ECONOMIC RESEARCH FORUM
منتدى البحوث الاقتصادية
2012

working paper series

MOROCCAN PASSENGER AIRLINES FRAMEWORK AND PERFORMANCE

Brahim Morchid and Khalid Sekkat

Working Paper No. 725

MOROCCAN PASSENGER AIRLINES FRAMEWORK AND PERFORMANCE

Brahim Morchid and Khalid Sekkat

Working Paper 725

November 2012

Send correspondence to:
Khalid Sekkat
University of Brussels
ksekkat@ulb.ac.be

First published in 2012 by
The Economic Research Forum (ERF)
21 Al-Sad Al-Aaly Street
Dokki, Giza
Egypt
www.erf.org.eg

Abstract

This paper studies the relationship between the current passengers' airlines framework and the performance of the sector in Morocco. The analysis aims at investigating the impact of further liberalization on passengers and on airline industry. The paper has two additional contributions to the existing literature. First, it addresses the issue at the route level. Second, it constructs an Openness Index (OI) that should reflect the degree of openness on each route. The analysis sets up an economic model of air transport, computes the indicator of openness, estimates the model incorporating the indicator and other determinants and uses the estimation results to simulate the impact of further liberalization on passengers and on welfare. The result of the OI computation shows that routes linking the main airport (i.e. Casablanca) are the least open to competition while Agadir and Marrakech are the most open. All routes became more open between 2000 and 2010. The econometric and simulation results show that further liberalization would increase the number of passengers to and from Morocco and decrease the average airfare. The net effect on society welfare is positive; the consumer surplus increase outweighs the producers' surplus decrease. This conclusion is robust the various liberalization scenario.

JEL Classification: L11, O53, C51

Keywords: Arab airlines, Competition, Welfare

ملخص

تقوم هذه الورقة بدراسة العلاقة بين الأطر الحالية لشركات الطيران للركاب وأداء القطاع في المغرب. هذا التحليل يهدف إلى التحقيق فى أثر تحرير أكبر للتجارة على الركاب وعلى صناعة الطيران. لهذه الورقة اضافاتين إلى الأدب والكتابات الموجودة. الأولى، هى أنها تعالج القضية من أساسها. والثانية، أنها تبني فهرس الانفتاح (OI) والذي يجب أن يعكس درجة من الانفتاح على كل الطرق. يضع التحليل نموذج اقتصادي للنقل الجوي، ويحسب مؤشر الانفتاح ويقدر نموذج دمج المؤشرات والمحددات الأخرى ويستخدم لمحاكاة نتائج تقدير أثر التحرير الأكبر على الركاب وعلى الرعاية الاجتماعية. نتيجة حساب OI تبين أن الطرق التي تربط بين المطار الرئيسي (أي الدار البيضاء) هي الأقل انفتاحا للمنافسة في حين أن أغادير ومراكش هي الأكثر انفتاحا. أصبحت جميع الطرق أكثر انفتاحا بين عامي 2000 و 2010. تبين نتائج الاقتصاد القياسي والمحاكاة أن زيادة التحرير من شأنه أن يزيد عدد المسافرين من وإلى المغرب وخفض الثمن المتوسط للتذكرة. الأثر الصافي على الرفاه المجتمع هو إيجابي، وزيادة فائض المستهلك يفوق انخفاض المنتجين الفائض. هذا الاستنتاج هو السيناريو الأقوى لسيناريوهات التحرير المختلفة.

1. Introduction

The modern airline passengers industry in Morocco started with the creation in 1957 of the Royal Air Morocco (RAM) replacing the Compagnie Chérifienne des Transports Aériens which was itself a result of the merger of Atlas Air and Air Maroc. Starting with less than 450 agents and a fleet of three DC-3 planes, RAM experienced a steady growth over time. It stands now as Africa's second largest airline company in terms of turnover and third in terms of the number of passengers. The Royal Air Morocco is a semi-public company with 95.94% of shares held by the State; Air France and other actors own the remaining shares from the private sector.

Beside Royal Air Morocco, three Moroccan companies are operating in the country's airline passengers market. These are Atlas Blue, Jet4you and Air Arabia. Royal Air Maroc is based in Casablanca, while its subsidiary Atlas Blue is based in Marrakech. In 2007, Royal Air Maroc accounted for 83% of domestic seat capacity in Morocco and 45% of international capacity, while Atlas Blue accounted for 11% of international capacity. In total, these two airlines had an 83% share of domestic capacity and a 56% share of international capacity. Jet4you is a low cost company, which started operating between Morocco and Europe in 2006. It is owned by the TUI group based in the UK. Air Arabia is a low cost carrier operating in Middle East and North Africa region and is officially approved as a national carrier in Morocco.

The airline industry in Morocco is under the control of the *Ministère de l'Equipement et des Transports* (Ministry of Equipment and Transport). Three Directorates are involved in the management of the air transport sector: *The Direction Générale de l'Aviation Civile* (The Directorate General of Civil Aviation); The *Direction de l'Aéronautique Civile* (Directorate of Civil Aeronautics); and the *Direction du Transport Aérien* (Directorate of Air Transportation). The *Office National des Aéroports* (National Board of Airports), ONDA, is responsible for management of airports and provision of air navigation services.

Full liberalization of the Moroccan airline industry was institutionalized on February 12, 2004. The process of liberalization was consolidated in 2005 with the signing of an open sky agreement with the European Union. Entered into force in 2006, this agreement focuses on liberalization of markets, improvement of competition conditions between companies of both parties and a high level of cooperation and alignment of regulations governing civil aviation.

In addition to liberalization, the evolution of the industry has been driven by the desire to boost tourist activity. The launch of an ambitious tourism strategy (Vision for 2010) has created a series of challenges for the airline industry. It was necessary to increase the number of international air passengers by almost 10 million per year, the number of international flights by around 700 per week and the proportion of flights to Moroccan provinces (point to point without stopover in Casablanca) from 40% to 60%.

In such a challenging context, this paper studies the relationship between the current passengers' airlines framework and the performance of the sector in Morocco. The analysis aims at investigating the impact of further liberalization on passengers and on airline industry welfare. Despite the high importance of this sector to the Moroccan economy, there is, to our best knowledge, no rigorous study of the relationship between its framework and performance. The analysis in this paper adopts an extended version of the well-known Structure-Conduct-Performance (SCP) framework. It postulates that the structure of an industry determines firms' conduct, which, in turn, determines performance. However, the performance may also allow a firm to affect the market structure. The paper has two additional contributions to the existing literature. First, it addresses the issue at the route level. Second, it constructs an Openness Index (OI) that should reflect the degree of openness on each route.

The paper is organized as follows: Section 1 is the introduction; Section 2 provides a descriptive analysis of the industry; Section 3 is devoted to the institutional framework. Section 4 focuses on the major national carrier (Royal Air Maroc); Section 5 presents the conceptual framework for the analysis; Sections 6 and 7 concern the econometric and simulation analyses respectively. Section 8 concludes.

2. Descriptive Analysis of the Industry

2.1 Passenger traffic

Just after the independence, the aggregate air traffic in Morocco was about 400,000 passengers per year. It reached around 3.28 million passengers in 1980 and 15.36 million in 2010. Figure 1 shows that since the liberalization of the sky in 2004, the movement has accelerated considerably. Within six years, the number of passengers has nearly doubled from 7 697 986 in 2004 to 15,361,841 in 2010. Of course, this score is closely related to tourism development in the country. It is estimated that liberalization of air transport has brought about 3 million extra tourists during the same year.

Air traffic was affected by the events of September 11, 2001 in the United States. Indeed, passenger traffic experienced internationally, a fall of 4% compared to 2000, and recorded at the national level, a decrease of 2.3%. The number of passengers carried increased from 7,2 million passengers in 2000 to 7,000,000 in 2001.

2.2 Airports

Airports play a crucial role in the value chain of passengers transport. They provide to airlines and other aircraft operators, all the services they need, ranging from ground handling services to various facilities necessary for their functioning. In addition, airports contribute to the financing needs of the state through taxes and other benefits. Airports infrastructure is more important in the context of liberalization. Factors such as airport congestion and routes concentration are likely to affect the outcomes of liberalization. This explains why Morocco considers airport reforms as a priority.

2.2.1 Infrastructure

Air transportation in Morocco has experienced significant development since the independence of the country, especially since the advent of jumbo jets in the 1970s. The extensive program of modernization and diversification, implemented as part of the National Land Use Planning, has helped to provide opportunities for much wider access to air traffic. In addition to the opening-up of isolated areas, this policy has contributed to promote and diversify the tourism industry. In the aftermath of its independence, Morocco had only seven airports; five of them were considered as international. In addition, most of them were under-equipped and poorly organized. As for traffic, it was at a very low level, with about only 500,000 passengers in 1960.

Starting in early 1990s, Morocco initiated a new airport policy. The goal was to not only build a new airport infrastructure but also to transform, improve, expand and modernize existing structures in order to adapt them to the increasingly stringent requirements of aircrafts and security. In recent years, a sustainable speed of airport infrastructure development has been achieved, thanks to the following factors:

- Rapid development of the aviation technology that enabled the use of more efficient aircrafts;
- Development of the tourism industry;
- Preparation of Morocco to the open sky policies with the entry of new airline companies

This resulted in a higher number of airports and an expansion and modernization of existing ones. Thus, just before the entry into force of the Open Sky Agreement with the European

Union in 2004, Morocco had fourteen modern airports. In 2010, this number increased to twenty; including fifteen international ones. The number of passengers, for the same period, rose from 7.6 to 15.3 million passengers in 2010 i.e. more than doubling over six years.[1]

Out of the twenty, three are considered as major airports (Casablanca Mohamed V, Agadir-Massira and Marrakech-Menara). In 2004, only Casablanca Mohamed V was considered as major. In 2010, these three airports attracted 81% of passengers' traffic against 87% in 2004.The other airports, which shared the remaining traffic rate are Tangier - Ibn Battuta, Rabat - Salé, Fez - Saiss, Laayoune - Hassan 1st, Oujda - Angad, Al Hoceima - Sharif Idrissi, Ouarzazate, Errachidia - Moulay Ali Cherif, Nador - El Aroui, Casablanca - Anfa, Dakhla, Tan Tan, Tetouan - Saniat R'mel, Essaouira, and Bouarfa. The size of these airports is continually increasing, with traffic growth rates rising more rapidly than in the three majors.

2.2.2 Operations and Investment

Airport management and exploitation is the responsibility of a state agency (a branch of the Ministry of Equipment and Transportation, called *Office National des Aéroports*, ONDA). This choice is probably due to the fact that airports are considered as natural monopolies characterized by significant economies of scale. The ONDA was created in 1990. It is a public entity, with private management norms, responsible for the management, investment, upgrading and exploitation of airports with, among others, the objective of the preparation of the aviation industry to the changes and challenges of the Open Sky policy and the 10 million tourists target. Since early 1990s, investment in airport infrastructure has been maintained at a sustained level with the strengthening of the "hub" structure of Casablanca Mohamed V, the construction of a new major international airport in Agadir and the extension of the Marrakech-Menara Airport.

Infrastructure investments have been accompanied by an introduction of new computer systems designed to ensure integrated management of airport resources as well as to improve efficiency and profitability. The three major airports should also benefit from the introduction of a second handling operator. The 2008-2012 Investment Plan confirms the important investments in airports just before the entry into force of the Open Sky policy. As part of this plan, ONDA has mobilized a budget of 10.5 billion dirhams for the development and modernization of airports in order to surpass the 22 million passengers per year against 14 million presently. With an estimated amount of investment of 6.8 billion dirhams, the period 2010-2012 concentrates almost 64% of the investment requirement of the 2008-2012 Strategic Plan.

Major projects included in this investment program concern:

- The development and expansion of Terminal 1 at Casablanca Mohammed V Airport;
- The building a new terminal at Oujda Angad Airport;
- The development and extension of the terminal in Rabat-Sale Airport;
- The use of a new terminal area at Marrakech-Menara Airport;
- The extension of terminal in Fez-Saiss Airport;
- The construction new terminal facilities at Essaouira-Mogador Airport;
- The construction of a new civilian area at Guelmim Airport.

In parallel with investment activities, a system of Quality Management was set up with monitoring indicators of passengers' satisfaction and airline companies and a RIMS Station was installed on the site of Agadir Airport. The latter is designed to perform tests and to generalize the use of the "GALILEO MOROCCO GIE" system by aircraft operating in the

[1] In 2010, the airport's overall capacity was approximately 20.3 million passengers, corresponding to a utilization rate of 75%.

Moroccan sky. The system, which was set up to implement the European satellite program in Morocco, improves the aviation safety, especially the *approaches* to airports. As a result, six airports were certified "ISO 9001" at the end of 2010. These are Agadir Al Massira, Oujda Angad, Fez-Saiss, Rabat-Salé, Tangier-Ibn Battuta and Marrakech-Menara.

2.3 Carriers

2.3.1 Domestic companies

The structure of the air transport market in Morocco has undergone three major changes: oligopoly (before 2005), soft competition (between 2005 and 2006) and competition (from 2006 until now). During the first stage, the market had an oligopolistic nature. Royal Air Maroc has embarked on several alliances with other major companies. These alliances have taken different forms; in particular, code-sharing agreements (Air France, TWA, Iberia, Tunisair, Egyptair, etc.) or joint exploitation of routes often accompanied by a coordination of customer's loyalty policies (Air France, Iberia, etc.). In the field of code sharing, allied carriers ensure the role of tractor or marketing company.

During the second stage, competition between airline companies has been limited due to:

- Strong complementarity of routes (Marseille, Bologna and Düsseldorf for the EU, Marrakech, Agadir and Fez for Morocco);
- Customers location (tourists from Paris Orly to Fez, Moroccans residing in Europe traveling from Lyon to Casablanca);
- Types of lines (major companies exploit longer distances while low cost companies operate short lines).

During the third stage, the market begins to exhibit characteristics of contestability:

- Entry into a market is free and unlimited (no barriers to entry);
- The entry is fast: it can be done before the incumbents can react.
- The entry is fully reversible, which means that companies are free to leave the market without major costs, especially sunk costs.

These induce a "Hit and Run" strategy by which foreign companies can enter, capture profit opportunities and leave the Moroccan market in the case of congestion. This showed up in an impressive increase in the number of flights or passengers on some routes. For instance, on Casablanca-Brussels the number of passengers increased by over 60% between 2006 and 2010 against 2 to 3% few years ago. Between London and Marrakech, the number of frequencies has increased fivefold (from 8 to 46) in 2006.

However, the domestic routes market remains almost monopolistic. Under section 127 of the 1962 Decree regulating the civil aviation, only national companies, especially Royal Air Maroc and the former private company Regional Airlines, can ensure regular air transport. This is actually a kind of quasi monopoly benefiting Royal Air Maroc. This is not surprising given that at the international level, cabotage is a privilege rarely open to foreign companies and only in very specific cases. It is governed by bilateral agreements concluded by Morocco, which do not grant foreign companies the right to provide this service. Despite this monopoly in the domestic market, results remain disappointing. In 2010, domestic flights have provided transport to 1.6 million passengers, against 6 million in 2004.

2.3.2 Foreign companies

Since the liberalization of air transport in Morocco in 2004, the number of airlines flying to Morocco has increased significantly. These companies fall into two categories: Major companies and low cost airlines. In 2003, before the liberalization of air transport, only 29 regular airline companies were serving Morocco (120 lines for 496 weekly flights). After liberalization, between 2004 and 2005, 12 new airline companies entered. During the period

2005-2009, air traffic has grown significantly with the entry of 41 new companies, creating 136 new routes and 350 additional frequencies.[2] In 2010, the number of airlines has increased to 52, operating 1200 weekly frequencies. Europe alone has 82% of connections into and from Morocco. The list of foreign companies is presented in Appendix A.

2.3.4 Low cost companies

After the 2004 liberalization, Morocco has attracted 12 companies including 11 European low cost ones, in addition to the two new low-cost Moroccan airlines, namely Atlas-blue and Jet4you, created in 2004 and 2006 respectively. In 2010, the number of low cost airlines reached 18 companies. The number of passengers carried by these companies experienced a sharp increase. In 2010, 18 low cost airlines operating in Morocco transported about 5.3 million passengers, that is 35% of total passengers and 50% of the market for Morocco-Europe. For 2007, this figure was only 2.8 million passengers, representing 23% of the total passengers. With the presence of low cost companies, the number of available seats increased from 1.5 million in 2006 to 7,000,000 in 2010. At the same, traditional companies, which present in Morocco for decades gradually, left the market in favor of their low-costs subsidiaries. This is the case of Iberia with Click Air Iberia and Air France-KLM with Transavia. The list of low cost companies is presented in Appendix B.

3. The Institutional Framework

The institutional framework of air transport in Morocco is under the control of different administrative bodies and is determined by a combination of international conventions (e.g. the Convention on International Civil Aviation signed in Chicago in 1944), regional agreements, bilateral agreements and national regulations (e.g. the Decree No. 2-61-161 of 10/07/1962 regulating the Civil Aviation). The multiplicity of rules and administrative bodies is a source of potential conflict in terms of jurisdictions as well flexibility and law enforcement.

3.1 Administration

The airline industry in Morocco is under the control of the *Ministère de l'Equipement et des Transports* (Ministry of Equipment and Transport). Three Directorates are involved in the management of the air transport sector: *The Direction Générale de l'Aviation Civile* (The Directorate General of Civil Aviation); The *Direction de l'Aéronautique Civile* (Directorate of Civil Aeronautics); and the *Direction du Transport Aérien* (Directorate of Air Transportation). The missions of these three managing institutions are summarized in Appendix C.

Other actors are also involved in airport management and air navigation. This is the case of:

- The *Office National des Aéroports* (National Board of Airports), ONDA, responsible for airport management and provision of air navigation services;
- Users of platforms (air cargo operators, airline companies, retail dealers within airports, and passengers);
- Services partners (RCMP, Customs, Health Services, Royal air Forces, CRT, ONMT, CRI, etc.)

The International Civil Aviation Organization (ICAO) is also present in Morocco. As a specialized agency of the United Nations, ICAO is the global forum for civil aviation. It works to achieve its vision of developing a safe, secure and sustainable civil aviation through cooperation between Member States.

3.2 National regulations

Nationally, air transport is governed by the following three legal texts:

[2] Note, however, the significant decline in 2008-2009, mainly due to the fall in air traffic following the recent financial crisis

- Decree No. 2-61-161 of 10 July 1962, on the regulation of civil aviation, as amended and supplemented;
- Order of the Minister of Transport and Shipping No. 544-00, dated 2 November 2000, establishing the conditions for obtaining the license to operate air services in public transport and air work, as it was amended and supplemented;
- Circular of 22 May 2002, on the operation of air services in non-regular public transport of passengers for tourist purposes, as amended and supplemented.

To take into account the new realities, especially the open sky activities and the WTO agreements on services, the legal and regulatory environment of the Moroccan civil aviation has experienced successive changes. In 2004, the Handling Assistance was liberalized (convergence program under the open sky). Similarly, the organization of the Ministry of Equipment and Transport was restructured, with the creation of the Directorate of Air Transportation. Finally as per Article 83 of the 2001 competition law, the domestic airline transport is exempted from competition policy provisions. The situation of the domestic regulation may be presented in Appendix D.

In addition to the above regulatory framework, an elaborated system of taxes and incentives aimed at developing the traffic is put in place. The provisions depend on the route (international versus domestic) and airports (Casablanca versus other airports). Regarding international traffic, charters have a 50% discount on passengers, royalty, approach and landing fees. These measures apply only to the international network point to point. Moreover, traffic from nearby destinations of Morocco with high potential (Canary Islands, southern France, southern Spain and Portugal, etc.), benefit from a 50% reduction on landing fees. This is applicable to scheduled flights operated by aircraft with a tonnage of less than 50 tons on the international network point to point for all routes to Morocco. Also, in order to encourage airline companies to increase the volumes of flights handled at each airport, the ONDA applies specific pricing mechanisms for large accounts and volume (see Table 4). Large accounts concern landing, parking, lighting, gateway, and approach fees while volume incentives concern passengers, landing, lighting and security fees. Finally, the commercial traffic at night on the international network point to point, for all routes operated between midnight and 6 am (local time), benefits from the total exemption of fees on lighting and parking, and from 50% discount on approach and landing fees.

The above provisions concern all airports but Casablanca Mohammed V. The incentives pertaining to the latter apply to passengers in transit and are based on the principle of non-double taxation of passengers provided that the latter does not fully use the facilities at the transit airport. The reduction rates applicable at Casablanca Mohammed V Airport are summarized in Table 5.

To develop domestic traffic, the ONDA applies since 2009 total exemption of charge for the purely domestic commercial traffic i.e. the one that does not include passengers on domestic routes for the purposes of subsequent international flights. This exemption applies to all charges: passenger, landing, approach, parking, markup, and gateway fees (up to 2 hours).

Beside the above incentives, a tax exemption system has been adopted to the benefit of air transport.[3] Under Article 8, paragraph 29 of Law 30-85, transport operations and services related to international air transport are exempt from VAT. Since 2000 (measures of the 2000 Finance Act), machines and equipment included in the capital account of international transportation companies are also exempt from VAT. Similarly, the 2002 Finance Act set up VAT exemption in favor of the international transport sector for the provision of services and

[3] In Morocco, airlines are liable of three taxes: the value added tax (VAT), the corporate tax for companies with headquarters in Morocco, and the airport tax.

repair operations, maintenance, processing, charter and rental on the various means of such transportation. However, from 1 January 2007 all tax benefits to air carriers have been removed in the framework of the Finance Act, which is considered a disabling the sector. While national companies are required to pay VAT on the imports of goods and equipment and spare parts, foreign ones, taking advantage of open sky agreements, are fully exempt from those expenses that relate to products embarked onboard and used across borders. Moreover, some companies such as Tunis Air are seen in their home country as exporters and are, therefore, exempt from VAT.

As far as the corporate tax is concerned, airline companies are subject to the Moroccan tax system applicable to service-exporting firms. Under this tax system, it is stated that:

- Domestic air transport (in Morocco) is taxed at the ordinary rate of 30%;
- International air transport is exempt from corporate tax for the first five consecutive years, running from the year in which the first export operation was performed;
- A reduced rate of 17.5% is applicable after this first period of five years.

However, the above exemption and reductions apply, under Article 4 of Law 24-86, only to turnover in foreign currencies. In addition, the 2011 Finance Act was marked by the exemption of air transport operators through the withholding of the corporate tax on aircraft leasing charges and similar remunerations paid to non residents, as counterparts for charter operations, leasing and maintenance of aircrafts destined for international traffic. This tax measure would allow national operators to align with international practices. It permitted to the *Royal Air Maroc* (RAM), for example, to achieve an average gain of 40 million dirhams per year. Indeed, before 2011, the national airline company was required to disburse annually 10% on royalties paid to the leaser. This was even so critical that 40% of RAM aircrafts are the property of financial companies operating in the leasing sector.

3.3 International Agreements

Since December 1956, Morocco adhered to the Chicago Convention on International Civil Aviation, signed on December 7th, 1944 (Dahir No. 1-57-172 of June 8th, 1957). This convention is still the main foundation for the organization of global air transport. This agreement, which has the major objective of developing international civil aviation on the basis of equal opportunities for all countries, first established the principle that the state has complete and exclusive sovereignty over its airspace. It also established, through the ICAO, the five freedoms of the air (right to fly, right to make technical stops, right to disembark, right to embark and right to land). Morocco also signed the Montreal Convention (1999) relating to the Unification of Certain Rules for International Air Carriage. This agreement is currently being ratified by Morocco.

3.4 Regional Agreements

At the regional level, Morocco is a member of the Arab Civil Aviation (ACTA), a specialized agency of the Arab League. A program of liberalization of air transport between the Arab States was adopted by the ACTA and approved by the Council of Arab Ministers of Transport in 1998. This program aims to gradually liberalize inter-Arab services and abolish restrictions on traffic rights of third, fourth and fifth freedoms for member states' airlines.
Meanwhile, another agreement to liberalize air transport between Arab countries was signed in Damascus in December 2004. Morocco adopted that agreement only later in 2010. It aspires to dealing with globalization and the agreements of the World Trade Organization (WTO) that dictate the liberalization of services, including air transport, which would allow major airlines to grab the Arab air transport market. It covers a number of measures taken by the country Parties in the areas relating to the granting of rights for air transport, employment authorizations, certificates and business needs of airlines, government subsidies to airline

companies, taxes and customs duties, aviation security, the protection of the environment and consumer interests.

3.5 Multilateral agreements: EU-Morocco open sky agreement

The process of political liberalization of air transport was consolidated in 2005 with the signing of an open sky agreement with the European Union. Entered into force in 2006, this agreement focuses on liberalization of markets, improvement the competition conditions of competition between companies of both parties and a high level of cooperation and alignment of regulations governing civil aviation.

In terms of market liberalization, the agreement removes all restrictions for airline companies' capacity, frequencies or routes, to carry passengers between Morocco and the EU countries (third and fourth freedoms for traffic rights). Now, European airlines, regardless of their nationality, may serve any route between Morocco and the EU without limitations of capacity, frequency or nationality (for instance, British companies can freely serve Morocco from Madrid, Milan or any other airport in the European Union).

Another important element of this agreement is the fifth freedom. A Moroccan company is now authorized to serve several European destinations at once through several stops. European companies are also allowed to do the same in Morocco. The only condition is that the starting point must be the European Union and Morocco. European companies are finally allowed to serve, from Morocco, all the southern Mediterranean countries of the Neighborhood Policy of the European Union, subject to the acceptance of the third country.

The agreement between Morocco and Europe has not only allowed proceeding with the opening of markets, but also the reconciliation of laws between the two parties, particularly around key elements of European regulations in the field of aviation, including aviation safety, regulatory competition, management of air traffic, computer reservation systems, consumers' protection, environmental preservation and social measures. It also contains proactive measures for cross-investment on both sides of the Mediterranean. For the first time, the Moroccan investors are allowed to take capital shares in European airline companies.

3.6 Bilateral agreements

In recent years, Morocco has concluded about 92 bilateral air agreements, among which almost fifty envisage a multiple designation of airline companies. For several years, the adopted policy for the liberalization of the sector is implemented in line with international developments, especially through the negotiation of air agreements more and more oriented to liberalization. The degree of liberalization of these agreements varies from total freedom of capacity prior to a determination of capacity. However, in the process of liberalization initiated by the Government, the agreements related to capacity determination were often subjected to prior negotiations aimed at gradual increases in capacity, or removal of any limitation on capacity. The intensification of finalized bilateral agreements since the beginning of the 21st century indicates a more liberal policy with regard to the strategic partners of Morocco. The list of Bilateral Agreements is presented in Appendix E.

4. Major national carrier: The Royal Air Maroc

4.1 Structure of the company

Africa's second largest airline company in terms of its turnover and third in terms of the number of passengers, *Royal Air Morocco* (RAM) is a semi-public company with 95.94% of shares held by the State; Air France and other actors in the private sector own the remaining shares. Founded in 1957 following the fusion of Atlas Air and Air Maroc, and with less than 450 agents and a fleet of three DC-3 planes, RAM experienced a steady growth over time. The growth of the Royal Air Morocco began in the early 1970s with the purchase of its first

Boeing B727-200, which was, at that time, an aircraft of higher caliber. Moroccan policymakers started even at early date to internationalize the company through its membership in the International Air Transport Association (IATA).

The internationalization of the company required a new strategy based on the development and improvement of the proposed product. This initiative focused on some changes including the redevelopment of sale points, customer loyalty, etc. The decade of the 1990s may be considered as boom years for RAM, as, over that period, the Company succeeded in creating a real continental and even global reputation. During that decade, the Company initiated a new internationalization strategy, known as "Hub Strategy", which allowed RAM to attract new international clients and to have a new position in the international aviation scene.

The early years of the second millennium allowed the company to create its own network of value by creating its own business network. This was possible through the acquisition of majority shares in continental airlines, including "Air Senegal International" and "Air Gabon International". Royal Air Morocco also established a special partnership with Boeing, which culminated in the signing of a contract to purchase twenty B737 new generation aircrafts.

Today, Royal Air Morocco is the second African company, behind South African Airways. With 150 flights a day, it serves some forty countries with a focus on West Africa and Western Europe. In 2010, RAM is carrying more than 6 million passengers, against 3 million passengers in 2005.

As a group, RAM is organized around four dimensions of growth: transport, aviation industry, services and human resources and training. Concerning transport, the group has two subsidiaries: one is specialized in the Regional Transit (RAM Express, founded in 2009) and the other is specialized in Low Cost international transportation (Jet4You). As far as the aviation industry is concerned, the group has three industrial centers: Aviation Industrial Center (repair, control, testing etc.), Snecma Morocco (review of aircraft motors and engines) and Matis Aerospace (manufacturing of aircraft cables). The services dimension includes: Atlas Hospitality (a hotel chain), Atlas Catering, Amadeus Morocco (marketing) and Atlas Online (customer relations). Finally, the human resources branch includes Casa-Aero Company and RAM Academy (training) and Atlas Multiservices (recruitment).

4.2 Transport performance

4.2.1 The fleet

Royal Air Marocco has a fleet of 50 planes. It is, however, relatively old and poorly adapted (Appendix F). In addition to these 50 aircrafts, the RAM group possess another B737-300F freighter aircraft, a VIP B737BBJ2, and six ATR aircrafts operated by RAM Express, a subsidiary 100% owned by the Group. To renew its fleet, RAM has already launched proceedings for the sale of its five Boeing 737-400, which will be replaced by Boeing 737-800. In addition, the new bailout plan (2011-20016) expects to the sale 10 aircrafts: five Boeing 537-500, one Boeing 567 and 4 Airbus 321.[4]

4.2.2 The traffic

Over time, RAM has developed a network of nearly 80 destinations including sixty international destinations with regular frequency at the departure points from major capitals of Europe, North America, Sub-Saharan Africa, North Africa, and the Middle East. This corresponds to go-and-back 1200 planes per week. The African market grows more rapidly; the service network has increased in Africa from 6 to 23 destinations in 2010; that is more than 100 weekly flights.

[4] The sale of the Airbus is not explained by considerations of age, but by the low number of unit RAM owns. Indeed, for an airline company, the critical size for a sub-fleet is usually 15 aircrafts.

Despite the successive crises in the airline industry worldwide and the liberalization of the sector, the number of passengers carried by the company almost doubled between 2004 (date of liberalization) and 2010. This result is due to the growth in the economic sector. Since 2003, the growth rate of world traffic increased significantly and continuously. Table 6 shows the trend in passengers' traffic of RAM between 2000 and 2010 (including its subsidiary, Atlas Blue, active between 2005 and 2010).

Royal Air Morocco has carried, in the 2010 fiscal year, 6.3 million passengers across its network, registering an increase of 6.77% compared to the 2009 fiscal year, for a range of 8.2 million passengers. The company has grown by diversifying its markets and seeking new market niches, especially to escape competition from point to point. The creation of the hub in Casablanca and the development of traffic continuation were the strengths of the company.

However, despite these actions, the share of RAM in the Moroccan market fell by 12 points since the beginning of liberalization, from 56% to 44%. The lost market shares seem to have been recovered by the companies from the Gulf and the low-cost European carriers, which practiced an aggressive policy in terms of lower prices. RAM is also beginning to face more competition in the market for West Africa. In addition to fierce competition from Air France-KLM, via the Skyteam alliance, the year 2009 saw the market entry of Lufthansa through the entry of Ethiopian Airlines in Star Alliance, led by the German company.

The liberalization of air transport in Morocco since 2004 resulted in a significant change in the business environment of Royal Air Morocco. The capacity of competing companies is multiplied by 12, going from 550,000 seats in 2006 to over 7 million seats in 2010. This resulted in an extremely competitive situation involving Royal Air Morocco, which faces new requirements of competitiveness.

It is primarily on the short and medium haul segment that RAM loses market shares, mainly because of competition from low cost companies. Despite the positioning of RAM in this niche, through the creation of Atlas Blue, the results are disappointing. Regarding the weight of the traffic network, RAM has strengthened its position in traditional markets, especially France (37%), while Africa accounts for only 3%. As for domestic traffic, it monopolizes 14% of the market. However, in terms of progress, Africa leads with a 29% trend in 2010 compared to 2009, against 22% for the Middle East, 27% for North America and 23% for Morocco.

4.3 Financial performance

To compete, Royal Air Morocco has embarked on an investment process to strengthen and modernize its fleet. Since the early 2000s, 15 billion dirhams have been invested and financed by cash flow from RAM, without any government guarantee. The direct contribution of the State during this period did not exceed 440 million dirhams. The amount of investment varies on average between 1.5 billion and 2.5 billion dirhams a year. Most of these investments are allocated to aeronautics. In 2009 for example, an amount of 1.369 billion dirhams of a total investment of 1.225 billion dirhams (89%), was used to purchase planes.

Royal Air Morocco has a speed of acquisition of one to three airplanes of new generations every year, which helps to support the development of its international network as part of a plan for modernization and development of the fleet. In total, twenty planes were bought between 2000 and 2010, particularly the B737-800, which is the preferred aircraft for RAM. However, this investment is expected to decline in the next five years. In contrast, as part of the recovery plan 2011-2016, RAM plans to sell 10 aircrafts.

The company reported a turnover of 12.52 million dirhams for the 2010 fiscal year; that is about 1.8% increase. The transport activity contributes more than 80% to this result. The rest is divided between the freight and other activities (hotels and other services). Table 7 shows

the evolution of the turnover of the company since 2000. Generally, sales of RAM followed an upward trend. However, despite this increase, the average revenue per passenger declined significantly during the same period, from 1759 to 1300 dirhams.

The debt of RAM non-guaranteed by the Government amounts to 6 billion dirhams in 2010, part of which was used for the renewal of the fleet. The debt of 6 billion dirhams may appear as excessive but it is not even the half of the company turnover. However, what is worrying is that the company is undercapitalized, especially since it invested heavily over the last 15 years and there were no significant recapitalization from the owner. The increase in the debt ratio in 2009 is due to the decline in equity because of the loss supported during that year, accentuated by increasing outstanding borrowings. Table 7 shows changes in the debt ratio of the company over the period 2000-2010. Data shows that the company has maintained a high level of debt. The debt is always much higher than the capital as the case for all the airline companies in the world.

Over the two years (2009 and 2010), RAM supported a deficit of about two billion dirhams, a record since its creation. This underperformance is mainly due to the implementation of the Memorandum of Understanding with Senegal (163 million dirhams for the liquidation of Air Senegal), a pilots' strike (217 million dirhams, decline in traffic due to the Arab Spring and the Marrakech attack, a tax adjustment in 2010 (1.4 billion dirhams) and soaring oil prices.

4.4 Economic performance

Following the deregulation process, cost control by airlines has become a crucial condition for success. In this regard, RAM has worked hard to reduce costs and improve its competitiveness. From 2003 to 2010, the cost per passenger of RAM fell by 19%. However, despite this encouraging decrease, revenues have not kept pace. In the same period, average revenue per passenger fell by 26% overall. To and from France alone, the decline was 45%, against 40% for Europe. As a result, the operating margin has deteriorated since the opening of the Moroccan sky in 2004. Finally, the load factor seems relatively low compared to the competition, which has a rate of around 70%. (See Table 8).

5. Conceptual Framework for the Analysis

The research question in this paper concerns the impact of further liberalization on passengers and on Moroccan airline industry welfare. To address this question, we investigate the relationship between the current passengers' airlines framework and the performance of the sector in Morocco. More precisely, we will:

- Set up a relevant model for air transport
- Compute an indicator of openness
- Estimate the model incorporating the indicator and other determinants to see its contribution
- Use the estimation results to simulate the impact of further liberalization on passengers and on welfare

The two main variables of interest are, therefore, the number of passengers and welfare. Assuming constant costs, the latter depends on the number of passengers and fares. Hence, we will investigate the determinants of both.

To travel from point A to point B, the passenger can either choose a direct itinerary or an indirect itinerary through a point C, which may affect the carriers involved in his/her trip. Moreover, the demand for air travel depends upon fares but also on frequencies and other service attributes such as the level and quality of air and airports services delivered. Hence, even with the same fares, the consumer may prefer different itinerary and different carriers. This has two implications for the choice of the framework to be used for the analysis. First, the analysis should be conducted at the route level and second the analysis should allow for

diversity in consumers' choice. It follows that the analytical framework used here will consists of the Dixit-Stiglitz model at the route level. The model considers a representative consumer faced with a variety of products and who choose the basket (composed of each variety), which maximizes his/her utility. The representative consumer's decision is, actually, reflecting the choice of the whole set of passengers to/from Morocco.

5.1 The economic model

The representative consumer has a CES utility function of the type:

$$V_n(q_1,.....,q_n)=\left(\sum_{j=1}^{n} q_j^{\theta}\right)^{1/\theta}, \quad 0<\theta<1 \tag{1}$$

where q_j is the quantity of variety j, n the number of available varieties and θ reflects the elasticity of substitution between the different varieties.

The consumer chooses q_j so as to maximize its utility under the budget constraint:

$$\sum_{j=1}^{n} p_j q_j = I \tag{2}$$

where p_j is the price of variety j and I the consumer's budget.

The maximization gives the following demand function for variety j

$$q_j=\left(\frac{p_j}{P}\right)^{-\sigma}\frac{I}{P} \tag{3}$$

where

$$\sigma=\frac{1}{1-\theta}$$

$$P=\left(\sum_{j=1}^{n} p_j^{1-\sigma}\right)^{\frac{1}{1-\sigma}}$$

Let's assume that a different producer provides for each variety having a constant marginal (average) cost c_j and that n is high enough that no individual producer can affect P. Producer j will set the price p_j so as to maximize its profit:

$$\max\left(p_j q_j - q_j c_{j;}\right) \tag{4}$$

This yields to the equilibrium price and quantity

$$p_j = c_j\frac{\sigma}{\sigma-1} \tag{5a}$$

$$q_j=\frac{\sigma-1}{\sigma}\left(\frac{c_j}{C}\right)^{-\sigma}\frac{I}{C} \tag{5b}$$

where

$$C=\left(\sum_{j=1}^{n} c_j^{1-\sigma}\right)^{\frac{1}{1-\sigma}}$$

Coming back to the airline market, let's take Equations (3) and (5b) in log and use θ which have an easy interpretation:

$$\log(q_j) = -\left(\frac{1}{1-\theta}\right)\log(p_j) + \left(\frac{\theta}{1-\theta}\right)\log(P) + \log(I) \quad (6a)$$

$$\log(p_j) = \log(c_j) + \log(\frac{1}{\theta}) \quad (6b)$$

Equation (6a) shows that the number of passengers for a given carrier will depend on the elasticity of substitution between its product and other carriers', on consumer's income, on the number of variety (*n* via *P*) and on fares. The elasticity of substitution, reflecting difference between carriers in terms of frequencies, slots, itinerary and the level and quality of air and airports services delivered, is likely to affect the concerned carrier performance. Equation (6b) shows that fares depend on cots and on the elasticity of substitution between its product and other carriers'.

Openness of the Moroccan airline market can involve both more carriers and a higher diversity in terms of itinerary and other services which may affect *n* and *θ*. Hence, to examine the impact of openness on passengers and fares, we will add to the equations an indicator of openness. Note that while such indicator will affect p_j only directly through *θ*, it will affect q_j both directly through *θ* and indirectly through p_j and *P*. Moreover the direct and the indirect effects on q_j go in opposite directions.

5.2 The openness indicator

Given the multiplicity of dimensions and provisions of airline agreements as well as the qualitative nature of many of them, it will be very difficult to incorporate them directly into the estimation. It is, therefore, necessary to construct an index that transforms the qualitative nature of the agreements' provisions into a quantitative indicator. OI is derived using Multiple Correspondence Analysis (MCA). MCA is a descriptive method that helps identify patterns in latent variables and determines weights measuring the contribution of individual variables in explaining the OI.

Table 10 presents the Openness Index which lies between -2 and 2; higher values mean more openness. The results show that the Index differs mainly according to airport. As expected from Section 3.2, the routes linking Casablanca Airport are the least open (i.e. 045 in 2010). The rest of the routes is much more open. Agadir and Marrakech are the most open with an index around 1.20 in 2010. In term of evolution, all routes became more open between 2000 and 2010 with an important increase in the index in 2006. The routes that were opened the most are Agadir and Marrakech while Casablanca is among those opened the least.

6. Econometric Analysis

As discussed above, the relevant unit of analysis in the airline market is the route level. However, deepening the analysis as such can only be done, especially when it comes to quantitative assessments, at the expense of exhaustiveness. Data availability doesn't allow us to conduct an analysis for all routes. The empirically testable equations are drawn from the model in Section 5.1. The analysis there has shown that the number of passengers depends on the elasticity of substitution between carriers, consumer's income, on the number of variety and on fares. Fares depend, in turn, on costs and on the elasticity of substitution between its product and other carriers'. Openness of the Moroccan airline market having

potentially an effect on these determinants, the analysis of the impact of openness should add to these determinants, or interact them with, the Openness Index. Moreover, there is a consensus in the empirical literature that the plane capacity utilization or load factor is an important determinant of fares. The latter are decreasing as a variable. This variable will be incorporated. These lead to the following version of the two simultaneous equations system (6a) and (6b) which are estimated using the GMM over the period 2005-2008:

$$\log(Pas)_{it} = \alpha_0 + \alpha_1 \log(GDPpc)_{it} + \alpha_2 \log(Pop)_{it} + \alpha_3 \log(Fare)_{it} + \alpha_4 (OI)_{it} + \varepsilon_{it} \quad (7a)$$

$$\log(Fare)_{it} = \beta_0 + \beta_1 \log(Cost)_{it} + \beta_2 (OI)_{it} + \beta_3 \log(Load)_{it} + \eta_{it} \quad (7b)$$

where

Pas: Number of passengers

Fare: Air Fares

Pop: Total population in the spaces linked by the route

GDPpc: Total GDP per capita in the spaces linked by the route

OI: Openness Index

Cost: Costs as explained below

Load: Load factor

i , t: Route and year respectively.

ε , μ : Error terms

From the discussion in Section 5, the expected signs of the coefficients of interest are:

$$\alpha_1 > 0, \alpha_2 > 0, \alpha_3 < 0, \alpha_4 < 0$$

and

$$\beta_1 > 0, \beta_2 < 0, \beta_3 < 0$$

The International Civil Aviation Organization (ICAO) provided the *number of passengers*. Data on *airfares* per route come from International Airline Industry Association (IATA). They represent the average fare per seat without any information on classes; discount or other loyalty rebates. It is important to keep in mind that defined this way, the fare already include the distance. Since they are available annually, the effect of seasons is not an issue.

Data on *costs* are not easily available per route. Our approach is the following. From RAM annual reports we obtained unit costs per kilometer. Then for each route we multiplied these "unit costs" by the number of kilometers. Note that since both the fare and costs already include distance, the latter needs not enter the specification separately.

The load factor is IATA. The *GDP per capita* and *population* are for the country from which a particular flight leaves or arrives (e.g. information for the route Agadir-London and for the route London-Agadir are from British data). These data can be drawn from the World Development Indicators (WDI). Data on *distance per route* are available from the Centre de Prospective et d'Information Internationale (CEPII, Paris).

We estimate 6 sets of results: 3 for the passengers' equation and 3 for fares. Each 3 sets give: first, the OLS results of each equation; second, the 3SLS results of the system; and third, the GMM results of the system. In both the 3SLS and the GMM, exogenous variables and lagged

dependent variables are used as instruments. The estimates are autocorrelation-heteroskedasticity consistent.

The overall quality of the fit is low for passengers (the adjusted R^2 is below 0.20) and good for fares (the adjusted R^2 is close to 0.40). The best results are obtained with the GMM system estimations. Focusing on the latter, in both the passengers and the fares equations the variables are significant with the expected sign. In the passenger's equation, the coefficient of fare signifies that when fares rise by 1 percent, the number of passengers decline by about 6 percent, keeping other factors constant. This result is quite predictable by the law of demand. The rise in airfares makes flights more expensive for people, reducing their purchase of flight tickets and hence decreasing the number of passengers. The OI's coefficient is statistically significant at the 1 percent level. It indicates that as the aviation market becomes more liberalized, the number of passengers decreases. This is understandable in light of the higher competition that airlines will meet in such deregulated market.

Regarding the fare equation, the costs coefficient is statistically significant at the 1 percent level with a positive sign. As the cost increases by 1 percent, the fares increases by around 0.2 percent, keeping other factors constant. About the coefficient of the load factor, it is statistically significant at the 1 percent level, and as expected with a negative sign; showing that the increase in the load factor by 1 percent reduces fares by around 0.3 percent, keeping other factors constant. The OI's coefficient is statistically significant at the 1 percent level with a negative sign. It means that as the aviation environment becomes less restricted and more liberalized, fares will decline, keeping other factors constant.

Overall, focusing on our variables of interest, the results uncover the theoretical expectations. More Openness reduces fares: the coefficient of openness is significantly negative in the fare equation. Openness has a direct negative impact on the number of passengers and an indirect positive effect on the number of passengers. The net effect will be discussed below when we simulate different scenarios.

7. Simulation Analysis

The previous section examined the relationship between the structure of the airline market and the number of passengers and fares to and from Morocco, taken the structure as given. In the present section, we will examine the impact of further liberalization (changing the structure) on these variables as well as on the welfare. Welfare is composed of consumers' and firms' surpluses. The impact on consumers' surplus is, in general, captured by combining the impacts of output and prices, while firms' surplus is measured by profit. Hence our intermediate variables of interest are output, prices and profits.

For examining the impact of less restricted aviation environment on the producer, consumer and society welfare, we use the reduced form of the structural system together with the estimated parameters ($\hat{\alpha}_k and \hat{\beta}_k$) and the exogenous variables. We considered two scenarios.

One assumes that the Openness Indicator is equal at its observed maximum on all routes. The other scenario assumes that the Openness Indicator increases by one standard deviation on all routes. The results from each scenario are compared to the fitted values with the observed Openness Indicator.

Table 12 shows the results of the first. As a consequence of increased competition, the number of passengers to and from Morocco increases while the average airfare decreases. One important question now is what would be the producer and consumer benefits, and societal welfare of having less restricted aviation market? We assume, in accordance, with the theoretical model that the decrease in fares will benefit all passengers irrespective of the carrier they choose. We can observe from Table 12 that both the total revenue of producers

and the consumer surplus increase. The total effect of producer and consumer surplus changes on societal welfare is positive.

The results with the second scenario are reported in Table 13. Here the increase in competition is much more important than with the first scenario. As a result, the impact on producers is negative. As in Table 12, the number of passengers to and from Morocco increases while the average airfare decreases. However, the total revenue of producers decreases, while the consumer surplus increases. The decline in producers' total revenue doesn't correspond to the decrease in their surplus (profits). One should deduce the companying decrease in expenses. To get an idea of the decrease in producers' surplus, which is the relevant variable for computing welfare, we draw on Section 7 and other companies' reports. They suggest that on average the producers' surplus is around 2.5% of total revenue. We, therefore, apply this percentage to get an estimate of the decrease in producers' surplus. Adding this decrease to the increase in consumers' surplus gives an estimate of the impact on welfare.[5] The net effect of producer and consumer surplus changes on societal welfare is positive; the consumers' surplus increase outweighs the producers' surplus decrease.

8. Conclusion

With around 10% of its population working and living abroad and a GDP share of tourism of approximately 10%, Morocco is highly dependent on the performance of its airline passenger industry. Moreover, since 1978 the international context of the airline passenger industry has witnessed dramatic changes with growing liberalization and the formation of numerous alliances and the signing of agreements among carriers and countries. Adding to these challenges, the evolution of the industry has been driven by the desire to boost tourist activity as shown by the launch of "Vision 2010"; an ambitious tourism strategy targeting an increase in the number of international air passengers by almost 10 million per year, the number of international flights by around 700 per week and the proportion of flights to Moroccan province (point to point without stopover in Casablanca) from 40% to 60%.

Morocco, acknowledging such challenges, institutionalized full liberalization of its airline industry in 2004. The process of liberalization was consolidated in 2005 with the signing of an open sky agreement with the European Union. Entered into force in 2006, this agreement focuses on liberalization of markets, improvement of competition conditions between companies of both parties and a high level of cooperation and alignment of regulations governing civil aviation. However, despite the high importance of such challenges to the Moroccan economy, there is, to our best knowledge, no rigorous study of the relationship between its framework and performance.

This paper seeks to fill this gap by analyzing the relationship between the current passenger airlines framework and the performance of the sector in Morocco. The analysis aims at investigating the impact of further liberalization on passengers and on welfare. The analysis in this paper adopts an extended version of the well-known Structure-Conduct-Performance (SCP) framework. It postulates that the structure of an industry determines firms' conduct, which, in turn, determines performance. However, the performance may also allow a firm to affect the market structure. The paper has two additional contributions to the existing literature. First, it addresses the issue at the route level. Second, it constructs an Openness Index (OI) that should reflect the degree of openness on each route. The latter was incorporated into an econometric model, which was estimated to assess the role of the various determinants of the number of passengers and fares. The estimation results were used to simulate the impact of further liberalization on passengers and on welfare.

[5] Here some of caveats are in order regarding the impact on each country's' welfare i.e. nationality of competitors, existence of fixed/sunk costs, impact on the whole demand for travel to or from Morocco, etc.

Regarding openness, the computed index shows that routes linking the main airport (i.e. Casablanca) are the least open. The rest of the routes is much more open. Agadir and Marrakech are the most open. In term of evolution, all routes became more open between 2000 and 2010.

The simulation results show that irrespective of the scenario (i.e. the assumed change in the degree of openness), the number of passengers to and from Morocco increases while the average airfare decreases. However, the total revenue of producers may decrease or increase depending on the scenario. Since, the the relevant variable for assessing the impact of the whole society is welfare, we assumed that on average the producers surplus is around 2.5% of total revenue. Apply this percentage to get an estimate of the decrease in producers' surplus and adding this decrease to the increase in consumer's surplus gives a positive impact on welfare. The net effect of producer and consumer surplus changes on societal welfare is positive; the consumers' surplus increase outweighs the producers' surplus decrease. Note that even doubling the percentage of the surplus doesn't change the conclusion.

References

Abdelkhalek T and F. Ejjanaoui 2009. Approche multidimensionnelle de la pauvreté : présentation théorique et application au cas de la ville de Marrakech". http://www.erf.org.eg/cms.php?id=conferences_details&conference_id=33

Adler, N. and N. Hashai.2005. Effect of open skies in the Middle East region *Transportation Research Part A*, 39, 878–894.

Bottini N. and M. A. Marouani.2009. An Estimation of Service Sectors Restrictiveness in The MENA Region.ERF, Working Paper no. 489.

Marouni M.A. and L. Munro .2009. Assessing Barriers to Trade in Services in the MENA Region. *Economic Research Forum ERF*, Working Paper no. 496

Oum, T.H., J.H. Park and A. Zhang. 2000. Globalization and Strategic Alliances: The Case of the Airline Industry. Oxford, Pergamon Press, p.252.

Piermartini R. and L. Rousava .2008. Liberalization of Air Transport Services and Passenger Traffic. Staff Working Paper ERSD-2008-06, World Trade Organization

Figure 1: Evolution of the Number of Passengers (1980-2010)

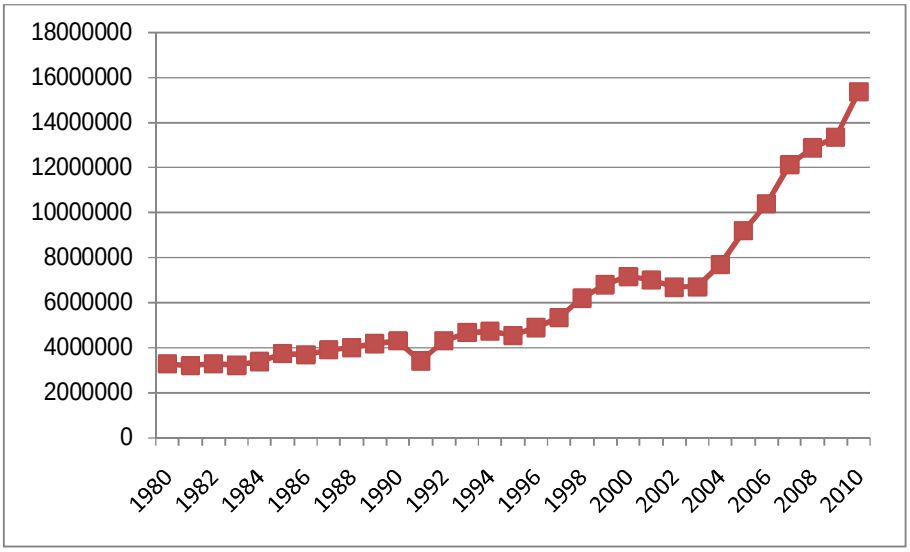

Figure 2: Air Traffic per Airport (2000-2010)

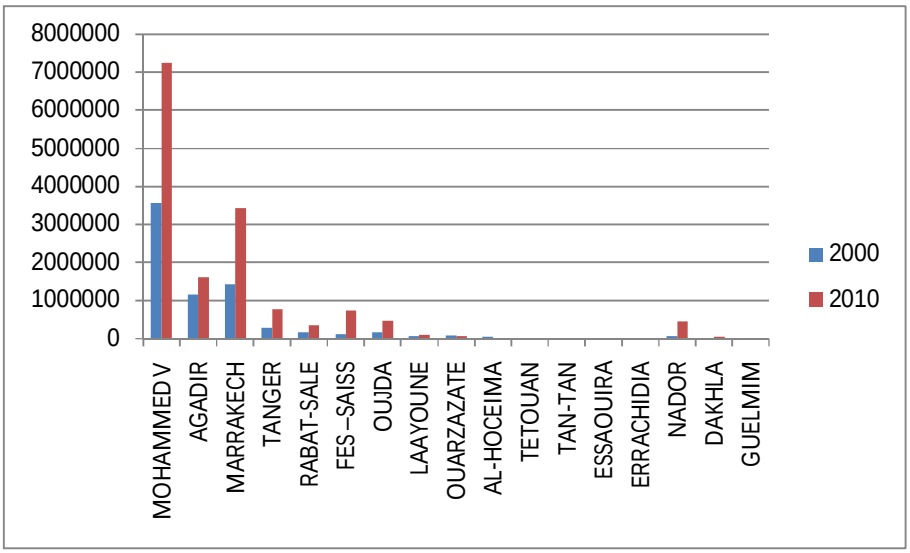

Table 1: Key Airports and their Evolution Since 1990

Airports	Years	Investments
	1992	New terminal, with a surface of 50000 m^2
Casablanca Mohamed V	2003	Construction of a second landing runway
	2007	Construction of the terminal 2
Agadir – Al Massira	1991	New airport
	2005	Construction of the terminal 2
Marrakech-Menara	2007	Extension of the terminal 1
Tanger-Ibn Battouta	1991	Extension of the terminal
Fès-Saiss	2003	Construction of a new terminal
Ourzazate	2001	Extension and redevelopment of the terminal
Nador	2000	Construction of a new terminal
Rabat-Salé	2007	Extension and redevelopment of the terminal I
Al Houceima	2007	Construction of a new terminal
Essaouira	2007	Construction of a new terminal

Table 2: Estimated Budget for Airport Investment (period 2010-2012)

Investments	2010	2011	2012	Total
Air Control	185830	199000	60000	444830
Airports	1387610	1030312	1362550	3780472
Land Purchasing	3110207	200000	200000	711207
Other Projects	885653	535000	435000	1855653
Total	2770300	1964312	2057550	6792162

Table 3: New Airline Companies, Lines and Frequencies

	2005	2006	2007	2008	2009	Total
Carriers	12	10	12	2	7	41
Routes	23	42	52	10	9	136
Frequencies	57	90	161	16	26	350

Table 4: Rate Schedules for Large Accounts and Volume Incentives

Large Accounts Policy		Volume Incentives	
Movements per Year	Reduction (%)	Movements per week	Reduction (%)
25000	5	2	2
40000	10	3-5	6
50000	15	6-9	12
75000	17.50	10-13	18
100000	20	14-17	25
		18-21	33
		22-25	43
		26-29	55
		60-60	60

Table 5: Exemptions Applicable to Hub Traffic at Casablanca Mohamed V Airport

Type of Passenger	Domestic-International	Domestic-Domestic	International-Domestic	International-International
Passenger's fees	Total Exoneration on Morocco's points and 50% discount on Casablanca Hub.	Total Exoneration on Morocco's points and Casablanca Hub.	50% discount on Casablanca Hub.	50% discount on Casablanca Hub.
Security Fees	Total exoneration on Casablanca Hub	Total exoneration on Casablanca Hub	No exoneration	No exoneration

Table 6: Main Traffic Indicators of RAM

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Passenger kilometers traveled (millions of ton kilometers)	3.808	3.981	4.595	4.161	4.785	5.46	6.92	7.76	8.453	8.945	9.63
Number of passengers (millions)	3.73	3.67	3.45	3.65	3.7	4.5	5.33	6.3	6.11	5.9	6.3
Market share	56%	56%	54%	54%	52%	54%	54%	52%	48%	45%	44%

Table 7: Main Financial Indicators of RAM

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Turnover (Billions of dirhams)	6.7	6.92	7.9	7.1	8.03	8.84	10.65	11.64	12.68	12.3	12.52
Average Revenue per Passenger (Dirhams out of fuel charge)	1759	1738	1719	1706	1678	1619	1539	1500	1500	1375	1300
Debt Ratio (%)	295	342	201	174	181	127	172	166	166	231	NA
Financial Net Results (Millions of dirhams)	-114	71	298	151	193	689	156	111	100	-851	-1000

Table 8: Unit Costs (Out of Fuel Expenses) and Operating Margin

	2003	2004	2005	2006	2007	2008	2009	2010
Unit costs (per available seat kilometer)	0.554	0.543	0.514	0.482	0.468	0.477	0.497	0.445
Load factor						69%	65%	
Operating Margin	NA	7.54	7.2%	6.3%	6%	3.6%	1.3%	1%

Note**:** Available Seat Kilometer equals the number of seats offered times and the distance of the trip.

Table 9: Questions for the Openness Index

Topic	Questions
Open Sky	Are domestic airlines allowed to join Open Skies agreements?
Code Share	Is it allowed that a seat purchased on one airline be operated by another?
5th Freedom	Can a foreign airline carry traffic between two other countries (flight originates and terminates in its own country)?
6th Freedom	Can a foreign airline carry traffic between two other countries (via its own country)?
Low cost carriers	Are foreign low cost carriers permitted to operate?
Airports	Is foreign movement is permitted?
Alliance	Are domestic airlines allowed to join alliances and which one?
Foreign ownership 1	Is foreign ownership in the provision of international services allowed?
Foreign ownership 2	Is foreign ownership in the provision of domestic services allowed?
Foreign ownership 2	Is foreign ownership allowed for domestic airports?
Airport management	Are foreign companies allowed to manage domestic airports?

Table 10: Openness Index

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Casablanca	-1.30	-1.26	-1.25	-1.20	-0.42	-0.35	0.31	0.38	0.41	0.44	0.45
Agadir	-1.42	-1.42	-1.42	-1.32	-0.33	-0.28	1.11	1.14	1.18	1.19	1.19
Marrakech	-1.13	-1.13	-1.05	-1.01	-0.08	-0.07	1.13	1.18	1.20	1.22	1.22
Tanger	-1.12	-1.12	-0.95	-0.92	-0.86	-0.83	1.05	1.05	1.08	1.08	1.08
Oujda	-0.52	-0.52	-0.42	-0.31	-0.31	-0.31	0.37	0.37	0.37	0.95	0.95
Fès	-0.52	-0.52	-0.48	-0.32	-0.07	-0.03	0.58	0.58	1.10	1.10	1.10

Table 11: Estimation Results of the Passengers and Fares System

	Fixed effects OLS		3SLS		GMM	
Variable	**Coefficient**	**t-statistic**	**Coefficient**	**t-statistic**	**Estimate**	**t-statistic**
			Dependent Variable: Log(Passengers)			
Log (GDP per capita)	**2.27**	2.66	**3.75**	3.69	**3.07**	3.88
Log(Population)	0.32	1.25	0.57	1.54	**0.65**	3.11
Log (Fare)	**-2.23**	-3.09	**-8.07**	-4.48	**-6.63**	-3.95
OI	-0.02	-0.32	**-0.19**	-2.54	**-0.16**	-2.10
Number of observations	143		143		143	
Adjusted R^2	0.17		0.16		0.17	
			Dependent Variable: Log(Fares)			
Log(Cost)	**0.16**	3.18	**0.16**	3.77	**0.17**	3.79
Log(Load)	-0.17	-1.59	**-0.23**	-3.05	**-0.26**	-2.82
OI	**-0.02**	-3.89	**-0.02**	-3.62	**-0.02**	-4.23
Number of observations	143		143		143	
Adjusted R^2	0.36		0.39		0.39	

Table 12: Simulation Results of the Impact of Setting the Openness Indicator at Its Observed Maximum on all Routes

	Impact on all passengers
a. Actual number of passengers	9768365
b. ***Simulated number of passengers***	10936844
c. Difference: (b-a)	1168479
d. Actual average fare US$	175
e. ***Simulated average fare US$***	162
f. ***Difference: (e-d) US$***	-13
g. ***Difference in total revenue:*** b * e - a* d US$	62304853
h. ***Change in "existing" consumer surplus***: - f * a US$	123380827
j. ***Change in producers surplus***: g * 2.5%	1557621

Table 13: Simulation Results of the Impact of One Standard Deviation Improvement in the Openness Indicator on all Routes

	Impact on all passengers
a. Actual number of passengers	9768365
b. ***Simulated number of passengers***	10742823
c. Difference: (b-a)	974458
d. Actual average fare US$	175
e. ***Simulated average fare US$***	154
f. ***Difference: (e-d) US$***	-20
g. ***Difference in total revenue:*** b * e - a* d US$	-55069133
h. ***Change in "existing" consumer surplus***: - f * a US$	195367300
j. ***Change in producers surplus***: g * 2.5%	-1376728

Appendix A: List of Main Major Airline Companies Serving Morocco

Companies	Country of Origin
Air Algeria	Algeria
Lufthansa	Germany
British Airways	Great Britain
Saudi Arabian Airlines	Saudi Arabia
Austrian Airlines/Lauda Air	Austria
Egypt Air	Egypt
Emirates Airlines	United Arab Emirates
Iberia, Air Europa	Spain
Air France	France
Royal Jordanian	Jordan
KLM	Netherlands
Alitalia	Italy
Libyan Arab Airlines	Libya
Air Mauritanie	Mauritania
Qatar Airways	Qatar
Swiss International Airlines	Suisse
Syrian Air	Syria
Tunisair	Tunisia
Gulfair	Bahrain – Oman

Appendix B: List of the Main Low-Cost Airline Companies Serving Morocco

Low-Cost Company	Country of Origin	Destinations in Morocco	Destinations in Europe
Jet4You	Morocco	Agadir (AGA) Casablanca (CMN) Marrakech (RAK)	Brussels, Barcelona, Lyon, Marseille, Paris, Toulouse. Bologna, Milan and Geneva, Stuttgart, Frankfurt, Frankfurt
Air Arabia	Morocco	Casablanca (CMN)	Brussels, London, Lyon, Marseille, Paris and Milan
Rayanair	Ireland	Marrakech	Düsseldorf, Frankfort, Brussels, Alicante, Barcelona, Seville, London and Liverpool
EasyJet	England	Casablanca Marrakech	Madrid, Lyon, Mulhouse, Paris, London, Milan and Geneva
Transavia	Netherlands	Agadir, Marrakech, Fez and Oujda	Lyon, Paris, Amsterdam
Airberlin	Germany	Agadir, Tangier, Casablanca, Nador	Berlin, Bremen, Hamburg, Stuttgart, Munich Leipzig, Nuremberg, Frankfurt, Dusseldorf, Erfurt, Dresden, Paderborn and Munster
Thompsonfly	England	Agadir and Marrakech	Bristol, Birmingham, London and Manchester
TUIfly	Germany	Agadir	Stuttgart, Frankfurt, London.
Tomas Cook Airlines	Belgium	Agadir, Marrakech and Oujda	Cologne, Brussels, Lille and London
Brussels Airlines	Belgium	Agadir, Casablanca and Marrakech	Brussels, Charleroi, and Liege
Condor	Germany	Agadir	Hamburg, Stuttgart, Munich, Leipzig, Frankfurt and Dusseldorf
Jet air fly	Belgium	Agadir, Marrakech, Casablanca, Nador, Tangier, Oujda, Fez, Tetoun and Al Houceima	Brussels, Charleroi, and Liege
Norwegian Air Shuttle	Norway	Agadir, Casablanca and Marrakech	Oslo, Copenhagen, Stockholm
Vueling	Spain	Marrakech, Agadir, and Casablanca	Paris, Barcelona, Bucharest, La Corogne, Lisboa
Aigle Azur	France	Agadir and Casablanca	Paris
My Way Airways	Italy	Casablanca	Bergamo and Venetia
Air Méditerranée	France	Agadir, Marrakech, and Tangier,	Le Havre, Nantes
Ettihad Airways	UAE	Casablanca	Milan, Abu Dhabi

Appendix C: Administrative Structure of Air Transport in Morocco

Directorate General for Civil Aviation	Directorate of Civil Aeronautics	Direction of Air Transport
To ensure coordination, monitoring and evaluation of the Ministry interventions in the aviation sector. To ensure accountability for basic infrastructure and facilities for air navigation as well as general functioning of the airline industry. To ensure the control and coordination of airport operations. To conduct international negotiations and to implement airline international agreements to which Morocco is a party. To apply the Ministry orientations regarding the supervision of the public institutions with activities related to air transport. whose business is related to the field of air transport.	To ensure the safety and regularity of air navigation. To direct, define, control and coordinate all aeronautical activities. To establish regulatory texts for civil aviation and to ensure their implementation To ensure compliance with international standards in the civil aviation arena. To develop planning for airport infrastructure and ensure its implementation. To develop cooperation with international and regional organizations in the field of civil aviation. To adopt the standards and practices as recommended by international organizations and ensure their respect. To establish the documents regulating the airport environment.	To develop strategic and economic studies for the development of air transport. To develop and adapt the regulation of air transport. To further promote the airlines, to ensure their attribution to various operators, and to manage and control them efficiently. To prepare air agreements and to ensure their monitoring and enforcement. To maintain and monitor the Air Transport Observatory.

Appendix D: Situation of the Domestic Regulation in the Aviation Sector at the End of 2010

Activity	Situation in 2010
Regular/International	The market is liberalized with the United States, European Union, United Arab Emirates and Bahrain. Commitment of airline companies to regularity, by maintaining, for a period of two successive seasons (winter and summer), a minimum service frequency per week and international route. Commitment to maximum rates of cancellation, set at the equivalent of 10% of the total foreseen number of flights.
Regular/Domestic	The market is open for Moroccan companies. Foreign companies have no right to cabotage. The market is beyond the law on competition and free pricing
Charter	The market is liberalized for Moroccan and foreign airline companies from and to Morocco. The 'Ferry Flights' are allowed since November 2003. Establishment of a control percentage of “dry” flights (charter flights without land services), particularly at the airports of Casablanca and Rabat (up to 30% off high season and 40% for June-August Period).

Appendix E: The Main Bilateral Agreements Concluded by Morocco

Regions	Capacity	Countries Concerned
Sub-Saharan Africa	Determined By AACs	Gabon, DRC, South Africa
	3rd and 4th Freedoms	Cap Verde, Benin, Burkina Faso, Cameroon, Central African Republic, Gambia, Ghana, Congo, Guinea, Guinea Bissau, Equatorial Guinea, Liberia, Mali, Madagascar, Niger, Nigeria, Sierra Leone, Togo.
	Limited Frequencies	Senegal, Cote D'Ivoire
	Liberal	Sierra Leone
North America	Determined By AACs	Canada
	Liberal: 3rd, 4th and 5th Freedoms	USA
European Union	Liberal	Germany, Austria, Belgium, Bulgaria, Cyprus, Denmark, Spain, Estonia, Finland, France, Great Britain, Greece, Hungary, Ireland, Italy, Leetonia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Sweden, Slovakia, Slovenia, Czech Republic.
Arab World	Determined By AACs	Mauritania, Sudan, Iraq
	Liberal: 3rd and 4th Freedoms	Libya, Saudi Arabia, Bahrain, UAE, Lebanon, Qatar, Oman, Syria, Tunisia
	Liberal: 3rd, 4th and 5th Freedoms	Kuwait
	Limited Frequencies	Algeria, Egypt, Palestine, Yemen
	Liberal	Jordan
Remaining Asia	Determined By AACs	Iran, Malaysia, Pakistan, South Korea,
	Limited Frequencies	China, India, Indonesia, Bangladesh
	Liberal: 3rd and 4th Freedoms	Singapore, Thailand
Remaining Europe	Determined By AACs	Turkey, Serbia
	Liberal: 3rd and 4th Freedoms	Russia
	Limited Frequencies	Ukraine
	Liberal	Island, Norway, Liechtenstein, Switzerland
Central America and Latin America	Determined By AACs	Cuba
	Limited Frequencies	Brazil, Uruguay

Appendix F: The Air Fleet of RAM

Airplanes	Quantity	Age	Status	Observations
B 737-400	5	18.3	Owned by RAM	To be sold
B 737-500	6	17.2	Five are owned by RAM and one rented	Five aircrafts are to be sold
B737-800	23	6.7	Financial rent	---
B737-700	6	9.45	Financial Rent	---
B747-400	1	18.7	Owned by RAM	---
B767-300	5	11.28	Four aircrafts are rented 'operational rental) and one is a commercial facility	One aircraft is for sale
A321-200	4	5	Financial rental	For sale
Total	50	10.4	---	---