulative aid received over a period (a stock measure, as in Szymanski 1976) or per capita aid from former colonial powers (Vengroff 1977). A high ODA/GNI percentage indicates that a country's development expenditure relies heavily on foreign aid.

Empirical findings on aid dependence are somewhat more **favorable**. The majority of studies have found a **positive** relationship between aid and growth. Notably, Papanek (1973) and subsequent works in the 1970s showed that countries receiving more foreign aid tended to achieve higher growth rates, all else equal. This positive effect is attributed to aid financing critical investments and infrastructure that spur development. McGowan and Smith (1978) also reported a positive impact of aid dependence, reinforcing the view that aid can be growth-enhancing. However, a minority of studies raised concerns about aid effectiveness: Griffin and Enos (1970) and Stevenson (1972) found negative relationships, suggesting that in some cases aid might foster dependency or be misallocated, thus undermining growth. On balance, though, the literature tilts

toward aid having a beneficial impact on growth in developing countries, especially when aid is well-targeted. This aligns with neoclassical and modernization arguments that external capital transfers (if used for productive investment) should accelerate growth. It is worth noting that more recent debates focus on the conditional effectiveness of aid—governance and policy environment mediate whether aid translates to growth—but such nuances go beyond the scope of this study's historical analysis.

Empirical research offers mixed evidence regarding the effects of economic dependence on growth. While dependency theory is supported by findings that link debt—and at times trade and foreign investment dependence—to slower growth, neoclassical and modernization perspectives emphasize the positive role of aid and certain types of trade and investment in fostering development. These contrasting results highlight the need to examine Egypt's experience, where all four forms of dependence have coexisted to varying extents. This study addresses this gap by providing a comprehensive analysis of Egypt's economic dependence across multiple dimensions over an extended period.

Hypotheses

Based on the theoretical framework, we propose the following hypotheses for empirical testing:

H1: The greater Egypt's trade dependence, the lower its economic growth will be.
H2: The greater Egypt's dependence on foreign investment, the lower its economic growth will be.
H3: The greater Egypt's dependence on external debt, the lower its economic growth will be.
H4: The greater Egypt's dependence on foreign aid, the lower its economic growth will be.

These hypotheses align with the expectations of dependency theory, which suggests that higher levels of economic dependence tend to restrain growth in developing countries. However, our empirical analysis will investigate the true nature of these relationships in Egypt's case. Should the results indicate positive effects of economic dependence, they will be interpreted within the framework of neoclassical economics and modernization theory, which view external linkages as potential catalysts for growth.

Methodology

Method Selection

To quantitatively assess the impact of economic dependence on growth, we employ time-series econometric techniques. We began by considering a standard Ordinary Least Squares (OLS) regression using annual data for Egypt. An initial OLS model (using data from 2000–2020) included a broad set of indicators related to economic dependence and structure, such as

Herfindahl-Hirschman indices of export and import market concentration, the ratio of international reserves to imports, and other variables reflecting Egypt's external engagements. We also conducted a factor analysis to condense highly collinear variables into composite factors. While this initial approach identified some significant predictors, it failed key diagnostic tests. In particular, the OLS residuals exhibited autocorrelation, and multicollinearity among the independent variables remained problematic. Heteroskedasticity was also detected, indicating non-constant error variance. These issues violated OLS assumptions and undermined confidence in the results.

In an attempt to address the small sample and autocorrelation issues, we expanded the dataset by incorporating a panel of comparable countries. For example, we explored a panel regression using data from several Latin American countries (1980–2020) to increase the number of observations (from 21 up to over 400). Although a larger sample improved some statistical properties, the core issues persisted, and the results were not directly applicable to Egypt's unique context.

To address these challenges, this study adopted the Autoregressive Distributed Lag (ARDL) modeling approach for a more robust analysis of Egypt's time-series data. The ARDL method (Pesaran and Shin 1999; Pesaran, et al. 2001) offers distinct advantages. It is suitable for small samples and accommodates regressors with mixed integration orders, provided none are integrated of order two. Additionally, ARDL models incorporate lags of both dependent and independent variables, capturing dynamic relationships and mitigating endogeneity by controlling for past values. This feature addresses autocorrelation and reduces bias from omitted dynamic effects. Furthermore, the ARDL framework supports bounds testing for cointegration, enabling the identification of long-run equilibrium relationships between economic growth and the dependence variables despite short-term fluctuations.

We therefore implemented an ARDL model on Egypt's annual data from 1977–2021. Through this approach, we incorporate time lags to represent gradual and lagged effects of the independent variables (trade, investment, debt, aid) on the dependent variable (economic growth). The model was specified to include up to four lags of the dependent variable and a sufficient number of lags for each regressor, as determined by information criteria (explained further below). By including an error correction term in the ARDL framework, we can distinguish between short-run effects and the long-run equilibrium relationship. Notably, the ARDL model we estimate passes all the major diagnostic tests (reported in the section Empirical Analysis), indicating no remaining autocorrelation, homoscedastic residuals, normal distribution of errors, correct specification, and parameter stability. In sum, the ARDL methodology provides a solid foundation for drawing valid inferences about the impact of economic dependence on Egypt's growth.

Data

The selection of data was a critical step in analyzing Egypt's economic dependency within the global system. For this purpose, we relied primarily on the World Bank's World Development Indicators (WDI) database. This source was chosen for its extensive coverage, methodological

rigor, and the credibility it derives from compiling data through national statistical agencies, government reports, surveys, and other verified sources.

The study covers the period from **1977 to 2021**, representing the longest available time series with reliable and consistent data. This time frame was selected not only for data availability but also to capture long-term trends and key economic events that have shaped Egypt's dependency dynamics over the past four decades. Earlier data could have offered additional historical perspective, but given concerns over data quality and consistency, the selected range ensures the robustness of the analysis.

By carefully choosing credible data sources and an appropriate time span, this study seeks to provide a comprehensive examination of Egypt's evolving economic dependence. The insights derived from this research aim to enrich the existing literature and support policymakers, researchers, and stakeholders in better understanding Egypt's position within the global economic landscape. Ultimately, the study aspires to contribute valuable knowledge that informs future economic strategies and decision-making processes.

Rationale. The selection of variables is crucial to capture and analyze the economic dependency dimensions of Egypt within the world system. The rationale behind selecting these variables is based on their theoretical relevance, empirical evidence, the availability of data from reliable sources, and their ability to provide meaningful insights into the research objectives.

Economic growth is captured through **GNI per capita**, which serves as a proxy for overall economic performance. By examining changes in GNI per capita over time, it is possible to evaluate Egypt's economic trajectory and consider how it relates to patterns of dependency.

To assess **trade dependence**, the study employs the Trade Openness Ratio, measured as the sum of imports and exports divided by GNI. A higher ratio indicates a greater reliance on international trade, making this a useful indicator of the trade dimension of economic dependency. **Aid dependence** is measured using the proportion of Net Official Development Assistance (ODA) received as a percentage of GNI. This variable reflects the extent to which Egypt relies on external assistance to support development projects and highlights the role of aid in shaping dependency relationships. The analysis of **debt dependence** incorporates two measures: external debt stocks as a percentage of GNI and total debt service as a percentage of exports. The former indicates the scale of borrowing relative to the economy, while the latter shows the share of export revenues allocated to debt repayment. Together, these measures capture the burden of external debt and its implications for trade balance and dependency. Finally, **investment dependence** is assessed through the ratio of foreign direct investment (FDI) stocks to GNI. This reflects the cumulative reliance on foreign capital for economic development and growth. While data were directly available from 2000 to 2021, earlier values were estimated retrospectively by subtracting annual FDI inflows from the reported stock values and accounting for reinvested earnings. This reconstruction produced consistent figures and has been validated in earlier work, such as Stoneman's (1975) study.

The selection of these variables is based on their established significance in the literature and their relevance to the research objectives of quantifying the economic dependency dimensions in

Egypt. By analyzing these variables, this study aims to provide a comprehensive assessment of Egypt's economic dependency on the world system and how it burdens the country's growth potential.

Limitations. Despite careful selection, our data and variables face certain limitations. First, we were unable to include some detailed indicators of dependence due to lack of consistent long-term data. For example, **trade partner concentration** (the share of trade with Egypt's top partners) was not incorporated because data for the full period were unavailable (such data exist only from the mid-1990s onward). Similarly, measures of export product concentration (like a Herfindahl index of export products) could not be obtained consistently for 1977–2021. Including such indicators might have enriched the analysis by capturing how diversification (or the lack thereof) affects Egypt's dependence. Second, our **debt variable** does not explicitly account for debt *maturity structure* (short-term vs. long-term debt). A high short-term debt could pose different risks than long-term debt, but we did not have a continuous series on average debt maturity. Third, for **aid dependence**, we do not distinguish how aid is allocated across sectors. Aid directed to productive investments might have a different impact than aid for emergency relief or military assistance, but disaggregated aid data by sector were not available for the entire timeframe.

In addition, since this study focuses on broad national-level indicators, it does not capture **qualitative aspects** of dependence such as conditionalities attached to aid and loans, or the geopolitical context of Egypt's foreign assistance (which notably shifted after the late 1970s peace accords). These factors, while important, are beyond the scope of our quantitative analysis. Acknowledging these limitations is important because they suggest caution in interpreting the results: an absence of a significant effect for a given variable might be due to measurement that is too coarse to detect the true influence. Future research can hopefully incorporate more granular data (e.g., trade composition, specific sources of investment and aid) as they become available, to build on our findings.

The bounds testing approach. The bound test results in Table 1 indicates that the F-statistics (5.6495) surpasses the critical upper bound (4.01) at the conventional (1, 5, and 10) percent significant level, this provides strong evidence in support of the cointegration between economic dependency and economic growth. The significance levels associated with the lower and upper bounds further confirm the presence of a long-run relationship, as they fall within the critical value range. Affirming that the economic dependency and economic growth have a long run relationship in Egypt.

H0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ (not cointegrated)

Table 1. Pesaran/Shin/Smith (2001) ARDL Bounds Test

	Dependent variable: $ln\ GNI_t$		
	F-statistic = 5.6495, K= 4		
	Critical Value		Remarks
Significant level	Lower bound I (0)	Upper bound I (1)	
1%	3.74	5.06	Cointegrated
5%	2.86	4.01	Cointegrated
10%	2.45	3.52	Cointegrated

Source: WBG, Authors' estimates
Note: (i) K denotes the number of independent variables.

We reject the null hypothesis (H0) that the coefficients β1, β2, β3, β4 are all equal to zero, indicating no cointegration relationship. We accept the alternative hypothesis (H1) of cointegration, suggesting a long-run relationship between economic dependency and economic growth in Egypt. These findings indicate that economic dependency, including variables such as aid, trade, investment, and debt dependence, has a meaningful and persistent impact on economic growth in Egypt. The results contribute to a better understanding of the dynamics and interdependence between these factors, highlighting the importance of managing economic dependence as it affects economic growth.

Following the confirmation of cointegration, the augmented ARDL (a, b, c, d, e) model is estimated as follows:

$$ln\ GNI_t = \beta_0 + \sum_{i=1}^{a} \beta_1\ (ln\ GNI)_{t-i} + \sum_{i=1}^{b} \beta_2 (DEBT)_{t-i} + \sum_{i=1}^{c} \beta_3 (TRADE)_{t-i} + \sum_{i=1}^{d} \beta_4 (AID)_{t-i} + \sum_{i=1}^{e} \beta_5 (INVEST)_{t-i} + \varepsilon_t \quad (1)$$

The maximum number of lags in Equation 1 is then determined. Once the lag structure of the ARDL model is specified, the error correction model (ECM) is estimated. The ECM version of the modified ARDL model captures the short-run dynamic relationship between economic dependency and economic growth in Egypt. By appropriately modifying the orders of the ARDL model, we can effectively address both residual serial correlation and the issue of endogenous regressors in a simultaneous manner. The selection of lag length for the distributed lag on the dependent variable and the regressors is typically guided by the Akaike Information Criterion (AIC) or the Schwartz Bayesian Criterion (SBC).

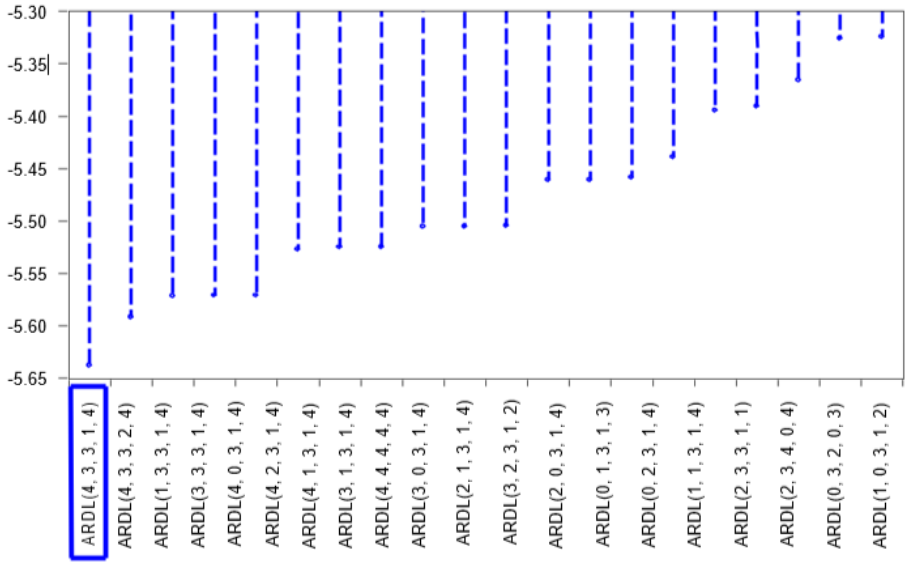
There has been a debate regarding which criterion to use. While SBC has been argued to be superior based on Monte Carlo evidence, in this investigation, we opted for AIC as our lag selection criterion. (AIC) selects a higher relevant lag length, which allows for a more comprehensive exploration of the dynamics among the variables. By considering a larger set of lag lengths, we aim to capture all potential long-run relationships and short-run dynamics that might exist in our model. Hence, the lag structure chosen for the respective variables in Equation

1 is ARDL (4, 3, 3, 1, 4), based on the AIC criterion as depicted in Figure 1. This lag structure is expected to provide a robust representation of the relationships and dynamics among the variables under investigation.

In the ECM, the lagged value of the first difference of ln(GNI) is regressed on the lagged values of the explanatory variables, including DEBT (a composite variable consisting of external debt stocks as a percentage of GNI and total debt service as a percentage of exports), TRADE (the trade openness ratio), AID (net ODA received as a percentage of GNI), and INVEST (FDI stocks divided by GNI), the model is then estimated as:

$$\Delta\,(ln\,GNI)_t = \beta_0 + \sum_{i=1}^{4} \beta_1\,(ln\,GNI)_{t-i} + \sum_{i=1}^{3} \beta_2 (DEBT)_{t-i} + \sum_{i=1}^{3} \beta_3 (TRADE)_{t-i} + \sum_{i=1}^{1} \beta_4 (AID)_{t-i} + \sum_{i=1}^{4} \beta_5 (INVEST)_{t-i} + \theta ECT_t \quad (2)$$

Figure 1 Akaike Information Criterion General to a Specific Approach



In the estimated augmented ARDL model, the coefficients β1, β2, β3, β4, and β5 represent the short-run dynamic effects of the explanatory variables. These coefficients capture the immediate impact of changes in the variables on the dependent variable, reflecting the short-term dynamics of the relationship.

The error correction term, denoted as ECT_t, measures the speed of adjustment or convergence towards the long-run equilibrium after a shock occurs. It represents the extent to which the system corrects deviations from the equilibrium relationship. A negative and significant ECT_t coefficient indicates the presence of convergence, with the dynamics adjusting towards the long-run equilibrium. The magnitude of the ECT_t coefficient provides insights into the speed of adjustment. A coefficient of -1 suggests perfect and instantaneous convergence, meaning that any deviations

from the equilibrium are immediately corrected. A coefficient of 0 implies no convergence, indicating that the system does not adjust towards the long-run equilibrium after a shock. Therefore, in the context of the study, a negative and significant ECT_t coefficient is desirable as it indicates the presence of a stable and converging relationship between the variables in the long run. It signifies that the system is moving towards its equilibrium state, reflecting the economic forces at play and the adjustments required to restore balance.

Empirical Analysis

Stationarity Test

The next step in our analysis involves verifying the stationarity of our variables through the application of the Augmented Dickey-Fuller (ADF) test. Stationarity is a crucial property for our series as it ensures the reliability of our modeling approach and prevents biased results. By conducting the ADF test, we can assess whether our variables exhibit unit roots and determine their stationarity properties.

The ADF test as presented in Table 2, developed by Dickey and Fuller (1979–1981), is specifically designed to examine the presence of unit roots in time series data by checking for the presence of a unit root. In our analysis, we focus on testing the stationarity of variables with an integration order of 0 first, and the null hypothesis is defined as:

H0: The time series has a unit root or is non-stationary.
H1: The time series does not have a unit root and is stationary.

Table 2. Unit Root Tests

	ADF Intercept & Trend				
	Level		1st Difference		Decision
Variables	ADF statistic	Level probability	ADF statistic 1st Difference	Difference probability	
$ln\,GNI_t$	-3.127	0.1000*	-3.590	0.0307**	I (1)
$DEBT_t$	-0.649	0.9763	-4.470	0.0017***	I (1)
$TRADE_t$	-2.761	0.064*	-4.923	0.0003***	I (1)
AID_t	-5.349	0.0000***	-6.106	0.0000***	I (1)
$INVEST_t$	-3.259	0.0733*	-3.535	0.0358**	I (1)

Source: WBG, Authors' estimates
Note: (i) The ADF statistics were generated from a random walk model with drift and trend
(ii) The lag length is determined through the Akaike Information Criterion (AIC)
(iii) * denotes rejection *** P < 0.01 ** P < 0.05, * P <0.1

Since most variables do not satisfy the stationarity assumption, they are differenced once to achieve first-order integration. This addresses the non-stationarity issue. The test results provide sufficient evidence to reject the null hypothesis, indicating that none of the variables exhibit a unit

root and are therefore stationary. Following the Augmented Dickey-Fuller (ADF) test and verification of stationarity, the analysis proceeds with subsequent modeling. This step is essential to ensure the validity and robustness of the results, allowing for accurate and meaningful interpretation of the relationships among the variables.

Short Run and Long Run Coefficients

After confirming cointegration using the F-statistics, the next step is to estimate long-run and short-run elasticities. The diagnostic test presented in Table 4 provides further evidence that the model is well-specified, as none of the reported statistics are significant at the 5 percent level. This indicates that the estimated ARDL model [4,3,3,1,4] satisfies key assumptions, including non-autocorrelation, homoscedasticity, normality of residuals, absence of model misspecification, and stability over the analysis period. Therefore, the model can be considered a reasonably adequate representation of the underlying data-generating process (DGP).

Table 3. The Short Run Elasticity of The ARDL Model and Summary Diagnostics

ARDL [4,3,3,1,4] Based on AIC (Akaike Information Criteria)				
Dependent variable: $\Delta\,(ln\,GNI)_t$				
Explanatory variable	**Coefficient**	**Standard errors**	**t-value**	**p-value**
$\Delta(ln\,GNI)_{t-3}$	-0.5323382***	0.1659606	-3.21	0.004
$\Delta DEBT_{t-2}$	-0.0848294**	0.035506	-2.39	0.026
$\Delta TRADE_{t-2}$	-0.4141089***	0.12772	-3.24	0.004
ΔAID_t	0.0163367***	0.0046005	3.55	0.002
$\Delta INVEST_{t-3}$	0.7097365***	0.089364	2.97	0.000
$ECT(-1)$	-0.7412429***	0.142735	-5.19	0.000
Diagnostic Tests			Remarks	
$\chi^2_{\text{LM test}}$	0.026 [0.8707]		No serial correlation	
$\chi^2_{\text{WHITE test}}$	41.00 [0.4265]		No Heteroskedasticity	
$\chi^2_{\text{JARQUE-BERA test}}$	22.24 [0.2727]		Normal	
$\chi^2_{\text{RAMSEY test}}$	0.07 [0.9740]		No Misspecification	
$\text{Stability}_{\text{CUSUM}}$	S		Stable	
$\text{Stability}_{\text{CUSUMSQ}}$	S		Stable	

Source: WBG, Author's Estimates
Note: (i) * denotes rejection *** P < 0.01 ** P < 0.05, * P < 0.1.
(ii) S denotes Stability

The short run dynamics full ARDL equation can then be written as:

$$\begin{aligned}\Delta\,(ln\,GNI)_t = {} & 0.0163367\Delta AID_t - 0.5825025\Delta TRADE_t + 0.7412429\,\Delta\,(ln\,GNI)_{t-1} \\ & + 1.228224\Delta INVEST_{t-1} - 0.5760084\Delta TRADE_{t-1} - 0.0848294\Delta DEBT_{t-2} \\ & - 0.4141089\Delta TRADE_{t-2} + 0.7097365\Delta INVEST_{t-3} \\ & - 0.5323382\,\Delta\,(ln\,GNI)_{t-3} - 0.7412429 ECT_{t-1} \qquad (3)\end{aligned}$$

The equation includes several notations to represent different variables:

$\boldsymbol{ln(GNI_t)}$: the natural logarithm of Gross National Income per capita at time t

$\boldsymbol{AID_t}$: this variable represents Net ODA received as percentage of GNI at time t.

$\boldsymbol{TRADE_t}$: this variable represents the Trade Openness Ratio which is the sum of exports and imports over GNI at time t.

$\boldsymbol{INVEST_t}$: this variable represents FDI stocks divided by GNI at time t.

$\boldsymbol{DEBT_t}$: this is a composite variable consisting of External debt stocks (percent of GNI) and Total debt service (percent of exports) at time t.

$\boldsymbol{ECT_{t-1}}$: The error correction term with a lag of one period (t-1).

$\boldsymbol{\Delta}$: this represents the integration order of the variable in this case it is of order 1.

We then analyse this short run equation and interpret each statistically significant coefficient and their possible meaning:

ΔAID_t: This variable represents Net ODA received as percent of GNI. The coefficient 0.0163367 suggests that a 1 percent increase in net ODA received leads to a 0.0163367 percent increase in economic growth, holding other variables constant. This indicates that foreign aid positively influences economic growth in the short run.

$\Delta TRADE_t$: It denotes the change in trade openness ratio. The coefficient -0.5825025 implies that a 1 percent increase in trade openness ratio results in a 0.5825025 percent decrease in economic growth, ceteris paribus. This suggests that higher trade openness may have a negative impact on short-term economic growth, possibly due to increased competition or external shocks.

$\Delta\,(ln\,GNI)_{t-1}$: This term captures the lagged effect of economic growth on current economic growth. The coefficient 0.7412429 indicates that a 1 percent increase in the lagged GNI per capita leads to a 0.7412429 percent increase in current economic growth. This suggests a positive feedback effect, where past economic growth positively influences current growth.

$\Delta\,(ln\,GNI)_{t-3}$: This term represents the lagged effect of economic growth three periods ago on current economic growth. The coefficient -0.5323382 implies that a 1 percent increase in economic growth three periods ago leads to a 0.5323382 percent decrease in current economic growth. This indicates a negative relationship, suggesting that a period of high growth in the past may dampen current growth.

$\Delta DEBT_{t-2}$: (Composite variable of external debt stocks and total debt service): The coefficient -0.0848294 suggests that a 1 percent increase in the combined external debt stocks and total debt service two periods ago leads to a 0.0848294 percent decrease in current economic growth. This highlights the negative influence of historical debt burdens on short-term economic growth.

$\Delta TRADE_{t-1}$ and $\Delta TRADE_{t-2}$These terms represent changes in the trade openness ratio lagged by one and two periods, respectively. The coefficients -0.5760084 and -0.4141089 indicate that a 1 percent increase in trade openness in the previous period and two periods

prior leads to respective decreases of 0.5760 percent and 0.4141 percent in current economic growth. This suggests that lagged trade openness negatively affects short-term economic growth.

$\Delta INVEST_{t-1}$: It represents the change in FDI stocks over GNI with a lag of one period. The coefficient 1.228224 suggests that a 1 percent increase in FDI stocks over GNI in the previous period leads to a 1.228224 percent increase in current economic growth. This implies that higher levels of foreign direct investment in the recent past positively impact short-term economic growth.

$\Delta INVEST_{t-3}$: The coefficient of 0.7097365 indicates that a 1 percent increase in FDI stocks relative to GNI from three periods ago leads to a 0.7097365 percent increase in current economic growth. This demonstrates the lagged effect of FDI on economic growth, highlighting the lasting impact of past investments.

ECT_{t-1}: The coefficient of -0.7412429 represents the error correction term with a one-period lag. This term captures the speed at which the system adjusts towards the long-run equilibrium relationship between the variables in the equation.

Concluding the interpretation, the analysis of the equation reveals valuable insights regarding the relationship between economic dependence and economic growth. The positive coefficients associated with variables such as net Official Development Assistance ΔAID_t, lagged GNI $\Delta\, ln(GNI_{t-1})$, and lagged foreign direct investment $\Delta INVEST_{t-1}$ signify their positive contributions to current economic growth. These findings suggest that foreign aid, past economic performance, and investment inflows play significant roles in driving short-term economic expansion. Conversely, the negative coefficients observed for variables such as trade openness $\Delta TRADE_t$, $\Delta TRADE_{t-1}$, and $\Delta TRADE_{t-2}$, lagged GNI $\Delta\, ln(GNI_{t-1})$, and the combined effect of debt $\Delta DEBT_{t-2}$ indicate potential hindrances to immediate economic growth. These results imply that a high reliance on trade, lower historical economic performance, and accumulated debt burdens could potentially impede short-term economic progress.

These findings underscore the intricate dynamics between economic dependence and economic growth as it is complex and involves both positive and negative aspects of. They emphasize the importance of adopting balanced economic policies that promote diversified sources of growth, effective management of trade relations, and careful debt management strategies. Such measures are crucial for fostering sustainable and resilient economic development, allowing countries to navigate the challenges associated with economic dependence while striving for long-term prosperity.

The results of the Error Correction Model (ECM) indicate that the coefficients for the natural logarithm of Gross National Investment (GNI), net ODA received as a percentage of GNI, trade openness ratio, FDI stocks relative to GNI, and a composite variable representing external debt stocks and total debt service exhibit a positive but statistically insignificant impact on short-run economic growth. These coefficients are relatively smaller compared to their long-run counterparts presented in Table 4. The error correction term (ECT), lagged by one period (t-1), is negative and statistically significant at the 5 percent level, indicating the presence of an adjustment mechanism

that guides the system back towards its long-run equilibrium. The significance of the lagged residual in the ECT term corroborates the existence of a long-run relationship, as established by Banerjee, Dolado, and Mestre (1996). The estimated speed of adjustment, at -0.7412, suggests that approximately 74 percent of deviations from the long-run equilibrium are corrected within one year, with the remaining 26 percent adjusted in the following year. This implies that when disequilibrium occurs, full restoration to equilibrium typically takes more than one year.

To clarify, the results indicate that, in the short run, the examined variables have a positive but statistically insignificant effect on economic growth. However, the presence of the error correction term suggests that the system possesses a self-correcting mechanism to restore long-run equilibrium. These findings underscore the necessity of considering both short-run dynamics and long-run relationships when analyzing the impact of these variables on economic growth.

Table 4. The Long Run Elasticity of The ARDL Model

ARDL [4,3,3,1,4] Based on AIC (Akaike Information Criteria)				
Dependent variable: $\Delta\,(ln\,GNI)_t$				
Explanatory variable	**Coefficient**	**Standard errors**	**t-value**	**p-value**
$DEBT_t$	0.2125149	0.5593076	0.38	0.708
$TRADE_t$	-3.467763**	1.308142	-2.65	0.015
AID_t	0.0387768	0.061015	0.64	0.532
$INVEST_t$	9.028468**	4.317697	2.09	0.049
Constant	-0.3827577	0.3913935	-0.98	0.339

Source: WBG, Author's Estimates
Note: (i) * denotes rejection *** P < 0.01 ** P < 0.05, * P < 0.1.

The results of the long-run ARDL model, as presented in Table 5, provide evidence supporting the relationship between economic dependence variables and economic growth. Specifically, the variable $TRADE_t$ shows a statistically significant negative impact on economic growth, while $INVEST_t$ demonstrates a statistically significant positive effect. On the other hand, both $DEBT_t$ and AID_twere found to have positive effects on economic growth but were not statistically significant.

These findings are consistent with established economic theories, affirming the role of trade and investment as key drivers of long-term economic growth. The negative effect of trade dependence suggests that higher levels of trade openness may impede growth, potentially due to increased vulnerability to external shocks or insufficient development of domestic industries. In contrast, the positive effect of foreign direct investment (FDI) indicates that greater FDI inflows can support economic growth by introducing capital, technology, and expertise, thereby enhancing productivity and economic activity. These results also align with Egypt's economic development strategy, which prioritizes attracting FDI and reducing reliance on external assistance. By

diversifying sources of economic support and promoting sustainable development, Egypt seeks to foster long-term growth and lessen its dependence on aid and debt financing. The statistically insignificant effects of debt and aid on economic growth suggest that other factors, not captured in the current model, may exert a stronger influence. Further research is needed to explore these factors and provide a more comprehensive understanding of the relationship between economic dependence and growth in the Egyptian context.

Summary of Results

The ARDL model produced robust results. The adjusted R^2 reached 86.7 percent, indicating that the model explains a substantial portion of the variation in Egypt's economic growth. Additionally, the log-likelihood value of 102.8601 supports the model's strong fit, as higher log-likelihood values indicate better alignment with the observed data.

In terms of prediction accuracy, the **Root Mean Square Error (RMSE) was calculated at 0.0275**, reflecting a small average deviation between actual and predicted values. This suggests that the model maintains a low margin of error in forecasting economic growth.

An essential feature of the ARDL framework is the **Error Correction Mechanism (ECM)**, which provided valuable insights into the speed of adjustment towards long-run equilibrium. The estimated coefficient revealed that **approximately 74 percent of deviations from the long-run equilibrium are corrected within one year**, indicating a rapid adjustment process. The remaining 26 percent of deviations typically resolve within the subsequent year.

Prior to estimation, we conducted a **Pesaran, Shin, and Smith (2001) bounds cointegration test**, which confirmed the existence of a long-run relationship among the variables at the 1 percent, 5 percent, and 10 percent significance levels. Based on this validation, the **Akaike Information Criterion (AIC)** was used to select the optimal lag structure, resulting in an **ARDL(4,3,3,1,4)** model specification. This relatively extended lag structure was chosen to better capture short-run dynamics across different periods.

Comprehensive **diagnostic tests** were conducted to ensure the validity of the model assumptions. The results confirmed the absence of serial correlation, heteroskedasticity, model misspecification, instability, non-normality, and endogeneity issues. These findings affirm the reliability and robustness of the model.

In the long-run analysis, we identified **statistically significant relationships for investment and trade dependence**. Specifically, **investment dependence exhibited a positive effect on economic growth**, while **trade dependence had a negative impact**. Other variables, such as aid and debt dependence, did not show statistically significant effects in this model. Nonetheless, future research could expand upon these findings by incorporating additional variables or alternative specifications to further explore these relationships.

Overall, the results provide a solid empirical foundation for understanding the impact of economic dependence on Egypt's growth, offering valuable insights for both researchers and policymakers.

Conclusion

This study examined the impact of economic dependence on Egypt's economic growth from 1977 to 2021, drawing on a theoretical framework that combines insights from dependency theory and neoclassical economic thought. We formulated four hypotheses predicting that greater dependence on trade, investment, debt, and aid would negatively affect Egypt's growth, in line with dependency theory expectations.

Employing the ARDL model, well-suited for small samples and time-series analysis, we assessed the effects of each dimension of economic dependence. The empirical findings revealed a **positive impact of investment and aid dependence** on economic growth, contradicting hypotheses H2 and H4. These results align with neoclassical and modernization theories, which argue that foreign investment and aid can promote growth by providing capital, technology transfer, and access to global markets.

The findings on **investment dependence** are consistent with prior empirical studies supporting its positive role (Papanek 1973; Kaufman, et al. 1975; Szymanski 1976; McGowan and Smith 1978; Ray and Webster 1978; Huang and Słomczyński 2003), while contradicting others that reported negative effects. Similarly, the positive impact of **aid dependence** resonates with the majority of empirical literature, despite some earlier studies suggesting the opposite (Griffin and Enos 1970; Stevenson 1972).

Conversely, the analysis confirmed a **negative impact of trade and debt dependence** on Egypt's economic growth, supporting hypotheses H1 and H3 in line with dependency theory. Increased trade openness and external debt burdens were associated with slower growth, challenging neoclassical assumptions that liberalized trade and debt-financed investments inherently foster economic expansion. These findings are consistent with previous studies highlighting the adverse effects of trade and debt dependence on growth (Chase-Dunn 1975a; Bradshaw and Huang 1991; Shen and Williamson 2001; Huang and Słomczyński 2003).

Despite these contributions, the study acknowledges certain limitations stemming from data constraints. Key variables such as **trade partner concentration**, **market concentration indicators** (available only from the mid-1990s), **debt maturity structures**, and **sectoral aid allocation** were not included, limiting the analysis of Egypt's nuanced dependency dynamics. Future research could address these gaps by incorporating more detailed and disaggregated data as it becomes available.

Overall, this study provides empirical evidence that deepens the understanding of how various forms of economic dependence influence Egypt's growth trajectory. The findings underscore the complexity of these relationships and highlight the need for nuanced policy approaches that balance the benefits of foreign engagement with the risks of over-dependence.

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