



**UNITED NATIONS
ECONOMIC COMMISSION FOR AFRICA**

Distr.: GENERAL

ECA-NA/RABAT/ICE/XXI/3/I
April 2006

ENGLISH
Original: FRENCH

ECA Office for North Africa

Twenty First Meeting of the Intergovernmental Committee of
Experts (ICE)

Rabat, Morocco
4-6 April 2006

TRADE IN NORTH AFRICA

Assessing Regional Integration Potential in North Africa

Assessing Regional Integration Potential in North Africa

Lahcen ACHY¹

Professor of Economics

National Institute of Statistics and Applied Economics Rabat, Morocco

March 2006

¹ I would like to thank Mrs. Karima Bounemra Ben Soltane, Director of ECA-NA, Mrs. Aissatou Gueye, Economist (Coordinator), M. Abdelilah Ouaqouaq, Senior Economist and Mrs. Semia de Tapia, Economist, for the quality of their comments on the first version of this paper. My thanks also go to the participants in the Round Table on “The Evolution of Economic Structures in North Africa”, Rabat, 7- 9, March 2006. I also extend my thanks to Dr. Rania Maniesy, who allowed me to access her trade database used to assess the gravity model and the trade potential between countries of the region. The present work reflects the author’s view solely and does not express ECA-SRO-NA’s.
Lahcen ACHY, INSEA BP 6217 Rabat Instituts, Rabat, Morocco. Email : lachy@ulb.ac.be

Table of Contents

I. INTRODUCTION	1
II. INTERNATIONAL TRADE IN NORTH AFRICA COUNTRIES	2
1. <i>HIGH GEOGRAPHIC CONCENTRATION OF TRADE</i>	3
2. <i>POORLY DIVERSIFIED EXPORTATIONS.....</i>	5
3. <i>A WEAK INTRA-REGIONAL INTEGRATION.....</i>	5
III. TRADE COMMITMENTS OF NORTH AFRICA COUNTRIES	9
1. <i>MULTILATERAL COMMITMENTS</i>	9
2. <i>PARTICIPATION IN PREFERENTIAL AGREEMENT NETWORKS.....</i>	10
IV. STUDY OF THE DETERMINANTS OF TRADE FLOWS USING A GRAVITY MODEL.....	12
1. <i>BASES OF THE GRAVITY MODEL.....</i>	12
2. <i>ESTIMATION OF THE GRAVITY MODEL APPLIED TO TRADE FLOWS ANALYSIS</i>	12
a. <i>General presentation of the gravity model.....</i>	13
b. <i>Signs expected from the gravity model parameters.....</i>	13
c. <i>Estimation and analysis of findings.....</i>	14
V. ESTIMATION OF NORTH AFRICA TRADE POTENTIAL	21
1. <i>METHOD OF TRADE POTENTIAL ESTIMATION</i>	21
2. <i>FINDINGS' ANALYSIS</i>	21
3. <i>FINDINGS' COMPARISON AND INTERPRETATION.....</i>	27
4. <i>GRAVITY MODEL AND REGIONAL INTEGRATION MONITORING</i>	28
VI. CONCLUSIONS.....	29
BIBLIOGRAPHY	31
Annex : Matrix showing preferential trade agreements between North Africa countries.....	32

I. Introduction

1. Is it still relevant today to be interested in the question of regional integration between North African countries?
2. The reflection on the pertinence of this issue is imperative for various reasons. It is not only a matter of fitting into the international wave of regional integration, but of conceiving an integration project that, while having a political vision, obeys an economic rationality, which includes incentives to private agents. This political vision, which reflects long-term strategic goals, justifies for the adoption in the short term of a proactive approach by member States, and the creation of conditions likely to stimulate propensity to trade between the economic operators of the region.
3. Some economists, but also some political and private sector decisions makers, consider that, even though the issue of regional integration between North African countries seems relevant, the counterarguments remain countless.
4. The first argument is based on an assessment of existing regional integration initiatives. Indeed, despite their diversity, intra-regional trade share is about 3% of total trade in the region; which is a very low percentage compared to that achieved by other regional groupings with the same development level.
5. The second argument is related to increased multilateralism and trade globalization. Currently, all countries of the region are involved in multilateral trade processes in the framework of the World Trade Organization (WTO). Four countries are full members, and the three others are observers and are all in different levels of the accession process. The multilateral framework provides for significant opportunities that are still poorly explored by the region.
6. Therefore, what is the pertinence of being concerned by a regional integration process with an uncertain future?
7. Firstly, the net welfare effect of a regional integration agreement is not necessarily positive. It depends on the magnitude of the trade creation and trade deviation effects deriving from the agreement's implementation. Secondly, an integration agreement could result in a partial loss of customs revenues for importing countries. This effect is even more significant as customs revenues constitute an important part of fiscal revenues in North Africa. Thirdly, rules of origin that are a basic component of integration agreements magnify the negative impact of trade deviation. From this angle, regional integration is not necessarily compatible with a higher degree of trade liberalization, as it could even be used as a protectionist instrument. Lastly, the effects of a regional integration agreement will not be similar for all member countries, as it could lead to trade deviation, and favor some member countries.

8. Others believe that the integration question needs to be presented and conceived within a new framework. The international experience, both in industrialized countries and emerging ones, shows that the economic steering within a globalized environment requires a subtle mixture of multilateral opening, as well as a network of preferential arrangements, and bilateral and regional strategic alliances.

9. Several researches show that regional integration is more valuable than multilateral agreements. However, the multiplicity or even the profusion of regional agreements, their potential interconnections and incompatibilities are likely to generate high economic and administrative costs.

10. Similarly, multiple integration initiatives in the absence of processes to coordinate their implementation may decrease the visibility of participants and have a bad impact on trade.

11. The object of the present document is to contribute to the debate on the trade potential of regional integration of North African countries (NA). In order to assess the trade potential compared to its current level, considering economic, geographic, historical and cultural characteristics of the region, a so-called “gravity” model has been estimated.

12. The model’s findings show that the existence of a preferential trade agreement between partner countries is the factor that stimulates bilateral trade.

13. Building on the gravity model estimations, the potential bilateral trade has been estimated for the North African countries. Compliant with our expectations, the observed intra-regional trade is widely lower than its potential.

14. The rest of this document is organized as follows. The second section tackles the international foreign trade profile in the region. The third section deals with NA multilateral, regional and bilateral trade agreements. The fourth section studies the main determinants of trade flows between the NA countries using an econometric gravity model. Estimations of this model are used afterwards as a benchmark to foresee the trade potential within the sub-region. Finally, the main findings of this document are discussed in the last section.

II. International trade in North Africa

15. North African countries remain relatively close to international trade. The tariffs applied to imported products are amongst the highest worldwide. For instance, the average of MFN customs duties applied in the industry is 21% for NA countries against 10.8% for Asia and 9.5% for Latin-American countries. These protection rates have considerably declined over the last ten years. However, the decrease has not been harmonized in all countries. According to the last FEMISE 2005 report, Morocco decreased its average tariff by 57% and its maximum tariff by 65% during the period 1993-2003. On the other hand, Algeria, Tunisia and Egypt decreased their average tariffs by 20% to 30%.

16. The trade performance of NA countries is affected by their highly concentrated geographic distribution, combined with a poorly diversified exporting structure and dominated by mineral or vegetal primary products. Moreover, despite the countless regional integration initiatives, intra-regional trade flows remain extremely low.

II.1 High geographic concentration of trade

17. The study of the North Africa foreign trade structure shows a high geographic concentration. This finding is obviously clear from table (1), which contains the export and import distribution of each country, according to the major regions of the world. The data are drawn from UNCTAD database and are related to 1990 and 2004.

18. Except for Sudan, about 40 and 80% of exports of the other six countries are destined to Europe and mainly the European Union market. EU dominance as an export market for North African countries reaches high levels in the case of Libya (83%) and Tunisia (80%), but also Morocco (69%), Algeria (55%) and Mauritania (53%). The EU share in Egyptian exports is around 42%. As to Sudan's exports, they are mainly (76%) directed towards emerging Asian markets² and particularly China.

19. The American and Canadian markets are poorly explored by North Africa exports, except for Algeria (30%) and Egypt (13%). Both countries have significantly increased their exports in 2004, as they represented only (20%) and (9%) respectively in 1990.

20. The exports of Morocco, which signed a free trade agreement with the United States to enter into force in 2006, to the American market did not exceed 5% in 2004, against 2% only in 1990. The exports of Libya, Mauritania, Sudan and Tunisia to the North American market remain insignificant.

21. With the exception of Mauritania and Sudan, which exported respectively 13% and 14% of their exports to the Japanese market, the other NA countries are almost absent in this market. Also, excluding Sudan, the Japanese market weight in the sub-region exports declined in the period 1990-2004. Mauritania's exports to this market have decreased from 20 to 13%, Egypt's from 3 to 0% and Morocco's from 4 to 1%.

22. The share of exports that is oriented to the Sub-Saharan market is low, and is above 10% only in the case of Mauritania (17%). It also declined between 1990 and 2004 in Tunisia's case, moving from 10 to 8%, Morocco's from 7 to 4% and Sudan's from 7 to 3%.

23. The dependence of North African countries at the sub-regional level on European imports is quite noticeable. Apart from Sudan, the weight of imports from European countries ranges between 38% in Egypt's case and 75% in Tunisia's. As to Morocco, Libya and Algeria, they are respectively supplied within 65%, 64% and 63% from the European market. Table (1) shows that Morocco's and Tunisia's dependence towards European imports increased during the period 1990-2004.

24. Except Egypt, which 13% of its imports come from the North America, the other countries are not largely supplied from this market. Algeria that used to import 15% of its needs from the North America in 1990, imported only 6% in 2004. Respective shares of Morocco decreased from 8% to 4% and from 6% to 2% for Tunisia.

25. The most noticeable change in the importing structure of North African countries at the sub-regional level is the reinforcement of imports from emerging Asian countries. Indeed, the percentages of imports from this group of countries have moved from 30% in

² Asian emerging markets include Western Asia and other Asian countries

1990 to 55% in 2004 for Sudan, from 12 to 23% for Egypt, from 12 to 19% for Libya, from 14 to 18% for Morocco, from 9 to 17% for Mauritania, from 3 to 16% for Algeria and finally from 8 to 9% for Tunisia.

Table 1
Geographical Structure of North Africa Foreign Trade
(1990 and 2004)

In (%)

	Algeria		Egypt		Libya		Mauritania		Morocco		Sudan		Tunisia	
	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004	1990	2004
EXPORTS														
Developed economies	91	86	61	56	85	85	80	68	69	78	48	19	79	83
of which														
Europe	70	55	43	42	85	83	60	54	63	71	39	5	78	80
EU 25	70	55	42	42	85	80	60	53	62	69	39	5	77	78
US and Canada	20	30	9	13	0	2	..	1	2	5	3	0	1	2
Japan	1	0	3	0	0	0	20	13	4	1	6	14	0	1
Others	0	0	7	1	..	..	..	0	0	1	0	0	0	0
South-east Europe and CIS	2	0	18	1	8	1	13	5	1	1	9	0	3	0
Developing Economies	7	14	19	30	8	13	7	25	20	19	43	80	18	13
of which														
OPEC	0	1	7	7	0	0	0	3	9	3	9	8	10	7
America	2	5	0	1	0	0	1	0	1	3	0	0	1	1
Africa	3	2	4	7	3	3	6	17	7	4	7	3	10	8
Western Asia	2	4	8	12	4	7	0	1	6	3	11	8	4	2
Other Asian countries	1	3	7	10	0	2	1	8	6	9	25	68	3	2
Non-distributed	0	0	2	13	0	0	0	2	10	1	0	0	0	4
World	100	100	100	100	100	100	100	100	100	100	100	100	100	100
IMPORTS														
Developed economies	88	73	72	57	77	69	78	57	62	70	51	32	76	78
of which														
Europe	68	63	49	38	71	64	69	47	53	65	43	22	68	75
UE 25	66	62	46	37	67	63	68	45	51	63	41	21	67	74
US et Canada	15	6	15	13	2	2	7	8	8	4	4	3	6	2
Japan	5	3	4	3	4	3	2	3	2	1	4	4	2	1
Others	1	1	5	2	0	0	0	0	..	0	0	4	1	0
South-east Europe and CIS	3	5	6	5	1	2	1	3	3	4	4	2	3	3
Developing Economies	9	22	16	32	20	29	17	30	23	26	45	55	16	17
of which														
OPEC	1	1	2	8	0	1	5	3	13	8	28	20	4	6
America	3	4	3	5	3	1	1	3	2	4	0	1	3	2
Africa	3	2	1	3	5	9	7	10	7	4	16	8	6	6
Western Asia	2	6	3	8	6	8	0	2	11	8	20	23	4	4
Other Asian countries	1	10	9	15	6	11	9	15	3	10	10	22	4	5
Non-distributed	0	0	5	7	1	0	4	10	12	0	0	10	5	2
World	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Table built up from UNCTAD data

II.2 Poorly diversified exportations

26. Table (2) shows the structure per group of exports and imports products for North Africa. Some countries such as Algeria and Libya have insufficiently diversified economies, and their exportations are greatly dominated by fuels with over 90% of sales on foreign markets.

27. Sudan has also a poorly diversified economy, as its exports are mostly raw agricultural products (46%) and food products (43%). The same applies to Mauritania that depends on its exports of food products (56%) as well as of minerals and metals (40%).

28. Egypt and particularly Morocco and Tunisia have relatively diversified exports. Respective shares of manufactured exports in the three countries are 37%, 67% and 78%. However, manufactured exports of the three countries are dominated by few products (clothing, textile, leather and chemistry) and often rely on imported inputs.

Table 2
Structure per group of exported and imported products in North Africa
(1990 and 2004)

	Algeria		Egypt		Libya		Mauritania		Morocco		Sudan		Tunisia	
	1990	2004	1990	2004	1990	2004	1995	2004	1990	2004	1995	2004	1990	2004
EXPORTS														
Fuels	96	98	29	37	94.5		1		4	5	0.5		17	10
Agricultural raw materials	0	1	10	8	0.2		0		3	2	46		1	1
Food products	0	0	10	9	0		56		26	17	43		11	11
Minerals and metals	0	0	9	4	0.3		40		15	9	0.5		2	
Manufactured products	3	1	41	37	5		0		52	67	6		68	78
Non-distributed	0	0	0	4	0		3		0	0	4		1	0
Total	100	100	100	100	100		100		100	100	100		100	100
IMPORTS														
Fuels	1	1	3		0		22		17	17	14		9	10
Agricultural raw materials	5	0	7		2		1		6	3	2		4	3
Food products	24	22	32		23		24		10	11	24		11	9
Minerals and metals	2	3	2		1		0		6	3	1		5	3
Manufactured products	68	74	56		74		53		61	66	59		71	75
Total	100	100	100		100		100		100	100	100		100	100

Source: UNCTAD data

II.3 A weak regional integration

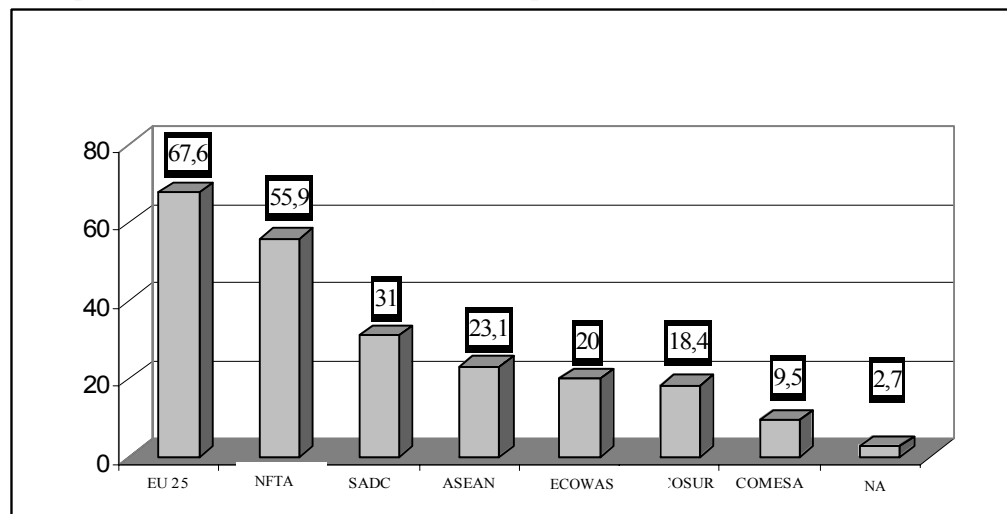
29. North Africa is one of the most extreme cases as to the weakness of intra-regional trade and lack of regional integration. Moreover, this situation has not improved over the last fifteen years. Overall, the share of intra North Africa exports stagnated during the period 2000-2004, standing around 2.7%. This trade integration level is quite below the performances achieved by other regional communities, including on the African continent.

30. Indeed, the Southern African Development Community (SADC), driven by South Africa, achieved the highest rate of trade integration at the African level. 31% of SADC exports are oriented towards the intra-community market. This is an outstanding performance, considering the relatively recent date of the trade protocol implementation (September 2000). Trade within SADC countries did not exceed 8% of the total in 2001⁴.

31. The Economic Community of West African States (ECOWAS) is in the second position in Africa, with 20% of intra-community exports in 2004 against 10.7% in 2001. The current integration level of this community is comparable to that of the Association of South East Asian Nations (ASEAN) or MERCOSUR (South American Common Market).

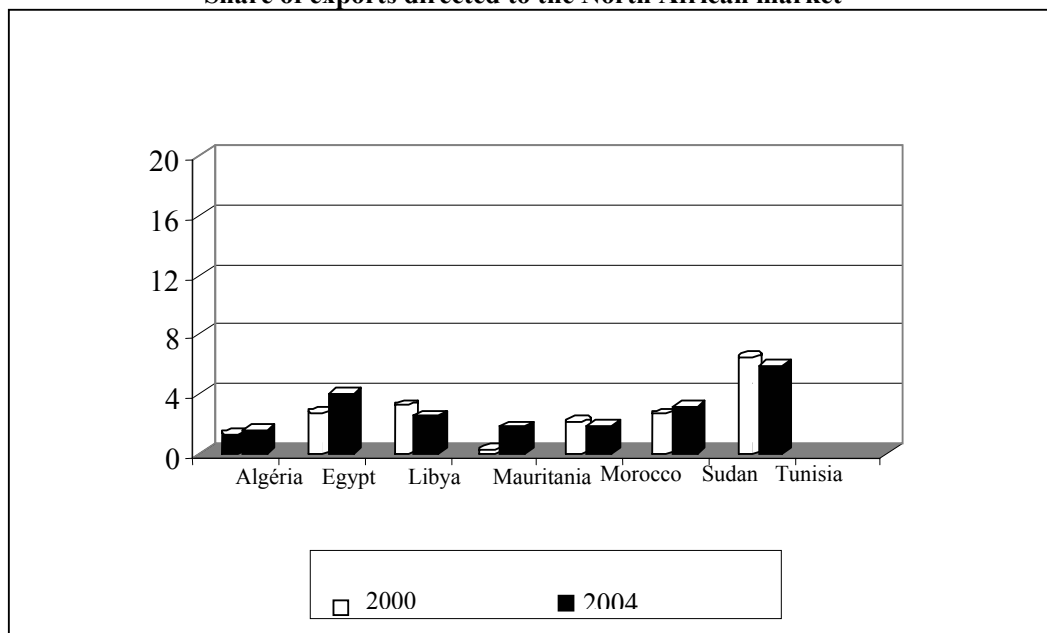
32. Within the Common Market of Eastern and Southern Africa (COMESA), the share of “intra” exports in total exports is 9.5% in average. Even though this rate is low compared to other economic regional communities; it is three times higher than that achieved within the North African sub-region or between countries of AMU.

Comparison of the level of intra-regional exports in various areas of the world (2004)



The shares exported by each country towards the North African market, as shown in the figure above, range between a maximum of 5.9% for Tunisia and a minimum of 1.5% for Algeria. The shares associated to other countries are 4% for Egypt, 3.2% for Sudan, 2.5% for Libya and around 1.8% for Morocco and Mauritania.

Share of exports directed to the North African market



33. The matrix of trade between North African countries, illustrated in table 3, clearly shows the marginal role within which the intra-regional trade is confined. Nonetheless, some countries are relatively more dynamic towards achieving regional integration. This is the case for Egypt, which exports towards the other North African countries moved from \$174 to \$483 million between 2000 and 2004 and its imports from the same countries from \$170 to \$478 million.

34. In North Africa, the most important bilateral trade is carried out between Libya and Tunisia, with a total amount of \$732 million in 2004, mainly composed of Tunisian food products and manufactured products of a value of \$347 million and of Libyan fuel worth \$385 million. The trade flow between Algeria and Egypt comes in the second position with \$326 million, mainly composed of Egyptian exports with a value of \$250 million.

Table 3
Intra-North Africa Exports

Towards	Algeria		Egypt		Libya		Mauritania		Morocco		Sudan		Tunisia	
From	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004	2000	2004
Algeria														
Value			19.5	249.5	0.18	11.7	11.35	16.1	169.2	0.03	0.00	145.0	74.45	68.3
%			0.09	0.78	0.00	0.04	0.06	0.05	0.82	0.00	0.00	0.45	0.36	0.21
Egypt														
Value	21.4	76.2			52.6	67.72	0.00	2.6	38.7	189.8	25.1	90.0	36.3	56.9
%	0.34	0.63			0.83	0.56	0.00	0.02	0.61	1.57	0.40	0.74	0.57	0.47
Libya														
Value	1.55	2.1	64.7	61.5			0.00	0.0	54.8	0.0	1.9	41.0	287.2	384.6
%	0.01	0.01	0.51	0.32			0.00	0.0	0.43	0.00	0.02	0.21	2.26	1.99
Mauritania														
Value	0.96	7.2	0.16	4.0	0.00	0.00			0.03	0.0	0.00	1.9	0.12	0.9
%	0.18	0.92	0.03	0.50	0.00	0.00			0.00	0.0	0.00	0.25	0.02	0.12
Morocco														
Value	7.34	40.9	13.4	23.4	62.9	32.63	13.9	20.5			0.61	0.1	57.8	61.1
%	0.10	0.42	0.18	0.24	0.85	0.34	0.19	0.21			0.01	0.00	0.78	0.63
Sudan														
Value	0.30	1.2	38.5	108.5	.00	3.2	0.00	0.0	0.14	0.0			4.4	7.6
%	0.02	0.03	2.37	2.88	0.00	0.08	0.00	0.00	0.01	0.00			0.27	0.20
Tunisia														
Value	61.2	108.9	34.2	31.2	264.2	347.4	1.66	7.1	25.4	2.9	0.33	74.2		
%	1.02	1.12	0.57	0.32	4.41	3.59	0.03	0.07	0.42	0.03	0.01	0.77		
Total														
Value	92.8	236.3	170.4	478.1	379.9	462.6	26.9	46.4	288.3	192.8	27.9	352.2	460.3	579.4
%	0.17	0.27	0.31	0.55	0.69	0.53	0.05	0.05	0.52	0.22	0.05	0.40	0.83	0.66

NB: This table describes the flows between countries at the regional level, where the country in the line represents the flow's home country and the country in the column represents that of flow destination.

Source: Table built up from UNCTAD data

III. Trade Agreements of North African Countries

35. This chapter presents the multilateral and regional trade agreements of North African countries. All of them are involved in the World Trade Organization (WTO) multilateral process. Four countries are full members and the three others are observers.

36. Along these multilateral trade negotiations, North African countries are also involved in bilateral and regional preferential agreements processes.

III.1 Multilateral trade agreements

37. All North African countries are involved in the multilateral trade liberalization process (WTO). The four full members are Egypt since 1970, Morocco since 1987, Tunisia since 1990 and finally Mauritania since 1995. The three other countries (Algeria, Libya and Sudan) are observers and are at different levels of the accession process.

38. Algeria has requested its accession since 1987. Its accession Working Group that was established in June 1987, convened for the first time in April 1998. The ninth round of Algeria negotiations took place in October 2005. Currently, Algeria has seemingly reached the final phase of its accession to WTO.

39. Sudan requested its accession in October 1994. The accession Working Group of Sudan was established on October 25th, 1994. The aide-mémoire of Sudan on its foreign trade system was distributed in January 1999. The working group second meeting was held in March 2004. Bilateral negotiations concerning access to markets for goods and services are underway.

40. Finally, the accession request of the Libyan Arab Jamahiriya was received by the World Trade Organization Secretariat in June 2004. It had the approval to negotiate its accession on July 27th, 2004, when the accession working group was implemented. Today, Libya is preparing the aide-mémoire about its foreign trade system in compliance with the guide to accede to WTO.

Table 4

World Trade Organization: Status of North African Countries (2006)

Algeria	Egypt	Libya	Mauritania	Morocco	Sudan	Tunisia
Observer status Accession request on 6/3/87 Negotiations in final phase	✓ GATT Member since 1970	Observer status Accession request on 6/20/2004 and working group creation on 7/27/2004	✓ Member since 1995	✓ GATT Member since 1987	Observer status Accession request on 10/11/1994 and working group creation on 10/25/1994	✓ GATT Member since 1990

III.2 Participation in Trade preferential agreement networks

41. Undoubtedly, the most important preferential agreements of the North African countries are the one they have entered bilaterally with the European Union. However, their implementation has been slow and difficult. Indeed, seven years have passed since the conclusion of the first agreement entered with Tunisia in 1995, which implementation took place in 1998; and that entered with Algeria in 2002, which implementation took place in September 2005. Their objective is to progressively create a Euro-Mediterranean free trade area. However, achievements by the end of the ten-year Barcelona Process are largely below the objectives fixed thereto in 1995 and the expectations nourished in North African countries concerned by this process.

42. Integration projects between North African countries are not recent and date back to a long time. They became more concrete at the end of the nineties with creation of the Arab Maghreb Union (AMU) in 1989, which include five North African countries namely Algeria, Libya, Mauritania, Morocco and Tunisia. The integration process within the AMU has however been unstable and highly influenced by the region geopolitical conditions.

43. Some of countries of the region have also joined other economic regional communities, such as the Great Arab Free Trade Area established in 1997. It includes all North African countries excluding Algeria and Mauritania.

44. In Africa, three countries (Libya, Egypt and Sudan) are members of COMESA founded in 1994 and five countries (Egypt, Libya, Morocco, Sudan and Tunisia) participate in the Community of Sahel-Saharan states (CEN-SAD) established in 1998.

45. More recently (2004), the Agadir Agreement was signed by three countries of the region (Egypt, Morocco and Tunisia) and Jordan in order to optimize the Euro-Mediterranean partnership process and strengthen the South-South integration.

46. North African Countries have also entered a series of bilateral agreements as free trade zone arrangements with other countries outside the region.

47. Regional integration agreements may have many advantages for North African countries. They complement the multilateral agreements and are a tool to reinforce them. They can be used as a sequence in the learning process and a pretest before engaging in multilateral agreements. They provide Member countries with a stronger power in negotiating with other regional groupings. These agreements can also help member countries unify their positions as to reach a bigger weight in multilateral negotiations.

48. Nevertheless, we have to recognize that regional and bilateral agreements signed between North African countries at the sub-regional level have not yet significantly decreased the tariffs. According to FEMISE report (2005), two reasons are behind this situation. First of all, some agreements have entered into effect only recently, such as the Agadir agreement, which entered in February 2004. Second, the implementation degree of the concluded agreements remains generally restricted, due to political constraints and the persistence of important tariff and non-tariff barriers.

49. These multiple integration initiatives without mechanisms to coordinate their implementation may decrease the visibility of participants and have a negative impact on trade outcome between member countries.

Table 5
Commitments and Preferential Agreements signed by North African (2006)

	Algeria	Egypt	Libya	Mauritania	Morocco	Sudan	Tunisia
FTA with the European Union	✓ Signature of association agreement 04/22/2002 entered into effect on 09/01/2005	✓ Signature of association agreement 06/25/2001 entered into effect on 06/01/2004	Observer's status ⁷	✓ Partnership agreement with ACP countries	✓ Signature of association agreement 02/26/1996 entered into effect on 03/01/2000	✓ Signature of a cooperation document between UE and Sudan 01/25/2005 besides the agreement with ACP countries	✓ Signature of association agreement in July 1995 entered into effect on 03/01/1998
Great Arab Free Trade Area (GZALE)	Negotiation phase	✓ Member since 1997	✓ Member since 1997		✓ Member since 1997	✓ Member since 1997	✓ Member since 1997
AMU	✓ Member since 1989		✓ Member since 1989	✓ Member since 1989	✓ Member since 1989		✓ Member since 1989
COMESA ⁸		✓ Member since 1994	✓ Member since 2005			✓ Member since 1994	
Agadir Agreement		✓ Agreement signature 02/25/2004			✓ Agreement Signature 02/25/2004		✓ Agreement Signature 02/25/2004
CEN-SAD ⁹		✓ Member since 2001	✓ Member since 1998		✓ Member since 2001	✓ Member since 1998	✓ Member since 2001
FTA with the United States		✓ QIZ			✓ Signature in March 2004 and entered into effect in January 2006		Negotiation phase
FTA with Turkey			Negotiation phase		✓ Signature in April 2004 and entered into effect in January 2006		✓ Signed in November 2004 to enter into effect planned in July 2005

⁷ Libya is not a member of the Barcelona Process. It plays an observer's role. However, Libya was invited to accept the experience acquired from Barcelona in order to accede to the Euromed process.

⁸ COMESA : Common Market of Eastern and Southern Africa

⁹ SEN-SAD: Community of Sahel and Saharan States.

IV. The study of determinants of trade flows using a gravity model

50. The present chapter is an empirical investigation of the determinants of trade flows between various countries of the world, based on an econometric gravity model. According to the basic gravity model, the bilateral trade is a linear function of attraction factors, such as the economic size of countries and their per capita income level and the resistance factors, such as geographical distance or various obstacles to trade.

51. Currently, the gravity model is widely used as a standard tool for international trade modeling. Drawing from the empirical literature, the gravity model basic formulation has been completed, so as to insert other relevant determinants of trade flows at the international level.

IV.1. Bases of the gravity model

52. Initially, the gravity model was intuitively deduced in order to analyze bilateral trade flows between countries. The basic concept builds on the gravity principle introduced by spatial economics experts. According to this principle, intensiveness of trade between two countries is proportional to their GDP and inversely proportional to the distance separating them.

53. The theoretical bases of the gravity model were gradually developed within the works of Anderson (1979), Bergstrand (1985 and 1989), Deardorff (1995) and Evenett and Keller (1998).

54. Anderson (1979) generalized the gravity equation, by building on the Heckscher-Ohlin (H-O) international trade theory. Assuming that each country is specialized in the production of one type of commodities, for which it is better endowed in relation to other countries, and the consumers' preferences are similar among countries, Anderson deduces the gravity equation from the linear expense system. Similarly, Krugman (1980), by introducing transport costs in the monopolistic competition model, derives a demand equation close to the gravity equation.

IV.2. Estimation of the gravity model applied in the trade flow analysis

55. The gravity model used in this work is inspired from the empirical literature on this subject. It mainly relies on the works of Miniesy & Nugent (2005), Batra (2004) and Fontagné and al. (2001). The following section is devoted to presenting a general equation of the gravity model, followed by the study of the signs expected from the model parameters. Finally, the findings of estimations are presented and analyzed.

56. The gravity model estimation has been carried out on a sample of 146 countries for five-year sub-periods between 1970 and 2000.

a. General presentation of the gravity model

57. The gravity model considered within this work has the following general expression:

$$\log X_{ijt} = \alpha_0 + \alpha_1 \log Y_{ijt} + \alpha_2 \log Z_{ij} + \alpha_3 V_{ijt} + \alpha_4 W_{ij} + \varepsilon_{ijt}$$

X_{ijt} indicates the total exports of the country i to country j during the year t.

Y_{ijt} indicates the vector of variables that change over time and according to partner countries i and j. GDP and per capita GDP variables are part of this vector.

Z_{ij} indicates the variables that change according to partner countries, but that are constant over time. These are variables such as the distance in kilometers between the capitals of both partner countries and the surface of partner countries expressed in Km².

V_{ijt} indicates the qualitative or binary variables that change over time and according to partner countries i and j. It is the case of “RIA” variable that takes the value 1 if the countries i and j are part of the same regional integration agreement in the year t and the value 0 otherwise. It is also the case of “CC” variable that takes the value 1 if the countries i and j have a common currency in the year t and the value 0 otherwise.

W_{ij} indicates the qualitative or binary variables that are specific to partner countries i and j but are not time-dependent. It is the case of the “*Without_SF*” variable that takes the value 0 if the countries i and j both have a sea front, the value 1 if one of the countries is landlocked and value 2 if none of the countries i and j has a sea front. It is also the case of the “*Colonizer*” variable that takes the value 1 when the countries i and j had had the same colonizer and the value 0 otherwise. Two other variables are introduced to consider the geographical or linguistic closeness effects on bilateral trade. The first one is the “*frontier*” variable that takes the value 1 when both countries have a common frontier and value 0 otherwise. The second “*language*” takes the value 1 when both countries have a common official language and 0 otherwise.

58. The log-linear form, which is only for continuous variables, enables interpreting directly the coefficients as elasticity.

b. Signs expected from the gravity model parameters

59. In compliance with the theoretical expectations, the signs anticipated from main variables of the gravity model are the following:

- GDP of partner countries is an indicator that reveals the market potential size. The coefficient associated to this variable should be positively correlated to the volume of bilateral trade.
- GDP per capita considers the effect of consumers’ purchasing power of both partner countries. A rise of per capita GDP should have a positive impact on demand and therefore increase the volume of bilateral trade.

- The “distance” and “surface” variables are proxies that enable approaching transport costs generated by trade between both partner countries. In a gravity model, these two variables are resistance factors and have a negative impact on the volume of bilateral trade.
- The “Without SF” variable allows considering the effect of a sea front or in contrast a landlocked situation, on the volume of trade. International transport statistics show that over 80% of trade is routed by boat, bulk or in containers. Therefore, a landlocked country is penalized by its situation.
- The impact on bilateral trade of a regional integration agreement, where both countries are members, is considered through the “RIA” variable. In theory, preferential tariffs offered within a trade agreement foster trade between member countries. The same applies to countries that are members to a formal or de facto¹⁰ currency union. This aspect is considered through the “CC” binary variable.
- In addition to geographical and economic factors, several recent works emphasize the importance of historic factors in determining trade flows. This dimension is taken in our model through the colonial past of partner countries using the “Colonizer” and “Colonial” variables. Theoretically, a colonial past common to both partner countries should have a positive impact on the volume of their trade.

c. Estimation and analysis of findings

60. The findings of the gravity model estimation using the method of ordinary least squares on pooled data over five-year sub-periods during the period 1970-2000.

61. All estimated coefficients are statistically significant and their signs are in conformity with expectations. The adjustment quality of the model as measured by the determination coefficient (R^2 adjusted) is quite high, standing at 71%. The outcome is that the variables introduced to the gravity model explain 71% of the variability observed in bilateral trade flows.

¹⁰ Formal currency union corresponds to the situation when sovereign States decide giving up their national currencies and adopting a common currency. This is the case of the Euro area. A currency union corresponds de facto to the situation of a country that unilaterally decides giving up its currency and choosing that of another country.

¹² The coefficient of the “frontier” binary variable is 0,72. As exports are taken in logarithm, the coefficient interpretation requires taking its exponential. In this case $\exp. (0,72)=2,05$.

Table 6
Findings of a standard gravity model estimation

	Coefficient		Standard deviation
GDP	0.92	***	0.01
PCGDP	0.06	***	0.01
Distance	-1.11	***	0.01
Surface	-0.20	***	0.01
Without SF	-0.26	***	0.02
Frontier	0.72	***	0.06
Language	0.77	***	0.08
RIA	0.87	***	0.02
Colonizer	0.61	***	0.04
Colonial	1.23	***	0.02
CC	1.09	***	0.08
Observation number	35989		
R ² adjusted	0.71		

NB: Estimation by means of the ordinary least squares method on pooled data related to a 146-country sample over five-year sub-periods between 1970-2000. *GDP* and *PCGDP* are, respectively, the product of GDP and per capita GDP (*PCGDP*) of the countries *i* and *j*. The *Distance* variable indicates the geodesic distance between the capitals of the countries *i* and *j* expressed in miles. The *Surface* variable is the sum of surfaces of the countries *i* and *j*. The “Without_SF” takes the value 0 if the countries *i* and *j* both have a sea fronting, value 1 if one of the countries is landlocked and value 2 if neither of the countries *i* and *j* has a sea fronting. *Frontier* and *Language* are both binary variables that respectively indicate if yes (1) or no (0) both countries *i* and *j* have a common frontier and official language. The *RIA* variable takes the value 1 if for the considered period, both countries *i* and *j* are both members of a preferential trade agreement and the value 0 in the opposite case. The *Colonizer* and *Colonial* variables respectively indicate if both countries *i* and *j* had had the same colonizer, and if *i* had colonized *j* or vice-versa. The *CC* binary variable takes the value 1 if both countries *i* and *j* have a common currency for the considered period and the value 0 otherwise. The number of stars points to the significance level of parameters. ***, ** and * correspond to 1%, 5% and 10% respectively.

62. GDP, GDP per capita, common frontier, common official language, common currency or common colonial past particularly have a positive impact on the volume of bilateral trade. On the other hand, the geographical distance factors measured by the “distance” and “surface” variables or land-locking “country with no sea front” negatively affect the volume of bilateral trade.

63. GDP-associated elasticity is positive, statistically significant and slightly close to unity. It shows that, other things being equal, a GDP increase by 1% is expressed by an export increase by 0.92%. An additional effect on exports is also generated by any rise of consumers’ purchasing power, such as measured by per capita GDP (*PCGDP*).

64. Positive and statistically significant coefficients combined with “frontier” and “language” variables show, other things being equal, that “neighboring” countries or countries with a common language tend to trade respectively twice¹² and 2.05 times more, compared to countries with no common frontier or language.

65. Findings of the gravity model estimations also reveal that a preferential trade agreement between partner countries is a factor that fosters bilateral trade. Other things being equal, countries having entered a preferential trade agreement tend to trade about 2.4 times more than countries uninvolved in a trade integration agreement. This finding clearly demonstrates that a preferential treatment between member countries significantly generates trade.

66. Estimations have also disclosed the history weight in defining the direction of trade flows. As a matter of fact, other things being equal, a country tends to trade 3.4 times more with its former colonizer than with other countries.

67. The distance is a statistical factor which is used here as a proxy to consider the impact of transport costs and other transaction costs. The coefficient associated to this variable is negative and statistically significant. It shows that bilateral trade decreases more than proportionally in relation to distance.

68. In order to test the specificity of MENA countries compared to other countries of the world regarding foreign trade, two dummy variables have been added compared to the previous specification, which findings are illustrated in table (6).

69. The first “MENA” variable is related to intra-MENA trade; it takes the value 1 when both partner countries belong to the MENA area and 0 otherwise. The second “MENA_World” attempts at grasping the trade specificity of MENA countries with other countries of the world.

70. Presented in table (7), the findings that confirm both hypotheses underlying this specification. The first hypothesis is that the trade opening of MENA countries towards the rest of the world is below the world average. The second is a very weak commercial integration of MENA countries between themselves.

71. In fact, the coefficients associated to these two dummy variables reveal, other things being equal, that bilateral trade of a country from the MENA area tends to be 36% lower in average, towards a partner country outside the MENA area; and 62% lower in average towards a MENA country. In other words, MENA countries are poorly open to international trade, but they are even more locked between themselves than towards the rest of the world.

Table 7
Findings of the gravity model estimation with binary variables associated to the
countries of the region

	Coefficient		Standard deviation
GDP	0.89	***	0.01
PCGDP	0.10	***	0.01
Distance	-1.24	***	0.01
Surface	-0.21	***	0.01
Without SF	-0.26	***	0.02
Frontier	0.55	***	0.02
Language	0.72	***	0.03
RIA	0.84	***	0.05
Colonizer	0.68	***	0.11
Colonial	1.53	***	0.12
CC	1.07	***	0.10
MENA	-1.11	***	0.14
MENA_World	-0.45	***	0.02
Observation number			
R ² adjusted			
Observation number	35989		
R ² adjusted	0.72		

NB: Estimation using the ordinary least squares method on pooled data over the period 1970-2000. Two variables have been added compared to the previous table. The *MENA* variable takes the value 1 when both countries *i* and *j* belong to the Middle East and North Africa area. The *MENA_World* variable takes the value 1 when one of the countries *i* and *j* is a country from the MENA area and 0 otherwise.

72. Table (8) estimations show that the negative effect of belonging to the MENA area on bilateral trade is even higher when the *estimation method of fixed effect panel* is used. In other respects, this finding remains solid upon introducing the control variables of the economic and governance policies' impact on bilateral trade.

Table 8
Findings of the gravity model estimation by the method of fixed effect panel with
binary variables associated to countries of the region

	coefficient		Standard deviation
GDP	1,02	***	0,01
PCGDP	0,38	***	0,01
Distance	-1,11	***	0,03
Surface	-0,21	***	0,01
Without SF	-0,24	***	0,03
Frontier	0,46	***	0,02
Language	0,54	***	0,03
RIA	0,70	***	0,09
Colonizer	0,92	***	0,01
Colonial	1,53	***	0,05
CC	1,15	***	0,04
MENA	-1,47	***	0,08
MENA_World	-1,05	***	0,06
Observation number			
R ² adjusted			
	35989		
Observation number	0,70		
R ² global			

NB: Estimation by the method of fixed effect panel over the period 1970-2000. The same variables as that of the previous table have been kept.

73. As expected, the findings of table (9) show that in addition to the factors related to the economic weight of partner countries, their history and geography, there are other variables such as the economic policy that influence the level of bilateral trade.

74. Four variables have been introduced to the model to consider the effect of economic policies on trade.

- The first variable rated by “Volat_Exchange” measures the bilateral exchange rate volatility of the country i with the country j in the year t. For each year t, it is calculated as the standard deviation of the first differences of the nominal exchange rate between i and j over the previous twelve months.
- The second variable rated by “Credit/GDP” is the result of ratios of the total amount of credits distributed in the economy compared to the gross domestic product. This variable gauging the weight of market intermediation is used as a measure of the financial sector quality of partner countries.
- The “Current_Account” and “Capital_Account” are qualitative variables that take the value 0, 1 or 2, respectively, as to whether both countries i and j do not impose restrictions or one of them imposes restrictions or neither countries imposes restrictions to current and capital operations.

75. As theoretically expected, the findings reveal that the financial development degree as measured by the ratio between credits to the economy and GDP, the volatility degree of the exchange rate and the magnitude of restrictions on current accounts and capitals all interfere in explaining the observed levels of bilateral trade.

76. The estimations have shown that the trade increases with the development of market intermediation and the liberalization of current and capital operations. Paradoxically, they have also shown that the bilateral exchange rate volatility does not hamper the trade development. In contrast, a higher volatility of bilateral exchange rates would even be a factor that stimulates exports.

77. Two explanations can be put forward to justify this result:

- The first one is that only a few key currencies (Dollar, Euro, Yen, and Pound) are used for the payment of international trade operations. In this case, the exchange rate volatility compared to the key currency is solely relevant in explaining the bilateral trade. In other words, the exchange rate volatility of a “peripheral” currency compared to another, even if it is important, may not influence the trade, as long as neither currencies is used as a reference in payment operations.
- The second explanation, largely mentioned in literature, is that the exchange rate volatility, especially when it is expected, does not influence the volume of trade. On the other hand, the exchange rate misalignment has a negative impact on the volume of trade (Achy & Sekkat 2003). Volatility refers to frequent but non-persistent fluctuations of the exchange rate compared to its equilibrium level. Misalignment refers to less frequent but persistent variations of the exchange rate compared to its equilibrium level.

78. The specification of table (9) also attempts to grasp the effect of governance quality on trade via the “Governance” variable. The latter corresponds to the sum of governance indexes of countries *i* and *j* based on the “*International Country Risk Guide*” data.

79. The measure of governance is based on three dimensions: (i) the process through which governments are “chosen”, controlled and replaced, (ii) the government’s effective capacity to conceive and implement adequate economic policies and (iii) the respect that the government and citizens feel towards the institutions governing the economy and society.

80. The governance quality influences trade through the output expected from international trade operations. Defective institutions with a heavy and bureaucratic or even arbitrary and approximate regulation, act as a trade tax. Rodrick (2002) points out that the main obstacle to international trade could be the implementation of contracts.

81. Findings show that the governance measure is statistically significant and has the expected sign. Improving the governance quality is likely to foster trade between countries. Anderson and Marcouiller (2002) reached the same result in the case of Latin American countries. They proved that trade is crippled both by the high level of formal trade barriers and waning institutions.

Table 9
Findings of the gravity model estimation by the method of fixed effect panel with
binary variables associated to countries of the region level and taking into
account the governance and economic policy indicators

Explanatory variables	Coefficient		Standard deviation
GDP	1.03	***	0,01
PCGDP	0.35	***	0,02
Distance	-1.19	***	0,01
Surface	-0.21	***	0,02
Without SF	-0.21	***	0,02
Frontier	0.56	**	0,21
Language	0.51	***	0,05
RIA	0.74	***	0,11
Colonizer	0.92	***	0,18
Colonial	1.54	**	0,14
CC	1.24	***	0,15
MENA	-1.89	***	0,11
MENA_World	-1.05	***	0,08
Volat_Exchange	-0.27	*	0,15
Credits/GDP	0.05	**	0,02
Current_Account	-0.13	***	0,02
Capital_Account	-0.10		0,13
Governance	0.21	***	0,02
Observation number	33872		
R ² global	0.66		

NB: Estimation using the method of fixed effect panel over the period 1970-2000. Five variables have been incorporated compared to the previous table specification. The “Volat_Exchange” measures the exchange rate volatility between the countries i and j in the year t calculated as a standard deviation of the first differences of the bilateral nominal exchange rate between i and j over the previous twelve months. The “Credits_GDP” variable is the result of ratios (credits/GDP) of countries i and j, used as a measure of the financial sector quality. The “Current_Account” and “Capital_Account” variables are qualitative variables that take the value 0, 1 or 2, respectively, as to whether both countries i and j do not impose restrictions or one of them imposes restrictions or neither imposes restrictions to current operations (or capital). The “Governance” variable corresponds to the sum of governance indexes of countries i and j based on the “*International Country Risk Guide*” data.

V. Estimating the trade potential of North African countries

V.1. Method of trade potential estimation

81. The gravity model estimations are often used as a benchmark to deduce the bilateral trade potential for a specific group of countries.

82. The method consists of assessing the bilateral trade equation, based on the gravity model in a first phase and then this equation is used for simulation in a second phase, for sampled countries or non-sampled countries trading with sampled countries.

83. Building on the gravity model estimations introduced above, it is possible to simulate the bilateral trade potential for North Africa countries, based on the coefficients assessed and introduced in table (9). Simulated exports of a country i into a country j for the year t rated by $\hat{X}_{ijt}$ are obtained as follows:

$$\log \hat{X}_{ijt} = \hat{\alpha}_0 + \hat{\alpha}_1 \log Y_{ijt} + \hat{\alpha}_2 \log Z_{ij} + \hat{\alpha}_3 V_{ijt} + \hat{\alpha}_4 W_{ij}$$

84. Given that the estimated coefficients tend to be structural and statistically solid, they can be extrapolated to a more recent year, without running any important error risk.

85. The gap between simulated exports $\hat{X}_{ijt}$ and that observed X_{ijt} provides a first measure of the bilateral trade potential. Regarding relative shares, they have been adjusted to consider the gap between current exports of a given country and simulated exports into all markets.

V.2. Findings' analysis

86. The findings of potential export estimations of North African countries are presented in table (10). To facilitate the comparison, the data related to the observed exports have been included in this table. Full tables for each country at the sub-regional level are incorporated in this document.

87. Upon reading table (10), the first finding is that the share of exports to North African countries, with exports simulated according to the gravity model, would be ten times higher than its current level. This finding is demonstrated in the last table line, the potential multiplier factor, which values are obtained by relating for each country the North Africa share in simulated exports to the North Africa share in the observed exports.

Table 10
Observed exports, simulated exports and multiplier factors of trade potential of
North African countries

	Algeria	Egypt	Libya	Mauritania	Morocco	Sudan	Tunisia	All
<i>Observed exports</i>								
Totals	31882	12100	19313	784	9738	3774	9679	87270
North Africa	490	483	489	14	179	120,5	572	2348
North Africa share	1,54	4	2,5	1,8	1,84	3,2	5,9	2,70
<i>Simulated exports</i>								
Total	36664	21730	21932	903	13146	7416	14035	115825
North Africa	7531	7344	5583	296	2430	1800	6881	31865
North Africa share	20,54	33,8	25,5	32,8	18,5	24,3	49	27,51
Variation of total exports in %	15,0	79,6	13,6	15,2	35,1	96,5	44,9	32,7
Ratio between the weight of intra-regional potential trade and actual trade	13,3	8,5	10,1	18,3	9,1	7,6	8,3	10,2

Source: Author's calculations based on the gravity model estimations. The used coefficients are that used in table 9.

88. The second important finding is that the increase of intra-regional trade emanates not only from a reallocation of exports, but also from a higher level of total simulated exports in relation to total observed exports. Indeed, based on the calculations carried out using the gravity model, if countries at the regional level acted as the benchmark, their exports would be 33% higher than their observed level.

89. Tables 11 to 16 introduce the estimations of potential intra-regional trade for each of the seven North African countries.

Each table is composed of seven columns.

- The first column enumerates, for each country, the six partner countries at the sub-regional level.
- The second one relates the value of current exports in million dollars to each one of partner countries.
- The third one calculates the shares related to current exports directed to countries at the regional level in relation to total exports.
- The fourth column provides the simulated exports obtained by applying the gravity model estimated above to trade flows of countries at the regional level.
- The fifth column features the relative shares of simulated exports directed to countries at the regional level in relation to total observed exports.
- However, given that the total value of simulated exports is higher than that observed, the relative shares have been adjusted and the results obtained are found in the sixth column.

- Finally, the last column calculates the relative gap between the potential trade and the observed one. The values of this column are expressed in the form of multiplier factors that convey the gap between the real trade and the potential trade within the countries of the region.

Table 11
Estimation of Algeria's potential trade with other North African countries based on findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Egypt	249.53	0.78	3995.09	12.53	10.90	13.97
Libya	11.71	0.04	318.60	1.00	0.87	21.72
Mauritania	16.15	0.05	211.49	0.66	0.58	11.54
Morocco	145.02	0.45	2070.93	6.50	5.65	12.55
Sudan	0.03	0.00	0.76	0.00	0.00	21.94
Tunisia	68.27	0.21	934.47	2.93	2.55	12.14
North Africa	490.70	1.54	7531.34	23.62	20.54	13.34

Source: Author's calculations based on the gravity model estimations. X indicates exports.

* It is the ratio between the share of simulated exports (column 6) and the share of current exports (column 2). The same applies to tables 12 to 17.

90. The share of Algeria's simulated exports to other countries at the region would be 13 times higher compared to the current level. Instead of US \$ 490 million, achieved in 2004, the amount of Algerian exports to the six countries should have been US \$7.5 billion, i.e. about 20.5% of Algeria's total exports instead of a little more than 1.5% currently.

91. According to this scenario deduced from the gravity model, Algeria's exports to Egypt would be \$4 billion instead of \$250 million and would represent about 11% of Algeria's total exports, instead of less than 1% currently. Algerian exports to Morocco would be around \$2 billion, instead of \$145 million currently. In relative terms, the share of Algerian exports to Morocco would be around 5.6% instead of 0.45% currently. As to exports towards Tunisia, they would move from below \$70 million to over \$900 million. They would represent 2.55% of Algerian exports instead of 0.2% currently.

92. Egyptian exports to the other North African countries, such as simulated from the gravity model, would be 8.5 times higher than their current level. Their amount would be \$7.3 billion instead of US \$490 million recorded in 2004, i.e. a third of Egyptian exports instead of 4%.

93. According to this scenario deduced from the gravity model, Egyptian exports to Sudan would rise to \$2.7 billion instead of \$190 million and would represent 12.6% of Egypt's total exports instead of less than 1% currently. Egyptian exports to Morocco and Algeria would be around \$1.5 and \$1.2 billion respectively, instead of \$90 and \$76 million in 2004. The relative shares of Egyptian exports to Morocco and Algeria would represent about 6.8% and 5.6% respectively instead of 0.74% and 0.63% currently. As to exports towards Libya and Tunisia, they would move from below \$70 and \$60 million respectively to verge on the billion dollar threshold for both countries.

Table 12
Estimation of Egypt's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Algeria	76.17	0.63	1219.52	10.08	5.61	8.91
Libya	67.72	0.56	972.36	8.04	4.47	7.99
Mauritania	2.65	0.02	103.64	0.86	0.48	23.85
Morocco	90.02	0.74	1487.83	12.30	6.85	9.25
Sudan	189.77	1.57	2744.13	22.68	12.63	8.04
Tunisia	58.89	0.47	816.88	6.75	3.76	8.00
North Africa	483.22	3.99	7344.35	60.70	33.80	8.47

Source: Author's calculations based on the gravity model estimations. X indicates exports.

94. Currently, Libya's exports to countries of the region reach \$490 million, whereas those simulated from the gravity model would be \$5.6 billion, i.e. 25.4% of Libyan exports instead of only 2.5% currently. In other words, the trade potential for Libya within the region is ten times higher than its observed level. The distribution of simulated exports according to countries emphasizes that Tunisia is the main market in the sub-region for Libyan products. This would be \$4.4 billion, i.e. around 19% of Libya's total simulated exports. Egypt and Morocco are ranked far behind with relative shares of 4% and 2.3% respectively.

Table 13
Estimation of Libya's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Algeria	2.06	0.01	56.05	0.29	0.26	25.56
Egypt	61.53	0.32	883.48	4.57	4.03	12.59
Mauritania	0.00	0.00	0.03	0.00	0.00	--
Morocco	41.00	0.21	499.70	2.59	2.28	10.85
Sudan	0.01	0.00	0.23	0.00	0.00	--
Tunisia	384.6	1.99	4144.02	21.46	18.89	9.49
North Africa	489.20	2.53	5583.51	28.91	25.46	10.06

Source: Author's calculations based on the gravity model estimations. X indicates exports.

95. Mauritania's simulations reveal that the amount of exports to North African countries is eighteen times lower than its potential level. Instead of US\$14 million observed in 2004, the value of Mauritanian exports to the six countries of the sub-region would be around \$300 million, i.e. 33% of Mauritania's total exports instead of 1.8% currently.

Table 14
Estimation of Mauritania's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between actual trade and potential trade*
Algeria	7.21	0.92	94.42	12.05	10.46	11.37
Egypt	3.96	0.50	154.87	19.76	17.15	34.30
Libya	0.00	0.00	0.00	0.00	0.00	--
Morocco	1.95	0.25	30.10	3.84	3.33	13.33
Sudan	0.00	0.00	0.00	0.00	0.00	--
Tunisia	0.91	0.12	16.88	2.15	1.87	15.58
North Africa	14.02	1.79	296.26	37.81	32.81	18.33

Source: Author's calculations based on the gravity model estimations. X indicates exports.

96. The distribution of simulated exports according to countries shows that Egypt and Algeria would be the main markets for Mauritanian products within the sub-region, with respectively 17 and 10.5% of exports, instead of 0.5% and 0.9% currently. Mauritanian exports towards Morocco and Tunisia would also increase, but their relative shares would remain low with 3.3 and 1.9% respectively.

Table 15
Estimation of Morocco's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Algeria	40.87	0.42	583.64	5.99	4.44	9.57
Egypt	23.42	0.24	387.08	3.97	2.94	11.25
Libya	32.63	0.34	397.69	4.08	3.03	7.91
Mauritania	20.52	0.21	316.76	3.25	2.41	10.48
Sudan	0.13	0.00	0.78	0.52	0.00	4.00
Tunisia	61.14	0.63	745.17	7.65	5.67	8.00
North Africa	178.7	1.84	2430.34	24.96	18.49	9.05

Source: Author's calculations based on the gravity model estimations. X indicates exports.

97. Morocco's simulated exports to North African countries would be nine times higher than their current level. Instead of US \$179 million realized in 2004, their amount would be US \$ 2.43 billion, i.e. 18.5% of Moroccan exports instead of less than 2% currently.

98. The scenario deduced from the gravity model shows that Tunisia would be the major destination of Moroccan exports within the sub-region, its relative share would move from 0.63% in 2004 to 5.7%. In the next position come Algeria, then Libya and Egypt with relative shares of 4.4%, 3% and 2.9%, respectively. Mauritania would also represent a significant market for Moroccan exports with \$317 million, i.e. a relative share of 2.4%.

99. Sudan's exports to North African countries, as simulated from the gravity model, would be around 7.6 times higher than their current level. Their amount would be \$1.8 billion against \$120 million currently, a little less than a quarter of Sudanese total exports instead of 3.2%.

Table 16
Estimation of Sudan's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Algeria	1.16	0.03	29.26	0.87	0.39	13.15
Egypt	108.50	2.88	1568.94	46.55	21.16	7.35
Libya	3.19	0.08	73.87	2.19	1.00	12.45
Mauritania	0.00	0.00	0.00	0.00	0.00	--
Morocco	0.00	0.00	0.00	0.00	0.00	--
Tunisia	7.60	0.63	128.36	3.81	1.73	2.75
North Africa	120.45	3.19	1800.43	53.41	24.28	7.61

Source: Author's calculations based on the gravity model estimations. X indicates exports.

100. Out of the total exports simulated from the gravity model, Egypt stands out as the major market; its potential would be \$1.6 billion and would represent 21.2% of Sudan's total exports. Even though the importance of other markets is likely to increase, it remains however marginal.

101. According to calculations made from the gravity model, Tunisia's simulated exports towards North African countries would be \$6.9 billion, i.e. about 8.3 times their current level standing at \$572 million. If Tunisia's trade flows were similar to the estimated benchmark, the sub-region market could absorb about half the Tunisian exports against a little less than 6% currently.

102. The distribution of simulated exports according to countries highlights Libya as the major market for Tunisian products; the latter is valued at \$3.7 billion, i.e. about 26.7% of Tunisia's total simulated exports. The Algerian and Moroccan markets are ranked in the second position with relative shares of 10.6% and 7.4% respectively. Both markets provide Tunisia businesses with a potential valued at more than a billion dollars.

Table 17
Estimation of Tunisia's potential trade with other North African countries based on the findings of the gravity model estimations

Importing countries	current X in M \$	% of current X	Simulated X in M \$	% of simulated X in total current X	% of simulated X with adjustment	Ratio between real trade and potential trade*
Algeria	108.85	1.12	1489.93	15.39	10.62	9.48
Egypt	31.15	0.32	432.09	4.46	3.08	9.62
Libya	347.36	3.59	3742.77	38.67	26.67	7.43
Mauritania	7.10	0.07	131.69	1.36	0.94	13.40
Morocco	74.22	0.77	1036.09	10.70	7.38	9.59
Sudan	2.89	0.03	48.81	0.50	0.35	11.59
North Africa	571.58	5.91	6881.38	71.10	49.03	8.30

Source: Author's calculations based on the gravity model estimations. X indicates exports.

V.3 Comparison and interpretation of the Findings

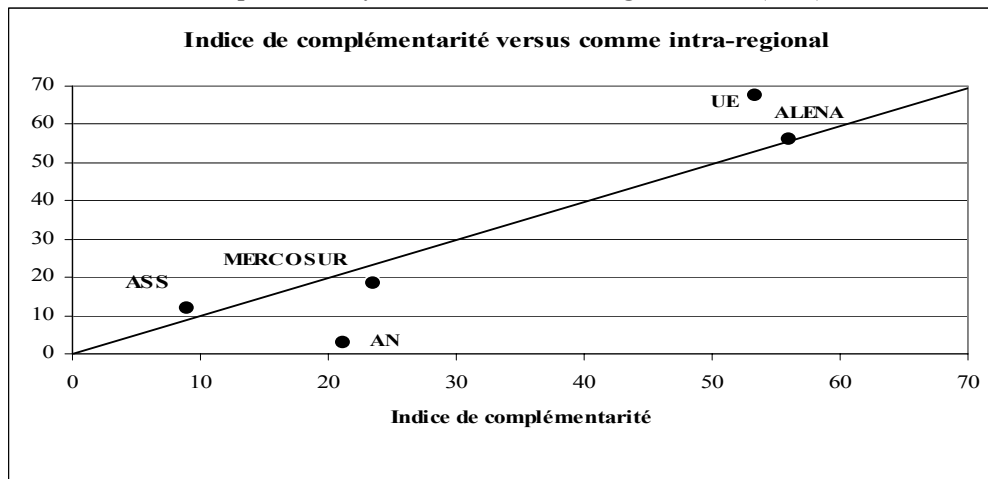
103. How can we rightly assess the reliability or reasonability of the estimations of trade potential between the North African countries?

1. The simulations carried out by ECA-NA in 2003, which were based on an approach inspired from the SMART method, maintained the multiplication times five of trade within the region as a reasonable hypothesis. To explain this hypothesis, the intra-regional trade potential as deduced from the gravity model within the present study considers a benchmark valued from data on 146 countries. The model considers the economic weight, the income level, geographical and historical data, in addition to economic policy indicators and governance status. Considering these various dimensions seemingly enables increasing the intra-regional trade potential.
2. In concrete terms, the trade potential performance between the North African countries would increase from their current level, not more than (2.7%), to settle at 27%. This rate can be perceived as an objective to meet in the middle term. For comparison purposes, intra-regional trade represents 23% in the Association of South East Asian Nations (ASEAN) and 18.2% in the case of South America Common Market (MERCOSUR). Intra-regional trade is clearly higher within NAFTA or the European Union with 56% and 67% respectively.

104. The magnitude of trade potential within the sub-region also seems reasonable, referring to complementarity's indexes calculated by E. KOFFI (2005)¹⁴. The complementarity's index reflects the differentiation degree of export and import structures of countries of a given regional community. The higher this index is, the more complementary the trade structures of corresponding countries are, and the more important the trade potential between them becomes. Even though measuring the complementarity's index between economies is not easy, as it closely depends on the disassociation degree of the used data, there is generally a close link between the complementarity's index and the rate of intra-regional trade as shown in the figure. Within the European Union and NAFTA, the proportion of intra-regional trade is slightly higher than the complementarity's index. This is also true for Sub-Saharan Africa (SSA) with a complementarity's index of 9% and intra-regional trade valued at 12%. For MERCOSUR, intra-regional trade is relatively low, compared to the complementarity's index, but the ratio between the two is around 0.8, which is close to unity. On the other hand, North Africa stands out as a paradox case. Its complementarity's index is valued at 21.3%, whereas its intra-regional trade does not exceed 2.7%.

¹⁴ The complementarity index of two countries i and j is calculated based on the following formula : $IC_{ij} = 100 - (\sum_k |m_{ik} - x_{jk}| \div 2)$ with m_{ik} the import share of the country i as to commodities k and x_{jk} the export share of the country j as to commodities k .

Complementarity's index versus intra-regional trade (2006)



105. These various arguments support the findings of the gravity model, according to which the trade potential within the North African region remains widely unexplored.

V.4 Gravity model and regional integration steering

106. The gravity model findings reveal that, compared to international trend, North African intra-regional trade is ten times lower than its potential. The objective of this chapter is to identify the factors likely to explain such gap and use it as a steering tool for trade integration. Indeed, the economic policy issue is the detection of the variables that need to be worked on in order to promote intra-regional trade. In order to focus the attention, only the transaction costs aspect is fully tackled.

107. The gravity model specifies that trade between two countries is positively associated to their economic weight, measured by GDP and per capita GDP and negatively associated to their geographic distance. This last dimension is grasped through the physical distance between both countries. It is supposed to reflect the transaction costs generated by bilateral trade. However, the distance is an imperfect proxy of trade transaction costs for three reasons at least.

108. The first reason is that transport costs, even for a given distance, greatly vary according to infrastructure quality, nature of traded products, the mode of transport used (bulk marine, containers, road transport, air freight), scale economies, level of trade balance (unfilled return costs) and finally the effectiveness level of the transport sector.

109. According to the ARIA study (2004) about the Regional Integration in Africa (ECA) transport costs are 63% higher in African countries compared to the average in developed countries. They are estimated at 14% of the value exported in the first group of countries, against 8.6% only in the second. According to a UNCTAD report published in 2002 and mentioned in a recent study by R. Lisinge (2005), the freight cost, as a percentage of the imported value, stood at 11% for North African countries, i.e. 111% more than industrialized countries and 25% more compared to the average in developing countries.

110. The second reason is the distance variable, such as measured in the mode, presumes direct links between partner countries. However, in the case of North African countries, it is commonplace that bilateral trade conveys in transit through European ports before reaching the final destination.

111. Therefore, the effective distance between the countries is higher than the physical distance in the gravity model. Higher transport costs between countries at the sub-regional level are a major obstacle to their trade development. According to the Limoa and Venables (2000) study on a sample of African countries, mentioned by Lisigne (2005), a decrease of transport costs leads to an increase two times higher of trade volume. This result implies that the freight cost in North Africa would decrease so as to reach the same level as the average in developing countries. This will increase the volume of trade by 50% compared to its current level.

112. The third reason is that distance, or its transport cost corollary, is only the most observable aspect of transaction costs. Other less perceptible aspects, such as administrative, technical or informational barriers may affect the trade flows between partner countries more severely. A recent study carried out by the Arab League (2004) has disclosed the heavy impact of non-tariff barriers on trade between Arab countries¹⁶. These are administrative barriers, quantitative restrictions, high-priced procedures, exchange restrictions and finally technical barriers. Most barriers have no legal ground and are arbitrarily imposed according to circumstances. Information about the trade potential between North African countries is also scarce. It is much easier to access this information on the European or American market via the Internet or through chambers of commerce, than on the North African ones. Trade flows are crippled by the lack of information on business opportunities in the sub-region.

113. The same analysis may be extended to other variables, such as sharing a common frontier or belonging to a regional integration agreement. As a matter of fact, a common frontier may foster trade only insofar as it is open and that the existing infrastructure facilitates the movement of goods on both sides of the frontier. In this respect, a preferential trade agreement enables increasing trade between member countries, provided that the provisions of this agreement are actually implemented.

VI. Conclusions

114. North African countries remain poorly open to international trade. Their trade is marked by a high geographic concentration and a weak diversification of products. An important part of exported manufactured products is labor intensive with poor technological content.

115. The main goal of the present work is to contribute to the debate on the trade potential of North African integration. In order to assess the trade level observed in relation to its potential level, considering the economic, geographical, historical and cultural characteristics of the countries, a gravity model was estimated. The gravity model estimations have been used as a benchmark to deduce the bilateral trade potential for a specific group of countries.

¹⁶ This study covered 15 countries, 5 of which in the North African sub-region. These are Egypt, Libya, Morocco, Sudan and Tunisia.

116. The first finding is that the simulated exports would be ten times higher than their current level. The second is that the increase of intra-regional trade derives both from a reallocation of exports and an increase of total simulated exports compared to total observed exports. Indeed, if countries at the sub-regional level acted as the benchmark, their total exports in \$ US would be 33% higher in relation to the observed level.

117. Several arguments support the reasonability of the findings of the gravity model, according to which the trade potential within North Africa remains highly unexplored. Particularly, the magnitude of trade potential within the region seems consistent, referring to complementarity's indexes calculated by E. KOFFI (2005). Overall, a strong correlation exists between the complementarity's index of trade and the intra-regional trade rate. Within the European Union and NAFTA, the proportion of intra-regional trade is slightly higher than the complementarity's index. This is also true for Sub-Saharan Africa (SSA). For MERCOSUR, intra-regional trade is relatively low, compared to the complementarity's index, but the ratio between the two remains close to unity. On the other hand, North Africa stands out as a paradox case. Its complementarity's index is valued at 21.3%, whereas its intra-regional trade does not exceed 2.7%.

118. Today, the question of trade and economic integration of North African countries has become an imperative for several reasons. It is not only a matter of fitting into the international wave of regional integration, but of conceiving an integration project that, while having a political vision, obeys an economic rationality with incentives to private agents. This political vision, which reflects long-term strategic goals, supports the adoption in the short term of a proactive approach by member States, and the creation of conditions likely to stimulate the propensity to trade between the economic operators of the region.

119. For the regional integration project of North African countries to be effective today, it needs to be redefined and given credibility.

120. This redefinition involves focusing the information, promotion and administration efforts on a "restricted" and consistent number of integration initiatives between the countries of the region.

121. The process can become credible by implementing transparent mechanisms of follow-up, assessment and resolution of trade conflicts between agents of the region.

122. Accession of countries of the regional to the WTO is a fundamental asset in their regional integration process. The respect of WTO rules provides a common reference framework for all countries. It ensures visibility to partners and insurance that trade obstacles would not be applied discretionarily and arbitrarily. Commitments reinforced multilaterally by countries at the regional level regarding market opening, among other areas, will represent a minimum credible basis for a deepened regional cooperation.

123. Strengthened by the knowledge acquired from their accession process or their experience within the WTO, it is quite probable that countries at the regional level have "matured" and their way of approaching the regional integration has changed. The latter should be conceived as a cleverly tailored component that completes the achievement of multilateral and Euro-Mediterranean relations and not as a substitute that aims at ousting them.

Bibliography

- Achy, L. & Sekkat, K. (2003), "The Impact of European Single Currency on MENA's Manufactured Exports to Europe" *Review of Development Economics*
- Anderson J. & D. Marcouiller, (2002), "Insecurity and the Pattern of Trade: An Empirical Investigation", *The Review of Economics and Statistics*, MIT Press, vol. 84(2), pages 342-352.
- Anderson J.E. (1979), "A Theoretical Foundation for the Gravity Equation", *American Economic Review*, 69: 106-116.
- Barta A. (2004), "India's global trade potential: the gravity model approach", Indian Council for Research on International Economic Relations, working paper n°. 151.
- Bergstrand J.H. (1989), "The Generalized Gravity Equation, Monopolistic Competition, and the Factor-Proportions Theory of International Trade", *Review of Economics and Statistics*, 23:143-153.
- Bergstrand J.H. (1985), "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence", *Review of Economics and Statistics*, 67: 474-481.
- CEA (Commission économique pour l'Afrique) (2004), "État de l'intégration régionale en Afrique (ARIA)," Addis-Abeba
- CEA-AN (Bureau de la CEA pour l'Afrique du Nord), (2003), "Rapport sur la situation de la coopération et de l'intégration régionale dans la sous-région de l'Afrique du nord : Aspect commercial", Maroc.
- Deardorff A. V. (1995), "Determinants of Bilateral Trade: "Does Gravity Work in a Neoclassical World?" *University of Michigan Discussion Paper*, 382.
- Evenett S., Keller W. (1998), "On Theories Explaining the Success of the Gravity Equation", *NBER Working Paper*, 6529.
- FEMISE (2005), "Le partenariat Euro-méditerranéen: dix ans après Barcelone : acquis et perspectives", Institut de la Méditerranée.
- Fontagné et al. (2001), "Potentiels de commerce entre économies hétérogènes : un petit mode d'emploi des modèles de gravité", CNUCED, Centre de commerce international, Genève.
- Hummels D., Levinsohn J. (1995), "Monopolistic Competition and International Trade: Reconsidering the Evidence", *Quarterly Journal of Economics*: 799-836.
- Koffi Ehoussou J.V. (2005), "Intégration économique régionale et commerce intra-zone: le cas de l'Afrique du Nord", mémoire professionnel Université de Cocody – Abidjan & CEA-AN.
- Ligue Arabe (2004), "Rapport global sur les barrières non tarifaires dans les pays arabes : étude et analyse" Direction du Commerce et développement, Egypte, Le Caire.
- Lima, N. et Venables, A. (2000). "Infrastructure, Geographical Disadvantage and Transport Costs", Mimeo, Banque mondiale, Washington, & Columbia University, New York
- Lisigne R.T, (2005), "Facilitation du commerce intra africain: Démanteler les barrières pour le commerce Intra africain", Centre africain pour les politiques commerciales (CAPC), CEA.
- Matyas L., (1998), "The Gravity Model: Some Econometric Considerations", *World Economy*, 21(3): 397-401.
- Minesy R. & Nugent, J. (2005), "Are there shortfalls in MENA trade, If so what are there sources and what should be done about them?", Economic Research Forum, Egypt.
- Rodrik, D. (2002), "Trade Policy Reform as Institutional Reform", in B.M. Hoekman, P. English and A. Mattoo (eds), *Development, Trade, and the WTO: A Handbook* (World bank, Washington, DC
- YEATS, A. (1998), "What Can Be Expected from African Regional Trade arrangement? Some Empirical Evidence", the World Bank Development Research Group, Washington, USA

Appendix

Interconnection matrix of preferential agreements between North African countries (2006)

	Algeria	Egypt	Libya	Mauritania	Morocco	Sudan	Tunisia
Algeria			PT AMU	TA (FTA) AMU	TA (ALE) AMU		TA (ALE) AMU
Egypt			TA Great Arab Free Trade Area (GZALE) COMESA CEN-SAD		ALE Great Arab Free Trade Area (GZALE) CEN-SAD AGADIR	GZALE COMESA CEN-SAD	ALE Great Arab Free Trade Area (GZALE) AGADIR CEN-SAD
Libya				CP AMU	TA (ALE) AMU Great Arab Free Trade Area (GZALE)	GZALE COMESA CEN-SAD	ALE AMU Great Arab Free Trade Area (GZALE) CEN-SAD
Mauritania					TA AMU		TA (ALE) AMU
Morocco						TA Great Arab Free Trade Area (GZALE) CEN-SAD	ALE AMU Great Arab Free Trade Area (GZALE) AGADIR CNE-SAD
Sudan							GZALE CEN-SAD
Tunisia							

NB: PT: Preferential trade (with positive lists), TA: Trade Agreement, FTA: Free Trade Agreement (with negative lists).