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Send correspondence to:
Houda Boubaker
Aix-Marseille School of Economics
houda.mrad@etu.univ-amu.fr

[1] LAREQUAD, FSEGT, University of Tunis El Manar, Tunisia and Amse, Aix-Marseille School of Economics. Phone: +216 22 630 818.
[2] Amse, Aix-Marseille School of Economics, E-mail: eric.girardin@univ-amu.fr
[3] Amse, Aix-Marseille School of Economics, E-mail: christophe.muller@univ-amu.fr

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Abstract

This paper investigates the role of shocks to trend in explaining the business cycle fluctuations in MENA countries. Therefore, We estimate a stochastic growth model with both transitory and permanent shocks. Our results provide the evidence about the shocks to trend productivity as a driver of the macroeconomic movements in the region. We find also that the model succeed to match a key of the empirical regularities as for emerging economies, which is the high relative volatility of consumption to output. The examination of the model performance for oil exporting and importing MENA countries indicate that the role of trend is more pronounced for the former group. The examination of the determinants of MENA countries' volatility identifies the trade openness, volatility of inflation rate, the quality of institution and the volatility of government consumption as source of shocks to productivity.

Keywords:

JEL Classifications: E32, F41, O40.

1 Introduction

Business cycle analysis in emerging economies is a field in continuous progress and receiving increasing focus from international organizations and research institutes. As those countries operates and evolve in more difficult circumstances researchers face challenges to come to establish a modeling strategy. More complicated has become the conduct of economic policies in those countries, since they experience periods of high uncertainty about the growth of output, interest and exchange rates and high inflation volatility.

The differences of business cycle features between developed and emerging economies has been addressed by many studies which are fairly reporting that emerging economies are highly volatile, consumption is higher than output and the trade balance is strongly countercyclical. This strand of literature is influenced by Aguiar and Gopinath [2007] and assigns these empirical regularities to structural changes stemming from shocks to the growth considered as permanent contrary to transitory ones that play important role only for developed countries.

Although the growing literature supporting the evidence that stochastic trend is of great importance to explain the salient features of emerging economic (Boz, Durdu, and Li [2015], Naoussi and Tripier [2013]), no study focused on the MENA region. It is especially this lack of literature that we find appealing for improving and enhancing knowledge about the business cycle fluctuation in MENA countries. Furthermore, it is a subject that offers large applicability since the region is consistently under-performing and also is affected by several external factors imported from developed countries.

The economic background of the region witnesses for the frequent changes in MENA countries' economic context, fiscal policies changes (Tax reforms, adoption of the single value-added tax), financial sector reforms, monetary policies shifts and trade liberalization. Additionally, conflicts and wars in the region contributed to political regime changes. The myriad of event the region experienced indicate deeper frictions that spark intuition about the role that permanent shocks might play at business cycle frequencies. Therefore, we seek to verify the assumption of "The cycle is the trend" in MENA countries. To the best of our knowledge this is the first study that address the issue of TFP shocks to be permanent or transitory and their role in inducing movements of the key economic indicators in the region. In quantitative analysis, we investigate the applicability of an RBC model to

MENA countries when the business cycle fluctuations are assumed to be driven solely by transitory and permanent shocks to total factor of productivity.

The outline of the final paper will be as follows. Section 2 will provide a review the literature about growth model for merging economies, stochastic trend and what represents these shocks in the context of MENA countries. Section 3 describes the economic context of the region. After presenting the model (Equations, calibration, methodology and data) in section 4, section 5 will focus on the structural parameter and business cycle moments estimation results. Section 6 will be devoted to shocks analysis and the determinants of the macroeconomic volatility in the region. Finally we conclude and draw the policy implication.

2 Literature review of the macroeconomic fluctuations

In this section, we highlight the literature of interest that has documented business cycles in developed and developing countries, and we present a summary of the commonly found features.

2.1 Developed versus Emerging economies

The literature about stylized facts of industrial countries had been influenced by Kydland and Prescott [1990]. The authors start by providing evidence that RBC models are designed with the sole objective to explain the facts drawn from the observed data of the US business cycle during the period 1954-1989 at a quarterly frequency. Technically, the authors use the famous Hodrick-Prescott (1981) (HP) filter to isolate the cyclical components and establish the comovements of several series with real output.

Then Backus, Kehoe, and Kydland [1992] extended the work of Kydland and Prescott to cover (i) not only the postwar period, but also the prewar and interwar periods and (ii) nine other developed countries [1] beside the US for a century of HP annual detrended data. In the same vein, Fiorito and Kollintzas [1994], investigate the G7 [2] business cycles for quarterly time series data ($1960:1$-$1989:4$). The latter authors employ different detren-

1. Australia, Canada, Denmark, Germany, Italy, Japan, Norway, Sweden and the United Kingdom
2. Canada, Germany, France, Japan, Italy, UK and US

ding methods to exploit the data and compare the outcomes of different alternatives of the benchmark RBC model, (See also Stock and Watson (1999) who focus on the U.S postwar period, (1953 : 1-1996 : 4)).

Documenting the stylized facts in Europe was addressed by Brandner and Neusser [1992], who focused on Austria and Germany for the period 1960[3]-1989. Also, Correia, Neves, and Rebelo [1995] examine the cyclical behavior of the Portuguese economy from 1958-1991.

To sum up, the empirical regularities highlighted by research cited above and many others on business cycles in developed countries are the following[4] : (i) Consumption and the net exports to output ratio are as volatile as output (Sometimes consumption is found to be less volatile, see Fiorito and Kollintzas [1994], Tawadros [2011]), (ii) exports and imports are more volatile than output, investment is much more volatile than output, (iii) government expenditure and real wages are less volatile than output (iv) real output and real exchange rates are persistent, (v) monetary aggregates are strongly procyclical and velocities weakly procyclical, (vi) fiscal policy is a-cyclical or countercyclical (vii) consumption, investment, employment and inflation are all procyclical, (viii) the ratio of net exports to output is countercyclical, prices are consistently countercyclical, inflation is procyclical and government expenditures are acyclical.

The study of Agénor, McDermott, and Prasad [2000] is a seminal work that reports the stylized facts for twelve developing countries[5]. The sample covers the period of 1978 Q1-1995 Q4 using a wide range of data. Agénor et al. [2000] gave appetite to other studies to document the business cycle stylized facts of emerging economies. For instance, Rand and Tarp [2002] extended the sample of countries to fifteen emerging markets classified into three groups of Sub-Saharan Africa, Latin America, and Asia and North Africa. Moreover, they provide a dating for the business cycle using the duration analysis.

The features of the business cycle characterizing emerging markets established by the studies above and those in the appendix are :

(i) The analysis of the duration of the business cycle indicates that the cycle in emerging markets (from seven to 18 quarters) is shorter than in the developed countries (32 quar-

3. For Austria data started in 1964
4. see table (14) for more details
5. Chile, Columbia, India, Korea, Malaysia, Mexico, Morocco, Nigeria, The Philippines, Tunisia, Turkey and Uruguay.

ters), (ii)The business cycle is more volatile in emerging markets, (iii)The output volatility is higher than in developed countries, (iv)The persistence of the output is almost similar to this observed in developed countries (Male (2010)). The striking finding is the excess volatility of consumption compared to the volatility of the output, that sometimes reach 40% (AG). The same character is observed for the real interest rates, (v)The cyclical behavior of prices and inflation does not lead to robust results about the countercyclicality of prices or the procyclicality of inflation as in developed countries, (vi) The procyclicality of consumption, investment, nominal wages and money aggregates, is supported in developing countries but consistent with developed countries evidence, (vii) The real interest rate is countercyclical which is not consistent with results for developed countries, (viii) The trade balance and terms of trade are more volatile than output and both are procyclical, (ix)the nominal and real exchange rates exhibit no consistent correlation with output, (x) The government expenditure is procyclical and (xi) Fiscal policy is procyclical.

2.2 Business cycle feature of MENA countries

Many studies have focused on the issue of business cycle fluctuations [6] and growth in MENA countries. Makdisi, Fattah, and Limam (2003) analyze the source of output fluctuations in order to measure their contribution to output growth. The cross country regression allows them to identify the role of external shocks to growth in MENA countries (GDP of trade partner and the volatility of per capita GDP rates). Contradictory results were found for the investment ratio and inflation. While the first factor had a weak impact on growth the second recorded a negative impact. Makdisi, Fattah, and Limam [2006] attribute the low investment ratio impact to the low efficiency of capital in the region, and the policy uncertainty and government's distortions for the negative impact of inflation. The impact of terms of trade was ambiguous and oil and natural resource wealth influence negatively the growth in the MENA region.

Trade triggers economic growth, but which component of trade, goods or services, has the most effect on the performance of growth in MENA Countries ?. This question was addressed by Karam and Zaki [2015] using panel (fixed and random effects) and dynamic panel techniques to estimate an augmented Solow residual model. They found that the re-

6. Table (15)

lationship between two sectors is negative and that trade in goods contributes the most to growth in the MENA region.

Another strand of literature, focuses more on the statistical properties of the cycle. The main study is Hirata, Kim, and Kose [2007] who investigate the sources behind the movements of the business cycle and the impact of shocks on these movements for Egypt, Jordan, Morocco, Tunisia, Israel and Turkey over the period $1960-2000$. To answer those questions the authors calibrate and simulate an open economy DSGE model with two sectors and imported capital goods. They find that for the sample average the volatility of the cyclical component matches the data (aggregated output, non-traded sector output and investment). However, when consumption does not include durable goods, the model underestimates its volatility. The procyclicality of output, consumption and net exports was captured by the model. Furthermore, the examination of the effects of shocks reveals that MENA countries business cycle is driven by terms of trade and TFP shocks, which explain 60% and 38% of the output variation respectively. On the other hand, the world interest rate and government spending shocks fail to explain the aggregate output fluctuations. The distinctive aspect of this paper, besides the model used, is that it documents the stylized facts of the MENA region through the statistical analysis of the volatility and contemporaneous correlations. Another study which also established the characteristics of business cycle for some countries of the region is Gallegati, Gallegati, and Polasek [2004]. However the sample covers fifteen Mediterranean countries including MENA countries such as : Algeria, Egypt, Israel, Jordan, Libya,,Malta, Morocco, Syria, Tunisia and Turkey. The findings can be summarized in two points (i) the more the level of developement is different between countries the large are the differences between their cyclical properties and (ii) trade and policy variables capture the most part of the differences in comovements between developed and developing countries. For the set of MENA countries Gallegati et al. [2004] report that : Interest has been renewed on the role of workers' remittances because of the gap in the literature to consider them an important determinant of growth in developing countries. The positive impact of remittances arises from the fact that remittances are an important source of foreign currency, help to reduce poverty, stabilize household consumption, and reduce school leaving in poor areas (see bank (2006) and Bouoiyour and Miftah [2014] Bouoiyour and Meftah $(2014, 2015)$). On the other hand, the negative effect stems from the appreciation of the real effective exchange rate and thereby the

reduction of exports competitiveness (Abdih, Chami, Dagher, and Montiel [2012]). In a recent paper, Kratou and Gazdar [2016] focus on determining to what extent workers' remittances impact economic growth. Their panel data analysis of twelve MENA countries for the period 1984-2011 indicate that over the long-run the relationship between economic growth and remittances is consistently positive, whereas, this link turns negative over the short-run using the GMM estimation. The authors find that financial development and quality of financial institutions condition the relationship between the growth rate of real per capita GDP and remittances on the short-run. They argue that a sound financial system and strong institutions allow remittances to promote growth in receiving countries.

On the cyclical behavior of remittances, some studies support the procyclicality of remittances in recipients countries (Giuliano and Ruiz-Arranz [2009] [7]). However, other research finds countercyclical remittances (see Frankel [2011] [8] and recently Bettin, Presbitero, and Spatafora [2014] [9]).

The cyclicality of energy consumption was rarely investigated. The unique paper we find, is Moosa (2000) in the OPEC Review. The author examines the cyclical properties of energy consumption and intensity for the Japanese economy over the period $1950 - 1991$. The HP detrended data indicate that the cyclical behavior of energy consumption or intensity varies according to the type of energy under study. In fact, while the consumption and intensity of oil are both procyclical, the consumption of coal is less procyclical whereas its intensity is acyclical, and gaz's consumption and intensity are both acyclical.

7. The authors use a new dataset based on a country-specific measure of remittances for 100 developing countries over the period $1975 - 2002$ to determine the nature of the relationship between growth and remittances. their main findings are that remittances are procyclical and financially less developed countries are those that benefit most from remittances to enhance growth through their role as a financing source for investment and easing liquidity constraint.

8. The author emphasizes the importance of bilateral data in the regression specification when addressing the issue of remittances. He uses a dataset that include 64 pairs of countries. He finds that the remittances are countercyclical in the recipient country, however it is procyclical in the host country.

9. Also use a bilateral dataset to estimate a gravity model for remittances using annual data for the period $2005 - 2011$ from 103 Italian provinces to 107 developing countries. Their results confirm the findings of Frankel [2011].

3 Economic background of the region

The premise behind the focus on shocks to trend is that emerging economies are highly volatile due to frequent changes in economic policies, institutions and the macro-economy. Therefore, before embarking up an empirical investigation, it will be useful to present the general background and major economic policy changes regarding the program of liberalization and structural reforms. We also zoom on the 2011 Arab revolutions to assess the economic impact on the region with a brief inspect of the key indicators.

3.1 Liberalization and economic reforms

MENA countries emerged from periods of colonization, the Ottman Empire or the Hashemite monarchy. Periods characterized by several weaknesses legitimating the heavy intervention by the state until the 1980s. The resulting system was centered on the public sector and governments exercised the levers of economic power to benefit of the interest groups they represent. The system had exhausted its effects, since the economic situation of the region suffered from debt crises, high public spending, incoherent pricing policies, trade imbalance and inefficient exchange rate policies. All of that made necessary to reduce the State involvement and protectionism and thus to switch to a new development model where the reliance on the private sector is a key ingredient to achieve the economic balances. Hence MENA countries have implemented a package of economic liberalization and structural adjustment policies under the supervision of the International Monetary Fund (IMF) since 1980s. We describe the process of liberalization and economic reforms in order to analyze changes of fluctuations of the major macroeconomic aggregates after the adoption of these measures as it will be developed in section **??**. The liberalization effort can be divided mainly into three categories : trade, financial liberalization and privatization.

3.1.1 Trade liberalization

The necessary condition for sustained economic growth is to establish trade policies that increase the degree of openness to foreign markets. Therefore, the majority of MENA countries started the accession to the World Trade Organization (WTO) at the same year of its establishment in 1995, Yemen was the latest to reach the organization by June 2014.

The main objective of the liberalization of the trade is to enhance the trading position and trade flows through lower trade barriers such as the customs fees and the creation of the free trade area. To succeed in the liberalization process, MENA countries moved ahead with the implementation of reforms aiming at the reduction of tariff protection, the abolishment of imports or exports prohibitions and the removal of non-tariff barriers.

As summarized in tables (1) and (2), trade agreements were established inside the region and called 'South-South' agreements and outside the region and called 'North-South' agreements.

The regional integration among countries of the MENA region has its roots in the cooperation agreement of the Arab States in 1953 through the signature of the first agreement on trade Agreement on Trade Facilitation and Organizing Transit Trade by the members of the Arab League. This cooperation leads to a two sub-regional agreements. The first was the Gulf Cooperation Council (GCC) that came into force in 1981 signed by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. The second was the Arab Maghreb Union (UMA) established in 1989 between Maghreb countries Algeria, Libya, Mauritania, Morocco and Tunisia. In a further step and in order to boost the intra-regional cooperations, the Arab League established in 1998 the 'Greater Arab Free Trade Area (GAFTA)'. In March 2007, the Agadir agreement came into force between Egypt, Jordan, Morocco and Tunisia, which built their agreement based on the Euro-Mediterranean rules of origin. Doing so, the State members of the cooperation are allowed to cumulate the origins and beneficiate from the advantages of the other agreement signed with the Euro-Mediterranean area.

While, GAFTA is considered as the most comprehensive agreement in the region, it does not include services and investment. On the other hand, the UMA is the unsuccessful agreement since neither of the objectives to create a customs union or a common market which were planned respectively for 1995 and 2000, was accomplished. The reasons are mainly the political conflict between Algeria and Morocco [10] and the biding clause of the unanimity of the five participating countries in the decision making process. Recently, the members of the UMA attempted to reactivate their commitment through three ministerial

10. The deadlock in the situation of Algeria and Morocco had origin in the the Western Sahara dispute after the withdrawal of Spain from the territory. These tensions lead to the closing of the border in 1994 date where the UMA summits were interrupted

TABLE 1 – MENA countries trade partnership : Agreements outside the region.

Country	Date signed	Entry into force
EU-Mediterranean Association Agreement (EMAA)		
Algeria	April 2002	September 2005
Egypt	June 2001	June 2004
Israel	November 1995	June 2000
Jordan	November 1997	May 2000
Lebanon	June 2002	April 2006
Morocco	February 1996	March 2000
Syria	Initialled (December 2008)	
Tunisia	July 1995	March 1998
Turkey	Custom Union	December 1995
The qualifying Industrial Zone (QIZ)		
U.S, Israel and Jordan	1997	1998
U.S, Israel and Egypt		2005
Canada free trade Agreement		
Israel	signed	January 1997
Jordan	signed	October 2012
Kuwait		January 2015
Turkey	Negotiations are underway	
European Free Trade Agreement (EFTA)		
Egypt	January 2007	August 2007
Isreal	September 1992	January 1993
Jordan	Juin 2001	September 2002
Lebanon	June 2004	January 2007
Morocco	June 1997	December 1999
Tunisia	December 2004	June 2005
Turkey	December 1991	April 1992
Middle East Free trade Area (MEFTA)		
Israel	signed	1997
Jordan	2000	20012
Bahrain		August 2006
Morocco	2004	January 2006
Oman	2008	September 2009
Turkey with the EU27		1996
Israel with Mexico		2000
Jordan with Singapore		2005
Deep and Comprehensive Free Trade Area (DCFTA)		
Tunisia with the EU	Launching of the negotiations	
	in October 2015	

Source : the WTO website, the office of the United States Trade Representative website (www.ustr.gov),and the website of the agreements.

TABLE 2 – MENA countries trade partnership : Regional Trade Agreement.

Country	Type of Agreement	Entry into force
Bahrain, Kuwait, Oman, Qatar, Saudi Arabia ans the United Arab Emirates	**The Gulf Cooperation Council (GCC)**	1981
Algeria, Morocco, Libya, Mauritania and Tunisia	**Arab Maghreb Union (AMU)**	1989
Egypt, Jordan, Morocco and Tunisia	**Agadir Agreement**	2007
Israel and Jordan	**Free Trade Agreement**	
Bahrain, Egypt, Iraq, Jordan, Kuwait, Libya, Lebanon, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, Yemen	**Greater Arab Free Trade Arean (GAFTA) agreement**	January 1998
Israel	**Bilateral agreements with Turkey**	1997
Tunisia		2005
Morocco		2006
Egypt		2007
Syria		2007

conferences in 2005 which were devoted to facilitating trade, promoting financial integration, enhance financial reforms and boosting private investment. Contrary to the UMA, the GCC six-oil exporting Gulf countries succeed in launching their common market in 2008 and custom union in 2015. The GCC agreement is the most ambitious piece of MENA countries cooperation since it includes the establishment of an 'Economic and Monetary Union' has been planned for 2010 with a common currency named 'Khaleeji'.

Agreements aim generally at promoting trade liberalization of goods such as GAFTA and Turkey-Syria agreement. On the other hand, Agadir and Turkey-Egypt and Turkey-Morocco agreements consider liberalization measures also for services and investment. Whereas, trade between Turkey and Israel is limited to goods and services. With respect to bilateral agreements, trade in goods, services and investment is covered by the Middle East Free trade Area (MEFTA) agreement, which contrast with the EUROMED agreement which excludes services and investment with a limited interest to agriculture. But, the European Union has extended the area of the agreement in a multilateral perspective through the European Free Trade Agreement (EFTA) to cover services and investment.

Trade liberalization efforts in MENA countries have been a priority for the authorities

not only through the free trade agreement but also through the structural adjustment plans (PAS) that will be developed in section 3.1.3.

3.1.2 Financial liberalization and privatization

Financial systems in MENA region were influenced by government intervention in setting administrative restrictions, granting exemptions and discriminating against borrowing by private companies as well as taking different measures to secure its control of the financial market (Eckstein, Ramot-Nyska, et al. [2008]). In the early 1980s, banking institutions composed the major part of the financial system in MENA countries besides the postal savings and insurance companies. The process of financial liberalization in the region was based on five axes (i) Elimination of interest rates restrictions (ii) Removal of credit controls (iii) Mobilizing the market financing of the budget, (iv) Enhancing prudential regulation and banking supervision and (v) Capital account liberalization. The liberalization process is described in details in table(3).

TABLE 3 – Liberalization measures in MENA region

	Interest rates/directed credit	Market−based financing of the budget /Reduction of the government intervention	Capital market/Monetary policy / Fiscal policy	Prudential regulation and banking supervision/ privatization	Exchange rate and Capital account liberalization
Algeria	Full liberalization of deposit interest rates in 1990. Replacement of lending rate ceiling by the limits on banking spreads in 1994. Abolishment of the limits on spreads in 1995. Withdrawal of the treasury from direct investment in state enterprise in 1987. Transfer of monetary policy responsibilities to the central bank in 1990. Commercial banks are provided with more autonomy in the allocation of credit to high-risk enterprise since 1994 and the mandatory holding of treasury bills was progressively eliminated.	Establishment of an official auction system to sell negotiable treasury bonds on the money market for banks and non bank institutions in 1995.		Elimination of domiciliation requirement for client and extension of the banking sector activities. Opening the capital of the domestic banks to foreign investors in 1994.the Prudential regulation : risk weighted capital adequacy ratio in 1999.The privatization process started in 1995. 22 privatizations were realized by the end of 2006.	Abolishment of restrictions regarding the use of foreign exchange resources in 1994. Establishment of interbank foreign exchange market in 1996.
Egypt	Liberalization of interest rates in 1991 Decontrol of all domestic prices by 1995. Abounding directed credit.	Abolishment of investment and production controls and remove discrimination in private sector and government monopolies.	Establishment of the Treasury Bills market in 1991. Imposing a credit ceiling in the banking system. Banks are allowed to set their own lending and deposit rates. The introduction of a global income tax and a general sales tax and raise prices of energy and public production. Restraint of the wage bill increase, reduction of public investment and subsidies.	Privatization process starts in 1990. Promulgation of the laws 203 and 95 for the restruction and privatization of public enterprise. Selling 20% stake of the of Telecom Egypt. Selling the government stakes in joint venture banks in 2006. Selling of Egypt Telecom in 2005, Bank of Alexandria in 2006. 228 enterprise were privatized up to 2006. Amendment of the Banking and Insurance law for a full private sector ownership in the sector in 1998.	Establishment of the free foreign exchange market and achievement of the convertibility of the Egyptian pound in 1991. Unifying the primary and secondary rate of foreign exchange rate and elimination of the foreign exchange quotas system in 1992.
Iran	remove of the ceiling on lending rates Abolishment of restrictions regarding the use in1991 on domestic commerce and services sector. Banking are allowed to set their deposit interest rates on $2-4$ year investment since 2001. Remove of the credit ceiling control on total banks loans in 1991.		Reduction in the reserve requirements since 2000.	The creation of private credit institutions was authorized by the central bank in 1994. Foreign banks are allowed to offer full services in Iran's free trade zone in 1998. Approval by the Parliament of the law to allow foreign banks to start financial intermediary, opening branches or participation in Iranian banks in 2001. Privatization of 3 state banks (Sadrat, Mellat and Tejarat banks) between $2009-2010$. Adoption of regulation reforms include licensing, net open positions in foreign exchange, and anti-money laundering regulations.	Abolishment of the official export rate, lifting the official exchange rate and unifying the exchange rate system in 2000. Establishment of a single exchange rate regime from the start of $2000/2003$. Establishment of the foreign currency trading center and setting three exchange rates (Official rate, the exchange rate in the center and the exchange rate in the informal market) in 2010. Reactivation of the Tehran Stock Exchange (TSE) in 1989 which joined the International Federation of Stock Exchange in 1992. Non-resident are allowed to invest in investment traded in the (TSE) since 2002. Approval of the new law for foreign portfolio investment in 2005.

Table 3 Continued

	Interest rates/directed credit	Market−based financing of the budget /Reduction of the government intervention	Capital market/Monetary policy / Fiscal policy	Prudential regulation and banking supervision/ privatization	Exchange rate and Capital account liberalization
Israel			Removal of administrative restrictions on deposits and credit since 1987. Reduction in direct discriminatory credit 198290. Use of new monetary policy Tools (Makam nominal bill : since 1987. Auctions for commercial bank deposits : since 1995). Decrease in liquidity rates, and avoidance of their use as a monetary tool since 1987. Elimination of tax discrimination since 1987 (eliminating tax and subsidies discrimination on production factors and goods). Taxation of financial income since 2003.	Splitting of non-banking corporations and subsidies since the 1990s. Splitting-off of the management of provident and mutual funds from the banks in 2005(Bachar reform). Splitting-off of underwriting and consulting from the banks. The privatization process started in 2000. 17 privatizations up to 2006.	Liberalization of the foreign exchange market from 1987 to 2003. Revocation of tax on capital flows over the period 2003−04. Reduction in requirements for institutional investors to invest in government bonds since 1987. Removal of the constraints on issuingprivate bonds since 1987. Gradual elimination of the issuance of non-tradable government bonds over the period 19872003.
Jordan	Full liberalization of interest rates in the early 1990. Preferential credit facilities remain for agriculture, handicraft and export sectors.		Issuing of own certificate of deposit by central bank to mop up excess liquidity in 1993. Regulations on reserve requirement became more flexible since 1996.	Privatization process initiated in 1980 and started in 1990. 33% of Jordan Cement Factories to the French giant Lafarge. 40% of the Jordan Telecommunication Corporation to France Telecom. Selling the 29% stake of the government in flagship Arab Potash Company to Canadian potash firm. Selling several companies in transport, water and electricity as well as three civil airports between 2004 and 2006.	Abolishment of the distinction between resident and non-resident accounts in 1996. Elimination of the ceiling on resident foreign currency deposits. Allowing the swap operations in foreign exchange and selling foreign exchange at the purchaseit at a forward rate for any period of time. spot rate and Full liberalization of the capital account in June 1997. Relaxing therestrictions on foreign investment.Improvement ofregulations on Amman Financial Market.
Mauritania			To improve liquidity management : Adoption of new regulations to promote the development of an interbank market ; introduction of a new liquidity management instrument (BCM deposit certificates) and restructuring and securitization of a portion of BCM claims on the government to be used in open market operations in 2006. Issuing treasury bills in the money	Privatization of all banks in 1990. Tightening bank supervision : one-site inspection in all banks since 2005.	For more flexible exchange rate policy : Removal of any remaining restrictions on current transaction payments ; abolition of the requirement to surrender a portion of fisheries export revenue to the BCM ; and introduction of a foreign exchange auction system managed by the central bank in 2006.

Table 3 Continued

	Interest rates/directed credit	Market−based financing of the budget /Reduction of the government intervention	Capital market/Monetary policy / Fiscal policy	Prudential regulation and banking supervision/ privatization	Exchange rate and Capital account liberalization
Morocco	Elimination of the subsidies on interest rates to priority sectors in 1980. Liberalization of interest rate rates on time deposits in 1989-90. Replacement of lending rates (shirt, medium and long-term credits) ceiling by limits on banking spreads in 1991. Full liberalization of lending and deposit rates in 1996. Abolishment of the mandatory holding ratio of bonds and the retention coefficients on export credits in 994. Elimination of exemption from the credit ceilings and preferential access to refinancing. Reduction of the percentage of obligatory holding of treasury paper by banks from 35% to 10%. Elimination of the tax preferences for interest income on government or government guaranteed paper.		market. Enactment of new tax reforms focusing on enhancing fairness, simplification and mobilizing revenues (Article IV consultation 2015 IMF country reports N 15/285), these reforms were effectively adopted in 2016.	Abolishment of the decree of 1973 imposing 49% as a high limit for foreign ownership in strategic sectors. Eliminate the compartmentalization of activities between development and commercial banks through the new banking law of 1993 . The Prudential regulation : risk weighted capital adequacy ratio in 1996. The privatization program started in 1988, however, the effective process begun in 1993. 115 firms were privatized by the end of 2006. Full liberalization of Altadis/ RÃl'gie de tabac in 2006 and Maroc Telecom in 2007. Full privatization of Royal Air Maroc and Comanav over the period 2006-2008. Adoption of a new central bank law for supervision in Febrary 2006.	Convertibility of the current account in 1993. Issuing equities in international markets using the Global Depositary Receipts (GDRs) and issuing corporate bonds in the European market by the private enterprise in 1996. Establishment ofinterbank foreign exchange market in 1996.
Tunisia	Liberalization of interest rates on time deposits at least three months in 1987. Pegging the interest rates on special savings account to the TMM in 1987. Liberalization of the lending interest rates (unless those to priority sectors) inside a range of TMM+3. Full liberalization of lending rates for non priority sectors in 1994. Abolishment of preferential interest rates on priority sectors. Full liberalization of lending and deposit rates keeping some limits for the deposit rates in 1996. Limitation of deposit rates to 2% of sight deposits and TMM-2 for saving deposits still effective.	Elimination of the central bank prior authorization of loans in 1988. Elimination of the bank financing at preferential interest rates for public enterprises in 1990. Replacement of mandatory holding of treasury debt instruments by banks by treasury bills with the public in 1991. Abolishment of holding treasury bills in 1994. Abolishment of the obligatory sectoral lending ratios and the preferential refinancing rates in 1996.		Expansion of banks offshore activities in 1986. Offshore banks can collect deposits from residents conditions), are allowed to use their foreign holdings to subscribe in the capital of resident grant credits in local currency, insure the medium lending operations in foreign currency and finance and exports operations of resident. The is given to foreign-owned banks to settle their Tunisia in 1989. reduction of the specialization of and development banks in 1994. Prudential risk weighted capital adequacy ratio in 1999. Tunisie Telecom in 2006. Selling (whole or partial) of the period 1987-1994. Privatization (fully or 194 state-owned firms by the end of 2005. Rades II power station in 2007. Installation of the mobile phone licence "Tunisiana" in 2002. 219 firms privitazed by the end of 2009. Adoption of a new banking law in July 2002 revised and promulgated in 2006.	Convertibility of the current account in 1993. Issung oflong-term bonds on the Japanese capital market in1994. Establishment of inter-bank foreign exchange market in 1994.

	Interest rates/directed credit	Market−based financing of the budget /Reduction of the government intervention	Capital market/Monetary policy / Fiscal policy	Prudential regulation and banking supervision/ privatization	Exchange rate and Capital account liberalization
Turkey	Interest rate deregulation began in 1980. Liberalization of the non-preferential loan rates in 1984. Abolishment of the ceilings on deposit interest rates in 1988. Central banks are allowed to set their own interest rate on deposits since 1983.		Enactment of the capital market law in 1981. The establishment of the capital market board in 1982. Establishment of the interbank money market in 1984 and became operational in 1986. Open market operation began in 1987. Elimination of the restrictions of interest rates on corporate bonds by the Central Bank 1987. In same year, introduction of commercial paper. Introduction of certificate of deposits in 1980, Mutual fund participation certificate, corporate and government bonds in 1982, revenue sharing certificates in 1983, interbank and foreign exchange deposits in 1984, treasury bills in 1985, finance and bank bills in 1986, and venture capital corporation shares and REPO in 1992. Tax exemption on imported inputs	Establishment of deposit insurance for banks in 1983. Privatization of the revenue sharing certificates of Bosphorus Bridge and Keban Dam in 1984. The sale of the state's 22% in Teletas in 1988. Selling 99% of the state's equity in Citosan to Société Ciment Français, and 70% of USA airline catering service to Scandinavian Airlines at the first half of 1989. Privatization of the Turk telekom in 2005. According to Karatas (2001) there is 52 firms privatized from 1988 to 1992.	Abounding crawling peg in 1982. Opening capital account in 1989 and full liberalization by 1990. Holding deposits in foreign currencies by residents were allowed since 1984. Banks allowed to set their own exchange rates in 1985. The Istanbul Stock exchange and brokerage houses opened in 1986

A growing number of studies have examined the effect of financial liberalization (or development) on economic growth. For the MENA region studies are not conclusive. On the other hand, Naceur, Ghazouani, and Omran [2008] focus on the impact of stock market liberalization of a panel of eleven MENA countries [11] over the sample of 1979-2005. The authors measure the performance changes between the pre and post liberalization periods of the market capitalization and credit to private sector as indicators of stock market and banking development, respectively. They find a positive impact of liberalization on both indicators. Regarding the impact on growth, their analysis did not reveal a significant impact, either in the short or in the long-run.

The privatization process in the MENA region can be decomposed into three periods. The first one begins with the first privatization in Turkey in 1988 until 1998 where the other countries joined Turkey and the number of firms privatized grew. The second phase from 1998 to 2000, where the number of privatized firms was low. From 2000 to 2005, this phase knew an active privatization activity, and the peak was reached in 2005 through the divestiture of the largest companies (Kauffmann and Wegner [2007]).

3.1.3 The structural adjustment plans (PAS)

As conceptualized by the World Bank (WB) and the International Monetary Fund (IMF) the SAPs are a programs implemented according to the debtor countries' economic conditions in order to help them to repay their debt in foreign currency. Basically, the macroeconomic policies of countries which embrace such a program are designed by IMF and WB. The four key objectives of these programs are (i) shifting to a more market-based system and opening the economy to outside word : (ii) expanding the role of the private sector by boosting the privatization of public services and companies (iii) deregulating the market (iv) improving competitiveness. In the MENA region the adoption of SAPs (see table (4) exclusively aim at damping inflation rates and reducing the burden of public and current account deficits. After two decades from the last adoption of SAP, the economic performance of the region has been uneven.

11. Bahrain, Egypt, Iran, Jordan, Lebanon, Kuwait, Morocco, Oman, Saudi Arabia, Tunisia and Turkey

TABLE 4 – Structural Adjustment Plan.

Country	Structural Adjustment Plans
Algeria	FMI agreement 1991-1992. First and Second PAS with rescheduling 1994-1998.
Egypt	First SAP 1987-1988. Second SAP with rescheduling of debt service payments 1992.
Iran	SAP 1990.
Israel	Stabilization program 1985.
Jordan	First SAP 1989-1991. Second SAP with rescheduling of debt service payments 1992-1997.
Lebanon	SAP 1993.
Mauritania	SAP 1990.
Morocco	SAP 1983-1989 and rescheduling of debt service payments 1983-1992.
Tunisia	SAP without rescheduling 1986-1990.
Turkey	SAP and exports expansion 1980-1985.
Syria	SAP 2006.
Yemen	SAP 1996.

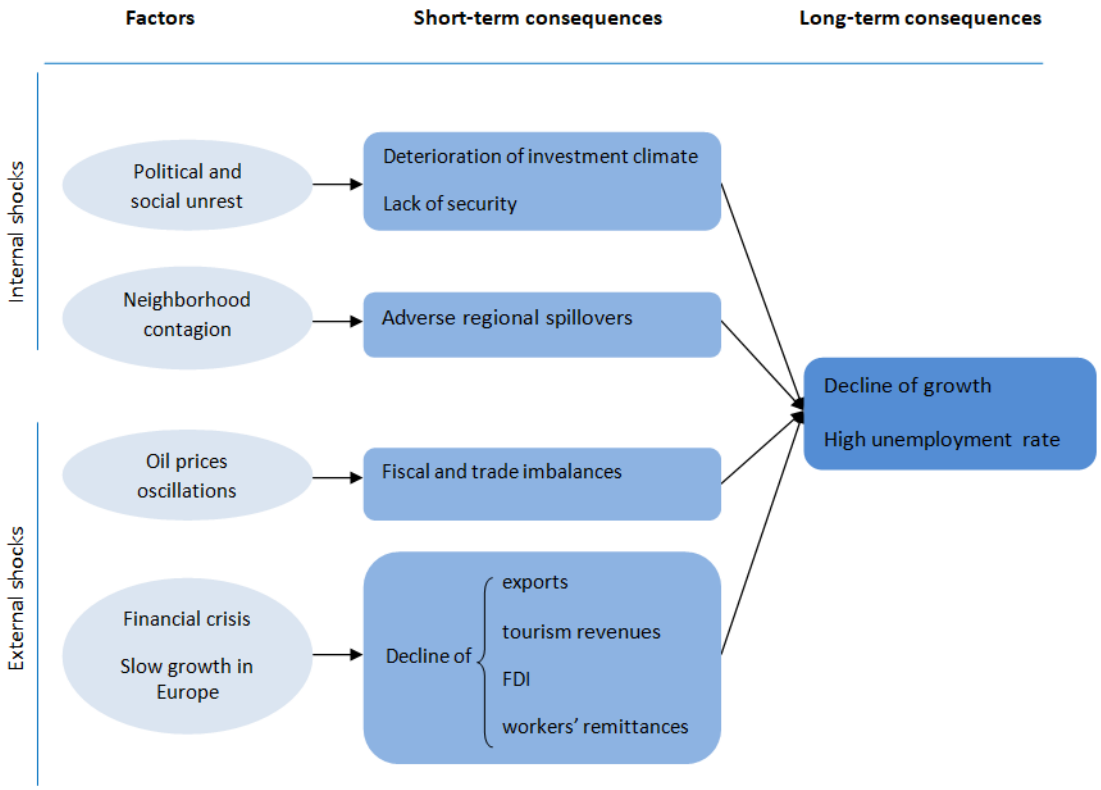
Source : The IMF publications and various sources.

3.2 Arab Spring : Brief economic assessment

During the last five years the region has witnessed an unprecedented political turmoil through the series of revolutions that started in Tunisia, and then affected Egypt, Libya and Yemen. Many analysis and research have been made by international organizations, academic and experts to evaluate the post-revolution period and views converge about the slow GDP and high unemployment as the major consequences of the Arab revolutions. The scene was not calm before the uprisings, unemployment, the lack of political freedom, corruption, poverty and inequality characterized well the pre-revolution period with a blind and deaf governments, the social and political explosion in 2011 marked the history of Arab countries forever. Internal factors linked to the political and social unrest and the neighborhood contagion worsen the investment climate and expose domestic economics to spillovers. Additionally, external factors inherent to the tumbling oil prices combined with the effects of financial crisis and the economic slack in European countries triggered fiscal and trade imbalances and decline in hard currency sources. All this elements put together had weakened the Arab countries economies.

Since 20011, the growth rate of MENA countries declined sharply to record negative

FIGURE 1 – Arab uprisings : Factors and consequences



Note : Based on Khan [2014].

levels, particularly in Tunisia, Yemen and Libya with -2%, -13% and -62.1% [12], respectively. In the case of Egypt and Bahrain, growth rates decreased both to less than 2%. On the other hand, other countries had seen their GDP growth increasing, such as Turkey, Saudi Arabia, Kuwait, Iraq and Morocco, which recorded a growth rates about 11%, 10%, 9.6%, 7.5% and 5.2%, respectively.

As shown in figure 2, the overall economic outlook for the region remains grim. Indeed, after successive years of rise and fall between $2011 - 213$, the growth trend was decreasing since 2013. It is due partly to the drastic fall of the OEC growth rate (Delimited by the blue circle) following the dramatical fall of the global oil prices since the mid-2014 [13]. The average growth rate of the OEC reached 1.3% in 2015.

An evident negative impact of the political crisis and the laxity of security was the de-

12. Libya is a special case because the country had experienced besides to the civil war in 2011, a substantial interruption of production triggered by the war. As it is an oil exporter and then its principal revenues were from oil exports, the fall of oil production to less than 0.5 million barrel per day in 2011 has exacerbated the Libyan economy.

13. The oil prices fall ended in 2015 : $Q4$

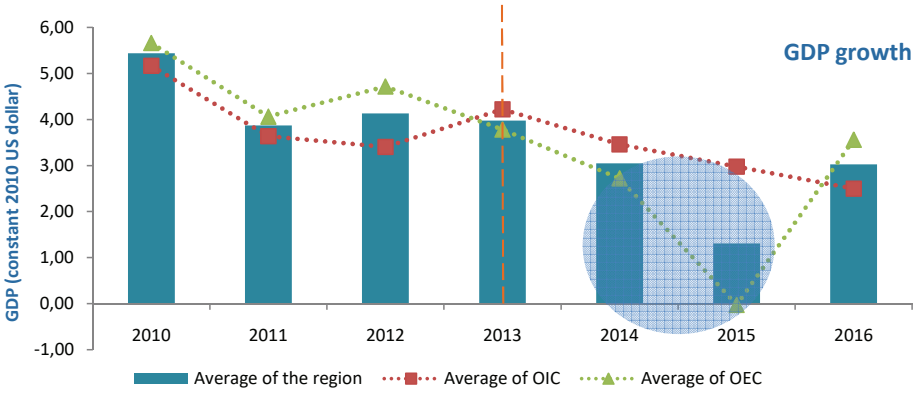
cline of tourism in the MENA region. This sector was always seen as the backbone of the economy in countries such as Tunisia, Egypt, Syria and Jordan, it is also considered as their primary source of hard currency. The examination of tourism related indicators casts a heavy shadow on the situation because while the number of arrivals declined only by 0.52 million tourists between $2010 - 2011$, in average the tourism receipts felt by 310.10 million dollars equivalent to a loss that reached up 5.18% $2010 - 2011$, particularly in Egypt, Yemen and Tunisia where the decline recorded the levels of 31.54%, 29.51% and 27.26%, respectively. The dynamic impact of tourism is transmitted to labor market since it contributes towards employment and job creating. The negative effects of tourism decline on unemployment was more pronounced specially for Tunisia because of the conflict in Libya spillover. In the aftermath of revolution of February 2011 in Libya, almost one million and half migrant workers return home has raised unemployment in the country by more than 18%.

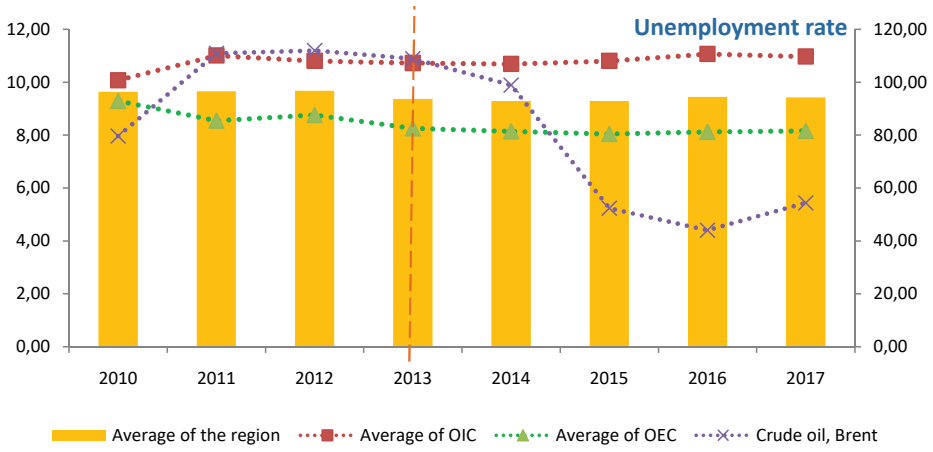
Not all countries experienced the adversed effects of the Arab revolutions. We distinguish potential winners such as Morocco and Turkey. With regard to the rates of growth, both countries achieved high and positive growth rates equal to 5.25% and 11.11% in 2011 compared to 3.82% and 8.49% in 2010. Additionally, unemployment rates had fallen from 9% and 10.66% in 2010 to 8.91% and 8.80% in 2011 for Morocco and Turkey respectively. In both countries, tourism receipts had risen by 11.31% for Morocco and 15.15% for Turkey in 2011. For Morocco, the investment ratio to GDP increased to 35.78% in 2011 against 34% one year before. However, the increase of the investment ratio was higher in Turkey which achieved a ratio of 31.27% in 2011 compared to 27% in 2010. Some other countries such as Mauritania witnessed the highest increase of investment ratio in 2011 equals to 10.81%, followed by Israel with a growth in investment ratio recorded at 10.62%. Gulf countries, achieved good performance in tourism with an increase of their revenues by about 12.20%, 23.63% and 41.34% of for Kuwait, Saudi Arabia and Oman, respectively.

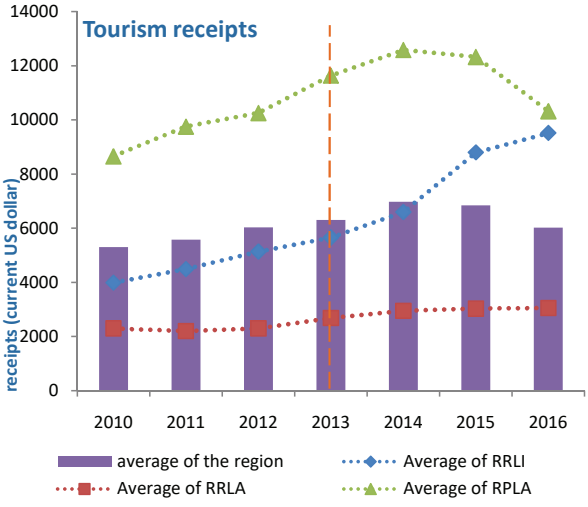
As shown in figure 2, the overall economic outlook for the region remains grim. Indeed, after successive years of rise and fall between $2011 - 213$, the growth trend was decreasing since 2013. It is due partly to the drastic fall of the OEC growth rate (delimited with the blue circle) following the dramatical fall of the global oil prices since the mid-2014 [14]. The average growth rate of the OEC reached 1.3% in 2015. The average rate of unemployment

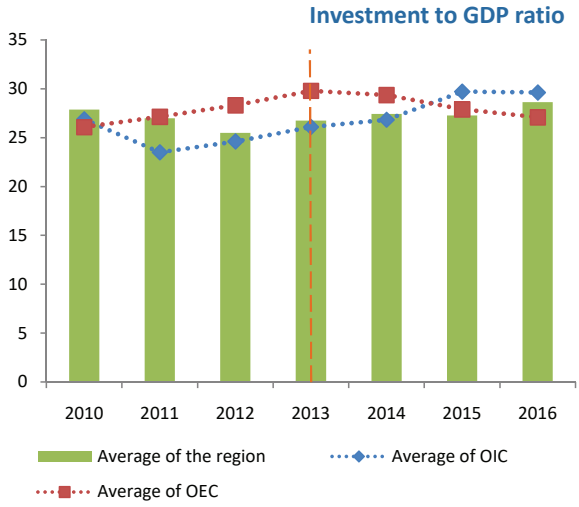
14. The oil prices fall ended in $2015 : Q4$

FIGURE 2 – Econonomic development : After the uprisings









Note : Data source is the world bank (World Development Indicator). Syria and Mauritania are not included for data discontinuity. Israel, Mauritania and Turkey are not classified in the labor resource abundance groups so they were excluded from the subgroups but the average tourism receipt accounts for their receipts.

in the region did not exceed 10% in 2011 but the higher rates are recorded by OIC which kept a gap of 2% compared to the average of the region. Investment to output ratio declined in average by 1% in 2011. The OIC investment ratio felt by 3% after reaching a level of 27.88% in 2010. Conversely, OEC investment increased by 1% in the same year. The progress of investment in the region was stable with an increase from both type of countries until 2015 where the trend is reversed, and the average of the investment ratio in OIC was about 30% against 28% in OEC. The region suffers from a structural unemployment however, it seems to be the sole indicator that shows stability around a rate of 10% during $2015 - 2017$. To summary our analysis about the period of turmoil since 2011 we quote from the last report of October 2017 of the Fund [2017] which starts the region highlights by "Despite the strengthening global recovery, MENAP's [15] economic outlook remains relatively subdued owing to the adjustment to low oil prices and regional conflicts.".

3.3 Structural breaks analysis

We conduct a supplementary exercise which is to detect structural breaks in the data. Our objective is to identify which events marked the most the MENA region and whether policy changes and regime shifts can be captured by the data. Doing so, we can promote for more homogeneity in the region. On the other hand, we aim to capture whether some important dates evoked above can be identified as a structural break.

The importance of studying structural breaks has been extensively emphasized in the literature since the work of Perron [1989]. He challenged the time series analysis by showing that there are specific economic events that have permanent effects on macroeconomic variables and that contrary to Nelson and Plosser [1982] that fluctuations are transitory and only the events of 1929 and 1973 had permanent impact on the US economy. Bai and Perron (1998) propose a multiple structural break test based on the following regression :

$$y_t x_t^{'} + z_t^{'}\delta_j + u_t, \ (t = T_{j-1} + 1, ..., T_j). \tag{1}$$

The regression assumes m unknown breaks points $(T_1, ..., T_m)$ and implies $m+1$ regimes. The selection of the number of breaks is based on the modified Schwarz' criterion proposed by Liu, Wu, and Zidek [1997].

15. MENAP= Middle East, North Africa, Afghanistan, and Pakistan.

TABLE 5 – Structural breaks analysis

Variables	DZA	BHR	EGY	IRN	IRQ	ISR	JOR	KWT	LBN	MRT	MAR	OMN	QAT	SAU	SYR	TUN	TUR	ARE	YEM
Real GDP	1974 1983 2001 2008	1992 1999 2005 2010	1977 1985 1994 2001 2008	1970 1998 2006	1979 1998 2009	1972 1987 1995 2006	1981 1994 2002 2007	1994 2004	1994 2004 2009	1980 1995 2006	1976 1988 1999 2007	1976 1984 1992 1999 2008	1997 2004 2009	1976 1991 2003 2009	1975 1981 1993 2002	1972 1980 1990 1998 2006 2011	1986 1996 2005	1980 1994 2000 2006	1995 2000 2005
Growth	1980	1987	1975 1984	1977	1990	1973	1982	1992	2007	2006	1993	1977	1997	1977	1981	1982	2006	1981	2011
Real Private Consumption	1970 1977 1984 2008	1991 2009	1979 1992 2000 2008	1979 1990 1999 2007	1981 2009	1972 1983 1991 1999 2007	1982 2000 2006	1986 1997	2004 2008	1974 1982 1998 2008	1976 1988 1998 2007	1975 1992 2005	2004 2009	1979 1992 2007	1975 1996 2002	1977 1990 1998 2006	1987 1996 2005	1986 1994 2001 2006	2000 2006 2011
Real Investment	1975 2001 2008	2003	1975 1982 1989 1998 2007	1973 2002	1978 1990 2005	1971 1987 1995 2007	1992 2005	1991 2005	1993 2008	2004	1975 1989 1999 2007	1974 1981 2005	2002 2007	1977 2001 2007	1975 1986 1992 2002	1972 1980 1998 2006	1987 2005	1994 2007	1996 2000 2003 2007 2011
Real Gov. Consumption	1978 1985 2008	1986 1992 2009	1975 2001 2008	1974 1986 2001	1981 1990 1998 2009	1970 1980 1995 2007	1981 1997 2008	1989	1997 2009	1975 1982 2003	1976 1986 1999 2007	1974 1981 1993 2005	2004 2009	1979 2000 2006	1973 1979 1987 2000	1975 1984 1998 2006	1990 2001 2008	1981 1996 2001 2009	1992 2006
Real Trade Balance	2000 2008	1999 2010	1974 2008	1980 1993	1982	1969 1997 2005	2004	1981 2005	1997 2007	1974 2003	1975 2007	2000 2008	1999 2009	1982 2003	1975 1997	1976 1992 2006	2006	2005	1994 1999
Real Exports	1974 1996 2003	1999 2005	1979 1991 2004	1972 1980 1993 2004	1997	1976 1996 2004	1988 2002 2007	1981 1994 2005	2004 2011	1981 2006	1983 1998 2006	1981 1996 2008	2004 2009	2005	1988 1994 2002	1979 1989 1998 2006	1983 1994 2001 2008	1993 2004 2009	1996 2000
Real Imports	1974 2001 2008	1990 2004	1978 1988 2004	1969 2002	1997	1968 1976 1993 2006	1992 2004	1990	1997 2004 2008 2011	1974 2004	1976 1999 2007	1982 1993 2008	1995 2006	1977 2007	1974 1992 2002	1976 1989 1998 2006	1983 1995 2006	1993 2007	1995 2005

International crisis (2007-2008 financial crisis, 1997-1998: Asian financial crisis) Foreign currency bank debt* Currency crisis* Inflation crisis* Wars and revolutions: Iranian revolution (1978-1979), Iraq/Kuwait war (1990-1991), Iraq war (2003-2011) and Arab spring(2011). Oil price shocks: Arab oil embargo (1973-1974), crude oil collapse (1986) and OPEC cuts production (1999-2000). The September 11 attacks. Economic events specific for each country. Israel domestic banking crisis (1983), in Turkey: The entry in force of the EU-Mediterranean Association Agreement (EMAA) (1995), the Middle East Free Trade Area (MEFTA) (1996) and the accession in negociation with the EU (October 2005) and the introduction of the explicit inflition targeting (2006), Mauritania: The dispute over offshore oil projects with Woodside (2006), and Iraq: Osiraq reactor raid (1981). White values indicate that the break is obtained by Zivot and Andrews (1992) procedure and not with the multiple test of Bai and Perron (1998) as the case for the rest values.

See table Data span" in Appendix A for details on country specific data span. Tests are performed using Eviews 9.The selection of the number of breaks is based on the modified Schwarz criterion of Liw et al.(1997)(LWZ), the trimming level is 15% and the maximum number of breaks is fixed at 5. * Source: Reinhart, Carmen M. and Kenneth S. Rogoff "This Time is Different: Eight Centuries of Financial Folly", (Princeton: Princeton University Press, 2009).

Table (5) summarizes the breaks date in the MENA region as detected by the Bai and Perron (1998)' s test. We distinguish that wars and political conflicts events (Orange color) are well captured by the test and dominate the other events in the picture. International financial crisis (The Asian crisis $(1997-1998)$ and financial crisis $(2007-2008)$) stands for the second event that marked the region. The third major event is the oil prices shocks. Although the scale of the Arab Spring events and the widespread of its consequences, the break date of 2011 is detected only for Tunisia and Yemen.

The background review witnesses for the frequent changes in MENA countries' economic context, fiscal policies changes (Tax reforms, adoption of the single value-added tax) , financial sector reforms, monetary policies shifts and trade liberalization. Additionally, conflicts and wars in the region contributed to political regime changes. The myriad of event the region experienced indicate deeper frictions that spark intuition about the role that permanent shocks might play at business cycle frequencies. This assumption will be tested in section 4.2 after the model being specified.

4 Stochastic growth model

4.1 The model

Our model is a small open economy model where a single good and single assets are exchanged. The specification of the model allows transitory and trend shocks to productivity to be included through the Cobb-Douglas production function which is given by :

$$Y_t = e^{z_t} K_t^{1-\alpha} (\Gamma_t L_t)^{\alpha} \tag{2}$$

According to this equation technology is using two inputs, capital K_t and laborL_t and is governed by two types of productivity shocks. The transitory shock is z_t and follows a first-order autoregressive process $AR(1)$:

$$z_t = \rho_z z_{t-1} + \epsilon_t^z \tag{3}$$

Where $|\rho_z| < 1$ and $\epsilon_t^z \ NID(0, \sigma_z$. The permanent shock g_t evolves as follows :

$$g_t = (1-\rho_g)\mu_g + \rho_g g_{t-1} + \epsilon_t^g \tag{4}$$

Where $|\rho_g| < 1$, $\epsilon_t^g \ NID(0, \sigma_g)$ and μ_g is the long-run mean growth rate. The growth shocks can be accumulated through the function Γ as

$$\Gamma_t = e^{g_t}\Gamma_{t-1} = \Pi_{s=0}^{t} e^{g_t} \tag{5}$$

The household maximizes an expected lifetime utility function following Cobb-Douglas preferences given by :

$$E\sum_{t=0}^{\infty}\beta^t[\frac{(C_t^{\gamma}(1-L_t)^{1-\gamma})^{1-\sigma}}{1-\sigma}] \tag{6}$$

Where $0 < \gamma < 1$ and $\sigma > 0$. If δ is the depreciation rate the capital at $t+1$ is accumulated as follows

$$K_{t+1} = (1-\delta)k_t + I_t \tag{7}$$

And the capital stock changes happen with a quadratic cost

$$\frac{\phi}{2}(\frac{K_{t+1}}{k_t} - e^{\mu_g})^2 K_t \tag{8}$$

As our MENA countries are open economies, we assume that households intervene in the international financial market to hold risk-free bonds. Over a period t the level of debt is B_t and debt for $t+1$, B_{t+1} entails the payment of a price q_t. Following Schmitt-Grohe and Uribe (2003), the economy is assumed to face a debt elastic interest rate premium r_t which is given by :

$$r_t = r^* + \psi e^{(\frac{B_{t+1}}{\Gamma_t} - b) - 1} \tag{9}$$

Where ψ measures the elasticity of the interest rate to changes in indebtedness. In the first right hand side term of the equation (9) r^* is the world interest rate which is assumed to be constant. The second term represents the domestic premium that is an increasing function of the normalized debt. Thus by including a risk premium on the domestic interest rate the model resolution based on linearization around a stationary steady state can be validated. In fact this interest rate is inversely related to the debt price according to

$$\frac{1}{q_t} = 1 + r_t \tag{10}$$

The model is solved for the optimization problem of the household which maximizes its utility function recursively [16] subject to its budget constraint which is given by

$$C_t + K_{t+1} = Y_t + (1-\delta)K_t - \frac{\phi}{2}(\frac{K_{t+1}}{k_t} - e^{\mu_g})^2 K_t - B_t = qB_{t+1} \tag{11}$$

16. The recursive optimization is provided by AG(2007) in the technical appendix on the website of the Harvard University.

4.1.1 Identification strategy and Solow residuals

In this paragraph we consider the way to distinguish between the two types of shocks ? To answer that question we follow an identification strategy built on the permanent income hypothesis (PIH) developed by Milton Freidman in (1957). The idea behind the PIH is that economic agents consume, depending on what they expect to earn over a considerable period of time. This suggests that they will try to decide whether a shock to income is temporary or not. So If they decide that it is temporary, it has a small effect on their spending and consequently on their saving as well as on the trade balance deficit. However, agents will adjust their consumption much less than changes in current output, expecting that the shock is permanent, savings and the trade balance deficit change by a sizable amount.
On the other hand, technological shocks are considered by the RBC theory as the source of business cycle fluctuations, and such shock have permanent effects on total factor of productivity measured by the Solow residual. From this perspective, the variability of output is triggered by shifts in the trend. The empirical efforts of previous studies at the early stages of the RBC theory aimed at finding a way to represent economic series ; almost of the time it is consisted in regressing economic series to extract a trend which was supposed to represent the long-term behavior of time series and the resulting (stationary) component was assumed to capture the short-term adjustments, or the cycle. By construction, any random disturbance affecting the stationary component was nothing but an alteration of cyclical movements. Thus, the theory of the growth-cycle was based on the distinction between stationary and non-stationary components, emphasizing the deterministic behavior of the latter.
This dichotomy was questioned by Nelson and Plosser [1982] [17] who proposed to characterize time series fluctuations as a deviations around a stochastic rather than a deterministic trend. Their specification assumes a random walk process of the trend which allows shocks to the long-run to be permanent. Thus variations of economic series include the effects of transitory and permanent shocks.
Our identification scheme uses the second-order moments estimated by the GMM tech-

17. Nelson and Plosser [1982] focus on U.S time series of real GNP, nominal GNP, real per capita GNP, industrial production, employment, unemployment rate, GNP deflator, consumer prices, wages, real wages, money stock, velocity, bond yield and common stock prices. They found that these series, except for unemployment rate, exhibit a "difference-stationary processes"

nique for the data and the structural model. As we need to replicate the empirical stylized facts with the model moements, the GMM methodology is appropriate because it allows to reduce the gap between empirical and theoretical moments. In fact the .....

We implement the GMM codes developed by Burnside [1999] using the MATLAB software. The GMM estimation is based on the iterated procedure of Hansen [1982] which estimates the parameters vector given by

$$\theta = [\sigma_z, \sigma_g, \rho_z, \rho_g, \mu_g, \phi] \tag{12}$$

when the moments restrictions implied by the unconditional moments conditions are null, that is the model parameters are choosen as the distance between empirical moments and theoretical moments is nul : Following AG (2007) [18] we estimate the importance of perma-

TABLE 6 – GMM moments conditions

Moments	Theoretical moments	Moments conditions
$\sigma(y)$	$m_1(\theta)$	$Em_1(\theta)^2 - y_t^2 = 0$
$\sigma(\Delta_y)$	$m_2(\theta)$	$Em_2(\theta)^2 - (\Delta y_t - m_{11}(\theta)^2) = 0$
$\sigma(I)/\sigma(y)$	$m_3(\theta)$	$Em_3(\theta)^2 - I_t^2 = 0$
$\sigma(c)/\sigma(y)$	$m_4(\theta)$	$Em_4(\theta)^2 - c_t^2 = 0$
$\sigma(TBY)/\sigma(y)$	$m_5(\theta)$	$Em_5(\theta)^2 - tb_t^2 = 0$
$\rho(y)$	$m_6(\theta)$	$Em_6(\theta)^2 - \frac{y_t y_{t-1}}{m_1(\theta)^2} = 0$
$\rho(\Delta_y)$	$m_7(\theta)$	$Em_7(\theta)^2 - \frac{(Deltay_t - \mu_g)(Deltay_{t-1} - \mu_g)}{m_2(\theta)^2} = 0$
$\rho(y, TBY)$	$m_8(\theta)$	$Em_8(\theta)^2 - \frac{tb_t y_t}{m_1(\theta)^2 m_5(\theta)^2} = 0$
$\rho(y, c)$	$m_9(\theta)$	$Em_9(\theta)^2 - \frac{c_t y_t}{m_1(\theta)^2 m_4(\theta)^2} = 0$
$\rho(y, I)$	$m_{10}(\theta)$	$Em_{10}(\theta)^2 - \frac{I_t y_t}{m_1(\theta)^2 m_3(\theta)^2} = 0$
μ_g	$m_{11}(\theta)$	$Em_{11}(\theta)^2 - \Delta y_t^2$

nent and transitory shocks through the measure of the ratio of the variance of permanent

18. The estimation of the random walk component of the Solow residual (sr_t) is based on its decomposition into permanent (τ_t) and transitory (s_t) components, see AG(2007) page 83.

shocks relative to the all variance of Solow residual according to : [19]

$$\frac{\sigma^2_{\Delta_\tau}}{\sigma^2_{\Delta_{sr}}} = \frac{\alpha^2\sigma_g^2}{(1-\rho_g)^2\sigma^2_{\Delta_{sr}}} \tag{13}$$

$$= \frac{\alpha^2\sigma_g^2/(1-\rho_g)^2}{[2/(1+\rho_z)]\sigma_z^2 + [\alpha^2\sigma_g^2/(1-\rho_g^2)]} \tag{14}$$

4.1.2 Calibration

Our model is calibrated at annual frequency. The benchmark values assigned to the structural parameters are taken from the literature about developing countries. The discount factor β is assigned to 0.9224 as set by GPU (2010). We follow the same authors to calibrate the consumption curvature γ and the coefficient on the interest rate premium ψ at 0.36 and 0.001, respectively. The risk aversion σ is set to 2. The steady state level of debt to GDP is equal to 0.1 and the depreciation rate to δ. The calibrated parameters are summarized in the table (7).

TABLE 7 – Benchmark parameters

description	Parameters	Values
β	Time preference rate	$1/1.0204^4$
γ	Consumption exponent (utility)	0.36
b	Steady-state normalized debt	0.1
ψ	Coefficient on interest rate premium	0.001
α	Labor exponent	0.64
σ	Risk aversion	2
δ	Depreciation rate	$1.05^4 - 1$

4.2 Estimation results

This subsection presents results of the theoretical moments and parameters' estimates, our aim is to examine the performance of the stochastic growth model to predict the second moments of MENA countries' business cycles. It provides also a comparison between the two groups of oil-exporting and importing countries in the region. As we employ the same

19. Cochrane (1988). Another studies adopted the methodology of the PIH are, among many others Campbell and Deaton [1989] and Blundell and Preston [1998].

methodology and model as Naoussi and Tripier [2013] we compare our results for MENA countries according to the authors specification to their findings for developed, emerging and Sub-Saharan Africa countries.

4.2.1 Parameter estimates

Apart from the calibrated parameters, theoretical moments rely on productivity parameters which are estimated using the GMM method. Table (9) shows results of the estimated parameters when we match the entire set of moments (11 moments).
We consider two specifications. In the first one we use the same vector of parameters initialization $[\sigma_z, \sigma_g, \rho_z, \rho_g, \mu_g, \psi]$ as AG (2007) that is equal to $[0.06, 0.025, 0.95, 0.01, 1.006^4, 4]$. However in the second one we employ Naoussi and Tripier [2013] vector of parameters initialization given by $[0.01, 0.01, 0.01, 0.01, 1.006^4, 4]$. In both specifications we set the labor share of output $\alpha = 0.68$ to compare the model results with previous studies. Also, motivated by the differences of MENA economic structure, we resort to different values of α estimated [20] by studies which focus either on growth accounting or supply labor.
Table (9) reports parameters and moments estimation of specifications above. The estimates of ρ_g range from zero in the first specification to 0.04 in the fourth one. This indicates that independently from the initial values of parameters or α values, autocorrelations of shocks to trend are weak. This result is in line with AG's and NT's findings about emerging markets. However, σ_g is fairly high, especially under the AG specifications where the maximum value is 7.87 for Iraq and the minimum is a null variability in the case of Mauritania and Yemen. These two parameters help to calculate the variance of trend shocks according to the formula $Var(g_t) = \sigma_g^2/(1-\rho_g^2)$ which is equal to $0.226, 0.042, 0.155$ and 0.051 for specification (1) , (2), (3) and (4). Regarding the volatility of transitory shocks, results reveal a weak estimates under AG specifications contrary to σ_g and the maximum value is obtained by Iraq which is equal to 7.88 for NT (1). The null transitory

20. We used the labor share values estimated by Caselli and Feyrer [2007] using the Penn World database version 6.1. The authors provide results for the total capital share α_w for Algeria, Egypt, Israel, Jordan, Morocco and Tunisia, hence the labor share α is calculated as $1-\alpha_w$: 0.61, 0.77, 0.7, 0.64,0.58 and 0.62 respectively. Results are not reported here but the moments estimated using these values are either similar to those obtained using α from table (8) or worse.

TABLE 8 – The labour share for MENA countries

Country	Value	Study	Country	Value	Study
Algeria	0.49	Razaak and Laabas (2016)	Morocco	0.44	Razaak and Laabas (2016)
Bahrain	0.65	Razaak and Laabas (2016)	Oman	0.47	Razaak and Laabas (2016)
Egypt	0.55	Razaak and Laabas (2016)	Qatar	0.50	Razaak and Laabas (2016)
Iran	0.588	Esfandyari and Dahmardah	Saudi Arabia	0.49	Razaak and Laabas (2016)
Iraq	0.50	Mitra t al. (2015)	Syria	0.68	Razaak and Laabas (2016)
Israel	0.65	Mitra t al. (2015)	Tunisia	0.76	Razaak and Laabas (2016)
Jordan	0.64	Razaak and Laabas (2016)	Turkey	0.65	Mitra t al. (2015)
Kuwait	0.45	Senhadji (2000)	UAE	0.39	Razaak and Laabas (2016)
Lebanon	0.60	Naïmy (2006)	Yemen	0.50	Mitra t al. (2015)
Mauritania	0.65	Mitra t al. (2015)			

shock volatility is recorded in the case of Iran and Lebanon. Here again we corroborate the AG findings about the volatility of the transitory component. The authors find that $\sigma_z = 0.53$ and $\sigma_g = 2.13$ in the case of Mexico. Similarly for MENA countries we report that $\sigma_z = 0.71$ and $\sigma_g = 4.76$, and $\sigma_z = 0.58$ and $\sigma_g = 3.94$ for AG (1) and AG (2), respectively. On the other hand, the persistence of z is higher than that of g as found by AG and NT. The long-run mean rate of productivity long-run given by μ_g is similar for the different specifications and is higher than that found by AG and NT. This parameter adjusts for the estimates of the long-run growth of GDP, indeed, $\mu_g = E(\Delta_y) + 1$.

The relative variance of the random walk component is $0.90, 0.25, 0.48$ and 0.32 for specifications (1), (2), (3) and (4), respectively indicates that there is a large difference in estimates across specifications. In particular, RWS estimates are larger under AG (2007) specifications whether the value of α is standard or country specific. Under specification (1), the maximum values of RWC is 1.03 for the UAE and the lowest value is 0.38 for Morocco. The latter has also the lower RWC value of 0.1 under specification (3), however, the maximum value is 1.02 for Oman. Under specification (4), Oman has lower RWC of 0.01. The highest RWC estimate is 1.77 for Iraq (Specification 4) and the lowest one is zero for Yemen (Specification (2)).

The maximum values of parameters estimation are provided by specifications where $\alpha = 0.68$, in particular under the one of AG. This implies that minimum values are those rela-

ted to cases where α was fixed at a country specific level. Even when we used the same initialization vector as NT (2013), on average we found that the volatility of transitory and permanent shock are very close ($\sigma_z = 2.20$ against $\sigma_g = 2.06$).

TABLE 9 – Average estimates for MENA countries

			$\alpha = 0.68$				Different values of α			
	Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
			(1)		(2)		(3)		(4)	
Structural parameters										
σ_z			0.71	(77)	2.20	(0.49)	0.58	(29.8)	1.72	(3.62)
σ_g			4.76	(757.28)	2.06	(37.70)	3.94	(232.87)	2.26	(1.50)
ρ_z			0.55	(4054)	0.02	(18.49)	0.41	(4.487)	0.01	(176.43
ρ_g			0.00	(143)	0.02	(11)	0.004	(48.79)	0.04	(36.05)
μ_g			4.51	(0.72)	4.66	(0.75)	4.65	(0.72)	4.79	(0.73)
ψ			0.03	(0.07)	0.08	(0.03)	0.02	(0.05)	0.38	(0.32)
RWS			0.90	(311)	0.25	(0.22)	0.84	(130)	0.32	(0.77)
Moments										
$\sigma(y)$	5.61	(0.99)	6.00	(0.57)	4.93	(0.64)	6.35	(1.31)	5.04	(0.66)
$\sigma(\Delta_y)$	6.26	(1.28)	3.90	(0.62)	5.94	(1.02)	4.28	(1.00)	5.47	(1.11)
$\sigma(I)/\sigma(y)$	3.82	(0.61)	2.88	(0.30)	4.29	(0.51)	3.00	(0.31)	4.23	(0.57)
$\sigma(I)$	19.12		17.30		21.14		19.03		21.35	
$\sigma(C)/\sigma(y)$	1.87	(0.34)	1.20	(0.13)	0.54	(0.18)	0.74	(0.29)	0.53	(0.18)
$\sigma(C)$	10.49		7.18		2.64		7.36		4.22	
$\sigma(TBY)/\sigma(y)$	2.33	(0.89)	1.14	(0.09)	1.42	(0.15)	1.18	(0.10)	1.72	(0.21)
$\sigma(TBY)$	9.97		6.82		6.98		7.46		8.66	
$\rho(y)$	0.50	(0.12)	0.80	(0.05)	0.26	(0.15)	0.78	(0.07)	0.33	(0.15)
$\rho(\Delta_y)$	0.15	(0.14)	0.23	(0.18)	-0.39	(0.11)	0.23	(0.34)	-0.34	(0.21)
$\rho(y, TBY)$	0.03	(0.13)	0.24	(0.09)	0.64	(0.10)	0.32	(0.10)	0.59	(0.09)
$\rho(y, c)$	0.38	(0.12)	0.74	(0.07)	0.61	(0.14)	0.74	(0.22)	0.58	(0.26)
$\rho(y, I)$	0.46	(0.12)	0.30	(0.07)	-0.12	(0.15)	0.24	(0.08)	-0.10	(0.15)
$P - value$			0.38		0.38		0.38		0.39	

It emerges from table (10) that ρ_g is slightly positive for MENA countries and negative for developed, emerging and SSA countries. However, MENA has the lowest random walk component which is equal to the third of that of developed and emerging markets and about the quarter of that of SSA countries.

The comparison between oil-importing and exporting MENA countries is shown in tables (11), respectively. On average the autocorrelations estimates are weak and very close between the two groups of countries and across specifications. While the ρ_g estimates are homogeneous, the standard deviation of the trend is higher for the oil-exporting group which reaches its maximum of 6.29 for specification (1). Transitory shocks' autocorrelation estimates are higher for the oil-importing group only for AG specifications, whereas, NT specifications estimates are similar for the two groups. Contrary, to ρ_z, transitory shocks are more volatile for oil-exporting group across all specifications. The relative variance of the random component is higher for oil-exporting group under AG specifications, whereas, under those of NT oil-importing group RWS estimates are higher than those of the second group.

4.2.2 Moments estimates

The volatility of output is overestimated by specifications (1) and (3) when we use the initialization vector of AG(2007), contrary to specifications (2) and (4) which underestimate this volatility. But, specification (1) matches mildly the empirical output volatility with a gap 0.39. The volatility of the unfiltered output is underestimated by the model. It is only under specification (2) that the estimated volatility is close to the empirical one with a gap about 0.22 (The reported volatility by the model is equal to 5.94 against 6.26 for the data). Regarding their respective autocorrelations, specification (4) provide a $\rho(y)$ closer to its empirical counterpart (0.23 for the model against 0.15 for the data) and $\rho(\Delta(y)$ of specification (1) is more appropriate.

Regarding the relative volatility of consumption to output, it is underestimated by the model, except for specification (1) (The model predicts a ratio of 1.20 compared to the ratio of 1.87 given by the data). However, the correlation of consumption with output is overpredicted by the model. The model specifications (1) and (3) underestimate the volatility of investment relative to output, contrary to specifications (2) and (4) which overestimate

TABLE 10 – Average estimates : comparison

	MENA	**Developed countries**	**Emerging markets**	**SSA**
Structural parameters				
σ_z	2.20	0.75	0.86	0.56
σ_g	2.06	2.89	5.18	6.43
ρ_z	0.02	0.68	0.23	-0.44
ρ_g	0.02	-0.12	-0.09	-0.01
μ_g	4.66	1.02	1.02	1.01
ψ	0.08	0.38	0.31	0.26
RWS	0.25	0.66	0.70	1.04
Moments				
$\sigma(y)$	4.93	2.27	3.81	5.19
$\sigma(\Delta_y)$	5.94	2.23	3.91	5.32
$\sigma(I)/\sigma(y)$	4.29	2.76	2.97	3.19
$\sigma(I)$	18.77	6.27	11.32	16.56
$\sigma(c)/\sigma(y)$	0.54	0.98	1.03	1.04
$\sigma(c)$	2.55	2.23	3.94	5.38
$\sigma(TBY)/\sigma(y)$	1.42	0.78	0.86	1.14
$\sigma(TBY)$	6.42	1.76	3.28	5.91
$\rho(y)$	0.26	0.64	0.59	0.54
$\rho(\Delta_y)$	-0.39	0.24	0.18	0.15
$\rho(y, TBY)$	0.64	-0.13	-0.15	0.03
$\rho(y, c)$	0.61	0.88	0.88	0.80
$\rho(y, I)$	-0.12	0.69	0.63	0.39
$P - value$	0.38			

The GMM estimation of the moments of the model. The first column reports our results of specification (2).The three remaining column corresponds to table 5 of NT(2013).

it, but specification (1) gives the closest estimation with a gap of 0.67). The behavior of the theoretical $\rho(y, I)$ is underestimated compared to empirical one and even became negative under NT specifications. Again specification (1) provide a closer estimation of 0.30 compared to 0.46 for data

Although the model predictions of the relative volatility of trade balance is underestimated its correlation with output is overestimated. In average the model did not succeed to reproduce the acyclical properties of trade balance.

The bottom panel of the table (10) shows the estimated moments for MENA countries and those of table (5) in Naoussi and Tripier [2013]. The empirical output and output growth in MENA countries are more volatile than those of developed and emerging countries, but lower than SSA countries output. The persistence of MENA' s output and output growth is the lowest among the other type of countries. The trade balance of MENA countries exhibits higher relative volatility and correlation than other countries, whereas, their consumption is the most volatile and less correlated with output than in the other countries. Regarding investment it shows the highest volatility but the lowest correlation among the other types of countries.

We move to the groupings results in the bottom of table (11). Oil-exporting countries' output and output growth are empirically more volatile than oil-importing countries ($7.48 - 8.42$ versus $3.93 - 4.32$). Although, the autocorrelation of output is similar for the two groups, output growth is less persistent for oil-importing countries.

Specification (2) predicts closely the first three moments for oil-importing countries with a modest gap of 0.55, 0.69 and 0.55 for the volatility of output, output growth and the relative volatility of investment, respectively. These moments are fairly matched for oil-exporting countries given that the gaps between the empirical and theoretical first three moments are : $0.40, 0.03$ and 0.27.

The relative volatilities of consumption and trade balance are underestimated by the model in the case of oil-exporting countries and consumption in the case of oil-importing countries. However, the volatility of the trade balance of oil-importing countries' matches the empirical volatility (1.09 for the model specification (3) compared to 1.04 for the data). Regarding the correlation of consumption and trade balance they are overestimated by the model for both groups except for the trade balance of oil-exporting countries where the correlation was matched by specification (1) (0.19 for the model against 0.20 for the data).

The correlation of investment with output is underestimated by the model for both oil-importing and exporting countries with a matched value provided by specification (1) .
The $p - value$ of the overidentification test is about 0.38 for all specifications , which implies that the null hypothesis of equality between empirical and theoretical moments is wrongly rejected at the probability of 38%. For all specification the model cannot be rejected at all significance levels.

TABLE 11 – Paramters and Moments estimates in the MENA region : Groupings comparison

	Oil-importing countries									Oil-exporting countries								
	Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
			(1)		(2)		(3)		(4)			(1)		(2)		(3)		(4)	
tructural parameters																			
$_z$			0.68	(11.681)	1.16	(0.40)	0.51	(59.762)	1.07	(0.45)			0.74	(161.908)	3.37	(0.60)	0.64	(19.63)	2.38	(6.79)
$_g$			3.37	(736)	1.64	(0.88)	3.13	(463)	1.74	(0.74)			6.29	(781)	2.52	(78.62)	4.74	(2.78)	2.77	(2.27)
$_z$			0.70	(142)	0.01	(26.14)	0.50	(8.747)	0.012	(18.21)			0.39	(8.557)	0.03	(9.98)	0.31	(226)	0.014	(335)
$_g$			0.002	(78.47)	0.02	(29.40)	0.002	(58.37)	0.03	(28.46)			0.01	(216)	0.017	(23.946)	0.01	(39.22)	0.05	(43.64)
$_g$			4.61	(0.49)	4.56	(0.50)	4.48	(0.46)	4.48	(0.46)			4.40	(0.97)	4.78	(1.03)	4.83	(0.98)	5.10	(1.00)
			-0.034	(0.04)	-0.08	(0.03)	-0.023	(0.03)	0.83	(0.60)			-0.01	(0.11)	-0.09	(0.04)	-0.015	(0.07)	-0.07	(0.03)
RWS			0.84	(374)	0.34	(0.32)	0.81	(259)	0.35	(0.28)			0.96	(241)	0.16	(0.12)	0.86	(0.94)	0.30	(1.26)
Moments																				
(y)	3.93	(0.56)	5.11	(0.43)	3.39	(0.41)	4.81	(1.73)	3.21	(0.42)	7.48	(1.48)	7.00	(0.73)	6.75	(0.91)	7.88	(0.89)	6.88	(0.90)
(Δ_y)	4.32	(0.74)	3.22	(0.39)	3.83	(0.55)	3.21	(1.14)	3.61	(0.51)	8.42	(1.87)	4.66	(0.88)	8.39	(1.53)	5.35	(0.86)	7.32	(1.70)
$(I)/\sigma(y)$	4.41	(0.75)	3.12	(0.30)	4.96	(0.67)	3.11	(0.44)	4.89	(0.80)	3.16	(0.46)	2.62	(0.29)	3.52	(0.32)	2.89	(0.18)	3.58	(0.34)
(I)	17.11		15.72		15.67		15.2		14.50		21.35		19.14		22.22		23.00		22.88	
$(c)/\sigma(y)$	1.59	(0.32)	0.79	(0.11)	0.58	(0.20)	0.76	(0.37)	0.59	(0.18)	2.19	(0.36)	1.65	(0.15)	0.49	(0.17)	0.72	(0.21)	0.47	(0.19)
(c)	6.16		4.09		1.97		3.65		2.07		15.30		7.92		3.19		5.19		3.47	
$(TBY)/\sigma(y)$	1.04	(0.18)	0.94	(0.06)	1.55	(0.20)	1.09	(0.13)	1.77	(0.25)	3.76	(1.69)	1.35	(0.12)	1.27	(0.10)	1.26	(0.07)	1.66	(0.16)
(TBY)	3.98		4.74		4.93		5.30		5.42		16.62		6.80		8.09		10.07		10.86	
(y)	0.47	(0.13)	0.81	(0.04)	0.32	(0.17)	0.78	(0.10)	0.33	(0.18)	0.53	(0.11)	0.78	(0.06)	0.19	(0.12)	0.77	(0.04)	0.33	(0.12)
(Δ_y)	0.02	(0.14)	0.31	(0.13)	-0.35	(0.10)	0.27	(0.44)	-0.38	(0.12)	0.29	(0.14)	0.15	(0.24)	-0.43	(0.11)	0.19	(0.23)	-0.31	(0.29)
(y, TBY)	-0.11	(0.14)	0.28	(0.07)	0.57	(0.12)	0.30	(0.14)	0.57	(0.10)	0.20	(0.13)	0.19	(0.11)	0.70	(0.09)	0.35	(0.06)	0.61	(0.07)
(y, c)	0.54	(0.08)	0.79	(0.06)	0.62	(0.13)	0.79	(0.14)	0.58	(0.13)	0.20	(0.17)	0.69	(0.09)	0.61	(0.14)	0.70	(0.31)	0.59	(0.38)
(y, I)	0.56	(0.11)	0.30	(0.06)	-0.12	(0.18)	0.25	(0.09)	-0.11	(0.16)	0.35	(0.14)	0.31	(0.09)	-0.11	(0.12)	0.23	(0.07)	-0.09	(0.13)
$^2 - value$				0.35		0.36		0.35		0.35				0.42		0.41		0.41		0.43

Note : The GMM estimation of the moments of the data and the model is the average of individual estimates for countries importing and exporting oil among MENA countries. The standard deviation are expressed in percentage.The standard errors are into parenthesis.All series are logged unless net exports then series are filtered using HP(100) unless the output growth. $z = y, I, c, TBY$ is the cyclical component of the series $\sigma(z)/\sigma(y)$ is the relative standard deviation of z and $\rho(y, z)$ is the correlation between output and z.

To summarize our results, first, empirically on average the consumption is 87% more volatile than real GDP. Reversely, the model reports that consumption is less volatile than GDP (unless for specification(1)). The same behavior is observed for oil-exporting countries where under all the specifications consumption is from 30% to 50% less volatile than real output. This result partially corroborates AG(2007) observation first that consumption is more volatile than GDP but not highly volatile and second, that their model reproduced well the consumption behavior. Similarly, we are in line with NT(2013) about the relative volatility of consumption. The authors find that consumption is roughly twice more volatile than real GDP for emerging and SSA countries and that this feature is not exactly fitted by the model.

Second, with respect to the correlation of the trade balance-to-output ratio with output, the full estimation of the productivity parameters (specification 3) indicates a procyclical trade balance contrary to what AG (2007) advocate about the strong countercyclicality of trade balance of emerging markets. Basically, their model was designed to produce the trade balance countercyclicality but in the case of MENA countries the model estimates a procyclical TBY instead of an acyclical one. We are in line with Naoussi and Tripier (2013) in rejecting the countercyclicality feature for the particular emerging economies under study (SSA in their case and MENA countries in ours). It is noteworthy that AG estimate their model also for annual data and they found that while the higher relative volatility of consumption is a constant feature, the countercyclicality of the trade balance in emerging markets was only captured after the 1980s.

Third, on average the output and its growth grate are more volatile than those observed in developed countries. Hence, we support the findings of AG(2007) and NT(2013) that emerging economies are characterized by their large volatility. According to Naoussi and Tripier results and ours, real GDP of MENA and SSA countries is more than 2 times more volatile than developed countries' output volatility.

For the rest of our empirical investigation we consider the specification (1) as the one that provided much closer moments estimation. The RWS estimations of specification (1) and (2) are both used in the next section about the determinants of the volatility for matter of comparison between AG's and NT's initialization vector.

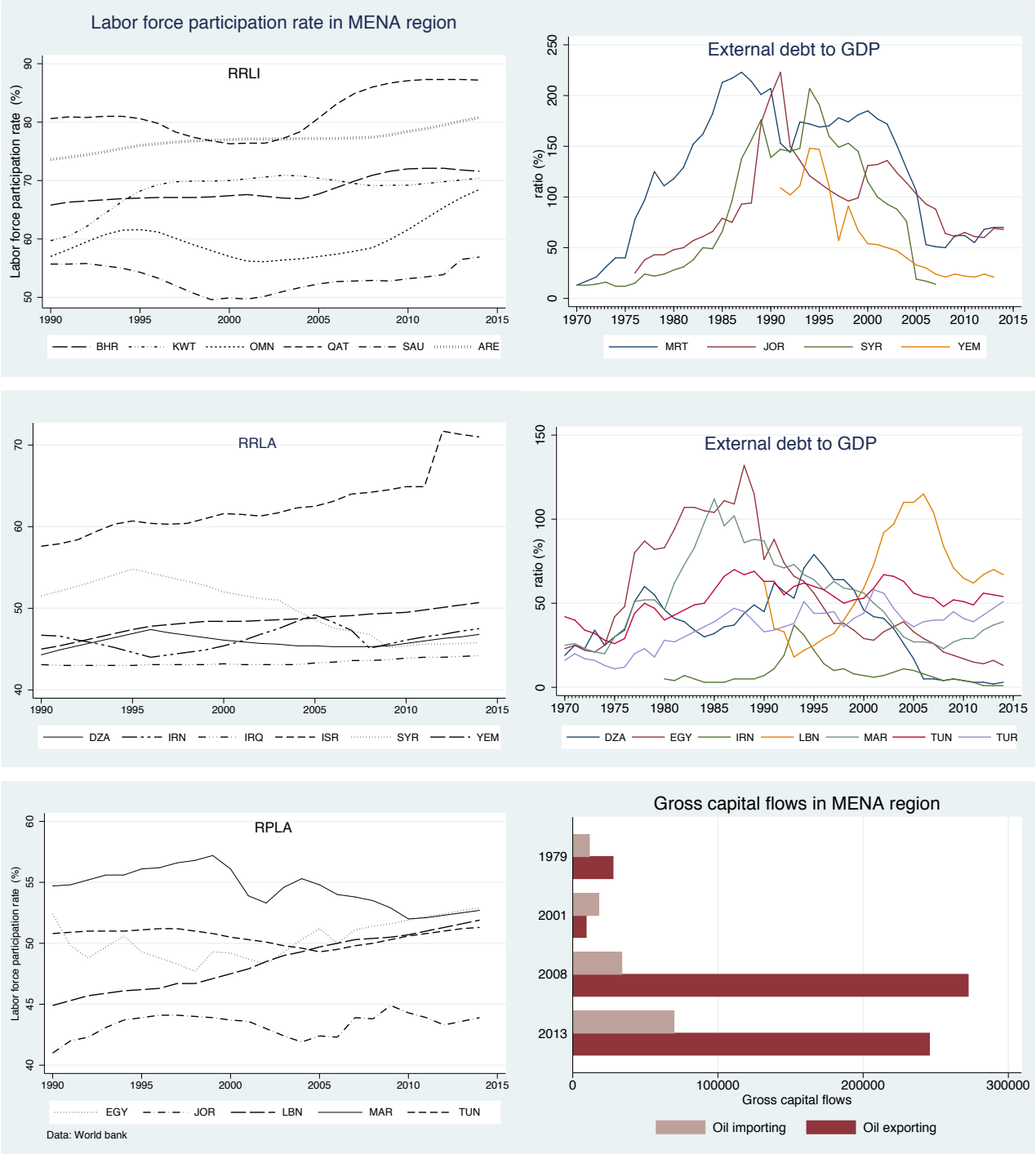
5 Shocks analysis

In the following section we seek the determinants of macroeconomic volatility. As stated by AG(2007) trend shocks in emerging markets reveal regime switches, sudden stops, fiscal and monetary policy changes. Therefore we need to obtain information about trend shocks. We consider a set of variables that contains four variables : The nominal exchange rate (LCU/$) which is available for all countries over the periods 19702014. The labor force can be a criterion to define groupings inside the MENA region. In fact, MENA countries can be divided into three groups according to the labor force : Resource Rich-Labor Importing (RRLI) (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates) and Resource Rich-labor Abundant (RRLA) (Algeria, Iran, Iraq, Syria and Yemen) and Resource Poor Labor Abundant (RPLA) (Egypt, Jordan, Lebanon, Morocco, Mauritania, Tunisia and Turkey) countries. Therefore, we use the labor participation rate in our analysis which is available from 1990. The third variable is the capital flows, which has been mentioned in the literature as highly correlated with the business cycle in emerging market countries, and an important driver of their output fluctuations. Finally, External debt is included given the high ratio of external debt to GDP in the MENA region. The availability of the last two variables is given by table (16). The data are depicted in figures (2 and 3).

Inspired by the measure of the contribution of trends shock as a ratio of the permanent component variance to the overall variance, we conduct determine whether shocks to trend are important first for the shock variable itself and second for the variance of GDP trend growth rate. As shown in table (12) trend volatility of the participation rate has a great impact on growth volatility for oil exporting countries (Kuwait, Oman, Qatar, Saudi Arabia and Yemen). Moreover, external debt growth volatility is explained to a large extent by the volatility of its trend for the majority of countries where data were available. However, the trend growth volatility of the capital flows does not contribute to the growth volatility of the region. With respect to GDP, the trend volatility of exchange rate and external debt contributes highly to the growth rate of the GDP trend.

Our results provide an evidence in favor of the importance of external shocks as a trigger of fluctuations in the MENA region. We focus more on this aspect by looking for the relationship between the GDP growth volatility and RWS component with trade openness

FIGURE 3 – Labor participation rate, debt to GDP ratio and capital flows in MENA countries



among other variables.

TABLE 12 – The relative volatility of trend shocks

Countries	Participation rate		Exchange rate		External debt		Capital flows	
	RSD_{Prate}	RSD_{GDP}	RSD_{Exch}	RSD_{GDP}	RSD_{Exd}	RSD_{GDP}	RSD_{CF}	RSD_{GDP}
Algeria	0.66	0.04	0.62	1.21	0.60	2.13	0.19	0.10
Bahrain	0.55	0.06	0.14	0.002			0.06	5.58
Egypt	0.26	0.22	0.31	2.14	0.63	4.74	0.08	0.31
Iran	0.21	0.04	0.27	1.42	0.25	0.88	0.09	0.09
Iraq	0.48	0.00	0.23	0.21				
Israel	0.22	0.18	0.97	9.74			0.12	0.00
Jordan	0.21	0.07	0.29	0.62	0.50	1.76	0.04	0.18
Kuwait	1.55	0.13	0.34	0.15			0.06	0.90
Lebanon	0.22	0.02	0.21	0.60	0.23	0.48		
Mauritania	0.43	0.10	0.47	1.18	0.70	4.28		
Morocco	0.24	0.12	0.36	1.08	0.72	3.61	0.10	0.22
Oman	1.82	0.11	0.27	0.08			0.13	0.12
Qatar	1.08	0.08	0.14	0.001				
Saudi Arabia	0.59	0.08	0.54	0.11			0.17	0.16
Syria	0.80	0.11	0.25	0.60	0.61	2.39	0.15	0.22
Tunisia	0.53	0.06	0.26	0.67	0.48	1.42	0.06	0.08
Turkey	0.41	0.34	0.70	6.35	0.33	1.32	0.03	0.06
UAE	0.44	0.04	0.61	0.10				
Yemen	0.91	0.05	0.46	4.24				

RSD_z denotes the relative standard deviation of the trend growth rate of z to the standard deviation of growth rate of z with $z = Prate, Exch, Exd, CF$. RSD_{GDP} is the relative standard deviation of trend growth rate of z to the standard deviation of growth rate of output.

5.1 The determinants of macroeconomic volatility

Here we focus on the sources of macroeconomic volatility in the MENA region in terms of output volatility and the relative volatility of the random walk (RWS) depicted in figure 5 and 7, respectively. We consider a set of variables that cover (i) financial development which is measured by the mean of domestic credit to private sector provided by banks as a ratio of GDP (ii) the volatility of inflation rate, (iii) the volatility of the log of government consumption (iv) governance indicators which are the quality of institution given by the mean of the rule of law and political stability, and (v) trade openness which refers to the ratio of trade balance. Data is retrieved from the World Bank database.

The literature has focused mainly on the causality link between economic growth and

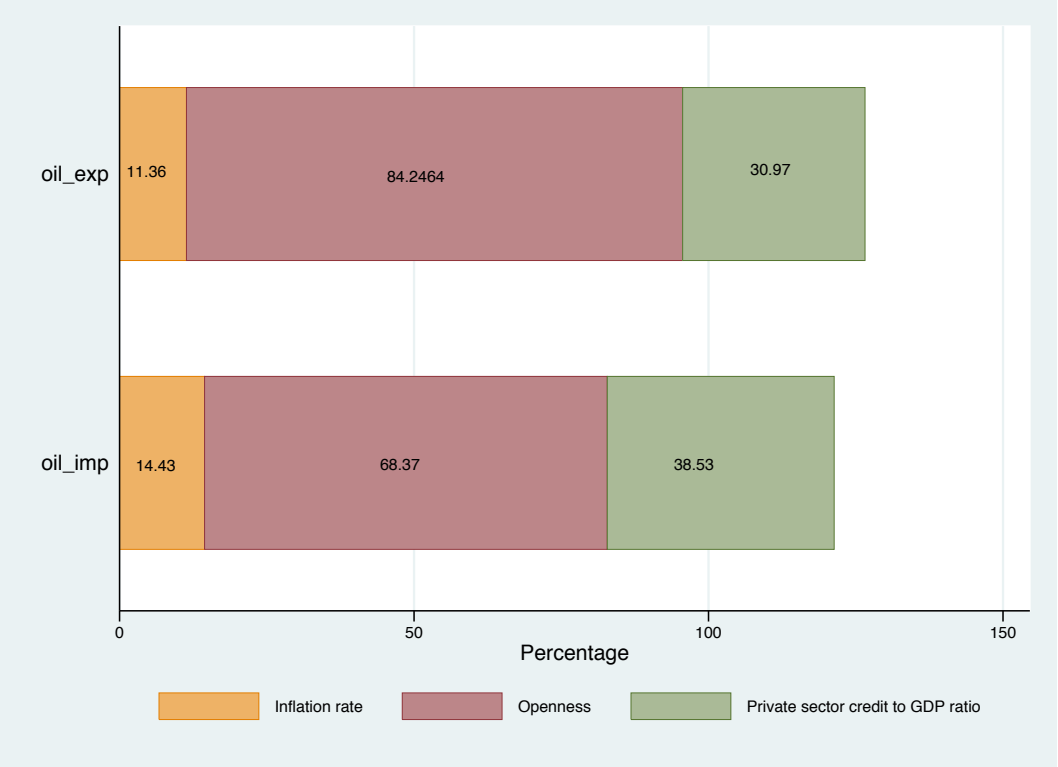


FIGURE 4 – Inflation, openness and financial development in MENA region (1960-2014)

financial development for either developed (see Shan, Morris, and Sun [2001]) [21]) or developing (see Khan and Senhadji [2003] [22]) countries. Different banking measures of financial development have been used such as the private credit to GDP ratio (see figure 4). This ratio helps to determine accurately the role of financial intermediation in private sector isolating the effect of public sector. Findings of studies on MENA countries indicate that causality runs from the private credit ratio to GDP per capita (Omri, Daly, Rault, and Chaibi [2015] and Kar, Nazlıoğlu, and Ağır [2011]) [23]. GÜRSOY and Hassan [2011],

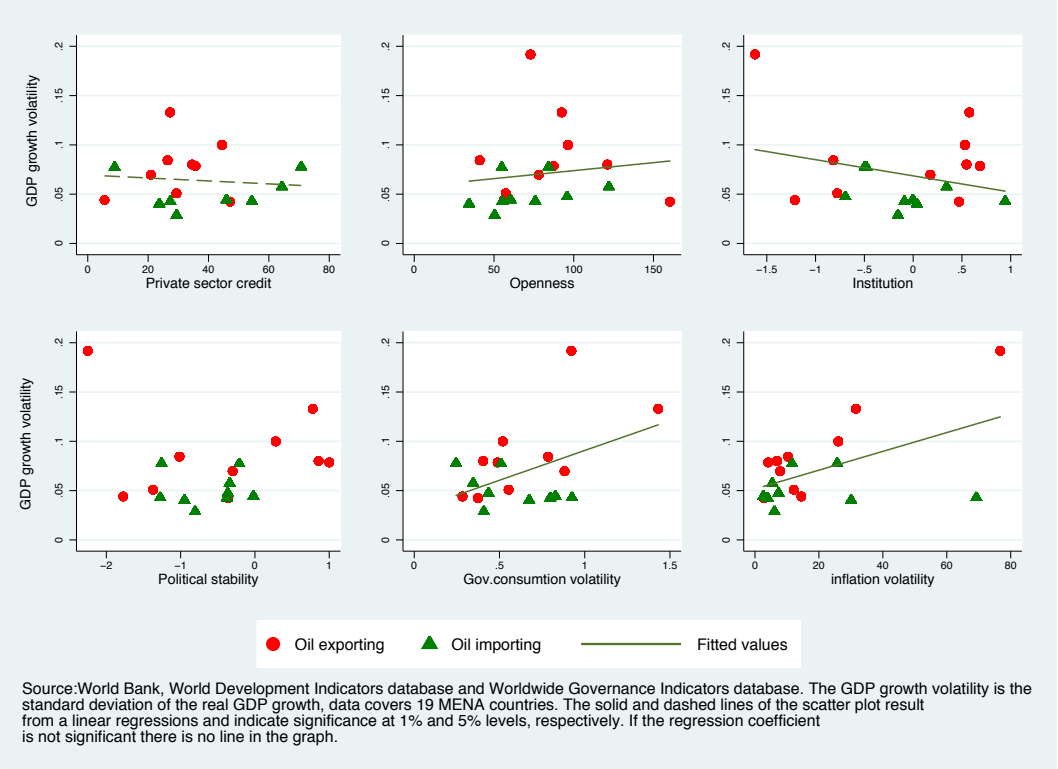
21. Shan et al. (2001) estimate a VAR model and test for causality using Granger tests for a sample of nine OECD countries and China. They find a bi-directional causal link in half of the countries (in Australia, Denmark, Japan, the USA, and the UK) and reverse causality in China, Italy and USA.

22. Khan and Senhadji [2003] find a bi-directional causality for a sample of developing countries : using data covering

23. Omri et al. [2015] identifies an unidirectional causality from Algeria, Bahrain, Egypt, Iran, Israel, Jordan, Kuwait, Libya, Morocco, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, and Turkey). Kar et al. [2011] using annual data from 1980 to 2007. Financial development is measured by six different indicators which are : (1) M/Y : the ratio of narrow money to income, (2) QM/Y : the ratio of quasi money to income, (3) $M2/Y$: the ratio of M2 to income, (4) BDL/Y : the ratio of deposit money bank liabilities to income, (5) CPS/Y : the ratio of private sector credit to income, and (6) DC/Y : the ratio of domestic credit to income. There is no clear pattern about the link of causality between measures of financial development and

using Granger causality over the period of 1973-1988 find that causality is running from financial development to economic growth in the case of Kuwait. However, it is running in the reverse direction for Bahrain and Saudi Arabia. Ben Ben Naceur and Ghazouani [2007] [24] attempt to assess empirically whether financial development has a positive effect on growth rather than looking for the causality between these two variables. They argue that there is no significant relationship between banking development indicators-among them banks credit to private sector-and growth of GDP per capita, using a dynamic panel data for eleven MENA countries over the period 1979-2003. The authors explain this result by the intervention of the public sector in the allocation of credit.

Results reported in figure 5 indicate that, at 5% level, private sector credit is signifi-



Source:World Bank, World Development Indicators database and Worldwide Governance Indicators database. The GDP growth volatility is the standard deviation of the real GDP growth, data covers 19 MENA countries. The solid and dashed lines of the scatter plot result from a linear regressions and indicate significance at 1% and 5% levels, respectively. If the regression coefficient is not significant there is no line in the graph.

FIGURE 5 – The macroeconomic volatility : The growth volatility

cantly and negatively correlated with output growth volatility. This result corroborates those obtained by Easterly, Islam, and Stiglitz [2001] who point out that a deeper financial

growth. When testing for the effect of growth on financial development, Algeria, Egypt, Iran, Qatar, Saudi Arabia and Syria show no link, and the remaining countries show a weak relationship. Regarding the impact of financial development on growth, while there is no link is found for Algeria, Egypt, Iran and Sudan, a one indicator among the six used induce growth in the case of Bahrain, Jordan and Iran.

24. Bahrain, Egypt, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, Tunisia and Turkey.

system in developing countries is significantly associated with lower volatility. Similar conclusion were found by Hakura [2007] with OLS regressions including only developing countries [25]. On the other hand, Mobarak [2006] finds an insignificant effect of financial development on the volatility of real GDP per capita growth for the mixed sample. However, contrary to Naoussi and Tripier [2013], we find that the private sector credit is not correlated with the size of the random walk component. Thereby, the macroeconomic instability is induced by a weak financial system. But we can not conclude the same about the trend shocks.

Empirical evidence from developed countries supports the negative impact of government consumption on macroeconomic volatility. For example, Gali [1994] shows that the mean of ratios of tax revenues and government purchases to GDP is negatively correlated to standard deviations of detrended output and output growth for 22 OCED countries. Mohanty and Zampolli [2009] focus also on OECD countries and argue that a 21% fall in the cyclical output volatility was associated with about a 10% increase of the government expenditure to GDP ratio. For developing countries it has been shown also that government consumption has a negative impact on welfare and growth. Herrera [2007] found that public spending triggers a welfare loss in terms of consumption of about 8% for developing countries [26].

These findings are part of the debate about the role of macroeconomic policies in business cycle. Some authors argue that monetary or fiscal policies serve as an indicator of misguided institutions rather than a source of economic instability (Acemoglu, Johnson, Robinson, and Thaicharoen [2003] and Easterly [2005]). Other studies show that these policies play a significant role as a source of growth volatility. F*á*tas and Mihov(2013) support this finding and attempt to check Acemoglu et al. [2003] conclusion. their empirical exercise covers a sample of 91 developed and developing countries [27] over 40 years of annual data. The authors provide a confirmation that regressions using the level of policy variables imply that such variables can be regarded as proxies for institutions as advocated by Acemoglu et al. [2003]. Furthermore, Fatás and Mihov [2001] establish a

25. The negative significance of financial sector development was obtained when the discretionary fiscal policy volatility was not controlled.

26. the sample covers 82 developing countries among them there are 7 MENA countries which are : Algeria, Egypt, Iran, Mauritania, Morocco, Syria and Tunisia.

27. Including 8 MENA countries : Algeria, Egypt, Israel, Mauritania, Morocco, Syria, Tunisia and Turkey.

new evidence that policies volatility is what matters for long-term economic performance. Quantitatively, they find that the negative impact of a one standard deviation increase of fiscal policy yields a 75% points decrease of output. That was the reason behind our choice to examine the effects of the standard deviations of inflation and government consumption on economic volatility of MENA rather than their means.

At 1% level, inflation [28] is significantly positively associated with GDP growth volati-

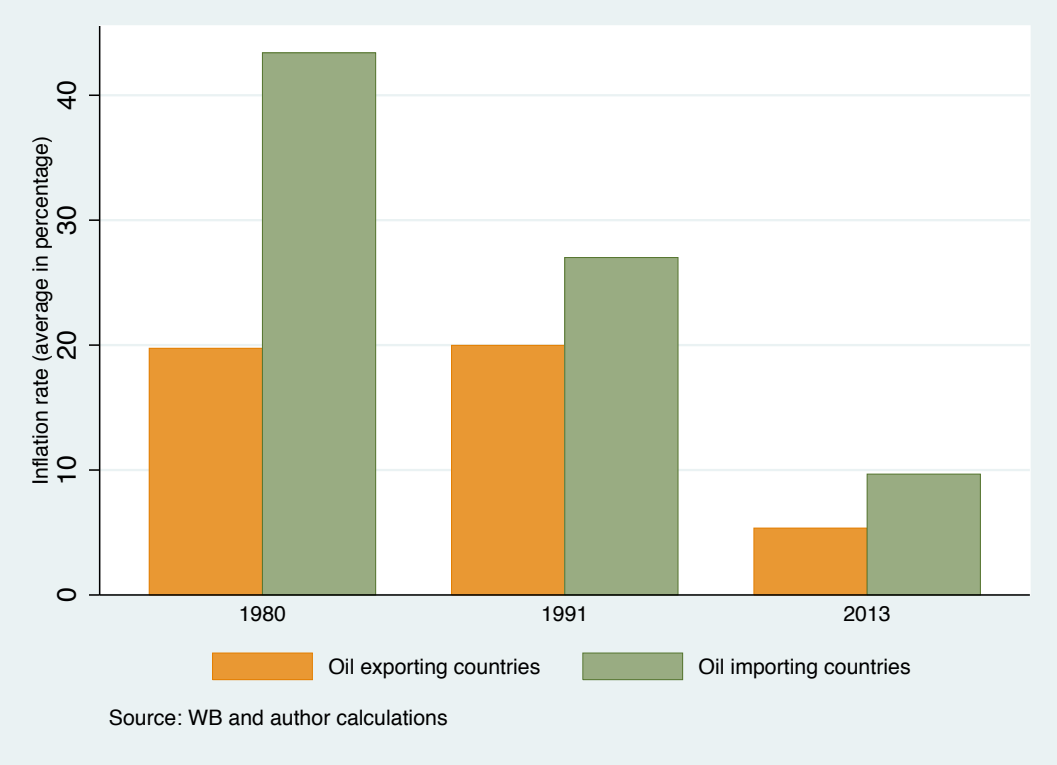


FIGURE 6 – Inflation rate for oil importing and exporting MENA countries

lity; that is, low inflation reduces output volatility. This confirms partially the results of Neaime (2005) who reports that the inflation rate is positively and significantly related to GDP volatility in the case of the less financially integrated MENA [29] countries (while it is insignificantly associated with GDP volatility for the more financially integrated MENA [30] countries.). Moreover, we are in line with Mobarak [2006], although, he reports that the inflation effect was marginally significant. Additionally, inflation is significantly positi-

28. Ben Naceur and Ghazouani [2007] examined also the effect of inflation rate as a control variable for macroeconomic stability when the GDP per capita was the dependent variable. They found that inflation rate effect is insignificant.

29. Bahrain, Kuwait, Saudi Arabia and UAE.

30. Egypt, Iran, Jordan, Morocco and Turkey

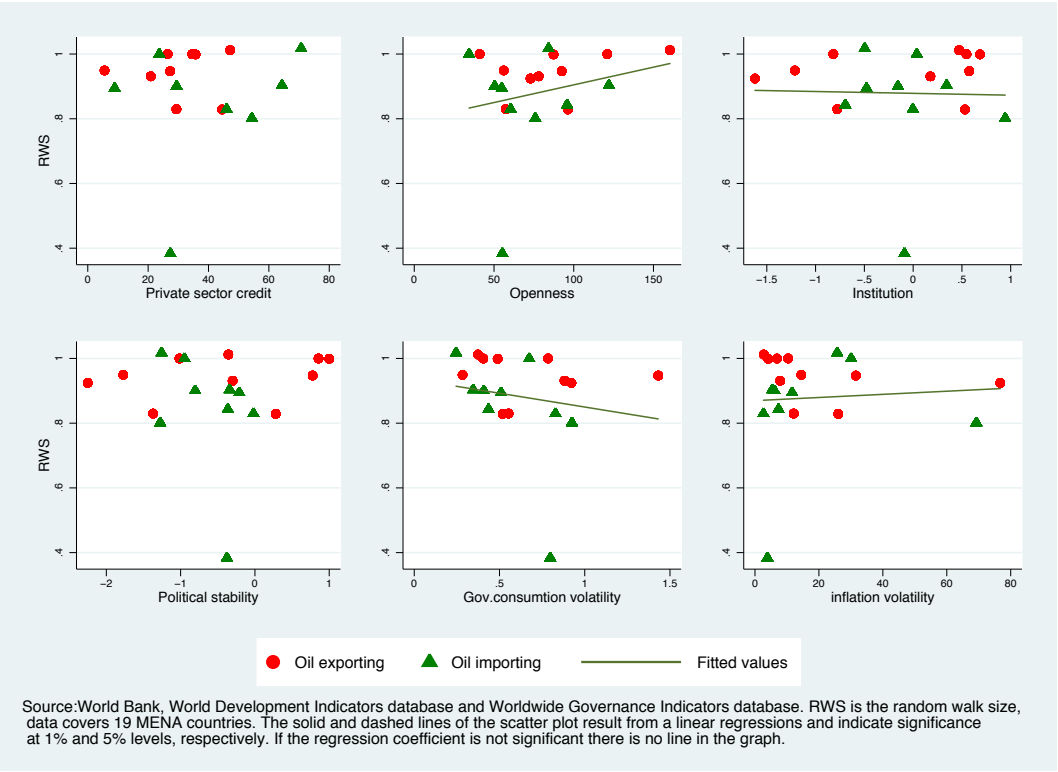
vely correlated to RWS. On the other hand, figure (6) depicts the average inflation rate for $1980-1991-2013$ for each group of MENA countries. It shows that the inflation rate is diminishing over time weakening the relative volatility of shocks to trend effects on growth. As a proxy of monetary policy, results about inflation volatility enhance a monetary policy framework that targets inflation in order to achieve price stability in the short-run and economic stability in the long-run. We turn now to the effects of fiscal volatility, as measured by the standard deviation of government consumption on economic volatility. Results show a significant negative relationship with RWS. This result stands in line with that of Gali (1994) for developed countries indicating a stabilizing effect of fiscal policy. For oil-exporters, because of the heavy reliance on oil, a drop in oil prices induces directly the tightness of fiscal policy by reducing government spending. This situation dampens growth and exacerbates macroeconomic volatility. According to figure 5 oil-exporters are above the regression line and exhibit high growth volatility. However, figure 7 shows a significant positive link between fiscal volatility and real GDP growth volatility. Therefore, we conclude as in Naoussi and Tripier [2013] that fiscal policy is not a good indicator of the trend shocks weight in developing countries.

Research about macroeconomic stability has highlighted the role of governance quality [31] to explain economic stability. According to Acemoglu et al. [2003] weak institutions make poor countries more prone to crisis and economic volatility, especially those who experienced colonial periods. They document also that a low quality of institution yields distortionary macroeconomic policies. In spite of growing literature about policy stability and governance effect on growth, little has been done in measuring their impact on the volatility of GDP (or GDP growth) in the MENA region. To verify whether the same conclusions hold true for the MENA region we plot the worldwide data for two indicators- the rule of law, the political stability and absence of violence index [32]- against the standard deviation of real GDP growth.

Our results suggest that in three cases, the governance indicators are negatively correlated

31. See table (23) for more details.

32. The effect of quality of governance was addressed using other index such as "Quality of bureaucracy, law and order traditions" provided by the International Country Risk Guide (ICRG), "Civil liberties and political rights" provided by Freedom House or "Democracy indicator and openness of political institutions provided by Policy IV.



Source:World Bank, World Development Indicators database and Worldwide Governance Indicators database. RWS is the random walk size, data covers 19 MENA countries. The solid and dashed lines of the scatter plot result from a linear regressions and indicate significance at 1% and 5% levels, respectively. If the regression coefficient is not significant there is no line in the graph.

FIGURE 7 – The macroeconomic volatility : The RWS

with output volatility [33]. This result is in line with Malik and Temple [2009] who find a negative relationship between the average of the six governance indicators of Kaufmann, Kraay, and Zoido-Lobatón [1999] and real GDP per capita growth volatility. Furthermore, Naoussi and Tripier [2013] establish the same result for the quality of institutions with the volatility of real GDP per capita as regressand. Figure 5 shows that the majority of oil-exporting countries with high scores of institutional quality or political stability exhibit high growth volatility except for Iraq which is badly ranked on governance quality and shows the highest volatile growth. The same author reports that the quality of institution is negatively correlated with the RWS, However in the case of MENA countries neither the quality of institution or the political stability is correlated with RWS.

Studies about macroeconomic volatility addressed also the issue of trade openness as a source of volatility, but their findings are ambiguous. Bejan [2006] finds a positive relationship between trade openness and the volatility of GDP growth for a mixed sample, even when isolating developing countries in a one sub-sample over the entire period 1950-

33. The same results remain when we control for the period of revolutions by dropping data from $2011-2014$ for Egypt, Tunisia and Yemen

2000 and the two sub-periods (break in 1975). However, this impact was dampened by the introduction of government size and external risk as control variables. Hakura [2007] reports the same conclusion of the OLS and IV cross-country regressions for the period of 19702003 when she excludes industrial countries from the sample, whereas, Mobarak [2006] shows that the link between trade openness and output growth volatility is negative and marginally significant. A different result was established by RAZIN and ROSE [1994] who find that there is no significant empirical relationship between openness and the volatility of GDP for a sample of 138 countries.

Our results show that trade openness significantly increases output volatility in MENA countries. This finding is in line with Neaime [2005] who finds that trade openness has a positive and significant relationship with GDP volatility in eight MENA countries for the period 1980-2002. The positive link can be explained by the vulnerability of the MENA region to external shocks. Moreover, the MENA region has experienced a long period of trade liberalization as developed in section 3.1.1. Taking a look at figure 5, we observe that this link is more pronounced for oil-exporting countries. This may be due to the oil-price shocks to which those countries are exposed and their high level of openness, which reaches more than 84% as shown in figure 6.

6 Conclusion

We investigated in this chapter the stylized facts of the MENA region over an average of forty five years. Following the standard methodology using the statistical indicators of volatility, persistence and cross correlations a number of empirical regularities can be established for the MENA region [34]. First, real output is on average about two to five times more volatile in MENA countries than in developed countries. Second, private consumption is about 80% more volatile than real output in the MENA region which is opposite to the consumption behavior observed in developed countries which is less volatile than output. This percentage is even higher than that observed in other developing countries. Third, whilst investment volatility is four times higher than real output in the region, it is not much higher than in developed countries.

34. See table (13)

Fourth, both private consumption and investment are significantly procyclical. However, their procyclicality is less pronounced than in developed or other emerging countries. Fifth, government consumption is twice more volatile than output and than that observed in developed countries. The procyclicality of government consumption is significant contrary to developed countries where this variable is either acyclical or mildly countercyclical. Sixth, the trade balance to output ratio is much more volatile than in developed countries and more volatile than in developing countries. As found by Hirata et al. [2007], in MENA countries the trade balance to output ratio is acyclical, contrary to developed and developing countries where trade is countercyclical. Hence, our findings suggest that the business cycle is more volatile in MENA countries. However, our results are in line with previous studies about developing countries and more especially the MENA region shares the same features as in the Sub-Saharan countries.

We attempted, in further step, to determine the nature of business cycles drivers in the MENA region through the lens of the standard stochastic growth model that features combined transitory and permanent TFP shocks. The model succeeds in capturing the excess volatility of consumption in MENA countries, but cannot for the acyclical behavior of trade balance. So broadly speaking, the model performs as in AG (2007), with some exceptions such as, (i) that the underestimated moments happens with a larger gap than that in AG (2007) and (ii) the correlation of the trade balance with output is over-estimated. We calculated also the relative variance of the random walk component that translates the relative variance of trend shocks to the overall variance indicate a high value of RWS. The identification of the nature of TFP shocks based on the permanent income hypothesis is true in the case of MENA economies. Indeed following the PIH, the shock is considered as permanent when an increase of output is followed by a higher increase in consumption and a large deterioration of the trade balance and the opposite happens when the shock is transitory. According to the theoretical moment estimates of specification (1), consumption volatility is 20% higher than real GDP volatility. This indicates that the response of consumption to the shock was higher than the income response, leading to a stronger response of investment. All that leads guide us to reject the assumption that transitory shocks are responsible for the business cycle changes in MENA countries.

TABLE 13 – Business cycle features : Literature summary

	Emerging countries					**Developed countries**				**MENA countries**			
	Neumeyer and Perri (2005)	Rand and Trap (2005)	Male (2010)	Naoussi and Trippier (2013)[1] EMs	Naoussi and Trippier (2013)[1] SSA	Christodoulakis et al.(1995)	Neumeyer and Perri (2005)	Male (2010)	Naoussi and Trippier (2013)[1]	Hirata, et al. (2007)	our study		Model
Volatility													
$\sigma(Y)$	2.79	3.60	6.00	3.71	4.25	1.34	1.3	3.10	2.25	11.29	5.89	5.61	6.00
$\sigma(c)$	1.30	1,43	1.30	1.22	1.76	1.07	0.92	0.50	1.04	1.02	1.79	1.87	1.20
$\sigma(I)$	3.29	3.94	2.70	3.43	4.13	2.65	3.44	1.6	3.12	1.56	3.63	3.82	2.88
$\sigma(G)$		0.54	4.50			0.45		1.10			2.33		
$\sigma(TBY)$	0.86	3.01	0.47	0.80	1.19	0.48	0.67	2.00	0.69	0.27	1.08	2.33	1.14
$\sigma(TB)$	2.40	10.84*	2.80*	2.9	5.07	0.64	0.92	6.20*	1.55	3.01	5.68	9.97	5.72
Correlations													
$\rho(c)$	0.80	0.64	0.23	0.73	0.52	0.90	0.67	0.52	0.78	0.95	0.36	0.38	0.74
$\rho(I)$	0.88	0.54	0.36	0.75	0.36	0.91	0.73	0.71	0.83	0.66	0.36	0.46	0.30
$\rho(G)$		0.33	0.05			0.11		-0.23			0.22		
$\rho(TBY)$	-0.61	0.13	-0.12	-0.35	0.00	-0.79	-0.23	-0.40	-0.37	0.09	0.07	0.03	0.24

The table summarizes features of the business cycle for developed, developing and MENA countries, all these studies followed almost the same methodology in the extent that the key moments reported in the table are those which are not estimated using a model and are HP detrended. Model moments are only those of the our study.

TB denotes the trade balance to output ratio and * indicate another measure of trade balance.

In Christodoulakis, Dimelis, and Kollintzas [1995] only the standard deviations were given and G denotes the ratio og government to output.

In Neumeyer and Perri [2005] only the standard deviation of TB was given. In Male (2010) TB denote the ratio of exports to imports data in quarterly frequency.

In Rand and Tarp [2002] TB denotes the terms of trade and I corresponds to fixed investment.

a. GMM estimation

Part I Text

Appendix

A Literature review

Table 14 – Literature review: Developed countries

Study	Sample and data	Methodology	Findings
Kydland and Prescott (1990)	Twelve developing countries: Chile,Columbia, India, Korea, Malaysia Mexico, Morocco, Nigeria, The Philippines, Tunisia, Turkey and Uruguay. Data: Real output: IPI, or the manufacturing production index, the CPI, NW and RW index, reserve money, the narrow money, the broad money velocity of money, private sector credit, Gov cons, Gov R, the fiscal impulse measure	Detrending method: The HP and Band-pass filters	(i) The output is more volatile than in industrialized countries. (ii) PI, M2, official development assistance (ODA) and credit to the private sector are more volatile than Y. (iii) C is more volatile than Y. (consumption of services and durables)
Tawadros (2011)	Australia Post war quarterly data: 1985 to 2008 Real output, consumption, investment, exports, imports,employment, labour productivity, real wages, money, price and real interest rate	Detrending methods: HP and the unobserved component (UC) filter	The deterministic trend seems to be more appropriate. *HP results*: C, Inv I, E, LP, RW, P, and RI are less volatile than Y. VM3, broad money and its velocity,VBM:are moderately more volatile than Y. S,Fix I, I, X and M: are considerably more volatile than output. *Persistence*: all variable are persistent and strongly are Fix I, LP, P and broad money. *Procyclical variables*: C, S, Fix I, Inv I, I LP, E, X, M *Countercyclical variables*: VBM and RI. *UC results*: C,Inv I, LP, RW, P, RI and M are less volatile than Y. VBM, LP and RW are less persistent.
Prorio and Kollintzas (1990)	G7 :Canada, France, Germany, Japan, Italy, UK and US. Quarterly data from 1960 to 1989.	Detrending methods:HP filter, unit root and log-polynomial deterministic trends no clear pattern.	Results were robust to the detrending methods. C: procyclical and less volatile than output I: procyclical and more volatile than output, NX: countercyclical, P: countercyclical. GOV cons and money:
Backus and kehoe(1992)	Ten developed countries: Australia, Canada, Denmark, Germany, Italy, Japan, Norway, Sweden, the United Kingdom, and the United States.	Detrending method: HP filter	Stable correlations between outputs of countries. Positive and more pronounced in the postwar period. C: is as variable as output. I: is more variable than output. Strong positive correlations between C,I and Y. TB: is countercyclical. Government consumption exhibits no systematic cyclical tendency.Money: correlation with Y was less pronounced in the postwar period. No change in persistence of the growth rate of money.

C=consumption, I=investment, Gov cons= government consumption, Gov R= government revenue, Inv I= inventory investment, Fix I= fixed investment, E=employment, LP= labor productivity,

Table 15 – Literature review: MENA countries

Study		Sample and data	Methodology	Findings
Source of economic fluctuations: MENA countries				
Makdisi et	al.(2003)	1960-1998 Algeria, Egypt, Iran, Iraq, Jordan, Kuwait, Libya, Morocco, Sudan, Tunisia and Turkey. Factors: Real GDP per capita, Primary school enrollment ratio, investment ratio, inflation, Openness and the share of exports of primary products in GNP.	cross country regressions	(−)Inflation, oil and natural resources. (+) Investment ratio
Hirata et	al.(2007)	1960-2000 Egypt, Jordan, Morocco, Tunisia, Israel and Turkey. Data: GDP, GPD of nontraded good sector, GDP of exportable good , sector consumption of non durable goods, investment and net exports to GDP ratio.	DSGE model	terms of trade and TFP shocks explain about 60% and 38% of the output variations.
Abu-Qarn and	Abu-Bader (2007)	1960-1998 10 MENA countries: Algeria, Egypt, Iran, Israel, Jordan, Morocco, Sudan, Syria, Tunisia, and Turkey. Data: Physical capital stock, labor force and human capital	Panel data (region−specific) Estimation of the share of capital in income using cointegration (country specific) method.	TFP has a minor role to boost growth, while capital accumulation and improvement in the quality of labor.
Oil shocks and growth				
Berument	et al.(2010)	Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan,Kuwait,Libya, Morocco, Oman, Qatar,Syria, Oman, Tunisia and UAE	SVAR methodology	the positive oil price shocks increase real growth of oil-exporting countries except for Bahrain. For oil importing countries: the demand side shock increases growth and supply side shock has the opposite effect.
Apergis and	Payne (2014)	1990-2013 Algeria, Bahrain, Kuwait,Libya, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, and Yemen Factors: Crude oil reserves, education, openness, foreign and and domestic direct investment institutional quality and reforms.	Panel data (Cross-sectional dependence tests, panel unit root tests, time varying cointegration analysis)	The improvement of institutional quality dampens the negative impact of oil reserve (oil curse)

Table 15 Continued

Study		Sample and data	Methodology	Findings
Trade and financial market liberalization				
Cestepe et	al.(2015)	30 OECD and 13 MENA: Algeria, Bahrain, Egypt, Israel, Jordan, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Tunisia, UAE	Panel gravity model	the positive effect of trade liberalization on exports of MENA countries is effective only when it is conducted through the free trade agreements. However, the membership to the WTO worsens the export performance in this region.
El-Wassal	(2012)	1995-2010 19 MENA countries: Algeria, Bahrain, Djibouti, Egypt,Iraq, Jordan, Kuwait,Lebanon, Libya, Mauritan, Morocco,Oman, Qatar,Saudi Arabia, Sudan, Syria, Tunisia, UAE and Yemen.	GMM estimation for panel data with fixed effects.	the impact of trade liberalization on trade balance and its component is positive. This situation is reversed when the fuel is excluded from exports and the trade balance
Tosun	(2005)	1980-1997 14 MENA: Algeria, Bahrain, Djibouti, Egypt, Iran, Jordan, Kuwait, Lebanon, Morocco, Oman, Syria, Tunisia, UAE and Yemen.	Panel data with fixed and random effects	Trade liberalization has not a substantial impact on revenue sources of MENA countries.
Ben Naceur	et al.(2008)	1979-2005 11 MENA countries: Bahrain, Egypt, Iran, Jordan, Kuwait,Lebanon, Morocco, Oman, Saudi Arabia,Tunisia and Turkey. Stock market index, turnover ratio, Income per capita, credit to private sector, Δ of credit to private sector, inflation rate, government consumption, trade openness, Black market premium and US interest rate	Unbalanced panel data	Economic growth is not affected by stock market liberalization Stock market liberalization has positive impact on stock market development in the long-run and negative impact in the short-run. The positive response is strengthened when the economic preconditions are taken into account.

$(-)$ indicates a negative effect and $(+)$ indicates a positive one.

B Data

The real series of private investment (RPI) they are not available for all countries, some countries have only data on real investment, therefore we note (RI) the series of real investment whether its private or not. Energy consumption, Participation rate and exchange rate series start for all countries from 1971, 1990 and 1970, respectively. Domestic credit to private sector is not available for Egypt, Iraq and Mauritania and it starts from 1972 for Oman. Almost all data are retrieved from the World Bank website, except for Iraq, Kuwait and Yemen where data was taken from the UNdata (data.un.org). Capital flows are from IMF website data for balance of payment and the database of Broner et al.(2013) Journal of Monetary Economics 60(1). The regular span and data with different dates are given in table (17)

C Estimation

Table 16 – Data definition

Variables	Code	Definition
Real Gross Domestic Price	GDP	GDP
Real private consumption	RPC	Household final consumption expenditure
Real Investment	RPI	Private gross fixed capital formation
	RI	Gross fixed capital formation
Trade balance to output ratio	TBY	(exports-imports)/GDP
Real government consumption	RGC	General government final consumption expenditure
Energy consumption	EC	Energy use (1971-2013). Data from the IEA Kg of oil equivalent per capita.
Real Workers' remittances	WR	Personnel remittances. received .
Real Domestic credit	RDC	Domestic credit to private sector by banks (% of GDP)
External debts	Exd	External debt stocks. total (DOD. current US$)
Exchange rate (LCU/$)	Exch	Official exchange rate (LCU per US$, period average)
Participation rate	Prate	Labor force participation rate, total (% of total population ages 15-64) (modeled ILO estimate)
Capital flows	CF	Gross capital flows =capital inflows plus outflows. Capital inflows are inflows of FDI, portfolio investment liabilities and other investment liabilities. Capital outflows are the aggregation of outflows of FDI, portfolio investment assets. other investment assets. and international reserve assets.

ILO: The International Labor Organization. IEA: The International Energy Agency.

Table 17 – Data span and sources

Countries	Regular span	Capital flows	External debts	WR
DZA	1963-2014	1977-1991	1970-2014	1970-2014
BHR	1980-2014	1998-2014		
EGY	1966-2014	1977-2014	1970-2014	1977-2014
IRN	1960-2014	1976-2000	1980-2014	1991-2011
IRQ	1970-2014	2008-2012		
ISR	1960-2014	1960-2014		1970-2014
JOR	1976-2013	1972-2014	1970-2014	1972-2014
KWT	1965-2014	1975-2014		
LBN	1990-2013	2005-2014	1970-2014	
MRT	1965-2014		1970-2014	
MAR	1960-2014	1975-2013	1970-2007	1975-2007
OMN	1976-2014	1974-2014		1978-2014
QAT	1980-2013			
SAU	1970-2014	1971-2014		
SYR	1965-2007	1977-2007	1970-2014	1977-2010
TUN	1960-2013	1976-2014	1970-2014	1976-2014
TUR	1968-2014	1974-2014	1970-2014	1974-2014
ARE	1975-2013			
YEM	1991-2013			

Table 18 – Volatility and relative volatility

		GDP	RGC	RPC	RI	TBY	EC	WR
Algeria	SD	3.24	8.78	6.96	12.28	5.23	4.53	49.91
	RSD	1.00	2.71	2.15	3.79	1.61	1.40	15.40
Bahrain	SD	3.83	6.23	11.64	19.26	6.48	4.27	
	RSD	1.0	1.63	3.04	5.03	1.69	1.11	
Egypt	SD	2.95	13.62	6.30	5.28	2.79	4.40	29.97
	RSD	1.00	4.62	2.14	1.79	0.95	1.49	10.16
Iran	SD	8.26	10.03	12.46	26.57	5.84	5.14	72.96
	RSD	1.00	1.21	1.51	3.22	0.71	0.62	8.84
Iraq	SD	16.66	44.80	29.78	39.87	1.92	12.63	
	RSD	1.00	2.69	1.79	2.39	0.12	0.76	
Israel	SD	3.81	7.77	3.58	13.47	3.05	6.14	31.81
	RSD	1.00	2.04	0.94	3.53	0.80	1.61	8.34
Jordan	SD	5.81	10.09	7.53	23.62	5.46	5.63	17.05
	RSD	1.00	1.74	1.3	4.06	0.94	0.97	2.93
Kuwait	SD	8.82	17.05	18.00	23.31	16.89	28.85	
	RSD	1.00	1.93	2.04	2.64	1.91	3.27	
Lebanon	SD	6.11	8.34	8.29	18.08	3.92	10.60	
	RSD	1.00	1.36	1.36	2.96	0.64	1.73	
Mauritania	SD	3.63	16.24	8.95	33.20	8.53		10.19
	RSD	1.00	4.48	2.47	9.15	2.35		2.81
Morocco	SD	3.03	7.25	3.33	10.91	2.78	2.47	28.98
	RSD	1.00	2.39	1.1	3.6	0.92	0.82	9.56
Oman	SD	9.32	30.54	32.02	37.24	9.36	22.70	11.41
	RSD	1.00	3.28	3.43	3.99	1.00	2.43	1.22
Qatar	SD	5.48	8.95	9.29	20.19	7.59	5.43	
	RSD	1.00	1.63	1.7	3.69	1.39	0.99	
Saudi	SD	6.66	10.08	10.10	14.49	9.74	12.13	
	RSD	1.00	1.51	1.51	2.17	1.46	1.82	
Syria	SD	5.94	13.37	8.84	18.14	3.56	7.36	
	RSD	1.00	2.25	1.49	3.05	0.60	1.24	
Tunisia	SD	2.69	2.58	3.57	14.39	2.00	2.81	9.09
	RSD	1.00	0.96	1.33	5.35	0.75	1.05	3.38
Turkey	SD	3.78	9.06	5.07	13.74	2.05	4.16	28.67
	RSD	1.00	2.4	1.34	3.64	0.54	1.1	7.59

Table 19 – Persistence

	GDP	RGC	RPC	RI	TBY	EC	WR
Algeria	0.11	0.47***	0.26*	0.42***	0.27*	0.35*	0.45***
Bahrain	0.44***	0.29*	0.46***	0.57***	0.25	0.11	
Egypt	0.68***	0.64***	0.21	0.44***	0.31***	0.48***	0.59***
Iran	0.67***	0.64***	0.00	0.53***	0.32***	0.17	0.42**
Iraq	0.20	0.64***	0.29***	0.38 ***	-0.12	0.50***	
Israel	0.62***	0.25*	0.24*	0.62***	0.27***	-0.10	0.45***
Jordan	0.65***	0.49***	0.52***	0.45***	0.42***	0.51***	0.64***
Kuwait	0.46***	0.36***	0.18	0.35***	0.15	0.52***	
Lebanon	0.25	0.48***	0.36*	0.66***	0.48***	0.45***	
Mauritania	0.31***	0.67***	0.30***	0.10	0.32***		0.24
Morocco	0.13	0.64***	0.16	0.56***	0.48***	0.47***	0.44***
Oman	0.31**	0.62***	0.54***	0.59***	0.17	0.18	0.31*
Qatar	0.49***	0.25	0.65***	0.58***	0.46**	0.15	
Saudi	0.69***	0.55***	0.71***	0.79***	0.35**	0.62***	
Syria	0.29*	0.59***	0.47***	0.68***	0.43***	0.11	
Tunisia	0.01	0.48***	0.30**	0.47***	0.31**	0.01	0.39**
Turkey	0.50***	0.66***	0.24*	0.54***	0.09	0.47***	0.62***
UAE	0.62***	0.47***	0.29*	0.64***	0.24	0.33*	
Yemen	0.37***	0.59*	0.38*	0.59***	0.55	0.25	0.32
Persistent	14	18	15	18	12	10	9
Non persistent	5	1	4	1	7	8	2

Table 20 – Contemporaneous correlation

	RGC	**RPC**	**RI**	**TBY**	**EC**	**WR**
Algeria	0.03	0.32**	0.38***	0.05	0.25*	-0.13
Bahrain	-0.25	0.62***	0.31*	-0.29*	-0.12	
Egypt	0.51***	0.13	0.33**	0.17	0.37***	-0.15
Iran	0.57***	0.03	0.45	0.29**	0.17	-0.07
Iraq	0.51***	-0.06	0.34***	0.11	-0.02	
Israel	0.28**	0.34**	0.83***	0.13	0.15	-0.10
Jordan	0.50***	0.74***	0.24	-0.13	0.56***	0.50***
Kuwait	0.09	0.30	0.04	0.33***	0.33***	
Lebanon	-0.37*	0.80***	0.79***	-0.13	0.53***	
Mauritania	-0.05	0.22	0.28**	0.35**		-0.09
Morocco	0.44***	0.78***	0.43***	-0.20	0.17	0.35***
Oman	-0.14	-0.28**	-0.27*	0.44***	0.24	0.31**
Qatar	0.35	0.11	-0.01	0.13	0.27	
Saudi Arabia	0.33**	-0.01	0.68***	0.55***	-0.02	
Syria	0.33**	0.65***	0.69***	-0.31**	-0.02	
Tunisia	0.09	0.50***	0.26*	-0.08	0.55***	-0.23*
Turkey	0.32**	0.71***	0.88***	-0.49***	0.83***	-0.21
UAE	0.32**	0.42***	0.45***	0.49***	0.39**	
Yemen	0.27	0.60***	0.68***	-0.13	0.64***	-0.38*
Procyclical	12	11	16	6	11	3
Acyclical	5	7	2	10	7	6
Countercyclical	2	1	1	3		2

*1%,**5% and ***10% for the significance of correlation coefficients.

D Countries GDP and variables' shocks trend growth

E Parameters and moments estimation

Table 21 – Parameters estimates

	Parameters	$\alpha = 0.68$				Different values for α			
		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Algeria	σ_z	0.86	(7118)	1.04	(0.69)	0.44	(4807)	1.09	(1.24)
	σ_g	2.78	(4761)	1.29	(0.72)	2.96	(2969)	1.19	(0.80)
	ρ_z	1.00	(0.85)	0.00	(0.24)	1.00	(1.09)	0.00	(0.12)
	ρ_g	0.00	(2.30)	0.02	(0.60)	0.00	(0.34)	0.01	(0.44)
	μ_g	3.95	(0.46)	3.96	(0.59)	3.97	(0.53)	4.02	(0.66)
	ψ	0.01	(0.04)	-0.13	(0.08)	0.02	(0.03)	-0.07	(0.04)
	RWS	0.83	(2841)	0.27	(0.48)	0.92	(1835)	0.13	(0.35)
	$P-value$	0.19		0.20		0.18		0.21	
Bahrain	σ_z	0.30	(1.25)	1.87	(0.18)	0.30	(1.25)	1.85	(0.21)
	σ_g	7.61	(0.95)	1.90	(0.88)	7.61	(0.95)	1.96	(0.95)
	ρ_z	0.00	(5.92)	0.00	(0.06)	0.00	(5.92)	0.00	(0.05)
	ρ_g	0.01	(0.06)	0.05	(0.16)	0.01	(0.06)	0.04	(0.15)
	μ_g	4.42	(0.42)	4.21	(0.35)	4.42	(0.42)	4.20	(0.33)
	ψ	-0.30	(0.03)	-0.13	(0.01)	-0.30	(0.03)	-0.12	(0.01)
	RWS	1.01	(0.06)	0.22	(0.12)	1.01	(0.06)	0.21	(0.13)
	$P-value$	0.43		0.45		0.43		0.45	
Egypt	σ_z	0.57	(0.28)	0.94	(0.16)	0.63	(0.48)	0.98	(0.19)
	σ_g	2.62	(0.29)	1.23	(0.50)	2.70	(0.25)	1.16	(0.58)
	ρ_z	0.84	(0.54)	0.00	(0.13)	0.65	(0.30)	0.00	(0.11)
	ρ_g	0.00	(0.17)	0.02	(0.24)	0.001	(0.25)	0.018	(0.17)
	μ_g	4.83	(0.29)	4.82	(0.30)	4.82	(0.35)	4.73	(0.34)
	ψ	-0.01	(0.02)	-0.12	(0.05)	0.005	(0.01)	-0.09	(0.02)
	RWS	0.90	(0.33)	0.29	(0.27)	0.82	(0.58)	0.18	(0.19)
	$P-value$	0.28		0.31		0.30		0.30	
Iran	σ_z	0.00	(3,729.566)	3.15	(0.47)	1.72	(0.76)	2.30	(0.50)
	σ_g	6.61	(1.16)	2.37	(1.80)	3.78	(1.39)	3.40	(1.80)
	ρ_z	0.00	(938,146.094)	0.00	(0.05)	0.10	(0.24)	0.01	(0.11)
	ρ_g	0.00	(0.15)	0.002	(0.58)	0.00	(0.29)	0.00	(0.30)
	μ_g	4.40	(1.24)	4.54	(1.35)	4.25	(1.52)	4.00	(1.40)
	ψ	0.52	(0.13)	-0.17	(0.16)	0.03	(0.03)	-0.17	(0.11)
	RWS	1.00	(0.22)	0.12	(0.21)	0.48	(0.20)	0.28	(0.27)
	$P-value$	0.35		0.63		0.37		0.38	
		1.56	(0.64)	7.88	(2.05)	0.44	(2.07)	0.38	(56.3)

Table 21 Continued

	Parameters	$\alpha = 0.68$				Different values for α			
		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Israel	σ_z	0.93	(0.60)	1.04	(0.32)	1.05	(0.54)	0.99	(0.36)
	σ_g	3.17	(0.37)	1.41	(0.47)	3.15	(0.36)	1.39	(0.49)
	ρ_z	0.50	(0.22)	0.01	(0.14)	0.48	(0.18)	0.01	(0.14)
	ρ_g	0.001	(0.14)	0.01	(0.22)	0.001	(0.13)	0.01	(0.19)
	μ_g	5.21	(0.58)	5.02	(0.58)	5.21	(0.56)	5.14	(0.57)
	ψ	0.01	(0.01)	-0.13	(0.04)	0.02	(0.01)	-0.12	(0.03)
	RWS	0.80	(0.37)	0.31	(0.19)	0.74	(0.34)	0.30	(0.20)
	$P-value$	0.29		0.23		0.29		0.22	
Joradan	σ_z	0.61	(0.65)	0.68	(0.90)	0.10	(1.04)	0.71	(0.83)
	σ_g	3.05	(1.22)	1.10	(2.27)	3.19	(1.31)	0.90	(1.30)
	ρ_z	0.63	(0.04)	0.02	(0.33)	0.67	(0.30)	0.02	(0.23)
	ρ_g	0.00	(0.22)	0.01	(0.25)	0.00	(0.27)	0.01	(0.45)
	μ_g	5.26	(0.60)	5.24	(0.60)	4.97	(0.66)	5.27	(0.60)
	ψ	-0.28	(0.11)	-0.10	(0.03)	-0.17	(0.10)	-0.05	(0.02)
	RWS	0.90	(0.54)	0.39	(1.40)	1.00	(0.50)	0.26	(0.94)
	$P-value$	0.43		0.45		0.52		0.45	
Kuwait	σ_z	1.38	(1.45)	2.50	(0.41)	0.93	(3.85)	4.47	(0.59)
	σ_g	6.24	(1.22)	2.98	(1.39)	6.31	(2.19)	3.55	(1.73)
	ρ_z	0.00	(0.89)	0.002	(0.08)	0.009	(2.82)	0.004	(0.01)
	ρ_g	0.002	(0.12)	0.00	(0.38)	0.00	(0.24)	0.00	(0.30)
	μ_g	2.75	(0.95)	2.85	(1.02)	2.74	(0.92)	3.02	(0.96)
	ψ	0.04	(0.03)	-0.14	(0.07)	0.04	(0.03)	-0.08	(0.02)
	RWS	0.83	(0.25)	0.25	(0.18)	0.82	(0.85)	0.06	(0.03)
	$P-value$	0.37		0.38		0.36		0.41	
Lebanon	σ_z	0.01	(105.38)	0.32	(0.62)	0.00	(485.672)	0.31	(0.46)
	σ_g	6.85	(343)	3.01	(0.28)	4.86	(1,193.25)	1.97	(0.63)
	ρ_z	1.00	(1,384.695)	0.001	(1.38)	1.00	(3,433.137)	0.01	(52.09)
	ρ_g	0.01	(0.88)	0.04	(0.05)	0.01	(315)	0.00	(8.03)

Table 21 Continued

	Parameters	$\alpha = 0.68$				Different values for α			
		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Morocco	σ_z	1.22	(0.24)	1.84	(0.23)	1.56	(0.34)	1.50	(0.29)
	σ_g	1.77	(0.56)	2.86	(0.55)	1.56	(1.24)	2.00	(1.49)
	ρ_z	0.28	(0.30)	0.00	(0.11)	0.13	(0.22)	0.01	(0.14)
	ρ_g	0.00	(0.22)	0.01	(0.17)	0.00	(0.68)	0.01	(0.70)
	μ_g	4.52	(0.31)	4.60	(0.32)	4.50	(0.35)	4.67	(0.34)
	ψ	-0.01	(0.02)	0.05	(0.04)	0.00	(0.01)	0.00	(0.01)
	RWS	0.38	(0.16)	0.36	(0.07)	0.10	(0.04)	0.15	(0.08)
	$P-value$	0.33		0.32		0.33		0.30	
Oman	σ_z	1.11	(177)	3.33	(0.52)	0.03	(1.53)	2.40	(0.65)
	σ_g	6.04	(70)	2.28	(2.05)	3.80	(3.94)	0.57	(4.11)
	ρ_z	1.00	(0.73)	0.02	(0.05)	0.57	(0.54)	0.001	(0.03)
	ρ_g	0.01	(18.05)	0.07	(0.29)	0.01	(0.42)	0.12	(0.42)
	μ_g	5.55	(0.90)	4.95	(0.87)	4.97	(0.86)	5.53	(0.89)
	ψ	-0.03	(0.03)	-0.12	(0.02)	-0.09	(0.07)	-0.05	(0.02)
	RWS	0.95	(2168)	0.12	(0.11)	1.02	(0.87)	0.01	(0.11)
	$P-value$	0.35		0.37		0.41		0.42	
Qatar	σ_z	0.53	(1.02)	1.66	(0.29)	0.94	(1.11)	1.45	(0.59)
	σ_g	4.51	(1.07)	2.01	(1.78)	4.59	(1.15)	1.88	(1.69)
	ρ_z	0.38	(2.52)	0.004	(0.12)	0.36	(0.88)	0.01	(0.09)
	ρ_g	0.02	(0.14)	0.01	(0.36)	0.03	(0.17)	0.01	(0.28)
	μ_g	6.87	(1.58)	6.86	(1.74)	7.09	(1.42)	6.96	(1.53)
	ψ	-0.02	(0.01)	-0.12	(0.03)	0.00	(0.01)	-0.08	(0.01)
	RWS	1.00	(0.36)	0.26	(0.24)	0.85	(0.61)	0.18	(0.25)
	$P-value$	0.45		0.44		0.45		0.43	
Saudi Arabia	σ_z	1.05	(1.79)	3.15	(0.46)	0.62	(2.61)	4.43	(0.74)
	σ_g	6.88	(1.16)	2.45	(1.47)	5.23	(1.08)	2.09	(1.11)
	ρ_z	0.00	(0.90)	0.001	(0.07)	0.00	(4.12)	0.001	(0.02)
	ρ_g	0.01	(0.24)	0.01	(1.61)	0.01	(1.01)	0.01	(1.01)
	μ_g	4.37	(0.78)	4.07	(0.82)	4.14	(0.89)	4.41	(0.76)

Table 21 Continued

	Parameters	$\alpha = 0.68$				Different values for α			
		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Tunisia	σ_z	0.48	(0.23)	0.93	(0.16)	0.80	(0.10)	0.95	(0.14)
	σ_g	1.73	(0.50)	0.88	(0.37)	2.51	(0.36)	0.91	(0.32)
	ρ_z	0.60	(0.02)	0.00	(0.05)	0.00	(0.21)	0.00	(0.05)
	ρ_g	0.002	(0.14)	0.02	(0.15)	0.003	(0.08)	0.015	(0.20)
	μ_g	4.63	(0.39)	4.75	(0.36)	4.86	(0.42)	4.77	(0.40)
	ψ	-0.30	(0.06)	-0.11	(0.02)	-0.03	(0.01)	-0.14	(0.03)
	RWS	0.83	(0.24)	0.18	(0.13)	0.74	(0.14)	0.21	(0.15)
	$P-value$	0.37		0.40		0.30		0.39	
Turkey	σ_z	0.03	(8.08)	1.77	(0.13)	0.00	(474)	1.80	(0.20)
	σ_g	3.81	(0.22)	1.45	(0.58)	4.03	(0.39)	5.17	(0.40)
	ρ_z	0.22	(323)	0.00	(0.03)	0.001	(752.869)	0.00	(0.24)
	ρ_g	0.00	(0.04)	0.07	(0.11)	0.003	(0.13)	0.193	(0.11)
	μ_g	4.28	(0.35)	4.22	(0.35)	4.26	(0.35)	4.23	(0.36)
	ψ	0.03	(0.01)	-0.14	(0.03)	0.05	(0.01)	8.10	(5.21)
	RWS	1.00	(0.14)	0.15	(0.11)	1.01	(0.46)	0.95	(0.18)
	$P-value$	0.31		0.32		0.31		0.32	
UAE	σ_z	0.00	(14,534.236)	2.13	(0.38)	0.80	(4.65)	1.58	(1.49)
	σ_g	5.17	(0.77)	2.16	(0.73)	5.14	(0.91)	1.77	(2.77)
	ρ_z	0.97	(760,791.551)	0.01	(0.10)	0.00	(4.82)	0.05	(0.18)
	ρ_g	0.013	(0.17)	0.00	(0.42)	0.00	(0.19)	0.00	(1.46)
	μ_g	4.75	(0.78)	4.67	(1.13)	4.61	(1.19)	4.60	(1.20)
	ψ	0.34	(0.39)	-0.03	(0.01)	0.20	(0.19)	-0.01	(0.01)
	RWS	1.03	(0.41)	0.19	(0.08)	0.76	(1.30)	0.09	(0.16)
	$P-value$	0.37		0.40		0.36		0.39	
Yemen	σ_z	0.73	(0.28)	4.65	(0.61)	0.00	(159)	2.57	(0.16)
	σ_g	5.70	(0.63)	0.00	(690)	3.55	(1.03)	1.58	(0.26)
	ρ_z	0.12	(0.41)	0.00	(0.01)	1.00	(2,036.382)	0.00	(0.001)
	ρ_g	0.004	(0.05)	0.01	(215,524.452)	0.001	(0.02)	0.005	(0.05)

Table 22 – Moments estimates

	Moments	$\alpha = 0.68$						Different values for α			
		Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Algeria	$\sigma(y)$	3.22	(0.66)	3.97	(0.16)	2.44	(0.54)	4.36	(0.19)	2.77	(0.49)
	$\sigma(\Delta_y)$	4.78	(1.33)	2.30	(0.24)	2.94	(1.29)	2.48	(0.24)	3.12	(1.30)
	$\sigma(I)/\sigma(y)$	3.61	(0.63)	2.92	(0.37)	4.84	(0.99)	2.61	(0.32)	4.23	(0.61)
	$\sigma(I)$	11.62		11.60		11.82		11.40		11.74	
	$\sigma(c)/\sigma(y)$	2.17	(0.53)	0.92	(0.09)	0.60	(0.20)	0.80	(0.11)	0.44	(0.23)
	$\sigma(c)$	7.00		3.67		1.46		3.48		1.21	
	$\sigma(TBY)/\sigma(y)$	1.61	(0.41)	0.87	(0.12)	1.50	(0.30)	1.18	(0.10)	1.94	(0.32)
	$\sigma(TBY)$	5.19		3.46		3.66		5.16		5.37	
	$\rho(y)$	0.10	(0.25)	0.86	(0.03)	0.29	(0.35)	0.86	(0.02)	0.38	(0.33)
	$\rho(\Delta_y)$	-0.21	(0.21)	0.53	(0.09)	-0.44	(0.19)	0.52	(0.07)	-0.36	(0.20)
	$\rho(y, TBY)$	0.08	(0.12)	0.11	(0.13)	0.61***	(0.20)	0.24	(0.06)	0.60***	(0.16)
	$\rho(y, c)$	0.32**	(0.12)	0.94***	(0.05)	0.48***	(0.45)	0.89***	(0.06)	0.37***	(0.45)
	$\rho(y, I)$	0.36***	(0.14)	0.34**	(0.09)	-0.12	(0.25)	0.27**	(0.04)	-0.17	(0.23)
Bahrain	$\sigma(y)$	3.30	(0.47)	6.33	(0.45)	4.11	(0.27)	6.33	(0.45)	4.16	(0.26)
	$\sigma(\Delta_y)$	3.80	(0.84)	4.91	(0.47)	5.02	(0.33)	4.91	(0.47)	5.02	(0.31)
	$\sigma(I)/\sigma(y)$	5.87	(0.90)	2.97	(0.29)	4.61	(0.38)	2.97	(0.29)	4.55	(0.36)
	$\sigma(I)$	19.37		18.78		18.98		18.78		18.93	
	$\sigma(c)/\sigma(y)$	3.47	(0.30)	1.33	(0.04)	0.54	(0.18)	1.33	(0.04)	0.53	(0.19)
	$\sigma(c)$	11.44		8.45		2.22		8.45		2.22	
	$\sigma(TBY)/\sigma(y)$	1.99	(0.34)	0.93	(0.03)	1.44	(0.07)	0.93	(0.03)	1.52	(0.07)
	$\sigma(TBY)$	6.58		5.92		5.92		5.92		6.35	
	$\rho(y)$	0.49	(0.14)	0.75	(0.02)	0.27	(0.04)	0.75	(0.02)	0.29	(0.03)
	$\rho(\Delta_y)$	0.27	(0.15)	-0.19	(0.04)	-0.43	(0.06)	-0.19	(0.04)	-0.43	(0.06)
	$\rho(y, TBY)$	-0.34**	(0.08)	0.11	(0.03)	0.63***	(0.05)	0.11	(0.03)	0.62***	(0.05)
	$\rho(y, c)$	0.60***	(0.15)	0.73***	(0.06)	0.45***	(0.13)	0.73***	(0.06)	0.44***	(0.13)
	$\rho(y, I)$	0.43***	(0.16)	0.22	(0.07)	-0.10	(0.15)	0.22	(0.07)	-0.11	(0.14)
	$\sigma(y)$	2.90	(0.60)	3.86	(0.37)	2.37	(0.43)	4.19	(0.49)	2.62	(0.39)
	$\sigma(\Delta_y)$	2.64	(0.54)	2.41	(0.24)	2.85	(0.34)	2.62	(0.26)	3.02	(0.37)
	$\sigma(I)/\sigma(y)$	4.45	(0.72)	3.24	(0.36)	5.28	(0.93)	2.92	(0.32)	4.64	(0.63)

Table 22 Continued

	Moments	$\alpha = 0.68$						Different values for α			
		Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Iran	$\sigma(y)$	8.31	(1.83)	7.34	(0.82)	5.62	(0.74)	5.61	(0.87)	4.94	(0.76)
	$\sigma(\Delta_y)$	8.31	(1.67)	3.97	(0.71)	7.40	(0.96)	4.37	(0.84)	5.60	(0.81)
	$\sigma(I)/\sigma(y)$	1.75	(0.22)	1.76	(0.09)	2.28	(0.18)	2.31	(0.24)	2.60	(0.30)
	$\sigma(I)$	14.52		12.89		12.82		12.97		12.83	
	$\sigma(c)/\sigma(y)$	1.51	(0.25)	1.05	(0.03)	0.49	(0.34)	0.79	(0.09)	0.74	(0.32)
	$\sigma(c)$	12.55		7.67		2.75		4.42		3.66	
	$\sigma(TBY)/\sigma(y)$	0.71	(0.13)	0.55	(0.09)	0.97	(0.09)	0.93	(0.12)	1.15	(0.17)
	$\sigma(TBY)$	5.90		4.05		5.44		5.23		5.66	
	$\rho(y)$	0.67	(0.05)	0.89	(0.04)	0.14	(0.18)	0.72	(0.06)	0.38	(0.19)
	$\rho(\Delta_y)$	0.50	(0.09)	0.47	(0.29)	-0.47	(0.03)	0.00	(0.14)	-0.42	(0.09)
	$\rho(y, TBY)$	0.29**	(0.19)	-0.11	(0.14)	0.77***	(0.14)	0.30**	(0.13)	0.59***	(0.19)
	$\rho(y, c)$	-0.03	(0.26)	0.93***	(0.05)	0.53***	(0.26)	0.85***	(0.07)	0.47***	(0.23)
	$\rho(y, I)$	0.74***	(0.06)	0.77***	(0.06)	0.10	(0.19)	0.36***	(0.15)	0.09	(0.26)
Iraq	$\sigma(y)$	16.83	(3.52)	12.94	(1.44)	15.90	(2.44)	13.56	(1.51)	16.24	(1.98)
	$\sigma(\Delta_y)$	21.79	(6.30)	7.83	(2.53)	15.81	(6.60)	7.21	(0.88)	9.37	(8.22)
	$\sigma(I)/\sigma(y)$	2.39	(0.45)	2.92	(0.33)	2.31	(0.33)	2.72	(0.20)	2.23	(0.12)
	$\sigma(I)$	40.26		37.80		36.67		36.87		36.28	
	$\sigma(c)/\ sigma(y)$	1.76	(0.41)	0.72	(0.16)	0.52	(0.13)	0.24	(0.72)	0.76	(0.04)
	$\sigma(c)$	29.58		9.28		8.35		3.30		12.41	
	$\sigma(TBY)/\sigma(y)$	0.04	(0.02)	0.84	(0.04)	0.77	(0.10)	1.12	(0.05)	1.12	(0.11)
	$\sigma(TBY)$	0.73		10.93		12.23		15.13		18.12	
	$\rho(y)$	0.20	(0.21)	0.88	(0.09)	0.52	(0.29)	0.87	(0.03)	0.86	(0.28)
	$\rho(\Delta_y)$	-0.33	(0.12)	0.32	(0.41)	-0.11	(0.38)	0.43	(0.47)	0.45	(1.71)
	$\rho(y, TBY)$	0.19	(0.07)	0.43***	(0.02)	0.61***	(0.08)	0.55***	(0.02)	0.35**	(0.04)
	$\rho(y, c)$	-0.07	(0.14)	0.61***	(0.24)	0.72***	(0.08)	0.60***	(1.80)	0.82***	(0.07)
	$\rho(y, I)$	0.34**	(0.11)	0.44***	(0.06)	0.44***	(0.09)	0.29**	(0.07)	0.25*	(0.08)
	$\sigma(y)$	3.83	(0.50)	4.53	(0.36)	2.58	(0.53)	4.63	(0.35)	2.57	(0.55)
	$\sigma(\Delta_y)$	3.90	(0.52)	2.88	(0.54)	3.08	(0.41)	2.97	(0.51)	3.03	(0.42)
	$\sigma(I)/\ sigma(y)$	3.53	(0.53)	2.74	(0.47)	4.89	(0.73)	2.67	(0.16)	4.90	(0.79)
	$\sigma(I)$	13.51		12.41		12.50		12.37		12.50	

Table 22 Continued

	Moments	$\alpha = 0.68$						Different values for α			
		Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Kuwait	$\sigma(y)$	8.78	(1.20)	8.25	(0.77)	5.37	(0.82)	8.97	(0.81)	8.06	(0.81)
	$\sigma(\Delta_y)$	9.66	(1.52)	5.46	(1.14)	6.53	(1.03)	5.11	(1.24)	9.48	(1.21)
	$\sigma(I)/\sigma(y)$	2.64	(0.45)	2.63	(0.22)	4.04	(0.65)	2.44	(0.18)	2.65	(0.17)
	$\sigma(I)$	23.15		21.72		21.67		21.91		21.39	
	$\sigma(c)/\sigma(y)$	2.04	(0.47)	0.91	(0.08)	0.62	(0.16)	0.77	(0.09)	0.45	(0.11)
	$\sigma(c)$	17.87		7.49		3.34		6.92		3.60	
	$\sigma(TBY)/\sigma(y)$	1.94	(0.61)	0.82	(0.07)	1.31	(0.15)	1.18	(0.09)	1.39	(0.08)
	$\sigma(TBY)$	17.03		6.80		7.04		10.62		11.20	
	$\rho(y)$	0.47	(0.10)	0.80	(0.08)	0.27	(0.16)	0.86	(0.08)	0.32	(0.07)
	$\rho(\Delta_y)$	0.12	(0.18)	0.21	(0.37)	-0.45	(0.09)	0.46	(0.55)	-0.41	(0.05)
	$\rho(y, TBY)$	0.34**	(0.06)	0.15	(0.14)	0.61***	(0.09)	0.25	(0.07)	0.61***	(0.04)
	$\rho(y, c)$	0.28*	(0.09)	0.92***	(0.06)	0.52***	(0.25)	0.86***	(0.06)	0.41***	(0.19)
	$\rho(y, I)$	0.01	(0.12)	0.39***	(0.09)	-0.05	(0.15)	0.31**	(0.07)	0.03	(0.09)
Lebanon	$\sigma(y)$	4.26	(0.24)	8.04	(0.32)	4.30	(0.18)	6.40	(0.34)	2.96	(0.24)
	$\sigma(\Delta_y)$	3.19	(0.29)	4.26	(0.20)	2.97	(0.19)	3.48	(0.17)	2.96	(0.17)
	$\sigma(I)/\sigma(y)$	3.85	(0.57)	1.95	(0.07)	3.69	(0.30)	2.52	(0.10)	5.41	(0.66)
	$\sigma(I)$	16.40		15.68		15.87		16.14		15.99	
	$\sigma(c)/\sigma(y)$	1.73	(0.33)	1.01	(0.02)	0.88	(0.03)	0.89	(0.04)	0.70	(0.16)
	$\sigma(c)$	7.36		8.09		3.78		5.70		2.08	
	$\sigma(TBY)/\sigma(y)$	0.91	(0.13)	0.61	(0.02)	1.13	(0.07)	0.93	(0.02)	1.96	(0.21)
	$\sigma(TBY)$	3.86		4.89		4.85		5.94		5.81	
	$\rho(y)$	0.77	(0.07)	0.89	(0.01)	0.78	(0.02)	0.88	(0.01)	0.52	(0.08)
	$\rho(\Delta_y)$	0.41	(0.13)	0.55	(0.06)	0.21	(0.10)	0.61	(0.06)	-0.37	(0.05)
	$\rho(y, TBY)$	-0.49**	(0.10)	-0.04	(0.02)	0.25	(0.03)	0.15	(0.02)	0.56***	(0.06)
	$\rho(y, c)$	0.75***	(0.04)	0.93***	(0.01)	0.92***	(0.02)	0.92***	(0.01)	0.44*	(0.13)
	$\rho(y, I)$	0.84***	(0.09)	0.68***	(0.01)	0.11	(0.04)	0.39*	(0.01)	-0.21	(0.08)
	$\sigma(y)$	3.62	(0.56)	6.49	(0.63)	3.64	(0.30)	6.16	(12.11)	3.75	(0.31)
	$\sigma(\Delta_y)$	4.53	(0.51)	4.63	(0.49)	4.90	(0.49)	4.82	(6.85)	5.11	(0.51)
	$\sigma(I)/\sigma(y)$	9.20	(1.86)	4.65	(0.37)	8.27	(0.92)	4.94	(1.14)	7.98	(0.81)

Table 22 Continued

	Moments	$\alpha = 0.68$						Different values for α			
		Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Oman	$\sigma(\Delta_y)$	6.93	(1.32)	6.01	(0.98)	9.01	(1.22)	6.63	(0.94)	7.67	(1.16)
	$\sigma(I)/\sigma(y)$	5.07	(0.51)	3.82	(0.18)	4.72	(0.31)	3.76	(0.17)	4.93	(0.31)
	$\sigma(I)$	36.79		32.99		32.59		31.40		30.98	
	$\sigma(c)/\sigma(y)$	4.37	(0.49)	0.88	(0.06)	0.40	(0.25)	0.46	(0.54)	0.14	(0.28)
	$\sigma(c)$	31.76		7.63		2.73		3.82		0.91	
	$\sigma(TBY)/\sigma(y)$	1.10	(0.15)	1.14	(0.08)	1.53	(0.12)	1.74	(0.09)	2.30	(0.15)
	$\sigma(TBY)$	7.99		9.87		10.58		14.53		14.42	
	$\rho(y)$	0.63	(0.09)	0.78	(0.03)	0.15	(0.06)	0.70	(0.03)	0.26	(0.07)
	$\rho(\Delta_y)$	0.67	(0.34)	0.20	(0.21)	-0.45	(0.06)	-0.06	(0.22)	-0.31	(0.17)
	$\rho(y, TBY)$	0.17	(0.26)	0.24	(0.07)	0.71***	(0.11)	0.55***	(0.06)	0.63***	(0.06)
	$\rho(y, c)$	-0.23	(0.16)	0.93***	(0.02)	0.45***	(0.13)	0.37***	(0.52)	0.75***	(2.18)
	$\rho(y, I)$	-0.18	(0.24)	0.10	(0.06)	-0.21	(0.11)	-0.04	(0.07)	-0.29**	(0.08)
Qatar	$\sigma(y)$	5.47	(0.80)	6.28	(0.39)	4.07	(0.38)	7.18	(0.43)	4.54	(0.37)
	$\sigma(\Delta_y)$	7.07	(0.70)	4.09	(0.53)	4.96	(0.42)	4.73	(0.53)	5.15	(0.47)
	$\sigma(I)/\sigma(y)$	3.74	(0.47)	3.22	(0.27)	4.97	(0.55)	2.76	(0.17)	4.41	(0.31)
	$\sigma(I)$	20.46		20.23		20.23		19.79		20.00	
	$\sigma(c)/\sigma(y)$	1.71	(0.22)	0.88	(0.07)	0.55	(0.33)	0.75	(0.05)	0.42	(0.29)
	$\sigma(c)$	9.36		5.55		2.24		5.38		1.90	
	$\sigma(TBY)/\sigma(y)$	1.36	(0.14)	0.98	(0.10)	1.55	(0.17)	1.24	(0.07)	2.00	(0.12)
	$\sigma(TBY)$	7.42		6.15		6.30		8.87		9.07	
	$\rho(y)$	0.51	(0.08)	0.81	(0.05)	0.27	(0.13)	0.81	(0.04)	0.37	(0.10)
	$\rho(\Delta_y)$	0.40	(0.15)	0.34	(0.19)	-0.44	(0.11)	0.31	(0.14)	-0.36	(0.11)
	$\rho(y, TBY)$	0.11	(0.19)	0.22	(0.12)	0.64***	(0.18)	0.32	(0.06)	0.63***	(0.10)
	$\rho(y, c)$	0.10	(0.23)	0.93***	(0.06)	0.47***	(0.32)	0.87***	(0.04)	0.35**	(0.22)
	$\rho(y, I)$	-0.02	(0.18)	0.21	(0.08)	-0.18	(0.12)	0.19	(0.06)	-0.24	(0.09)
Saudi Arabia	$\sigma(y)$	5.94	(1.02)	5.41	(0.92)	6.02	(0.78)	6.61	(0.92)	6.86	(1.11)
	$\sigma(\Delta_y)$	6.34	(1.3)	4.74	(0.96)	7.70	(1.02)	3.39	(0.51)	8.87	(1.54)
	$\sigma(I)/\sigma(y)$	2.40	(0.22)	2.44	(0.26)	2.14	(0.15)	1.99	(0.14)	1.85	(0.18)
	$\sigma(I)$	14.23		13.17		12.92		13.14		12.67	
	$\sigma(c)/\sigma(y)$	1.65	(0.25)	1.42	(0.11)	0.51	(0.09)	0.86	(0.08)	0.34	(0.13)

Table 22 Continued

	Moments	$\alpha = 0.68$						Different values for α			
		Data		AG(2007)		NT(2013)		AG(2007)		NT(2013)	
Tunisia	$\sigma(y)$	3.63	(0.36)	3.10	(0.47)	2.14	(0.27)	3.55	(0.44)	2.07	(0.26)
	$\sigma(\Delta_y)$	3.76	(0.67)	2.27	(0.46)	2.69	(0.44)	2.88	(0.39)	2.69	(0.40)
	$\sigma(I)/\sigma(y)$	4.56	(0.48)	3.72	(0.35)	5.43	(0.49)	3.30	(0.34)	5.71	(0.63)
	$\sigma(I)$	16.54		11.55		11.59		11.73		11.84	
	$\sigma(c)/\sigma(y)$	1.49	(0.25)	0.63	(0.12)	0.47	(0.15)	0.87	(0.02)	0.51	(0.14)
	$\sigma(c)$	5.42		1.94		1.00		3.11		1.07	
	$\sigma(TBY)/\sigma(y)$	0.71	(0.07)	1.21	(0.05)	1.66	(0.11)	0.83	(0.03)	1.39	(0.10)
	$\sigma(TBY)$	2.58		3.77		3.54		2.95		2.88	
	$\rho(y)$	0.51	(0.14)	0.75	(0.03)	0.21	(0.13)	0.69	(0.05)	0.17	(0.13)
	$\rho(\Delta_y)$	-0.31	(0.17)	0.00	(0.07)	-0.44	(0.06)	-0.04	(0.16)	-0.47	(0.05)
	$\rho(y, TBY)$	-0.07	(0.17)	0.64***	(0.05)	0.65***	(0.08)	0.26	(0.02)	0.66***	(0.08)
	$\rho(y, c)$	0.64***	(0.07)	0.48***	(0.05)	0.45***	(0.11)	0.91***	(0.01)	0.52***	(0.12)
	$\rho(y, I)$	0.52***	(0.17)	-0.01	(0.06)	-0.20	(0.13)	0.22	(0.05)	-0.15	(0.12)
Turkey	$\sigma(y)$	3.82	(0.38)	4.88	(0.24)	3.48	(0.20)	5.16	(0.28)	5.52	(0.30)
	$\sigma(\Delta_y)$	3.94	(0.36)	2.74	(0.22)	4.39	(0.28)	2.82	(0.38)	4.85	(0.26)
	$\sigma(I)/\sigma(y)$	3.63	(0.35)	2.68	(0.08)	3.74	(0.16)	2.52	(0.11)	0.78	(0.20)
	$\sigma(I)$	13.86		13.06		13.04		13.01		4.29	
	$\sigma(c)/\sigma(y)$	1.33	(0.23)	0.94	(0.03)	0.50	(0.16)	0.93	(0.01)	1.20	(0.07)
	$\sigma(c)$	5.10		4.56		1.73		4.78		6.64	
	$\sigma(TBY)/\sigma(y)$	0.54	(0.07)	0.80	(0.04)	1.24	(0.09)	0.82	(0.03)	0.63	(0.03)
	$\sigma(TBY)$	2.07		3.91		4.32		4.25		3.48	
	$\rho(y)$	0.50	(0.11)	0.87	(0.02)	0.21	(0.11)	0.88	(0.05)	0.65	(0.02)
	$\rho(\Delta_y)$	-0.03	(0.13)	0.56	(0.23)	-0.45	(0.02)	0.60	(0.39)	-0.15	(0.07)
	$\rho(y, TBY)$	-0.49***	(0.15)	0.09	(0.03)	0.67***	(0.09)	0.10	(0.08)	0.19	(0.04)
	$\rho(y, c)$	0.71***	(0.09)	0.94***	(0.02)	0.47***	(0.07)	0.93***	(0.01)	0.80***	(0.02)
	$\rho(y, I)$	0.88***	(0.04)	0.41***	(0.05)	-0.02	(0.13)	0.43***	(0.09)	0.85***	(0.02)
	$\sigma(y)$	7.76	(1.71)	6.03	(0.41)	4.51	(0.66)	6.65	(0.85)	3.77	(1.55)
	$\sigma(\Delta_y)$	7.38	(1.45)	3.19	(0.41)	5.37	(0.42)	3.39	(1.24)	3.82	(1.27)
	$\sigma(I)/\sigma(y)$	1.58	(0.33)	1.88	(0.15)	2.72	(0.31)	1.81	(0.19)	3.20	(1.21)
	$\sigma(I)$	12.24		11.31		12.28		12.07		12.07	

Table 23 – Economic volatility and institution literature

dependent variable	Sample / method	Variables of control	Governance indicators	Findings
σ growth rate and an interquartile range of growth rate	80 countries: mixed sample Cross-section analysis. Two-equation model joint estimation	Trade and shocks, Economic diversification, Human cpital	Democracy indicator (0-1), Civil liberties index, openness of political institutions (0-10), competitiveness of political participants (0-5) and political constraints (0-1)	Negative impact of democracy on output volatility.
σreal GDP growth rate	68 Developing over the period 1960-1999. Cross-section analysis. Bayesian estimation.	Trade, geography, Ethnic fractionalization index, Index of religious fractionalization, participation in external wars and population,	Average of the governance indicators of Kaufman, et al. (1999), constraints on the executive (EXEC) and the competitiveness of political participation, type of government.	Negative impact of institutional quality on volatility (weak institution triggers high volatile output). Geograp hical location has an effect on output volatility(Countries located far away from sea experience high volatility)
GDP per capita/ Governance indicators	Mixed sample of 197 countries . The relationship between governance and growth concerns only the 22 MENA Two-stage Least Square regression.cross-sectional analysis (2009).		Kaufman and Kraay (2002) governance indicators.	Positive bi-directional causality between govarnance indicators and GDP per capita volatility (For all the sample). Positive effect from output volatility to governance for MENA case.
Inflation rate, wage inflation, export growth, labor growth, private credit growth, real GDP, private fixed investment growth, private investment, FDI,	16 MENA countries over the sample period 1995-2005 Cross-country regressions.	The economic freedom index, Indicators of policy quality, Real per capita GDP, Credit risk ratings, Trade openness, Government spending, Money supply, REER, The price level, Nominal wage, Exports of goods and services, labor, private credit, real GD growth, private fixed investment, aid per capita, literacy rate, school enrolment and FDI.	Kaufmann et al. (2005) and the corruption perception index.	Dep.Var is real GDP per capita: Institutional indicators have positive effect on real GDP growth (excepting voice and accountability index).
σ GDP growth rate	Mixed: 110 countries over the period 1960 and 2005 Cross-country regressoins. GMM estimation technique	Inflation, terms of trade, openness, oil producing country, primary commodity exporter, sector diversification, secondar school enrolment, service share of GDP, agriculture share of GDP population, union	political instability (agression, protest, government instability, political instability times fiscal policy uncertainty, and monetary policy uncertanty).	Negative relationship between democracy and output volatility. Positive link between political instability and output volatility. Policy uncertainty is positively (negatively) linked to economic volatility conditional to policy stability (democracy).

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