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The Current Exchange Rate Regimes Effect's on the Economic Growth: Case Studies of MENA Countries

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Abstract. This paper is an attempt to analyze the effects of current exchange rate regimes on the economic growth achieved by the MENA countries. To determine in a dynamic perspective new relationships that will be established between growth and exchange rate regimes, we are looking for an answer to two major concerns, namely: the question of the choice of the exchange rate regime and the question of the impact of this choice on economic performance. To reach our objective we first studied the theoretical and empirical literature of the exchange rate regime and then we had to study the evolution of the exchange rate regime in MENA countries. Then, we got an economic model based on the determinants of growth. The data used on this model takes the form of panel data for 5 MENA countries (Algeria, Egypt, Jordan, Morocco, and Tunisia) for the period 1984-2019, as well as, several methods of modeling will be discussed, to finally adopt one from them that best applies to our research goal and shows several possibilities that can be used to apply this model in different ways depending on the country considered. The results reveal that it is very important to take into account the monetary policy framework that accompanies the exchange rate regime when assessing the effects of this regime on the overall performance of the economy.

Keywords: Exchange rate regimes; economic growth; models with panel data; MENA countries.

Introduction

The exchange rate is an important link between a country and the rest of the world (i.e. goods and services market and in financial assets). The profitability of production and investment in a given country is based on dollar costs in relation to the international price. An inappropriate exchange rate policy may jeopardize a country's economic growth.

The choice of exchange rate regime must be made with great care, taking into account certain macroeconomic and financial characteristics. This choice remains currently the concern of many economists. There is abundant theoretical literature on this subject, and many empirical tests have been conducted. So far, there is highlighted no link between the exchange rate regime and economic growth. Several authors, including Calvo and Reinhart (2002), point out that this difficulty could be due to measurement errors in the classification of exchange rate regimes.

The majority of studies are based on the official IMF classification, which is also based on the principle of self-classification by each member country. No effort is usually made to verify if this official classification conforms to the regimes practiced by these countries. To overcome this failure, some authors have proposed alternative classifications of exchange rate regimes. Major contributions in this area are Levy-Yeyati and Sturzenegger (2005) and Reinhart and Rogoff (2002).

In their classifications, the former is based on the variability of the exchange rate and foreign exchange reserves, while the latter uses the parallel exchange rate as an indicator. Other classifications have been issued by some researchers, including that of Bubula and Ötker-Robe (2002), which is largely inspired by the official classification, and that of Bailliu et al. (2002) which is based on the framework of the conduct of monetary policy. These new classifications prompted some researchers to study the evolution of the distribution of exchange rate regimes in the world. Approaches have been used to explain the general trend in choosing these diets (Aloui et al., 2005): the predominance of floating exchange rate regimes (IMF, 1997); the corner solutions or bipolarism (Obstfeld & Rogoff, 1995; Bayoumi & Eichengreen, 1998; Fisher, 2001); the fear of the floating (Calvo & Reinhart, 2002).

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Indeed, the exchange rate regime is a set of principles that ensure convertibility between currencies determined by a foreign exchange market. Theoretically, the question of choice between fixed and flexible exchange rates has engendered various controversial currents of thought. In general, the main points of disagreement are threefold (Casimir, 2006): Stability or instability of prices and markets?; Independence or cooperation?; The effectiveness of macroeconomic policies (Macroeconomic adjustment). Others studies have been developed on the impact of exchange rate regimes on economic growth with a continuous classification of de facto regimes (Frankel et al., 2019). These authors built a new database characterizing the de facto exchange rate regime (ERR) for 145 countries throughout the post-Bretton Woods period.

With this new database, they have firstly investigated the global changes of de facto ERRs over time, and then study the relationship between ERR and economic growth. Their findings contradict both the "corner hypothesis" and "fear of floating". They showed that intermediate ERR is positively related to economic growth at the greatest significance level. They have also found this relationship varies among countries at different income levels, and the choice of ERR appears to be more important for low-income countries rather than high-income ones. Several developed and developing countries have modified their exchange rate regimes to benefit from such a scheme (IMF, 2000). In this work, we propose to answer the following recurring question:

What is the impact of the exchange rate regime's choice on economic growth?

In other words:
Are there any links between exchange rate choice and economic growth?

Such a question continues to arouse great interest among economists. As a result, while the economic theory has shed light on the possible advantages and disadvantages of different exchange rate regimes, it has been proven insufficient to generate a universal guide to this link.

The objective of this work is to answer the question mentioned above of the impact of the exchange rate regime on the economic growth of the MENA countries. To achieve this objective, we resort to panel data; for each of these countries, the interactions between variables that are receptive to exchange rate regimes (the relative investment rate, the rate of growth of foreign trade, and the rate of inflation) and the rate of growth of real GDP by the head, with a dummy variable designating the exchange rate regime adopted by each country selected in the sample. Annual data will be kept for the period 1984 to 2019.

This paper will be structured in three sections as follows. The first section will be devoted to a literature review on the relationship between exchange rate regimes and economic growth, while the second section begins with a brief review of the main exchange rate policies adopted in these countries. In the third section, we will estimate a panel data model to estimate the relationship between exchange rate regimes and economic growth in this region to specify the contribution of the exchange rate regime variable per capita GDP growth.

Theoretical and empirical review

Theoretical review

An exchange regime is the set of rules, which determine the intervention of the monetary authorities in the changing market, and therefore, on the behavior of the rate of change (Plihon, 2006). The economic literature distinguishes three different types of the regime of the change: a regime fixed exchange rate, a flexible exchange rate regime, and an intermediate exchange rate regime. The International Monetary Fund classified five categories of the change regime: pegging to one money, pegging to a basket of currencies, directed flexibility, limited flexibility, and independent flexibility (IMF, 1980).

Reflections on exchange regime suggested that the nature of the regime of change adopted by a given country may have direct and indirect consequences on its medium-term growth direct through either its effects on adjustments to shocks or indirect through its impact on other important determinants of growth such as investment, foreign trade and financial sector development (Aloui et al., 2005). The choice of an exchange rate regime is of great importance;

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because it influences the political economy of a country, its use and method of adjustment will allow macroeconomic adjustment. The choice of an exchange rate regime is made based on the expectation of its impact on macroeconomic performance. In fact, no exchange rate regime is better than another, and it becomes more complex if we take into account the shocks occurring in the economy. Decisions on the choice of exchange rate regime are taken according to the shocks as follows:
- A fixed exchange rate is preferable if the disturbances to the economy are much more monetary in origin and therefore affect the general level of prices.
- A flexible exchange rate is preferable if the disturbances are much more real or come from outside.

Therefore, if an economic theory has enlightened the minds on the possible advantages and disadvantages of different exchange rate regimes, it has been proven insufficient to generate a universal guide on the link between regime and growth. Moreover, the more stable the macroeconomic policy, the more preferable the flexible exchange rate regime is. Indeed, in developing countries, monetary and budgetary policy measures are a major source of macroeconomic instability Gaffard (2010). In this case, a fixed exchange rate regime is preferable to a flexible exchange rate regime. The economic analysis identifies several factors determining this choice.

These are the structural characteristics of the economy, the nature, the macroeconomic and institutional conditions, the preferences of the political authorities, and the sensitivity to the shocks to which it is subjected.

The review of the empirical literature

The studies of the relationship between exchange rate regimes and economic growth have been conducted from different angles and have yielded mixed results. Baxter and Stockman (1989) find no systematic differences in the behavior of these aggregates according to the exchange rate regime applied using a sample of 49 countries to compare the behavior of a few economic aggregates over a period extending from 1946 to 1986. Mills and Wood (1993), in a study based on the United Kingdom's experience from 1855 to 1990, conclude that the exchange rate does not influence economic growth. Then, Rose (1994) reaches the same conclusions by studying the case of Germany between 1960 and 1992.

Using a sample of 136 countries covering the period 1960 to 1989, Ghosh, Gulde, Ostry, and Wolf (1997) find that the countries with fixed exchange rate regimes have lower and less variable inflation than countries adopting floating exchange rate regimes. However, they do not reveal any systematic difference in growth rates and output variability that is attributable to the exchange rate regime. The same authors (Ghosh et al., 2003) using a sample of 165 countries covering the period 1973-1999; they conclude that fixed-rate countries experience lower inflation than those with a flexible regime and fail to find a significant relationship between the exchange rate regime and economic growth.

Bailliu et al. (2002), in an analysis of 25 emerging economies during the period 1973 to 1998, found that floating exchange rate regimes are accompanied by faster economic growth, but only in the case of relatively open to international capital flows, and to a lesser extent in countries with well-developed financial markets. Similarly, the study conducted by Levy-Yeyati and Strunzenegeer (2005) on a sample of 183 countries covering the period 1974-1999, showed that fixed exchange rate regimes are associated with the lowest growth rates per capita in developing economies and the type of regime has no noticeable effect on growth in developed economies. The same authors found that the flexibility of the exchange rate allowed for a rapid reallocation of resources, following a real shock and in the presence of a significant rigidity of prices in the short term (Levy-Yeyati & Strunzenegeer, 2005). In addition, Edwards and Levy-Yeyati (2003) subsequently confirmed these results and emphasized the inability of fixed exchange rate regimes to absorb shocks to the terms of trade, which translates into a slowdown in economic growth. Husain et al. (2005) using a sample of 158 countries covering the period 1970-1999 concluded

that, in terms of growth, the choice of a foreign exchange regime depends essentially on the level of economic development (Aloui et al., 2005).

Using a sample of 16 countries from Central and Eastern Europe covering the period 1999 to 2010, Ihnatov and Capraru (2012) used OLS and GMM methods to estimate a growth model with dummy variables that isolate the effect of exchange rate regimes on economic growth. This research has been employed in 16 countries, where the exchange rate arrangement choice is a key point in the years before Euro adoption. They have found that the statistically significant coefficients for the regime dummy variables, independently of the estimation method. Their results suggest a superior effect on the economic growth of the floating and intermediate regimes compared to the fixed arrangements.

Others studies on Exchange Rate Regime and Economic Growth in Asia as the convergence or Divergence edit by (Ha & Hoang, 2020). They use the exchange rate database constructed by Reinhart and Rogoff. This study also employs the GMM (Generalized Method of Moments) technique on unbalanced panel data to analyze the effect of the exchange rate regime on economic growth in Asian countries from 1994 to 2016. Empirical results suggest that a fixed exchange rate regime (weak flexibility) will affect economic growth in the same direction. As such, results from the study will serve as quantitative evidence for countries in the Asian region to consider when selecting a suitable policy and an exchange rate regime to attain high economic growth. According to the study by Adama and Bamba (2012), based on a panel of 14 CEDEAO countries covering the period 1970-2009. They state that the effect of the flexible exchange rate regime on growth is greater than that of the fixed exchange rate regime.

As for Stotsky et al. (2012) who studied the impact of the change regime on economic growth using longitudinal data for 7 African countries over the period 1990-2010, they found, conversely that the exchange rate regime is the framework for appropriate monetary policy that matters for economic growth. According to Alhadj et al. (2019) who studied the role played by the quality of institutions in the performance of growth and resilience in the face of crises relating to the nature of the exchange rate regime, they use a database of 134 IMF member countries, during the period 1984-2013 according to the base of the IMF classifications and Reinhart and Rogoff. Their results show that, regardless of the classification used, the quality of institutions has a positive influence on the growth performance of extreme change regimes (fixed and floating).

Exchange rate policies in the MENA region

Algeria

From 21 January 1974 to 1 October 1994, the dinar exchange rate was determined based on a fixed exchange rate with a basket of currencies whose composition was changed occasionally. On October 1, 1994, the Bank of Algeria adopted a managed float scheme whereby the value of the dinar was subject to daily fixing sessions involving six commercial banks. On January 2, 1996, this system was replaced by an interbank foreign exchange market.

The bid and ask prices on the interbank foreign exchange market are not subject to any ceiling or floor, except in the case of a margin of 0.017 DA between the bid and ask prices of the Bank of Algeria for the dinar against the dollar US. All hydrocarbon export revenues are subject to a retrocession obligation.

Egypt

A study conducted by Bentabet and Ziad (2010) shows that the exchange rate policy pursued in Egypt in the 1980s following the oil price shocks has led to a regular appreciation of the real exchange rate of the Egyptian pound. This leads to a 67% increase in its value. This gradual increase between the multiple exchange rate of the union of commercial banks and that of the official exchange rate of government authorities has established a new foreign exchange market bank.

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In May 1987, the exchange rate was reflected in a free exchange market, which had consequences for global reform programs in cooperation with the IMF to cushion the external and internal imbalance.

According to Sami (2012), the Egyptian Central Bank had since 1991 adopted a fixed exchange rate regime whereby the local currency, the "Pound" (EGP-Egyptian Pound), was pegged to the US dollar at a fixed rate of 3.5 pounds for a dollar. From 1997, the Egyptian economy began to suffer the negative effects due to the slowdown in the tourist sector (the events of Luxor), particularly concerning foreign currency inflows. And to keep the exchange rate within the range determined by the Central Bank of Egypt (± 3%), the latter was forced to intervene in the foreign exchange market by injecting foreign currencies into the Egyptian market. This has led to a shortage of international reserves held by the Central Bank. This situation led the Egyptian authorities to make several successive devaluations of the Egyptian currency in 2001 and 2002, but these measures contributed only temporarily to solving the problem and the shortage was resumed on the foreign exchange market.

To deal with these problems, the government announced on January 29, 2003, its decision to float the Egyptian Pound which has depreciated by 20%, and the supply of currency on the official market has increased. To improve the functioning of the currency market the government opened an interbank currency market in December 2004. In accordance with the IMF conditionality program of January 2005, Egypt has agreed to abide by the requirements of Article VIII, which requires the convertibility of the Pound for current account purposes. In February 2009, Egypt was reclassified ”in the new IMF classification of exchange rate regimes”, as “Other managed arrangement”.

Morocco

According to El Bouhadi et al. (2008), two different exchange rate systems have marked the effective exchange rate practice in Morocco before the 1980s. The first one is based on two methods of quotation: reference to an intervention currency which is the French franc (FF) then to a basket of currencies. The second is based on repeated devaluations.

Regarding the first regime, before May 1973 Bank Al-Maghrib (BAM) defines a quotation method where: first, the dirham is attached to a key currency (the FF); The dirham is then pegged to a basket of currencies that best reflects Morocco's foreign trade structure. When the flotation of currencies occurred in 1973, Morocco suspended the fixed parity of the dirham with foreign currencies including the French currency (FF), since then the central bank, which centralizes foreign exchange reserves, quotes foreign currencies daily which have made it possible to maintain relative stability of the dirham. However, this relative stability was soon hindered by the overvaluation of the real effective exchange rate of the dirham in the first place against hard currencies, especially from 1974. Indeed, the overvaluation of the exchange rate during the period of the 1970s negatively affected the competitiveness of the Moroccan economy. The 1975-1977 phase is seen as a phase of the emergence and acceleration of current account deficits. It follows that the objective of the rating system has not been compatible with the desired objective of promoting exports. This is the reason why Morocco adopted during the 1980s a new foreign exchange policy.

Morocco's currency devaluation of 16.4% between 1983 and 1985 is a part of a comprehensive approach aimed at resolving short-term imbalances and restructuring the Moroccan economy as a whole in the medium and long term. Further devaluations during the 1980s and early 1990s were applied. We can note 1990 when the dirham was devalued by 9.3%. Since January 1993, because of the obligations of Article VIII of the IMF, Morocco has introduced the convertibility of the dirham into current operations, linking it to a basket of currencies of major trading partners with a weighting kept secret.

Sami (2012) considered in his study "The challenges of the liberalization of capital accounts in the southern Mediterranean countries" that the exchange rate regime in Morocco is free from restrictions on payments and transfers related to current international transactions. However, this country maintains certain restrictions applied following United Nations Security Council resolutions. These restrictions are subject to IMF approval under Decision 144 (52/51). The dirham exchange rate (MAD), which has been partially convertible since 1993 and is pegged to a basket of currencies including the euro and the US dollar, is freely determined on the interbank foreign exchange market, created in 1996.

The Central Bank of Morocco sets the daily rates for listed currencies taking into account changes in the value of the basket. The rates for most of the currencies listed in Morocco are fixed based on the daily dirham-euro rate and cross rates of these currencies against the euro on the international exchange markets. BAM intervenes in the market to keep the exchange rate within the target range, which is defined around a fixed central rate. In this context, it should be noted that BAM is preparing for the transition to a more flexible exchange rate regime and the possible adoption of an inflation-targeting framework.

Tunisia

According to Benahji (2008), Tunisia has adopted since the collapse of the Bretton Woods system; from 1973 to 1986 a fixed exchange rate policy; indeed, it has applied a conventional fixed parity regime. Thus, according to the same author, Tunisia has applied an intermediate exchange rate policy since the devaluation of 1986; it has put in place a regime with mobile fluctuation bands. Indeed, it has pegged its exchange rate to a basket of currencies and has set a band of fluctuations; the pivot rate and the fluctuation band were determined according to objectives and inflation.

According to Mohamed Sami Ben Ali (2006), the establishment of the spot interbank exchange market in March 1994, transactions in this market were reserved exclusively for the Central Bank of Tunisia where the Tunisian dinar was pegged to a basket of currencies. Move to a managed floating regime, where the Tunisian Dinar exchange rate has been since that date, determined freely on the interbank foreign exchange market between the official intermediaries of Tunis Square. The Central Bank intervenes in this market and publishes the interbank currency exchange rate. The intervention of the Central Bank of Tunisia is generally motivated by the objective of maintaining the stability of the real effective exchange rate. If we retain the official classification, the exchange rate regime in Tunisia corresponds to an administered floating regime.

Jordan

During the 1970s and until 1986, the Jordanian Dinar was anchored successively in the pound. In this period, the dinar has been shown relatively stability, favored by a significant return of foreign capital from the Gulf countries and the transfers of Jordanian migrant workers, which led to an appreciation of the real exchange rate of around 13%, which lasted until 1979. As a result, economic stabilization measures initiated in the early 1980s helped to maintain this trend in part, where the real exchange rate of the dinar remained relatively high at the end of 1985, compared with the 1970s.

From 1986 to 1992, the foreign exchange market was characterized by high volatility, which forced the government to change this policy change and adopt a new exchange rate regime, to stabilize the exchange rate at its desired level. Following the recession during the second half of the 1980s with a balance of payments deficit, this resulted in a partial float of the dinar. On October 15, 1989, the dinar has been a managed float regime with devaluation applied to about 12%. However, the constraint of the instability of the exchange rate continued for 3 months by significant government intervention in the foreign exchange market to ensure compliance of operators with foreign exchange controls. The ineffectiveness recognized in this action to stop the fall of the dinar, the authorities devalued the dinar by approximately 13%. In February 1989, adopting a peg to the dollar exchange rate USD devaluation was accompanied by a closing of the exchange chamber by the Jordanian authorities.

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As a result, the crisis continued to worsen gradually exchange market official and the parallel market quickly. The search for stabilization of the Jordanian dinar was to separate from the USD dollar (May 30, 1989) and was instead linked to a weighted basket of currencies. On June 30, 1989, the system of multiple exchange rates was determined, composed of an official market and a free market exchange rate. The official exchange rate was applied to the public sector imports of necessary goods and transfer of Jordanian students abroad. This system of multiple exchanges was abandoned on 17 February 1990, the exchange rate was unified dollar USD 1.49 per dinar. These adjustments in the exchange rate have established a strong devaluation of the real exchange rate of dinar. But it remained significant restrictions on bank transactions of foreign exchange. The dinar was strongly fixed to the dollar at USD 23 October 1995. This anchor exchange rate helped the country to reduce inflation and to cope with nominal shocks that have affected the demand for money. He also helped to attract capital flows and to support tourism and other service sectors that export to the Gulf countries.

Although private capital inflows are not very large, commercial banks have accumulated foreign assets during periods of instability to compensate for the increased preference for foreign residents. To alleviate the pressure on the dinar, the central bank intervened in the foreign exchange market and adjusted interest rates. The accumulation of official reserves equivalent to nine months of imports by end of September 2002 has reduced Jordan's vulnerability to external shocks. But fiscal adjustment has lowered the ratio of public debt and enhanced its credibility, which has created a leeway to conduct countercyclical fiscal policy.

Empirical framework

Model specification

The econometric method used in our work is distinguished by the use of panel data. Indeed, this tool allows us to take into account both the individual specificities of the different countries and a temporal dimension, which contributes to increasing the size of the sample very significantly. Panel data econometrics appears to be a more appropriate research pathway in the empirical estimation of economic growth factors.

Our sample is based on a panel econometric analysis of a sample of 5 MENA countries (Algeria, Egypt, Jordan, Morocco, and Tunisia) over the period from 1984 to 2019.

The review of the literature above suggests an estimation equation of the following form:

$$\mathrm{GDP}_{it} = \beta_0 + \beta_1 \mathrm{U}_{it} + \beta_2 \mathrm{FBCF}_{it} + \beta_3 \mathrm{trade}_{it} + \beta_4 \inf_{it} + \varepsilon_{it}$$

The dependent variable is the annual growth of the real gross domestic product (GDP) per capita. The independent variables are those traditionally considered as important determinants of growth: physical capital investment (FBCF), trade growth (trade), and macroeconomic stability inflation (inf). To determine the impact of the exchange rate regime (U) on economic growth, the variables: fixed, floating, and intermediate are dummy variables chosen in the following way

- U_1: fixed exchange rate takes two values:

$$U_1 = \begin{cases} 1: if\ the\ country\ adopts\ fixed\ exchange\ rate\ regime \\ 0: if\ not \end{cases}$$

- U_2: intermediary exchange rate regime takes two values:

$$U_2 = \begin{cases} 1: \text{if the country adopts an intermediary exchange rate regime} \\ 0: if not \end{cases}$$

- U_3: floating exchange rate regime takes two values:

$$U_3 = \begin{cases} 1: if\ the\ country\ adopts \text{ floating } exchange\ rate\ regime \\ 0: if\ not \end{cases}$$

Using panel data from the five countries studied, we will check the validity of the hypothesis that the exchange rate regimes influence economic growth and quantify this effect.

The expected sign of the coefficients associated with exchange rate regimes is however indeterminate because it is difficult to establish a priori whether economic growth is favored by a fixed, floating, or intermediate exchange rate regime.

The data sources

The data used are taken from the databases: World Bank WDI 2020 World Development Indicators CD-ROM) and the IMF. In the classification of exchange rate regimes adopted by each country, we referred to the article published by Drine and Rault (2004), who classified them according to a bipolar view (fixed, intermediate, and flexible).

Descriptive statistic

From Table 1, it can be seen that the standard deviations are not too high compared to the mean values. The data are relatively uniform, with no presence of an anomaly. A sample size of 180 observations is less size in statistics.

Table 1. Descriptive statistics of variables

Variable	Sample Size	Mean	Std. Dev.	Maximum	Minimum
FBCF	180	24.97844	5.621403	43.07444	12.44560
inf	180	6.527868	6.350124	31.66966	-0.876851
GDP	180	2952.606	918.3941	4828.626	1354.887
trade	180	75.32107	28.39947	149.4534	30.24655

Stationary test results

In general, the classical statistical methods of econometrics were designed for stationary series whose statistical properties do not change over time. The most common unit root panel tests are those of I'm, Pesaran, and Shin (IPS) and Levin-Lin-Chu (LLC). It is this test that is used because it is not only effective but it is also stable. The null hypothesis of this test assumes that all series are non-stationary versus the alternative hypothesis that only a fraction of the series is stationary.

Table 2. Stationary test

Variables	Im- Pesaran –Shin (IPS)	Results
D(FBCF)	-6.58473 (0,000)	Stationary
D(inf)	-7.92551 (0,000)	Stationary
D(trade)	-8.63799 (0,000)	Stationary
D(GDP)	-3.02123 (0.0013)	Stationary

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Through the Im-Pesaran-Shin stationarity test, we see that all variables are stationary in first difference, at the threshold of 1%

Estimation methods

If we assume uniformity of behavior over time and at the level of individuals (countries), econometrically, this amounts to assuming that our two models (random effect, fixed effect) can be written as follows for all countries of MENA:

$$\mathrm{GDP}_{it} = \beta_0 + \beta_1 \mathrm{U}_{it} + \beta_2 \mathrm{FBCF}_{it} + \beta_3 \mathrm{trade}_{it} + \beta_4 \inf_{it} + \varepsilon_{it}$$

If we also assume that the errors εit are identical and follow a normal distribution N (0, σ). We will then be able to estimate these models by the method of ordinary least squares (OLS). This specification implies that the coefficients are identical for all the MENA countries studied.

We can also think of the existence of individual effects specific to each MENA country. Therefore, we introduce into our models an intercept μi specific to each country. It is assumed that the behavior coefficients are the same between countries and remain invariant over time except for the constants (β_0 and μ_i), which are assumed to be specific to each country. The country-specific effects are here assumed to be deterministic. The errors εit are again assumed to be identical and follow a normal distribution N (0, σ). We'll have:

$$\mathrm{GDP}_{it} = \beta_0 + \mu_i + \beta_1 \mathrm{U}_{it} + \beta_2 \mathrm{FBCF}_{it} + \beta_3 \mathrm{trade}_{it} + \beta_4 \mathrm{L}\inf_{it} + \varepsilon_{it}$$

From the above, we have identified a form of heterogeneity that distinguishes countries, this heterogeneity can be caused by real factors that particularize each country, or probably, it is the result of random variables.

To better build our system, it is important to do a Hausman test to choose which model has been adopted: random effect or fixed effect

Hausman test

According to the estimates of two models with fixed and random effects, the coefficients of determination are close, and the coefficients of the explanatory variables also have almost the same significance. To be able to determine which form of modeling to choose, it is necessary to run the Hausman test (1978). Indeed, this test responds to this concern by proposing a test that compares the performance of these two types of modeling.

The Hausman test looks for the presence of a correlation between specific effects and explanatory variables. Under the null hypothesis, the regressors are strictly exogenous (Cadoret et al., 2004). It is therefore a question of testing the hypothesis H0: "the preferred model is the random effects model" or in other words, the errors are not correlated with the other explanatory variables.

If the value P is less than 0.05, then we reject the null hypothesis and keep our model at fixed effects.

We performed this test as part of our work for the flexible regime case and the results are shown in the following table:

Table 3. Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob
Cross-section random	343.493049	4	0.0000

The p-value obtained is less than 5%. This allows us to reject the H0 hypothesis; there is therefore a systematic difference between the coefficients obtained by the fixed effects method and those

obtained by the random effects method. According to the Hausman test, the fixed effects model for an intermediate exchange rate regime should be adopted.

Estimation of the fixed-effects model

After estimating the first model using the least-squares method and as already demonstrated, there is a fixed effect in the countries. In this part, we will use a fixed-effects model that takes into account the unobserved variables that cause the estimates to differ between countries. The fixed-effects model is used when we are interested in analyzing the impact of variables that vary over time. The fixed-effects model explores the relationship between explanatory variables and dependent variables. Each entity has its own characteristics which may or may not influence the explanatory variables. Using a fixed-effects model assumes that an individual factor can influence or bias the explanatory or outcome variables, so this needs to be controlled. Likewise, the fixed-effects model eliminates the effects which do not vary over time and therefore retain only the net impact of the explanatory variables.

We estimated the fixed effects model for fixed (model 1), intermediate (model 2), flexible (model 3) exchange rate regimes using Eviews10 software. The results are shown in the following table.

Table 4. Results of the estimation of the fixed effects model for a fixed, intermediate, and flexible exchange rate regime

	Model1		**Model 2**		**Model 3**	
Variable	Coefficient	Prob	Coefficient	Prob	Coefficient	Prob
FBCF	-18.82451	0.0310	-16.80880	0.0520	-12.19730	0.1471
Trade	20.54770	0.0000	22.67789	0.0000	17.07969	0.0000
Inf	-32.39615	0.0000	-33.14604	0.0000	-24.73578	0.0005
C	2103.646	0.0000	2024.315	0.0000	1986.189	0.0000
U_1	-109.4796	0.3938				
U_2			-239.3358	0.0210		
U_3					597.6722	0.0000
R^2	70%		71%		73%	

U_1: Fixed exchange rate regime
U_2: Intermediate exchange rate regime
U_3: Flexible exchange rate regime

From this table, it seems that all the coefficients of the variables of our model are significant at the significance level of 5% and 10% except the variables fixed exchange rate regime and investment which are not significant (by comparing the P-value of Student at 5%). The signs of the coefficients of the variables (inflation, trade growth) are consistent with the expected signs and with economic theory. We found a negative relationship between the fixed exchange rate regime and economic growth and also a negative relationship between the intermediate exchange rate regime and economic growth on the other hand the relationship is positive between the flexible exchange rate regime and growth. The coefficient of determination (R^2) is 70%, for the three models.

The explanatory power of the model is strong and our model is statistically valid (p-value <0.05), and the expected signs of the coefficients of the variables are compatible with economic theory, for all these justifications, we have chosen this model. These coefficients are largely sufficient to judge the adequacy of these models. It appears that the introduction of maintaining the coefficient of determination as a single index for the choice of the model is not sufficient. The introduction of several additional tests will allow us to deepen the choice of the models to be retained.

Conclusion

This paper validated empirically the existence of an empirical link between exchange rate regime and economic growth, by using panel data econometrics, and a sample that concerned of 5 MENA countries (Algeria, Egypt, Jordan, Morocco, and Tunisia) over the period 1984 - 2019 and based on the classification method of Levy –Yeyati and Stuezenegger (2002). It finds a positive and robust

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relationship between the exchange rate regime and economic growth, so we found that the flexible exchange rate regime positively influences economic growth for the entire sample. The response remains mixed, as it is not yet certain that in the long term, the impact would not be negative.

With this result, the study suggests that the approach in the choice of a government policy consisting of an intervention on the exchange rate to reduce its flexibility is done according to the capacity of each government.

To do this, policymakers should prepare the tools for intervention on exchange rates, such as foreign exchange reserves or the power and efficiency of the central bank. Moreover, depending on the context, when formulating exchange rate policies, governments should take into account trade interdependence, the convergence of macroeconomic policies, the flexibility of factors of production, and the uniformity of responses to shocks concerning the economy.

Moreover, the passive adoption of a fixed exchange rate mechanism is a failure of this mechanism. Therefore, it is necessary to have flexible policies and a good strategy for this adjustment. However, it has been observed that exchange rate regimes are superior flexible compared to fixed exchange rate regimes in terms of GDP growth using the IMF classification. In addition, our study disregards the use of a classification that has already been established, hence the superiority of fixed exchange rate regimes which was confirmed by the study by Alhadj et al. (2019).

It should be noted that although our empirical results prove the above-mentioned hypothesis, the theoretical foundations underlying this impact remain largely absent due to the lack of robustness to verify over an extended period of time as well as sub-samples. Therefore, providing detailed information on financial crises and the enlargement of the sample size by increasing the number of the countries observed, as well as also the number of years of observation by using other econometrics methods (like GMM methods) will allow it to be developed in future research. Finally, we can say that our empirical work does not answer all the questions raised by the theme of the interrelationships between exchange rate regime and economic growth, but nevertheless provides an interesting basis for the reflection.

References

Adama, D., & Bamba, K. (2012). Exchange rate regime and economic growth: the case of ECOWAS countries. *The West African Economic Review*, *1*(2), 33-54. https://amao-wama.org/wp-content/uploads/2016/10/ECONOMIC-REVIEW2012_2.pdf#page=34

Alhadj, M. S., André, A. Y., &Samuel, N. P. (2019). Exchange rate regime and economic growth: an empirical investigation from the role of institutional quality. *Global Journal of Human Social Science Research: Economics*, *19*(1). https://socialscienceresearch.org/index.php/GJHSS/article/view/2775

Aloui, C., & Sassi, H. (2005). Exchange rate regime and economic growth: an empirical investigation. *Économie Internationale*, *4*, 97-134. https://doi.org/10.3917/ecoi.104.0097

Bailliu, J., Lafrance, R., & Perrault, J. F. (2002). Does exchange rate policy matter for growth?. *International Finance*, *6*(3), 381-414. https://www.bankofcanada.ca/wp-content/uploads/2010/02/wp02-17.pdf

Baxter, M., & Stockman, A. C. (1989). Business cycles and the exchange-rate regime: some international evidence. *Journal of Monetary Economics*, *23*(3), 377-400. https://www.nber.org/system/files/working_papers/w2689/w2689.pdf

Bayoumi, T., & Eichengreen, B. (1998). Exchange rate volatility and intervention: implications of the theory of optimum currency areas. *Journal of International Economics*,*45(2)*, 191-209. https://people.ucsc.edu/~hutch/241B/Ec%20241b%20SYLLABUS%20Winter%202010_files/bayoumi-eichengreen-OCA_jie98.pdf

Benahji, H. S. (2008). Choix des politiques de change dans les pays en developpements: Etude de la compétitivité de la Tunisie [Choice of exchange rate policies in developing countries: Study of Tunisia's competitiveness]. *Panoeconomicus*, *55*(3), 353-367. http://www.doiserbia.nb.rs/img/doi/1452-595X/2008/1452-595X0803353B.pdf.

Ben Ali, M. S (2006). Libéralisation du compte capital et choix d'un régime de change, quelle portée pour la flexibilité en Tunisie? [Liberalization of the capital account and choice of an

exchange rate regime, what scope for flexibility in Tunisia ?]. *Revue Tiers Monde*, *47*(188), 863-882. https://www.persee.fr/doc/tiers_1293-8882_2006_num_47_188_6466

Bentabet, B., & Ziad, M. (2010). Exchange rate regime and development: a quantitative analysis. *Revue Sciences & Technologie – ANDRU*, 7, 152-166. https://www.researchgate.net/publication/331431315_Regimes_de_change_et_developpement_Une_analyse_quantitative

Bubula, A., & Otker-Robe, I. (2002). The evolution of exchange rate regimes since 1990: evidence from De Facto Policies. *IMF Working Paper*, *2*(155). https://doi.org/10.5089/9781451857320.001

Calvo, G., & Reinhart, C. M. (2002), Fear of floating. *Quarterly Journal of Economics*, *117*(2), 379-408. https://doi.org/10.1162/003355302753650274

Casimir, R. (2006). Régimes de change et croissance économique: Une étude comparative entre Haïti et la république dominicaine (1970-2004) [Exchange Rate Regimes and Economic Growth: A Comparative Study between Haiti and the Dominican Republic (1970-2004)], MA thesis, University of Quisquéya, Haïti. https://www.memoireonline.com/12/09/3030/Regimes-de-change-et-croissance-economique-Une-etude-comparative-entre-Hati-et-la-republique-.html

Ha, D. T. T., & Hoang, N. T. (2020). Exchange rate regime and economic growth in Asia: convergence or divergence. *Journal of Risk and Financial Management*, *13*(1), 9. https://doi.org/10.3390/jrfm13010009

Edwards, S., & Levy Yeyati, E. (2003). Flexible Exchange Rates as Shock Absorbers. NBER Working Paper Series, No. 9867. https://www.nber.org/system/files/working_papers/w9867/w9867.pdf

El Bouhadi, A., Elkhider, A., Kchirid, M., & Idriss, A. (2008). The exchange rate determinants in Morocco: an empirical investigation. *MPRA* Paper No. 24115. https://mpra.ub.uni-muenchen.de/24115/

Fisher, S. (2001, January 6). Exchange Rate Regimes: Is The Bipolar View Correct. Distinguished Lecture on Economics in Government American Economic Association and the Society of Government Economists, Delivered at the Meetings of the American Economic Association New Orleans.

Frankel, J., Ma, X., & Xie, D. (2019). *The impact of exchange rate regimes on economic growth with continuous classification of de facto regimes*. Working Paper. https://scholar.harvard.edu/files/frankel/files/fmaxie_errgr_2019apr26.pdf

Gaffard, J. L. (2010). Monetary policy, macroeconomic stability and structural change. OFCE Working Paper, 2010-09. https://hal-sciencespo.archives-ouvertes.fr/hal-01069418/document

Ghosh, A. R., Gulde, A. M., Ostry, J. D., & Wolf, H. C., (1997). Does the nominal exchange rate regime matter?. NBER Working Paper 5874. https://www.nber.org/system/files/working_papers/w5874/w5874.pdf

Ghosh, A. R., Gulde, A. M., &Wolf, H. C. (2003). E*xchange Rate Regimes: Choices and Consequences*. MIT Press. https://mitpress.mit.edu/books/exchange-rate-regimes

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica*, *46*(6/Nov.), 1251-1271. http://www.econ.uiuc.edu/~econ536/Papers/hausman78.pdf

Husain, A. M., Mody, A., & Rogoff, K. S. (2005). Exchange rate regime durability and performance in developing versus advanced economies. *Journal of Monetary Economics*, *52*(1), 35-64.https://doi.org/10.1016/j.jmoneco.2004.07.001

Ihnatov, I., & Căpraru, B. (2012). Exchange rate regimes and economic growth in Central and Eastern European Countries. *Procedia Economics and Finance*, *3*, 18-23. https://doi.org/10.1016/S2212-5671(12)00115-3

IMF (1980). Exchange Rate Arrangements.

IMF (1997). World Economic Outlook. Exchange rate arrangements and economic performance in developing countries. https://doi.org/10.5089/9781557756817.081

IMF (2000). Exchange rate regimes in an increasingly integrated world economy. https://www.imf.org/external/np/exr/ib/2000/fra/062600f.htm

Levy-Yeyati, E., & Sturzenegger, F. (2005). Classifying exchange rate regimes: Deeds vs. words. *European Economic Review*, *49*(6), 1603-1635. https://doi.org/10.1016/j.euroecorev.2004.01.001

Mills, T. C., & Wood, G. E. (1996). *Does the exchange rate regime affect the economy?.* Inter-university Consortium for Political and Social Research.

Obstfeld, M., & Rogoff, K. (1995). The mirage of fixed exchange rates. *Journal of Economic Perspectives*, *9*(4), 73-96. https://doi.org/10.1257/jep.9.4.73

Vol.9 (2021) no.4, pp.419-431; DOI 10.2478/mdke-2021-0028

Plihon, D. (2006). *The Exchange Rates* (4th ed.). La Découverte Editions. https://www.editionsladecouverte.fr/les_taux_de_change-9782707196415

Reinhart, C., & Rogoff, K. (2002). The modern history of exchange rate arrangements: A reinterpretation. *Quarterly Journal of Economics*, *119*(1). *https://scholar.harvard.edu/files/rogoff/files/51_qje2004.pdf*

Rose, A. K. (1994). Are exchange rates macroeconomic phenomena?. *Economic Review-Federal Reserve Bank of San Francisco*, (1), 19-30. https://www.proquest.com/openview/84fe03a2fcca29d0ef21cc102bc71a60/1?pq-origsite=gscholar&cbl=41365

Sami, M. (2012). Challenges arising from capital account liberalisation in the countries of the South Mediterranean Region. *MEDPRO Technical Report*, 11. https://dx.doi.org/10.2139/ssrn.2033080

Stotsky, M. J. G., Ghazanchyan, M. M., Adedeji, M. O., & Maehle, M. N. (2012). *The relationship between the foreign exchange regime and macroeconomic performance in Eastern Africa*. International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2012/wp12148.pdf

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