Czech University of Life Sciences Prague
Faculty of Economics and Management

Department of Economics

Economic analysis on the impact of Free trade agreement (FTA) and Trade openness on the Agriculture sector and key macroeconomic variables

Supervisor

Assoc. Prof. MANSOOR MAITAH

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Table of contents

List of Figures

List of tables

Abstract

In this study the author tries to identify the effect of Free trade agreements (FTA) and trade openness measured by export plus import divided by GDP. The objective is to investigate the causality of Free trade agreements (FTA) and trade openness on economic growth (ln_gdp), foreign directed investment (FDI), Human development (HDI), women's fertility (fertility), aggregate trade flow (LF), and Agriculture sector (AGR). To achieve the stated objectives the author uses two databases. One, the study uses gravity data base constituting data from 1950-2013 Algeria, Egypt, Morocco and Tunisia as reporter and all countries of the world as partners. Second, the study uses panel data from 2000 -2014 for North African countries (Algeria, Egypt, Morocco and Tunisia). Further, the study uses three different estimation techniques and come up with the one better explains the data. Specifically, the study uses Pooled OLS, fixed effect (FE) and random effect (RE) model. However, the choice which model better explains the data is made based on economic theories and diagnostic tests. Accordingly, the study finds that fixed effect (FE) better explains the data and the resulting finding shows that trade openness and Free trade agreements could have a positive impact on the economy and the agriculture sector in particular.

Key words: Trade openness, Free trade agreement, Human development, Economic growth, Agriculture sector, Non-Agriculture sector, panel model

Declaration

I declare that the doctoral dissertation has been completed by me, without any other outside help and I have used only the sources mentioned at the end of the thesis. It is submitted in partial fulfillment of the requirements for the PhD degree at Czech University of Life Sciences Prague, Faculty of Economics and Management. It has not been submitted before for any degree or examination in any other University.

Author: _____ **signature:** _____

Date:

Acknowledgments

I would like to express my special thanks to my supervisor Prof. Mansoor Maitah, who has given me strong support and encouragement during the whole research, and I so much appreciate the academic guidance and inspiration he has given me.

ACCRONYM

FTA	Free trade agreement
EU	European union
AGADIR	Trade agreement among Algeria, Egypt, Morocco, and Tunisia
IMF	International monetary fund
FDI	Foreign directed investment
AGR	Agriculture sector
GDP	Gross Domestic product
HDI	Human development index
PTA	Positive trade effect
WTO	World trade organization
RTA	Regional trade agreement
NAFTA	North American free trade agreement
EFTA	European free trade area
TFP	Total factor productivity
ARDL	Autoregressive distributive lag model
GCC	Gulf cooperation council
PPML	Pseudo-maximum likelihood

Chapter 1

Introduction

1. Introduction

Economists from mercantilists to classical and neoclassical school of thought try to provide different reasons for the active involvement of countries in international trade. For instance, according to David Ricardo (1817) countries engage in international trade because of difference in technology. According to this theory difference in comparative cost of production force countries to start specializing in producing goods and services which can be produced cheaply with the level of technology available. Therefore, courties export items which are superior line of production and import products which are inferior line of production domestically as compared to trading partners. However, only this factor cannot explain the reason why countries trade in the international market.

The Heckscher – Ohlin- Samuelson model (Heckscher, 1919; Ohlin, 1933; Samuelson, 1967), stresses that factor endowment plays an important role for countries to specialize in producing particular commodity and trade in the international market. Particularly, according to this theory countries have a different endowment and different factor proportions. Therefore, this difference in endowment makes marginal cost of producing commodities to differ among countries. Hence, countries will produce and export goods and services with abundant factors and import commodities with less abundant factors. However, although this theory is a bit advanced and could be one of the reasons affecting the international trade it cannot be claimed it plays the sole role.

According to the recent neoclassical economists, factors such as technological difference, factor endowment and test of different countries could play an important role simultaneously. In fact, according to the last claim even if countries have similar technology and factor endowment they could trade in the international marker due to the difference in tests. Therefore, countries with similar technology and endowment may specialize and export different commodities based on the test of their country.

Despite the difference in the trade theories in defining the source of specialization and export, all the theories agree that trade benefits both exporting and importing countries. However, despite the potential benefits from international trade countries apply both tariff and non-tariff methods to discourage imports and boost domestic industries. The common reasons mentioned are economic and non-economic reasons. The economic and oldest line of argument of pro protectionism is protecting infant industries from foreign competition. According to, the infant industry argument domestic firms have to be protected by tariff to give them time and become competitive against foreign firms. Once the firms become strong enough to compete with foreign firms the tariff cease. However, despite the validity of the argument, it faces two potential problems. First, infant industry protection through tariff may not guarantee the graduation of those firms into competitive firms. Second, the objective of developing infant industries into competitive industries could be achieved through non-distortive method (subsidies) instead of the distortive method (tariff).

The most frequently mentioned non-economic protection arguments are national defense, national pride, and foreign policy. These protection methods are applied in both war times and peace times and they can use tariffs and embargos to adopt these policies. In fact, these measures are made even if they are disadvantageous from the economic point of view. Therefore, they will not be the interest of this research topic.

Despite the protectionism countries for economic and non-economic reasons engage into the preferential trading agreement. Those agreements include preferential trading club, free trade area, customs union, and common market. According to the preferential trade agreement, two or more countries agree to reduce their tariff to each other while retaining the right to change the tariff rate. Similarly, free trade area allows partner countries to abolish tariffs and other restrictions on imports. However, the policy towards the remaining world remains the same tariff and restriction. In a further development, customs union extends beyond free trade agreement and introduces a common external tariff on imports from non-member countries. Last but not least, countries create a common market which allows them the free movement of all factor of production among member countries.

The preferential trade agreements are a step towards free trade agreement and increase the welfare of the society theoretically. However, since the Pareto-optimum is violated with trade restriction eliminating some restriction may not necessarily improve welfare. Therefore, it is important to examine empirically if the preferential trade agreements improve the welfare of the society. Particularly, looking their effect towards human development (hdi), women's decision making (fertility), foreign directed investment (FDI), Agriculture sector (AGR) and GDP growth will be important.

This study, unlike to the previous studies, applies econometric estimation which is common in labor economics but rarely used in the study of international trade that is the Panel data estimation techniques. Further, the paper uses the effect of these preferential trade agreements among North African countries. The choice of the countries is based on that there are few studies in this particular area and the fact countries in this region are heavily dependent on primary commodities make them interesting. The study also uses the gravity model to estimate the effect of free trade agreement on trade flows. This model is used because signing trade agreement between two countries could affect another external country. Therefore, to capture those effects we have included all countries in to our gravity database.

Last but least, the study aims to contribute four main things through conducting this research. First, contribute to the existing literature on international trade. Second, contribute an input for policy makers. Third, contribute to panel data estimation technique in macro-econometrics. Last but not least, although there are several studies conducted studying the effect of trade agreement (FTA) on particular topics, the number of comprehensive studies is very limited. In fact, for North Africa countries to my knowledge this would be the first.

Chapter 2

Literature review

2. Literature review

Since the objective of the paper is to assess the impact preferential trade agreements in improving the welfare of the society the literature discusses the empirical findings in this respect. Further, to justify the validity of the findings the methodology and the data used in those papers will be discussed in detail.

2.1 Theoretical Background

In this section different economic theories on trade will be discussed. The trade theories discussed here includes both the classical and modern trade theories. To make the theories understandable and appreciate the contributions they made they will be presented chronologically. In fact, they are organized as first mercantilists followed by Price-Specie-Flow Mechanism, Comparative advantage theory, Mill-Bastable (infant industry) and Heckscher–Ohlin Theory respectively.

2.1.1. Mercantilists

With the aim establishing centralized and strong European countries mercantilists form a system of policies for industry and commerce. Since the policies are highly heterogeneous and diversified it is difficult to call them mercantilism school. Therefore, it is difficult to say the view of mercantilists was a specific theory or assumption. However, we can raise some point with our own view. Accordingly, it is worthy to mention three points with regard to this. Firstly, Adam smith categorized mercantilism as a system of trade formulated based on the wrong concept of the wealth of nation although they were popular. This conclusion of Adam smith is based on the wrong belief of the mercantilist the wealth of the nation is determined by gold, silver and metal. In fact, the balance of trade is determined by the balance between the payment made in gold and silver and the payment received in gold and silver. Therefore, this definition of wealth fails to take in to account the value of land, houses, consumption goods, services, and all other goods.

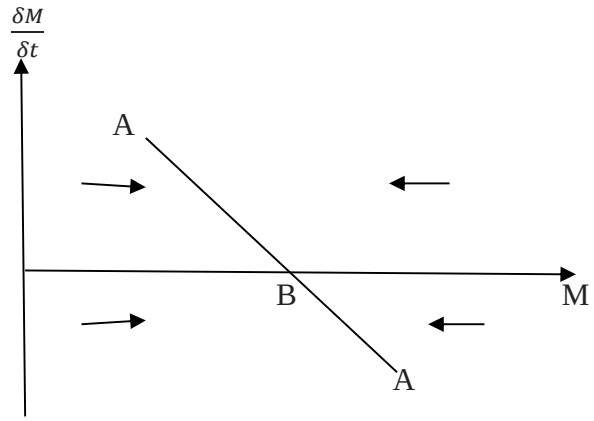
However according to price-specie- flow theory it is difficult to keep a balanced trade. In fact, if a country accumulates trade surplus (value of export exceeding import) the price level will increase domestically and decrease the price in the world market. Therefore, the country will force to lose the trade surplus it made. This happens because the price level is too high to make the country competitive in the international market. In fact, the domestic high price will encourage imports and thereby alter the balance of trade. Although, mercantilist do not try to solve the problem in their theory some admitted the existence of the problem. Therefore, since the very definition wealth is wrong, it is convenient to assume the conclusion made by mercantilist is wrong.

2.1.2 Price-Specie-Flow Mechanism

The most important point of the price-specie-flow mechanism is the distribution of coins because of trade imbalance. The main argument presented by the classical economists is that when the supply of bullion increases the price of domestically produced goods and services become dearer while the price of imported commodity becomes cheaper. In contrary, when the supply of bullion drops the price of domestic prices decreases and price of imported commodity increases and, therefore, create a trade surplus.

However, the modern literature of international trade the change in price could go in either direction depending on the international market. Therefore, in spite of an increase in bullion and thereby the domestic price the trade balance could remain the same, surplus or deficit depending what is happening in other countries. This argument is in fact supported by kemp(1964). For instance, if two countries have identical demand and are engaged in bilateral trade their trade balance might remain the same due an increase or decrease of bullion supply.

Figure 1The specie–flow mechanism



The specie–flow mechanism

According to this theory when money supply (M) is greater than B = wL/V, money supply decreases in time through unfavorable trade balance. Contrary, when B = wL/V is greater than the supply of money, M increase through favorable trade balance. Therefore, the balance is maintained ultimately. However, since prices are determined by nominal wage in the model the direction of the price change cannot be explained by price-specie-flow theory.

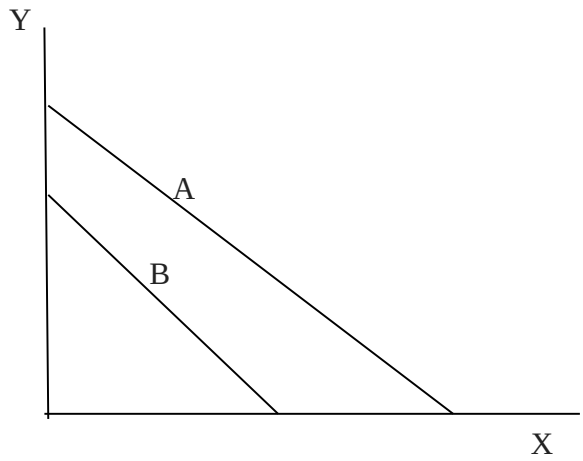
2.1.3 Comparative advantage theory

David Ricardo's (1817) theory of comparative advantage has been one of few economic theories economists agree. Even though the theory of neo-classical economics are not developed based on this theory they understand and accept it. Therefore, it is understandable that Ricardo's comparative advantage theory is the cornerstone of modern international trade theory. In fact, Ricardo's theory has been studied by neoclassical economics leading scholars. However, the modern interpretations of Ricardo's theory are distinctively different from what originally Ricardo meant. Ricardo famously interpreted the comparative cost using a numerical example.

According to Ricardo's comparative advantage despite country A having the absolute advantage of producing Y and X they can benefit from trade by producing only one commodity and leave the other commodity for country B to produce. For instance, if country A produces using one unit of input X and country B producing Y using one unit of input both country A and B will be better off. Therefore, country A will specialize in producing X and country B specialize

producing Y. However, in this simple model, we assume only labor is used as an input in the production of both Y and X.

Figure 2Comparative advantage

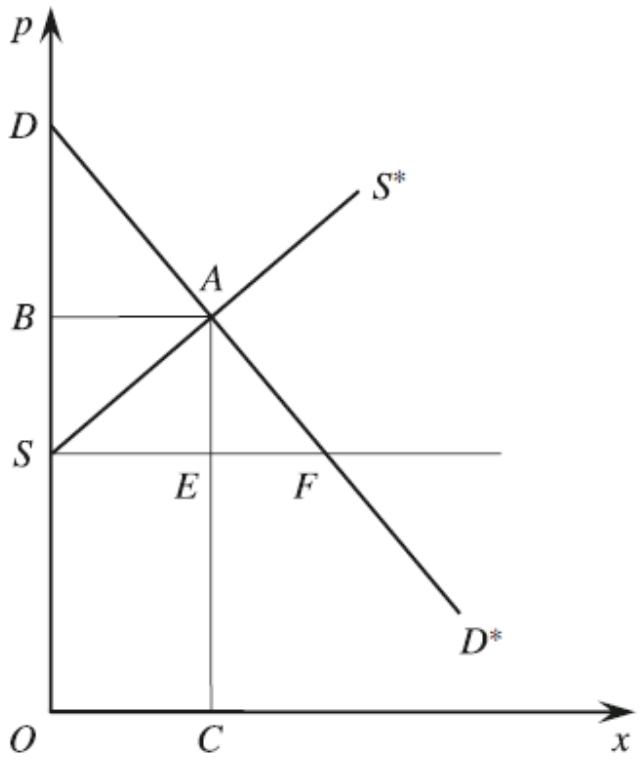


Source: Authors plot following David Ricardo comparative advantage

2.1.4 Mill-Bastable (infant industry)

Unlike the classical economists who criticize mercantilism and advocate free trade, J.S.Mill, and Bastable advocate infant industry protection or some restriction to free trade through tariff and non-tariff barriers. However, they put some necessary conditions to apply for infant industry protection. To fully understand the importance and the implication of this theory discussing consumers and production theory is important. To explain the gain in international trade a graph is depicted below. In the following graph prices and cost of production are depicted in the vertical line. In the horizontal line, the quantity of the commodity is depicted. Further, the DD and SS represent the demand and supply respectively. According to market clearing condition, the equilibrium is where the demand and supply interact. Therefore, the optimal production will be OC and the price will be OB. In effect, the consumer surplus will BAD and the producers surplus will be BAS. The reason for consumer surplus is that because although consumers are willing to pay OCD they are paying only OCAB which makes the difference to be BAD. While the producers surplus indicates to be a profit margin for producers.

Figure 3 Implication of Tariff and Non-tariff barriers



If we assume the price in the international market for commodity X is OS instead of OB, the consumer surplus will be DSF instead of BAD. This shows that the welfare of consumers increases in response to international trade. However, the producer surplus disappears in response to international trade. Consequently, the overall effect will be higher welfare as a nation. If tariff and non-tariff barriers are introduced the welfare of the consumers decreases and producers profit increases. However, the overall welfare of the nation decreases as compared with free trade.

The domestic firms could be inefficient because two reasons. First, domestic firms may not have a comparative advantage. Second, although they have a comparative advantage the domestic firms could be young. According to, Mill-Bastable theory the later firms (infant industry) need protection to compete with multinational companies and graduate into competitive industry. However, the downside of this theory is that these infant industries may not graduate into competitive industries and additionally the protection could be applied without introducing barriers using such as subsidies.

2.1.5 Heckscher–Ohlin Theory

Modern international trade theories, unlike the classical trade theories, assume counties have identical technology. However, in the earlier trade theories, economists assume that different countries have different production technologies. The comparative advantage in the modern international trade theories is explained by the difference in factor endowment instead of production technology. The modern trade theory is known by the name Heckscher–Ohlin Theory because they are first proposed by Heckscher (1919) and Ohlin (1933). The assumption of free trade and same production function make factor price equalization realistic. According to Heckscher–Ohlin theory, the ratio of capital to labor will be the same in similar industries in different countries. Therefore, countries with highly endowed capital will specialize in the production of capital-intensive commodities. In the same manner, countries endowed with high labor capital will specialize in the production of labor-intensive products. Hence, capital rich countries export capital intensive commodity and labor intensive country export labor-intensive commodity.

Although the theory of Heckscher–Ohlin seems reasonable and acceptable, the cornerstone of the theory is counter-institutive. For instance, the assumption of factor price equalization does not seem reasonable. Based on the factor equalization similar industries in different courtiers will have the same capital to labor ratio to produce the same items. However, this assumption fails to take into account there is no perfect mobility of resources and difference in technology between countries.

The Heckscher–Ohlin theory could be refuted for three main reasons. First, the assumption of identical consumption pattern among different countries is unrealistic. Second, although at this information age the knowledge about technology can be easily accessed by countries, labor is not mobile and therefore, the capital-labor ratio could differ among countries. Last but not least, the assumption that there is no factor reversal does not take the role of research and development in technology. Therefore, because of the mentioned failure, there is a need for a more realistic trade theory.

2.1.6 Country similarity (Staffan Burenstam, 1961)

According to Staffan Burenstam (1961) products are often traded based on similarity in demand structure among countries. Burenstam reach to this conclusion through empirical analysis using Leointief Hypothesis. The finding shows that contrary to H-O factor proportion theory, which assumes difference in the supply side, countries with similar demand structure could trade with each other. Accordingly, Burenstam stipulates that countries with similar level of development, value, and per capita income could have similar preference to some products. Hence, residents in these countries are expected to consume and use similar type and quality of products.

This theory was tested empirically and found to be true. For instance, according to Bergstrand (1990) several econometrics studies found that positive effect between average level of per capita income and intra industry trade among countries. Similarly, our statistical analysis in this study shows that per capita income, belief and some other identity of countries play important role in their trade. For instance, in the agriculture sector and particularly animal products and some fruits seem to be traded based on similarly of the countries. However, since all the trade among the countries cannot be explained through this theory we will see other trade theory developments as well.

2.1.7 Product life cycle (Raymond Vernon (1966))

This theory is developed following the failure of H-O to explain several international trade patterns. According to this theory, trade between countries follows the life cycle of products. More specifically, trade follows five stages of product life cycle. First, innovation and invention level were the product is introduced and attracts demand in similar regions as it been introduced. Second, in this stage it is expected to emerge product growth and competition. In this stage, technology will start transferring from innovating country to other countries in the form of foreign investment. Third, at this stage the innovation is expected to be at its maturity stage and export from the innovating country decreases. Fourth, at this stage the product is to reach its peak and saturation. Last, decline and being replaced by overseas production. More specifically, at this particularly stage the products are expected to be produced in developing countries. The implication of the theory is that, first products are exported from innovating countries but after the technology becomes known to ever country the trade reverses.

The theory seems to explain the trade pattern in the industry and service sector. However, regarding the agriculture sector the theory fails to explain the trade pattern. In fact, it is difficult to categorize in the mentioned product life cycle. Even agriculture is at the last stage, developed countries ted to subsidize their agriculture and depend on their domestic production. Therefore, the product life theory will not explain the trade pattern in agriculture.

2.1.8 Intra-Industry trade (Grubel and Lloyd (1971))

According to the intra-industry theory, trade among countries and industries takes place because of imperfect information, product differentiation and economics of scale. The conjecture is contrary to what the traditional international economics stipulates. Grubel and Lloyd (1971), attempted to measure empirically intra-industry trade using the Grubel-Lloyd index.

$$\text{Grubel-Lloyd index} = \frac{(EX_i + IM_i) - (EX_i - IM_i)}{EX_i + IM_i}$$

Where EX represents export and IM represents import. The Grubel-Lloyd index, which represents the inter-industry trade, ranges from 0 to 1. If the Grubel-Lloyd index is equal to one, there is only intra-industry trade while zero represents non-existence of intra-industry trade. The study finds that, developed countries have a higher Grubel-Lloyd index. Indicating developed countries tend to have a high intra-industry trade.

The intra-industry trade seems valid in the agriculture and food commodities. For instance, according to McCorriston and Sheldon (1991) there exists an intra-industry trade between USA and EU. However, there is no enough evidence to support the existence of agriculture and food intra-industry trade among developing countries. Therefore, the theoretical issues addressed by this model and the empirical validity of the theory in case of agricultural and food commodities make the model valuable. Hence, the theory plays a significant role in formulating trade policy.

2.1.9 Increasing Returns to Scale and Network Effects (Paul Krugman (1979))

According to this theory trade is not solely caused by difference in technology and endowment instead it caused by economies of scale. The theory recognizes the importance of comparative advantage and endowment. However, despite their importance they fail to explain the trade

pattern. Therefore, Krugman introduced economics of scale and network as an important factor determining trade among countries and industries.

The theory assumes a model with two economies and with no initially trade and the model further assume countries have identical technologies and tests. In the traditional trade model, there countries would not gain from trade. However, according to Krugman countries in this case they would not only trade but also benefit from trade. More specifically, if trade opens between two countries with zero transport cost, because of symmetry wage rate will be same between the two countries. Therefore, the effect of trade will be same as the effect of economic growth in single and closed economy. In fact, as a result of trade there would be an increase in scale economy and available commodities.

2.1.10 Gravity model

According to the gravity model, the pattern of trade among nations is determined primarily by distance and economic size of trading countries. The model stipulates that countries with large economy are likely to produce more, consume and export. These countries will be able to generate more revenue and spending it by importing other commodities. Further, the model assumes geographical location between countries have an impact on both cost of export and import. The basic gravity model assumes only economy size and distance between countries determine trade.

After some refinements and extensions, the gravity model is heavily used in studying the effect of trade agreements. Further, empirically it is proven to be useful in identifying the effect of trade agreements on agricultural trade, economic growth, foreign directed investment, human development, price stability, employment, women's decision making power and so on.

2.1.11 Firm heterogeneity (Melitz, M. J. (2003))

The previous mentioned trade theories assume trade takes place between homogeneous products. According to these models, the homogenous products trade takes place between developed countries while the intra-industry theory conjectures heterogeneous precuts trade takes place with both developing and developed countries. However, these models are based on representative firms and the empirical findings significantly differ from the fact on the ground. In

fact, firms are heterogeneous rather than homogeneous. According to Melitz (2003), firm heterogeneity could be considered as a source of comparative advantage. Therefore, according to this theory this theory could explain why countries export some commodities despite having comparative disadvantage.

The application of the theory in to the agriculture sector has been done by some important empirical papers. For instance, Golpinath, Sheldon, and Echeverria (2007) examined the validity of the theory in the agriculture. However, the finding shows that there may be no direct decision of export in the agriculture sector compared non-agriculture sector. The main reason for the weak validity of the model is that farmers could easily shift their production to other products. For instance, taking the export favorability of products in the international market they may decide to export less or more of their products. In a similar empirical work, Ahn, Khandelwal, and Wei (2011) farmers choose for either export or domestic market based on the volume of production. Therefore, according to the author's agriculture export decision is influenced by farmer's decision rather than production decision.

2.2 Empirical literature

In this section I have presented the literature review based on the objective of the studies. The empirical literature part is divided in to seven sections including the effect of trade agreement on trade flow, well-being and women, productivity and price, foreign directed investment (FDI), Environment, Economic growth, and Agriculture sector respectively.

2.2.1 Impact of Trade agreement on trade flow

Baier & Bergstrand (2007) using countries who introduce free trade agreement as a treatment group and countries who did not introduce free trade agreement as a control variable make cross-country empirical analysis. In their study, the authors take into account the possibility of endogeneity variable to the variables of free trade agreement. Further, the researchers consider the potential flow of the gravity equation. Traditionally, economists estimate the impact of free trade using gravity equation. However, since trade policy is not exogenous variable the estimation using gravity equation will be biased. In this paper, the authors solved the potential endogeneity problem using difference in difference method. Accordingly, based on their estimate they found that free trade agreement doubles trade flow after a decade. However, the paper could not come up with the welfare impact of free trade.

Vicard (2011) finds that the effectiveness of regional trade agreements in accelerating trade between two countries differs based on the economic condition of the countries. In fact, according to the author the size and distribution of GDP among the members play an important role. For instance, regional trade agreement increases the trade between the countries when they are large and symmetric. However, for this to succeed the other members of the trade agreement has to be small and symmetric. Moreover, the authors found that region (north/north, north/south and south/south) plays an important role beside the size of the GDP. Despite the paper was successful in identifying the determinants of success in a trade agreement, it failed to identify why countries decide to engage in free trade agreements.

Eicher and Henn (2011) examine the effect of membership of world trade organization (WTO) on trade flows. In doing so they try to unify previously made estimation approaches in one framework to solve the omitted variable bias. In fact, they delineated three sources of omitted

variable and solve them. Specifically, they control individual preferential trade agreement (PTA), unobserved bilateral heterogeneity and multilateral resistance. In effect, the result of previous papers shows that WTO membership does not have significant trade effect. However, the preferential trade agreement (PTA) creates a strong trade effect although it differs from individual agreements. Nonetheless, in contrast to the previous literature Eicher and Henn (2011) by extending the gravity model they found that WTO membership has a positive trade effect before PTA is made. Further, the study finds WTO membership increases regional trade specifically to developing countries. However, the benefit from membership in WTO depends heavily on the negotiation ability of countries.

Foster, Poeschl and Stehrer (2011) using large size sample data of countries from 1962-2000 estimates the trade creating the effect of preferential trade agreement (PTA). The paper uses previous researchers as a springboard in determining whether PTA increases trade through diversification or increasing trade of the same commodities. To estimate the effect the paper uses the traditional gravity model and matching approach the problem of self-selection. Therefore, the estimation shows that the introduction of PTA increases the export of new products through diversification. Further, the result shows that large countries and large exporting countries are significantly affected by the preferential trade agreement.

Melitz (2003) by developing a dynamic industrial model with diverse firms the paper examines the effect of international trade on intra-industry. The result from the model reviles that once firms are exposed to international trade efficient and inefficient firms react differently. For instance, an introduction of international trade induces efficient firms to export their goods to the world market. However, the less efficient firms are forced to exit from the market due to the introduction of international trade. The result further shows that additional introduction of firms to international trade result in the relocation of resources to the productive industries. The main interesting finding of the paper is that by relocating resources from less productive to productive firms the welfare of the society increases. Therefore, while productive firms reap the benefit of trade through market share and profit the less productive firm loss both. Hence, without increasing individual firm level productivity the aggregate industry productivity increases and results in welfare gain.

2.2.2 Impact of Trade agreement on well-being and women

In the study by Kosack & Tobin (2015), they tried to reconcile competing argument regarding the implication of free trade agreement on the well-being of citizens. The arguments are trade decreases citizens welfare by diminishing the motive and resource for welfare enhancement or the counter argument raises welfare by increasing motivations and resources. According to, their empirical analysis the potential benefit depends on the level of human capital. Countries with a better level of human capital have the potential of increasing the welfare of their citizens after making free trade agreement. However, countries with a lower level of human capital development are negatively affected or the welfare improvement is slower as compared to the previous countries. Although human capital plays an important role in determining the welfare gain from trade, it is not the sole factor determining the potential gain.

Khun, Lahiri, & Lim (2015) in their paper they examine the causality between trade openness and wellbeing. To study the causality between trade openness and wellbeing they use cross-sectional combined data from European value survey for 89 countries. Further, their paper focuses on two particular measures of wellbeing which are “life satisfaction” and “happiness”. Accordingly, they found trade restriction is negatively correlated with both life satisfaction and happiness. This further implies that people who live in opened economy have both life satisfaction and happiness. The results are robust after making several tests and alternative estimation techniques. However, it is impossible to take the finding at a face value because the measures of wellbeing are based on people’s opinion.

In a similar vein, scholars studied the effect of trade openness on women. For instance, Aguayo-Tellez, Airola, Juhn & Villegas-Sanchez (2010), using the impact of the North American free trade agreement (NAFTA) in 1994 between Mexico and USA, estimate the impact of NAFTA on women wage. Accordingly, they found that in the liberalization period the relative wage of women increased everything remaining constant. Their finding further shows that the liberalization favors women in both between industries and intra-industry shift. The other significant finding is that the liberalization has an impact on the decision making of households which favors women. The shift in the decision making is captured by the purchasing habit of the family which starts becoming what women favors. Particularly, the purchase of tobacco, alcohol

and men's clothing started declining significantly and the expenditure for women's clothing and education increasing. However, it would be difficult to take this result at a face value because there results could be only suggestive but could not conclude that the spending change is due to financial freedom of women.

2.2.3 Impact of Trade agreement on productivity and prices

In a different scenario, Munir & Kiani (2011) studies the relationship between trade openness and inflation using Pakistan data from 1976 to 2010. In effect, the empirical study finds four important findings. First, trade openness significantly affects inflation. Second, quasi-money and money have an insignificant impact on the price of commodities. Third, openness in the financial market has a significant impact on inflation. Last but not least, real exchange rate affects price significantly. The finding has a far-reaching effect on policy implications for Pakistan. However, it is impossible to make a generalization regarding the short term and long term relationship between inflation and trade openness.

Moser and Rose (2014) using 200 regional trade agreements (RTA), 20 years of data and 80 countries the authors try to measure the effect of the news of RTA on stock market price. The stock prices are adjusted for international stock market movement. In effect, the paper finds that stock prices rise when the trade agreement is between big trading countries. Further, the result shows that when the trade agreement is made between poor countries the stock price increases. Additionally, when the regional trade agreement (RTA) is with small partners the stock price increases. However, the result does not show trade diversification in response to a regional trade agreement (RTA). Therefore, the finding shows that all trade agreement does not result in an increase in the stock market price. In fact, it only shows that when the trade level is high and the agreement is between countries has a positive implication on the stock price.

From the productivity of domestic firm's point of view Doan, Nguyen, Vu, Tran & Lim (2016) studied the impact of trade liberalization (import penetration) on the productivity of domestic firms. The focus area of the study is in Vietnam from 2000 to 2009 and authors use panel and instrumental variable method to identify the causal effect. Accordingly, the finding shows that liberalization or import penetration affects negatively the productivity of small domestic firms.

However, in terms the magnitude, the effect is very small. Nonetheless, when the import penetration is very high it has a potential of killing small domestic firms. Similarly, to the previous papers the finding in this paper cannot be generalized as a valid for all countries. It is difficult to generalize because the level of technology, human capital, and other important variables could be significantly different among countries.

2.2.4 Impact of Trade agreement on Foreign directed investment

Baltagi, Egger & Pfaffermayr (2008) studied the effect of regional trade agreement (RTA) on foreign directed investment (FDI). The underlying assumption is that when countries engage in regional trade agreement (RTA) it has two effects. First, it increases the FDI towards the host countries and countries with a lower wage. Second, decreases FDI towards non-signatory countries and countries with a higher relative wage. To examine this possible scenario the authors studies the impact of European free trade area (EFTA) agreement on foreign directed investment (FDI). Accordingly, their study found that RTA has a positive impact on the host countries. However, due to the scarcity of resources this increase is augmented through a decrease in FDI in non-signatory countries. It has also an impact of relocating of investments towards countries with a lower wage. This paper went further one step beside analyzing the effect of RTA on trade flows between the signatory countries.

Liargovas & Skandalis (2012) in their paper they examine the role of trade openness through free trade agreements on attracting foreign directed investments (FDI). The study takes 36 developing countries from Africa, Asia, Eastern Europe and Latin America for the period of 1990 to 2008. The study took trade openness and other important macroeconomic variable to quantify their effect on foreign directed investment (FDI). Accordingly, holding other variables constant an increase in trade openness has a long-run positive effect on export-oriented foreign directed investments (FDI). The finding of Liargovas & Skandalis (2012) is similar to what Baltagi, Egger & Pfaffermayr (2008) found.

In similar vein, Naveed & Shabbir (2006) examine the causality between trade openness, foreign directed investment (FDI) and economic growth. To achieve their objective the authors use panel data from 1971-2000 for 23 developed countries. Accordingly, Naveed & Shabbir find that trade

openness significantly causes economic growth while foreign directed investment fails to cause economic growth. However, unlike the result of Sakyi, Villaverde & Maza (2015) the result here is one directional that is trade openness causes economic growth but not the other way round.

In a further wellbeing and human development implication Nourou (2015) studied the effect of openness in mitigating excessive food price and their implication for human development. The study takes into account 74 less developed countries and with a span of data from 1980 to 2012. At the outset, the study finds that a positive shock in food price has a negative effect on life expectancy at birth while a negative price shock fails to affect the human development indicator. The last finding is important from a policy point of view because family do not react immediately regarding the decision of sending their children to school. Therefore, according to this paper timely openness of trade could decrease the negative effect of food price shocks on life expectancy at birth. However, regarding the effect on human capital is not clear because they are significantly affected by food price.

2.2.5 Impact of Trade agreement on Environment

From environmental and ecological side Tsai (1999) studied the impact of trade liberalization on the environment. At the outset, the paper tries to show that trade liberalization could improve environmental quality through kicking inefficient firms from the market. The finding shows that under both Cournot and Bertrand competition model both partial and full liberalization improves environmental quality. The finding is robust because it is valid for both Cournot and Bertrand competition and further works under partial and full liberalization. However, it fails to take into account important features such as oligopolistic competition among local firms, local consumption, transboundary pollution, and general equilibrium problems. Therefore, the finding is very simplistic and would be difficult to make a meaningful economic decision. However, the study could be used a springboard for further study in the area.

Hua & Boateng (2015) investigate the long-term relationship between trade, economic growth, financial openness and emission of carbon. In this study, Hua and Boating use 37 years of data (1970-2007) from 167 countries. Further, the authors employ a dynamic generalized method of moment and panel least squares to solve misspecification of models in the previous studies.

Accordingly, they find that there is a strong relationship between trade, economic growth, environment and financial openness in advanced countries.

López & Galinato (2005) in their seminal paper examine the effect of trade openness and economic growth on deforestation. To achieve their objective they make cross-country analysis using countries such as Brazil, Malaysia, Indonesia, and Philippines. Trade openness and economic growth affect deforestation through poverty, agriculture expansion, and road construction. For instance, trade openness increases forest coverage in Brazil and the Philippines through agricultural expansion. Further, economic growth has a negative effect on the forest coverage.

2.2.6 Impact of Trade agreement on Economic growth

Madsen (2009) using long data spanning from 1870 to 2005 and incorporating 16 advanced economies estimated the effect of trade openness on per capita growth and total factor productivity (TFP). According to their finding per capita growth is largely independent of trade openness. However, trade openness seems to have a significant impact in influencing total factor productivity. The total factor productivity (TFP) is increased through importation of knowledge from foreign countries. However, this result may not be the case in developing countries because they significantly lack human capital that can adopt the imported knowledge and technology.

Similarly, Sarkar & Bhattacharyya (2005) study the causality between trade openness and economic growth in the case of India and South Korea. The study aims to investigate whether outward oriented countries (trade openness) perform better than inward-looking countries (import substitution industrialization). To achieve their objective the authors use autoregressive distributive lag model (ARDL) to examine the long-term relationship between economic growth and trade openness. However, despite the aggressive persuasion of the world bank and International monetary fund (IMF) for countries to adopt trade liberalization in less developed countries, the empirical finding between India and Korea shows that there is no significant relationship between trade liberalization and growth.

In contrary to the previous two papers Sakyi, Villaverde & Maza (2015) found bidirectional causality between trade openness and income growth. The novelty of the paper is that it takes

into account 115 developing countries. The 115 countries are further categorized into three categories: upper-middle-income, lower middle-income, and lower-income countries. The second important contribution of the paper is the use of panel non-stationary Cointegration technique to solve the complications in the use of cross-sectional data. The finding of the paper underlines that trade openness is both a cause and an effect of income growth. The causality applies in both short term and long term. Following the finding, the authors recommend for policy makers to work for further trade openness.

Kali, Méndez & Reyes (2007) study the effect of trade structure, measured by trade partners and concentration of trade, on economic growth. The study is based on a notion that trade structure significantly affects economic growth. In this study, the authors went further than looking trade volumes and trade openness. In fact, they concentrated on the structure of trade as an important variable determining economic growth. Accordingly, the paper finds two important findings. First, the number of trade partners positively affects economic growth especially in the case of developed countries. Second, trade concentration affects positively economic growth particularly developing countries. The findings are robust even through applying different econometric specifications. For instance, despite changing the number of explanatory variables and making a correction on heteroscedasticity the result stands.

Similar to the previous papers Sarkar (2008) examines the relationship between trade openness and economic growth. Although the author used 51 less developed countries in the study, only the result of 11 rich countries with heavily trade dependence shows a significant relationship between openness and economic growth. In fact, for the majority of the countries, there is no long-term relationship between trade openness and economic growth. In summary, the result shows that only middle-income countries demonstrate a long-term relationship between trade openness and economic growth.

Santarelli & Figini (2006) went further than examining the relationship between growth and trade openness. In fact, the authors study the relationship between globalization and poverty. Further, the study investigates the relationship between government size, financial openness, and poverty level. Accordingly, the study finds that both trade openness and size of government affects the absolute poverty level negatively. However, the effect of financial openness is not

significant. With regard to relative poverty, the result differs. For instance, financial openness increases the relative poverty while trade openness does not affect relative poverty.

Jouini (2015) examines the empirical link between economic growth and trade openness for the gulf cooperation council (GCC) countries. The finding of the study shows that there exists a positive relation between trade openness and economic growth in both short run and long run. The result is robust and stands the test of different trade openness measures. The novelty of this paper is that it positively relates trade openness and economic growth in GCC countries.

2.2.7 Impact of Trade agreement on Agriculture sector

Grant and Lamber (2008) using modified gravity model examine the effect of regional trade agreements (RTA) on agricultural trade flow. Unlike the traditional gravity studies, who applies aggregate data, in this study the authors take separate data for agriculture and non-agriculture trade flow, conceding the effect could be different based on the type of products. Accordingly, the authors study if trade agreement increase agricultural trade flow more than non-agricultural products. Further, the study examines whether phases in the RTA agreement have a significant impact. The ex post finding shows that, there is an evidence confirming trade-flow of agriculture increasing more than non-agriculture. Further, it is evident it could take several years for trade agreement to take an effect on agricultural trade flow.

In similar vein, Sun and Reed (2010) through employing both Poisson Pseudo-Maximum-Likelihood (PPML) and gravity model they examine the effect of free trade agreements (FTA) on agriculture. Particularly, the study focuses on trade creation and diversion in response to trade agreements (FTA). In the outset, the paper finds that PPML estimation gives different result to OLS estimation. Particularly, when the zero trade is taken in to the study the finding from PPML fundamentally differ from OLS. Accordingly, the study finds that free trade agreements (FTA) such as ASEAN-China, EU-15, EU-25, and SADC increased agricultural trade among member countries. More specifically, EU-15 increases agricultural trade among members though diversion of trade while in the SADC it increases through trade creation. In fact, in case of SADC non member countries were also beneficial from the trade agreement. On contrary, NAFTA created trade diversion only. For that matter, NAFTA failed to create trade.

Similar to Sun and Reed (2010), Koo, Kennedy, and Skripnitchenko (2006) taking trade agreements such as the Caribbean community and common market (CARICOM), EU-15, the southern common market (MERCOSUR), and the North American free trade agreement (NAFTA), examine the effect of trade agreements on agricultural trade. However, uniquely from the previous papers the authors study the externality of the trade agreements as well. More specifically, the study examines the diversion effect of the trade agreement on non members as well. The diversion is studied through employing dummy variables. Accordingly, the finding shows that, on one hand NAFTA failed to have a significant effect in increasing agricultural trade flow between members. On other hand, the agricultural trade diversion from non-member countries in to member countries is insignificant. The possible explanation, for the insignificance of the NAFTA, is that the countries have already an established trade flow because of the proximity. The non-existence of diversion effect shows that non-members countries may not be affect by trade agreements.

Lambert and McKoy (2009), admitting non-existence of the effect of sectoral analysis on agriculture, the authors examine the effect of PTA on agriculture and food products. To achieve the objective, the paper employs gravity model and both intar-bloc and extra-bloc agricultural trade. Accordingly, the study shows that intra-bloc agricultural trade increasing due to preferential trade agreement (PTA). This finding confirms that, PTA results in creation of trade among signatory countries. However, the finding also confirms that it results in trade diversion from extra-bloc to intra-bloc countries. The diversion is particularly prevalent with developing countries.

Yanikkaya (2008) examine the effect of trade liberalization on employment in both developed and developing countries. The study finds that the increase in trade flow in response to an increase in the trade flow failed to increasing employment. The main explanation for the negative effect is due to liberalization is due to the fall of output following. Further, higher trade volume of trade negatively affected employment in the industry and service sector in developed countries. However, the employment in developing countries shows an increase in both industrial and service sectors. In a net shell, the study finds trade barriers have a positive effect on employment and perhaps limited adverse effects. On contrary, higher volume of trade have an adverse effect on industrial sector employment.

In another seminal paper, Anderson and Valenzuela (2007) estimate the effect of trade distortions on value added agricultural output in different countries. The study reveals that moving towards free trade farm income in developing countries increases. The move towards free trade results in alleviating poverty in developing countries. Further, the study found net food importers are also benefiting despite the term of trade distortions. However, the finding does not show each and every developing country farmers income improves from the globalization. Last but not least, own countries trade distortion policies tend to harm the agriculture sector more than the non-agriculture sector. In a nut shell, the research concludes that multilateral trade among countries is beneficial in improving farmer's net income.

Medvedev (2006) in his article studies the effect of preferential trade agreements (PTA) on the trade flow of member countries. To achieve the objective, the author employs world trade matrix and detailed enforced preferential trade agreements (PTA). In compiling the essential database, the author considers trade pattern between PTA countries is a weak measure of preferential trade. In fact, using gravity model and total trade to estimate the effect of PTA on Trade flow between signatory countries will result in a biased PTA coefficient. More specifically, the coefficient would be downward biased. Therefore, the author aspires to solve the problem through using world trade matrix and detailed enforced preferential trade agreements (PTA). Accordingly, the author finds the aggregate trade agreements have a significant effect on trade flow. However, the marginal impact among trade agreements differs. For instance, the impact of south-south preferential trade agreements is more than north-south preferential trade agreements. Further, the finding shows that the north-north agreement to have affecting significantly.

In more particular and relevant article, Aghrout (2007) examines the impact of bilateral trade agreement. More specifically, the author examines Algerian trade association agreement with European Union (EU). The finding shows that, the new association agreement results in eliminating the preferential status of Algeria with European countries (EU). However, Algeria remains to benefit from the trade agreement for the export items. Last but not least, the author also examines the potential effect of the trade agreement on foreign directed investment (FDI) flow in to Algeria. Accordingly, the result shows that the effect is minimal. The potential effect is that the agreement affects the FDI slightly and this is also in line with the general FDI flow in to the region.

Another important article by Miljkovic and Shaik (2010), estimate the impact of trade openness on technical efficiency of agriculture sector in the US. The study is conducted using stochastic frontier analysis (SFA). The finding shows that trade openness fails to influence significantly the technical efficiency of the agriculture sector in the US. Further, there is no difference even after divining the trade openness in to the share of export and import. The finding means that importing agricultural commodities after removing some tariff barriers fails to boost the agriculture productivity in the US. Similarly, export increase due to fewer barriers in trading countries fails to increase the technical efficient of agriculture in the US. Therefore, the trade openness does not have a positive effect on the technical efficiency of agriculture sector.

Chapter 3

Methodology and data

3. Methodology and data

In this section the empirical methodology and the data we are going to use in the study will be elaborated in detail. The methodology discusses two methods (panel data and gravity model) we are going to use to find the causality between free trade agreement, trade openness and some macroeconomic variables.

3.1 Methodology

In this research one notable estimation techniques and another new method will be used. The first one is the traditional gravity model following the works of Anderson (1979), Deardorff (1998), Baier and Bergstrand (2001), Eaton and Kortum (2002), Anderson and van Wincoop (2003) and Baier & Bergstrand (2007). According to this model the impact of trade agreement can be estimated using the gravity model as follows:

$$In\left[\frac{PX_{ij}}{GDP_iGDP_j}\right] = \gamma_0 + \gamma_1(InDIST_{ij}) + \gamma_2(ADJ_{ij}) + \gamma_3(LANG_{ij}) + \gamma_4(FTA_{ij}) - InP_i^{1-\delta} - InP_j^{1-\delta} + \varepsilon_{ij} \quad \textbf{(1)}$$

Where PX_{ij} is the value of trade flow from country I to country j through export of i and import of j, GDP_iGDP_j indicates the nominal domestic product in country I and j respectively. While $DIST_{ij}$ Measures the geographical distance between country I and j from their economic center (capital city in most cases). Since similarity of language plays an important role in trading a binary variable $LANG_{ij}$which have a value of one if the language is the same and zero if they have different language is incorporated. Similarly, since sharing border with a country could play an important role in the gravity model a binary variable ADJ_{ij} is taken in to account. Last but not least, membership in to free trade agreement is taken in to account that is FTA_{ij}.The last two price terms $P_i^{1-\delta}$ and $P_j^{1-\delta}$ are multilateral resistance terms and they can be estimated according to equation 2.1 to 2.N. While ε_{ij} are assumed to be a log normally distributed disturbance term.

Subject to N equilibrium conditions the gravity equation is estimated. Accordingly we find the following:

$$P_1^{1-\delta} = \sum_{i=1}^{N} P_i^{\delta-1} \left(\frac{GDP_i}{GDP^W}\right) e^{\gamma_1(InDIST_{i1})+\gamma_2(ADJ_{i1})+\gamma_3(LANG_{i1})+\gamma_4(FTA_{i1})} \quad \textbf{(2.1)}$$

$$P_2^{1-\delta} = \sum_{i=1}^{N} P_i^{\delta-1} \left(\frac{GDP_i}{GDP^W}\right) e^{\gamma_1(InDIST_{i2})+\gamma_2(ADJ_{i2})+\gamma_3(LANG_{i2})+\gamma_4(FTA_{i2})} \quad \textbf{(2.2)}$$

$$\vdots$$

$$P_N^{1-\delta} = \sum_{i=1}^{N} P_i^{\delta-1} \left(\frac{GDP_i}{GDP^W}\right) e^{\gamma_1(InDIST_{iN})+\gamma_2(ADJ_{iN})+\gamma_3(LANG_{iN})+\gamma_4(FTA_{iN})} \quad \textbf{(2.N)}$$

According to the authors this estimation help find unbiased estimate of $\gamma_0,\ \gamma_1, \gamma_2, \gamma_3\ and\ \gamma_4$. Therefore, in this research as a starting point and comparison tool the gravity model will be estimated. However, I expect to face some of the common problems in estimating cross-sectional empirical work. For instance, if any of our explanatory variables are correlated with the disturbance term that exogenous variable will be endogenous and estimating using ordinary least square (OLS) could yield inconsistent and biased estimate. For instance, Brada and Mendiz (1985) and Frankel (1997) found that FTA binary variable and DIST variable have statistically significant correlation. Accordingly, we could have potentially measurement error, simultaneity and omitted variable. Therefore, testing the results for these problems and estimating using another model will be vastly important. In fact, it could boost the robustness of the finding. In a refinement, to test for omitted the variables case the gravity model will be also extended to include variables such as population and landlockedness in to account. Lock will have values 0,1,2 representing none are landlocked, only one country landlocked and all countries are land locked respectively.

$$In\left[\frac{PX_{ij}}{GDP_i GDP_j}\right] = \gamma_0 + \gamma_1\left(InDIST_{ij}\right) + \gamma_2\left(ADJ_{ij}\right) + \gamma_3\left(LANG_{ij}\right) + \gamma_4\left(FTA_{ij}\right) + \gamma_5 In(POP_{it}) + \gamma_6(LOCK_{ij}) - InP_i^{1-\delta} - InP_j^{1-\delta} + \varepsilon_{ij} \quad \textbf{(3)}$$

The second and main estimation technique is relatively new to macroeconomics but widely used in labor economics is the Panel data estimation technique. According to this methodology, countries are categorized based on observables and we will group then into two equal groups. The first group is the treatment group which means that countries who introduce bilateral and multilateral trade agreements. The second group includes the control group or countries who either do not introduce trade agreement or who did after some time. Hence, our main model will be the panel data because it would be difficult to capture the effect of free trade agreement on economic growth, foreign directed investment, human development and women's decision making using the gravity model. Therefore, we will use the gravity model to estimate the effect of FTA on trade flows only.

The model for panel data are based on Romer (1990) and Barro and Sala-i-Martin (1994). The basic model assumes the production function for single commodity is as follows:

$$Y_t = AH_t^{\propto} K_t^{1-\propto} \qquad (4)$$

Where A is the exogenous state of technology, H is human capital, K is physical capital. t represents time period and $\propto$ share of human capital. if we change the same model in to growth equation we will have :

$$g(y) = F(y_0, y^*) \qquad (5)$$

Where $g(y)$ represents the growth rate of output per capita, y_0 is the initial level of output per capita and y^* output per capita in the long run. The growth in output per capita$g(y)$, is inversely related to the current level of output per capita according to classical model.

This model is estimated using pooled OLS, fixed effect (FE) and random effect (RE) model. We further incorporated trade openness (Openness), previous GDP (D_gdp), foreign directed investment (FDI), human development (hdi), and womens fertility (fertility) representing as an initial state .

$$g(\ln\_gdp) = F(opennes_t, d_{gdp_t}, hdi_t, FTA_t, fdi_t) \qquad (6)$$

Further since the main interest of this research are trade openness , free trade agreement, human development, foreign directed investment, women's decision making and economic growth we estimated further models. Those include

$$g(\text{fdi}) = F(opennes_t, d_{gdp_t}, hdi_t, FTA_t,) \quad (7)$$

This model is used to estimate the effect of trade openness and free trade agreement on foreign directed investment.

$$g(\text{fertility}) = F(opennes_t, d_{gdp_t}, hdi_t, FTA_t, fdi_t) \quad (8)$$

The above model is used to estimate the decision making of women. The model assumes women's decision of having children reflects their decision making in the household.

$$g(\text{hdi}) = F(opennes_t, d_{gdp_t},, FTA_t, fdi_t) \quad (9)$$

The last equation shows that human development of a country as influenced by trade openness, gross domestic product (GDP), foreign directed investment (FDI) and free trade agreement (FTA). In case of the FTA we have taken different trade agreements including with EU, turkey, and regional agreement (Jordan, Egypt, morocco and Tunisia).

3.2 Data used in the study

The data for this research will compiled from different sources. From international monetary fund (IMF) database we will use nominal bilateral trade flows and the span of the data would be from 2000 to 2014. Further, to estimate the gravity model nominal GDP from the World Bank development indicators (2015) will be used; to create the real GDP they will be scaled using the GDP deflator. From CIA fact book and Research and expertise on the world economy (CEPII), variables such as distance (DIST), language (LANG), population (POP), common boarder (ADJ) and lad lockedness (LOCK), will be compiled. Data regarding membership in a preferential trade agreement (PTA) will be taken from WTO database.

The data set will be organized in two ways. First, gravity database will include the mentioned data from 1950 to 2000. Further, the data will encompass from all countries of the world. However, we will use this data only to estimate the impact of FTA on trade flows. This database is substantiated by gravity data for the agricultural trade flow. The span is from 1999 to 2013 and it includes Algeria, Egypt, Morocco and Tunisia as reporting countries and the rest of the world as partner countries. This database is used to estimate the trade flow in Agriculture in general and Vegetable, cereals, dairy and honey, live animals and animal and vegetable fat in particular.

In contrast, to find the causality among trade openness (openness), free trade agreements (EU, Agadir, Turkey, and EFTA), economic growth (ln_gdp), human development (hdi), women's fertility (fertility) and foreign directed investment (FDI) we will use a panel data from 2000 to 2014 for north African countries only. In fact, this last dataset will be our main resource in this research.

Chapter 4

Statistical Trade Analysis of North African countries

4 Statistical Trade Analysis

4.1 Introduction

Before diving to the estimation of gravity model answering three crucial questions is vital. First, studying the trade flow of the country is important; this is because the trade flow shows the foreign trade exposure of the countries. Second, it is vital to analyze the composition of traded commodities; this question answers the export diversification of the countries in the study. Further, the diversification of the export indicates the level of endowment and technology the North African countries have. Last but not least, identifying trade partners of the North African countries is important because it could reveal if the North African countries benefit from the trade partnership.

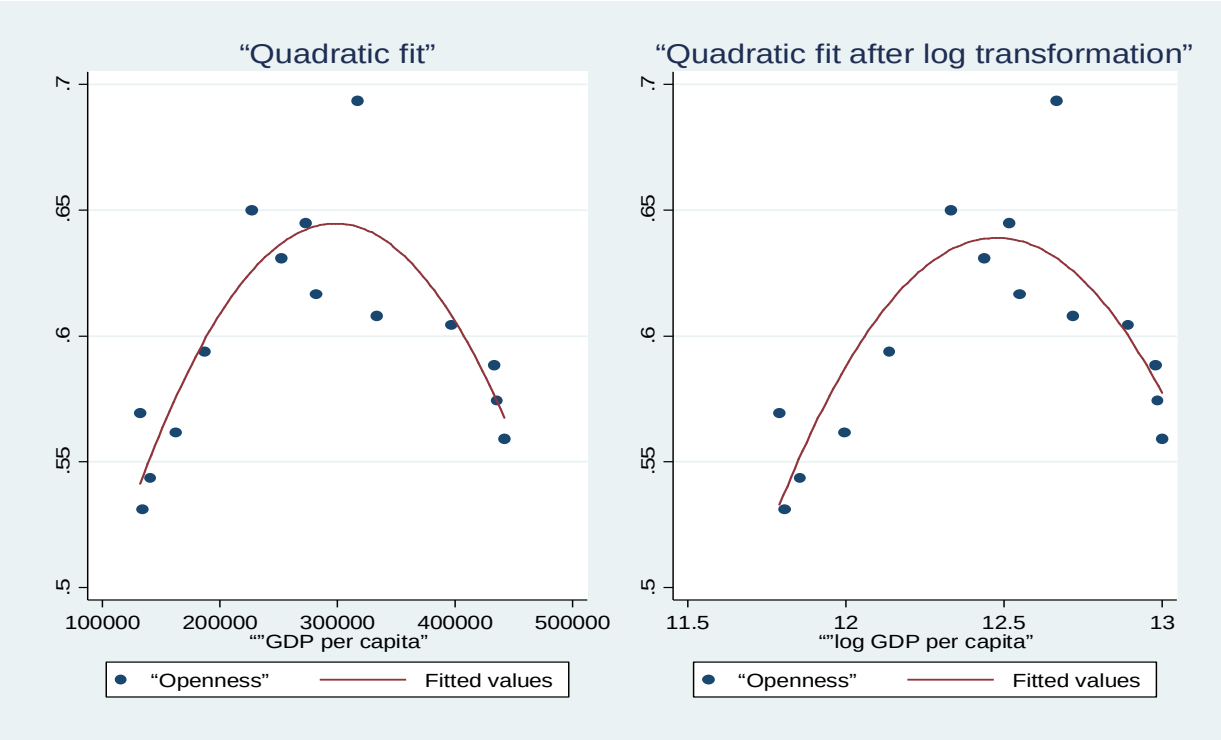
4.2 Trade openness of North African countries

In this section trade openness of Algeria, Egypt, Morocco and Tunisia will be derived. The most commonly used measure of openness is measured through adding export and import and dividing by gross domestic product (GDP). The openness index can be tracked through time and openness value of one indicates full integration to international trade and zero indicates no integration. In fact, the openness is measured in the following way:

$$\text{Openness} = \frac{Export+Import}{GDP} \qquad \text{equation (10)}$$

In the following graphs trade openness of North African countries are plotted. These variables are also used in chapter five of the estimation to identify the impact of trade openness on economic growth, foreign directed investment, human development index and women's fertility rate. Therefore, discussing them their evolution and identifying the reason for the change would be valuable. Accordingly, I have presented the openness for Algeria, Egypt, morocco and Tunisia respectively.

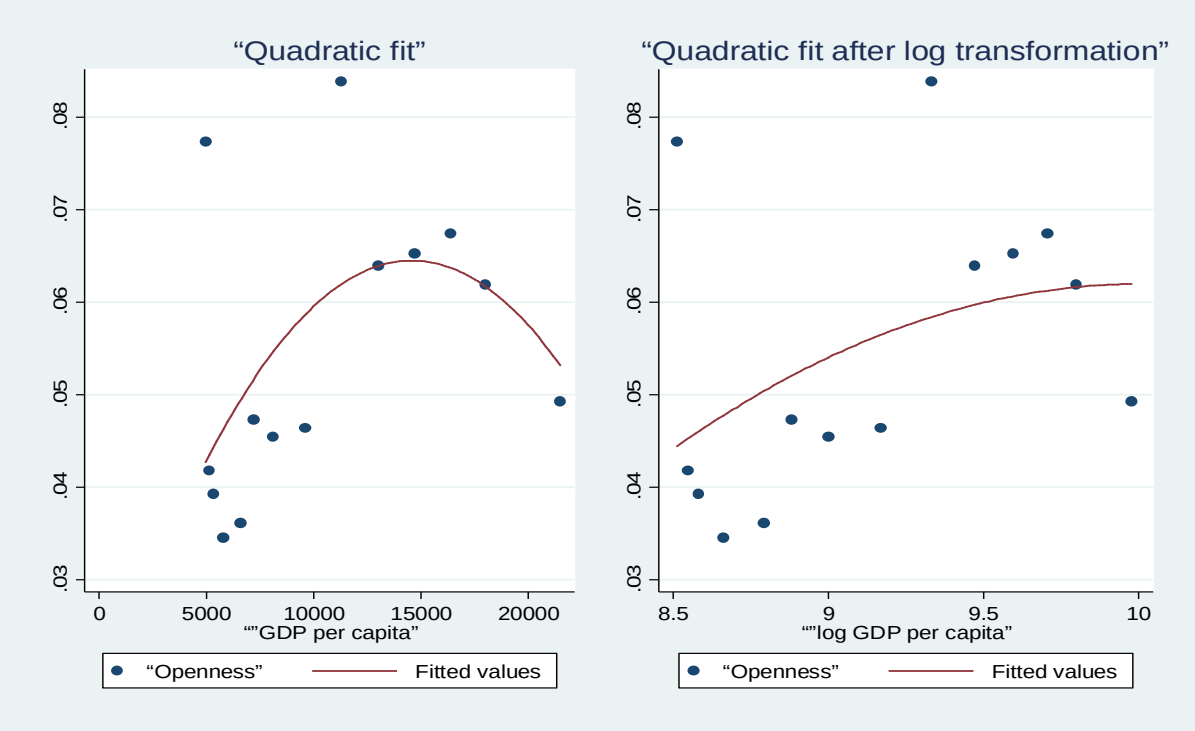
Figure 4 Algeria Trade openness



Source: World Bank Data and own calculation

The fitted line indicates Algeria with the level of per capital income it has to trade above the fitted line. However, Algeria does not necessarily trade on their potential because at some levels Algeria trade below its potential. However, this result will be difficult to use to compare between countries. In a similar vein, the graph of openness with log GDP per capita shows that often Algeria's participation in international trade is below its potential. However, similar to the figure on the left this result does not help in making cross-country analysis. The decrease in openness at a higher level of per capita income is due to decrease in the volume of trade in 2012 through 2014.

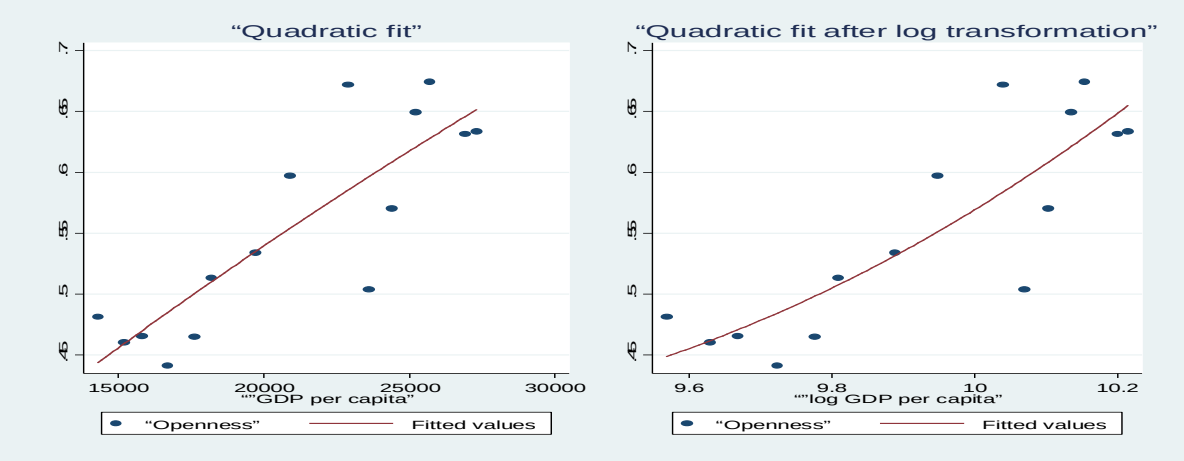
Figure 5 Egypt Trade openness



Source: World Bank Data and own calculation

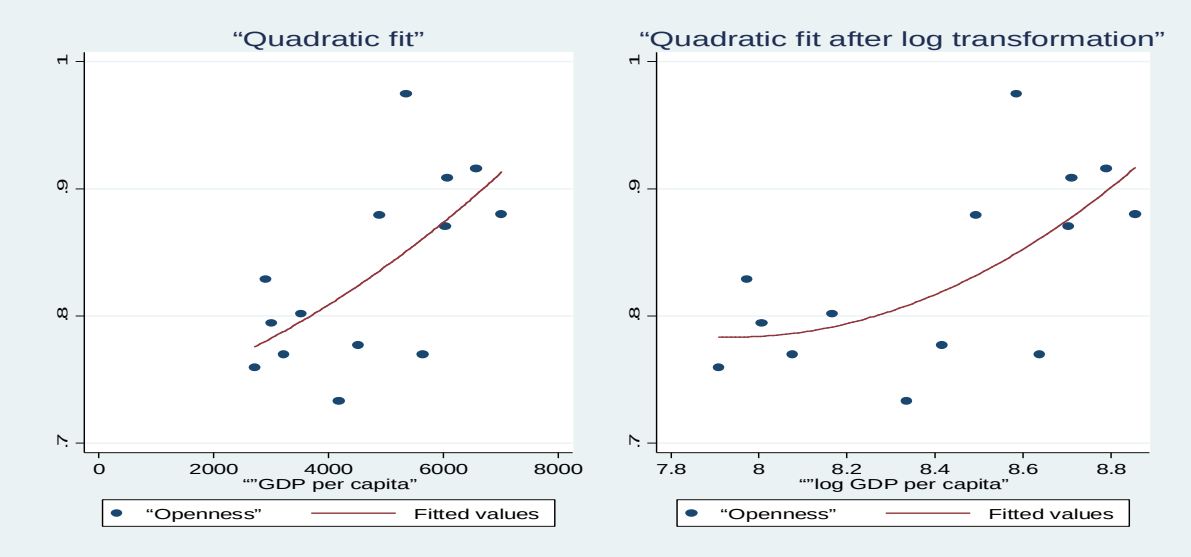
The openness index in case of Egypt shows that there is a potential for increasing international trade. However, the graph shows that there is a great stride in the later period special before the Arab revolution. Nonetheless, there is a room for further engagement of international trade in both regional and international level. Further, the openness increases as the per capital income increase with the exception of the years after the Arab spring.

Figure 6 Morocco Trade openness



Unlike the previous two cases, the trade openness of Morocco shows a persistent increase in openness in response to an increase in per capital income. Further, the trade openness share shows a significant involvement in international trade. However, as we can see there is an opportunity to increase trade relationship with both Middle East and North African countries (MENA) and international market.

Figure 7 Tunisia Trade Openness



Last but not least, Tunisia's trade openness shows that Tunisia is heavily integrated into international trade as compared to Algeria, Egypt, and Morocco. Further, similar to Egypt and

Morocco trade openness increases as per capita income increases. However, similarly, there is a room for further trade integration with both MENA countries and countries out of the region.

Table 1 Openness estimation result

VARIABLES	(1) ln_openess	(2) ln_openess	(3) ln_openess	(4) ln_openess
ln_gdppc	1.038***	0.694***	0.694***	-0.998***
	(0.0550)	(0.0497)	(0.0497)	(0.00175)
ln_pop		-0.943***	-0.943***	-1.000***
		(0.0799)	(0.0799)	(0.000554)
ln_trade				0.999***
				(0.000985)
Constant	-15.18***	6.524***	6.524***	-0.00146
	(0.736)	(1.918)	(1.918)	(0.0125)
Observations	58	58	58	58
R-squared	0.850	0.960	0.960	1.000

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The regression result shows that GDP per capita is significant in all four models. This result reveals that as GDP per capita increases the openness of trade increases. Similarly, the variable population is found to be significant indicating that the openness increases as the population size increases. The result above includes country fixed effect to eliminate the problem of omitted variable bias. Therefore, consideration of country fixed effect in this estimation solves the problem of correlation between the explanatory variable and the disturbance term.

4.3 Import and Export composition of north African countries

The composition of commodities exported and imported are valuable indicators for several reasons. For example, identifying the commodities imported could be valuable because it can reveal whether the imported commodities are going to create a value in the future. Particularly, capital goods are expected to increase the productivity of a country. While consumption goods although they could increase the welfare of the people they may not create a value in the future. Therefore, in this section, the paper will discuss the import and export component of countries.

4.3.1 Algeria import and export compositions

As can be seen, from the graph below the two main import components of Algeria are capital and consumption goods. On one hand, capital goods import accounts on average 33.8 % of the import value from 2000 to 2014. On the other hand, import of consumption goods constitutes on average 22.9 % from 2000 to 2014 period. However, capital and consumption good import show volatility. For instance, in 2009 import of capital and consumption goods constitute 37.38 % and 19.8% respectively. However, in 2012, this was reversed and import of capital and consumption goods constitute 26.7% and 32.2% respectively.

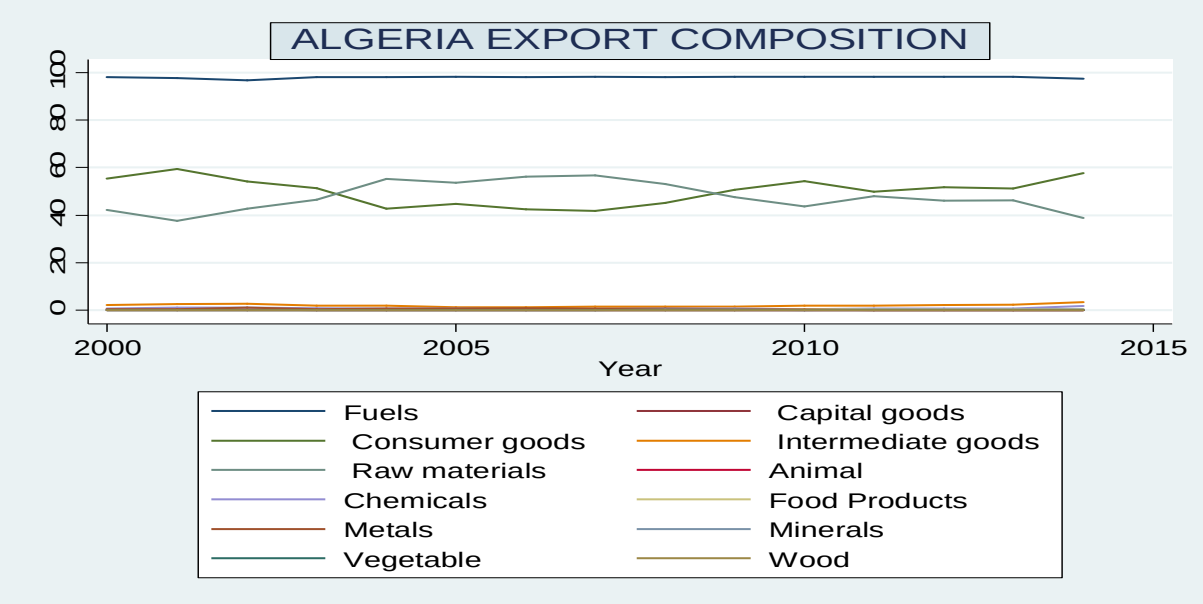
The detail component based on the 1992 harmonized system (HS2), depth of imports, shows that 23% are machines, 15% transportation, 11% metal, 8.4% chemical, 8.2% mineral and vegetables and foodstuffs constitute 7.8% and 6% respectively. In general, the import items show that Algeria is importing commodities which are manufactured and require advanced knowledge and technology.

Figure 8 Algeria Import composition

In a similar vein, the export composition of Algeria shows that more than 90% of the export is fuel and fuel products. In fact, 42% of crude petroleum, 41% petroleum gas, and 13% refined petroleum constitute the lion's share of the export. This shows that more than 98% of the export items are mineral related. As a matter of fact, only the remaining 2% of export item are non-

mineral. Therefore, the figure reveals that the value addition into primary commodities is very low.

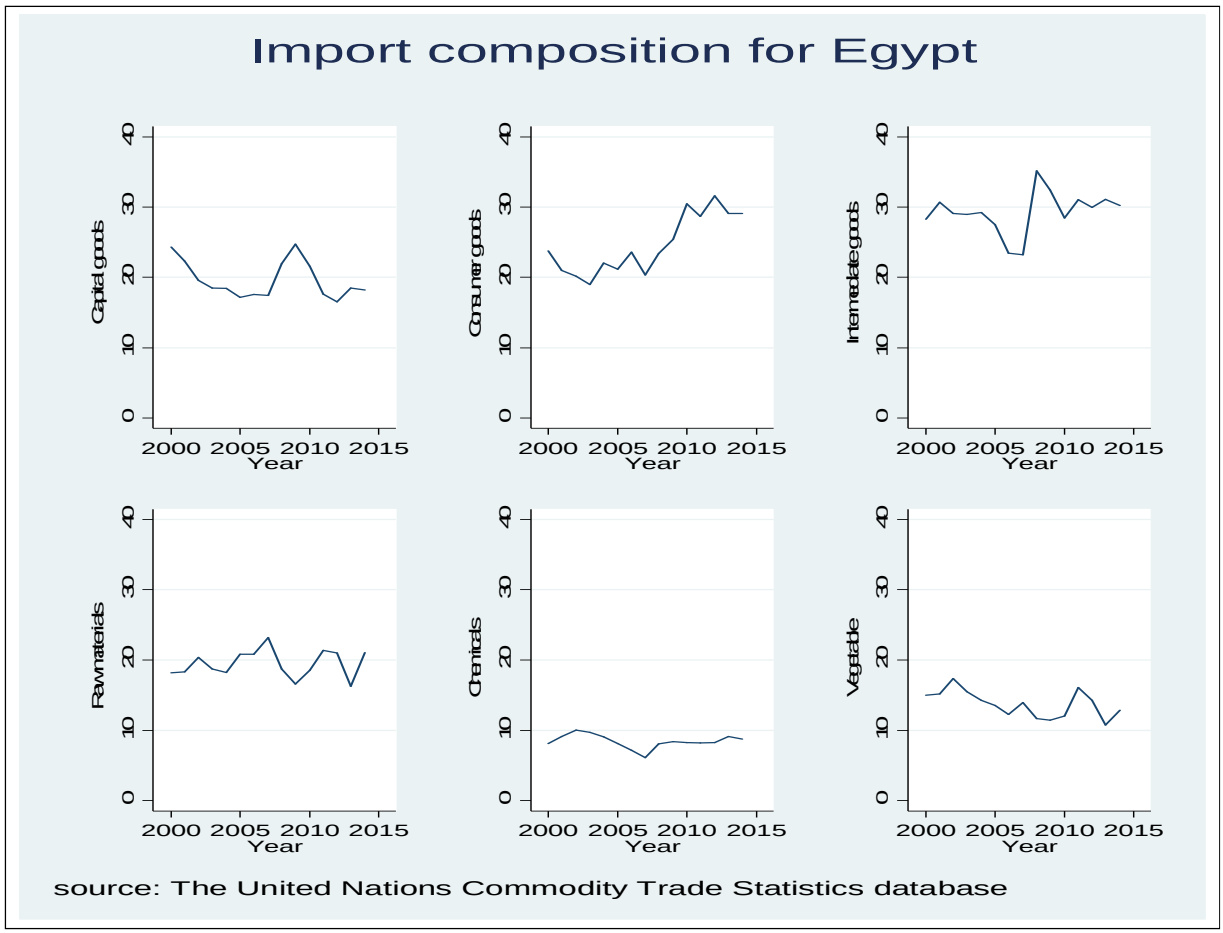
Figure 9 Algeria Export composition



4.3.2 Egypt import and export compositions

Egyptian import from 2000 to 2014 shows that on average the import of capital goods, consumption goods, raw materials, and chemical makes 19.6%, 24.6%, 29.2%, and 8.4% respectively. The figure shows us that similar to Algeria the import items are dominated by manufactured and productions which require an advanced level of technology and knowledge. However, unlike Algeria intermediate goods constitute a significant share of export. Further, vegetable imports constitute around 13% the import items. However, unlike the previous imports, vegetable imports reflect the weather and suitability of farming in Egypt. The only import which shows a persistent increase in the volume is consumer goods. The remaining main imports show volatility and remain more or less around the mean.

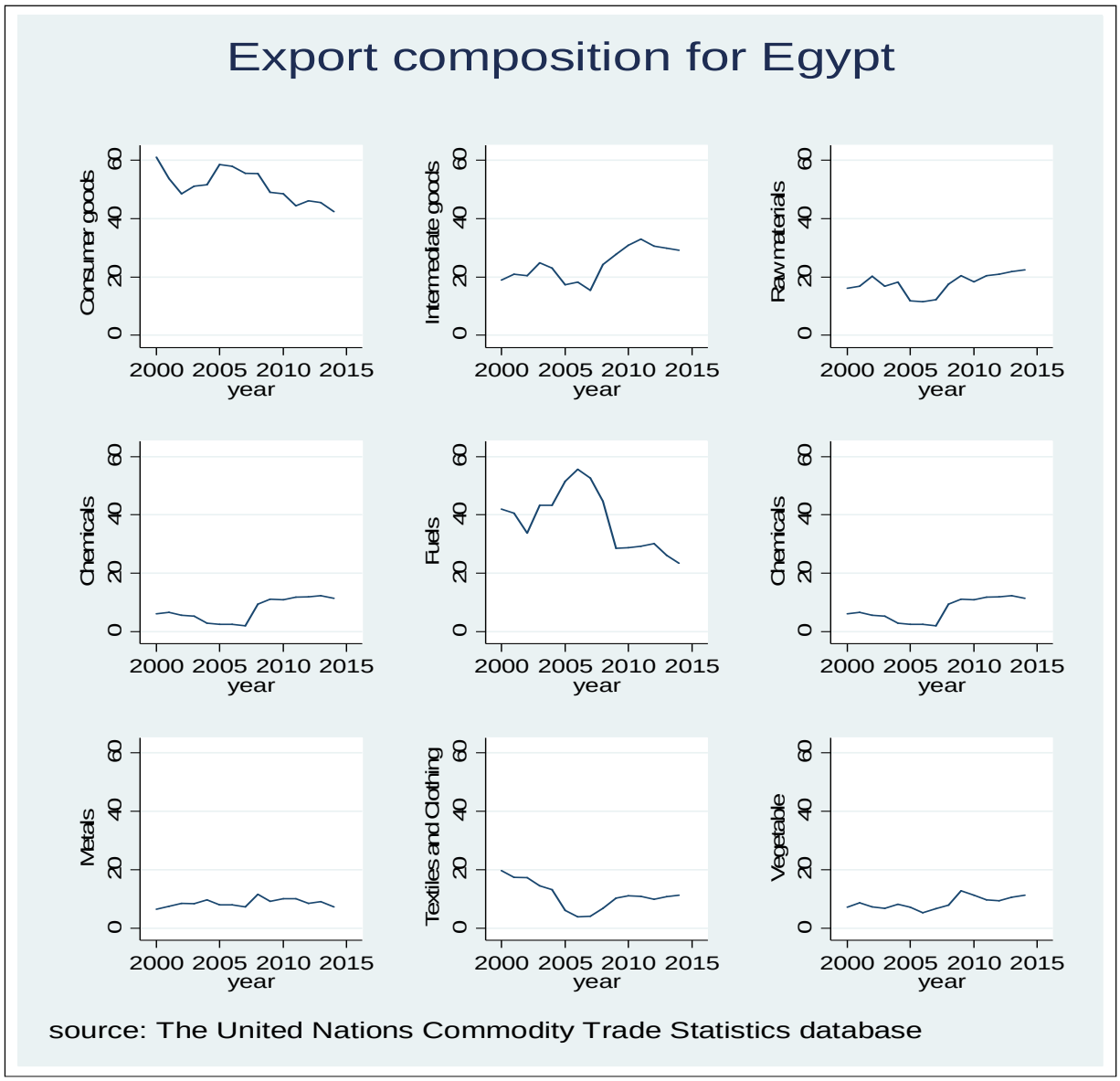
Figure 10 Import Composition for Egypt



Source: World Bank Data and own calculation

As can be seen, from the table below the lion's share of export comes from consumption goods and fuels. In fact, the export of consumer goods and fuel constitute 51.23% and 38.53% respectively. Despite there exists a presence of diversification in the export items it still remains heavily dependent on natural resources and products which require little capital in their production.

Figure 11 Egypt Export composition



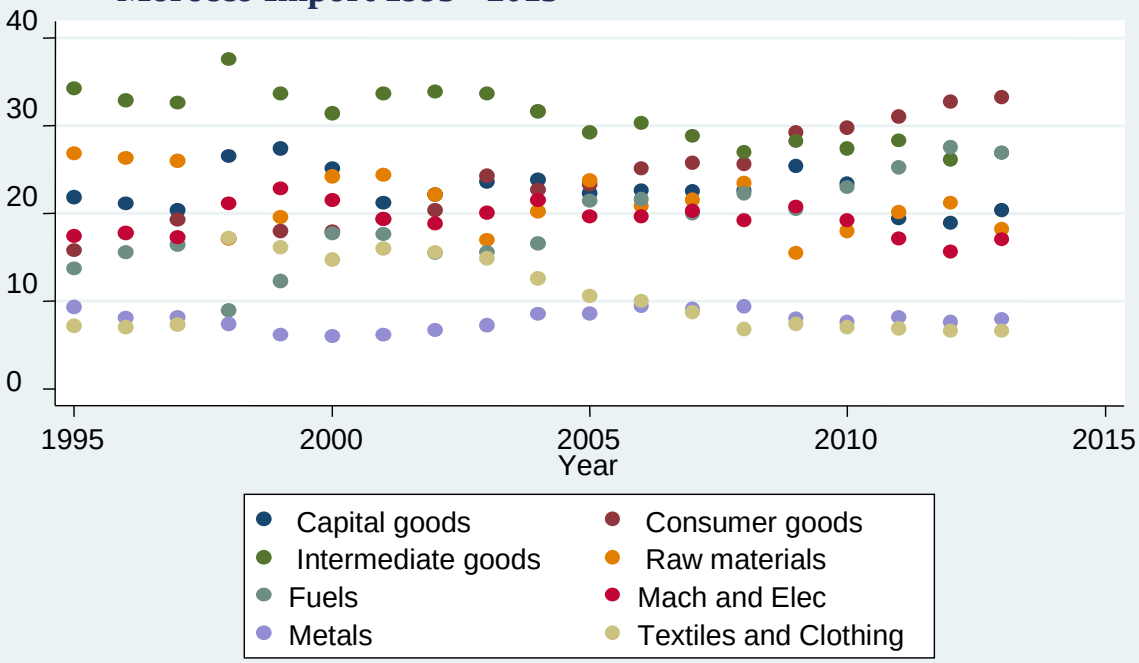
Source: World Bank Data and own calculation

4.3.3 Morocco import and export composition

The following graph shows the flow of import from the world market to morocco from 1995 to 2013. According to the figure, the import of intermediate good takes the highest share of the import although it steadily declined from 1995 to 2013. The intermediate good is followed by consumer goods which in fact show a significant increase since 1995 and reaching 33% in 2013. The other equally important items are capital goods and raw materials which constitute 22.7%

and 21.4% respectively on average. Last but not least, fuels, machines and electric, transportation, vegetable, and metals constitute a significant share of the import. In fact, fuels, machines and electric, transportation, vegetable and metals account for 18.9%, 19.3%, 7.6%, 9%, and 7.9% respectively.

Figure 12 Morocco Import composition

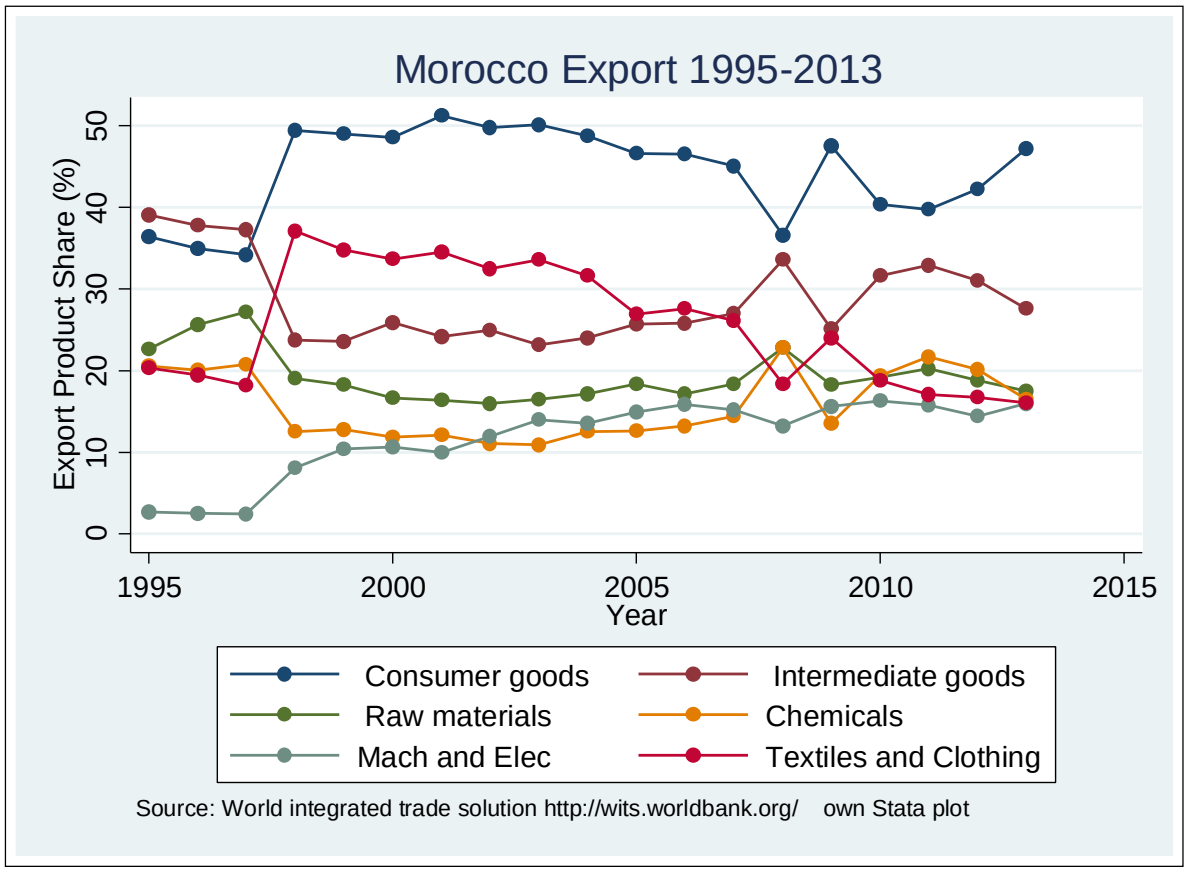


Source: World integrated trade solution http://wits.worldbank.org/

Source: World Bank Data and own calculation

Similar to North African countries the export items are dominated by either primary commodities or products from light industries. For instance, the export of raw materials accounts well more than 20 % of the overall export share. Further, consumer goods constitute more than 40% of the exported commodities.

Figure 13 Morocco Export composition



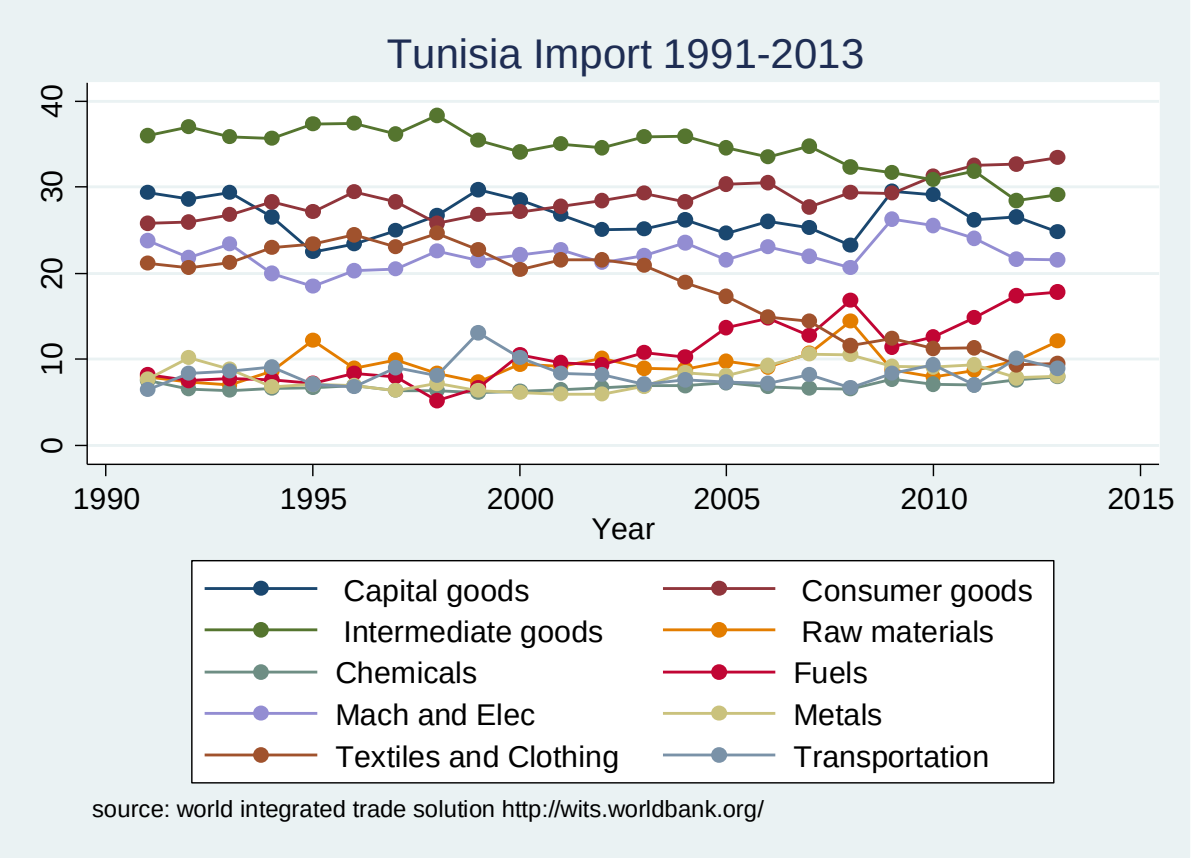
The one sector which shows a decrease in the export content is the textile and clothing export. At the end of 1990's this sector constitutes almost 40% of the export items but after the mid of 2005 and onwards started to decrease significantly and barely reached 10% in 2013. There are two possible explanations for this to happen. First, it could be morocco is losing the competition to other textile and cloth exporting countries. Second, domestic demand for local textile and cloth increases. At this point, the paper will not address this issue it will be discussed on the gravity model analysis.

One interesting figure from the export flow is the export of machines and electricity. The machines and electric category increased significantly from around 2% in 1995 to 16% in 2013. The increase in this category is boosted by the export of insulated wire which constitutes almost 10% of the total export while the other 6% is due to the export of cars.

4.3.4 Tunisia import and export composition

Tunisia is a 57th complex economy based on the economic complexity index (ECI). Further, Tunisia is 75th largest exporting country from the world based on 2013 data. The trade balance of Tunisia shows a negative balance throughout 1991 to 2013. From the graph below it is visible the three main importing items are intermediate goods, consumer goods, and capital goods. These import figures are similar to the previous North African countries

Figure 14 Tunisia Import composition



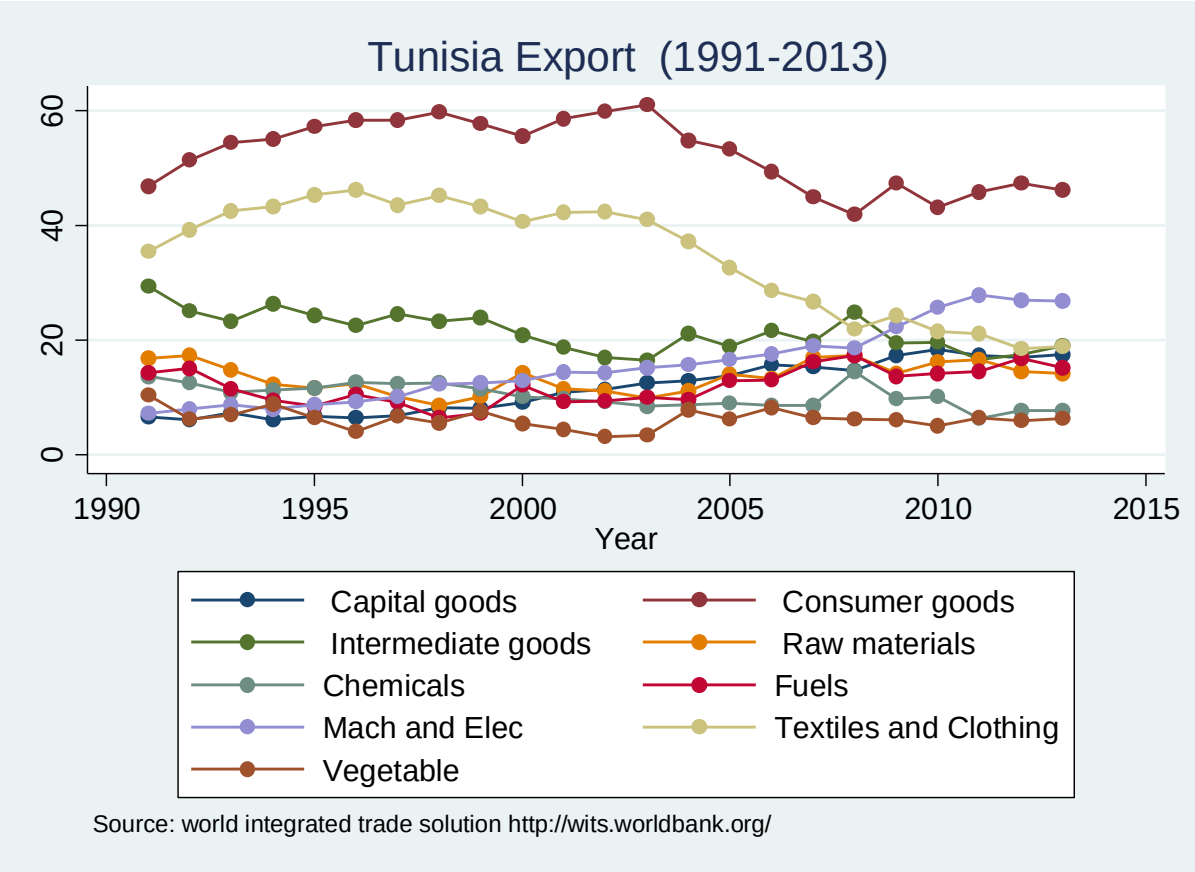
source: world integrated trade solution http://wits.worldbank.org/

The exception in the size of import is the share of textile and cloth which constitute around 30% of the imported commodities. In fact, it further increased from 30 % in 2013. In 2013, Tunisia becomes the 73rd importer from the world in terms of the total volume of import. Further, the import volume increased this will be discussed in the later section of the paper.

In the export sector unlike the import sector, there is a steady decrease in the value of exports. However, despite the decrease, the value of export Tunisia stands 75th largest exporting country

from the world based on the volume of trade 2013. When we examine closely the composition of exports we see consumer goods and textile and clothing constitute the significant portion. However, they are facing the same fate of export deterioration similar to other commodities.

Figure 15 Tunisia Export composition



Source: world integrated trade solution http://wits.worldbank.org/

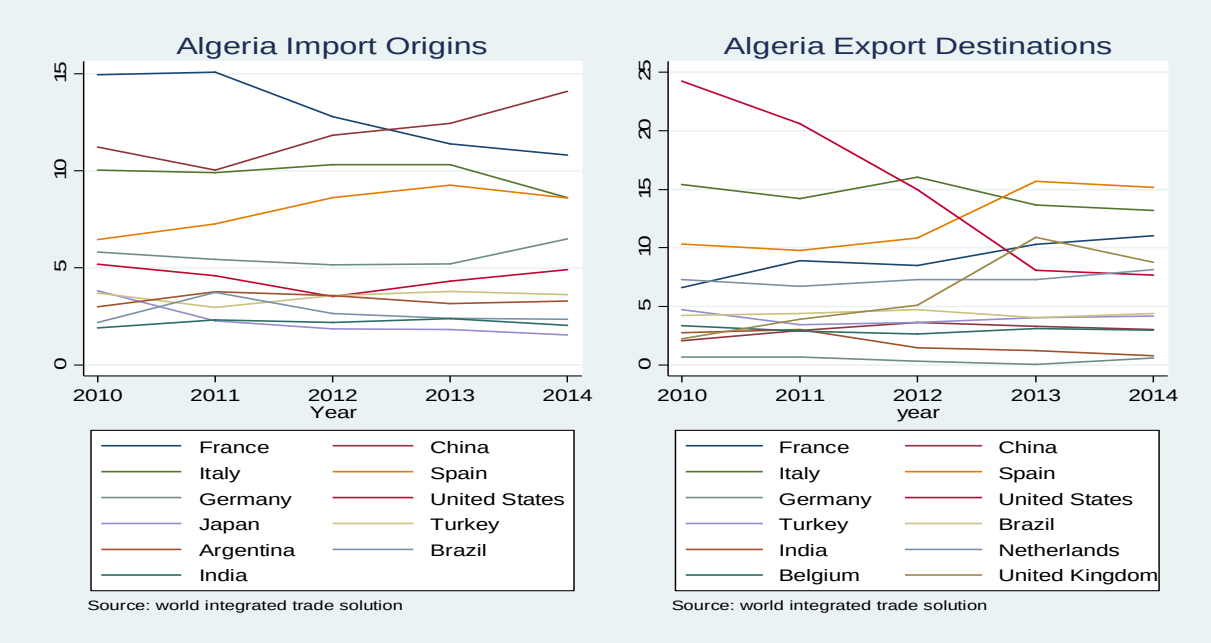
4.4 Trade origin and destination of North African countries

In this section both the origin and destination of trade partners of North African countries will be discussed. In this analysis, we will be able to identify both trading partners and dynamics in partnership of North African countries. Further, indentifying origin and destination of trade could provide valuable information regarding the priority of countries, whether they are integrated with advanced countries and the country's political stand. Therefore, for this effect in the following sub sections we will discuss in detail trade origins and destination of North African countries.

4.4.1 Algeria trade origins and destination countries

The top import origins of Algeria are France, china, Italy, Spain and Germany from first to fifth respectively. However, the trade partnership shows difference before and after 2013. For instance, before 2013 France was the leading import origin and followed by china. However, after 2013 china become the leading origin of Algeria's import and France follows in second. When we see the interregional trade between North African countries is very low.

Figure 16 Algeria trade origins and destination countries

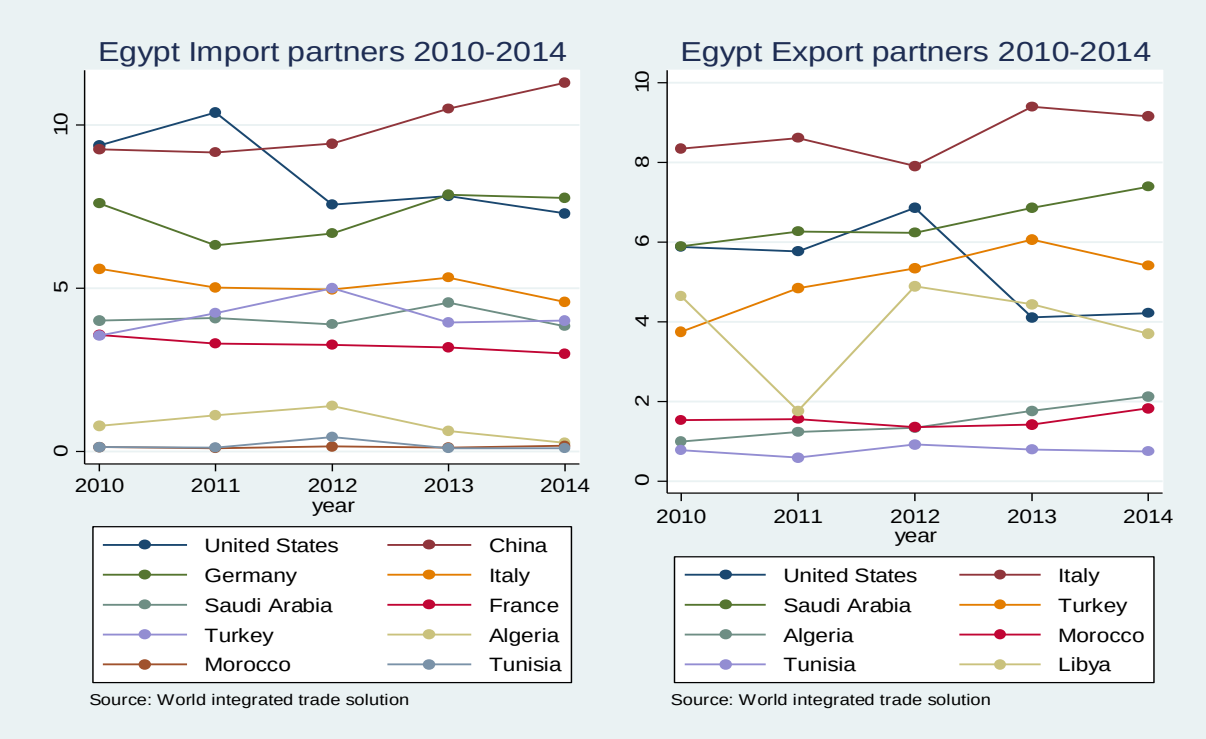


Post-2013 the top export destination of Algeria is Spain, Italy, France, the United Kingdom, and the United States. However, pre 2013 the top export destination were the united states, Italy, Spain, France and the united kingdom. In this section, I will not examine the reason for the shift in the trade partner's pattern. Similarly to the import origin of Algeria, the export destination of Algeria is to western countries. In fact, the export destination to the Middle East and North African countries is limited in both pre and post 2013. However, this does not mean there is an improvement in the export volume.

4.4.2 Egypt trade origins and destination countries

The top import origins of Egypt are china, the United States, Italy, Germany, and turkey. The imports from other North African countries account less than 2% of the imported items into Egypt. Further, the import from Middle East countries is very low. In fact, the only exception with this regard is the import from Saudi Arabia which accounts around 5% of the imported commodities. However, the historical increase in the import from Saudi Arabia does not show a significant improvement.

Figure 17 Egypt trade origins and destination countries

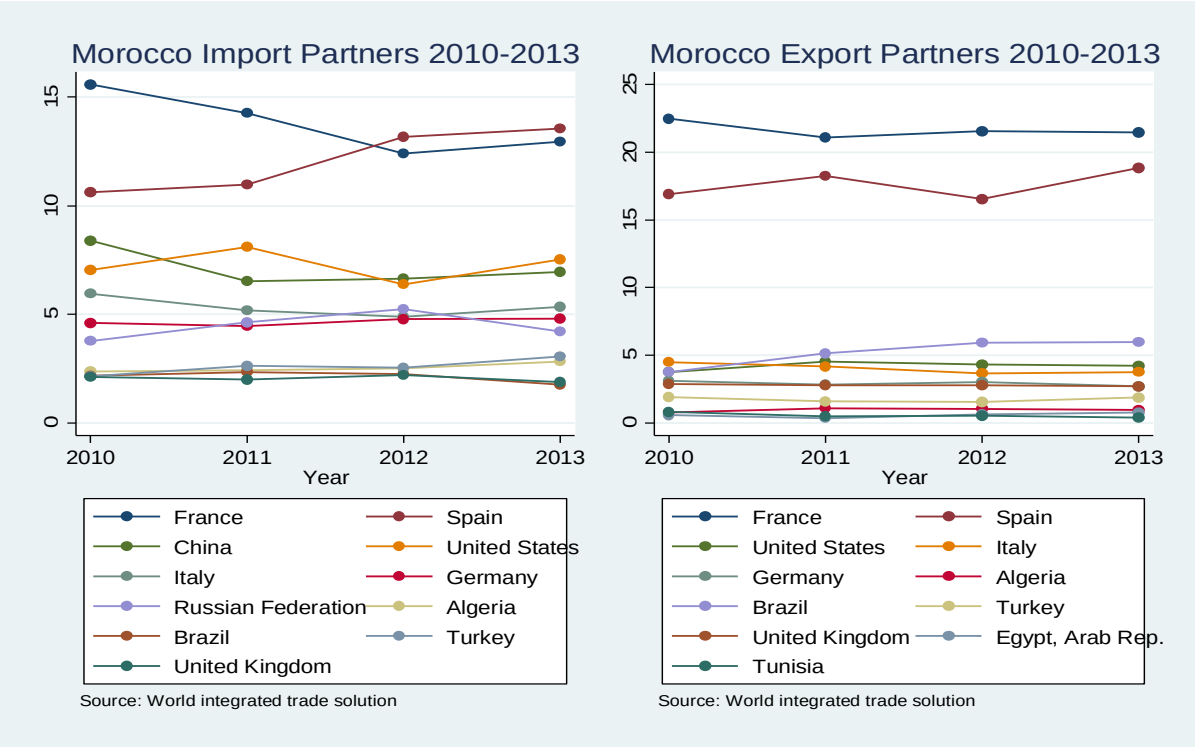


The top export destinations are Italy, India, Saudi Arabia, turkey, and Germany. This figure shows that the trade is skewed towards the trading partners. Particularly, the trade balance between Egypt and china and Egypt and the United States show trade flow in favor of china and the United States. The export between Egypt and Middle East and North African countries show that the trade volume is very low. The only exception here is the export to Libya which accounts 4% of Egypt's export share.

4.4.3 Morocco trade origin and destination countries

The top import origins of morocco are Spain, France, the United States, china and Saudi Arabia respectively. When we see the historical trade of trade origin there appears to be a change of dynamics. For instance, prior to 2012 France used to be the import origin of morocco. However, post-2012 trade shows that France been overtaken by Spain. Further, the import origin from china and the United States shows oscillation from year to year. Last but not least, unsurprisingly the import from the North African countries is very low.

Figure 18 Morocco trade origin and destination countries

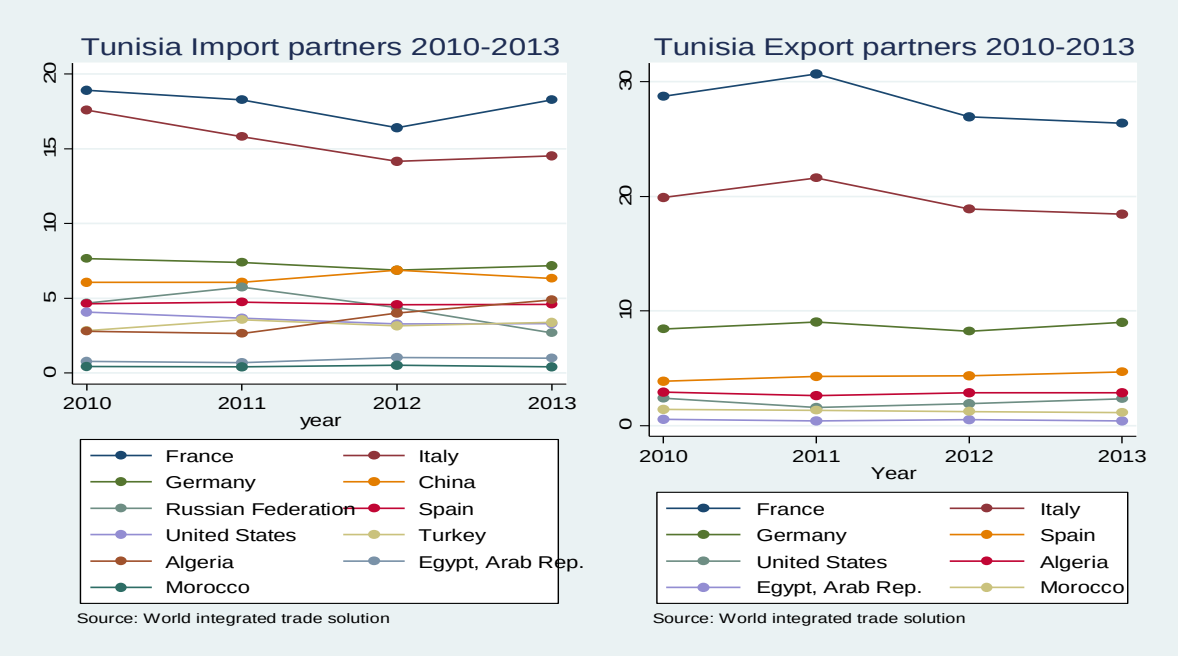


Unlike the import origin the export destination are dominated by France and Spain. In fact, the combined export constitutes more than 40% of the export destination. However, similar to import origin the export destination to North African countries is very low. The next important export trade partners for morocco are Brazil, Italy, and the United Kingdom. This graph clearly shows that there is a clear room for expanding trade with the Middle East and North African (MENA) countries. As can be seen, from the above graph despite the geographic and cultural advantage MENA countries are trading less among each other.

4.4.4 Tunisia trade origin and destination countries

The top import origins for Tunisia are France, Italy, Germany, China, Russian federation and Spain. The import from France and Italy constitute more than 35% of the imported products. Similarly to Algeria, Egypt and Morocco the trade flow among MENA countries is very limited. In fact, the import from all MENA countries constitutes less than 5% of imported commodities. Further, the import from Egypt and morocco constitute less than 2%. The only exception and with significant improvement is the import from Algeria which stands around 3% by the year 2013.

Figure 19 Tunisia trade origin and destination countries

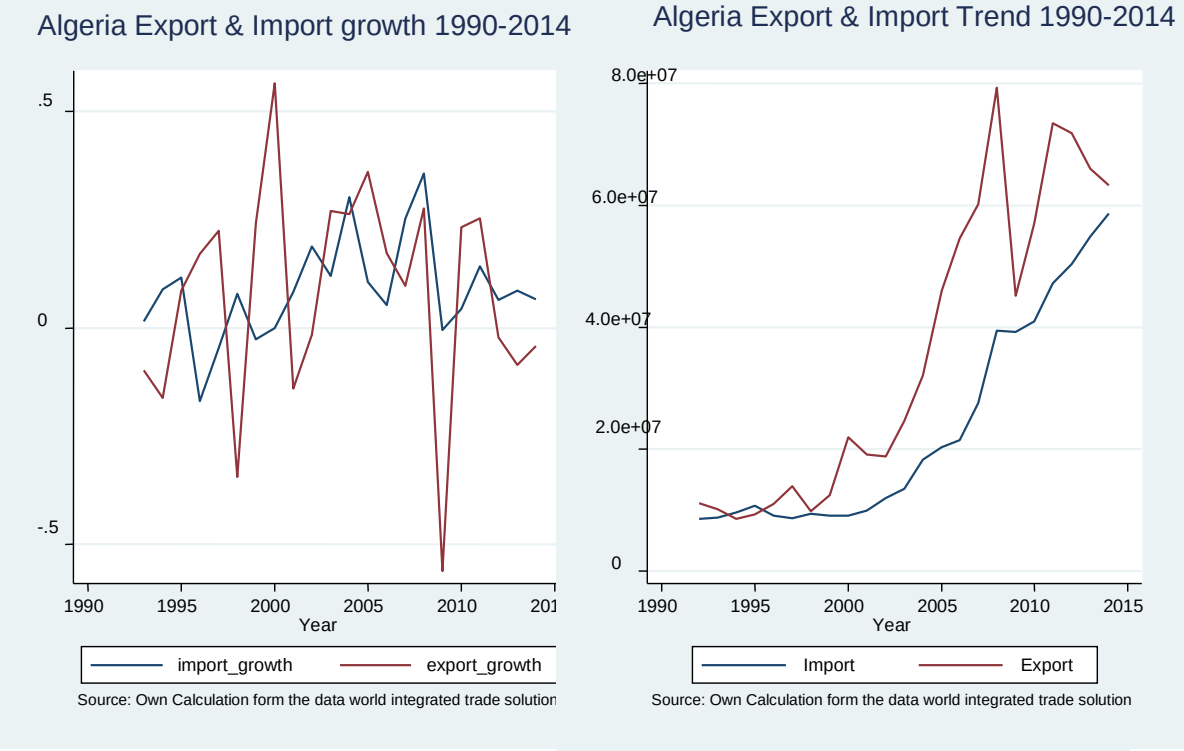


The top export destinations of Tunisia are France, Italy, Germany, Spain, and the United States. In fact, only exports to France, Germany and Spain constitute more than 50% of the exported commodities. However, the exported items into MENA countries constitute less than 10 % of the exported commodities. Therefore, similar to the above countries Tunisia could exploit the geographic and cultural advantage among MENA countries.

4.5 Growth orientation of Export and import

Algeria, unlike the other North African countries, enjoy trade surplus from 1992 to 2014. In fact, starting from 2000 to 2014 the export significantly increased as compared to the import value. The only exception we can see at the time of financial and economic crisis of 2008 to 2010. This figure is expected taking into account the main export destination of Algeria are France, Italy and Spain which are heavily affected by the economic crisis.

Figure 20 Trend and growth of Export and Import (Algeria)

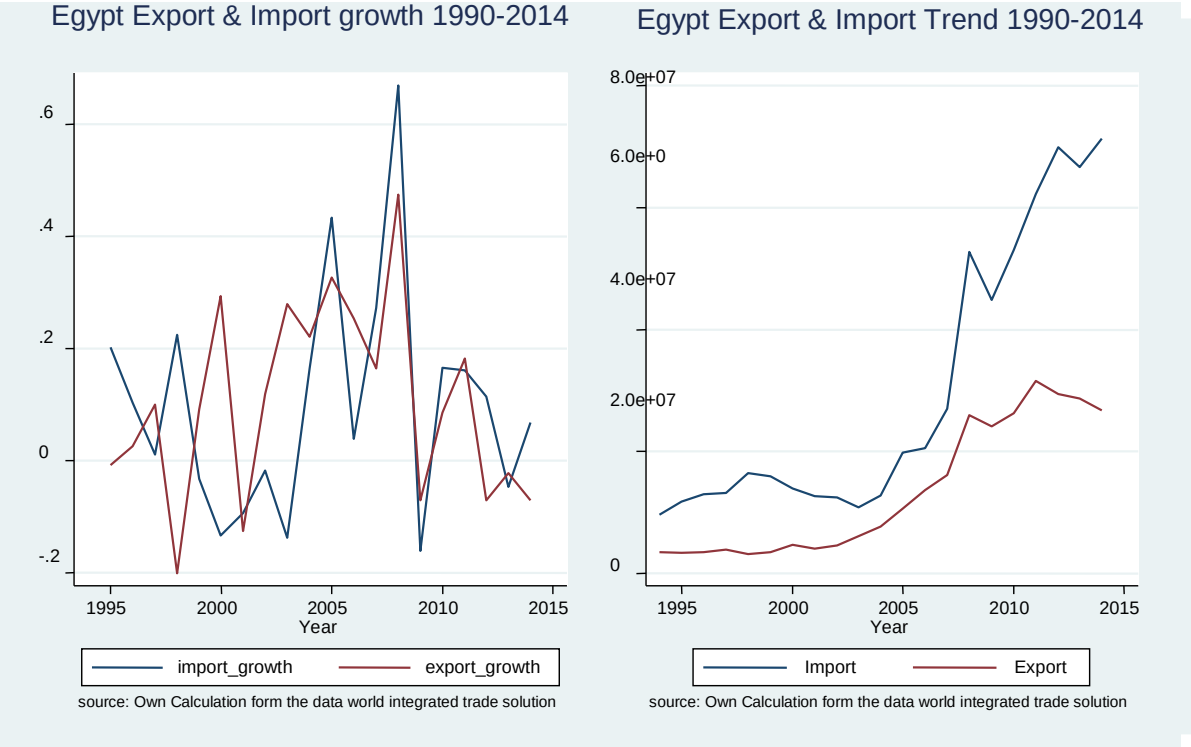


The boost in the export value could be related to the increase in commodity price during 2000's. According to Azzarello and Putnam (2012), Brazil, Russia, India and china (BRIC countries) share of world GDP was only 8% in 2000. However, after 2010 the share of BRIC countries rose

to 25% of the world GDP. Therefore, this development has a significant impact on commodity price in the world market. Hence, since Algeria heavily depends on primary commodities for export it is understandable the export value to Algeria to increase significantly. Further, it reflects the decrease of commodity prices afterwards. Last but not least, the figure shows that the export growth is highly volatile while the import shows a modest volatility.

Egypt, unlike Algeria, faces trade deficit starting from 1995 to 2015 as it can be seen in the figure below. Especially, since 2008, the deficit increased significantly. The trade deficit is exacerbated by the decrease in the export value. In a similar vein, both the export and import growth are volatile. If we see closely the growth trend for both export and import we observe export and import moving in the same direction from 1995 to 2005. However, the movement trend reversed from 2005 to 2015.

Figure 21 Trend and growth of Export and Import (Egypt)

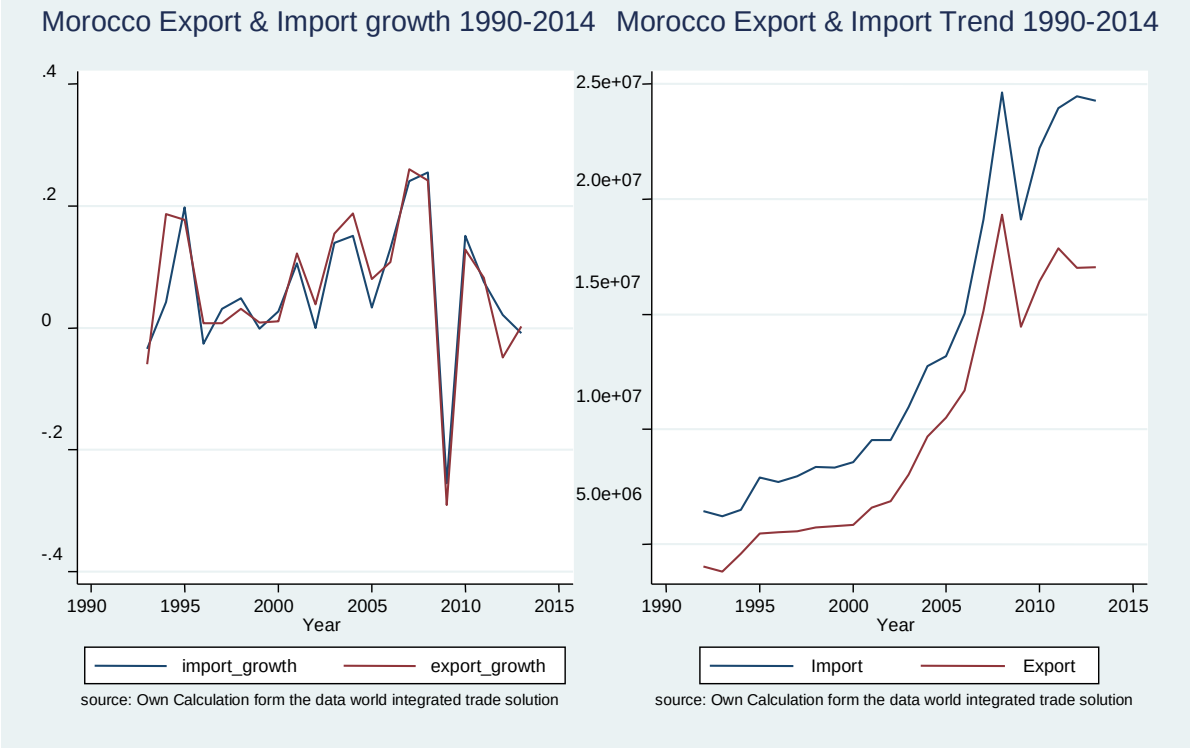


In 2015 morocco have a negative trade balance of $18.75 billion of net imports. In 1995, the negative trade balance was around 2.03$ billion. The exceptional aspect of the trade pattern is that both export and import moves the same direction. Further, both export and import increased

significantly starting the year 2000. In fact, this could be related to the components of exports and imports of morocco. Specifically, from 2000 to 2008 due to development in BRIC countries the commodity price increased in the international market and this is reflected in the export and import of morocco.

The figure also shows the trading origin and destination. For instance, due to the economic slowdown in European countries both the export and import of Morocco from 2008 to 20012 decreased significantly. However, from the end of 2013 onwards, both export and import started increasing significantly. Further, reflecting the stability in European economy and resurgence of commodity prices.

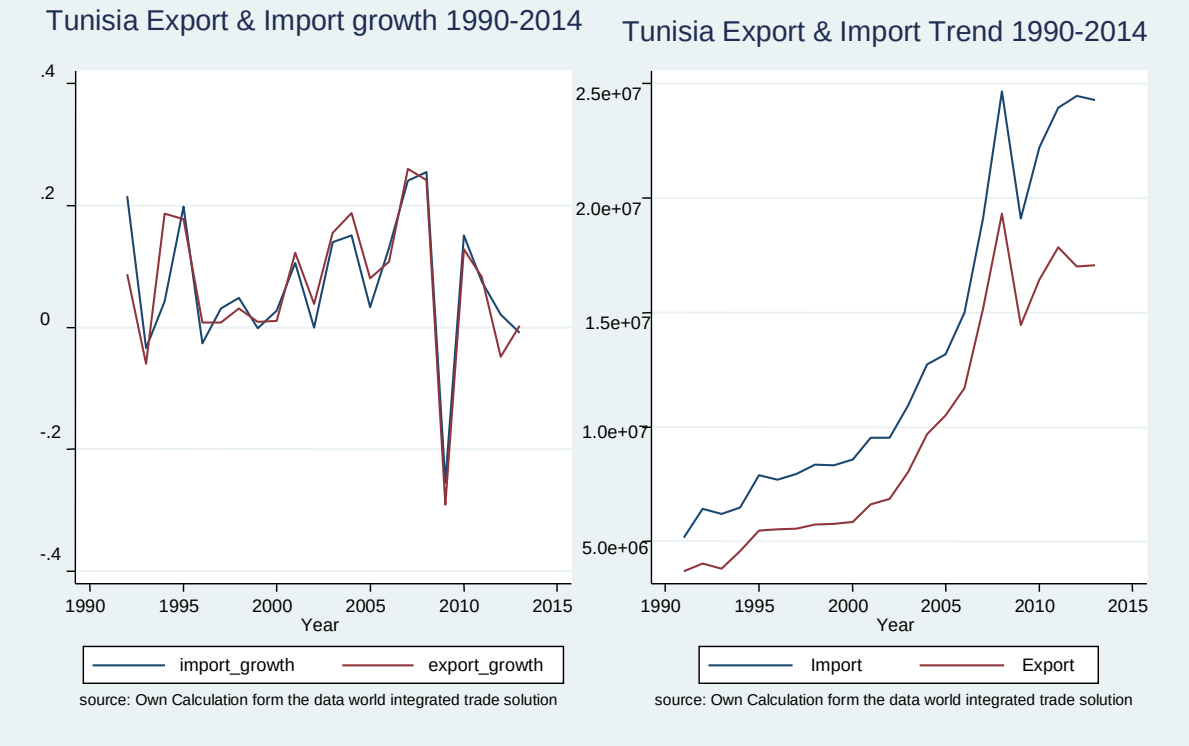
Figure 22 Trend and growth of Export and Import (Morocco)



In case of Tunisia, the first thing we observe from the export and import trend is that import is more than export for the whole period and both move in the same direction. The second important aspect we can observe is that both import and export are increasing with time except during the period 2008 to 2011. This trend is synonymous with the other North African countries and it reflects their trade partnership with Europe. In this period, countries such as Spain, Italy,

Portugal and Greece were heavily affected by the financial crisis. Since the financial crisis was boiled down in to economic crisis, it is natural to observe both import and export of North Africa countries to slump.

Figure 23 Trend and growth of Export and Import (Tunisia)



4.6 Free trade agreements (FTA)

In this section we will discuss free trade agreement among the North African countries and with other partners. To make a distinction between regional and international trade agreement we presented them in two different sections. First, the regional trade and investment agreement among North African countries will be presented. In the second part, trade agreements with European Union (EU) and turkey will be presented.

4.6.1 Regional trade agreements

Despite the lack of trade flow between the North African countries, the countries have either BIT, TA or FTA among themselves. Particularly, Egypt has enforced bilateral investment treaties with all North African countries accompanied by a free trade agreement with morocco and Tunisia and trade agreement with Libya. The only exception is the nonexistent of a trade

agreement between Algeria and Libya. Further, with the exception of bilateral investment treaties between Egypt and Tunisia, the bilateral investment treaties of Tunisia with the other North African countries all are not enforceable.

Therefore, in order for North African countries to benefit from the potential gain from the trade they have to adopted enforceable trade agreement.

Table 2 Trade agreement among North African countries

Countries	Algeria	Egypt	Libya	Morocco	Tunisia
Algeria					
Egypt	BIT, TA				
Libya	None	BIT,TA			
Morocco	TA	BIT, FTA	BIT, TA		
Tunisia	**BIT(ne), TA**	**BIT, FTA**	**BIT(ne), TA**	**BIT(ne),TA**	

Source: Shui and Walkenhorst (2010).

Note: BIT or Bilateral Investment Treaties which offer investor security and the term (ne) represents the BIT is not enforced. While FTA or Free Trade Agreements involves tariff reductions on commodities imported from partner countries. Last but not least, TA is a Trade Agreements which may include tariff reductions, special exemptions, and the creation of a free trade zone.

4.6.2 International Free trade agreements

As can be seen in the appendix part Egypt, Morocco and Tunisia have enforced free trade agreements with EU and Turkey. For instance, Algeria has an in forced free trade agreement with European Union (EU) since 1, Sep 2005. Egypt on the other hand enjoys trade agreement with Turkey and EU since 2005 while EFTA (Iceland; Liechtenstein; Norway; Switzerland) since 2007. Similarly, morocco entered in to trade agreement with EFTA, EU, Turkey and US since 1999, 2000, and 2006 respectively. Tunisia on the other hand has trade agreement with EU, EFTA, and turkey since 1998 and 2005 respectively. The detail signature data and termination of the trade agreements it can be referred in to the appendix part of the paper.

4.7 Empirical Tariffs and Non-Tariff barriers in north African countries

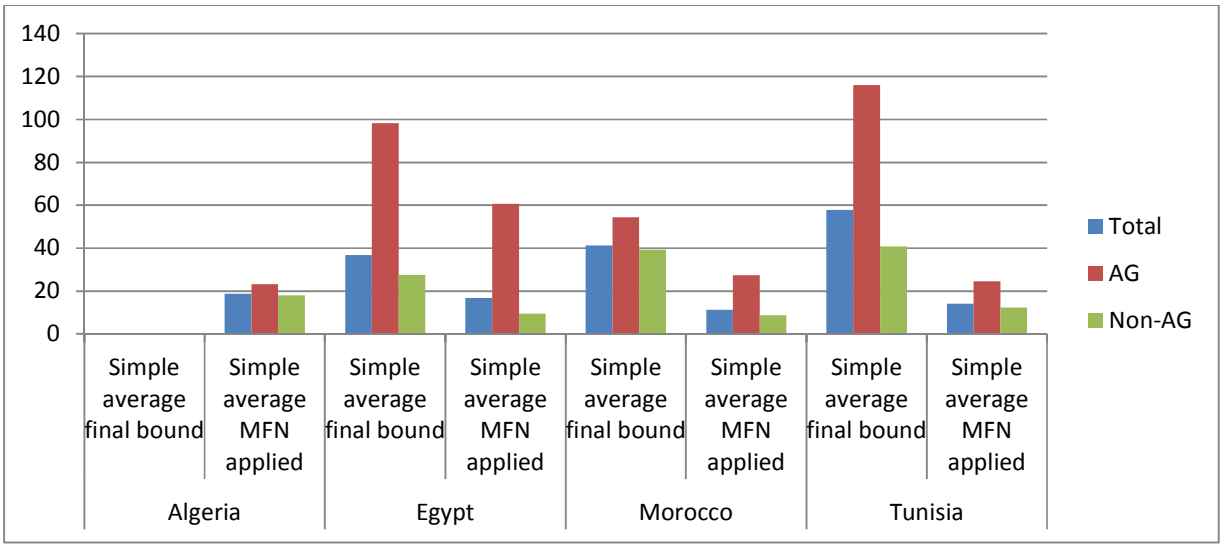
4.7.1 Average Bound and applied Tariffs among north African countries

Countries introduce tariffs for three main reasons. First, they introduce tariff as a means of revenue generation. Revenue motive is particularly apparent in the case of developing countries. In fact, Revenue from import duties constitutes a significant portion of developing countries overall revenue. Second, countries apply a tariff to protect domestic industries, because based on GATT article XI quantitative restriction of imports are prohibited. Third, tariffs could be used to remedy distortions made by exporting countries. For instance, importing countries could apply antidumping duties to mitigate the negative effect of proven dumping and subsidies made by exporting countries to their agriculture sector and non-agricultural sector.

Despite the mentioned reasons to impose tariffs there an ongoing initiative to decrease the tariff between world trade organization (WTO) members and non members through different agreements. Therefore, it is vital to have a look on the bound and applied tariffs among the North African countries. However, since the bound tariff applies only to members of WTO we do not have simple average bound for Algeria.

The empirical comparison of tariff is difficult because the tariff schedule of countries may constitute around 5,000 tariff lines. Therefore, we have to aggregate the tariff in two ways. First, simple average is calculated by calculating all the tariff lines and dividing by the number of tariff lines. The second alternative is weighted average. This is done through weighting the share of imports by respective countries. Although, the values of both approaches different they can be used as a spring board. Therefore, in the following graph the simple average tariffs are depicted.

Figure 24 Average Bound and applied Tariffs among North African countries



Source: world integrated trade data

As can be seen for Egypt, Morocco and Tunisia there is a significant difference between bound tariffs and most favored nations (MFN) applied tariff. The tariff gap indicates that commodities from non WTO members are heavily taxed. The tariff gap is particularly huge for agricultural products. For instance, in Tunisia agricultural products import from non WTO members are taxed on average 116% while products from member countries are taxed only 24.6% on average. Although the magnitude differs in case of Egypt and Morocco they have similar trend of heavy taxation for non member countries. Additionally, we see agricultural products being heavily taxed as compared to non-agriculture products. Although, this requires further investigation it implies that there is a protection of domestic agricultural producers as compared to the non agriculture producers.

In case of Algeria, there is only applied tariff due to Algeria's non-membership of the world trade organization (WTO). However, despite non-membership of the WTO Algeria have lower tariff for both agriculture and non-agriculture imports. However, this result serves only as a spring board because the simple average gives the same weight for both small imports and large imports. Therefore, to understand the tariff culture we have to take in to account other measures of tariff. In fact, we will see the tariff dispersion of North African countries.

4.7.2 Frequency distribution of tariffs among North African countries

The average bound tariff and MFN applied tariff give good glimpse regarding the tariff structure of countries. However, it fails to give the detail picture and would be difficult to compare tariff structure between countries. Therefore, next we analyze in detail the tariff frequency distribution.

Table 3 Tax frequency distribution for selected North African countries

Country	Products	Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
				Tariff lines and import values (in %)								in %
Algeria	AG	Final bound										
		MFN applied	2014	0.9	20.5	0	9.6	0	69.1	0	0	0
		Imports	2013	15.8	55.6	0	5.4	0	23.2	0	0	0
	NAG	Final bound										
		MFN applied	2014	1.7	23.3	0	37.4	0	37.6	0	0	0
		Imports	2013	0.8	42.5	0	33	0	23.7	0	0	0
Egypt	AG	Final bound		0	10.6	18.1	2.2	17.4	23.8	25.2	2.3	1.6
		MFN applied	2014	16	44.4	13	0.2	11.9	12.2	0.2	2	1.3
		Imports	2013	61.6	24	2.4	0	6.8	3.8	0	1.4	3.3
	NAG	Final bound		2.2	11.9	9.8	4.3	23.1	34.9	12.8	0.1	0
		MFN applied	2014	11	50.5	19.2	0	4.3	15	0	0.1	0
		Imports	2013	29.7	41.9	14.5	0	2.1	11.7	0	0.1	0
Morocco	AG	Final bound		0	0	0.1	0	4	79.7	4.1	12.1	0
		MFN applied	2014	0	34.3	13.4	0	16	30	3.4	2.8	0
		Imports	2013	0	34.4	6.7	0	21.2	30.3	6	1.5	0
	NAG	Final bound		0	0.1	0.4	0	1.8	97.6	0	0	0
		MFN applied	2014	0	64.9	9.1	0	25.7	0.3	0	0	0
		Imports	2013	1.3	68.1	6.7	0	23.8	0	0	0	0
Tunisia	AG	Final bound		0	0	0	0	1.7	2.9	44	51.4	0
		MFN applied	2013	13.2	0	14.5	11.8	0	60.4	0	0	0
		Imports	2013	1.5	0	1.8	30	0	66.8	0	0	0
	NAG	Final bound		0	0	0	0	8.1	27.2	16.3	0.1	0
		MFN applied	2013	38	0.1	21.7	13.2	0	27.1	0	0	0
		Imports	2013	40.7	0	14	20.5	0	24.7	0	0	0

In Algeria only 0.9% of agricultural products have free applied MFN duties, while 69.1% face tariff of more than 25%. Similarly, only 1.7% of Non-Agricultural products have free applied MFN duties, while more than 37.6% Non-Agricultural products face more 25% tariff. The figure indicates two important facts with regard to Algeria. First, Algeria is less open to international trade. Second, Algeria is very protective to the agricultural products as compared to non-agricultural products. Similar, Morocco have none of agricultural and non-agricultural products

have free applied MFN duties, while more than 50% of agricultural products face a duty of more than 15%. Nonetheless, 26% of non-agricultural products face duty of more than 15%. The figure indicates that, morocco similar to Algeria is protective of the agricultural products. Further indicating although there is an improvement in the openness of their trade they remain less open compared to other regions.

However, in Egypt 16% of agricultural products have free applied MFN duties, while 24% of agricultural products face more than 15% of tariff. The 11% of the Non-Agriculture products face zero tariffs, while 20% face tariff more than 15%. In case of Egypt, it is not distinct whether Egypt gives more protection to agricultural products as compared to non-agricultural products. Similarly, Tunisia have 13.2% of agricultural precuts with free applied MFN duties, while 60.4% of agricultural products facing more than 20% of tariff. The non-agricultural products on the other hand are granted free applied MFN duties for 38% of the products, while 27.1% non-agricultural products facing a duty of more than 20%. Tunisia similar to morocco and Algeria is protective of the agricultural products. However, Tunisia unlike to these two countries grants free duty to some agricultural and non-agricultural products.

In summary, today the North African countries are more openness as compared to their 1980s level and in fact all except Algeria are members of the world trade organization (WTO). However, as we have see in the above figures they are still protective of some of their sectors and still have heavy duties on their import. For instance, Algeria, Morocco and Tunisia are heavily protecting their agricultural products. Nonetheless, we cannot distinctly claim which particular products are heavily protected from the international market. Therefore, we have to analyze in detail the tax structure using the HS2 tax lines.

Table 4 Tariffs and imports by product groups

Tariffs and imports by product groups												
	Algeria			Egypt			Morocco			Tunisia		
	MFN applied duties			MFN applied duties			MFN applied duties			MFN applied duties		
	AVG	Duty-free	Max	AVG	Duty-free	Max	AVG	Duty-free	Max	AVG	Duty-free	Max
Product groups		in %			in %			in %			in %	
Animal products	27.4	0	30	15	21.6	30	73.9	0	200	32.6	0	36
Dairy products	22.7	0	30	6	29.5	20	51	0	100	32.3	0	36
Fruit, vegetables, plants	25.5	0	30	11.2	4.9	40	26	0	40	32.1	6.7	36
Coffee, tea	26.5	0	30	10.5	20.8	30	17.5	0	40	26	4.9	36
Cereals & preparations	23.4	3.3	30	13.2	21.9	> 1000	22.7	0	170	29.3	8.3	36
Oilseeds, fats & oils	18.5	2.4	30	3.8	26.5	30	10.3	0	50	10.8	18.6	36
Sugars and confectionery	23.8	0	30	10.5	0	40	19.3	0	50	14.4	34.7	36
Beverages & tobacco	26.7	0	30	803.2	0	> 1000	36.5	0	49	33.4	0	36
Cotton	5	0	5	4	20	5	2.5	0	3	0	100	0
Other agricultural products	17.8	1	30	2.4	22.6	30	7.7	0	49	9.9	36.1	36
Fish & fish products	29.7	0	30	9.6	36.6	40	14.2	0	50	30.2	0.1	36
Minerals & metals	16.4	1.3	30	7.9	8.3	30	8.9	0.1	25	9.3	45.1	30
Petroleum	18.6	32.3	30	3.2	16.7	5	14.3	0	25	5	66.7	15
Chemicals	14.6	0.2	30	5.8	9.4	> 1000	5.4	0	25	5.2	67.8	30
Wood, paper, etc.	19.3	0	30	11.3	6.2	30	15.3	0	25	19.2	9.5	30
Textiles	24	0.2	30	10.8	3.9	30	8.9	0	25	14.4	8.9	30
Clothing	30	0.2	30	28.9	0	30	24.3	0	25	29.6	0	30
Leather, footwear, etc.	19	0.6	30	12.1	1.3	30	14.8	0	25	20.2	15.1	30
Non-electrical machinery	8.8	0.2	30	4.9	21.6	30	4.4	0	25	5.9	66.2	30
Electrical machinery	17.6	0	30	7.9	22.4	30	6	0	25	13.6	26.1	30
Transport equipment	10.4	25.4	30	13.7	5.7	135	9.5	0	25	10.9	57	30
Manufactures, n.e.s.	21	7	30	12.3	10	40	4.8	0	25	12	34.9	30

Source: WTO, at www.wto.org, accession countries

Note: (1) AVG represents Simple average of most favored nations (MFN) applied duties. (2) Duty-free in % represents Share of duty free HS six-digit subheadings in the total number of subheadings in the product group.

The table above indicates Algeria, Egypt, Morocco and Tunisia tariffs by product groups. In Algeria except the import of cotton, where duties are lower, the maximum duties applied with all products is 30%. This rate of duty is significant although the average applied rates are slightly lower than the maximum amount. Further, similar to the result we saw earlier the applied duties are higher for agriculture as compared to non-agriculture. In fact, the agriculture products face on average more than 22% of duty, while the non agriculture facing less than 21% duty except cloth, where duties are around 30%.

In Egypt, the structure is different from Algeria, the maximum duty could range until 1000%. For instance, cereals and preparations, beverage and tobacco and chemicals could face maximum duty of 1000%. However, the average applied rates for cereals and preparation and chemicals is 16% and 5% respectively. In case of beverage and tobacco the average applied duty rates are staggering 803.2%. Another important figure worth mentioning is the maximum and average applied tariff of cloth imports. Cloth imports from most favored nations face a maximum of 30%, while the average applied rate is 28%. In summary, all products except beverage and tobacco and clothing, there is huge difference between the maximum set duty and the average applied duties. The reason of heavily taxing those products could be two reasons. First, religious and health reason in case of beverage and tobaccos. Second, the duty on cloth imports to protect the textile industry from China's and India's products.

In Morocco, animal products, dairy products, cereals and preparations and beverage and tobaccos face maximum duties of 200%, 100%, 170% and 49% respectively. These products except cereals and preparations face small difference between their respective maximum duty and average applied duties. In fact, animal products, dairy products and beverage and tobaccos face a staggering average applied duties of 73.9%, 51% and 36.5% respectively. The result further shows that Morocco heavily protects agricultural products particularly the animal husbandry from international market. Another important figure worth mentioning is duty free product items; Morocco unlike other North African countries does not have free duty for both agricultural and non-agricultural products.

Last but not least, in Tunisia majority commodity face duty between 30% - 36%. The unique character of Tunisia is that there are several products excepted from duty. For instance , 66.2%

of non-electricity machinery, 100% of cotton, 66.7% of petroleum products and 67.8% of chemical imports are imported free of duty, While animal and dairy products face 32.6% and 32.3% duty respectively. Therefore, Tunisia similar to Algeria and morocco protect the agriculture sector while the non-agricultural sector is less protected through tariff. In fact, some non-agricultural products are taxed less than 20% of duty with the exception of clothing.

In a nutshell, Algeria, Egypt, Morocco and Tunisia have a higher maximum and average applied MFN duties. Further, Algeria, Morocco, and Tunisia tend to protect their agricultural products by levying higher import duties for agricultural products. However, the non-agricultural products are less protected through fewer duties, while the textile industry is heavily protected. The textile industry is protected through two measures: through importing cotton duty free and levying heavy tax for imported clothes.

Chapter 5

Empirical Result

5 Empirical estimation of North African countries.

In this section the impact of Free trade Agreements (FTA) and trade openness is examined using panel data from Algeria, Egypt, morocco and Tunisia. The estimation uses data from 2000 to 2014 for all four North African countries. In this empirical estimation the author tries to quantify the impact of trade agreements and trade openness on economic growth, foreign directed investment (FDI), consumer price index and employment. To achieve the stated objective the author uses fixed effect model with dummies and controls. The estimation is done in the footstep of Baro (1993).

5.1 Effect of Free trade agreement (FTA) on economic growth

Often when western countries, particularly the U.S and European countries (EU), make a free trade agreement (FTA) with less developed countries they set some economic objectives and political target. For instance, the U.S entered into FTA with the Middle East and North African countries to counter extremism through boosting economic growth and reducing unemployment. In the same manner, the European Union (EU) enters into free trade agreement to reduce the number emigrants into Europe through boosting economic growth and improving the life standard of these nations.

Despite these mentioned objectives, the effectiveness of these agreements is less explored from both policy and empirical point. Therefore, in the following section, the author tries to estimate the effect of these trade agreements on economic growth, employment, foreign directed investment (FDI), fertility rate and human development in the region. Hence, in the following section, the effect of the trade agreement is presented using three estimation technique and several models. In fact, to capture the causality we set six models with a different set of variables.

The first model takes GDP growth as a dependent variable and trade openness and previous year GDP as the independent variable. The second model tries to explain the economic growth through previous year GDP and foreign directed investment (FDI). The third model takes

economic growth as a dependent variable and trade openness, previous year GDP and FDI as an independent variable. In the fourth and fifth model, we try to include the impact of human development (HDI) to economic growth while in the last model we further incorporated the trade agreements as a dummy variable.

Table 5 Pooled regression result for economic growth (ln_gdp)

Model	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	ln_gdp	ln_gdp	ln_gdp	ln_gdp	ln_gdp	ln_gdp
openess	-2.231*		-2.339*	-2.428*	-2.983**	-0.788
	(0.860)		(0.977)	(1.116)	(1.088)	(1.463)
d_gdp	2.24e-13*	1.61e-13	2.28e-13*	2.11e-13	2.15e-13*	2.06e-13
	(1.07e-13)	(1.11e-13)	(1.10e-13)	(1.12e-13)	(1.06e-13)	(1.06e-13)
fdi		9.96e-11	-2.80e-11	2.29e-11	3.91e-09*	4.10e-09*
		(1.07e-10)	(1.16e-10)	(1.30e-10)	(1.69e-09)	(1.70e-09)
hdi				-0.0291	0.0191	0.104
				(0.0437)	(0.0465)	(0.0701)
hdifdi					-4.49e-11*	-4.59e-11*
					(1.95e-11)	(1.95e-11)
eu						-1.303
						(0.805)
agadir						0.971
						(1.246)
turkey						-2.230*
						(1.076)
_cons	28.38***	27.01***	28.50***	30.49***	26.55***	20.33***
	(0.504)	(0.356)	(0.711)	(3.478)	(3.724)	(5.507)
R-sq	0.149	0.056	0.150	0.155	0.254	0.384
F	4.630	1.571	3.051	1.876	2.721	2.887

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: Authors own Pooled OLS estimation

The estimation result from our pooled OLS shows that trade openness negatively affecting economic growth. Further, in the last model we observe trade agreement with turkey significantly affecting economic growth negatively. However, the conventional wisdom and economic theories show us that this not the case. Therefore, the result we found from this model cannot reliably consider as the real causality between the explanatory variables and economic growth. In fact, this conclusion is supported by the diagnostic test we make and it can be seen in the appendix part of the paper. Therefore, an estimation technique which takes the advantage of panel data is required. Particularly, estimating fixed effect and random effect model and choosing the best model through diagnostic tests will be advisable.

Following the above finding, the author made fixed effect estimation and find the following results. As we can see above trade openness positively affects economic growth. Further, human development, previous year GDP, and trade agreement with the European Union (EU) positively affect economic growth. These findings are coherent with not only what the conventional economic theory but also with the empirical findings discussed in the literature part of this paper. Another valuable finding is the causality between foreign directed investment and economic growth. According to our fixed effect regression result, foreign directed investment play an insignificant role in economic growth. Although economic theories advocate FDI plays an important role in influencing economic growth, in the North African countries the role is very limited. However, we have to be cautious here because the insignificance of FDI could be due to several reasons not included in this model. In a nut shell, according to our fixed effect model although all the variables have the expected influence on economic growth, only human development (HDI) and Trade agreement with European countries (EU) have a significant impact on economic growth.

However, it would be difficult to take the finding at a face value. In fact, for our finding to have internal validity we have to make several diagnostic tests. First, we need to estimate random effect model and compare it with our fixed effect result. Using Hausman test we will determine which model better explains our data with internal validity. Accordingly, in the next section I have estimated the random effect model and compare it with the fixed effect model.

Table 6 Fixed effect regression result for economic growth (ln_gdp)

	(1) ln_gdp	(2) ln_gdp	(3) ln_gdp	(4) ln_gdp	(5) ln_gdp	(6) ln_gdp
openess	3.067***		2.793**	0.583	0.492	0.122
	(0.876)		(0.893)	(0.606)	(0.620)	(0.504)
d_gdp	5.78e-14*	4.61e-14	5.08e-14*	1.07e-14	1.15e-14	-3.44e-16
	(2.31e-14)	(2.54e-14)	(2.35e-14)	(1.29e-14)	(1.30e-14)	(9.78e-15)
fdi		5.27e-11	3.45e-11	1.52e-11	1.72e-10	3.73e-11
		(2.70e-11)	(2.56e-11)	(1.37e-11)	(2.02e-10)	(1.62e-10)
hdi				0.0436***	0.0455***	0.0288**
				(0.00594)	(0.00645)	(0.00808)
hdifdi					-1.81e-12	-6.40e-13
					(2.32e-12)	(1.86e-12)
eu						0.511***
						(0.0839)
agadir						0.0488
						(0.123)
turkey						0.150
						(0.107)
_cons	25.66***	27.11***	25.72***	23.37***	23.24***	24.31***
	(0.451)	(0.0830)	(0.450)	(0.387)	(0.419)	(0.604)
R-sq	0.267	0.153	0.294	0.764	0.768	0.890
F	9.128	4.500	6.790	30.79	24.50	34.30

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Sources: Authors own stata Fixed effect estimation

Table 7 Random effect regression result for economic growth (ln_gdp)

	(1) ln_gdp	(2) ln_gdp	(3) ln_gdp	(4) ln_gdp	(5) ln_gdp	(6) ln_gdp
openess	-2.231**		-2.339*	-2.428*	-2.983**	-0.788
	(0.860)		(0.977)	(1.116)	(1.088)	(1.463)
d_gdp	2.24e-13*	5.85e-14	2.28e-13*	2.11e-13	2.15e-13*	2.06e-13
	(1.07e-13)	(4.46e-14)	(1.10e-13)	(1.12e-13)	(1.06e-13)	(1.06e-13)
fdi		5.71e-11	-2.80e-11	2.29e-11	3.91e-09*	4.10e-09*
		(4.68e-11)	(1.16e-10)	(1.30e-10)	(1.69e-09)	(1.70e-09)
hdi				-0.0291	0.0191	0.104
				(0.0437)	(0.0465)	(0.0701)
hdifdi					-4.49e-11*	-4.59e-11*
					(1.95e-11)	(1.95e-11)
eu						-1.303
						(0.805)
agadir						0.971
						(1.246)
turkey						-2.230*
						(1.076)
_cons	28.38***	27.10***	28.50***	30.49***	26.55***	20.33***
	(0.504)	(0.323)	(0.711)	(3.478)	(3.724)	(5.507)
R-sq						
F						
N	56	56	56	46	46	46

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001
Source: authors own stata random effect estimation

Before comparing the models, we need to see the coefficients we found through random effect regression. Similar to the result we found in Pooled OLS the variables does not have the expected sign. For instance, trade openness affects economic growth negatively. Further, trade agreements with Turkey and EU have a negative effect on economic growth. Although, the finding contradicts with the conventional wisdom, we have to make a formal test using Hausman and determine which model better explain the data.

Table 8 Hausman fixed random, sigma less for economic growth (ln_gdp)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
-
          eu |    .5108556    -.2865289        .7973845        .0508197
      agadir |    .0488466     .5891867       -.5403401        .0717892
      turkey |    .1498939    -.3976496        .5475436        .0539045
------------------------------------------------------------------------------
-
                           b = consistent under Ho and Ha; obtained from
xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from
xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =    11194.66
                Prob>chi2 =      0.0000

Source: Authors own stata Hausman estimation
```

The Hausman test reveals that fixed effect is the best model in estimating the causality between the dependent variables and economic growth. Considering, the objective of this paper is to identify the impact of free trade agreements and their implication to economic growth the result confirms our institution and the theories were correct. However, despite the fixed effect is better than the random effect model, this does not mean the fixed effect is the best model in explaining the causality between economic growth and explanatory variables. Therefore, we have to make further tests. To make our finding internally valid, we will conduct tests for time fixed effect, random effect, cross-sectional dependence, heteroscedasticity, serial correlation and unit root.

In macro data like what we have often there is the issue of cross correlation between countries or cross-sections. Therefore, it would be valuable to check for cross correlation between the countries in the study. Accordingly, the Breusch-Pagan LM test of independence was tested and the result shows that there is no cross-correlation dependence. As we can see based on 11 complete observations the p-value is above 0.05 and implying there is no cross-correlation dependence.

Table 9 Correlation matrix of residuals for economic growth (ln_gdp)

	__e1	__e2	__e3	__e4
__e1	1.0000			
__e2	0.1589	1.0000		
__e3	-0.4331	-0.3387	1.0000	
__e4	0.0713	-0.1358	-0.2758	1.0000

Breusch-Pagan LM test of independence: chi2(6) = 4.698, Pr = **0.5831**
Based on 11 complete observations over panel units

Source: Authors own estimation for Correlation matrix of residuals

As we have stated earlier in macro data we have to make sure the residuals between the North African countries must not be correlated. Therefore, we have to further check for correlation using Pasaran cross-sectional dependence (CD) test. The null hypothesis in Pasaran CD test is that the residuals are not correlated. Accordingly, since the P>0.05 we cannot reject the null hypothesis. The result means that the residuals between the countries are not correlated.

Table 10 Parsan CD test for economic growth (ln_gdp)

Pesaran's test of cross sectional independence = -1.368, Pr = **0.1713**
Average absolute value of the off-diagonal elements = 0.244

Source: Authors own stata Parsan CD test

Another test we need to make is the homoskedasticity test. We are interested in this test because we do not want the causality between the explanatory variable and economic growth to be

spurious or false causality. Therefore, we test the null hypothesis that homoskedasticity (or constant variance).

Table 11 Modified Wald test for economic growth (ln_gdp)

H0: sigma(i)^2 = sigma^2 for all i

chi2 (4) = 6293.47

Prob>chi2 = 0.0000

Source: authors own stata test for Modified Wald test

Accordingly, the test shows that our variances are not constant or there is heteroskedasticity. This is because we rejected the null hypothesis $p<0.05$. Therefore, we may have a false causality between explanatory variables and economic growth. However, this problem can be solved using Huber/White or sandwich estimators. In fact, we can correct the problem using the command 'robust' and come up with heteroskedasticity-robust standard errors.

The result is further substantiated by checking for serial correlation using Wooldridge test for autocorrelation. The null hypothesis for this test indicates there is no first-order autocorrelation. Accordingly, the test result shows that there exists autocorrelation and our R-square and standard error may not be correct. In fact, our R-square may be higher and standard error lower wrongly.

Table 12 Wooldridge test for autocorrelation in panel data for economic growth (ln_gdp)

H0: no first-order autocorrelation

F(1, 3) = 141.001

Prob > F = 0.0013

Source: Authors own stata Wooldridge test for autocorrelation in panel data

Therefore, we have to estimate our fixed effect model taking in to account the first order serial correlation. This is done using 'xtregar' command in stata. Accordingly, our adjusted fixed effect result will be as follows:

Table 13 Adjusted fixed effect estimation for economic growth (ln_gdp)

```
RE GLS regression with AR(1) disturbances       Number of obs      =        46
Group variable: country1                        Number of groups   =         4

R-sq:  within  = 0.8356                         Obs per group: min =        11
       between = 0.6645                                        avg =      11.5
       overall = 0.0061                                        max =        12

                                                Wald chi2(9)       =     50.19
corr(u_i, Xb)      = 0 (assumed)                Prob > chi2        =    0.0000

------------------- theta --------------------
  min      5%       median        95%      max
0.8848   0.8848     0.8868     0.8868   0.8868

------------------------------------------------------------------------------
      ln_gdp |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     openess |   .2588607   .2705469     0.96   0.339    -.2714015    .7891228
       d_gdp |   5.33e-15   5.93e-15     0.90   0.368    -6.29e-15    1.70e-14
         hdi |   .0332683   .0072646     4.58   0.000       .01903    .0475067
      hdifdi |  -5.71e-13   1.15e-12    -0.50   0.618    -2.82e-12    1.68e-12
         fdi |   4.87e-11   9.99e-11     0.49   0.626    -1.47e-10    2.44e-10
          eu |   .1545517   .0720067     2.15   0.032     .0134212    .2956821
      agadir |   .0099422   .0689154     0.14   0.885    -.1251295     .145014
      turkey |   .0891007   .0655039     1.36   0.174    -.0392845    .2174859
       _cons |   24.26913   .9072207    26.75   0.000     22.49101    26.04725
-------------+----------------------------------------------------------------
      rho_ar |  .88852238   (estimated autocorrelation coefficient)
     sigma_u |  1.7837438
     sigma_e |  .11970691
     rho_fov |  .99551645   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Source: authors own stata regression result

The result further confirms that human development and trade agreement with the European Union has a significant and positive effect on economic growth.

5.2 Causality between Free trade agreement (FTA) and Foreign directed investment (FDI)

Estimating the effect of free trade agreement (FTA) on economic growth will not be enough because FTA could influence other variables and FTA indirectly affecting economic growth. Therefore, in the following section, the research paper focuses the causality between FTA and foreign directed investment (FDI). Methodologically, the section follows the empirical approach done in the previous section. Accordingly, first, we will estimate the causality using the pooled OLS and followed by fixed effect and random effect model. The best model will be selected based on the coherence of coefficients with previous empirical and theoretical findings and diagnostic tests.

In the pooled OLS estimation technique four basic models are estimated. First, foreign directed investment on trade openness (Openness), and previous year GDP (D_GDP). Second, FDI on human development index (HDI) and previous year GDP.(D_GDP). Thirdly, trade openness (Openness), previous year GDP (D_GDP) and human development index (HDI). Last but not least, the fourth model includes Openness, D_GDP, HDI, trade agreement with European union (EU), AGADIR (Jordan, morocco, Egypt and Tunisia), and TURKEY.

Table 14 Pooled OLS Estimation of Foreign Directed Investment (FDI)

	(1) fdi	(2) fdi	(3) fdi	(4) fdi
openess	-3.87392e+09***		-2.61435e+09*	-4.31090e+09*
	(1.02799e+09)		(1.26588e+09)	(1.66485e+09)
d_gdp	0.000155	0.0000148	0.0000925	0.0000492
	(0.000128)	(0.000131)	(0.000132)	(0.000135)
hdi		182567820.6***	138988509.6**	66062207.9
		(43995649.8)	(47373794.6)	(89339767.6)
eu				2.17694e+09*
				(971642564.8)
agadir				-30695045.8
				(1.53155e+09)
turkey				586873347.9
				(1.37803e+09)
_cons	4.28294e+09***	-1.18041e+10**	-7.12435e+09	-2.67379e+09
	(602319041.6)	(3.40967e+09)	(3.99249e+09)	(7.05323e+09)
R-sq	0.214	0.288	0.354	0.435
AIC	2570.3	2115.3	2112.9	2112.7
BIC	2576.4	2120.8	2120.2	2125.5
F	7.203	8.710	7.669	5.010
N	56	46	46	46

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: Authors own stata regression result

In the first model, the variable openness is significant while the previous year GDP (D_GDP) is insignificant. Despite the significance of the openness variable the sign is different from both theory and empirical point of view. Thus, we tried to estimate another model by excluding

openness variable (Openness) and including human development index (HDI). Accordingly, we find that HDI positively affecting FDI. This result is in line with expectation, as the HDI increases it has the potential of attracting foreign directed investment. However, since our main objective is to estimate the effect of Free trade agreements (FTA) on FDI we incorporate EU, AGDIR and Turkey variables to catch their impact on FDI. Following, the inclusion of these variables in model (4) we find that only trade agreement with European countries have a positive effect on FDI.

Despite of finding the result we expected, failing to capture the country specific effect make, our result could be unreliable. Therefore, in the following section fixed effect estimation will be done. Further, to make the finding internality valid different diagnostic tests will be conducted.

Table 15 Fixed Effect estimation of Foreign Directed Investment (FDI)

	(1) fdi	(2) fdi	(3) fdi	(4) fdi
openess	7.95294e+09		755277562.2	-3.82553e+09
	(4.80708e+09)		(7.07557e+09)	(6.83453e+09)
d_gdp	0.000202	0.000111	0.000115	0.0000458
	(0.000127)	(0.000143)	(0.000149)	(0.000139)
hdi		120250080.1*	116327887.7	-130113844.6
		(55022012.7)	(66740132.9)	(114470875.6)
eu				3.50118e+09**
				(1.05764e+09)
agadir				1.04023e+09
				(1.60654e+09)
turkey				2.32563e+09
				(1.48150e+09)
_cons	-1.76328e+09	-6.98870e+09	-7.06468e+09	1.00839e+10
	(2.47424e+09)	(4.25996e+09)	(4.37192e+09)	(8.51488e+09)
R-sq	0.094	0.152	0.152	0.376
AIC	2562.6	2110.4	2112.3	2104.2
BIC	2568.7	2115.8	2119.7	2117.0
F	2.601	3.588	2.337	3.619
N	56	46	46	46

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: Authors own stata regression result

The result from fixed effect estimation shows that both openness and D_GDP are statistically insignificant in the first model. The second model shows that human development has a positive and significant impact on foreign directed investment (FDI). However, our fourth model shows that except trade agreement with European (EU) countries the remaining variables are insignificant. This finding confirms that trade agreement with EU increases the flow of FDI to North African countries particularly Tunisia, Egypt and Morocco.

However, despite finding the expected result between FTA and FDI we have to make sure this model is the best we can have. The comparison between models is done through the Hausman test by estimating random effect and comparing with fixed effect model. After selecting the best model, the best model is tested through several diagnostic tests.

Table 16 Random Effect estimation of Foreign Directed Investment (FDI)

	(1) fdi	(2) fdi	(3) fdi	(4) fdi
openess	-3.87392e+09***		-2.61435e+09*	-4.31090e+09**
	(1.02799e+09)		(1.26588e+09)	(1.66485e+09)
d_gdp	0.000155	0.0000148	0.0000925	0.0000492
	(0.000128)	(0.000131)	(0.000132)	(0.000135)
hdi		182567820.6***	138988509.6**	66062207.9
		(43995649.8)	(47373794.6)	(89339767.6)
eu				2.17694e+09*
				(971642564.8)
agadir				-30695045.8
				(1.53155e+09)
turkey				586873347.9
				(1.37803e+09)
_cons	4.28294e+09***	-1.18041e+10***	-7.12435e+09	-2.67379e+09
	(602319041.6)	(3.40967e+09)	(3.99249e+09)	(7.05323e+09)
N	56	46	46	46

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the random effect model similar to pooled OLS we have a significant relationship between trade openness (Openness) and previous year GDP (D_GDP). However, the realized sign of relationship seem different from the empirical findings we have and the expectation. On the other hand, in the second equation we see human development positively affecting FDI. The positive effect of HDI on FDI is also confirmed by the thirds equation while confirming trade openness (Openness) negatively affecting foreign directed investment (FDI). Further, the fourth model confirms openness negatively affecting FDI while trade agreement with EU positively influencing FDI.

Despite of having several significant variables in the random effect model it has to pass two tests. First, we have to compare it with the fixed effect model using Hausman Test. Second, if the random effect is selected by Hausman test we have to make several diagnostic tests. Namely, time fixed effect, random effect, cross-sectional dependence, heteroskedasticity and serial correlation. However, if the random effect is failed to be selected the same diagnostic tests will be conducted for fixed effect.

Table 17 Hausman test for foreign directed investment (FDI)

```
                 ---- Coefficients ----

             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
-
     openess |   -3.98e+09    -3.92e+09       -6.18e+07        6.25e+09
         hdi |   -1.02e+08     8.29e+07       -1.85e+08        6.24e+07
          eu |    3.51e+09     2.00e+09        1.51e+09        4.40e+08
      agadir |    8.79e+08    -1.35e+08        1.01e+09        4.14e+08
      turkey |    2.24e+09     5.39e+08        1.70e+09        4.60e+08
------------------------------------------------------------------------------
-
                           b = consistent under Ho and Ha; obtained from
xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from
xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        9.21
                Prob>chi2 =      0.1010
                (V_b-V_B is not positive definite)
```

Source: author's own stata estimation

The Hausman test is not conclusive over selecting which model best explains the data on trade agreement and FDI. Therefore, in the next section diagnostic test for both random effect (RE) and fixed effect (FE) will be made. In the following section, we will start by checking time fixed effect. This is done through making fixed effect estimation of the model.

Table 18 Time fixed effect test for foreign directed investment (FDI)

```
( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0

       F( 11,    25) =    1.17
            Prob > F =    0.3525
```

Since the P>0.05 we failed to reject the null hypothesis. Therefore, there is no need for time specific fixed effect. In fact, the result indicates that the coefficients for all years are jointly insignificant. Hence, including them in to our equation adds no valuable information which can be used. Further, to check the relevance of having country specific effects, country fixed effect is tested and the result shows that in this particular model there is no need of incorporating country fixed effect.

Table 19 Country fixed effect test for foreign directed investment (FDI)

(1) 2.country1 = 0

(2) 3.country1 = 0

(3) 4.country1 = 0

chi2(3) =   7.24

Prob > chi2 =   0.0647

The P-Value is greater than 0.05 and therefore we do not need to include country fixed effect in the model. Hence, we have to check for random effect. For this effect, I have tested the random effect using Breuch and pagan lagrangian multiplier (LM) tests. Accordingly, the test result shows that we cannot reject the null hypothesis. The implication is that there is no need to make random effect and in fact we do not need to estimate random effect (RE) model in our estimation.

Table 20 Breusch and Pagan LM test for random effects of foreign directed investment (FDI)

```
fdi[country1,t] = Xb + u[country1] + e[country1,t]

Estimated results:
                    |       Var     sd = sqrt(Var)
          ----------+------------------------------
               fdi  |   6.90e+18       2.63e+09
                 e  |   4.06e+18       2.01e+09
                 u  |          0              0

Test:   Var(u) = 0
                           chibar2(01) =     0.00
                        Prob > chibar2 =   1.0000
```

Source: Authors own stata Lm test

According to our LM test random effect is not an appropriate model to estimate the causal relation between foreign directed investment (FDI) and free trade agreements (FTA). Therefore, in the following sections we will make some diagnostic tests to determine whether the fixed effect is appropriate to estimate the model. The first test will be cross-sectional dependence test using LM test. Making cross-sectional dependence is crucial because it appears in most macro economic variables as compare to micro level data. The LM tests whether the residuals from the North African countries are correlated. Particularly, it tries to capture if there is a common variable which is not incorporated in the model explaining the foreign directed investment. Therefore, this test is vital in determining the internal validity of our finding.

Table 21 Correlation matrix of residuals: foreign directed investment (FDI)

	__e1	__e2	__e3	__e4
__e1	1.0000			
__e2	-0.4721	1.0000		
__e3	-0.3942	-0.0814	1.0000	
__e4	0.3666	0.2511	-0.1938	1.0000

```
Breusch-Pagan LM test of independence: chi2(6) =    6.819, Pr =
0.3379
Based on 11 complete observations over panel units
```

Source: Authors own stata test for correlation of residuals

As we can see the P-Value is > 0.05 and we cannot reject the null hypothesis which means that residuals are not correlated across countries. The fact that, the errors are not correlated across the countries makes our finding reliable. However, this does not mean we do not need any other tests. In fact, we have further check for errors correlation using Pasaran CD test. Similar our previous test, the null hypothesis in parsan CD is the residuals are not correlated. Accordingly, we have tested the Parsan CD test and the result shows that there is no correlation across residuals from the countries taken in the study.

Table 22 Parsan CD test of foreign directed investment (FDI)

```
Pesaran's test of cross sectional independence = -0.694, Pr =
0.4874

Average absolute value of the off-diagonal elements =     0.293
```

Source: Authors own stata test

The fact that the P-value is greater than 0.05 make us not to reject the null hypothesis and confirm that there is no cross correlation between the disturbance terms. However, despite this finding improves the internal validly there could be other serious problem in our estimation. For instance, if the variance is not constant (hetroskedastic), we could face problem of spurious correlation Between FDI and FTA. In fact, spurious regression could create false correlation between FTA and FDI. Therefore, to check this problem we have conducted heteroskedasticity test. Accordingly, the test shows us the variances are not constant or there exists heteroskedasticity.

Table 23 Modified Wald test for group wise heteroskedasticity in FE regression model (FDI)

```
H0: sigma(i)^2 = sigma^2 for all i

chi2 (4)  =      318.09
Prob>chi2 =      0.0000
```

Source: Authors own stata test

The null hypothesis of homoskedasticity is rejected because we have p-value of less than 0.05. Hence, we have the problem of heteroskedasticity and we could have wrong standard error and r-square. In fact, we will have lower than actual standard error and higher than actual R-square. Despite the problem of heteroskedasticity we can solve the problem using the Huber/white or sandwich estimator. However, we have to further test for serial correlation because we could further have the problem of small standard error and large r-square.

Table 24 Wooldridge test for autocorrelation in panel data (FDI)

```
H0: no first-order autocorrelation
    F(  1,       3) =      4.060
           Prob > F =      0.1373
```

Source: Authors own stata test

The Wooldridge test for autocorrelation shows us that we cannot reject the null hypothesis. Therefore, there exists the problem of autocorrelation and the standard error and r-square we have are incorrect. Hence, we have to make fixed effect estimation by accepting there is first-order autocorrelation.

Table 25 Adjusted fixed effect estimation (FDI)

```
RE GLS regression with AR(1) disturbances       Number of obs      =        46
Group variable: country1                        Number of groups   =         4

R-sq:  within  = 0.3260                         Obs per group: min =        11
       between = 0.7659                                        avg =      11.5
       overall = 0.4205                                        max =        12

                                                Wald chi2(7)       =      3.76
corr(u_i, Xb)      = 0 (assumed)                Prob > chi2        =    0.8066

------------------- theta --------------------
  min      5%       median        95%      max
0.0000   0.0000     0.0000     0.0000   0.0000
------------------------------------------------------------------------------
         fdi |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     openess |  -2.55e+09   2.35e+09    -1.09   0.278    -7.14e+09    2.05e+09
       d_gdp |  -.0000167    .000105    -0.16   0.874    -.0002224    .0001891
         hdi |   2.22e+07   9.89e+07     0.22   0.822    -1.72e+08    2.16e+08
          eu |   1.13e+09   1.18e+09     0.96   0.339    -1.19e+09    3.45e+09
      agadir |  -4.48e+07   1.26e+09    -0.04   0.972    -2.52e+09    2.43e+09
      turkey |   7.43e+08   1.19e+09     0.62   0.532    -1.59e+09    3.07e+09
       _cons |   3.57e+08   7.81e+09     0.05   0.964    -1.49e+10    1.57e+10
-------------+----------------------------------------------------------------
      rho_ar |  .63416567   (estimated autocorrelation coefficient)
     sigma_u |           0
     sigma_e |  1.647e+09
     rho_fov |           0   (fraction of variance due to u_i)
      ------------------------------------------------------------------------------
```

We are able to correct our estimation through accepting there is first-order autocorrelation. However, finally the finding shows that none of the variables affect FDI. In fact, neither FTA, openness, previous year GDP nor HDI influence FDI. The result shows that there are other variables determining the size of FDI in to the North African countries.

The empirical estimation shows that FTA does not have an impact on FDI. However, the lack of FTA effect could be because other exogenous variables negatively offsetting the positive effect of FTA. In fact, if we consider the year 2010 to 2014 the region was instable and this instability could negatively affect FDI. Even if we want to control the years before, European countries were affected by financial crisis which could affect negatively the FDI. Hence, the main reason for not having the real effect of FTA could be due to other external variables.

5.3 Free trade agreement and women's decision making

Several empirical findings show that trade openness has the potential of improving the welfare of women and increase their decision making in the household. For instance, Aguayo-Tellez, Airola, Juhn & Villegas-Sanchez (2010), using the impact of the North American free trade agreement (NAFTA) in 1994 between Mexico and USA, estimate the impact of NAFTA on women wage. Accordingly, they found that in the liberalization period the relative wage of women increased everything remaining constant. In similar way, but with different variable (fertility) we estimate if the decision making of women improves following free trade agreements (FTA).

In order to achieve the stated objective different panel data estimation are made. In fact, to find a robust and reliable finding we have used three deferent estimation techniques and choose the one which explains the causal effect reliably. The estimation technique applied includes pooled regression, fixed effect (FE) and random effect model (RE). In the following section we start estimating pooled OLS followed by fixed effect (FE) and Random effect (RE) respectively.

In the pooled OLS model we estimated three different equations which different set of variables. The first equation constitutes GDP growth (ln_gdp) and Trade openness growth (ln_openness). The second equation includes GDP growth (ln_gdp), human development index (hdi) and Trade openness growth (ln_openness). The third and main equation constitutes GDP growth (ln_gdp), human development index (hdi), and Trade openness growth (ln_openness) and free trade agreement with EU, turkey and AGADIR (morocco, Jordan, Egypt, and Tunisia).

Table 26 Pooled OLS estimation (Fertility Rate per Women)

	(1)	(2)	(3)
	fertilityr~e	fertilityr~e	fertilityr~e
ln_gdp	0.0983***	0.0938***	0.107***
	(0.00865)	(0.00954)	(0.0104)
ln_openess	-0.275***	-0.273***	-0.322***
	(0.0147)	(0.0182)	(0.0239)
hdi		0.000917	-0.0106*
		(0.00256)	(0.00506)
eu			0.142**

			(0.0504)
agadir			0.138
			(0.0802)
turkey			0.00916
			(0.0784)
_cons	-0.365	-0.330	-0.0244
	(0.234)	(0.319)	(0.338)
R-sq	0.910	0.908	0.928
AIC	-74.15	-61.25	-66.78
BIC	-68.08	-53.77	-53.68
F	269.2	144.4	87.43
N	56	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: author's own stata estimation

The estimation result from the first equation shows that GDP growth (ln_gdp) has a positive effect on women's fertility rate while growth in trade openness (ln_openness) negatively affects women's fertility rate. The result is in line with the norm and culture of North African countries and empirical findings of previous studies. We expect as income a household increases the number of children to increase. While trade openness encourages women to actively participate in the labor market and decrease household or child rearing time. The estimation from the second equation shows similar to the first except human development index (hdi) has a positive but insignificant effect. Although, the first two results are in line with our expectation the hdi result shows unexpected result. The third equations, keeping the other results as they are they further show that trade agreement with EU have a positive effect on women's fertility.

The findings particularly on human development (hdi) and trade agreement with EU have unexpected results. Therefore, we have to make sure these variables have the unexpected causality effect on women's fertility rate. The second reason which forces us to estimate another model is the fact the estimation technique did not take in to account the effects could differ from one country to another. Hence, in the following section we will use a model which takes in to account free trade agreement (FTA) could have different effect from county to country. In a

similar vein, the fixed effect (FE) model is estimated using three different equations. The first equation constitutes GDP growth (ln_gdp) and Trade openness growth (ln_openness). The second equation includes GDP growth (ln_gdp), human development index (hdi) and Trade openness growth (ln_openness). The third and main equation constitutes GDP growth (ln_gdp), human development index (hdi), and Trade openness growth (ln_openness) and free trade agreement with EU, turkey and AGADIR (morocco, Jordan, Egypt, and Tunisia).

The empirical estimation result from the first equation shows that GDP growth (ln_gdp) has a positive effect on women's fertility rate while trade openness (ln_openness) has a negative effect on women's fertility. The finding is similar to what we found in the pooled OLS estimation and it is coherent with previous literatures and culture and norm of the region. In the second equation, we find economic growth (ln_gdp) have positive effect while the human development (hdi) has a negative effect. This result is different from the pooled OLS because in this equation we found trade openness is insignificant in causing women's fertility while in the pooled OLS decreases women's fertility rate. In the last and main equation we see three variables are significant. Accordingly, economic growth (ln_gdp) has a positive effect on women's fertility, change in trade openness (ln_openness) has a negative effect on fertility and free trade agreement with EU countries affects women's fertility negatively.

Table 27 Fixed Effect Estimation (Fertility Rate per Women)

	(1)	(2)	(3)
	fertilityr~e	fertilityr~e	fertilityr~e
ln_gdp	0.191***	0.445***	0.630***
	(0.0355)	(0.0599)	(0.0783)
ln_openess	-0.0893	0.00862	0.00585
	(0.0919)	(0.0736)	(0.0737)
hdi		-0.0209***	-0.0232***
		(0.00330)	(0.00428)
eu			-0.155**
			(0.0478)
agadir			0.0357
			(0.0501)
turkey			-0.0935
			(0.0481)

_cons	-2.700*	-7.866***	-12.57***
	(1.016)	(1.447)	(1.923)
R-sq	0.395	0.597	0.697
AIC	-100.6	-115.3	-123.0
BIC	-94.47	-107.8	-109.9
F	16.33	20.23	14.57
N	56	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001.

Source : author's own estimation

The finding from this estimation is coherent with both theories and empirical findings from different studies. For instance, in this region we expect an increase in GDP to increase family income and thereby women fertility. However, free trade agreements with EU and trade openness are expected to create job opportunity for women and increase their income (Aguayo-Tellez, Airola, Juhn & Villegas-Sanchez (2010)). In fact, this increase in income could increase their decision making power and reduce women's fertility rate.

Despite finding the result we expected we are cautious and we want to make an estimation of another model and compare it with our fixed effect (FE) model. Therefore, in the next section we will estimate and present the result from random effect (RE) model. Similar to the previous two models we estimate three different equations. The first equation constitutes GDP growth (ln_gdp) and Trade openness growth (ln_openness). The second equation includes GDP growth (ln_gdp), human development index (hdi) and Trade openness growth (ln_openness). The third and main equation constitutes GDP growth (ln_gdp), human development index (hdi), and Trade openness growth (ln_openness) and free trade agreement with EU, turkey and AGADIR (morocco, Jordan, Egypt, and Tunisia).

Table 28 Random Effect Estimation (Fertility Rate per Women)

	(1)	(2)	(3)
	fertilityr~e	fertilityr~e	fertilityr~e
ln_gdp	0.131***	0.0938***	0.107***
	(0.0187)	(0.00954)	(0.0104)
ln_openess	-0.237***	-0.273***	-0.322***
	(0.0344)	(0.0182)	(0.0239)

hdi		0.000917	-0.0106*
		(0.00256)	(0.00506)
eu			0.142**
			(0.0504)
agadir			0.138
			(0.0802)
turkey			0.00916
			(0.0784)
_cons	-1.200*	-0.330	-0.0244
	(0.512)	(0.319)	(0.338)
R-sq			
AIC	.	.	.
BIC	.	.	.
F			
N	56	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: author's own estimation

Accordingly, the first equation shows that GDP growth (ln_gdp) and trade openness (ln_openness) have a significant impact on women's fertility. These finding are similar to what we found in case of pooled OLS and fixed effect (FE). The second equation, reveals similar what we found in pooled OLS that is human development (hdi) positively affects women's fertility. However, this finding is different from what we found in fixed effect and is not coherent with expectation. The estimation form the third equation further shows that trade agreement with EU has positive effect on fertility. In summary, the result from RE are similar with pooled OLS and we have results not coherent with expectations. However, despite the unexpected results we have to make sure the FE model is better than RE model through Hausman test. Therefore, in the following table we estimated the Hausman test.

Table 29 Hausman test (Fertility)

```
               ---- Coefficients ----
                    |          (b)                (B)                    (b-B)
sqrt(diag(V_b-V_B))
                    |     fixed        random       Difference          S.E.
      -------------+----------------------------------------------------------
-------
            ln_gdp |    .6303426     .1072522        .5230904          .07761
        ln_openess |    .0058493    -.3217186         .327568        .0697503
               hdi |   -.0231819    -.0106213       -.0125606               .
                eu |   -.1550687     .1416852       -.2967539               .
            agadir |    .0357359     .1379981       -.1022622               .
            turkey |   -.0934551      .009162       -.1026171               .
      ------------------------------------------------------------------------
-------
                                b  =  consistent  under  Ho  and  Ha;  obtained
from xtreg
                B  =  inconsistent  under  Ha,  efficient  under  Ho;  obtained
from xtreg

          Test:  Ho:  difference in coefficients not systematic

                        chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                                =       80.24
                      Prob>chi2 =      0.0000
                      (V_b-V_B is not positive definite)
```

Source: Author's STATA calculation result

Although we have p-value less than 0.05 since (V_b-V_B) is not positive the test does not give valuable information regarding which estimation technique is better. Therefore, we have to make further test to justify our choice of the estimation technique. Hence, in the next section diagnostic test for both random effect (RE) and fixed effect (FE) will be made. In the following section, we will start by checking time fixed effect. This is done through making fixed effect estimation of the model.

Table 30 Joint time fixed effect test (Fertility)

```
( 1)  2001.year = 0
 ( 2)  2002.year = 0
 ( 3)  2003.year = 0
 ( 4)  2004.year = 0
 ( 5)  2005.year = 0
 ( 6)  2006.year = 0
 ( 7)  2007.year = 0
 ( 8)  2008.year = 0
 ( 9)  2009.year = 0
 (10)  2010.year = 0
 (11)  2011.year = 0

       F( 11,    27) =    5.08
            Prob > F =    0.0003
```

Source: Author's own stata estimation

The joint estimation shows that the time fixed effect are important and they have to be incorporated in our fixed effect estimation. Accordingly, we estimated the fixed effect model with time dummies and the result reveals that ln_gdp, hdi and agdir are significant and expected result. The full estimation result is presented in the appendix part. Next we will test if random effect could be used as our estimation technique using Breusch and Pagan Lagrangian multiplier test for random effects.

Table 31 Breusch and Pagan Lagrangian multiplier test for random effects (fertility)

```
fertilityrate[country1,t] = Xb + u[country1] + e[country1,t]

            Estimated results:
                             |       Var     sd = sqrt(Var)
                    ---------+-----------------------------
                   fertili~e |   .1532759       .3915046
                           e |   .0042629       .0652908
                           u |          0              0

            Test:   Var(u) = 0
                                 chibar2(01) =     0.00
                              Prob > chibar2 =   1.0000
```

Source: author's own stata estimation

The estimation result shows that random effect (RE) model is not appropriate to estimate the causality in this model. This is because we fail to reject the null hypothesis since we have p-value of more than 0.05. Hence, to find the real causality between free trade agreements (FTA) and women's fertility we have to estimate our model using fixed effect (FE) technique. However, this does not mean the result from fixed effect is reliable. For our estimation from FE to be internally valid we have to make further tests. For instance, we need to test for cross-sectional dependence, heteroskedasticity and serial correlation.

Table 32 Correlation matrix of residuals: using Breusch-Pagan LM test (fertility)

```
             __e1      __e2      __e3      __e4
__e1       1.0000
__e2      -0.2263    1.0000
__e3       0.5043    0.4337    1.0000
__e4       0.0686    0.0250    0.4349    1.0000

Breusch-Pagan LM test of independence: chi2(6) =  8.258,
Pr   =    0.2198
Based on 12 complete observations over panel units
```

Source: Authors own stata estimation

In this test we are checking if the residuals across countries are correlated. This problem is prevalent in macroeconomic data and we have to check if the problem exists. If the problem exists we will have two issues in our estimation. First, our standard error will be lower and causing to reject the null hypothesis less often. Second, the correlation across residuals will artificially increase our R-square. However, according our result there is no cross correlation between the residuals across different countries. However, to further confirm the result we will conduct another cross-correlation test using Pasaran CD test.

Table 33 Correlation test of residuals using Pasaran CD test (fertility)

Pesaran's test of cross sectional independence = 1.754, Pr = 0.0794

Average absolute value of the off-diagonal elements = 0.282

Source: Authors own stata estimation

Fortunately, the Pasaran CD test also confirms that there is no cross-correlation across the residuals. Therefore, the standard error and the R-square we have are reliable. Hence, if the hull hypothesis is accepted or rejected we are less likely to face type I and II errors. Where type I error represents incorrectly rejecting the null hypothesis while type II represents failure to reject the false null hypothesis. The above findings are necessary for our result to be reliable but they are not the sufficient condition. In fact, for our result to be fully reliable we have to further conduct heteroskedasticity test. The main reason for conducting heteroskedasticity is that, if in fact it is present we will have spurious or false correlation in our result. Hence, checking for heteroskedasticity is vital.

Table 34 Modified Wald test for group wise heteroskedasticity in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (4) = 2.34
Prob>chi2 = 0.6741

Source: authors own stata modified Wald test

The modified Wald test reveals we cannot reject the null hypothesis because we have p-value greater than 0.05. Not rejecting the null hypothesis means we have constant variance. Therefore, spurious correlation among dependent and explanatory variables is less likely. Hence, the correlation we find among variables can be reliably interpreted as causality if the estimation is able to pass the autocorrelation test.

Table 35 Wooldridge test for autocorrelation in panel data (fertility)

H0: no first-order autocorrelation
F(1, 3) = 29.462
Prob > F = 0.0123

Source: Authors own stata estimation for Wooldridge test for autocorrelation in panel data

Unfortunately, the Wooldridge test shows us there is a serial autocorrelation. Therefore, we have to estimate our equation using an estimation technique which takes in to account we do not have first-order autocorrelation. Hence, in the following estimation we take in to account we have no first-order autocorrelation. Accordingly, the result shows that only GDP growth and

trade openness have a significant impact in determining women's fertility rate. In fact, GDP growth has a potential of increasing the fertility rate while trade openness decreases women fertility rate.

Table 36 Adjusted fixed effect estimation (fertility)

```
RE GLS regression with AR(1) disturbances       Number of obs      =        48
Group variable: country1                        Number of groups   =         4

R-sq:  within  = 0.2410                         Obs per group: min =        12
       between = 0.7647                                        avg =      12.0
       overall = 0.7241                                        max =        12

                                                Wald chi2(7)       =     22.11
corr(u_i, Xb)      = 0 (assumed)                Prob > chi2        =    0.0024

------------------------------------------------------------------------------
fertilityr~e |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      ln_gdp |    .119211   .0326632     3.65   0.000     .0551924    .1832297
  ln_openess |  -.1271174   .0447695    -2.84   0.005    -.2148641   -.0393708
         hdi |  -.0023167   .0039704    -0.58   0.560    -.0100984    .0054651
          eu |   .0015757   .0456224     0.03   0.972    -.0878427     .090994
      agadir |   .0196927   .0418611     0.47   0.638    -.0623535    .1017389
      turkey |  -.0095594   .0412365    -0.23   0.817    -.0903815    .0712627
       _cons |  -.5680803   .8554542    -0.66   0.507     -2.24474    1.108579
-------------+----------------------------------------------------------------
      rho_ar |  .84632497   (estimated autocorrelation coefficient)
     sigma_u |  .09675794
     sigma_e |  .05973801
     rho_fov |  .72401946   (fraction of variance due to u_i)
       theta |  .35795366

------------------------------------------------------------------------------
```

The fact that the free trade agreements do not have an impact on fertility is coherent with what we found in FDI. The main assumption was trade agreements will increase FDI and FDI will increase women's participation in the labor market through introducing less labor intensive technologies. Therefore, since trade agreement does not have an impact on foreign directed investment (FDI) it would correct not to have causality with women fertility rate. In summary, although trade openness have a potential to decrease women's fertility , trade agreement neither regionally or with European countries fail to influence women's fertility rate. This can be related with the type of commodities the North African countries are exporting to both Europe and within the region. Further, it could also be related with Arab- Spring and the financial and economic crisis in European trade partners. In summary, because the stated reasons the trade agreement with EU, turkey and among North African countries failed to increase the decision making of women in the region.

5.4 Free trade agreement and Human development

The last but not least, causality we want to indentify in this study is the causality between trade openness, trade agreements and human development. it is well documented human development plays an important role in facilitating economic growth. Therefore, investigating whether trade openness and trade agreements affect economic growth would be vital. Hence, in the following panel data estimation we try to find a reliable causality between human development and trade agreement and trade openness. The estimation techniques applied in this section are the same like the previous three sections. In fact, first we will estimate using the pooled OLS followed by fixed effect (FE) and radon effect (RE) models. The selection of the model will base on logical relationship between variables and diagnostic tests. That is, the estimation technique which satisfies the logical expectation and passes the diagnostic test will be chosen as the causal relation between the variables.

Accordingly, in the following section the pooled OLS estimation is made using three different equations. In the first equation trade openness and previous year GDP are taken as explanatory variables. In the second equation foreign directed investment (FDI) is added as an explanatory variable. In the third and important equation we further incorporated explanatory variables such as trade agreement with EU, TURKY and among regional countries (AGADIR). These equations are taken to check the relevance of some variables and to avoid omitted variables bias in our estimation.

The first equation shows that the only significant variable in the equation is trade openness (ln_opnness) and it negatively affects human development (hdi). However, the finding is not in line with our expectation because when a country becomes open to international trade life improving technologies and innovation could be imported and increase human development through life expectancy and literacy. Nonetheless, in this estimation we found the opposite result. In the second equation, we found trade openness (ln_opnness) and foreign directed investment (FDI) as significant variables. Despite finding FDI having the expected impact, we found trade openness affecting HDI negatively. In the last and important equation, we found three more significant variables affecting HDI. Namely, we found tarde agreement with EU, TURKEY and regional trade agreement (AGADIR) positively affecting HDI. Although, the result in trade

agreement are the desired one, the fact trade openness affecting HDI negatively make us cautious of this result. Therefore, in the following section we will estimate the fixed effect model.

Table 37 Pooled OLS estimation (HDI)

	(1) hdi	(2) hdi	(3) hdi
ln_openess	-3.394***	-2.044*	-3.613***
	(0.932)	(0.952)	(0.584)
ln_gdp	-0.0214	-0.179	0.897**
	(0.555)	(0.509)	(0.303)
fdi		1.30e-09**	-9.74e-12
		(4.12e-10)	(2.69e-10)
eu			3.500*
			(1.602)
agadir			6.518**
			(2.257)
turkey			6.060*
			(2.263)
_cons	73.50***	76.37***	41.26***
	(15.00)	(13.72)	(8.731)
R-sq	0.229	0.372	0.833
AIC	327.9	318.1	260.5
BIC	333.5	323.7	271.7
F	6.682	8.681	34.07
N	48	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: Authors own STATA estimation

In the fixed effect (FE) estimation similar to pooled OLS we use three estimation equations to find the causality among variables. First, we estimated the causality using trade openness (ln_openness), GDP growth (ln_gdp) and foreign directed investment (FDI) as an explanatory variables. Second, we estimated the first equation after droping the variable (FDI). last, we estimate first equation after including trade agreement with EU, Turkey and Agadir (morocco, Jordan, Tunisia and Egypt) as explanatory variable.

Table 38 Fixed effect estimation (HDI)

	(1) hdi	(2) hdi	(3) hdi
ln_openess	0.962	1.054	-4.592
	(3.494)	(3.437)	(2.696)
ln_gdp	14.83***	14.97***	11.33***
	(1.687)	(1.579)	(2.474)
fdi	6.51e-11		4.33e-11
	(2.47e-10)		(2.10e-10)
eu			-1.859
			(2.092)
agadir			4.532*
			(1.756)
turkey			3.022
			(1.842)
_cons	-324.2***	-327.9***	-236.6***
	(47.47)	(44.89)	(65.62)
R-sq	0.759	0.759	0.884
AIC	252.9	253.0	224.0
BIC	258.5	258.6	235.2
F	43.13	66.12	48.09
N	48	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: authors own STATA estimation

Our estimation from the first equation of fixed effect (FE) shows us that only GDP growth (ln_gdp) has a significant effect on human development (hdi). In fact, the ln_gdp positively influences human development (hdi) this logical as a country we expect to have better education (literacy), health care and life expectancy. However, trade openness (ln_openness) and foreign directed investment (fdi) faied to have significant impact on human development (hdi). After dropping FDI in our second equation, we find only GDP growth (ln_gdp) has a positive and positive effect on human development (hdi). The final and last equation reveal that regional trade agreement (Agadir) and GDP growth (ln_gdp) have a positive and significant impact on human development (hdi). Although, the result we found is in line with our expectation we have

to formally test and determine this model is the best. Therefore, to compare the fixed effect (FE) with random effect (RE) modle we have to estimate the later one compare it using Hausman test.

Similarly, we estimate the random effect (RE) using three equations to find the causality among variables. First, we estimated the causality using trade openness (ln_openness), GDP growth (ln_gdp) and foreign directed investment (FDI) as an explanatory variables. Second, we estimated the first equation after droping the variable (FDI). Last, we estimate first equation after including trade agreement with EU, Turkey and Agadir (morocco, Jordan, Tunisia and Egypt) as explanatory variable

Table 39 Random Effect estimation (HDI)

	(1) hdi	(2) hdi	(3) hdi
ln_openess	-2.044*	-3.394***	-3.613***
	(0.952)	(0.932)	(0.584)
ln_gdp	-0.179	-0.0214	0.897**
	(0.509)	(0.555)	(0.303)
fdi	1.30e-09**		-9.74e-12
	(4.12e-10)		(2.69e-10)
eu			3.500*
			(1.602)
agadir			6.518**
			(2.257)
turkey			6.060**
			(2.263)
_cons	76.37***	73.50***	41.26***
	(13.72)	(15.00)	(8.731)
R-sq			
F			
N	48	48	48

Standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Source: Authors own STATA random effect estimation

The finding from RE are similar with what we found from pooled OLS. In fact, we found trade openness and foreign directed investments (fdIi) are significant and show a negative impact on human development (hdi). However, GDP growth and trade agreement with EU, Turkey and among the region (Agadir) have a positive impact on human development (hdi). The result on trade agreement and gdp growth are desirable while the result on trade openness and foreign directed investment are not. Although, we have undesirable result we have tomake the decision which model is best based on Hausman and other diagnostic tests.

In the following section we will estimate both FE and RE models and estimate the Hausman test to determine which model better explains our data.

Table 40 Hausman test between fixed effect and random effect (hdi)

```
                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+------------------------------------------------------------
-
  ln_openess |   -.0811896    -.0368016        -.044388        .0363074
      ln_gdp |    .1494889     .0069726        .1425163        .0323282
      ln_fdi |    .0120155     .0192727       -.0072572               .
          eu |   -.0411093     .0210597        -.062169        .0162708
      agadir |    .0571549     .0784172       -.0212622               .
      turkey |    .0307069     .0603879        -.029681               .
------------------------------------------------------------------------------
-
                           b = consistent under Ho and Ha; obtained from
xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from
xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =        9.46
                Prob>chi2 =      0.1493
                (V_b-V_B is not positive definite)
```

Source: authors own stata estimation

The Hausman test shows that we cannot determine which model is better to estimate the causality between the explanatory variables and human development (hdi). Although we have p-value greater than 0.05 since (V_b-V_B) is not positive definite the test does not give valuable information regarding which estimation technique is better. Therefore, we have to make further test to justify our choice of the estimation technique. Hence, in the next section diagnostic test

for both random effect (RE) and fixed effect (FE) will be made. In the following section, we will start by checking time fixed effect. This is done through making fixed effect estimation of the model.

Table 41 Time joint fixed effect test (hdi)

```
( 1)  2001.year = 0
( 2)  2002.year = 0
( 3)  2003.year = 0
( 4)  2004.year = 0
( 5)  2005.year = 0
( 6)  2006.year = 0
( 7)  2007.year = 0
( 8)  2008.year = 0
( 9)  2009.year = 0
(10)  2010.year = 0
(11)  2011.year = 0

       F( 11,    26) =    4.67
            Prob > F =    0.0006
```

Source: Authors own stata joint test

The joint test shows that we reject the hull hypothesis that all the coefficients for year are jointly zero. Therefore, the test shows that when we are running the fixed effect (FE) we have to include the time fixed effect in our estimation. The regression result is presented in the appendix part. Accordingly, the estimation after including time as a dummy variable in our estimation only regional trade agreement have a positive and significant impact on human development (hdi). The finding here is similar with what we found in our fixed effect model without time dummy. In fact, the only exception is that the effect of GDP growth (ln_gdp) to human development (hdi) becomes insignificant. However, since we have not chosen the best model we have to further estimate the random effect (RE) and check if it is appropriate.

Table 42 Breusch and Pagan Lagrangian multiplier (LM) test for random effects

```
ln_hdi[country1,t] = Xb + u[country1] + e[country1,t]

Estimated results:
                 |       Var     sd = sqrt(Var)
        ---------+-----------------------------
          ln_hdi |    .0093903       .0969037
               e |    .0010903       .0330196
               u |          0               0
Test:   Var(u) = 0
                        chibar2(01) =     0.00
```

```
                        Prob > chibar2 =   1.0000
```

Source: Authors own stata test

The estimation result shows that random effect (RE) model is not appropriate to estimate the causality in this model. This is because we fail to reject the null hypothesis since we have p-value of more than 0.05. Hence, to find the real causality between free trade agreements (FTA) and human development we have to estimate our model using fixed effect (FE) technique. However, this does not mean the result from fixed effect is reliable. For our estimation from fixed effect (FE) to be internally valid we have to make further tests. For instance, we need to test for cross-sectional dependence, heteroskedasticity and serial correlation.

Table 43 Correlation matrix of residuals

```
             __e1    __e2    __e3    __e4
     __e1  1.0000
     __e2  0.0588  1.0000
     __e3  0.0923  0.6606  1.0000
     __e4  0.0128  0.3671  0.6454  1.0000

     Breusch-Pagan LM test of independence: chi2(6) =    10.999,
Pr = 0.0884
     Based on 11 complete observations over panel units
```

Source: Authors own stata residual correlation test

In this test we are checking if the residuals across countries are correlated. This problem is prevalent in macroeconomic data and we have to check if the problem exists. If the problem exists we will have two issues in our estimation. First, our standard error will be lower and causing to reject the null hypothesis less often. Second, the correlation across residuals will artificially increase our R-square. However, according our result there is no cross correlation between the residuals across different countries. However, to further confirm the result we will conduct another cross-correlation test using Pasaran CD test.

Table 44 Pasaran CD test (hdi)

```
Pesaran's test of cross sectional independence =     1.727, Pr = 0.0842
 Average absolute value of the off-diagonal elements =     0.403
```

Source: Authors own stata Pasaran CD test

Accordingly, the Pasaran CD test also confirms that there is no cross-correlation across the residuals. Therefore, the standard error and the R-square we have are reliable. Hence, if the hull hypothesis is accepted or rejected we are less likely to face type I and II errors. Where type I error represents incorrectly rejecting the null hypothesis while type II represents failure to reject the false null hypothesis. The above findings are necessary for our result to be reliable but they are not the sufficient condition. In fact, for our result to be fully reliable we have to further conduct heteroskedasticity test. The main reason for conducting heteroskedasticity is that, if in fact it is present we will have spurious or false correlation in our result. Hence, checking for heteroskedasticity is vital.

Table 45 Modified Wald test for group wise heteroskedasticity in fixed effect regression model

```
H0: sigma(i)^2 = sigma^2 for all i

chi2 (4)  =        8.32
Prob>chi2 =      0.0806
```

Source: Authors own stata estimate for Modified Wald test

The modified Wald test reveals we cannot reject the null hypothesis because we have p-value greater than 0.05. Not rejecting the null hypothesis means we have constant variance. Therefore, spurious correlation among dependent and explanatory variables is less likely. Hence, the correlation we find among variables can be reliably interpreted as causality if the estimation is able to pass the autocorrelation test.

Table 46 Wooldridge test for autocorrelation in panel data

```
H0: no first-order autocorrelation
    F(  1,       3) =      6.367
           Prob > F =      0.0859
```

Source: Authors sown stata estimate for Wooldridge test for autocorrelation in panel data

Fortunately, the Wooldridge test shows us there is no serial autocorrelation. Therefore, we do not have to estimate our equation using an estimation technique which takes in to account we do not have first-order autocorrelation. Hence, the fixed effect we have is enough to determine the causal effect between free trade agreement (FTA) and human development (hdi).

5.5The impact of free trade agreement (FTA) on Trade flow

In this estimation unlike the previous four estimation techniques we used the gravity database and gravity estimation. Further, the estimation is not particularly to the North African countries. In fact, the estimation is for all countries of the world from the year 1950 to 2010. The main reason for that is, when there is a trade agreement between two countries it directly and indirectly affects the competitiveness of other countries. Therefore, it would be difficult to see the real causality by taking only the countries making trade agreement. Hence, to this effect in this trade flow estimation we have taken all countries in to account.

$$lnF_{it} = C + \text{lgdp\_o}_{it} + \text{lgdp\_d}_{it} + \text{ldis}_{it} + \text{adj}_{it} + \text{lang}_{it} + \text{colony}_{it} + \text{fta}_{it} + \text{gatt}_{it} + coco_{it} + \text{comcol}_{it} + \varepsilon_{it}$$

Table 47 Trade Flow estimation using Gravity Model

```
Linear regression                               Number of obs =  456176
                                                F( 10, 13161) = 3648.28
                                                Prob > F      =  0.0000
                                                R-squared     =  0.5413
                                                Root MSE      =  2.0401

                                  (Std. Err. adjusted for 13162 clusters in ldis)
------------------------------------------------------------------------------
             |               Robust
          lf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lgdp_o |   .7577348   .0054078   140.12   0.000     .7471347    .7683348
      lgdp_d |   .6706172   .0055148   121.60   0.000     .6598074    .6814269
        ldis |   -.912849   .0212685   -42.92   0.000    -.9545384   -.8711595
         adj |   .3582362   .0826717     4.33   0.000     .1961878    .5202847
        lang |   .7222776   .0899238     8.03   0.000     .5460139    .8985413
      colony |   1.809572   .1069033    16.93   0.000     1.600026    2.019118
         fta |    .886613   .0650314    13.63   0.000     .7591421    1.014084
        gatt |  -.0011688   .0217196    -0.05   0.957    -.0437423    .0414047
        coco |  -.2368711   .0364152    -6.50   0.000    -.3082502   -.1654919
      comcol |   .1902377   .0571253     3.33   0.001     .0782638    .3022116
       _cons |  -5.163394   .2039187   -25.32   0.000    -5.563104   -4.763684
------------------------------------------------------------------------------
```

Our model fits the data and perhaps we have an R-square of 0.54 which is good. The fact we have more than .50 r-square reveals our model explains more than 50% of the trade flow. When

we see the coefficients the GDP terms for both importing and exporting countries are significant and positive. The implication is that countries with higher GDP are more likely to trade with each other. In fact, everything remaining constant as the GDP of exporting country increases by 1 percent we expect trade to increase by 0.75 percent, and the result is statistically significant.

The estimation result for distance shows that it plays an important role in determining trade flow between countries. However, unlike to our previous finding it affects the trade flow negatively. For instance, everything remaining constant when the distance between exporting and importing countries increases by 1 percent trade flow between countries decrease by .94 percent. Further, the estimation shows that language, and being a colony of a country affects the trade flow between countries.

The other important aspect is the effect free trade agreement on trade flow. According to our finding there is a positive and significant causality between free trade agreement and trade flow. In fact, everything remaining constant the presence of free trade agreement could increase the trade flow between countries by .95 percent. Before proceeding to other estimation techniques we will test some commonly believed correlation. For instance, in most cases the GDP coefficients from gravity model estimation are exactly one. Therefore, in our model we will test for the join hypothesis (lgdp_o = lgdp_d=1).

Table 48 . A test of the hypothesis that (lgdp_o = lgdp_d=1).

```
 ( 1)  lgdp_o - lgdp_d = 0
 ( 2)  lgdp_o = 1

       F(  2, 13161) = 1956.89
            Prob > F =    0.0000
```

Source: Authors sown stata estimate

In similar vein we can test if cultural and historical variables are jointly significant in explaining trade flow among countries. For, this reason we tested if having similar language, communism as a system and common colonizer jointly influences the trade flow between countries.

Table 49 A test for the hypothesis cultural and historical coefficients are jointly insignificant

```
 ( 1)  tree - colony = 0
 ( 2)  tree - comcol = 0
 ( 3)  tree = 0
```

```
F(  3, 13161) =  129.22
     Prob > F =    0.0000
```

Source: Authors sown stata estimate

The result shows that we strongly reject the null hypothesis they are jointly insignificant. Because we have a p-value of below 0.05, we can safely say that they are jointly significant in influencing the trade flow between countries.

Table 50 Gravity model using fixed effect exporting and importing countries

```
reg lf ldis contig tree colony comcol i.ccode_d i.ccode_o, robust cluster(ldis)

Linear regression                                      Number of obs =  487197
                                                       F(375, 13371) =  153.93
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5806
                                                       Root MSE      =  1.9329

                             (Std. Err. adjusted for 13372 clusters in ldis)
------------------------------------------------------------------------------
             |               Robust
          lf |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ldis |  -1.047136   .0199446   -52.50   0.000     -1.08623   -1.008042
      contig |   .3756197   .0837163     4.49   0.000     .2115239    .5397154
        tree |   .3584806   .0763393     4.70   0.000     .2088448    .5081164
      colony |   1.418838   .1037581    13.67   0.000     1.215458    1.622219
      comcol |   .6780356   .0475111    14.27   0.000     .5849072     .771164
             |
     ccode_d |
           |
        600  |  -4.811623   .1130252   -42.57   0.000    -5.033168   -4.590077
        615  |  -4.845808   .1177199   -41.16   0.000    -5.076556   -4.615061
        616  |  -5.470593   .1142756   -47.87   0.000    -5.694589   -5.246597
        620  |  -4.985384   .1430515   -34.85   0.000    -5.265786   -4.704983
        651  |  -4.502227   .1277589   -35.24   0.000    -4.752652   -4.251801

     ccode_o |
        600  |  -5.311703   .0987331   -53.80   0.000    -5.505234   -5.118172
        615  |   -5.76257   .1401629   -41.11   0.000    -6.037309   -5.487831
        616  |  -6.187902   .1097594   -56.38   0.000    -6.403046   -5.972758
        620  |  -5.398443   .1825401   -29.57   0.000    -5.756248   -5.040639
        651  |  -5.449818   .1109557   -49.12   0.000    -5.667307   -5.232329

       _cons |   19.18279   .2361786    81.22   0.000     18.71985    19.64574
------------------------------------------------------------------------------
```

Source: Authors sown stata estimate

In this fixed effect (FE) we incorporate a dummy variable which indicates particular exporter appears in the data set. Hence, there is one dummy variable for Algeria as an exporter and Egypt, morocco, Libya and Tunisia separately. We use the same approach for import and have full set importer fixed effect. The estimation we find from fixed effect is straightforward. In fact, what

we have to do include the dummies of countries as exporter and importer as explanatory variables in our model. This estimation will give us consistent, unbiased and efficient estimator if the three key OLS assumptions are satisfied. However, since we introduce dummies this could create perfect collinear with variable which vary with fixed effect. Therefore, it is only possible to identify variable which does not move along the fixed effect variable.

In order to estimate the fixed effect (FE) in STATA it is necessary to create variables that list importers and exporters in a numerical code. Accordingly, after incorporating importer and exporter fixed effect an OLS model is estimated. One noticeable difference we can observe from the fixed effect model is that our r-square will be higher as compared the first OLS estimation (0.58). This change is natural to expect because we have included several dummy variables in to our model.

The second important difference between the models we estimated is the value in the coefficients. For instance, the value for distance becomes more than one percent. Particularly, a one percent increases in distance causes a more than one percent drop in trade flow between trading countries while variable like colony decreased slightly. However, despite a change in the value of r-square and coefficients the overall impact and direction of the impact remains the same.

5.6The impact of free trade agreement (FTA) on Agriculture sector

5.6.1 Free trade agreement on aggregate Agriculture trade

In the following gravity model estimation, we estimated the effect free trade agreements (FTA) particularly with EU and AGADIR on Agriculture. The agriculture component consists of import and export of live animals, cereals, dairy product and homey, vegetables and oil products. Accordingly, the estimation shows that similar to our previous model, trade is affected by size of the economy and proximity between countries. For instance, as can be seen GDP of both reporter and partner country positively affects the trade flow between nations. The finding basically confirms what we found in the earlier estimation. However, uniquely in this model we estimated the Agriculture sector only unlike the previous section which considers the aggregate trade in the economy.

Table 51 Aggregate Free trade agreement (FTA) on aggregate Agriculture trade

```
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    4518
-------------+------------------------------           F(  6,  4511) =   37.80
       Model |  2185.69229     6  364.282048           Prob > F      =  0.0000
    Residual |  43472.2814  4511     9.63695           R-squared     =  0.0479
-------------+------------------------------           Adj R-squared =  0.0466
       Total |  45657.9737  4517  10.1080305           Root MSE      =  3.1043
------------------------------------------------------------------------------
     ln_agri |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .5789028   .0689735     8.39   0.000     .4436809    .7141246
 ln_gdp_part |    .245005   .0234924    10.43   0.000     .1989484    .2910616
        dist |   .0002888   .0004008     0.72   0.471    -.0004969    .0010746
     distcap |  -.0003204   .0004019    -0.80   0.425    -.0011083    .0004675
      eu_fta |   .2824191   .1422046     1.99   0.047     .0036283    .5612098
   agadir_na |   1.332715   .4144878     3.22   0.001     .5201162    2.145315
       _cons |  -6.484507   1.823742    -3.56   0.000    -10.05994   -2.909078
------------------------------------------------------------------------------
```

Source: Authors own estimation

The other causality we are interested in this section is how trade agreements affect agriculture export and import. As we can see from our estimation, trade agreement with European countries (EU) positively affect the agricultural trade between EU countries and the selected North African countries. More specifically, all things remaining constant trade agreement increases agricultural trade between the countries by 28 percent. Similarly, Agadir trade agreement that is between morocco, Tunisia, Egypt and Jordan positively affect the agricultural trade flow. More specially, all things remaining constant due to free trade agreement the agricultural trade flow between the countries increased by more than 130 percent.

Table 52 EU and AGADIR Free trade agreement (FTA) on aggregate Agriculture trade

```
------------------------------------------------------------------------------
Linear regression                                     Number of obs =    4518
                                                      F(  5,  4512) =   49.26
                                                      Prob > F      =  0.0000
                                                      R-squared     =  0.0478
                                                      Root MSE      =  3.1042
------------------------------------------------------------------------------
             |               Robust
```

ln_agri	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ln_gdp_rep	.5784141	.0728355	7.94	0.000	.4356208	.7212074
ln_gdp_part	.2460041	.0238259	10.33	0.000	.1992937	.2927144
distcap	-.000031	.0000147	-2.11	0.035	-.0000598	-2.14e-06
eu_fta	.2762095	.1319774	2.09	0.036	.017469	.5349499
agadir_na	1.329277	.3010236	4.42	0.000	.7391237	1.919431
_cons	-6.49485	1.875749	-3.46	0.001	-10.17224	-2.817463

Source: authors own estimation

The estimation, although the magnitude of the effect differs, after controlling for robustness in our data it give us similar finding with the previous estimation. Further, the direction of the effect is same and they are in line with theory. Further, the join test of the variables shows that they have significant effect on agricultural trade flow. For instance, the joint tests the size of the economy and trade agreements are as follows:

Table 53 size of economy joint test

```
test ( ln_gdp_rep= ln_gdp_part=0)
( 1)  ln_gdp_rep - ln_gdp_part = 0
( 2)  ln_gdp_rep = 0
F(  2,  4512) =   90.18
Prob > F =    0.0000
```

Source: authors own estimation

Indicating, the size of the economy is jointly significant in determining the agricultural trade flow between reporting and partner countries. in addition, the joint test for the trade agreement shows that they are jointly significant.

Table 54 Free trade agreement joint test

```
test ( eu_fta = agadir_na =0)
 ( 1)  eu_fta - agadir_na = 0
 ( 2)  eu_fta = 0
       F(  2,  4512) =   10.85
            Prob > F =    0.0000
```

Source: authors own estimation

The result makes perfect sense taking in to account pre FTA arrangements the tax rate on agricultural products was very high (refer the statistical analysis part). Further, due to the

countries are neighbors, share similar culture and language the increase makes sense. However, this aggregate agricultural export and import data does not show which particular products are increased. Therefore, in the following sections trade agreement effect on live animals, cereals, vegetables, dairy products, poultry products and honey and vegetable and animal oil are separately estimated.

5.6.2 Free trade agreement on vegetables and fruits

In the following regression we examine the effect of trade agreements on the trade flow of vegetable and fruits between the reporter and partner country. First, we estimated the aggregate effect on trade agreement and in the later part we try to identify which particular trade agreement affects the trade balance significantly. Further, to make our model more explanatory and free of contamination we estimated economy size and distance between reporting and partner countries.

Table 55 Aggregate Free trade agreement on vegetable and fruits

```
 reg ln_veg ln_gdp_rep ln_gdp_part distcap fta
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    3157
-------------+------------------------------           F(  4,  3152) =   61.77
       Model |  1565.62775     4  391.406938           Prob > F      =  0.0000
    Residual |  19971.1966  3152  6.33603952           R-squared     =  0.0727
-------------+------------------------------           Adj R-squared =  0.0715
       Total |  21536.8243  3156  6.82408882           Root MSE      =  2.5171
------------------------------------------------------------------------------
      ln_veg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .8882297   .0655377    13.55   0.000     .7597289     1.01673
 ln_gdp_part |   .0612373   .0220684     2.77   0.006     .0179675    .1045072
     distcap |  -.0000703   .0000143    -4.92   0.000    -.0000983   -.0000423
         fta |   .3740378   .1306944     2.86   0.004     .1177831    .6302926
       _cons |   -11.6857   1.762408    -6.63   0.000    -15.14128   -8.230114
------------------------------------------------------------------------------
```

Source: authors own estimation

From the estimation we observe that the size of the economy plays an important role in the gravity of the trade. In this particular case, both reporting and partner country GDP have a positive effect on vegetable and fruit trade between the countries. More specifically, reporting countries GDP growth plays an important role in increasing the trade flow between the countries. The second important factor is the role of distance between trading countries. In our study, we

see the distance between the capital cities of the trading countries negatively influence the trade. The third and main result is the effect of free trade agreement (FTA) on import and export of vegetables and fruits in North African countries. Accordingly, the estimation shows that everything remaining the same, as the countries engage in trade agreement the trade flow of vegetable and fruits between reporting and partner countries increases by approximately 37 percent.

However, since this result do not show which particular trade agreement affects the trade significantly, in the following regression we will estimate the trade flow on EU and AGADIR trade agreements. We only took these agreements because the other trade agreements are either insignificant or only some of the North African countries are member. Therefore, to make our estimation robust we took only EU and AGADIR trade agreements.

Table 56 EU and AGADIR Free trade agreement on vegetable and fruits

```
reg  ln_veg ln_gdp_rep ln_gdp_part distcap eu_fta agadir_na
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    3157
-------------+------------------------------           F(  5,  3151) =   54.44
       Model |  1712.64378     5  342.528755            Prob > F      =  0.0000
    Residual |  19824.1805  3151  6.29139338            R-squared     =  0.0795
-------------+------------------------------           Adj R-squared =  0.0781
       Total |  21536.8243  3156  6.82408882            Root MSE      =  2.5083
------------------------------------------------------------------------------
      ln_veg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .8728357   .0653812    13.35   0.000     .7446417     1.00103
 ln_gdp_part |   .0691047    .021969     3.15   0.002     .0260298    .1121797
     distcap |  -.0000705   .0000142    -4.98   0.000    -.0000983   -.0000427
      eu_fta |   .2481898   .1348744     1.84   0.066    -.0162608    .5126404
   agadir_na |   1.988177   .3623757     5.49   0.000     1.277661    2.698694
       _cons |  -11.49491   1.755456    -6.55   0.000    -14.93687   -8.052959
------------------------------------------------------------------------------
Source: authors own estimation
```

In the above estimation, we observe trade agreement with European countries and regional trade agreement have a significant impact on trade flow. For instance, everything remaining the same due to a trade agreement between North African countries and EU positively influence vegetable and fruit trade. More specifically, trade agreement with EU increases the trade by 24 percent.

Similarly, AGADIR trade agreement between Morocco, Jordan, Tunisia and Egypt increases trade flow by more than double.

The finding particularly with AGADIR is very high and makes us wonder if the result also includes other factors. For instance, if there is an exogenous factor affecting all AGADIR member countries, it could potentially influence the trade flow between countries. Therefore, we have to conduct endogeneity test to the estimated model.

Table 57 Instrumental variable EU and AGADIR Free trade agreement on vegetable and fruits

```
------------------------------------------------------------------------------
Instrumental variables (2SLS) regression              Number of obs =    3157
                                                      Wald chi2(5)  =  272.74
                                                      Prob > chi2   =  0.0000
                                                      R-squared     =  0.0795
                                                      Root MSE      =  2.5059
------------------------------------------------------------------------------
      ln_veg |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .8728357   .0653191    13.36   0.000     .7448128    1.000859
 ln_gdp_part |   .0691047   .0219481     3.15   0.002     .0260872    .1121222
     distcap |  -.0000705   .0000142    -4.98   0.000    -.0000983   -.0000428
      eu_fta |   .2481898   .1347462     1.84   0.065    -.0159079    .5122875
   agadir_na |   1.988177   .3620312     5.49   0.000     1.278609    2.697745
       _cons |  -11.49491   1.753788    -6.55   0.000    -14.93227   -8.057552
------------------------------------------------------------------------------
(no endogenous regressors)
Source: authors own estimation
```

After controlling for endogeneity using instrumental variables we found the same effect of trade agreement on vegetable and fruit trade flow. Similarly, I have tried to control the country effect in to estimation but the effect is same. Therefore, the result we found in the previous estimation is internally valid. However, for our result to have external validity we must include all trade agreements and partner countries as reporter countries. Further, it is crucial to examine FTA on other agricultural products. In effect, in the next section we have estimated FTA effect on cereals exports and imports.

5.6.3 Free trade agreement on cereals

Through following similar steps in the above section, we examine the effect of free trade agreement (FTA) on import and export of cereals. In order to grant the internal validity, variables such as size of the economy for both reporter and partner country, distance between their capital and free trade agreements (FTA) are taken in to account. Accordingly, we see reporter country's GDP negatively affecting cereal exports and imports. The possible explanation being the decrease in export is associated with demand and supply of cereals in domestic market

Table 58 Free trade agreement on cereals

```
 reg ln_cereals ln_gdp_rep ln_gdp_part distcap fta
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    2117
-------------+------------------------------           F(  4,  2112) =    4.93
       Model |  254.726005     4  63.6815013           Prob > F      =  0.0006
    Residual |  27262.3693  2112  12.9083188           R-squared     =  0.0933
-------------+------------------------------           Adj R-squared =  0.0746
       Total |  27517.0953  2116  13.0042984           Root MSE      =  3.5928
------------------------------------------------------------------------------
  ln_cereals |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |  -.1611226   .1219197    -1.32   0.186    -.4002177    .0779725
 ln_gdp_part |    .080087   .0393504     2.04   0.042     .0029174    .1572567
     distcap |  -.0000939   .0000245    -3.84   0.000    -.0001419   -.0000459
         fta |  -.4938561   .2236591    -2.21   0.027    -.9324712    -.055241
       _cons |   16.77934   3.306644     5.07   0.000     10.29472    23.26396

------------------------------------------------------------------------------
```

Source: authors own estimation

Everything remaining constant as the reporter country economy grows domestic consumption of cereals increases and the export decreases. In fact, in countries like North Africa policy makers may choose to restrict exports of cereals in order to control the surge of price. However, since our p-value is greater than 0.05 we can see that the causality is not significant. On contrary, the GDP of partner country has a significant effect on cereals import and export. More specifically, one percent increase in GDP of partner country increases export and import combined by 8 percent.

Another important variable is the effect of distance between the capital city of reporting and partner country. As can be seen, as the distance between the countries increase, cereal exports and imports decrease. However, the margin is very small and may not be economically significant. Similarly, the introduction of FTA negatively affects both exports and imports of cereals. However, from theoretical point we expect FTA to positively influence the cereal trade flow. The possible explanation for the negative causality is that there are other factors playing an important role. For instance, subsidies and restriction of some imports in the name of health and safety standard could be applied.

5.6.4 Free trade agreement on animal and vegetable oil

In this section we estimated the effect of trade agreements on import and export of fat oil from vegetables and animals. First, we estimated the aggregate trade agreement effect on oil from animal and vegetable. Accordingly, in response to trade agreement the export and import increases by more than 45 percent other things remaining constant. However, the size of GDP for both reporting and partner countries seems to be insignificant. Further, distance variable seem insignificant although the sign is coherent with both theory and empirical findings.

Table 59 Aggregate Free trade agreement on animal and vegetable oil

```
reg ln_aminalfats ln_gdp_rep ln_gdp_part distcap fta
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    2927
-------------+------------------------------           F(  4,  2922) =    3.72
       Model |  171.585102     4  42.8962756           Prob > F      =  0.0051
    Residual |  33720.5385  2922  11.5402254           R-squared     =  0.0512
-------------+------------------------------           Adj R-squared =  0.0376
       Total |  33892.1236  2926  11.5830908           Root MSE      =  3.3971
------------------------------------------------------------------------------
ln_aminalf~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .1338657   .0924463     1.45   0.148    -.0474008    .3151322
 ln_gdp_part |   .0428482   .0311775     1.37   0.169    -.0182839    .1039803
     distcap |  -2.24e-06   .0000202    -0.11   0.911    -.0000418    .0000373
         fta |   .4556988   .1805119     2.52   0.012     .1017553    .8096424
       _cons |   8.306982   2.471189     3.36   0.001     3.461532    13.15243
------------------------------------------------------------------------------
```

Source: authors own estimation

Since the above regression does not uniquely show how much of the trade is affected by each trade agreements, in the following estimation we estimated the effect of EU and AGADIR trade agreement on agricultural trade flow. Accordingly, the estimation shows that everything remaining constant trade agreement with EU increases the trade flow by 45 percent and the result is statistically significant. Similarly, trade agreement between Egypt, morocco, Jordan and Tunisia increases the trade flow by more than 87percent. However, the later result is statistical insignificant.

Table 60 EU and AGADIR Free trade agreement on animal and vegetable oil

```
reg ln_aminalfats ln_gdp_rep ln_gdp_part distcap eu_fta agadir_na
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    2927
-------------+------------------------------           F(  5,  2921) =    3.31
       Model |  190.682142     5  38.1364284           Prob > F      =  0.0056
    Residual |  33701.4415  2921  11.5376383           R-squared     =  0.0565
-------------+------------------------------           Adj R-squared =  0.0396
       Total |  33892.1236  2926  11.5830908           Root MSE      =  3.3967
------------------------------------------------------------------------------
ln_aminalf~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .1307054   .0925513     1.41   0.158    -.0507671    .3121779
 ln_gdp_part |   .0454469   .0311362     1.46   0.145    -.0156041     .106498
     distcap |  -1.52e-06     .00002    -0.08   0.940    -.0000408    .0000377
      eu_fta |   .4527693   .1873796     2.42   0.016     .0853598    .8201788
   agadir_na |   .8715283   .5013014     1.74   0.082    -.1114118    1.854468
       _cons |   8.314608   2.469343     3.37   0.001     3.472778    13.15644
------------------------------------------------------------------------------
```

Source: authors own estimation

However, despite the trade agreement having significant relation the remaining variables fails to influence the trade flow. For instance, size of the economy for the partner and reporter fail to influence the trade flow. Further, distance between partner and reporter country fail to influence the trade pattern. However, the sign for both distance and size of the economy seem to be coherent with both theory and literature.

5.6.5 Free trade agreement on dairy and honey products

The other important correlation studied here is the causality between free trade agreement (FTA) and dairy and honey import and export by the North African countries. Accordingly, the size of the economy positively affects the trade flow. However, distance and FTA fail to have a significant impact on the trade flow. The possible explanation is particularly with honey is the main exporting countries are out of the main exporting countries. Therefore, introduction of the trade agreement may not necessarily affect the trade pattern.

Table 61 Aggregate Free trade agreement on dairy and honey products

```
reg ln_dairy ln_gdp_rep ln_gdp_part distcap fta
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    2718
-------------+------------------------------           F(  4,  2713) =   14.89
       Model |  457.489128     4  114.372282           Prob > F      =  0.0000
    Residual |  20836.5585  2713  7.68026485           R-squared     =  0.0215
-------------+------------------------------           Adj R-squared =  0.0200
       Total |  21294.0477  2717  7.83733811           Root MSE      =  2.7713
------------------------------------------------------------------------------
    ln_dairy |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |   .5954991   .0824182     7.23   0.000     .4338902    .7571079
 ln_gdp_part |   .0480591   .0265018     1.81   0.070    -.0039067    .1000249
     distcap |  -2.00e-06   .0000163    -0.12   0.902     -.000034      .00003
         fta |   .2432909   .1504541     1.62   0.106    -.0517254    .5383071
       _cons |  -2.952421   2.186646    -1.35   0.177    -7.240081    1.335239
------------------------------------------------------------------------------
```

Source: authors own estimation

Similarly to honey exports and imports the dairy products are not significantly affected through the introduction of FTA. The main reason is again the main exporters in the world market are out of the trade agreements considered in this study. Therefore, it is logical for EU and AGADIR trade agreement not to influence the import and export of dairy and honey products.

5.6.6 Free trade agreement on live animals

The other important component of agriculture, worth of study, is the trade flow in live animals. Countries such as Algeria, morocco and Tunisia import cattle from both Spain and France.

Therefore, studying the effect of trade agreement particularly with EU is expected to have a significant impact in the trade flow. Accordingly, the estimation shows that economic size matter in determining the trade partnership. However, distance between the capital cities of reporting and partner country fail to influence the partnership. In case of size of the economy, the effective is negative meaning that as the size of the economy increases the trade decreases. The explanation is as the economy increases the domestic consumption increases and affects significantly the export sector.

Table 62 Free trade agreement on live animals

```
reg ln_liveanimals ln_gdp_rep ln_gdp_part distcap fta
------------------------------------------------------------------------------
      Source |       SS       df       MS              Number of obs =    1035
-------------+------------------------------           F(  4,  1030) =    4.19
       Model |  200.922941     4  50.2307353           Prob > F      =  0.0023
    Residual |  12357.3139  1030  11.9973921           R-squared     =  0.1608
-------------+------------------------------           Adj R-squared =  0.1224
       Total |  12558.2368  1034  12.1452967           Root MSE      =  3.4637
------------------------------------------------------------------------------
ln_liveani~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  ln_gdp_rep |  -.5379541   .1605989    -3.35   0.001    -.8530926   -.2228157
 ln_gdp_part |  -.0120347   .0522142    -0.23   0.818    -.1144931    .0904237
     distcap |  -7.68e-06   .0000358    -0.21   0.830     -.000078    .0000626
         fta |  -.6479454   .2905351    -2.23   0.026    -1.218054   -.0778371
       _cons |   25.34504    4.39809     5.76   0.000      16.7148    33.97528
------------------------------------------------------------------------------
Source: authors own estimation
```

The other main important causality is between free trade agreement (FTA) and live animal trade flow. The estimation result shows that, trade agreement causes the trade flow to decrease by more than 64 percent. From conventional economic theory and empirics the result is something unexpected because we expect tariff elimination to increase the trade flow. However, if some laws are introduced at that particular time the law not only could offset the positive effect but also it could decrease it significantly. Therefore, the study may fail to capture the net effect of trade agreement. Hence, to uniquely identify the effect we have to include the potential variables in the study.

Chapter 6

Conclusion and Recommendation

6. Conclusion and recommendation

6.1 Conclusion

The objective of this study was to identify the impact of trade agreements and trade openness on economic growth, foreign directed investment, women's decision making, agriculture sector and human development in North African countries. The study of this topic is basically important for four main reasons. First, there is an increasing demand to boost economic growth, women's decision making, foreign directed investment, Agriculture sector, and human development because they have the power to change the welfare of the nation. Second, from empirical perspective there are limited studies in North African countries; even if they exist they are focused on only one aspect. In fact, it is nonexistent to my knowledge with such comprehensive study. Third, the findings from this paper can be used as an input for policy makers. Last but not least, it will be an addition to existing literature in trade theories and panel data estimation.

Hence, taking in to account the objective of the paper and the potential importance of the study, the author took two databases to estimate the causality. The first and main data base used is a panel data from 2000 to 2014 for selected North African countries. The data was selected because in these countries trade agreements with EU, Turkey and Agadir (Jordan, morocco, Egypt and Tunisia) is made in the mead of 2000's. Therefore, we have six years before the trade agreement and eight years after the agreement and this make it valuable in finding the causality of trade agreements (FTA). Form this database we are able to find important causality between trade agreements and dependent variables (economic growth, human development, women's decision making and foreign directed investment).Further, we are able to identify the impact of trade openness on the dependent variables (economic growth, human development, women's decision making and foreign directed investment).

The second data base used is the gravity database ranging from 1950 to 2000 and constitutes all countries in the world. However, the limitation of this data is we cannot capture FTA effect on economic growth, foreign directed investment, human development and women decision

making. Therefore, from this database we can only capture the effect of FTA on trade flows. Hence, we tried to capture this causality only from this database.

In this research, we want to find internally valid causality among dependent and explanatory variable. Therefore, to this effect we have used three different estimation techniques. Namely, the study uses pooled OLS, fixed effect (FE) and random effect (RE) model. However, the best model is selected through economic theories, previous empirical findings and statistical diagnostic tests. Accordingly, based on the economic theories, previous empirical research and diagnostic tests we have selected the fixed effect (FE) as the best estimation to identify the causality.

The estimation between free trade agreement and economic growth shows that only the trade agreement between the north African countries and EU have a positive and significant (**p<0.001)**impact on economic growth. However, the trade agreement with turkey and regional agreement (Agadir) do not have an impact on economic growth. This result is coherent with the trade origin and destination. The North African countries heavily rely for both export and import on EU countries. In fact, more than 50 percent of both export and import of North African countries is from EU countries. Therefore, having trade agreement with EU a positive effect on economic growth is logical.

On the other hand the causality between free trade agreement (particularly with EU) and foreign directed investment (FDI) is insignificant. However, this result is not coherent with the economic theories and the fact more than 50 percent of North African countries trade is with EU countries. The main reason for the unexpected result can be summarized in to two events. First, European countries were affected by financial crisis (from 2008 to 2012). Therefore, at this particular period it would be difficult to finance several foreign directed investments in the North African countries by EU firms. The second reason is that, North African countries were relatively unstable due to Arab revolution. Therefore, it is natural to expect the FTA not to have a significant impact on foreign directed investment (FDI). Therefore, because these two exogenous effects we are unable to capture the effect of FTA on FDI.

The causality between free trade agreement and women decision making is captured through variables fertility and EU. The underplaying assumption is that the trade agreement creates jobs

which are suitable for women and increase the opportunity cost of having children and therefore they decide to decrease the number of children they have. According to our expectation, an increase in trade agreement with EU affects women fertility negatively and it is statistically significant (**** p<0.01).** However, we have to be cautious with this finding because the there could be other factors affecting the fertility rate of women. For instance, the introduction of contraceptive could significantly decrease the fertility. For this reason, I have tried to control countries that made the trade agreement first and last and check if the decline in fertility could be explained by other common exogenous factor. However, the result shows that even after controlling those exogenous common factors the trade agreement with EU has a significant effect on fertility.

The causality between free trade agreement and human development is captured through FTA (EU, Turkey, and Agadir) and human development (hdi). Despite the importance of trade agreement with EU to most of the variables it does not have an impact on human development. The logical reason for this is again, FTA does not have impact on FDI and knowledge transfer with the North African countries. However, surprisingly the trade agreement among North African countries has a positive impact on human development. The possible explanation for this trade agreement facilitates education and health services because of their proximity to each other.

Last but not least, the causality between FTA and trade flow shows that there is a positive and significant ($p<0.001$) relationship. The estimation implies that generally, making a free trade agreement increases the trade flow between countries. Further, the study finds that distance between countries, similarity of language, having common colonizer and being communist have a positive effect on trade flows between countries.

The impact of trade agreement on the Agriculture sector shows that import and export of agricultural commodities increase significantly. More specifically, in response to an introduction of free trade agreement with European Union (EU) everything remaining constant increases the agricultural trade flow by 28 percent. Similarly, trade agreement with Morocco, Egypt, Jordan and Tunisia has a significant effect. In fact, everything remaining constant the trade agreement with AGADIR increases agricultural trade by more than 133 percent. This finding is robust and despite a small difference in magnitude alternative estimation techniques also make the same conclusion. The other vital causality we find is that, the importance of the size of economy for

both reporter and partner country. Accordingly, we found everything remaining constant as partner economy grows the agriculture trade increase and the same applies when partner country economy. However, the magnitude of the agricultural trade differs based on the growth is in reporter and partner country.

In this study, in addition to the aggregate agriculture trade we have examined the effect of FTA on Animal products, live animals, Cereals, vegetable and vegetable products, and Dairy and honey. Accordingly, the result shows that with the exception of Dairy and honey products, the trade in the remaining agricultural products significantly increased. The main reason for the no significance of dairy and honey products is that they are been imported from non member countries. Since, the objective of this paper is to study the effect of FTA hence the study did not examine the reason. Therefore, this finding requires further research.

In summary, the study shows free trade agreement will have a positive effect on economic growth, women's fertility, human development, Agriculture trade flow and Aggregate trade flow. However, the potential benefit from free trade agreement depends on the composition of exports and imports in both origin and destination countries. However, the impact on foreign directed investment (FDI) needs further investigation.

6.2 Recommendation

As we have seen in the applied and most favored nation's tariff rates, there is still tariff on imported and exported goods and services despite making trade agreements. Therefore, while this condition persist the Pareto optimality cannot be achieved. Therefore, to have a Pareto optimal welfare in the economy the trade restriction in the form of tariff should be eliminated. However, despite the tariff is not fully eliminated trade agreement with EU have a positive effect on economic growth and trade flow been countries. Similarly, trade openness plays an important role in the economy.

Therefore, the EU has to extend the trade agreement coverage and encourage the FDI to North African countries. Because, by extending the trade agreement and encouraging FDI with North African countries EU could reduce the number of migrants and illegal human traffickers in to Europe. As we have found the trade agreement stimulate economic growth and if this substantiated through FDI job for young and women will be created. If women and young people are able to be a job, women start to postpone having children and increase their decision making while young people decide to stay home instead of migrating.

However, from the side of North African countries dropping tariffs with their trading partners may not be beneficial all the time. For instance, the textile sector requires protection because it employees a huge labor force. Whereas the heavy tariff for animal and animal product may negatively affect the spending of households. Therefore, the courtiers need to critically assess the potential benefits and costs of reducing the tariff rates. In fact, if this is not made based on critical study it may have undesirable effect on prices and employment.

Further, extending the trade agreement with other nations requires further studies. For instance, it would be advisable to study further why some trade agreements have positive effect and others fail to meet the hype. Particularly, it is advisable to study why regional trade agreements such as Agadir (Jordan, morocco, Egypt and Tunisia) fail to improve economic growth, FDI, and women decision making.

Last but not least, extending the study to the whole Middle East and North Africa (MENA) countries would shade some important findings. Particularly, it could be studied using all the MENA countries as a both reporter and partner countries. This study has to be substantiated

through including all trade agreement between MENA and other countries. Further, the study could be compared with other regional trade agreements. For instance, trade agreements south-south, north-north, and south-north could be used as a reference in studying how the MENA trade is influencing the overall economy as compared to other trade agreements. The challenging aspect of the study would be developing a comprehensive gravity database which includes all trade agreements and their respective key macroeconomic variables.

Reference

Azzarello, S., & Putnam, B. (2012). BRIC Country Update: Slowing growth in the face of internal and external challenges. Market Insights.

Bacchetta, M., Beverelli, C., Cadot, O., Fugazza, M., Grether, J. M., Helble, M., ... & Piermartini, R. (2012). A practical guide to trade policy analysis. World trade organization.

Richter, S. (2012). Regional Trade Integration in the Middle East and North Africa: Lessons from Central Europe (No. 014). FIW.

Shui, L., & Walkenhorst, P. (2010). Regional integration: Status, developments, and challenges. Trade Competitiveness of the Middle East and North Africa: Policies for Export Diversification, 267.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. The American Economic Review, 106-116.

Anderson, J. E., & van Wincoop, E. (2003). nGravity with Gravitas: A Solution to the Border Puzzle, oAmerican Economic Review. March, 93(1), 170.

Baier, S. L., & Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade?. Journal of international Economics,71(1), 72-95.

Baier, S. L., & Bergstrand, J. H. (2009). Estimating the effects of free trade agreements on international trade flows using matching econometrics. Journal of international Economics, 77(1), 63-76.

Baier, S. L., Bergstrand, J. H., & Feng, M. (2014). Economic integration agreements and the margins of international trade. Journal of International Economics, 93(2), 339-350.

Brada, J. C., & Méndez, J. A. (1985). Economic integration among developed, developing and centrally planned economies: A comparative analysis. The Review of Economics and Statistics, 549-556.

David, R. (1817). On the principles of political economy and taxation. publicado en.

Deardorff, A. V., & Stern, R. M. (1998). Measurement of nontariff barriers (Vol. 179). University of Michigan Press.

Eicher, T. S., & Henn, C. (2011). In search of WTO trade effects: Preferential trade agreements promote trade strongly, but unevenly. Journal of International Economics, 83(2), 137-153.

Eaton, J., & Kortum, S. (2002). Technology, geography, and trade.Econometrica, 1741-1779.

Foster, N., Poeschl, J., & Stehrer, R. (2011). The impact of Preferential Trade Agreements on the margins of international trade. Economic Systems, 35(1), 84-97.

Heckscher, E. F. (1919). The effect of foreign trade on the distribution of income.

Kosack, S., & Tobin, J. L. (2015). Which Countries' Citizens Are Better Off With Trade?. World Development, 76, 95-113.

Ohlin, B. (1933). International and interregional trade. Harvard Economic Studies, Cambridge, MA.

Samuelson, P. A. (1967). General proof that diversification pays. Journal of Financial and Quantitative Analysis, 2(01), 1-13.

Melitz, M. J. (2003). The impact of trade on intra□industry reallocations and aggregate industry productivity. Econometrica, 71(6), 1695-1725.

Moser, C., & Rose, A. K. (2014). Who benefits from regional trade agreements? The view from the stock market. European Economic Review, 68, 31-47.

Negishi, T. (2001). Developments of international trade theory. Boston, MA: Kluwer Academic.

Vicard, V. (2011). Determinants of successful regional trade agreements.Economics Letters, 111(3), 188-190.

Khun, C., Lahiri, S., & Lim, S. (2015). Do people really support trade restrictions? Cross-country evidence. *The Journal of International Trade & Economic Development*, *24*(1), 132-146.

Aguayo-Tellez, E., Airola, J., Juhn, C., & Villegas-Sanchez, C. (2010). Did trade liberalization help women?: the case of Mexico in the 1990s (No. w16195). National Bureau of Economic Research.

Doan, T., Nguyen, S., Vu, H., Tran, T., & Lim, S. (2016). Does rising import competition harm local firm productivity in less advanced economies? Evidence from the Vietnam's manufacturing sector. The Journal of International Trade & Economic Development, 25(1), 23-46.

Baltagi, B. H., Egger, P., & Pfaffermayr, M. (2008). Estimating regional trade agreement effects on FDI in an interdependent world. Journal of Econometrics, 145(1), 194-208.

Nourou, M. (2015). Human development effects of large changes in food prices: Does openness policy matter?. The Journal of International Trade & Economic Development, 24(5), 591-615.

Tsai, P. L. (1999). Is trade liberalization harmful to the environment? An alternative view. Journal of Economic Studies, 26(3), 201-209.

Shaikh, F. M. (2009). Analysis of bilateral trade liberalization and South Asian Free Trade Agreement (SAFTA) on Pakistan's economy by using CGE model. Journal of International Trade Law and Policy, 8(3), 227-251.

Munir, S., & Kiani, A. K. (2011). Relationship between Trade Openness and Inflation: Empirical Evidences from Pakistan (1976—2010). The Pakistan Development Review, 853-876.

Madsen, J. B. (2009). Trade barriers, openness, and economic growth.Southern Economic Journal, 76(2), 397-418.

Liargovas, P. G., & Skandalis, K. S. (2012). Foreign direct investment and trade openness: The case of developing economies. Social indicators research, 106(2), 323-331.

Sarkar, P., & Bhattacharyya, B. (2005). Trade Liberalisation and Growth: Case Studies of India and Korea. Economic and Political Weekly, 5635-5641.

Sakyi, D., Villaverde, J., & Maza, A. (2015). Trade openness, income levels, and economic growth: The case of developing countries, 1970–2009. The Journal of International Trade & Economic Development, 24(6), 860-882.

Naveed, A., & Shabbir, G. (2006). Trade openness, FDI and economic growth: A panel study. Pakistan Economic and Social Review, 137-154.

Kali, R., Méndez, F., & Reyes, J. (2007). Trade structure and economic growth. The Journal of International Trade & Economic Development, 16(2), 245-269.

López, R., & Galinato, G. I. (2005). Trade policies, economic growth, and the direct causes of deforestation. Land Economics, 81(2), 145-169.

Hua, X., & Boateng, A. (2015). Trade Openness, Financial Liberalization, Economic Growth, and Environment Effects in the North-South: New Static and Dynamic Panel Data Evidence. Beyond the UN Global Compact: Institutions and Regulations (Advances in Sustainability and Environmental Justice, Volume 17) Emerald Group Publishing Limited, 17, 253-289.

Sarkar, P. (2008). Trade openness and growth: is there any link?. Journal of economic issues, 42(3), 763-785.

Santarelli, E., & Figini, P. (2006). Openness, economic reforms, and poverty: Globalization in developing countries. The Journal of Developing Areas, 39(2), 129-151.

Jouini, J. (2015). Linkage between international trade and economic growth in GCC countries: Empirical evidence from PMG estimation approach. The Journal of International Trade & Economic Development, 24(3), 341-372.

Wälde, K., & Wood, C. (2004). The empirics of trade and growth: where are the policy recommendations?. International Economics and Economic Policy, 1(2-3), 275-292.

Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" forthcoming *American Economic Review,* available for download at www.ggdc.net/pwt

Romer, P. M. (1990, May). Human capital and growth: theory and evidence. In Carnegie-Rochester Conference series on public policy (Vol. 32, pp. 251-286). North-Holland.

Barro, R. J., & Sala-i-Martin, X. (1994). Quality improvements in models of growth (No. w4610). National Bureau of Economic Research.

Grant, J. H., & Lambert, D. M. (2008). Do regional trade agreements increase members' agricultural trade?. American journal of agricultural economics, 90(3), 765-782.

Sun, L., & Reed, M. R. (2010). Impacts of free trade agreements on agricultural trade creation and trade diversion. American Journal of Agricultural Economics, 92(5), 1351-1363.

Koo, W. W., Kennedy, P. L., & Skripnitchenko, A. (2006). Regional preferential trade agreements: Trade creation and diversion effects. Applied Economic Perspectives and Policy, 28(3), 408-415.

Lambert, D., & McKoy, S. (2009). Trade creation and diversion effects of preferential trade associations on agricultural and food trade. Journal of Agricultural Economics, 60(1), 17-39.

Verter, N. (2015). The Application of International Trade Theories to Agriculture. *Mediterranean Journal of Social Sciences*, *6*(6 S4), 209.

Grubel, H. G., & Lloyd, P. J. (1971). The Empirical Measurement of Intra□Industry Trade*. Economic record, 47(4), 494-517.

McCorriston, S., & Sheldon, I. M. (1991). Intra-industry trade and specialization in processed agricultural products: the case of the US and the EC. Review of Agricultural Economics, 13(2), 173-184.

Porter, M. E. (1990). The competitive advantage of notions. Harvard business review, 68(2), 73-93.

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. Journal of international Economics, 9(4), 469-479.

Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. The American Economic Review, 70(5), 950-959.

Melitz, M. J. (2003). The impact of trade on intra□industry reallocations and aggregate industry productivity. Econometrica, 71(6), 1695-1725.

Golpinath, M., Sheldon, I., & Echeverria, R. (2007). Firm heterogeneity and international trade: Implications for agricultural and food industries. IATRC Trade Policy Issues Paper, 5.

Ahn, J., Khandelwal, A. K., & Wei, S. J. (2011). The role of intermediaries in facilitating trade. Journal of International Economics, 84(1), 73-85.

Yanikkaya, H. (2008). Is Trade Liberalization a Solution to the Unemployment Problem? (No. 2008/17). Discussion Paper, Turkish Economic Association.

Anderson, K., & Valenzuela, E. (2007). Do global trade distortions still harm developing country farmers?. Review of World Economics, 143(1), 108-139.

Medvedev, D. (2006). Preferential trade agreements and their role in world trade. World Bank Policy Research Working Paper, (4038).

Aghrout, A.(2007). Embracing free trade:The EU's economic partnership with Algeria. Intereconomics, 42(2), 96-104.

Appendix

Algeria

Part A.1 Tariffs and imports: Summary and duty ranges

Summary		Total	Ag	Non-Ag	Non-WTO member	
Simple average final bound					Binding coverage:	Total
Simple average MFN applied	2014	18.8	23.2	18.1		Non-Ag
Trade weighted average	2013	13.1	11.3	13.5	Ag: Tariff quotas (in %)	
Imports in billion US$	2013	55.0	10.5	44.5	Ag: Special safeguards (in %)	

Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
		Tariff lines and import values (in %)								in %
Agricultural products										
Final bound										
MFN applied	2014	0.9	20.5	0	9.6	0	69.1	0	0	0
Imports	2013	15.8	55.6	0	5.4	0	23.2	0	0	0
Non-agricultural products										
Final bound										
MFN applied	2014	1.7	23.3	0	37.4	0	37.6	0	0	0
Imports	2013	0.8	42.5	0	33.0	0	23.7	0	0	0

Part A.2 Tariffs and imports by product groups

Product groups	Final bound duties				MFN applied duties			Imports	
	AVG	Duty-free	Max	Binding	AVG	Duty-free	Max	Share	Duty-free
		in %		in %		in %		in %	in %
Animal products					27.4	0	30	0.8	0
Dairy products					22.7	0	30	2.3	0
Fruit, vegetables, plants					25.5	0	30	1.9	0
Coffee, tea					26.5	0	30	0.9	0
Cereals & preparations					23.4	3.3	30	7.1	23.0
Oilseeds, fats & oils					18.5	2.4	30	3.2	40.1
Sugars and confectionery					23.8	0	30	1.7	0
Beverages & tobacco					26.7	0	30	0.9	0
Cotton					5.0	0	5	0.0	0
Other agricultural products					17.8	1.0	30	0.4	34.4
Fish & fish products					29.7	0	30	0.2	0
Minerals & metals					16.4	1.3	30	16.5	0.5
Petroleum					18.6	32.3	30	6.9	0.7
Chemicals					14.6	0.2	30	11.4	0.6
Wood, paper, etc.					19.3	0	30	3.5	0
Textiles					24.0	0.2	30	1.2	0.6

Clothing			30.0	0.2	30	0.6	3.5
Leather, footwear, etc.			19.0	0.6	30	1.5	0.2
Non-electrical machinery			8.8	0.2	30	15.6	0.2
Electrical machinery			17.6	0	30	7.0	0
Transport equipment			10.4	25.4	30	14.3	1.7
Manufactures, n.e.s.			21.0	7.0	30	2.2	6.3

Part B Exports to major trading partners and duties faced

Major markets	Bilateral imports		Diversification		MFN AVG of traded TL		Pref. margin	Duty-free imports	
		in million US$	95% trade in no. of HS 2-digit	HS 6-digit	Simple	Weighted	Weighted	TL in %	Value in %
Agricultural products									
1. European Union	2013	88	9	11	12.7	38.3	3.0	42.7	39.7
2. Sudan	2012	18	1	2	17.5	10.9	10.9	100.0	100.0
3. Niger	2013	16	3	4	14.8	17.5	0.0	0.0	0.0
4. Lebanese Republic	2013	15	1	1	22.5	5.4	0.0	0.0	0.0
5. Ghana	2013	14	2	2	18.7	14.9	0.0	0.0	0.0
Non-agricultural products									
1. European Union	2013	36,457	1	5	3.6	0.2	0.2	100.0	100.0
2. United States of America	2013	4,595	2	6	0.8	0.0	0.0	96.7	100.0
3. Canada	2013	3,249	1	1	3.7	0.0	0.0	60.4	100.0
4. Brazil	2013	3,075	1	3	1.6	0.0	0.0	80.0	100.0
5. China	2013	2,164	1	3	9.6	0.1	0.0	9.7	94.8

Egypt

Part A.1 Tariffs and imports: Summary and duty ranges

Summary		Total	Ag	Non-Ag	WTO member since		1995
Simple average final bound		36.8	98.3	27.5	Binding coverage:	Total	99.3
Simple average MFN applied	2014	16.8	60.6	9.5		Non-Ag	99.2
Trade weighted average	2013	11.8	20.1	10.1	Ag: Tariff quotas (in %)		0
Imports in billion US$	2013	65.0	12.8	52.1	Ag: Special safeguards (in %)		0

Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
		Tariff lines and import values (in %)								in %
Agricultural products										
Final bound		0	10.6	18.1	2.2	17.4	23.8	25.2	2.3	1.6
MFN applied	2014	16.0	44.4	13.0	0.2	11.9	12.2	0.2	2.0	1.3
Imports	2013	61.6	24.0	2.4	0	6.8	3.8	0.0	1.4	3.3
Non-agricultural products										

Final bound		2.2	11.9	9.8	4.3	23.1	34.9	12.8	0.1	0
MFN applied	2014	11.0	50.5	19.2	0	4.3	15.0	0	0.1	0
Imports	2013	29.7	41.9	14.5	0	2.1	11.7	0	0.1	0

Part A.2 Tariffs and imports by product groups

Product groups	Final bound duties				MFN applied duties			Imports	
	AVG	Duty-free in %	Max	Binding in %	AVG	Duty-free in %	Max	Share in %	Duty-free in %
Animal products	44.2	0	80	100	15.0	21.6	30	2.0	67.4
Dairy products	23.3	0	60	100	6.0	29.5	20	1.2	83.2
Fruit, vegetables, plants	37.8	0	80	100	11.2	4.9	40	1.7	37.7
Coffee, tea	36.9	0	60	100	10.5	20.8	30	0.8	14.8
Cereals & preparations	42.3	0	> 1000	100	13.2	21.9	> 1000	6.8	48.0
Oilseeds, fats & oils	19.9	0	60	100	3.8	26.5	30	4.3	55.3
Sugars and confectionery	37.5	0	60	100	10.5	0	40	0.7	0
Beverages & tobacco	957.9	0	> 1000	100	803.2	0	> 1000	0.9	0
Cotton	5.0	0	5	100	4.0	20.0	5	0.3	99.2
Other agricultural products	19.3	0	60	100	2.4	22.6	30	1.2	23.9
Fish & fish products	24.8	0	60	100	9.6	36.6	40	0.8	14.4
Minerals & metals	31.1	0.1	60	99.7	7.9	8.3	30	19.5	38.9
Petroleum	20.0	0	20	100	3.2	16.7	5	11.6	27.3
Chemicals	18.9	0.1	80	100	5.8	9.4	> 1000	13.7	34.9
Wood, paper, etc.	36.5	0	60	100	11.3	6.2	30	4.9	32.2
Textiles	27.7	0	60	100	10.8	3.9	30	4.1	10.3
Clothing	40.0	0	40	100	28.9	0	30	0.8	0
Leather, footwear, etc.	41.7	0	60	91.2	12.1	1.3	30	1.7	0.7
Non-electrical machinery	18.1	6.0	80	99.2	4.9	21.6	30	9.6	15.1
Electrical machinery	26.9	19.6	60	98.0	7.9	22.4	30	6.4	35.7
Transport equipment	35.4	0	160	94.2	13.7	5.7	135	5.3	0.1
Manufactures, n.e.s.	31.2	4.8	70	100	12.3	10.0	40	1.9	11.2

Part B Exports to major trading partners and duties faced

Major markets	Bilateral imports		Diversification		MFN AVG of traded TL		Pref. margin	Duty-free imports	
		in million US$	95% trade in no. of HS 2-digit	HS 6-digit	Simple	Weighted	Weighted	TL in %	Value in %
Agricultural products									
1. European Union	2013	1,078	19	59	14.5	8.5	7.3	94.1	91.7
2. Saudi Arabia, Kingdom of	2013	662	16	64	4.6	5.7	5.7	100.0	100.0
3. Russian Federation	2013	362	3	8	10.4	8.1	2.0	2.6	0.0
4. Jordan	2013	184	16	61	17.7	17.0	17.0	100.0	100.0

5. Lebanese Republic	2013	183	15	43	23.2	24.0	24.0	100.0	100.0
Non-agricultural products									
1. European Union	2013	9,194	41	179	4.5	2.8	2.8	100.0	100.0
2. India	2013	2,325	4	7	9.2	1.2	0.0	1.9	80.4
3. China	2013	1,811	7	10	11.5	0.5	0.0	7.3	93.5
4. Turkey	2013	1,578	35	123	5.5	6.1	6.1	99.6	100.0
5. United States of America	2013	1,512	25	87	5.8	10.9	0.1	63.6	42.1

Morocco

Part A.1 Tariffs and imports: Summary and duty ranges

Summary		Total	Ag	Non-Ag	WTO member since		1995
Simple average final bound		41.3	54.4	39.3	Binding coverage:	Total	100
Simple average MFN applied	2014	11.2	27.4	8.7		Non-Ag	100
Trade weighted average	2013	10.1	25.6	8.1	Ag: Tariff quotas (in %)		13.5
Imports in billion US$	2013	45.6	5.1	40.5	Ag: Special safeguards (in %)		16.2

Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
		Tariff lines and import values (in %)								in %
Agricultural products										
Final bound		0	0	0.1	0	4.0	79.7	4.1	12.1	0
MFN applied	2014	0	34.3	13.4	0	16.0	30.0	3.4	2.8	0
Imports	2013	0	34.4	6.7	0	21.2	30.3	6.0	1.5	0
Non-agricultural products										
Final bound		0.0	0.1	0.4	0	1.8	97.6	0	0	0
MFN applied	2014	0.0	64.9	9.1	0	25.7	0.3	0	0	0
Imports	2013	1.3	68.1	6.7	0	23.8	0.0	0	0	0

Part A.2 Tariffs and imports by product groups

Product groups	Final bound duties				MFN applied duties			Imports	
	AVG	Duty-free	Max	Binding	AVG	Duty-free	Max	Share	Duty-free
		in %		in %		in %		in %	in %
Animal products	94.5	0	289	100	73.9	0	200	0.3	0
Dairy products	76.7	0	87	100	51.0	0	100	0.7	0
Fruit, vegetables, plants	34.0	0	40	100	26.0	0	40	0.7	0
Coffee, tea	34.0	0	34	100	17.5	0	40	0.8	0
Cereals & preparations	59.4	0	195	100	22.7	0	170	3.8	0
Oilseeds, fats & oils	86.2	0	236	100	10.3	0	50	2.1	0
Sugars and confectionery	134.5	0	168	100	19.3	0	50	1.0	0
Beverages & tobacco	34.0	0	34	100	36.5	0	49	0.5	0
Cotton	22.0	0	34	100	2.5	0	3	0.2	0

Other agricultural products	33.6	0	40	100	7.7	0	49	1.1	0
Fish & fish products	39.6	0	40	100	14.2	0	50	0.4	0
Minerals & metals	39.4	0.2	45	100	8.9	0.1	25	17.6	6.5
Petroleum	40.0	0	40	100	14.3	0	25	19.6	0
Chemicals	39.0	0	45	100	5.4	0	25	10.1	0
Wood, paper, etc.	39.0	0	45	100	15.3	0	25	3.6	0
Textiles	41.8	0	45	100	8.9	0	25	6.1	0
Clothing	40.2	0	45	100	24.3	0	25	0.7	0
Leather, footwear, etc.	39.7	0	45	100	14.8	0	25	1.8	0
Non-electrical machinery	36.8	0	45	100	4.4	0	25	9.4	0
Electrical machinery	37.8	0	45	100	6.0	0	25	7.6	0
Transport equipment	38.7	0	45	100	9.5	0	25	9.1	0
Manufactures, n.e.s.	39.2	0	45	100	4.8	0	25	2.8	0

Part B Exports to major trading partners and duties faced

Major markets	Bilateral imports		Diversification		MFN AVG of traded TL		Pref. margin	Duty-free imports	
		in million US$	95% trade in no. of HS 2-digit	HS 6-digit	Simple	Weighted	Weighted	TL in %	Value in %
Agricultural products									
1. European Union	2013	1,742	17	67	13.5	14.4	9.3	97.7	78.4
2. Russian Federation	2013	347	2	5	11.5	8.2	2.0	2.8	0.1
3. United States of America	2013	129	11	22	3.2	2.5	1.5	95.4	75.3
4. Canada	2013	71	7	12	4.5	0.2	0.0	61.2	97.9
5. Switzerland	2013	49	6	19	25.8	7.4	1.6	42.3	72.7
Non-agricultural products									
1. European Union	2013	10,976	54	277	5.0	7.0	7.0	100.0	100.0
2. Brazil	2013	1,431	5	8	19.1	0.8	0.0	16.7	94.5
3. India	2013	891	3	4	9.1	4.9	0.8	9.3	2.6
4. United States of America	2013	831	20	76	6.7	3.5	1.6	86.5	89.9
5. Turkey	2013	566	17	46	7.6	6.8	6.4	98.7	93.8

Tunisia

Part A.1 Tariffs and imports: Summary and duty ranges

Summary		Total	Ag	Non-Ag	WTO member since		1995
Simple average final bound		57.9	116.0	40.8	Binding coverage:	Total	58.0
Simple average MFN applied	2013	14.1	24.6	12.3		Non-Ag	51.6
Trade weighted average	2013	13.1	28.7	11.2	Ag: Tariff quotas (in %)		4.7
Imports in billion US$	2013	23.8	2.6	21.2	Ag: Special safeguards (in %)		4.7

Frequency distribution		Duty-free	0 <= 5	5 <= 10	10 <= 15	15 <= 25	25 <= 50	50 <= 100	> 100	NAV
		Tariff lines and import values (in %)								in %
Agricultural products										
Final bound		0	0	0	0	1.7	2.9	44.0	51.4	0
MFN applied	2013	13.2	0	14.5	11.8	0	60.4	0	0	0
Imports	2013	1.5	0	1.8	30.0	0	66.8	0	0	0
Non-agricultural products										
Final bound		0	0	0	0	8.1	27.2	16.3	0.1	0
MFN applied	2013	38.0	0.1	21.7	13.2	0	27.1	0	0	0
Imports	2013	40.7	0	14.0	20.5	0	24.7	0	0	0

Part A.2 Tariffs and imports by product groups

Product groups	Final bound duties				MFN applied duties			Imports	
	AVG	Duty-free	Max	Binding	AVG	Duty-free	Max	Share	Duty-free
		in %		in %		in %		in %	in %
Animal products	113.1	0	180	100	32.6	0	36	0.4	0
Dairy products	132.6	0	180	100	32.3	0	36	0.2	0
Fruit, vegetables, plants	137.5	0	200	100	32.1	6.7	36	0.3	0
Coffee, tea	85.6	0	150	100	26.0	4.9	36	0.5	0
Cereals & preparations	119.4	0	200	100	29.3	8.3	36	4.6	0
Oilseeds, fats & oils	110.1	0	200	100	10.8	18.6	36	2.8	0
Sugars and confectionery	100.0	0	100	100	14.4	34.7	36	0.9	0
Beverages & tobacco	107.1	0	150	100	33.4	0	36	0.6	0
Cotton	62.0	0	62	100	0.0	100.0	0	0.1	100.0
Other agricultural products	99.7	0	200	100	9.9	36.1	36	0.7	12.0
Fish & fish products	71.9	0	180	8.7	30.2	0.1	36	0.3	0
Minerals & metals	31.5	0	43	26.0	9.3	45.1	30	16.4	53.8
Petroleum	-	-	-	0	5.0	66.7	15	12.1	33.3
Chemicals	29.5	0	75	41.8	5.2	67.8	30	12.6	60.6
Wood, paper, etc.	37.8	0	52	49.6	19.2	9.5	30	2.9	4.8
Textiles	56.1	0	60	91.8	14.4	8.9	30	7.8	2.0
Clothing	60.0	0	60	100	29.6	0	30	1.8	0
Leather, footwear, etc.	39.1	0	43	51.5	20.2	15.1	30	2.1	6.3
Non-electrical machinery	27.0	0	43	54.3	5.9	66.2	30	10.4	61.0
Electrical machinery	33.7	0	52	55.1	13.6	26.1	30	10.7	19.7
Transport equipment	31.0	0	52	43.9	10.9	57.0	30	9.0	58.7
Manufactures, n.e.s.	35.2	0	43	52.5	12.0	34.9	30	2.8	55.9

Part B Exports to major trading partners and duties faced

Major markets	Bilateral imports		Diversification		MFN AVG of traded TL		Pref. margin	Duty-free imports	
		in million US$	95% trade in no. of HS 2-digit	HS 6-digit	Simple	Weighted	Weighted	TL in %	Value in %
Agricultural products									
1. European Union	2013	446	19	50	13.3	24.5	3.8	44.8	44.1
2. United States of America	2013	127	2	4	3.7	1.4	1.2	79.5	96.5
3. Morocco	2013	85	4	5	30.9	46.3	46.3	100.0	100.0
4. Algeria	2013	35	13	24	27.1	25.6	25.6	98.6	100.0
5. Senegal	2013	34	4	6	15.9	15.6	0.0	0.0	0.0
Non-agricultural products									
1. European Union	2013	11,269	54	427	4.8	4.5	4.5	99.7	100.0
2. United States of America	2013	592	22	90	6.8	2.8	0.3	52.1	83.5
3. Algeria	2013	464	38	171	20.1	15.9	15.7	96.2	98.0
4. Canada	2013	297	9	16	7.1	1.4	0.0	49.9	91.5
5. Turkey	2013	284	24	56	6.9	5.4	5.4	99.8	100.0

North African countries free trade agreements (FTA)

1. Algeria

Agreement name:	EU - Algeria		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	22-Apr-2002	**Date of notification:**	24-Jul-2006
Date of entry into force:	01-Sep-2005	**End of implementation period:**	2017
Remarks:	Official Journal of the European Union, L 265, 10 October 2005.		
Current signatories:	Algeria; Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom		
Original signatories:	Algeria; Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Africa; Europe		
All Parties WTO members?	No		

Agreement name:	Global System of Trade Preferences among Developing Countries (GSTP)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	13-Apr-1988	**Date of notification:**	25-Sep-1989
Date of entry into force:	19-Apr-1989	**End of implementation period:**	1989
Current signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
Original signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Romania; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
RTA Composition:	Plurilateral		
Region:	Africa; South America; West Asia; Caribbean; East Asia; Middle East; North America; Central America		
All Parties WTO members?	No	**Cross-Regional:**	Yes

2. Egypt

Agreement name:	Agadir Agreement		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	25-Feb-2004	**Date of notification:**	22-Feb-2016
Date of entry into force:	27-Mar-2007		
Current signatories:	Egypt; Jordan; Morocco; Tunisia		
Original signatories:	Egypt; Jordan; Morocco; Tunisia		
RTA Composition:	Plurilateral		
Region:	Africa; Middle East		
All Parties WTO members?	Yes		

Agreement name:	EFTA - Egypt		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	27-Jan-2007	**Date of notification:**	17-Jul-2007
Date of entry into force:	01-Aug-2007	**End of implementation period:**	2020
Current signatories:	Egypt; Iceland; Liechtenstein; Norway; Switzerland		
Original signatories:	Egypt; Iceland; Liechtenstein; Norway; Switzerland		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Africa; Europe		
All Parties WTO members?	Yes		

Agreement name:	Egypt - Turkey		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	27-Dec-2005	**Date of notification:**	05-Oct-2007
Date of entry into force:	01-Mar-2007	**End of implementation period:**	2020
Current signatories:	Egypt; Turkey		
Original signatories:	Egypt; Turkey		
RTA Composition:	Bilateral		
Region:	Africa; Europe		
All Parties WTO members?	Yes		

Agreement name:	EU - Egypt		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV

Date of signature:	25-Jun-2001	**Date of notification:**	03-Sep-2004
Date of entry into force:	01-Jun-2004	**End of implementation period:**	2019
Remarks:	Official Journal of the European Union, L 304, 30 September 2004.		
Current signatories:	Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom; Egypt		
Original signatories:	Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom; Egypt		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Europe; Africa		
All Parties WTO members?	Yes		

Agreement name:	Global System of Trade Preferences among Developing Countries (GSTP)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	13-Apr-1988	**Date of notification:**	25-Sep-1989
Date of entry into force:	19-Apr-1989	**End of implementation period:**	1989
Current signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
Original signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Romania; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
RTA Composition:	Plurilateral		
Region:	Africa; South America; West Asia; Caribbean; East Asia; Middle East; North America; Central America		
All Parties WTO members?	No		

Agreement name:	Pan-Arab Free Trade Area (PAFTA)		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	19-Feb-1997	**Date of notification:**	03-Oct-2006
Date of entry into force:	01-Jan-1998	**End of implementation period:**	2005
Remarks:	The current signatories stated below are "as notfied by the Parties". However, please note that		

	Algeria and the Palestinian Authority of the West Bank and the Gaza Strip are now Parties of PAFTA.		
Current signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
Original signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
RTA Composition:	Plurilateral		
Region:	Middle East; Africa		
All Parties WTO members?	No		

Agreement name:	Protocol on Trade Negotiations (PTN)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	08-Dec-1971	**Date of notification:**	09-Nov-1971
Date of entry into force:	11-Feb-1973	**End of implementation period:**	1973
Current signatories:	Bangladesh; Brazil; Chile; Egypt; Israel; Korea, Republic of; Mexico; Pakistan; Paraguay; Peru; Philippines; Serbia; Tunisia; Turkey; Uruguay		
Original signatories:	Bangladesh; Brazil; Chile; Egypt; Israel; Korea, Republic of; Mexico; Pakistan; Paraguay; Peru; Philippines; Romania; Tunisia; Turkey; Uruguay; Yugoslavia, Socialist Federal Republic of		
RTA Composition:	Plurilateral		
Region:	West Asia; South America; Africa; Middle East; East Asia; North America; Europe		
All Parties WTO members?	No	**Cross-Regional:**	Yes

3. Morocco

Agreement name:	Agadir Agreement		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	25-Feb-2004	**Date of notification:**	22-Feb-2016
Date of entry into force:	27-Mar-2007		
Current signatories:	Egypt; Jordan; Morocco; Tunisia		
Original signatories:	Egypt; Jordan; Morocco; Tunisia		
RTA Composition:	Plurilateral		
Region:	Africa; Middle East		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

Agreement name:	EFTA - Morocco

Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	19-Jun-1997	**Date of notification:**	20-Jan-2000
Date of entry into force:	01-Dec-1999	**End of implementation period:**	2011
Current signatories:	Iceland; Liechtenstein; Norway; Switzerland; Morocco		
Original signatories:	Iceland; Liechtenstein; Morocco; Norway; Switzerland		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Europe; Africa		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

Agreement name:	EU - Morocco		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	26-Feb-1996	**Date of notification:**	13-Oct-2000
Date of entry into force:	01-Mar-2000	**End of implementation period:**	2011
Remarks:	Official Journal of the European Union, L 70, 18 March 2000.		
Current signatories:	Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom; Morocco		
Original signatories:	Austria; Belgium; Denmark; Finland; France; Germany; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden; United Kingdom; Morocco		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Europe; Africa		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

Agreement name:	Global System of Trade Preferences among Developing Countries (GSTP)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	13-Apr-1988	**Date of notification:**	25-Sep-1989
Date of entry into force:	19-Apr-1989	**End of implementation period:**	1989
Current signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
Original signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Romania; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		

RTA Composition:	Plurilateral		
Region:	Africa; South America; West Asia; Caribbean; East Asia; Middle East; North America; Central America		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Agreement name:	Pan-Arab Free Trade Area (PAFTA)		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	19-Feb-1997	**Date of notification:**	03-Oct-2006
Date of entry into force:	01-Jan-1998	**End of implementation period:**	2005
Remarks:	The current signatories stated below are "as notfied by the Parties". However, please note that Algeria and the Palestinian Authority of the West Bank and the Gaza Strip are now Parties of PAFTA.		
Current signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
Original signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
RTA Composition:	Plurilateral		
Region:	Middle East; Africa		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Agreement name:	Turkey - Morocco		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	07-Apr-2004	**Date of notification:**	10-Feb-2006
Date of entry into force:	01-Jan-2006	**End of implementation period:**	2015
Current signatories:	Morocco; Turkey		
Original signatories:	Morocco; Turkey		
RTA Composition:	Bilateral		
Region:	Africa; Europe		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

Agreement name:	US - Morocco

Coverage:	Goods & Services	**Type:**	Free Trade Agreement & Economic Integration Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV & GATS Art. V
Date of signature:	15-Jun-2004	**Date of notification:**	30-Dec-2005
Date of entry into force:	01-Jan-2006	**End of implementation period:**	2030
Current signatories:	Morocco; United States of America		
Original signatories:	Morocco; United States of America		
RTA Composition:	Bilateral		
Region:	Africa; North America		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

4. Tunisia

Agreement name:	Agadir Agreement		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	25-Feb-2004	**Date of notification:**	22-Feb-2016
Date of entry into force:	27-Mar-2007		
Current signatories:	Egypt; Jordan; Morocco; Tunisia		
Original signatories:	Egypt; Jordan; Morocco; Tunisia		
RTA Composition:	Plurilateral		
Region:	Africa; Middle East		
All Parties WTO members?	Yes		

Agreement name:	EFTA - Tunisia		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	17-Dec-2004	**Date of notification:**	03-Jun-2005
Date of entry into force:	01-Jun-2005	**End of implementation period:**	2023
Current signatories:	Iceland; Liechtenstein; Norway; Switzerland; Tunisia		
Original signatories:	Iceland; Liechtenstein; Norway; Switzerland; Tunisia		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Europe; Africa		
All Parties WTO members?	Yes		

Agreement name:	EU - Tunisia		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	07-Jul-1995	**Date of notification:**	15-Jan-1999
Date of entry into force:	01-Mar-1998	**End of implementation period:**	2009

Remarks:	Official Journal of the European Union, L 097, 30 March 1998.		
Current signatories:	Austria; Belgium; Bulgaria; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Romania; Slovak Republic; Slovenia; Spain; Sweden; United Kingdom; Tunisia		
Original signatories:	Austria; Belgium; Denmark; Finland; France; Germany; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden; United Kingdom; Tunisia		
RTA Composition:	Bilateral; One Party is an RTA		
Region:	Europe; Africa		
All Parties WTO members?	Yes		

Agreement name:	Global System of Trade Preferences among Developing Countries (GSTP)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	13-Apr-1988	**Date of notification:**	25-Sep-1989
Date of entry into force:	19-Apr-1989	**End of implementation period:**	1989
Current signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
Original signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Romania; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
RTA Composition:	Plurilateral		
Region:	Africa; South America; West Asia; Caribbean; East Asia; Middle East; North America; Central America		
All Parties WTO members?	No		

Agreement name:	Pan-Arab Free Trade Area (PAFTA)		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	19-Feb-1997	**Date of notification:**	03-Oct-2006
Date of entry into force:	01-Jan-1998	**End of implementation period:**	2005
Remarks:	The current signatories stated below are "as notfied by the Parties". However, please note that Algeria and the Palestinian Authority of the West Bank and the Gaza Strip are now		

	Parties of PAFTA.		
Current signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
Original signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
RTA Composition:	Plurilateral		
Region:	Middle East; Africa		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Agreement name:	Protocol on Trade Negotiations (PTN)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause
Date of signature:	08-Dec-1971	**Date of notification:**	09-Nov-1971
Date of entry into force:	11-Feb-1973	**End of implementation period:**	1973
Current signatories:	Bangladesh; Brazil; Chile; Egypt; Israel; Korea, Republic of; Mexico; Pakistan; Paraguay; Peru; Philippines; Serbia; Tunisia; Turkey; Uruguay		
Original signatories:	Bangladesh; Brazil; Chile; Egypt; Israel; Korea, Republic of; Mexico; Pakistan; Paraguay; Peru; Philippines; Romania; Tunisia; Turkey; Uruguay; Yugoslavia, Socialist Federal Republic of		
RTA Composition:	Plurilateral		
Region:	West Asia; South America; Africa; Middle East; East Asia; North America; Europe		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Agreement name:	Turkey - Tunisia		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	25-Nov-2004	**Date of notification:**	01-Sep-2005
Date of entry into force:	01-Jul-2005	**End of implementation period:**	2014
Current signatories:	Tunisia; Turkey		
Original signatories:	Tunisia; Turkey		
RTA Composition:	Bilateral		
Region:	Africa; Europe		
All Parties WTO members?	Yes	**Cross-Regional:**	Yes

5. Libya

Agreement name:	Global System of Trade Preferences among Developing Countries (GSTP)		
Coverage:	Goods	**Type:**	Partial Scope Agreement
Status:	In Force	**Notification under:**	Enabling Clause

Date of signature:	13-Apr-1988	**Date of notification:**	25-Sep-1989
Date of entry into force:	19-Apr-1989	**End of implementation period:**	1989
Current signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
Original signatories:	Algeria; Argentina; Bangladesh; Benin; Bolivia, Plurinational State of; Brazil; Cameroon; Chile; Colombia; Cuba; Ecuador; Egypt; Ghana; Guinea; Guyana; India; Indonesia; Iran; Iraq; Korea, Democratic People's Republic of; Korea, Republic of; Libya; Malaysia; Mexico; Morocco; Mozambique; Myanmar; Nicaragua; Nigeria; Pakistan; Peru; Philippines; Romania; Singapore; Sri Lanka; Sudan; Tanzania; Thailand; Trinidad and Tobago; Tunisia; Venezuela, Bolivarian Republic of; Viet Nam; Zimbabwe		
RTA Composition:	Plurilateral		
Region:	Africa; South America; West Asia; Caribbean; East Asia; Middle East; North America; Central America		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Agreement name:	Pan-Arab Free Trade Area (PAFTA)		
Coverage:	Goods	**Type:**	Free Trade Agreement
Status:	In Force	**Notification under:**	GATT Art. XXIV
Date of signature:	19-Feb-1997	**Date of notification:**	03-Oct-2006
Date of entry into force:	01-Jan-1998	**End of implementation period:**	2005
Remarks:	The current signatories stated below are "as notfied by the Parties". However, please note that Algeria and the Palestinian Authority of the West Bank and the Gaza Strip are now Parties of PAFTA.		
Current signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
Original signatories:	Bahrain, Kingdom of; Egypt; Iraq; Jordan; Kuwait, the State of; Lebanese Republic; Libya; Morocco; Oman; Qatar; Saudi Arabia, Kingdom of; Sudan; Syrian Arab Republic; Tunisia; United Arab Emirates; Yemen		
RTA Composition:	Plurilateral		
Region:	Middle East; Africa		
All Parties WTO members?	No	**Cross-Regional:**	Yes

Source: https://www.wto.org/english/tratop_e/region_e/rta_participation_map_e.htm