



Does exchange rate flexibility affect Morocco's economic performance: an ARDL approach

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ABSTRACT

In a dynamic economy, researchers have long been interested in exchange rates and exchange rate regimes. Debates about their effects, notably on economic growth, have been generated by the transmission of exchange rate fluctuations to macroeconomic performance. The discussion over the type of exchange rate (optimal) that can best encourage economic growth is one of the most significant unsolved topics in the world of international finance. Regarding how the exchange rate affects economic growth, there hasn't been any agreement.

In fact, does switching from one system of exchange rates to another have an impact on economic growth?

This study aims to capture the influence of exchange rate volatility on economic growth in Morocco in order to evaluate the direction and degree of the impact of a regime on exchange rates. Using a co-integration method through an ARDL model, on quarterly data, covering the time range of Q1 2007 to Q4 2021. The findings demonstrate the existence of a long-term relationship between exchange rate fluctuations and economic development as well as the existence of an error correction mechanism that modifies growth in times of temporary instability.

INTRODUCTION

A market economy with a flexible exchange rate has daily, if not minute-to-minute, fluctuations in the exchange rate. Changes in the exchange rate have an effect on society as well as the economy (as shown by macroeconomic indicators).

As a result, the majority of the public is interested in changes in exchange rates in addition to policymakers and businesses. The selection of an appropriate exchange rate regime for a country is crucial since it has an impact on the country's economic growth.

The choice of exchange rate regime and the macroeconomic effects of that choice have received a great deal of attention in the last ten years.

In addition to their effects on trade flows (Rose, 2000; Rose and van Wincoop, 2001; Frankel and Rose, 2002; Rose and Stanley, 2005; Klein and Shambaugh, 2006; Adam and Cobham, 2007), terms-of-trade shocks (Broda, 2004; Edwards and Levy-Yeyati, 2005) and foreign direct investment flows (Ghosh et al, 2002) are also transmitted by exchange rate regimes (Schiavo, 2007; Abbott and De Vita, 2008). The relationship between exchange rate regimes and economic growth is the main topic of this study, with specific attention paid to how choosing a particular regime affects economic growth in developing countries, as like Morocco.

The classic theory of currency neutrality contends that long-term growth performance should not be impacted by the exchange rate regime.

However, the literature identifies a several processes by which the connection can be made. The first of these processes dates back to Milton Friedman's work from 1953, who made the argument for flexible exchange rates by arguing that such regimes are better suited to protect the economy from shocks. In particular, a flexible regime can boost economic growth by enabling an economy with nominal rigidities to more effectively absorb and respond to actual shocks from both domestic and international sources. This business cycle dampening mechanism (Barlevy, 2004) suggests that fixed regimes result in higher output volatility, which should adversely influence an economy's long-term growth performance (Ramey and Ramey, 1995; Kneller and Young, 2001).

Flexibility in rates, it has also been argued, makes them more susceptible to exchange rate shocks, which in turn exacerbates business cycles and output volatility.

Because there are so many indirect channels via which exchange rate regimes could influence growth, the theoretical uncertainty regarding the direction of the relationship between exchange rate regimes and economic growth is exacerbated. These include the speed of the accumulation of physical capital (Aizenman, 1994), the degree of capital flow openness (Bailliu,

2000), and the degree of financial development (Levine, 1997; Aizenman and Hausmann, 2000; Flandreau and Bordo, 2003; Aghion et al., 2006). Despite the indirect and generally beneficial impacts of fixed exchange rates on long-run growth that are theorized in this literature, the theoretical debate is reinforced by conflicting hypotheses regarding the effects on growth of other important factors that may be impacted by the regime type. For example, it has not always been found that increasing commerce leads to faster economic growth (Slaughter, 2001). The introduction of endogenous growth theory (Barro and Sala-i-Martin, 1995) has given rise to a new wave of growth theory models in which foreign direct investment (FDI) induces permanent increases in the growth rate of output as it generates income, in contrast to traditional neoclassical growth models of the Solow type, where the assumption of diminishing returns to physical capital means that FDI could at best affect the level of income with no impact on the long-run growth rate (Mello; 1997).

In light of this theoretical framework, it is not surprising that the issue of whether or not there is a relationship between exchange rate regimes and growth will require empirical investigation.

However, empirical research has so far produced contradictory findings that it is similarly challenging to make any decisions about popular wisdom. In various ways, our contribution advances this field of research. First, we take into account the majority of the variables mentioned in the empirical literature using the best data available. Second, although some results.

No attempt has been made in the previous literature to estimate the relationship between exchange rate regimes and growth in a framework that is broken down by the maturity of member countries (Levy-Yeyati and Sturzenegger, 2003), their institutions (Bailliu et al., 2003; Husain et al., 2005), and their level of involvement in international financial markets (Jadresic et al., 2001).

This paper's main goal is to investigate how Morocco's economic growth might be impacted by a broader range of exchange rate variations.

According to theory, a high exchange rate is associated with economic growth, indicating that devaluation or depreciation enhances economic growth.

The rest of the manuscript is structured as follow:

The theoretical and empirical literature on the relationship between exchange rate regimes and growth is reviewed in the section that follows.

The empirical research on how exchange rate regimes affect growth is then reviewed. This study examines the mechanisms through which exchange rate volatility affects economic growth.

The second section, in which we detail the model and data used, contains a description of the empirical technique. The estimation results are then presented and discussed after that. Conclusions are made in the final part.

1. Literature review

Theoretical and empirical research on the link between economic growth and exchange rate regimes will be addressed.

1.1 Theoretical literature review

The effect of exchange rates on growth is not clearly supported by theoretical research. The variety of indirect channels (trade, investment, and productivity) by which exchange rate regimes could influence growth contributes to the theoretical ambiguity about the direction of the relationship between exchange rate regimes and economic growth. The level of uncertainty imposed by the variable rate option and the impact of the exchange rate on economic growth are theoretically related. In spite of the fact that a peg's reduction in policy uncertainty promotes an environment favorable to factor growth, trade, and consequently output, such goals lack an adjustment mechanism in the event of shocks, which encourages protectionist behavior, price distortion signals, and ultimately the misallocation of resources in the economy. As a result, the link is still ambiguous and needs more empirical research.

Theoretical channels via which the exchange rate regime could have an impact on growth are discussed, with a focus on how it may impact factors of production and consequently growth.

The impacts of exchange rate depreciation on output and prices have been extensively studied both theoretically and empirically. It has been noted in various researchers that depreciations may have contractionary effects on production.

In Argentina between 1955 and 1961, Diaz-Alejandro (1965) examined the effects of devaluation on a few macroeconomic indicators. According to the author, the devaluation has a reductive impact on Argentina's economy because it causes a change in the income distribution in favor of savers, which lowers consumption and real absorption.

Cooper (1971) also studied at 24 devaluation experiments from the 1959–1966 period involving 19 developing country cases. Based on the study, devaluation improved the trade balance of the country that devalued its currency, but it was also frequently accompanied with a short-term fall in economic activity and an increase in inflation.

Another study by Mireille (2007) argues that overvaluation of the exchange rate was a significant obstacle to the recovery of Nigeria and the Benin Republic. In addition, the author posits that devaluation combined with targeted policies and an increase in domestic tradeable products prices might balance the exchange rate and boost economic output.

In conclusion, exchange rate regimes have been considered to be an important tool in the analysis of economic efficiency since the writings of Friedman (1953) and Mundell (1961, 1963). Exchange rate variability, according to proponents of flexible exchange rate regimes, makes it easier for economies to adapt to asymmetric real shocks (Edwards and Levy-Yeyati, in fact, when asymmetric real shocks happen and prices and wages are relatively rigid, flexible exchange rates can adjust relative international prices and thus compensate for output losses) (Mundell, 1961). In a similar sense, Edwards and Levy-Yeyati (2005) show that exchange rate volatility, by increasing adaptive capacity while avoiding extended and expensive adjustment processes, allows the absorption of external shocks.

According to Cerra et al. (2013) and Furceri and Zdzienicka (2011), countries with flexible exchange rates suffer less production loss during financial crisis periods than nations with fixed exchange rates.

The independence of monetary policy and the credibility and discipline restrictions imposed by the exchange rate regime are additional arguments for increased exchange rate flexibility (volatility) (Mundell 1963, Dornbusch and Giovannini 1990).

In fact, exchange rate regimes that really are flexible allow the maintenance of an independent monetary policy in the context of significant global capital mobility and, as a result, offer the possibility of stabilizing the local economy.

So according Ghosh et al. (1997), Bailliu et al. (2003), and Jakob (2016), the economic theory that used explain how the exchange rate regime influences the economy's growth is comparatively underdeveloped.

The theories mainly discuss of exchange rate regimes that have an impact on trade, investment, and productivity, and consequently have an impact on growth. Additionally, each country's level of development determines the size of these effects.

Mundell's (1961) theory of optimal currency areas (OCAs) and Balassa's (1964) Penne hypothesis are two important theories that address this relationship. Samuelson (1964).

The OMZ hypothesis, first put forth by Mundell and McKinnon in 1961, serves as the primary theoretical foundation for the selection of exchange rate regime (1963). In accordance with this theory, a fixed exchange rate system can encourage trade and production growth by depreciating the exchange rate and the cost of risk insurance while promoting investment by reducing the value of money through an interest rate decrease. On the other side, by delaying the relative price adjustment process, it reduces the potential for trade and output growth.

Another well-known theory that indirectly explains trade, growth, and the exchange rate regime is the Balassa-Samuelson hypothesis.

Because productivity growth in the trade sector typically outpace those in the non-trade sector, this phenomenon is known as the Penne effect.

Productivity gains should therefore influence the tradable sector's rate of price growth. Additionally, exchange rates frequently rise in high-growth countries and fall in low-growth countries (Balassa 1964; Samuelson 1964).

Numerous research using a variety of data sources, time periods, and estimating approaches have failed to produce any convincing evidence of the impact of the exchange rate regime on economic growth. Regression was used to panel data from 18 developed countries between 1976 and 2001 by Huang and Malhotra. The switching estimation method was applied by Domaç et al. (2004) for 22 different countries across several 10-year periods in the 1990s. Ordinary Least Squares (OLS) was used by Garofalo (2005) for Italy from 1861 to 1998.

Studies that indicate the negative correlation between the degree of exchange rate fixity and economic growth include those by Husain et al. (2005), Levy-Yeyati and Sturzenegger (for 183 countries in 1974-2000), and Eichengreen and Leblang (for 183 countries in 1974-2000). (21 countries in 1880-1997). Husain et al. (2005) specifically argue that a floating exchange rate regime is more stable and strongly correlates with economic growth. This is due to the fact that richer and more developed financially countries profit more from the exchange rate system's flexibility. On the other hand, a fixed exchange rate regime results in lower inflation and greater stability for the economy, despite the fact that it is less stable and more prone to risk in the case of a crisis because emerging countries are less responsive to capital markets.

1.2 Empirical literature review

The relationship between the exchange rate target and economic growth is not strongly supported by economic theory, hence the issue becomes empirical.

Published empirical investigations, though, have also shown inconsistent outcomes (appendix 1).

First, a lot of attention has been paid in earlier research to the relationship between exchange rate dynamics and macroeconomic performance.

Studies have shown that exchange rate flexibility enhances economic growth by influencing how quickly people can respond to shocks (Mundell 1961, Edwards and Levy-Yeyati 2005).

Instead, other research (Doganlar 2002, Servén 2003, Demir 2010, Belke and Gros 2001) have demonstrated the existence of adverse impacts of exchange rate volatility on some macroeconomic aggregates that can affect economic growth, such as international commerce, investment, and employment.

According to Aliyu (2011), an increase in the exchange rate causes a decrease in exports and an increase in imports, while a decrease in the exchange rate causes exports to rise and imports to fall.

Depreciation of the exchange rate also frequently results in a shift from imported to domestic goods.

As a consequence, income is diverted from importing to exporting countries through a change in the terms of trade, which often has an impact on both exporting and importing countries' economic growth.

In a similar study, Hossain (2002) agreed that the exchange rate influences the volume of imports and exports, the country's balance of payments position, and serves to link the price systems of two separate countries by facilitating international trade.

Additionally, Rogoffs and Reinhartl (2004) contend that when developing markets choose for a flexible exchange rate regime, they are comparatively well protected. The empirical work reflects the theoretical ambiguity regarding the link between exchange rate regimes and economic growth. Economic growth regressions were undertaken for 136 countries between 1960 and 1989 by Ghosh et al.

Using data from the de jure classification published by the International Monetary Fund (IMF), they considered fixed, intermediate, and flexible exchange rate regimes into account but still found no apparent variation in growth rates across the range of exchange rate regimes they looked at.

Ghosh et al. (2002), who used data from the sample period of 1970 to 1999 and adjusted for the endogeneity of the regime using a treatment effects model, provide a broad confirmation of this conclusion. The durability and effectiveness of exchange rate regimes across a wide range of advanced, emerging, and developing economies for the period 1970-1999 are examined by Husain et al. (2005) (with and without country fixed effects). They discover that more flexible regimes in developing countries are associated with high inflation but no improvements in economic growth, whereas fixed or intermediate regimes lower inflation without reducing growth. In specifically, Levy-Yeyati and Sturzenegger's 2003 study looks at how 183 countries' growth and exchange rate policies varied between 1974 and 2000 during the post-Bretton-Woods era. Slower growth rates and more erratic output variations are common in developing countries with rigid exchange rate policies.

Contrary to what is assumed, a fixed exchange rate regime can boost trade and the rate of output growth by devaluing the exchange rate and the risk premium while promoting investment by lowering the monetary value with the interest rate, according to the theoretical analysis of Mundell (1961),

which forms the basis of the theory of the choice of exchange rate regime.

Trade interdependence between the zone's member countries, a trend toward convergence in macroeconomic policies, the adaptability of production components, and consistent shock reactions are requirements for attaining this. Other empirical research conducted by Dubas et al. (2005), De Grauwe and Schnabl (2005), Bailliu et al. (2003), and Baldwin (2005) supports this conclusion (1989).

But essentially, the analysis of empirical data produced contradictory outcomes rather than any conclusions.

In fact, one group of studies came to the conclusion that growth is stimulated by a fixed exchange rate while it is not by a flexible one; the other group reached the opposite conclusion.

A third set of studies also found no evidence that a fixed exchange rate promotes growth or ambiguous. The latter could be driven on by inconsistencies in the measurement of exchange rate uncertainty, measurement error in classifying exchange rate regimes, or sample mistakes.

2. Methodology

2.1 Model specification and data

This paper aims to analyze the degree of the effect of exchange rate regime on Moroccan's economic growth. According to the theoretical and empirical reviews, the crucial indicators (appendix 2) that can impact Moroccan's economic growth are:

-Annual percentage rate of economic growth: the annual change in gross domestic product serves as the endogenous variable for this in our model (GDP).

-Real Effective Exchange Rate (REER): The exchange rate affects economic growth through transmission channels. An important factor in the relationship between the exchange rate and the growth rate of an economy is the degree of openness to foreign trade.

Due to the competitiveness effect, exports can rise when the real exchange rate is low. As exports grow, the external constraint is removed and foreign capital can be imported, which encourages economic growth.

-Gross Fixed Capital Formation: Capital is a central component of economic growth. Indeed, empirical studies confirm that higher capital formation leads to higher GDP growth (Waheed, 2004).

-Economic openness rate as a percentage of GDP (OR): Foreign commerce is a catalyst for progress since it generates new jobs, lessens poverty, and expands economic possibilities. Indeed, all empirical research show a significant and favorable relationship between openness and economic growth. According to Aliyu (2011), although currency rate depreciation encourages exports while increasing imports, appreciation of

the exchange rate has the opposite effect.

-The Consumer Price Index (CPI): Alban William Phillips (1958) discovered a negative association between wage inflation assessed by the growth rate of nominal wages and the unemployment rate in the study of the effect of the inflation rate on economic growth (Avom and Gbetkom; 2004). Several studies have looked at the link between economic growth and inflation, particularly in industrialised countries (Sidrauski, 1967; Benes et al. 2010, Tiwari, Oros, and Albulescu, 2014 and Khan, 2016).

- Government expenditure (GE): According to standard theoretical frameworks, whether Real Cycle or Keynesian models, inflation is assumed to rise and the real exchange rate to appreciate in response to increased government spending. However, the empirical literature has mixed results. Regarding inflation, Edelberg et al (1999) show that a government spending shock is inflationary. 60 observations with a quarterly data, which span the time period from Q1 2007 to Q4 2021, sourced from the High Commission for Planning (HCP). (Appendix 2)

2.2 Model specification

Pesaran et al. (2001) developed the Auto-Regressive Distributed Lag (ARDL) model, which, in opposition to the simple instantaneous explanation model, integrates time dynamics into the explanation of time series. The adoption of an ARDL model to examine the relationship between economic growth and the Moroccan currency's exchange rate is motivated by the model's ability to handle both long-term dynamics and short-term adjustments simultaneously. The model also performs better with small samples and is more reliable.

In the context of this study, the theoretical form of the ARDL model representation is often established as follows:

$$Y_t = \alpha + \sum_{i=1}^p a_i Y_{t-i} + \sum_{j=0}^q b_j X_{t-j} + \beta_k X_k + \varepsilon_t$$

Where Y_{t-p} is the lagged dependent variable, X_t denotes the explanatory variables and X_{t-q} their past values. Taking into account the variables of interest, we obtain:

Y_t : The growth rate (GDP); t: Unit of time (quarterly) $t= 1, 2, 3, \dots, 60$; ε_t the error term of the model and X_t : The explanatory variables namely: Real effective exchange rate (REER), Gross capital formation (GFCF), Consumer Price Index (CPI), Economic openness rate (OR), Government expenditure (GE).

3. Results

To analyze the degree of the effect of exchange rate regime on Moroccan's economic growth, the following treatments have been carried out:

3.1 Stationarity test

In order to have a non-spurious estimate in a non-stationary statistical universe, it is crucial to consider the stationarity

aspects of time series.

If the average value and variance of a time series don't change over time, it is said to be stationary.

In other words, there are no trends or seasons in the series.

Unit root tests on the variables at level were carried out using the Augmented Dickey Fuller test to investigate the order of integration of the series included in the model (ADF, 1981).

Thus, to study the order of integration of our series, unit root tests were performed on the level variables, using the Augmented Dickey Fuller (ADF, 1981) tests. As shown in the results in Appendix 3, we performed the ADF tests for each of the time series. The examination of the different results reveals that: The endogenous variable is stationary after the first differentiation and the other exogenous variables are a mixture between stationary and non-stationary.

Therefore, the non-stationarity hypothesis is accepted for all the series, except for the economic openness rate (OR) and Government expenditure (GE), which are stationary at level.

3.2 Determination of the optimal ARDL model

The optimal number of lags in a model is the ideal model. The Schwarz information criterion is typically one of several criteria used to determine the number of lags. The study of the data reveals twenty best models; however, the ARDL model has the ideal number of lags for the dependent variable and the explanatory variables (Schwartz information criterion (SIC) = -4.7).

The determination of the number of lags for the dependent variable and the explanatory variables leads to the ARDL model (4,1,1,0,0,1) (appendix 4).

4. Model validation

4.1 ARDL residual tests and stability

The validation of the model involves analyzing the tests on the ARDL residuals in order to confirm the errors' homoscedasticity, non-autocorrelation and the normality distribution.

These tests are, respectively, ARCH (0.774), Breusch-Pagan Godfrey (0.419) and Jacques-Bera (0.000) tests. The ARDL model is well-specified since the probability of all three tests are greater than 0.05, showing that the errors are homoscedastic, non-autocorrelated and normally distributed. (appendix 5).

The model's stability can be evaluated using the cumulative sum stability tests CUSUM (Brown et al., 1975), which are based on the sum of the residuals, in the process of model validation. If the blue curve falls inside the red-lined confidence interval's bounds, the model's parameters are considered to be stable. In our case, the CUSUM curve lies inside this range, allowing us to accept the conclusion that the coefficients of the ARDL model are stable (appendix 6).

4.2 Bonds test

The co-integration test can be used to investigate the co-integration hypothesis between the variables.

In this test, we make use of Narayan P.K.'s asymptotic critical values (2005). In fact, we may compare the Fisher critical value to the bound test's values to the F-bonds test.

The "Bounds test" demonstrates that for all levels of significance, the Fisher statistic's value ($F = 6,27$) exceeds the value of the bounds. (appendix 7)

This forces us to recognize the existence of a short- and long-term link between the variables and reject the null hypothesis that there is no co-integration between the series under study.

5. Model estimation

5.1. Long-term coefficients

The long-run results (appendix 8) reveal the existence of a long-run and co-integrating relationship between economic growth and the explanatory variables. These results are based on the coefficient of the error correction term (ECM), which is negative and statistically significant, showing how quickly the endogenous variable (GDP) reaches equilibrium in the long run.

The results also show that all coefficients are statistically insignificant (at the 5% level) but have all the expected signs. Indeed, an increase in openness rate of about 1% would translate into an increase in Morocco's economic growth of about 0.022%. As for Gross Fixed Capital Formation (GFCF), an appreciation of the latter by 1% would lead to an increase in GDP of 0.13%. As for the explanatory variable of interest to us (REER), unlike the short-term results, it does not seem to have an effect on long-term economic growth. This indicates the low importance of the exchange rate as a factor stimulating economic growth in the long run. Indeed, an appreciation of The latter of 1% would lead to a decrease in GDP of 0.000279%. Finally, the CPI does not appear to have any effect on long-term economic growth.

Normalization with respect to the variable GDP allows us to rewrite the following long-run equation:

$$GDP = -0.069 + 0.022*OR + 0.135*GFCF + 0.000279*REER + 0.0000004*CPI - 0,0000DP$$

5.2 Short-term coefficients

The results of the short-term (appendix 9) estimation indicate that the estimated coefficient on the CointEq(-1) term, which corresponds to the lagged residual from the estimation, is statistically significant (0.000) and negative (-1.89). This means that the growth rate would adjust by -1.89 per quarter when it is above or below its equilibrium value. As a result, there is a long-run correction mechanism; every quarter, -1.89 is added to

rectify the deviation from the long-run equilibrium. In other words, a short-term shock causes a short-term deviation from long-term equilibrium that is generally rectified after almost two quarters. The results show that the growth rate is strongly correlated with its prior value. At first sight, it appears that the explanatory variables for interest (exchange rate and inflation rate) have little impact on short-term economic development, but this is not the case over the long term.

6. Discussion

Based on an ARDL model, this study empirically investigated the effect of exchange rate volatility on economic development in Morocco from Q1 2007 to Q4 2021. In contrast to the short-term results, the exchange rate does not seem to have an impact on long-term economic growth, making it the only variable in the model that is not significant, according to the data. This supports earlier studies that found emerging countries fare better when choosing flexible exchange rate regimes, indicating the low importance of the exchange rate as a factor supporting economic growth over the long term. The findings also suggest that the short-term impact of an appreciation (overvaluation) of the real exchange rate on economic growth is possible. It is predicted that a potential depreciation of the exchange rate under a flexible exchange rate regime will have no effect, which will prevent price competitiveness in the long run and, as a result, a reduction in the structural deficit of the trade balance. However, exchange rate variations do not have the expected effect on economic growth over the long term. The results also show that the OR has an important and favorable effect on economic growth. The GFCF and CPI, however, have a small but favorable effect on economic growth. Some researchers have suggested that the exchange rate is positively associated to economic growth, while others have claimed that it is negatively related, based on the empirical work that has been evaluated. The study's empirical examination, however, revealed a favorable correlation between the exchange rate and output growth. Additionally, Morocco mainly imports high-priced goods like oil, machinery, and high-tech items while exporting raw materials and agricultural products. Furthermore, Moroccan goods are less in demand abroad because they don't adhere to the necessary international standards when they're exported. Given these facts, Morocco's trade balance continues to be highly negative, which has a detrimental impact on economic growth.

In order to maintain a balanced or positive trade balance and to provide a conducive environment for foreign investment in Morocco, the government should support export promotion measures. Adequate security, efficient fiscal and monetary facilities, and infrastructure should also be put in place.

However, by urging the Central Bank to make more concerted efforts to manage the behavior of the parallel exchange rate and create monetary policies that promote income development.

CONCLUSION

Researchers are interested in learning whether exchange rate regimes have an impact on economic growth. However, there haven't been many of these research conducted in Morocco, and the outcome is debatable. As a result, the current study contributes to the literature by offering fresh data on how exchange rate regimes affect economic growth. Using quarterly data from 2007Q1 through 2021Q4 and a co-integration technique through an ARDL model. The findings demonstrate both the presence of a long-term link between exchange rate changes and economic growth as well as a mechanism for correcting errors and adjusting growth in the face of transient instability.

Previous studies regarding how the exchange rate affects economic growth have shown contradictory conclusions. On the empirical side, a number of research have established that exchange rate volatility has a major effect on economic growth. For example, empirical data has demonstrated that growth results can be impacted by changes in the real exchange rate. Evidence of higher economic growth in countries with more flexible exchange rates was discovered by Edwards and Levy Yeyati in 2003. In a similar context, (Hausmann, Pritchett and Rodrik 2005) show that real exchange rate depreciation is significantly associated with faster economic development. However, prior research has also shown that the performance of economic growth is not much impacted by the exchange rate. For example, Bosworth, Collins, and Yuchin (1995) found that real exchange rate volatility inhibits economic growth and lowers productivity growth in a sizable sample of industrial and emerging countries. The empirical relationship between exchange rate volatility and the primary drivers of economic growth—international trade, investment, and employment—has also been studied in other studies. Vieira and MacDonald (2016) analyze the impact of real effective exchange rate volatility on export flows in this context and come to the conclusion that there is a negative correlation between the two variables.

On the currency rate that will maintain macroeconomic stability, no clear consensus. The appropriate exchange rate system must be chosen based on each country's unique characteristics. For example, the floating exchange rate regimes adopted by developed countries may not be suitable for emerging countries, whose economies are not robust enough to absorb the risks associated with exchange rate

volatility and whose financial markets are not as developed.

The majority of econometric studies have shown that devaluations are linked to lower output and higher inflation. The studies mentioned above have confirmed that contractionary devaluation occurs in developing countries. However, developed economies have been the subject of the majority of devaluation cases. There has to be more research on the topic because there aren't many studies on it in Africa, especially in Morocco.

Our study's empirical findings can be summarized in three major conclusions. First, exchange rate volatility has favorable but negligible effects on economic growth, in contrast to the short-run findings. Second, the long-run results indicate that OR has a positive and also insignificant impact on economic growth, since in Morocco, which has a fixed exchange rate, the uncertainty of exchange rate movements is relatively limited and, therefore, these fluctuations have no impact on their economic performance. Third, although they have a slight beneficial effect on economic growth, GFCF and CPI.

In conclusion, our study shows that exchange rate fluctuation has a detrimental effect on economic growth. The formulation of Morocco's exchange rate policy will probably be significantly impacted by these findings. Morocco should try to adhere to an exchange rate strategy that focuses largely on stabilizing exchange rates in the short and medium term, given the significance of international trade and FDI in the process of economic growth. A generally stable and predictable exchange rate seems to be essential for promoting economic growth, according to the literature review.

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APPENDICES

Appendix 1: Summary table of empirical research on the effect of exchange rate regime on economic growth.

Author	Time and region regime	Method	Results
Baxter and Stockman (1989)	1946-1984; 49 countries; docking and floating	Comparative	No effect
Mundell (2002)	1947-1993; United States, Japan, Canada, EC, others Europe; De jure 1974-1999	Descriptive statistics	Positive
Moreno (2001)	98 developing countries, de facto from East Asia	Descriptive statistics	Positive
Ghosh et al (2002)	1960-1990; 145 countries; De jure	Descriptive statistics	Unclear relationship
Levy-Yeyati and Sturzenegger (2003)	1974-2000 ; 183 countries; de facto	MCO; 2MCO	Negative
Eichengreen and Leblang (2003)	1880-1997 ; 21 countries; de jure	GMM	Negative
Bailliu et al (2003)	1973-1998; 60 countries; de facto and de jure	GMM	Positive
Husain et al (2005)	1970-1999; 158 countries; De jure	MCO	Developing countries: positive Developed countries: Negative, Emerging countries: Not significant
Garofalo (2005)	1861-1998; Italy; De facto	MCO, 2MCO	Depends on the level of development
Kabul EL YAMANI, and al.	1988-2017-Morocco	MCO	The effect is not significant
Chaker Aloui and Haïthem SASSI	1973-1998 Morocco	Panel	Positive effect
Amina HAOUDI and Ayoub RABHI	1988-2016 Morocco	ARDL	Negative effect
ZIAD M'hamed	1980 – 2014-Algeria, Egypt, Jordan, Lebanon, Morocco, Syria and Tunisia	Panel	Significant effect

Source: Authors

Appendix 2: Description of the used variables and data source

Label	Description of the variables	Data source
GDP	Annual economic growth rate in %.	Ministry of Economy and Finance (MEF)
OR	The rate of economic openness as a % of GDP	
GE	Government expenditure	
GFCF	Gross Fixed Capital Formation	
REER	The Real Effective Exchange Rate	World Bank (WB)
CPI	The Consumer Price Index	High Commission for Planning (HCP)

Source: Authors

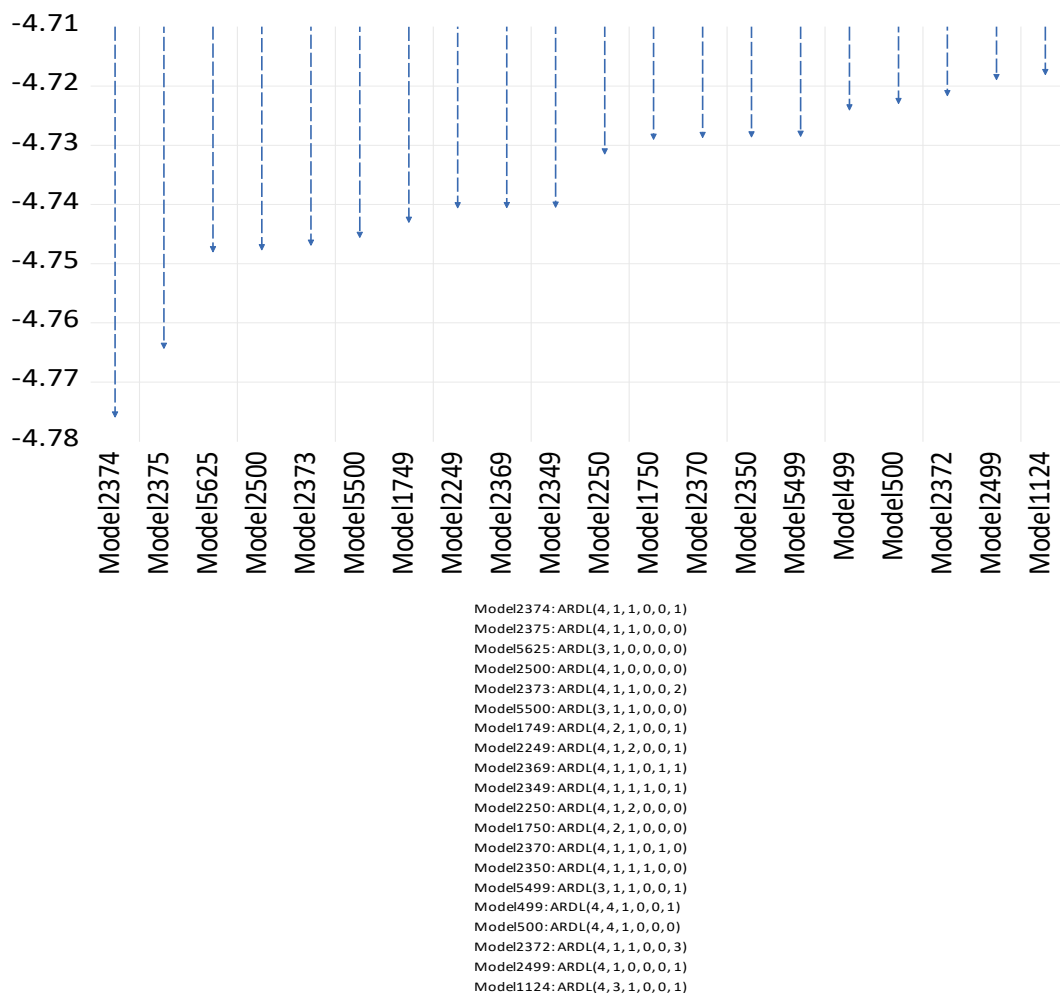
Appendix 3: Summary of ADF tests

Variable	Critical value for model 3	Critical value for model 2	Probability	Integration order
GDP	1,36	4,00	0,00	I(1)
OR	1,11	2,92	0,0527	I(0)
GFCF	4,37	-	0,0014	I(1)
REER	1,01	1,73	0,5503	I(1)
CPI	3,81	-	0,0167	I(1)
GE	4,34	-	0,0011	I(0)

Source: Authors' elaboration, results from Eviews12.

Appendix 4: Akaike values of the 20 optimal models for the delay (4,1,1,0,0,1)

Akaike Information Criteria (top 20 models)



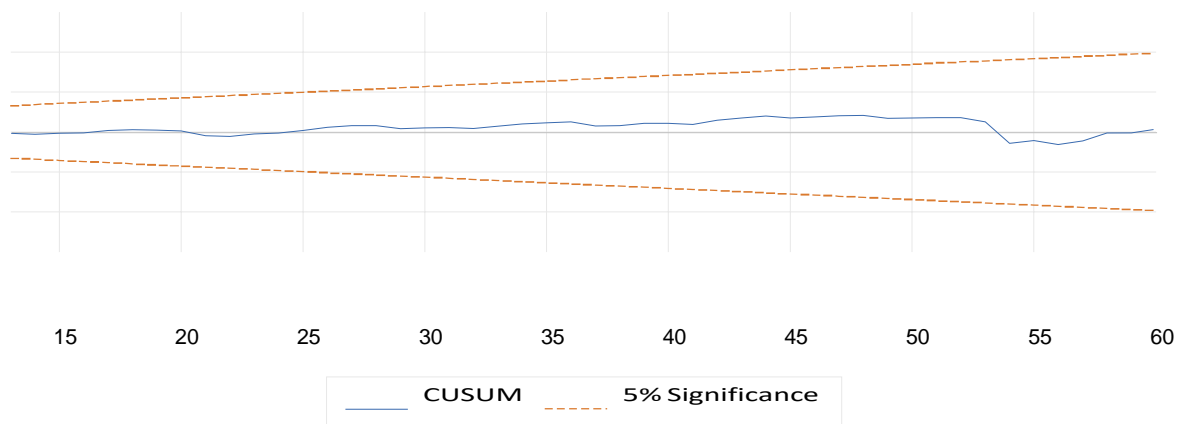
Source: Authors' elaboration, results from Eviews12.

Appendix 5: ARDL Residual Tests

Hypothesis H0	Applied test	Probability	Decision
Normality	Jarque Bera	0,000	Acceptance of H0
No autocorrelation	Breusch-Pagan Godfrey	0,419	Acceptance of H0
Homoscedasticity	ARCH	0,774	Acceptance of H0

Source: Authors' elaboration, results from Eviews12.

Appendix 6: CUSUM Tests



Source: Authors, Eviews12 results.

Appendix 7: Summary of F-bonds test results

F-Bounds Test	Null Hypothesis: No levels relationship			
	Value	Meaning.	I(0)	I(1)
F-statistic	6,27	10%	2.08	3
k	4	5%	2.39	3.38
		2,5%	2.7	3.73
		1%	3.06	4.15

Source: Authors' elaboration, results from Eviews12.

Appendix 8: Long-term coefficients.

Long-term coefficients				
Variable	Coefficient	Std.Error	t.statistic	Prob.
OR	0.022500	0.067085	0.335394	0.7388
GFCF	0.135989	0.150954	0.900861	0.3722
REER	0.000279	0.000566	0.493062	0.6242
CPI	4.82E-06	0.000653	0.007386	0.9941
GE	-1.30E09	1,11E-08	0,117279	0,9072
C	-0.069738	0.115884	0.601796	0.5501

Source: Authors' elaboration, results from Eviews12

Appendix 9: Short-term coefficients.

Form of cointegration				
Variable	Coefficient	Std.Error	t.statistic	Prob.
D(GDP(-1))	0.629746	0.164742	3.822623	0.0004
D(GDP(-2))	0.398502	0.103074	3.866176	0.0003
D(OR)	0.680027	0.114727	5.927365	0.0000
D(GE)	2,19E-08	1,03E-08	2,128857	0,0309
CointEq(-1)*	-1.896630	0.219379	-8.645465	0.0000

Source: Authors' elaboration, results from Eviews12