# Black Market Exchange Rate, Trade Freedom and the Links with Economic Growth: Empirical Evidence from the North African Countries

**Matallah Siham**
PhD Student in Institutional Analysis and Development, Department of Economics, University of Tlemcen, Algeria.Email: siham.maatallah@yahoo.com

**Bounoua Chaib**
PhD in Economics, Department of Economics,University of Tlemcen, Algeria.
Email: cbounoua@yahoo.fr

***Abstract***

The present paper investigates the impact of *black market exchange rate and trade freedom* on economic growth in *4 North African countries over the period 1995-2011*, through the use of panel data analysis. According to the Hausman test, the fixed effects model is the most suitable one, it reveals that the *black market exchange rate* exhibits a *statistically* significant positive impact on economic growth in the North African countries (*in other words, higher BEXR index leads to higher growth rates, since a high BEXR score indicates a low black market exchange rate premium*), and this is consistent with theory. *Likewise, trade freedom* displays a highly *significant positive* influence on economic growth *in the four* case study *countries.* To sum up, a low black market premium and high trade freedom serve as promising catalysts for the North African countries' economic growth.

Based on these findings, it can be concluded that the *North African governments* should dedicate massive reforms with *clear* goals and vigorous commitments to shrink the black market premium. Additionally, the use of economic incentives for converting the track of black market towards the official mainstream is more effective than a bunch of unenforceable laws, and it further reflects the credibility of the government's economic policy.

*Moreover, Policy-makers* in *the North African region* should design *proper policies* that aim to reduce incentives to engage in illegal market activities, and even more importantly, they must abandon all *restrictive trade* practices and liberalize FDI policies; they should also embark on ambitious policies aimed at stabilizing the political situation and consolidating peace.

***Key words:*** *Black Market Exchange Rate, Trade Freedom*, Economic Growth, *North African* Countries, Panel Data Analysis.

## 1. Introduction

The absence of trade hindrances *has been hitherto considered as the key* underlying factor that enables countries to ride the wave of prosperity. Indeed, the implementation of protectionist trade policies aimed at inhibiting international trade and access to foreign exchange is *commonly viewed* by *economists* as an impediment to the economy's growth potential.

Furthermore, governments' attempts to restrict trade and capital flows allow the emergence of a *black market* for foreign exchange, which can be defined as "*an unofficial market where suppliers of foreign exchange can satisfy the needs of those who are unable to get what they want from official sources*".

According to *Jason Z. Yin and William A. Stoever* (1994), the black market premium can be perceived as "*the percentage by which the black market rate exceeds the official rate*". Further, the cost of *purchasing* hard currency in the black market is generally higher than in the official market, as a result of the increased demand for foreign exchange and risk of government penalties that can menace participants in the illegal market (*Robert Grosse, 1992).*

Francisco Rodriguez and Dani Rodrik (2001) argued that countries with pervasive corruption and *weak rule of law are more likely* to *have* large unofficial foreign exchange markets; they also stated that the black market premium gauges the extent of rationing in the foreign *exchange market*. *Additionally,* Khalifa Hassanain (2005) pointed out that the *sizeable black market premium* indicates the need for adjustment.

The present study *attempts* to advance beyond the *existing literature, by employing black market exchange rate and trade freedom in assessing the* mischievous effects of trade barriers on economic growth. *Moreover, it sheds light on the North African countries that have embarked on the reform of their trade policies, but economic agents, foreign investors and international organizations state that the partial* reduction of *trade barriers and large scope* of *black market for foreign exchange still hamper economic growth, and this obvious fact leads us to examine empirically the impact of black market* exchange *rate and trade freedom on the North African countries' economic growth, using a panel data analysis over the period 1995-2011. For this purpose, the remainder of this paper is organized as follows:*

*Section 2 presents a theoretical and empirical review on black market* exchange *rate and trade freedom* and the links with economic growth*, section 3 discusses the* levels of economic growth, *black market* exchange *rate and* trade freedom in the *North African countries, section 4 introduces the data and analyzes the empirical results and finally section 5 concludes the paper.*

## 2. Theoretical and Empirical *Review on Black Market* Exchange *Rate and Trade Freedom* and the Links with Economic Growth

*It is widely viewed that* the *foreign exchange black market* is the result of limited access to legal exchange market. In general, the balance of payments deficit tends to *cause a* depletion of international reserves, also the *inability to* scrounge foreign exchange squeezes countries to adopt *foreign exchange controls that* give rise to *black markets* (*Mohsen Bahmani-Oskooee and Reza Shiva, 1998*). Moreover, governments tend to discourage capital outflows by preventing the process of acquiring foreign currencies *using multiple constraints* such as licensing requirements, taxes and artificial waiting times. These impediments increase the demand for foreign currency, *thus allowing for the emergence of* a *foreign exchange black market (Mohsen Bahmani-Oskooee et al., 2002*).

The Fraser Institute introduced the index of black-market exchange rate, and defined it as "*the percentage difference between the official and the parallel (black) market exchange rate*". Further, the following formula has been employed to calculate the zero-to-ten ratings,

$(V_{max} - V_i) / (V_{max} - V_{min})*10$.

$V_i$ is the country's black-market exchange rate premium.

The values for $V_{min}$ and $V_{max}$ were set at 0% and 50%, respectively. This formula allocates a rating of 10 to countries without a black-market exchange rate. In contrast, a zero rating is given when the black-market premium is equal to, or greater than, 50% (*James Gwartney et al., 2012*).

Furthermore, the black market exchange rate depends on the *interaction* of *demand and supply* forces and is *generally higher than the official* exchange *rate,* because the seller wants to *compensate* the *risk* he *takes in providing illegal foreign exchange (Cuddalore Sundar et al.,*

*1997*). In addition, the difference between the two rates *indicates* the black market premium, which often reflects the underlying macroeconomic misalignments. Therefore, every now and then, the central banks amend the official rate for narrowing the differential gap and avoiding potential misalignments (*Mohsen Bahmani-Oskooee et al., 2002*).

It is widely *held* among economists that the foreign exchange black market clearly has mischievous effects on economic growth (*Robert Grosse, 1992). Generally*, the black market exchange rate occurs because of the strict controls over exchange, and it reflects the failure of existing policies, which is responsible for lower growth rates (*Francisco Rodriguez and Dani Rodrik, 2001*).

A high *black market premium* induces incentives to *under-invoice exports*, causing a reduction in officially measured exports; the registered *shortfall in export* receipts *entails* low levels of *foreign reserves that frustrate imports through lifting restrictions on foreign exchange* holdings*,* and this vicious cycle doubtlessly threatens the economy's growth potential (*Steven B. Kamin, 1993*). *Additionally,* the foreign exchange black market alleviates the impact of exchange controls on *importation activities, but the entry of imports* encouraged by foreign exchange black market *crowds out the local* industry and depresses the local producers, and *thereby* reduces the *rate* of *economic growth (Robert Grosse, 1992).*

Moreover, the *large black market* premium reflects the government's willingness to impose more restrictions on the *purchase* of foreign currencies, and that is what induces individuals to convert their financial wealth into foreign assets (*Michael Frenkel and Mainz, F. R. G., 1990*). Consequently, the foreign exchange black market allows *funds to takeoff,* seriously *hindering economic progress (Robert Grosse, 1992). As well as,* the increased black market premium *shakes* some *investors' confidence in the local investment climate and prompts them to shift their investments abroad towards countries with reliable currencies, and hence may deprive the economy* of the benefits associated with these *investments (Robert Grosse, 1992).*

Indeed, the impact of the black market premium on economic activity *varies across countries* (*Panayiotis F. Diamandis and Anastassios A. Drakos, 2005*); furthermore, capital flight makes developing countries *more* severely *affected* by unofficial market activity (*Yochanan Shachmurove, 1999*).

It is *important to point out that* the use of *exchange rate* policy to regulate *trade and capital* movements, neglecting the role of foreign exchange black market creates trade imbalances through increasing the level of imports (*Keshab R. Bhattarai and Mark K. Armah, 2005*). Trade deficits and capital flight, *in turn*, force the government to clamp *foreign exchange controls (Robert Grosse, 1992),*

Usually, the underlying features of black-markets for foreign exchange such as segmented trading and imperfect information about prices and participants, *entail* high *transaction costs* that inexorably raise the cost of doing *business, thus impeding economic growth* (*Alan E.H. Speight and David G. McMillan, 2001*), and it is worth noting that the retired migrants' pensions, tourism and the revenues of exporters who favor illegal ways of exporting, are the *major* sources for supplying the black market for foreign exchange, which supplies those who produce and sell illegal products, by allowing them access to foreign exchange required to obtain the necessary inputs, and this ultimately harms the national economy and cripples the growth rates (*Robert Grosse, 1992).*

Many studies have *confirmed that the* black market premium which represents the magnitude of bad policies *is negatively linked* to *economic growth* (*Ross Levine and David Renelt, 1992; Ann Harrison, 1996; Sebastian Edwards, 1998*). Also, Barro, R. and Lee, R. (1993) argued that a *high black market premium* significantly obstructs economic growth. In the same vein, Brian Pinto (1991) pointed out that *the reduction of black market premium* by

*unifying* the *black market* and *official exchange rate helps revitalize exports* and *eliminates allocative inefficiency,* and *thereby boosts economic growth*.

Blejer Mario (1978) stated that the *depreciation* of the black market *exchange rate* generates *a decrease in money demand*, causing an increase in money supply, which in turn l*eads to lower interest rates* and thereby *increases investment* and spurs economic *growth*. However, Panayiotis F. Diamandis and Anastassios A. Drakos (2005) indicated that the *size* of the *foreign exchange black market has a crucial role in countries characterized by relatively high inflation and uncertainty*, because the possession of foreign currency is considered an effective hedge against domestic inflation.

Ross Levine and David Renelt (1992) suggested that specific macroeconomic policies like exchange rate policy, monetary policy and trade policy should be taken into serious consideration in mitigating the impact of black market premium on economic growth.

In general, many institutional factors such as pervasive corruption, *lack* of *rule of law*, *inefficient judicial system* and *unenforced property rights*, have the potential to widen the gap between the *official* and *black market rates*, as well as, other phenomena like smuggling and money laundering play a crucial role in broadening this gap (*Mohsen Bahmani-Oskooee and Gour Gobinda Goswami, 2004*). In addition, political instability *sparks* a dramatic *rise in* the black-market premium (*Francisco Rodriguez and Dani Rodrik, 2001*).

Rodrik, Dani (2007) claimed that the overvaluation of exchange rate is often tied up with a lack of hard currency, widespread *corruption, rent-seeking* activities, '*stop-go*' macroeconomic *cycles* and recurrent balance of payments crises, which *bring down the growth rates*. Also, the exchange rate uncertainty can depress trade activities (*Dimitrios Serenis and Nicholas Tsounis, 2013*).

*It is* almost *impossible to get perfect information about transactions taking place* in the unofficial foreign exchange market. Consequently, the participants involved in this market often rely on information extracted from the legal market in predicting *the future path* of *black market premium (Panayiotis F. Diamandis and Anastassios A. Drakos, 2005*). Thus, the black market exchange rate *follows to some extent* the official exchange rate and *the way* in which it is *administered; as well as the* government's attempts to rationalize the use of foreign currencies and impose *rigid sanctions significantly affect* the black market premium (*Hendrik van den Berg and Sanath C. Jayanetti, 1993*), and it is *worth noting that many* countries have endured *unofficial market* for *foreign exchange*, over and above that, the black market has been allowed to operate closely with the legal market (*Ali M. Kutan, 1998*).

On the other hand, the impact of trade freedom on economic growth has been thoroughly analyzed by economists, who pointed out that greater openness to trade generates robust positive effects on economic growth, through diffusing technology and boosting efficiency (*Rob Clark and Matthew C. Mahutga, 2013*)

In 1995, Heritage Foundation and Wall Street Journal introduced the Index of Trade Freedom and defined it as "*the economy's openness to the flow of goods and services from around the world and the citizen's ability to interact freely as buyer or seller in the international marketplac*e". This index is scored on a scale of 0 to 100, where higher scores reflect lower trade *barriers* (*Heritage Foundation, 2014*). Similarly, Ockey, Jason R. (2011) argued that the trade freedom reflects "*the absence of tariff and non-tariff barriers that affect imports and exports of goods and services*"

*In general, the imposition of trade barriers* is the main *impediment to the long-term growth (Halit Yanikkaya, 2003*). *More specifically*, protectionist trade policies aimed at inhibiting international trade and access to foreign exchange*,* restrict the quantity of inputs available to

local economy, and thus reduce the productivity and hamper the growth prospects (*Georgios P. Kouretas and Leonidas P. Zarangas, 2001*). Recently, *Gehring, Kai* (2013) stated that trade restrictions embodied in slow bureaucracies, complicated procedures and *intricate documents* have probably been the greatest hindrances to wealth and economic prosperity.

Trade openness exerts a positive influence on economic growth through facilitating physical capital accumulation, skill acquisition and *technology transfers* (*Rifat Baris Tekin, 2012; Mounir Belloumi, 2014*), *because trade* with *high-technology countries allows developing countries to benefit from* technological spillovers, R&D activities, new products, new *materials* and *modern methods* of *production, and enables them to* become more involved in international markets, and thus helps them achieve high growth rates (*Halit Yanikkaya, 2003*).

Furthermore, trade liberalization promotes the countries' competitive performance in international trade; it also affects economic growth through efficiency gains brought by competition and specialization (*Sachs*, *J. and A. Warner*, *1995; Lanfang Wang and Susheng Wang, 2012*). As well as, freedom of exchange allows firms permeate international markets, and supports them to be *more competitive* at a world *level* (W.N.W. Azman-Saini et al., 2010).

Moreover, nations that are fully *integrated* in the *global trade networks* enjoy greater leverage during exchange (*Rob Clark and Matthew C. Mahutga, 2013*). Further, countries with high-quality institutions trade more and tend to grow faster (*David Dollar and Aart Kraay, 2003*).

The developing countries should raise the level of trade freedom to reap the benefits of advanced technologies and attract foreign investors who have the will and potential to bolster the *host country's* economic *growth (Muhammad Shahbaz, 2012; Samia Nasreen and Sofia Anwar, 2014*).

There are countless *benefits* that the *host country* receives from *inward FDI, such as funds, hard currency, technological diffusion*, *knowledge spillovers,* know-how and *managerial skills that act as stimulants to domestic investments, and hence promotes economic growth (Hermes Niels and Robert Lensink, 2003*). Also, the inward FDI enhances the host country's export capacity, generating an increase in foreign exchange reserves; it also *helps to create new jobs* and competition with local firms, *thus upholding* the level of economic growth (*Mounir Belloumi, 2014*).

To sum up, trade freedom and FDI inflows are deemed crucial factors in *explaining economic growth*.

The table below summarizes the empirical studies that have investigated the impact of *black market exchange rate and trade freedom* on economic growth.

**Table n°01:** *Empirical Evidence on the Impact of Black Market Premium and Trade Freedom on Economic Growth*

| *Authors* | *Sample* | *Empirical approach* | *Results* |
|---|---|---|---|
| *Sebastian Edwards (1992)* | 51 developed and developing countries 1970-1982 | Ordinary Least Squares (*OLS*) *regression* | Economic growth is *negatively and significantly affected by* high black market premium. |
| *Barro, R.J. (1994)* | 100 countries 1960-1990 | Ordinary Least Squares (*OLS*) *regression* | The black market premium on foreign exchange is *negatively and* |

| | | | |
|---|---|---|---|
| | | | *significantly* related to the *growth rate* of *per capita* GDP. |
| *Laura Alfaro et al., (2004)* | 39 countries 1981-1997 | Ordinary Least Squares (*OLS*) *regression,* two-stage least squares (*2SLS*) *regression* | The black market premium appears to have a *significant negative impact* on *economic growth.* |
| *Thorsten Beck and Ross Levine (2004)* | 40 countries 1976-1998 | Ordinary Least Squares (*OLS*) *regression* | *There is a negative but insignificant relationship between* the large black market premium and economic growth. |
| *Samy Ben Naceur and Samir Ghazouani (2007)* | 11 MENA countries 1979-2003 | Generalized Method of Moments (GMM) | The black market premium shows *a significant negative influence* on economic growth. |
| *Hassan, M. Kabir et al., (1995)* | Nigeria 1976-1988 | A Box-Cox extended autoregressive model | The depreciation in black market exchange rate exerts a significant negative impact on the domestic demand for money. |
| *Ross Levine and Sara Zervos (1998)* | 47 countries 1976-1993 | Ordinary Least Squares (*OLS*) *regression* | The black market exchange rate premium *significantly reduces the* capital stock growth. |
| *Ann Harrison (1996)* | 51 countries 1960-1988 | OLS estimation, fixed effects model | -A higher black market premium is negatively associated with economic growth.<br>-Trade openness promotes economic growth *in the sample* selected for the *study.* |
| *Ross Levine et al., (2000)* | 74 countries 1960-1995 | Generalized Method of Moments (GMM) for *dynamic panel* data | - The black market exchange rate premium *contributes negatively and significantly to* GDP per capita growth.<br>- Openness to trade is *a powerful vehicle for* increasing |

| | | | |
|---|---|---|---|
| | | | economic growth. |
| *Mehmet N. Eris and Bülent Ulasan (2013)* | 66 countries 1960-2000 | Ordinary Least Squares (*OLS*) *regression* | - Economic growth is *significantly hindered by the* large black market premium.<br>- Trade openness is positively and robustly correlated with economic growth. |
| *Mogens K. Justesen (2008)* | A number of countries 1970-1999 | Granger causality tests | Trade freedom Granger *causes economic growth.* |
| *Hatem Derbel et al., (2011)* | 104 countries 1972- 2003 | OLS method, Final Weighed Least Squares (FWLS) | Trade freedom plays an intrinsic role in *generating sustained* economic growth. |
| *Ockey, Jason R. (2011)* | 164 countries 1995-2011 | OLS regression, VWLS regression | Trade freedom *has a robust positive significant* influence on per *capita GDP growth.* |
| *Mohammad Javad Razmi and Ramiar Refaei (2013)* | 17 Middle East and East Asian countries 2000-2009 | Pooled least squares, fixed effects and random effects models | Trade freedom displays a significant positive impact on economic growth. |
| *Santos-Paulino Amelia U. (2002)* | 22 countries 1976-1998 | Generalized Method of Moments (GMM) | Trade freedom fosters the import growth. |
| *Halit Yanikkaya (2003)* | 100 developed and developing countries 1970-1997 | Ordinary Least Squares (*OLS*) *regression* | Economic growth is significantly positively influenced by trade openness. |
| *V.G.R. Chandran and Munusamy (2009)* | Malaysia 1970- 2003 | The Autoregressive Distributed Lag (ARDL) Method | Trade openness exerts a positive and significant impact on *Malaysian manufacturing growth.* |
| *Arslan Razmi et al., (2012)* | 153 countries 1960-2004 | OLS estimation, Arellano-Bond two-step General Method of Moments (GMM) method | The degree of openness has a positive and significant effect on investment growth. |
| *Antonio N. Bojanic (2012)* | Bolivia 1940-2010 | *Johansen-Juselius cointegration test* | There is a long-run equilibrium relationship between economic growth and trade openness. |
| *Cécile Couharde and Audrey Sallenave* | 25 countries 1980-2009 | Dynamic Ordinary Least Squares | Trade openness *enhances the growth* |

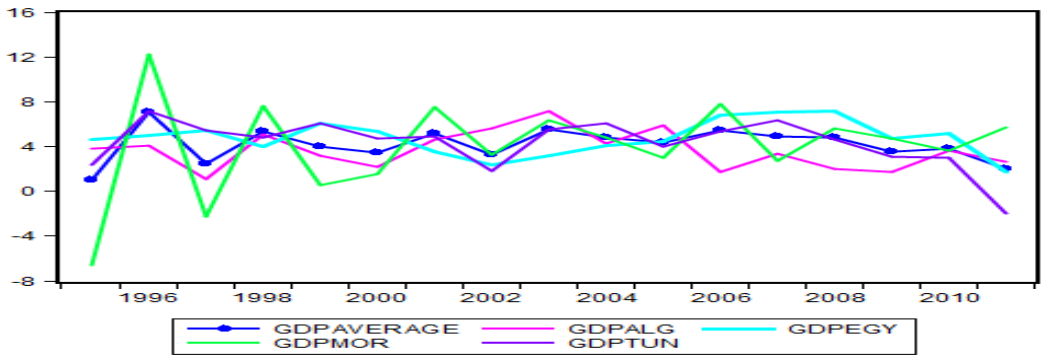
| | | | |
|---|---|---|---|
| *(2013)* | | (DOLS), Fully Modified Ordinary Least Squares (FMOLS) | *rate.* |
| *Rifat Baris Tekin (2012)* | 27 African least developed countries 1970-2010 | Granger causality testing procedure for panel data sets | *There is a causal* relationship *running from trade openness to economic growth.* |
| *Syed Tehseen Jawaid and Syed Ali Raza (2013)* | India 1980-2010 | The *ARDL bound testing* approach to *cointegration* | There is a significant positive *association* between trade and economic growth in the long run as well as in the short run. |
| *Mounir Belloumi (2014)* | Tunisia 1970- 2008 | The *ARDL bound testing* approach to *cointegration* | There is *a long-run relationship between* economic growth, foreign direct investment and trade openness in Tunisia. |

**Source:** *Constructed By Authors*

## 3. Economic Growth, *Black Market* Exchange *Rate and* Trade Freedom in the *North African Countries*

### *3.1. Economic Growth in the North African Countries*

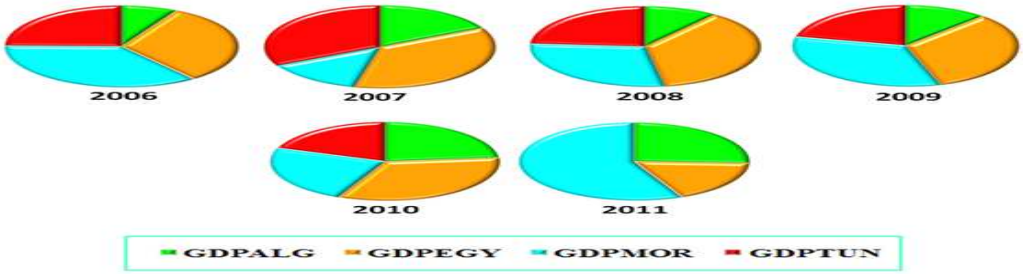
**Figure n°01**: Economic Growth (*The Annual Percentage Growth Rate of GDP*) in the *North African Countries*, 1995-2011.




**Source:** World Bank, World Development Indicators, the data are available online at: http://data.worldbank.org (accessed 15/03/2014).

*According to the graph above*, most North African countries have achieved considerable growth rates, as a result of noticeable progress in macroeconomic stabilization. Algeria has recorded a strong economic growth over the past decade due to *high revenues* gained from *oil abundance besides the* thriving progress in services, construction and industrial activities (*IMF, 2012a*). Likewise, Morocco, Egypt and Tunisia have boosted their growth rates through strengthening the *tourism sector*, *promoting infrastructure* and *pursuing* sound macroeconomic management (*Mustapha Kamel Nabli and Marie-Ange Véganzonès Varoudakis, 2004*; *Anthony O'Sullivan et al., 2011*).

**Figure n°02**: Economic Growth (*The Annual Percentage Growth Rate of GDP*) in the *North African Countries*, 2006-2011.



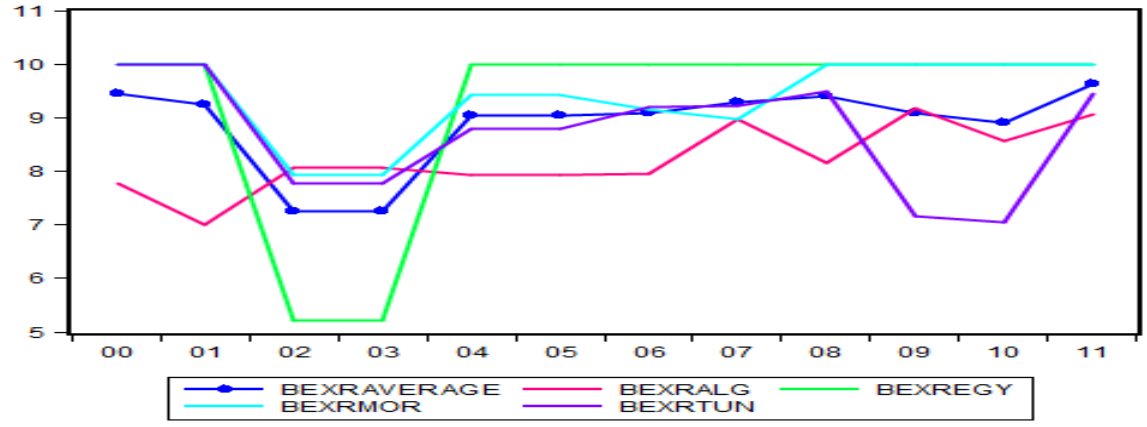

**Source:** World Bank, World Development Indicators, the data are available online at: http://data.worldbank.org (accessed 15/03/2014).

Moreover, the 2008 financial crisis did not spare the North African region, especially Algeria that has seen sharp decreases in its economic growth because of the great dependence on oil revenues *(World Bank*, *2010*).

In 2011, *a first-of-its-kind* phenomenon *known as* the Arab Spring has swept Tunisia and Egypt, further this unexpected *turmoil and associated security threats* have *slashed FDI* inflows, *manufacturing* and tourism sectors (*World Bank, 2013*); and hence these countries have suffered sharp *growth collapses* (*Anthony O'Sullivan et al., 2011*); over and above that *the escalation of rebellion has unveiled* several issues such as political pressures and inequality that have been hidden all these years, besides the political, economic and social tensions (*House of Commons, Foreign Affairs Committee, 2012*). In general, deeper *institutional reforms* will doubtlessly enable these countries to get out of the dark tunnel and *enhance* their *long-term growth* prospects.

### *3.2. The Level of Black Market Exchange Rate in the North African Countries*

**Figure n°03**: The Level of *Black Market* Exchange *Rate* in the *North African Countries*, 1995-2011.

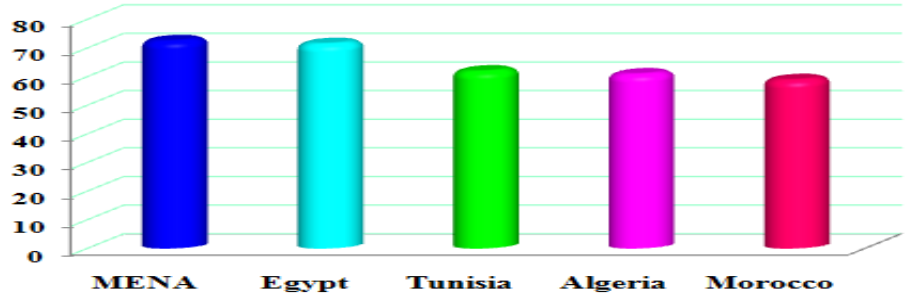



**Source:** Fraser Institute, the data are available online at: http://www.freetheworld.com (accessed 15/03/2014).

*It is readily seen that* both Egypt and Morocco enjoy a low black market premium as a result of their vigorous efforts to shrink the unofficial market for foreign exchange. Indeed, the Egyptian authorities have converted the track of black market towards the official mainstream; additionally Egypt enjoys the cheapest cost of importing in the region (including the possession of hard currency), and this reduces *the incentives* for *resorting* to the illegal foreign exchange market (*James Gwartney et al., 2013*); and it is worth noting that the GCC countries have recently sent massive financial assistance to Egypt, thereby the effects of political *turmoil* on *Egypt's foreign reserves have been* mitigated (*Garbis, I. and G. T. Abed, 2013*). As well as, Morocco *has succeeded in keeping black market premium low* by *narrowing the gap between the official* and the *unofficial rates*. While, Algeria has suffered from *high* demand for *foreign currency* in the *black market due to the* severe exchange controls imposed by government (*Belhadj Aram, 2008*); and even more, the *dark decade* and inflation have contributed to widen the black market for foreign exchange in Algeria (*Mustapha Kamel Nabli and Marie-Ange Veganzones-Varoudakis, 2007*). Also, there is a significant illegal exchange market in Tunisia, but the recent willingness to start a new operational framework has reduced the black market premium (*IMF, 2012 b*).

### *3.3. **Trade Freedom in the** North African Countries*

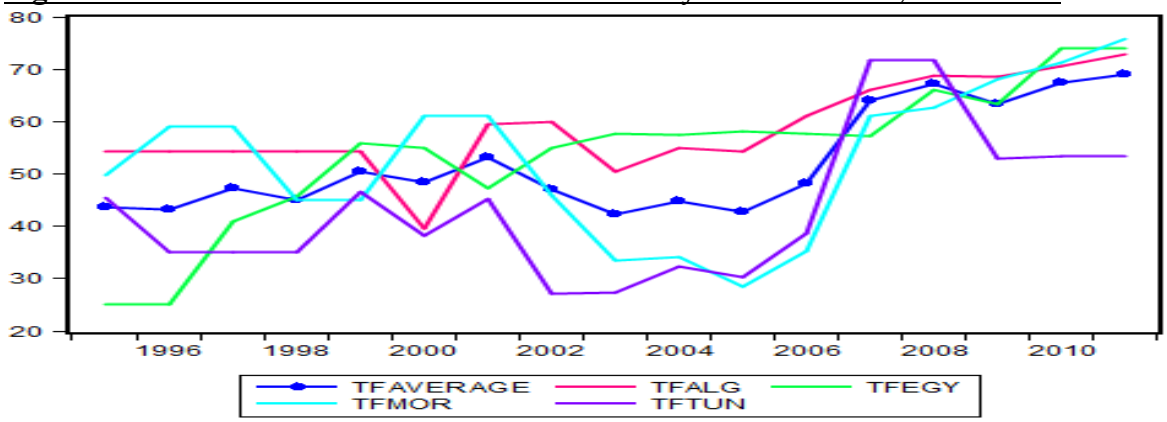
**Figure n°04:** The 2014 Index of Trade Freedom by Country




**Source:** Heritage Foundation's *Index of Economic Freedom*, the data are available online at: http://www.heritage.org/index/explore?view=by-region-country-year (accessed 15/03/2014).

The graph above clearly shows the North African countries' trade freedom scores in the 2014 Index of Economic Freedom. All countries scored lower than the regional average, and they are classified as 'Mostly Unfree' except Egypt which is considered as 'Moderately Free' in terms of trade; and this illustrates the inadequate performance of the North African countries as compared to other countries in the MENA region. More precisely, Egypt has achieved the highest score of trade freedom, because it has opened its markets to global trade and investment, while Algeria has come in third place after Tunisia and the last place has been occupied by Morocco (*Heritage Foundation, 2014*).

**Figure n°05:** The Trade Freedom Score in the *North African Countries*, 1995-2011.



**Source:** Heritage Foundation's *Index of Economic Freedom*, the data are available online at: http://www.heritage.org/index/explore?view=by-region-country-year (accessed 15/03/2014).

As is clearly visible in the graph above, the North African countries have made a slight progress towards promoting the trade freedom over the past decade, but restrictive trade practices still exist in the region. The Algerian government has restricted the import of medicine, medical products and other products for protecting the local industry and *crippling* foreign competition, and this serves as a major impediment to growth. Likewise, Tunisian authorities still *hinder the importation of* some pharmaceutical and agricultural goods using non-tariff barriers which outweigh the costs of trade and threaten the growth prospects. Also, the inefficient customs procedures continue to impede trade freedom in Morocco (*Heritage Foundation, 2013*). However, North African governments should enact wise trade policies and abandon all trade restrictions in order to reap the benefits of advanced technologies and exploit them in boosting economic growth potential.

## 4. Data and Empirical Results

### *A. Data*

This study examines the impact of *black market exchange rate and trade freedom* on economic growth in *4 North African countries (Algeria, Egypt, Morocco and Tunisia) over the period 1995-2011* using the following variables:

***GDP:*** GDP per capita (constant 2005 US$) is used as a proxy for economic growth, from the World Bank's *World Development Indicators* (WDI).

***BEXR:*** denotes the black market exchange rate, which is provided by the *Fraser Institute*, and a positive sign is expected, since a high BEXR score indicates a low black market exchange rate *premium.*

***TF:*** Trade Freedom introduced by Heritage Foundation and Wall Street Journal.

***FDI:*** represents foreign direct investment net inflows (% of GDP) from the World Bank's *World Development Indicators* (WDI)

.

### *B. Data Analysis Tools*

A panel data estimation is employed to examine the effect of *black market exchange rate and trade freedom* on economic growth in *4 North African countries (Algeria, Egypt, Morocco and Tunisia)* using Eviews 8.0 software package. Because the panel data analysis controls for both observed and unobserved heterogeneity, also it increases the degree of freedom and reduces the collinearity problems, and hence improves the efficiency of econometric estimates (*Cheng Hsiao*, *2003*), there are three main models as follows: *Pooled OLS Model, Fixed Effects Model and Random Effects Model*.

### *C. Analysis of Empirical Results*

**Table n°02:** Summary Statistics

| | GDP | BEXR | TF | FDI |
|---|---|---|---|---|
| Mean | 2340.253 | 8.933567 | 53.93137 | 2.518336 |
| Median | 2348.586 | 9.230769 | 57.20000 | 1.903832 |
| Maximum | 3807.069 | 10.00000 | 75.80000 | 9.424577 |
| Minimum | 956.9166 | 5.203915 | 25.00000 | -0.204533 |
| Std. Dev. | 833.9099 | 1.208787 | 14.38746 | 2.235510 |
| Skewness | 0.018042 | -1.268383 | -0.449087 | 1.650455 |
| Kurtosis | 1.739230 | 4.397373 | 2.158962 | 5.509746 |
| Jarque-Bera | 3.380541 | 17.82415 | 3.217378 | 36.53902 |
| Probability | 0.184470 | 0.000135 | 0.200150 | 0.000000 |
| Sum | 119352.9 | 455.6119 | 2750.500 | 128.4351 |
| Sum Sq. Dev. | 34770290 | 73.05825 | 10349.95 | 249.8753 |
| Observations | 51 | 51 | 51 | 51 |

**Source:** *Author's Computation Using Eviews 8.0.*

The table above presents the summary statistics for all the variables included *in the empirical study, covering 4 North African countries (Algeria, Egypt, Morocco and Tunisia) over the period 1995-2011. As can be readily seen from this data,* GDP has an average of 2340.253 and a maximum value of 3807.069 that *belongs to Tunisia*, reflecting that there are *considerable differences* in economic growth among the selected countries. Also, *the average of black market exchange rate is 8.93* and its minimum value is 5.20*, which means that almost all North African countries suffer from* large parallel *market premiums. While, the trade freedom has a mean value of 53.93, indicating that the group of four countries as a whole is classified as* 'Mostly Unfree' *in terms of trade. Whilst,* FDI has an average of 2.51 and a maximum value of 9.42 that *belongs to Egypt*, implicating that this country is considered an attractive destination for foreign investors.

**Table n°03:** Regression Results for 4 North African Countries

| Dependent Variable: GDP | | | |
|---|---|---|---|
| Coefficient Estimates (P-value) | | | |
| **Independent Variables** | **Pooled OLS Model** | **Fixed Effects Model** | **Random Effects Model** |
| **BEXR** | 191.5176 (0.0656) * | 49.57286 (0.0494) ** | 191.5176 (0.0000) *** |
| **TF** | 5.242693 (0.5303) | 14.17647 (0.0000) *** | 5.242693 (0.0502) * |
| **FDI** | 36.32872 (0.5048) | 38.15042 (0.0402) ** | 36.32872 (0.0378) ** |
| ***R-squared*** | 0.072582 | 0.914126 | 0.072582 |
| ***Prob (F-statistic)*** | 0.310712 | 0.000000 | 0.310712 |

*Significant at 1% (***), 5 %(**), 10% (*).*

**Source:** *Author's Computation Using Eviews 8.0.*

As is shown in the table above, the *black market exchange rate*, *trade freedom* and FDI inflows seem to have the expected signs in all regression, whereas these explanatory variables *appear to be statistically significant* in both the fixed and random effects models, this way, *we can disregard* the Pooled OLS model. Hence, *the next step involves employing* the Hausman test which is worthy in selecting between the fixed effects and random effects specifications.

**Table n°04:** Hausman test

| Correlated Random Effects - Hausman Test<br>Equation: Untitled<br>Test cross-section random effects | | | |
|---|---|---|---|
| **Test Summary** | **Chi-Sq. Statistic** | **Chi-Sq. d.f.** | **Prob.** |
| Cross-section random | 431.189093 | 3 | 0.0000 |

**Source:** *Author's Computation Using Eviews 8.0.*

The *Hausman chi-square test statistic* is highly *significant* (Prob (0.0000< 0.01), thus the random effects model can be definitely rejected in favor of the fixed effects model. In other words, the Hausman test suggests that the fixed effects model is the most consistent one, so we focus on it in this empirical study.

**Table n°05:** Fixed Effects Model

Dependent Variable: GDP
Method: Panel Least Squares
Sample: 1995 2011
Periods included: 13
Cross-sections included: 4
Total panel (unbalanced) observations: 51

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1910.627 | 307.0384 | 6.222762 | 0.0000 |
| BEXR | 49.57286 | 24.26392 | 2.043069 | 0.0494 |
| TF | 14.17647 | 2.901178 | 4.886454 | 0.0000 |
| FDI | 38.15042 | 18.04793 | 2.113839 | 0.0402 |
| *R-squared* | 0.914126 | | | |
| *Prob(F-statistic)* | 0.000000 | | | |

**Source:** *Author's Computation Using Eviews 8.0.*

The fixed effects model reveals that the *black market exchange rate* exhibits a *statistically* significant positive impact on economic growth in the four North African countries (*in other words, higher BEXR index leads to higher growth rates, since a high BEXR score indicates low black market exchange rate premium*), because the large *black market* premium spawned *by trade-distorting policies hinders economic activity, and hence dampens economic growth. Likewise, trade freedom* displays a highly significant positive influence on economic growth, indicating that the removal of trade barriers and implementation of relevant trade policies, provide a friendly and open environment, thereby spurring economic growth. Moreover, the inward FDI contributes positively and significantly to economic growth in the four case study countries, and this is consistent with theory that highlighted the intrinsic role played by FDI in boosting the host countries' growth rates through facilitating knowledge spillovers, technological diffusion and capital accumulation.

*Furthermore,* the $R^2$ value of 0.91 indicates that 91% of the variation in GDP is explained by independent variables (BEXR, TF and FDI). As well as, the F- statistic is highly statistically significant; hence the joint impact of explanatory variables on economic growth has been confirmed.

To sum up, the *enforcement* of strategies aimed at shrinking the black market for foreign exchange and promoting trade freedom is expected to act as a promising catalyst for the North African countries' economic growth.

## 5. Conclusion

This study examines the impact of *black market exchange rate and trade freedom* on economic growth in *4 North African countries (Algeria, Egypt, Morocco and Tunisia) over the period 1995-2011*, through the use of panel data analysis, including Fixed Effects Model, Random Effects Model and Hausman test.

According to the Hausman test, the fixed effects model is the most suitable one, it reveals that the *black market exchange rate* exhibits a *statistically* significant positive impact on economic growth in the four North African countries (*in other words, higher BEXR index leads to higher growth rates, since a high BEXR score indicates a low black market exchange rate premium*), and this is consistent with theory. *Likewise, trade freedom* displays a highly *significant positive* influence on economic growth. Moreover, the inward FDI contributes positively and significantly to economic growth *in the four* case study *countries.* To sum up, a low black market premium and high trade freedom serve as promising catalysts for the North African countries' economic growth.

Based on these findings, it could be pointed out that the *North African governments* should dedicate massive reforms with *clear* goals and vigorous commitments to shrink the black market premium. Additionally, the use of economic incentives for converting the track of black market

towards the official mainstream is more effective than a bunch of unenforceable laws, and it further reflects the credibility of the government's economic policy.

*Moreover, Policy-makers* in *the North Africa region* should design *proper policies* that aim to reduce incentives to engage in illegal market activities, and even more importantly, they must *keep the* black market exchange *rate* as low as possible by affecting the key factors that influence the black market foreign exchange. Further, they can cease the transfer of hard currency out of the country through enacting wise economic policies.

In addition, the North African governments need to *pursue* sound economic diversification strategies; they must abandon all restrictive trade practices and liberalize FDI policies, and even more, they should not fully ignore the substantial role played by trade and exchange rate policies in influencing the long term growth prospects. It is also worth to note that policy-makers in the North African region should embark on ambitious policies aimed at stabilizing political situation and consolidating peace and security.

***References***

Alan E.H. Speight and David G. McMillan (2001) "Volatility Spillovers in East European Black-Market Exchange Rates", *Journal of International Money and Finance 20*, pp: 367–378.

Ali M. Kutan (1998), "Dynamics of Parallel and Official Exchange Rates: The Experience of Hungary", *Atlantic Economic Journal*, vol. 26, issue 1, pp: 54-65.

Ann Harrison (1996), "Openness and Growth: A Time-Series, Cross-Country Analysis for Developing Countries", *Journal of Development Economics Vol. 48*, pp: 419-447.

Anthony O'Sullivan, Marie-Estelle Rey, and Jorge Galvez Mendez (2011), "Opportunities and Challenges in the MENA Region", *Arab World Competitiveness Report 2011-2012, World Economic Forum*, OECD.

*Antonio N. Bojanic (2012), "*The *Impact* of *Financial Development* and *Trade* on the *Economic Growth* of *Bolivia"*, *Journal of Applied Economics*, Vol XV, No. 1, pp: 51-70.

Arslan Razmi, Martin Rapetti and Peter Skott (2012), "The Real Exchange Rate and Economic Development", *Structural Change and Economic Dynamics 23*, pp: 151– 169.

Barro, R. and Lee, R. (1993), " Losers and Winners in Economic Growth", *National Bureau of Economic Research Working Paper*, No. 4341.

Barro, R.J. (1994), "Democracy and Growth", *NBER Working Paper* , No. 4909.

Belhadj Aram (2008), "Heterogeneity of Monetary Regimes in Maghreb: An Illustration with National Taylor Rules", in Mehran Nejati, Azadeh Shafaei and Mostafa Nejati (eds.), "Issues in Global Business and Management Research", *Proceedings of the 2008 International Online Conference on Business and Management (IOCBM 2008)*, Brown Walker Press, USA.

Blejer Mario (1978), "Black-Market Exchange-Rate Expectations and the Domestic Demand for Money: Some Empirical Results", *Journal of Monetary Economics* 4, pp: 767-773.

Brian Pinto (1991), "Black Markets for Foreign Exchange, Real Exchange Rates and Inflation", *Journal of International Economics 30*, pp: 121-135.

Cécile Couharde and Audrey Sallenave (2013), "How Do Currency Misalignments' Threshold Affect Economic Growth?", *Journal of Macroeconomics 36*, pp: 106–120.

*Cheng Hsiao* (*2003*), "Analysis of *Panel Data*", *2nd edition*, *Cambridge University Press:* Cambridge, *United Kingdom.*

Cuddalore Sundar, Oscar Varela and Atsuyuki Naka (1997), "Black Market and Official Exchange Rates, Cointegration and Purchasing Power Parity in Developing Asian Countries", *Global Finance Journal*, vol. 8, issue 2, pp: 221-238.

David Dollar and Aart Kraay (2003), "Institutions, Trade, and Growth", *Journal of Monetary Economics 50*, pp: 133–162.

Dimitrios Serenis and Nicholas Tsounis (2013), "Exchange Rate Volatility and Foreign Trade: The Case for Cyprus and Croatia", *Procedia Economics and Finance 5*, pp: 677-685.

Francisco Rodriguez and Dani Rodrik (2001), "Trade Policy and Economic Growth: A Skeptic's Guide to the Cross-National Evidence", in Ben S. Bernanke and Kenneth Rogoff (eds.), "Macroeconomics Annual 2000",Volume 15, *Cambridge: MIT Press for NBER*, pp: 261–325.

Garbis, I. and G. T. Abed (2013), "Arab Spring, Countries Struggle, GCC Prospects Favorable", *IIF Regional Overview on Middle East and North Africa report*, Middle East and Africa Department, Institute of International Finance (IIF), pp: 1-42.

*Gehring, Kai* (2013), " Who Benefits from Economic Freedom? Unraveling the Effect of Economic Freedom on Subjective Well-Being", *World Development*, Vol. 50, pp: 74–90.

Georgios P. Kouretas and Leonidas P. Zarangas (2001), "Black and Official Exchange Rates in Greece: An Analysis of Their Long-Run Dynamics", *Journal of Multinational Financial Management 11*, pp: 295–314.

Halit Yanikkaya (2003), "Trade Openness and Economic Growth: A Cross-Country Empirical Investigation", *Journal of Development Economics 72*, pp: 57– 89.

Hassan, M. Kabir, K. Choudhury and M. Waheeduzzaman (1995), "On Black Market Exchange Rate and Demand for Money in Developing Countries: The Case of Nigeria", *Atlantic Economic Journal*, Vol. 23, No.1, pp: 35-44.

*Hatem Derbel, Rami Abdelkafi* and *Ali Chkir (2011), "*The Effects of Economic Freedom Components on Economic Growth: An Analysis with A Threshold Model", *Journal of Politics and Law*, Vol. 4, No. 2.

Hendrik van den Berg and Sanath C. Jayanetti (1993), "A Novel Test of the Monetary Approach Using Black Market Exchange Rates and the Johansen-Juselius Cointegration Method", *Economics Letters 41*, pp: 413-418.

Heritage Foundation (2013), "2013 Index of Economic Freedom", *The Heritage Foundation and Dow Jones & Company, Inc*, Washington, DC, USA.

Heritage Foundation (2014), "2014 Index of Economic Freedom", *The Heritage Foundation and Dow Jones & Company, Inc*, Washington, DC, USA.

Hermes Niels and Robert Lensink (2003), "Foreign Direct Investment, Financial Development and Economic Growth", *Journal of Development Studies*, Vol 40, No. 1, pp: 142-163.

House of Commons, Foreign Affairs Committee (2012), "British Foreign Policy and the 'Arab Spring'", *Second Report of Session 2012–13*, 3 July 2012, London.

IMF (2012 a), "Algeria: 2011Article III Consultation- Staff Report, Public Information Notice", *IMF Country Report N°12/20*, Jannuary 2012.

IMF (2012 b), "Arrangements and Exchange International Monetary Fund Annual Report on Exchange Restrictions 2012", *CD-ROM Edition including Overview*, *Washington, D.C.: International Monetary Fund*.

James Gwartney, Robert Lawson and Joshua Hall (2012) "2012 Economic Freedom Dataset", *Economic Freedom of the World: 2012 Annual Report,* Fraser Institute, Vancouver, Canada.

James Gwartney, Robert Lawson and Joshua Hall (2013) "Economic Freedom of the World: 2013 Annual Report", Fraser Institute, Vancouver, Canada.

*Jason Z. Yin and William A. Stoever* (1994), "Testing the Causes of Discontinuities in the Black Market Exchange Rate in China", *World Development*, Vol. 22, No. 9, pp: 1413-1424.

Keshab R. Bhattarai and Mark K. Armah (2005), "The Effects of Exchange Rate on the Trade Balance in Ghana: Evidence from Cointegration Analysis", *Research Memorandum No. 52*.

Khalifa Hassanain (2005), "The Real Exchange Rate and the Black Market Exchange Rate in Developing Countries", *Empirical Economics 30*, pp: 483–492.

Lanfang Wang and Susheng Wang (2012), "Economic Freedom and Cross-Border Venture Capital Performance", *Journal of Empirical Finance 19*, pp: 26–50.

Laura Alfaro, Areendam Chanda, Sebnem Kalemli-Ozcan and Selin Sayek (2004), "FDI and Economic Growth: The Role of Local Financial Markets", *Journal of International Economics 64*, pp: 89-112.

Mehmet N. Eris and Bülent Ulasan (2013), "Trade Openness and Economic Growth: Bayesian Model Averaging Estimate of Cross-Country Growth Regressions", *Economic Modelling 33*, pp: 867–883.

Michael Frenkel and Mainz, F. R. G. (1990), "Exchange Rate Dynamics in Black Markets", Vol. 51, No. 2, pp: 159-176.

Mogens K. Justesen (2008), "The Effect of Economic Freedom on Growth Revisited: New Evidence on Causality from a Panel of Countries 1970–1999", *European Journal of Political Economy 24*, pp: 642–660.

Mohammad Javad Razmi and Ramiar Refaei (2013), "The Effect of Trade Openness and Economic Freedom on Economic Growth: the Case of Middle East and East Asian Countries", *International Journal of Economics and Financial*, Vol. 3, No. 2, pp: 376-385.

Mohsen Bahmani-Oskooee and Gour Gobinda Goswami (2004), "Long-Run Nature of the Relationship between the Black Market and the Official Exchange Rates", *Economic Systems 28*, pp: 319–327.

Mohsen Bahmani-Oskooee and Reza Shiva (1998), "A Method of Detecting Whether a Central Bank Engages in the Black Market for Foreign Exchange: Evidence from Iran", *Economics Letters 60*, pp: 97–103.

Mohsen Bahmani-Oskooee, Ilir Miteza and A.B.M. Nasir (2002), "The Long-Run Relation between Black Market and Official Exchange Rates: Evidence from Panel Cointegration", *Economics Letters 76*, pp: 397–404.

Mounir Belloumi (2014), "The Relationship between Trade, FDI and Economic Growth in Tunisia: An Application of the Autoregressive Distributed Lag Model", *Economic Systems xxx*, pp: 1-19.

Muhammad Shahbaz (2012), "Does Trade Openness Affect Long Run Growth? Cointegration, Causality and Forecast Error Variance Decomposition Tests for Pakistan", *Economic Modelling 29*, pp: 2325–2339.

Mustapha Kamel Nabli and Marie-Ange Véganzonès Varoudakis (2004), "Reforms and Growth in MENA Countries: New Empirical Evidence", *Washington, DC: World Bank*.

Mustapha Kamel Nabli and Marie-Ange Veganzones-Varoudakis (2007), "Reform Complementarities and Economic Growth in the Middle East and North Africa" in Mustapha Kamel Nabli (eds.), "Breaking the Barriers to Higher Economic Growth: Better Governance and Deeper Reforms in the Middle East and North Africa", *Washington, DC: World Bank*.

Ockey, Jason R. (2011), "Economic Freedom and Fiscal Performance: A Regression Analysis of Indices of Economic Freedom on Per Capita GDP", *Undergraduate Economic Review*, Vol. 8, Issue. 1; Article 9.

Panayiotis F. Diamandis and Anastassios A. Drakos (2005), "Long-Run Dynamics of Official and Black-Market Exchange Rates in Latin America", *Global Finance Journal 15*, pp: 219– 237.

Rifat Baris Tekin (2012), "Development Aid, Openness to Trade and Economic Growth in Least Developed Countries: Bootstrap Panel Granger Causality Analysis", *Procedia - Social and Behavioral Sciences 6*2, pp: 716 – 721.

Rob Clark and Matthew C. Mahutga (2013), "Explaining the Trade-Growth Link: Assessing Diffusion-Based and Structure-Based Models of Exchange", *Social Science Research 42*, pp: 401–417.

*Robert Grosse (1992), "*Colombia's Black Market in Foreign Exchange", *World Development*, vol. 20, No. 8; pp: 1193-1207.

Rodrik, Dani (2007), "The Real Exchange Rate and Economic Growth: Theory and Evidence", *John F. Kennedy School of Government*, Cambridge, MA: Harvard University.

Ross Levine and David Renelt (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, 82(4), pp: 942–963.

Ross Levine and Sara Zervos (1998), "Stock Markets, Banks, and Economic Growth", *American Economic Review*, 88(3), pp: 537-558.

Ross Levine, Norman Loayza and Thorsten Beck (2000), "Financial Intermediation and Growth: Causality and Causes", *Journal of Monetary Economics 46*, pp: 31-77.

*Sachs, J.* and A. *Warner (1995)*, "*Economic Reform and the Process of Global Integration*", *Brookings Papers on Economic Activity*, Vol. 1, pp: 1-118.

Samia Nasreen and Sofia Anwar (2014), "Causal Relationship between Trade Openness, Economic Growth and Energy Consumption: A Panel Data Analysis of Asian Countries", *Energy Policy*.

Samy Ben Naceur and Samir Ghazouani (2007), "Stock Markets, Banks, and Economic Growth: Empirical Evidence from the MENA Region", *Research in International Business and Finance 21*, pp: 297–315.

*Santos-Paulino Amelia U.* (2002), "The *Effects* of *Trade Liberalization* on *Imports* in *Selected Developing Countries*", *World Development*, Vol. 30, No. 6, pp: 959–974.

Sebastian Edwards (1992), "Trade Orientation, Distortions and Growth in Developing Countries", *Journal of Development Economics 39*, pp: 31-57.

Sebastian Edwards (1998), "Openness, Productivity and Growth: What Do We Really Know?", *Economic Journal 108*, pp: 383– 398.

Steven B. Kamin (1993), "Devaluation, Exchange Controls, and Black Markets for Foreign Exchange in Developing Countries", *Journal of Development Economics 40*, pp: 151-169.

Syed Tehseen Jawaid and Syed Ali Raza (2013), "Effects of Terms of Trade on Growth Performance of India", *Economic Modelling 33*, pp: 940–946.

Thorsten Beck and Ross Levine (2004), "Stock Markets, Banks, and Growth: Panel Evidence", *Journal of Banking & Finance 28*, pp: 423–442.

V.G.R. Chandran and Munusamy (2009), "Trade Openness and Manufacturing Growth in Malaysia", *Journal of Policy Modeling 31*, pp: 637–647.

W.N.W. Azman-Saini, Ahmad Zubaidi Baharumshah and Siong Hook Law (2010), "Foreign Direct Investment, Economic Freedom and Economic Growth: International Evidence", *Economic Modelling 27*, pp: 1079–1089.

*World Bank* (*2010*), "*Middle East and North Africa Region: A Regional Economic Update: Recovering from the Crisis", April 2010, Washington, DC: World Bank.*

World Bank (2013), "MENA Quarterly Economic Brief", *Office of the Chief Economist*, Issue 1, July 2013.

Yochanan Shachmurove (1999), "The Premium in Black Foreign Exchange Markets: Evidence from Developing Economies", *Journal of Policy Modeling 21(1)*, pp: 1-39.

**Appendix 1**: *Pooled OLS Model*

Dependent Variable: GDP
Method: Panel Least Squares
Date: 03/16/14 Time: 16:23
Sample: 1995 2011
Periods included: 15
Cross-sections included: 4
Total panel (unbalanced) observations: 51

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3876.955 | 921.5902 | 3.989794 | 0.0002 |
| BEXR | 101.5176 | 101.5011 | 1.885180 | 0.0656 |
| TS | 5.242693 | 5.262697 | 0.632706 | 0.5303 |
| FDI | 30.52072 | 54.04492 | 0.572195 | 0.5648 |

| | | | |
|---|---|---|---|
| R-squared | 0.072582 | Mean dependent var | 2340.253 |
| Adjusted R-squared | 0.013385 | S.D. dependent var | 833.9099 |
| S.E. of regression | 828.31103 | Akaike info criterion | 16.35184 |
| Sum squared resid | 32240804 | Schwarz criterion | 16.50335 |
| Log likelihood | -412.97119 | Hannan-Quinn criter. | 16.40974 |
| F-statistic | 1.226168 | Durbin-Watson stat | 0.136876 |
| Prob(F-statistic) | 0.310712 | | |

**Appendix 2**: *Fixed Effects Model*

Dependent Variable: GDP
Method: Panel Least Squares
Date: 03/16/14 Time: 18:24
Sample: 1995 2011
Periods included: 13
Cross-sections included: 4
Total panel (unbalanced) observations: 51

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1910.627 | 307.0384 | 6.222762 | 0.0000 |
| BEXR | 49.57286 | 24.26392 | 2.043069 | 0.0494 |
| TF | 14.17647 | 2.991178 | 4.886454 | 0.0000 |
| FDI | 36.15042 | 16.04793 | 2.113839 | 0.0402 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.914126 | Mean dependent var | 2340.253 |
| Adjusted R-squared | 0.902416 | S.D. dependent var | 833.9055 |
| S.E. of regression | 260.5006 | Akaike info criterion | 14.08996 |
| Sum squared resid | 2965993. | Schwarz criterion | 14.35511 |
| Log likelihood | -352.2940 | Hannan-Quinn criter. | 14.19126 |
| F-statistic | 78.06306 | Durbin-Watson stat | 0.472828 |
| Prob(F-statistic) | 0.000000 | | |

**Appendix 3**: *Random Effects Model*