



**“Impossible Trinity” effects on Macroeconomic performance in  
Non-oil Arab Economies: Evidence from Egypt, Jordan,  
Lebanon, Morocco, and Tunisia**

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**Abstract**

Monetary policy autonomy, exchange rate stability and free capital mobility are critical macroeconomic goals for all countries. However, Mundel-Fleming's impossible trinity hypothesis states that the extreme cases for these three goals cannot be targeted simultaneously. Despite the multiplicity of literature focused on testing the validity of impossible trinity, few empirical studies focused on its impact on macroeconomic performance. Neither these empirical studies nor the theoretical framework agreed on the validity of impossible trinity or its impacts on macroeconomic performance, particularly in developing countries. This study tests mainly the impact of impossible trinity indices on macroeconomic performance. The study uses deductive approach applied on five Non-oil Arab Economies using panel macroeconomic data. Two models are estimated for the period 1977-2021 using system generalized method of moments. Results confirmed the dynamic nature of macroeconomic performance, the validity of impossible trinity in sample countries and the significance of impossible trinity on affecting macroeconomic performance. More specifically, output volatility and inflation rates decrease by having greater capital openness and greater exchange rates stability. Inflation rate only can be reduced by greater monetary autonomy. Supportive policies are proposed to effectively improve macroeconomic performance relying on impossible trinity.

**Keywords: Impossible trinity; Capital liberalization; Exchange rate regime; Monetary policy autonomy**

**JEL Classifications:** F31, F36, F41 and O24

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## 1. Introduction

Of all macroeconomic goals, monetary policy autonomy (henceforth monetary autonomy), exchange rate stability and free capital mobility internationally (henceforth Trilemma goals) are critical for all countries (Hsing, 2012<sup>a</sup>, Obstfeld *et al.*, 2004). However, Mundel-Fleming's impossible trinity hypothesis (henceforth Trilemma) states that countries simultaneously can adopt policies to achieve only two of these goals at the expense of the third if focused on extreme cases of these three macroeconomic goals (Aizenman and Ito, 2012; Benlamine *et al.*, 2018; Hsing, 2012<sup>a</sup>; Ichnatov and Căpraru, 2014; Mansour, 2014). Aizenman (2019) and Patoria (2020) explained the Trilemma by the scarcity of instruments relative to policy objectives. Studying the validity of Trilemma has been given an increased attention in small open economies (Bhatta *et al.*, 2021).

Despite the multiplicity of empirical studies, both at one country level or at multi-country level, there was no consensus on the validity of Trilemma (Ichnatov and Căpraru, 2014). Some studies confirmed the validity of Trilemma such as Aizenman *et al.* (2013); Bhatta *et al.* (2021); Goh and McNown (2015); Hsing, 2012<sup>a</sup>; Kawai and Liu (2015); Majumder and Nag (2021) and You *et al.* (2014). Others have failed to prove such Trilemma like Kim and Lee (2008) and Rey (2015). This leads Rey (2015) to state that there exists a policy dilemma rather than a Trilemma. Aizenman (2019) and Majumder and Nag (2021) confirmed the existence of such policy dilemma when introducing the quadrilemma that adds financial stability as a fourth policy objective to Trilemma.

Bhatta *et al.* (2021) argued that the target of solving such policy dilemma should be to reach the optimal mix of the Trilemma goals simultaneously which helps improving overall economic performance (henceforth macroeconomic performance). The latter can support achieving sound and sustainable economic development. Hence, the focus of empirical studies shifted, as a first step, to the impact of Trilemma on macroeconomic performance.

Several empirical studies investigated the impacts of Trilemma on macroeconomic performance (Aizenman *et al.*, 2010; Hsing, 2012<sup>b</sup>, Mansour, 2014; Palley, 2009; Weiyang, 2021). The most used variables to express macroeconomic performance in these studies were output volatility and inflation rates. Despite the agreement of empirical studies on the existence of impacts of Trilemma on macroeconomic performance, they did not agree on the direction of these impacts. Aizenman and Ito (2012) explained this variety in findings by considering each of the Trilemma goals as a double-edged sword as the effect of each policy option can vary depending on other policy options it is associated with.

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Undoubtedly, the significance of these impacts increases in case of developing countries due to the reliance of Trilemma policy variables on developed countries policies and the lack of freedom to use the available economic instruments to improve their macroeconomic performance (Aizenman *et al.*, 2013; Patoria, 2020; Weiyang, 2021). Among developing countries, most of non-oil Arab countries suffer for a long period of time from structural economic problems. These structural problems restrict the ability to have stable exchange rates, free capital mobility internationally (henceforth capital openness) without losing a large amount of international reserves if a certain degree of monetary independence is maintained. All of these restrict macroeconomic performance improvements those can support achieving sound and sustainable economic development.

Despite studying the validity of Trilemma and its impact on macroeconomic performance is not being a new issue; it has gained additional importance after financial crises of the 1990s and 2008 (Aizenman, 2019; Bhatta *et al.*, 2021; Mansour, 2014). This increased attention has been accelerated with increased focus on sustainable development. To the best of our knowledge, although many empirical studies have been applied in this field, two main problems emerged when estimating this impact in these studies. First, dealt with the two-way causality between Trilemma and macroeconomic performance has been relatively neglected in empirical studies, although most studies agree that it exists (Bhatta *et al.*, 2021; Weiyang, 2021). Second, independent variables included in models are correlated, which is also what was not dealt with in the relationship when estimating. Additionally, studies that applied on Arab countries have suffered from even greater scarcity.

Based on the foregoing, the contribution of this study is to assess the validity of Trilemma and its impact on macroeconomic performance in a group of Arab non-oil countries. In this study, the concern focuses on output volatility and inflation as measures of macroeconomic performance. Through estimating two models, testing the following hypotheses can be done. The main hypothesis considers the significance and directions of impact of Trilemma goals indices (henceforth Trilemma indices) on macroeconomic performance in sample countries. Some sub-hypotheses can be tested including the validity of Trilemma (sub-hypothesis 1), the impact of monetary autonomy on macroeconomic performance (sub-hypothesis 2), the impact of exchange rate stability on macroeconomic performance (sub-hypothesis 3) and the impact of capital openness on macroeconomic performance (sub-hypothesis 4). Additionally, the dynamic nature of macroeconomic performance while studying the impacts of Trilemma indices (sub-hypothesis 5).

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The limitations of the study involve the selection of sample data those satisfy two conditions. The first is that it is applied on non-oil Arab countries only. The second only countries those satisfy the availability of data for required variables, sometimes on a monthly basis, for a long period of time are included.

The rest of the study is organized in six sections. Section 2 reviews the literature regarding Trilemma and its effects on macroeconomic performance theoretically and empirically. Section 3 describes the evolution of Trilemma indices in sample countries. Section 4 introduces the specification of the model, estimation techniques and data sources. Section 5 provides empirical results and discussion. Section 6 involves conclusions and policy implications.

## **2. Trilemma: A literature Review**

This section studies, theoretically and empirically, the validity of Trilemma and its impact on macroeconomic performance is reviewed.

### **2.1 A review on the validity of Trilemma**

Trilemma is considered of the main contributions of Mundell-Fleming framework. Mundell stated this Trilemma when expanding the application of IS-LM Neo-Keynesian model in a small open economy (Aizenman and Ito, 2012; Ozigbu, 2019).

Theoretically, according to the formal model of Trilemma, uncovered Interest Rate Parity leads to currency arbitrage activities. The latter reflects any change in exchange rates between two countries totally on nominal interest rate differential between these two countries in case of ignoring risk premium (Nassif, 2011). Accordingly, in case of having stable exchange rates and capital openness, there is opportunity to have only partial monetary autonomy as the monetary policy is used to support exchange rate stability. The reason is that central banks in this case respond to net inflow of foreign exchange by increasing domestic money supply and accordingly decreasing interest rates (Grenville, 2011). On the other hand, central banks decrease domestic money supply when having net outflow of foreign exchange. Accordingly, central banks cannot have complete monetary autonomy (Angrick, 2015; Zhanga *et al.*, 2019). Countries can have stable exchange rates and monetary autonomy only in case of preventing currency arbitrage activities through restricting capital openness. If the policy choice is to keep monetary autonomy coupled with capital openness, exchange rates cannot be kept stable (Obstfeld *et al.*, 2004).

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After introducing the formal model of Trilemma, many studies have tried to find additional theoretical logic of the Trilemma. Aizenman *et al.* (2013), Mansour (2014) and Patoria (2020) introduced the impact of the accompanying changes in the accumulation of international reserves and the structural changes in their patterns as intermediates to explain Trilemma. Carton (2011) added terms of trade as an intermediate to explain Trilemma. Grenville (2011) added base money changes as intermediate to explain Trilemma. Aizenman (2019) and Patoria (2020) explained Trilemma by the scarcity of instruments relative to policy objectives.

In addition to the theoretical basis supporting Trilemma, Aizenman and Ito (2011) and Zhanga *et al.* (2019) illustrated that different international financial systems adopted historically confirmed the validity of Trilemma. According to the Gold Standard system the focus was on supporting exchange rate stability and capital openness at the expense of monetary autonomy. Following Bretton Woods system, the focus was on monetary autonomy and exchange rate stability at the expense of capital openness (Obstfeld *et al.*, 2004). Nassif (2011) stated that following financial crises in Asian countries, Mexico and Russia during 1990s, several developing countries adopted fixed or semi-fixed exchange rate systems. Additionally, they enhanced capital openness. This led to strong currency speculative attacks forced them all to move to more flexible exchange rates. Brazil had the same experience in 1998. Aizenman and Glick (2009) stated that most of emerging countries those targeted having all of Trilemma goals simultaneously during late 1980s and early 1990s suffered from severe financial crises.

On the other hand, some studies criticized the theoretical basis of Trilemma. Carton (2011), Grenville (2011), Ozigbu (2019) and Zhanga *et al.* (2019) criticized the assumptions leading to the theoretical basis of Trilemma in several ways those make the Trilemma not realistic recently. First, considering a small, opened economy with risk neutral investors and interest rate is the only determinant of investment. Secondly, the equality of interest rates in the domestic and foreign markets after the unification of the currency. Third, nominal exchange rates need to be completely fixed. Fourth, prices of currencies in both of spot and forward exchange markets are unified. Fifth, factors such as wages and inflation remain unchanged during analysis. Sixth, there are no arbitraging costs, transaction costs, market imperfections, portfolio adjustment costs and taxation in markets. Seventh, the financial markets had to be dealt with using “portfolio theory” rather than “flow theory”. Eighth, capital flows can respond to exchange rates fluctuations as currencies are not close substitutes. Ninth, there are no differences in political risks between countries.

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(Patoria, 2020) criticized the mechanisms by which Trilemma operates as interest differentials is not the only determinant of capital flows. Moreover, it ignores the role of open-market operations to prevent capital flows changes to affect exchange rates. Bekaert and Mehl (2017) and Mansour (2014) criticized dealing with Trilemma as an internal mechanism only and ignoring the role of external factors on affecting it.

All of these criticisms led Ozigbu (2019) to state that the Trilemma was appropriate in the period after the collapse of Bretton Woods system with floating exchange rates and accelerated financial integration, but it does not fit the situation of the modern international economy. This is consistent with Zhanga *et al.* (2019) when stated that uncovered Interest Rate Parity is not applicable and thus questioned the existence of the Trilemma.

In conclusion, the theoretical framework for the Trilemma does not decisively determine the validity of it. It turns out that there are different channels that influence the direction and strength of relationships. Moreover, the theory is subject to criticisms that have to do with the assumptions and mechanisms of linking variables that affect the relationships. Thus, the determination of the validity of Trilemma has been left to empirical studies.

The lack of clarity of the theoretical background for the validity of Trilemma was reflected in the empirical studies. By reviewing the related empirical studies, some studies found evidence for Trilemma while others recognized that it does not exist and sometimes criticized it.

Some studies confirmed the validity of Trilemma on a country level. Bhatta *et al.* (2021) investigated the validity of Trilemma in Nepal from 1989 to 2019 using simulation model approach. A strong proof of the Trilemma and a failure to find a tripartite policy was found. Same findings found in Goh and McNown (2015) when reviewing the existence of Trilemma in Malaysia using Error Correction Model estimation. Kawai and Liu (2015) confirmed the same findings using monthly data for China from 1990 to 2014 when testing Trilemma challenges using generalized method of moments procedure (GMM). Majumder and Nag (2021) assessed the existence of Trilemma using quarterly data from 1991 to 2018 for India using Instrumental Variable method (IV). Findings highlighted the trade-off between the Trilemma goals policy.

There exist also some studies on the multi-country level confirmed the existence of Trilemma. Aizenman *et al.* (2013) tested the validity of Trilemma using balanced data for 50 countries (18 industrial and 32 developing countries) over the period 1970-2006. Findings confirmed the validity of Trilemma in both of industrial and developing countries. You *et al.* (2014) inspected the validity of

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Trilemma in 88 countries over the period 1995-2010 using GMM. Estimation results stressed that Trilemma is valid. Bekaert and Mehl (2017) tested the Trilemma in 17 countries and whether it is turned into a dilemma using monthly data over the period 1885-2014 using pooled OLS estimator. Findings stressed on the validity of the Trilemma and found no evidence for the transfer into a policy dilemma.

Several other studies have denied the validity of such Trilemma like Aizenman *et al.* (2013); Kim and Lee (2008), Mansour (2014) and Rey (2015). Mansour (2014) investigated the evolution of the Trilemma indices in Lebanon, Turkey, Argentina, Brazil and Mexico over the period 1973-2010. Findings revealed that countries adopting more flexible exchange rate systems can benefit from accumulating international reserves and accordingly can help improving the Trilemma goals simultaneously. Angrick (2015) confirmed the same result stating that countries with excess reserves can use it to stabilize exchange rates while maintaining monetary autonomy and capital openness. Rey (2015) divided countries into center and non-center countries and stated that the exchange rate system in non-center countries is irrelevant as they are followers. Accordingly, the Trilemma is reduced to only controlling capital mobility to sustain monetary autonomy in non-center countries. Aizenman *et al.* (2016) followed the same methodology of dividing countries between center and non-center countries in studying the role of exchange rate systems to protect non-center countries from financial shocks in center countries. Findings disclosed that links between center and non-center countries is the dominant effect in non-center countries to import center countries financial shocks. Additionally, exchange rate systems in non-center countries play a supporting role in the sensitivity of importing financial shocks from center countries.

Obstfeld *et al.* (2017) inspected the role of exchange rate systems in affecting the sensitivity of transferring external financial shocks to the domestic economies in 40 countries from 1986 to 2013. Findings revealed that having more flexible exchange rate systems reduces the sensitivity of domestic economies to external financial shocks. Klein and Shambaugh (2015) investigated the validity of Trilemma and its consequences on monetary autonomy during the period 1973-2011 for 134 countries. Findings confirmed the ability of having a moderate floating exchange rate and open capital accounts to support monetary autonomy.



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All these conflicting empirical results led Rey (2015) to state that there exists a policy dilemma rather than a Trilemma. Aizenman (2019) and Majumder and Nag (2021) confirmed the existence of such policy dilemma when introducing the quadrilemma that adds financial stability as a fourth policy objective to Trilemma. The focus then transferred to the impacts of having such Trilemma or dilemma on macroeconomic performance.

## **2.2 The impact of Trilemma on macroeconomic performance**

Investigating the impact of Trilemma on macroeconomic performance has gained additional importance as some of Trilemma goals become imperatives. Several factors combined to form the inevitable of Trilemma goals including the transformation of most of OECD countries to adopt flexible exchange rate systems, the competition between all countries to attract foreign capital, the increased financial integration of emerging markets and establishing the Eurozone (Aizenman, 2019).

Theoretically, the impacts of Trilemma on macroeconomic performance can be illustrated through analyzing the impacts of Trilemma indices on macroeconomic performance indicators such as economic growth, output volatility, inflation, inflation volatility and balance of payments position. Aizenman and Ito (2011) illustrated that greater monetary autonomy can help monetary authorities stabilizing the economy which helps having stable and sustainable economic growth. However, in case of having price and wage rigidities, output movement may be accelerated leading to increasing output and inflation volatility. Inflation volatility can be accelerated also if monetary autonomy is used to serve financing fiscal debt.

Exchange rate stability can support price stability. Additionally, it can help attracting investment and supporting international trade through reducing the uncertainty about exchange rate fluctuations and hence reduce risk premium. Moreover, sustaining exchange rate stability at times of economic crisis can enhance the credibility of the economy and the efficiency of managing it. The latter can support reducing output volatility following the crisis (Aizenman and Glick, 2009). However, Aizenman and Ito (2011) illustrated that high levels of exchange rate stability limit the ability of exchange rate changes to absorb the impact of external shocks. This leads to increased output volatility. Moreover, high levels of exchange rate stability cause misallocation of economic resources leading to unbalanced economic growth.

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Capital openness support allocating economic resources efficiently, supplement domestic savings and help transferring technology. However, unless the capital flows enjoy portfolio diversification, increasing capital flows can lead to economic distortions, unbalanced growth, and increased output volatility because of external economic cycles (Aizenman and Ito, 2011).

Several empirical studies investigated the impacts of Trilemma on macroeconomic performance. Some of them proved the effects of Trilemma goals policy choices (henceforth Trilemma choices) on macroeconomic performance (Aizenman and Ito, 2012; Ihnatov and Căpraru, 2014; Mansour, 2014; Palley, 2009; Weiyang, 2021). Others have failed to prove these effects of at least one of the Trilemma indices (Hsing, 2012<sup>a</sup>; Hsing, 2012<sup>b</sup>). The most used variables to express macroeconomic performance in these studies were output volatility, inflation rate and inflation rate volatility.

Aizenman *et al.* (2010) explored the effects of Trilemma policy mix on macroeconomic performance in more than 170 developing and emerging countries using a 5-year panel data over the period 1972-2006. Both of output volatility and inflation volatility are used referring to macroeconomic performance. Output volatility was measured in estimation as 5-year standard deviations of growth in per capita real output. Inflation volatility was measured as 5-year standard deviations of monthly inflation rate. Findings revealed the direct effects of Trilemma policy mix on macroeconomic performance. Output volatility is found to be reduced by greater monetary autonomy and accelerated by greater exchange rate stability. Attempts to stabilize the exchange rate increases output volatility unless financial development is at an advanced stage. Additionally, at advanced stages of financial development, output volatility decreases when increasing capital openness. Results also stated that inflation rate is reduced by greater exchange rate stability and greater capital openness.

Weiyang (2021) explored the interactions between Trilemma policy and macroeconomic performance in 42 developing and emerging countries over the period 1990-2017 using both of OLS and GMM. Both of output volatility and inflation volatility are used referring to macroeconomic performance and measured the same as Aizenman *et al.* (2010). Findings confirmed the same effects stating that greater capital openness reduces both of inflation rate and output volatility having stable exchange rates.

Ihnatov and Căpraru (2014) assessed the impacts of Trilemma policies on macroeconomic variables volatility in 10 EU members of Central and Eastern European Countries over the period 1999-2010 using fixed effects estimation model. Volatilities in Output growth, inflation rates, government balance and real interest rate are used referring to macroeconomic performance. Findings stated

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that all macroeconomic performance indicators except government balance volatility can be improved by enhancing capital mobility. Additionally, economic growth can be accelerated with higher exchange rate stability in general, but at times of being affected by external shocks it may restrict economic growth. Additionally, higher exchange rate stability can accelerate inflation rate volatility with more liberalized capital mobility. Exchange rate stability reduces investment risks and accordingly reduces real interest rate volatility. Findings failed to prove the effects of exchange rate stability on government balances as the latter depends on government policy mix.

Mansour (2014) inspected the effects of Trilemma choices on macroeconomic performance considering levels of foreign reserves holdings and external debt. The study was applied on Argentina, Brazil, Lebanon, Mexico and Turkey over the period 1973-2010. Output volatility is used referring to macroeconomic performance and measured the same as Aizenman *et al.* (2010). Results disclosed that output volatility decreases in countries with stable exchange rate systems and less monetary autonomy. Additionally, it was found that these effects increase when adding international reserves into account.

Aizenman and Ito (2012) evaluated macroeconomic policies adopted in developing and emerging economies in light of Trilemma over the period 1970-2009. A new variable is constructed measuring the variations in the three indexes of Trilemma. Using diamond charts, findings highlighted the importance of having moderate levels for the Trilemma goals to reduce output volatility. Findings revealed also that having liberalized financial markets and diversified indices of Trilemma leads to increase output volatility in emerging economies unless having high levels of international reserves holdings. According to these findings, the presence of high levels of international reserves can protect emerging economies from the contagion of the external financial crisis.

Kaur (2019) investigated the impact of Trilemma choices on macroeconomic stability in India from 1980 to 2016 using autoregressive distributed lag model (ARDL). Inflation rate, real output growth rate and volatility of both of inflation and output are used referring to macroeconomic performance considering international reserves position. Findings disclosed that inflation and output indicators can be improved when having monetary autonomy and capital openness in India. The results supported that monetary autonomy and exchange rate stability limit inflation volatility however both increases output volatility.

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Palley (2009) assessed the effects of capital openness in light of the Trilemma. Results exposed that liberalizing capital mobility can lead capital inflows to appreciate the value of the currency in case of having more flexible exchange rates. This restricts attracting foreign investment and net exports and ends up with reducing output and employment. On the other hand, having stable exchange rates and greater capital openness can lead inflation to increase.

Hsing (2012<sup>a</sup>) assessed the impacts of Trilemma indices on macroeconomic performance in Bulgaria over the period 1994-2009. The same macroeconomic performance indicators as Kaur (2019) are used. Both of output volatility and inflation volatility are used referring to macroeconomic performance and measured the same as Aizenman *et al.* (2010). Using different forms of the model, findings revealed that real output growth can be accelerated by enhancing exchange rate stability, less monetary autonomy and restricting capital mobility. Results found no evidence for the impacts of Trilemma choices on inflation rates, its volatility or output volatility.

Hsing (2012<sup>b</sup>) explored the effects of Trilemma choices on macroeconomic performance in Greece over the period 1970-2010. The same macroeconomic performance indicators as Kaur (2019) are used. Using different forms of the model, findings disclosed that exchange rate stability has no effects on all macroeconomic performance indicators used. Output volatility can be reduced by more monetary autonomy. Capital openness reduces both of inflation volatility and output volatility.

Juhro *et al.* (2021) investigated the effects of Trilemma on macroeconomic stability in a sample of 10 emerging countries in light of the macroprudential financial policies adopted in most countries after the global financial crisis. The sample countries are Brazil, China, Hungary, India, Indonesia, Malaysia, Poland, Russia, Thailand and Turkey. ARDL was applied using quarterly data during 1998-2018 with data start date varying between countries depending on data availability. Findings inspected that having macroprudential monetary policies coupled with exchange rate stability sustained macroeconomic stability in six countries. Liberalizing capital mobility was effective to sustained macroeconomic stability in only three countries. This was explained stating that this effect depends on the paths dominate capital flows between foreign direct investment (FDI) and foreign portfolio investment (FPI).

Thus, despite the agreement of most of empirical studies on the existence of impacts of Trilemma on macroeconomic performance, studies did not agree on the direction of these impacts. Aizenman and Ito (2012) explained this variety in findings between empirical studies by considering each of the Trilemma choices as a double-edged sword as the effect of each policy option can vary

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depending on other policy options it is associated with. Aizenman and Ito (2011) gave an example for this variation in effects of Trilemma choices using exchange rate stability. Exchange rate stability can support macroeconomic stability if coupled with capital openness while it may lead to macroeconomic instability if coupled with monetary autonomy.

### **3. The evolution of Trilemma indices in sample countries**

In this section, the evolution of Trilemma indices is described in selected countries during the period 2010-2021 in an attempt to check the validity of Trilemma in these countries. Monetary autonomy (MPA), capital openness (FCM) and exchange rate stability (ERS) indices constructed by Aizenman *et al.* (2010), (Canale *et al.*, 2018) and Weiyang (2021) are used in measuring Trilemma indices. Only Egypt, Jordan, Lebanon, Morocco and Tunisia are included out of all Non-oil Arab Economies due to the reasons stated above in the limitations of the study.

Figure 1 shows the evolution of Trilemma indices in the five countries over the period 2010-2021. It is clear from figure 1 that Jordan is the most country that focused on exchange rate stability as a result of the currency peg policy adopted since 1995. This is in light of the certainty of the Central Bank of Jordan that Dinar exchange rate stability against the US dollar is the basis for monetary policy stability (Central Bank of Jordan, 2017). Additionally, Jordan maintains an interest rate differential favors the dinar against the US dollar (Al-Araj, 2017). The latter encourages depositors to keep their assets as dinar-denominated leading to an acceptable degree of capital mobility liberalization. Accordingly, significant fluctuations occurred in the degree of monetary autonomy.

In Egypt, figure 1 illustrates that the focus in the majority of the period since 2010 was on liberalizing capital mobility. This can be explained by Egypt's switch to a flexible exchange rate system since the beginning of 2003 and accompanying inflation was controlled through the policy of inflation targeting to manage monetary policy in 2006 (Elsharif, 2016). This was coupled with other factors leading to a pound appreciation and an encouragement to save in domestic currency which leads to a more support to exchange rate stability. This was continued till 2011 when the political transition led to political uncertainty and social unrest those were reflected on the economic performance (Mansour and Soliman, 2021). Inflation rates, government budget deficits and debt exacerbated leading to a depreciation of the pound again in 2016 and accordingly depositors gave up holding their assets in domestic currency. These negative effects were accelerated by increased domestic inflation. Hence, since 2003, the negative impact was exchanged between exchange rate stability and monetary autonomy, so that if one of both was affected positively, the other was negatively affected.

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Lebanon recorded the highest rates of exchange rate instability during the period that followed 2010. Lebanon ended the civil war that lasted during the period 1975-1990, burdened with massive debts. The continuity of economic instability has exacerbated the crises of the Lebanese economy. The Lebanese government's attempts to attract investment have not yielded the desired results, despite placing capital mobility as a first priority for reconstruction, due to the accelerating inflation. In light of the high inflation rates, the Lebanese government was keen to maintain high interest rates on deposits in order to attract depositors to keep their money inside the country. This led to large fluctuations in monetary autonomy as shown in figure 1. However, these deposits were used to finance the government's budget deficit instead of being used for productive investment (Kandasamy, 2021). This exacerbated the economic crises in Lebanon leading to a collapse in the value of the domestic currency in 2019 because of the financial and political crisis (Guechati and Chami, 2022).

Morocco has adopted a fixed exchange rate system whereby its currency is linked to a basket of currencies, contains euro and US dollar, that reflects the relative weights of its partners. This is reflected in Figure 1 in the low values of exchange rate stability index of the dirham against the US dollar. The stability of the exchange rate of the dirham against the currencies of partners led to improving capital mobility index. Morocco targeted the independence of its central bank that led to improving monetary autonomy as a first since 2006 (World Bank, 2020). Since 2016, Morocco started planning to be a financial hub in Africa. Consequently, Morocco started pay attention to its interest rates relative to competitors leading to the reduction of monetary autonomy index since 2016. Morocco adopted, for a long time, relatively tight policy for capital flows (Benlamine *et al.*, 2018). Capital mobility did not witness a significant improvement except with the transformation into a more flexible exchange rate in 2018 when expanding the exchange rate band (World Bank, 2020). Benlamine *et al.*, (2018) stated that the case of Morocco proved the validity of Trilemma.

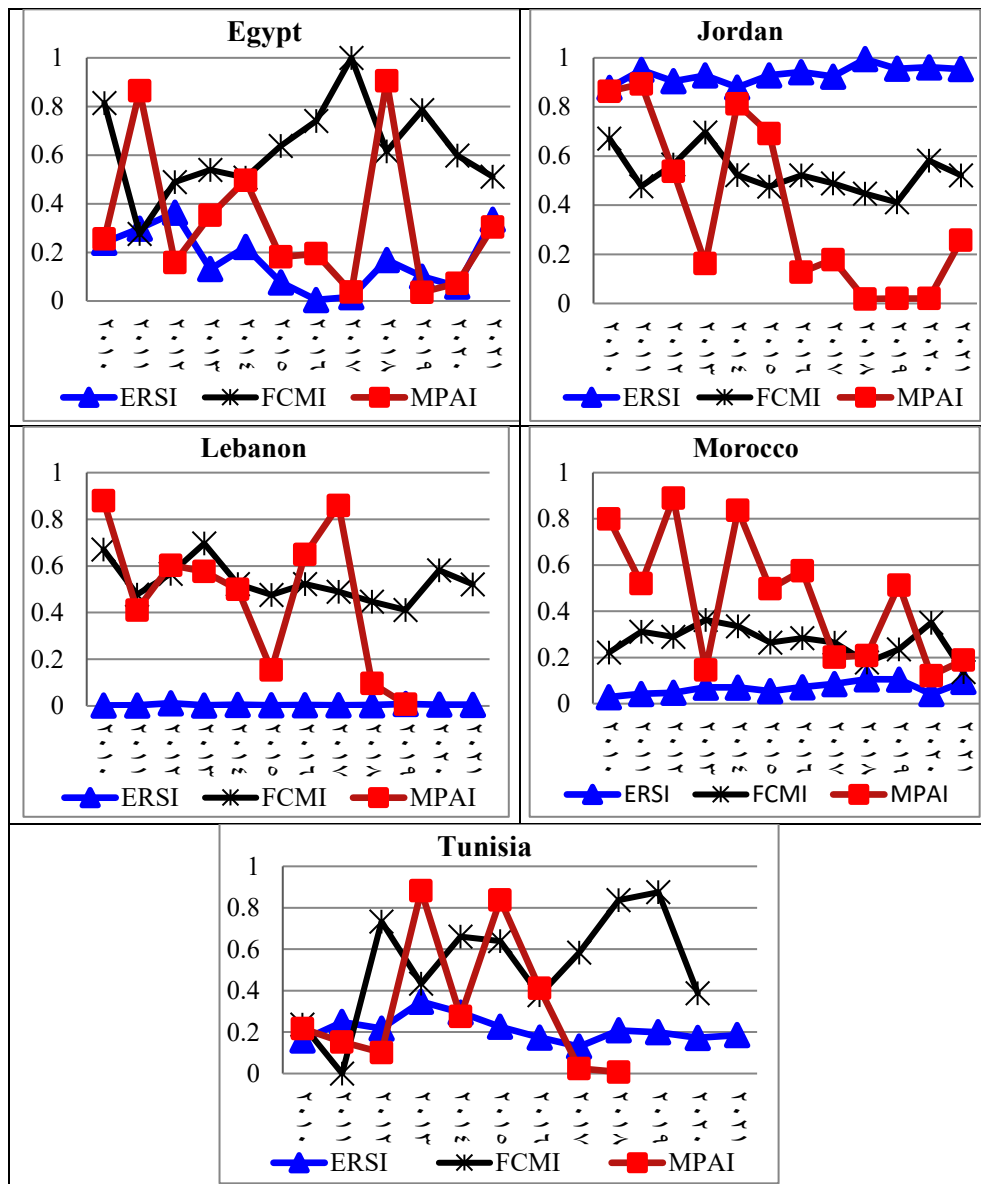


Figure 1: The evolution of Trilemma indices in sample countries, 2010-2021

Source: Author calculations depending on data sources explained below.

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The Tunisian economic performance was strong before 2010 in light of the inflow of capital from abroad, which led to a significant increase in net international reserves. The adoption of fiscal discipline policies supported the economy as it controlled inflation rates and led to increase liquidity because of accumulating banks' surpluses. The situation was reversed after the Tunisian revolution in 2011, which was followed by a large outflow of capital. The latter led to increasing capital mobility indicator in 2011, as shown in figure 1. The country tried to recover by devaluating the exchange rate several times which resulted in the relatively low values of exchange rate stability index. Additionally, central bank increased injecting domestic liquidity and moving interest rates into the markets. This resulted in fluctuating monetary autonomy index along the period after 2011. Pumping domestic liquidity and raising interest rates resulted in high inflation rates, which Tunisia was unable to control. The crisis was exacerbated with the terrorist attacks in 2015 as the central bank lost its ability to control monetary aggregates which led to the deterioration of monetary autonomy (Khatat *et al.*, 2020). In 2018, Tunisia managed to control the increase in inflation by raising interest rates. Hence monetary autonomy continued decreasing.

To conclude, it is evident from figure 1 that in all sample countries, if any pair of the Trilemma indices is targeted, accordingly the values of their indices increase, the inevitable result is a decline in the third index. This is evident from the fact that no positive annual growth occurred over the period in the three indicators simultaneously in any of the sample countries. This confirms the validity of Trilemma in sample countries (sub-hypothesis 1). These relations have not changed in the period prior to 2010 in these countries.

#### **4. Model Specification, data sources, and estimation techniques**

In this section, measuring Trilemma indices used are illustrated. Then the specifications of the model and data sources are discussed. This is followed by clarifying estimation strategy used.

##### **4.1 Measuring Trilemma indices**

As mentioned before, three measurements are used referring to Trilemma indices (MPA, FCM and ERS). The indices constructed by Aizenman *et al.* (2010), (Canale *et al.*, 2018) and Weiyang (2021) are used.

First, in constructing MPA, the annual average of the deviation of monthly short-term domestic interest rate from the base interest rate is used. Interest rate in the USA was selected as a base interest rate following Aizenman *et al.* (2010). The deviation in interest rates is measured using the annual average correlations between domestic and base interest rates as shown in equation 1:



$$MPA_{it} = 1 - \frac{corr(r_d - r_b)_{it} - (-1)}{1 - (-1)}$$

In equation 1, i and t refer to the sample country and year, respectively.  $r_d$  and  $r_b$  refer to annual average of domestic and base interest rates, respectively. Following equation 1, MPA index ranges from 0 for fully correlated monetary policy and 1 for full monetary autonomy.

Second, in constructing FCM, the lack of data available for sample countries restricted the use of the index established by Aizenman *et al.* (2010) and Weiyang (2021). Instead, the index used by (Canale *et al.*, 2018) is applied which is also widely used in related researches. The index measures capital openness as annual ratio of the summation of “net acquisition of financial assets and net incurrence of liabilities” to GDP. A modification was made in measuring the index to limit its value between 0 and 1 as both refer to free capital markets while a value of 0.5 refers to total prevention of financial markets. This is shown in equation 2:

$$FCM_{it} = \frac{(FA+FL)_{it} - (FA+FL)_{min}}{(FA+FL)_{max} - (FA+FL)_{min}} \quad \dots (2)$$

In equation 2, i and t refer to the sample country and year, respectively. FA and FL refer to annual “net acquisition of financial assets to GDP” and “net incurrence of liabilities to GDP” respectively. Both of FA and FL include direct investment, portfolio investment, financial derivatives other than reserves, employee stock options and other investment.

Third, in constructing ERS, the index constructed by Aizenman *et al.* (2010) and Weiyang (2021) are used. This index is constructed as the annual standard deviations of monthly exchange rate of domestic currency relative to US dollar. The US dollar is used despite Morocco pegs its currency to a basket of currencies because it accounts for a significant component of the basket of currencies in Morocco. Additionally, all the rest of sample countries pegged their currencies to US dollar in the majority of the period under study. ERS is shown in equation 3:

$$ERS_{it} = \frac{0.01}{0.01 + stdev_t(\Delta \log(ExRate_{im}))} \quad \dots (3)$$

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In equation 3, m and t refer to month and year respectively. ExRate refers to monthly exchange rate of the domestic currency in country i against US dollar. Following equation 3, ERS index ranges from 0 to 1 and a higher value means greater exchange rate stability.

#### 4.2 Specifications of the model and data sources

As mentioned above, the main objective of estimating the model is to measure the impacts of Trilemma on macroeconomic performance. Both of output volatility and inflation rates are used referring to macroeconomic performance “ $y_{it}$ ” as both are found the most commonly used indicators (Aizenman *et al.*, 2010; Hsing, 2012<sup>a</sup>; Hsing, 2012<sup>b</sup>, Mansour, 2014; Weiyang, 2021). The following specification of the model is used following Aizenman *et al.* (2010), Mansour (2014) and Weiyang (2021):

$$y_{it} = \lambda_i + \rho y_{i(t-1)} + \alpha_1 MPA_{it} + \alpha_2 FCM_{it} + \alpha_3 ERS_{it} + \sum_k \delta_k X_{it} + \varepsilon_{it} \quad \dots (4)$$

In equation 4, i and t denote country and year, respectively. The time lag of “ $y_{i(t-1)}$ ” is used to test the possible persistence in macroeconomic performance. Trilemma indices “ $MPA_{it}$ ”, “ $FCM_{it}$ ” and “ $ERS_{it}$ ” are considered the main independent variables in the model. “ $X_{it}$ ” refers to vectors of macroeconomic control variables; “ $\lambda_i$ ” is a set of individual and time-invariant country’s fixed effect and  $\varepsilon_{it}$  stands for the error term.

In estimating equation 4, output volatility is measured as a five-year standard deviation of real per capita GDP growth. Inflation rates are measured using GDP deflator. “ $X_{it}$ ” includes variables those are most used in related literature (Aizenman *et al.*, 2010; Mansour, 2014; Weiyang, 2021). Depending on the availability of data for selected countries, nine determinants of macroeconomic control variables are chosen. Inflation volatility “*InfVol*”, calculated as the five-year standard deviation of annual inflation rate. Trade openness “*Open*” measured as the sum of exports and imports as a percentage of GDP. Terms of trade (ToT) shocks “*ToTS*”, defined as a four-year standard deviation of the product of ToT growth times “*Open*”. Fiscal procyclicality “*FisCy*”, calculated as the correlation between HP-filtered government consumption expenditure and HP-filtered real GDP. Volatility of M2 growth “*BMV*”, measured as a five-year standard deviation of broad money growth. Domestic private credit “*DPC*”, defined as domestic credit to private sector by banks as a ratio of GDP. Reserves ratio “*RR*” measured as total official reserves excluding gold to GDP.

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Adding these control variables to equation 4, the specification of the model can be displayed as in equation 5.

$$y_{it} = \lambda_i + \rho y_{i(t-1)} + \alpha_1 MPA_{it} + \alpha_2 FCM_{it} + \alpha_3 ERS_{it} + \delta_1 InfVol_{it} + \delta_2 Open + \delta_3 ToTS_{it} + \delta_4 FisCy_{it} + \delta_5 BMV_{it} + \delta_6 DPC_{it} + \delta_7 RR_{it} + \varepsilon_{it} \quad \dots (5)$$

The expected effects of determinants of macroeconomic performance using output volatility and inflation rates are as follows:

- a) “*MPA*”, “*ERS*” and “*FCM*” have unknown impacts on both of output volatility and inflation rates as the impacts varied in theoretical basis and empirical studies as mentioned before. These examine the validity of sub-hypotheses 2, 3 and 4 respectively.
- b) “ $y_{i(t-1)}$ ” tests the hypothesis that output volatility and inflation rates follow a dynamic nature. To accept this hypothesis (sub-hypothesis 5), the variable needs to be statistically significant and positive in the model.
- c) “*InfVol*” as a measurement of prices instability is a main source of uncertainty and consequently the decline in economic growth. Uddin *et al.* (2021) documented the positive relationship between instability in prices and both of output volatility and inflation. Hence, “*InfVol*” is expected to be statistically significant and positive in both models.
- d) “*Open*” increases mean relying more on specialization in producing products those having a comparative advantage in. Therefore, its effects on both of output volatility and inflation is unexpected as the net effect depends on the other factors such as exchange rate changes, foreign components share of domestic goods and elasticity of supply and demand.
- e) “*ToTS*” leads to two effects when terms of trade deteriorate, which is the predominant case in sample countries (Funke *et al.*, 2008). The first is the spending effect resulting from the decline in national wealth following the reduction in exports prices or the increase in imports prices. The second is the resource-movement effect following the decrease in relative marginal product of factors used in exportable sector leading to a shift in resources away from this sector. Accordingly, the net effects of “*ToTS*” on output volatility and inflation are expected to be positive while the direction of changes of output depends on which of spending effect or resource-movement effect dominates the relation (Aizenman *et al.*, 2010).
- f) “*FisCy*” measures the extent to which government spending follows business cycle phases. Fiscal spending in developing countries is closely related to business cycles, as spending increases at the time of expansion (Lim, 2020). This is against the rational stabilization policy. Accordingly, the effects of “*FisCy*” on output volatility and inflation are expected to be positive.

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- g) “*BMV*” increases lead to increasing output volatility as it negatively affects real growth in both of short and long run and positively affects inflation (Algaeed and Algethami, 2022). Accordingly, the effects of “*BMV*” on output volatility and inflation are expected to be positive (Aizenman *et al.*, 2010).
- h) “*DPC*” increases refer to the development of financial markets. The latter enables the reallocation of capital in a more efficient manner, thus reducing output volatility Mansour (2014). It can help increasing purchases which can be converted into a rise in prices unless output increases at least the same rate. Accordingly, the effects of “*DPC*” on output volatility (inflation) are expected to be negative (positive) respectively.
- i) “*RR*” high levels work as a buffer from shocks leading to protecting the economy from fluctuations in output. Additionally, having high “*RR*” with holding a stable exchange rate, which is the case in majority of sample countries, leads to higher inflation. This is because the increase in reserves is evidence of scaling back the intervention in the exchange market to sterilize the effect of the intervention to stabilize exchange rate and accordingly inflation increases (Aizenman *et al.*, 2010). Accordingly, the effects of “*RR*” on output volatility (inflation) are expected to be negative (positive) respectively.

Data sources for constructing variables included in equation 5 include World Bank - World Development Indicators database for Output volatility, Inflation, “*InfVol*”, “*GDP*”, “*Open*”, “*ToTS*”, “*FisCy*”, “*BMV*”, “*DPC*” and “*RR*” data. “*MPA*”, “*FCM*” and “*ERS*” data are collected from International Monetary Fund. Natural logarithm transform is used for positive valued variables in order to minimize the heterogeneity in measuring variables. Hereafter, the start of the variable name with the letter “L” denotes that its value has been converted to a natural logarithm.

Descriptive statistics for the set of variables used show a set of facts during the period 1977-2021. First, output volatility shows that Lebanon had the maximum output volatility in sample countries and Egypt had the least. Average inflation in Lebanon and Egypt were higher than average of Middle East and North Africa while Morocco had the least average inflation between sample countries. The average of “*ERS*” index indicated that the main feature during the study period was the instability of the exchange rate in sample countries. The average of “*MPA*” index clarified that the main feature during the study period was the adoption of a moderate policy with regard to the independence of monetary policy, which reached its highest in Morocco and least in Tunisia. The average of “*FCM*” index illustrated that the main feature was the adoption of a moderate policy with regard to the movement of capital in sample countries,

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except for Morocco which increased restrictions on the movement of capital, as explained before.

Correlation coefficients between variables used confirm that output volatility is highly positively correlated to “*L\_MPA*”, “*L\_InfVol*” and “*L\_Open*”. It is highly negatively correlated to “*FCM*”, “*L\_ERS*”, “*L\_DPC*” and “*L\_RR*”. Correlation coefficients confirmed that inflation is highly positively correlated to “*L\_InfVol*” and highly negatively correlated to “*L\_MPA*”. “*L\_InfVol*” is found to be highly correlated to “*FisCy*”, “*L\_BMV*”, “*L\_DPC*” and “*L\_RR*”. All of these correlations are acceptable and consistent with the relevant literature. Correlation coefficients matrix is shown in table 1 in the appendix. Correlations between each pair of independent variables illustrated that “*L\_RR*” is highly correlated to “*LMPA*”, “*FCM*”, “*ERS<sub>it</sub>*”, “*L\_InfVol*”, “*L\_Open*”, “*L\_ToTS*” and “*L\_DPC*”. “*L\_BMV*” is highly correlated to “*L\_MPA*”, “*FCM*”, “*L\_ERS*” and “*L\_InfVol*”. “*FisCy*” is highly correlated to “*L\_InfVol*”, “*L\_Open*” and “*LToTS*”. All of these correlations have clear theoretical justifications. Accordingly, “*L\_RR*”, “*L\_BMV*” and “*FisCy*” are omitted from estimation.

### 4.3 Estimation strategy

Results of Wald test confirmed that variables of “*L\_Open*” and “*L\_DPC*” are endogenous variables in output volatility model. Variables of “*L\_MPA*”, “*FCM*”, “*L\_InfVol*”, “*L\_Open*”, and “*L\_DPC*” are endogenous variables in inflation model. The endogeneity of some of determinants in both models has been confirmed by Bhatta *et al.* (2021), Majumder and Nag (2021) and Weiyang (2021). “Panel groupwise Heteroskedasticity Wald Test” failed to reject heteroskedasticity in both models. Serial correlation is not proven using Pesaran's Cross sectional Dependence test.

Weiyang (2021) used GMM in estimating a model of levels of variables to avoid the problem of endogeneity. However, GMM keeps fixed effects differences between countries persisted influencing the model; additionally changes from one year to another were ignored. Hence, several benefits can be generated from estimating models using system GMM (S-GMM). First, it is used to avoid estimation problems of having endogeneity and heteroscedasticity as GMM estimator is preferred than conventional IV estimator and 2SLS procedure to maximize efficiency of estimation in case of existence of heteroscedasticity (Baum *et al.*, 2003). Second, Dynamic S-GMM gives the ability to add lagged dependent variable as an independent variable in estimating models. Third, S-GMM estimates relations as a system of two models simultaneously, one estimates the model using variables in levels while lagged differences as instruments and the other estimates the model using variables in first differences and variables levels as instruments. Hence, the model captures the effects of

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levels and changes in the same model which eliminates fixed effects differences between countries (Arellano and Bond, 1991). Accordingly, Dynamic S-GMM is used in estimation.

In estimating S-GMM models, variables of “*L\_InfVol*”, “*L\_Open*” and “*L\_DPC*” are used as endogenous variables and variables of “*L\_MPA*”, “*L\_ERS*”, “*L\_RR*” and “*L\_BMV*” are used as instruments in output volatility model. Variables of “*L\_MPA*”, “*FCM*”, “*L\_InfVol*”, and “*L\_DPC*” are used as endogenous variables and variables of “*L\_MPA*”, “*L\_InfVol*”, “*L\_ERS*”, “*L\_RR*”, *l.rus* and “*L\_Open*” are used as instruments in inflation model. Only the second lag of the endogenous variables is used as instruments.

The values of Sargan over-identification test rejected the null of over-identifying restrictions in both models used to estimate equation 5. Accordingly, this can give evidence about confirming instruments’ validity (Baum *et al.*, 2003). The tests of Arellano-Bond test for AR (2) rejected the problems of second order autocorrelation in differences at 95% confidence level. Results of estimating the Dynamic S-GMM models are reported in appendix 2.

## **5. Empirical Results and Discussions**

Estimation results in appendix 2 confirmed that output volatility decreases by increasing exchange rates stability and capital openness (sub-hypotheses 3 and 4, respectively in output volatility model). This is consistent with the results of Aizenman *et al.* (2010), Hsing (2012<sup>b</sup>), Mansour (2014) and Weiyang (2021). Results found no evidence of monetary autonomy on reducing output volatility (sub-hypothesis 2 in output volatility model). This is consistent with the results of Hsing (2012<sup>a</sup>). Inflation rate is reduced by greater monetary autonomy, exchange rate stability and capital openness (sub-hypotheses 2, 3 and 4, respectively in inflation model). This is consistent with the results of Aizenman *et al.* (2010), Hsing (2012<sup>b</sup>), Kaur (2019) and Weiyang (2021). Confirming the validity of these sub-hypotheses leads to strongly accept the main hypothesis of the study in sample countries, with an exception of the effect of monetary autonomy on reducing output volatility.

The rest of the statistically significant independent variables included in models has the expected signs. The significantly positive effects of time lag of the dependent variables in both models confirmed the validity of the hypothesis that output volatility and inflation rates follow a dynamic nature (sub-hypothesis 5). Increased inflation volatility and prices instability increase output volatility and inflation. Terms of trade shocks accelerates output volatility. Increased financial development supports output stability however it increases inflation.

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## **6. Conclusions and policy implications**

Both of theoretical basis and empirical evidence are investigated to check the validity of Trilemma and its impacts on macroeconomic performance in five Non-oil Arab Economies. First, theoretical framework for the Trilemma does not decisively determine its validity. Second, empirical literature investigation shows that while Trilemma was validated in some cases, some failed to prove it and others confirmed the existence of a policy dilemma rather than a Trilemma. Third, theoretical framework for Trilemma impacts on macroeconomic performance proved that while the impacts are confirmed, the direction of these impacts differ depending on the accompanying policy mix adopted. Fourth, empirical studies agreed with the theoretical framework regarding the disagreement of the direction of these impacts. Fifth, historical investigation of Trilemma indices in sample countries is confirmed the validity of Trilemma.

The contribution of this study is to assess the validity of Trilemma and its impact on macroeconomic performance in a group of Arab non-oil countries considering the dynamic nature of macroeconomic performance. Dynamic S-GMM is used to estimate two models one uses output volatility and the other uses inflation as measurements for macroeconomic performance. Estimation results highlighted the significance of all Trilemma indices in affecting output volatility and inflation as they all are binding and constraining. More specifically, greater capital openness and exchange rates stability can reduce output volatility. There is no substantiated evidence that monetary autonomy affects output volatility. Inflation rate can be reduced by greater exchange rate stability, capital openness and monetary autonomy. Both of output volatility and inflation follow a dynamic nature. Increased inflation volatility and prices instability increase output volatility and inflation. Terms of trade shocks accelerates output volatility. Increased financial development supports output stability however increases inflation.

Results of the study can lead to several recommendations to support the effectiveness of considering Trilemma while planning for improving macroeconomic performance indicators used in this study. Among these recommendations:

1. Giving attention to the dynamic nature of macroeconomic performance indicators when studying Trilemma indices effects.
2. Determining the main macroeconomic performance indicators targeted to be affected as the effects of Trilemma indices on macroeconomic performance depends on the indicator used.

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3. Targeting exchange rate stability is proposed to maintain macroeconomic stability. Additionally, macroprudential policies targeting increase FDI at the expense of FPI are proposed.
  4. Controlling inflation volatility and prices instability reduces uncertainty and accordingly both of output volatility and inflation.
  5. If reducing output volatility has a higher priority, the policy option considers greater capital openness and exchange rates stability at the expense of monetary autonomy can be effective.
  6. If reducing inflation rate has a higher priority, a moderate policy option of having a mix of greater exchange rate stability, capital openness and monetary autonomy can be effective.

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**Appendix 1**  
**Correlation coefficient matrix of variables**

	L_OV <sup>+</sup>	INFL	L_MPA	FCM	L_ERS	L_INFV	L_OPEN	L_TOTS	FISCY	L_BMV	L_DPC	L_RR
L_OV	1											
INFL.	0.19**	1										
L_MPA	0.13*	-0.19**	1									
FCM	-0.35***	-0.06	-0.096	1								
L_ERS	-0.17**	-0.13	0.023	0.19**	1							
L_INFV	0.22***	0.47***	0.127*	0.18***	-0.04	1						
L_OPEN	0.21***	-0.05	0.034	0.15**	0.28***	-0.06	1					
L_TOTS	0.16**	-0.02	0.002	-0.05	0.29***	-0.09	0.5***	1				
FISCY	0.117	0.11	0.055	-0.03	0.12	0.14*	0.26***	0.3***	1			
L_BMV	0.041	-0.3***	0.17**	0.24***	0.29***	0.18**	0.024	0.104	-0.06	1		
L_DPC	-0.13*	-0.04	-0.2***	0.18**	0.01	-0.22***	0.64***	0.32***	0.12*	-0.2***	1	
L_RR	-0.149**	0.01	-0.189**	0.17**	-0.15	-0.19**	0.49***	0.21***	0.13	-0.16**	0.8***	1

<sup>+</sup> L\_OV refers to the natural logarithm of output volatility.

Source: estimation results

The symbols \*, \*\* and \*\*\* reflects the significance at 10%, 5% and 1% levels.

**Appendix 2**  
**Dynamic S-GMM estimates of output volatility and Inflation models**  
**(1977-2021)**

No.	Independent variables	Dependent variable ( $y_t$ )	
		Output Volatility <sub>it</sub>	Inflation <sub>it</sub>
1	$y_{i(t-1)}$	0.728*** (10.16)	1.128*** (2.7)
2	L_MPA <sub>it</sub>	-0.0198 (-1.24)	-2.14*** (-3.26)
3	FCM <sub>it</sub>	-0.324*** (-3.75)	-13.869* (-1.85)
4	L_ERS <sub>it</sub>	-0.042*** (-2.84)	-0.534** (-2.23)
5	L_InfVol <sub>it</sub>	0.061** (2.34)	3.669*** (3.31)
6	L_Open <sub>it</sub>	0.278** (2.39)	0.616 (0.41)
7	L_DPC <sub>it</sub>	-0.115** (-2.04)	5.771** (2.19)
8	L_ToTS <sub>it</sub>	0.033 (0.82)	-0.733 (-0.63)
9	_cons	-0.571* (-1.93)	-24.905* (-1.87)
Countries/Observations		5/167	5/165
AR(2) p-value*		0.533	0.44
chi <sup>2</sup> Sargan Test <sup>+</sup>		0.201	0.161

The symbols \*, \*\* and \*\*\* reflects the significance at 10%, 5% and 1% levels.

Values in () refers to z- statistics.

\* Arellano-Bond test for Second-order autocorrelation AR(2) in first differences.

AR(1) was measured but not recorded.

<sup>+</sup> Sargan test of over-identifying restrictions

Source: Estimation results of models in equation.

## تأثيرات "الثالوث المستحيل" على أداء الاقتصاد الكلي في الاقتصادات العربية غير النفطية: دراسة حالة مصر والأردن ولبنان والمغرب وتونس

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المستخلص

تعتبر استقلالية السياسة النقدية، واستقرار سعر الصرف، وحرية انتقال رأس المال دولياً من الأهداف الاقتصادية الكلية الهامة لأي دولة. ومع ذلك، تنص فرضية الثالوث المستحيل على أنه لا يمكن استهداف الحالات المتطرفة لهذه الأهداف الثلاثة أنياً. وعلى الرغم من وفرة الأدبيات التي ركزت على اختبار صحة الثالوث المستحيل، ركزت دراسات تجريبية محدودة على تأثيره على أداء المتغيرات الاقتصادية الكلية. ولم تتفق هذه الدراسات التجريبية ولا الإطار النظري على صحة الثالوث المستحيل أو آثاره على أداء المتغيرات الاقتصادية الكلية، لا سيما في البلدان النامية. تختبر الدراسة فرضية الثالوث المستحيل وتقيس أثر استهداف مكوناته على أداء المتغيرات الاقتصادية الكلية. تم تطبيق الدراسة على مجموعة من الاقتصادات العربية غير النفطية وفقاً للمنهج الاستنباطي باستخدام مقطعية-زمنية Panel. تم تقدير نموذجين للفترة ١٩٧٧-٢٠٢١ باستخدام طريقة نظام العزوم المعممة (S-GMM). أكدت النتائج الطبيعية الديناميكية لأداء المتغيرات الاقتصادية الكلية، وصحة الثالوث المستحيل في بلدان العينة، وأهمية الثالوث المستحيل في التأثير على أداء المتغيرات الاقتصادية الكلية. وبشكل أكثر تحديداً، تتراجع تقلبات الإنتاج والتضخم مع زيادة انفتاح أسواق رأس المال، وزيادة استقرار أسعار الصرف. بينما يتراجع معدل التضخم فقط مع زيادة الاستقلال النقدي. وقد تم اقتراح سياسات داعمة لتحسين الأداء الاقتصادي الكلي بدول العينة بالتركيز على الأهداف المكونة للثالوث المستحيل.