The Air Liberalisation Index as a tool in measuring the impact of South Africa's aviation policy in Africa on air passenger traffic flows

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ABSTRACT

In Africa, the Yamoussoukro Decision (YD) to date remains the single most important air transport reform policy, the continent-wide implementation of which remains pending. This study employs the Air Liberalisation Index (ALI), developed by the Word Trade Organisation (WTO) Secretariat, to measure the impact of each of the seven quantifiable market access features of South Africa's aviation policy in Africa on air passenger traffic flows. A fixed one-way panel regression technique was applied to panel data, representing five air transport markets: intra-African, the SADC, East African, West African and North African over two time periods (2000 – 2010; 2006 – 2010). The results proved to be significant in three markets, intra-African, the SADC and East African and provide new insights into the relationship between air passenger traffic flows and aviation policy in the South African – intra-African and regional contexts.

Keywords: aviation policy, market access features, ALI, Yamoussoukro Decision, South Africa, Africa

1. Introduction

Over a number of decades gradual liberalisation and deregulation has taken place in many air transport markets around the world. The result of this liberalisation has been seen in the increase in air passenger traffic flows in various regions of the world (Myburgh et al., 2006; Inter*VISTAS*-ga[2] Consulting, Inc., 2006; Warnock-Smith and Morrell, 2008; Piermartini and Rousova, 2008; 2009; Inter*VISTAS*-EU Consulting, Inc., 2009; Schlumberger, 2010; Grosso, 2010). In Africa, the Yamoussoukro Decision (YD), which entered into force in 2000 and became fully binding in 2002, remains the single most important air transport reform policy to date. One of the vital parts of the decision was intra-African liberalisation, the objective of which was to develop air services in Africa and to stimulate the flow of private capital in the industry (Meshela, 2006:1). As of today, the governments of Africa have not yet fully implemented the YD, although, on a small scale, some like-minded countries apply the principles of the YD but not, however, on a continental-wide basis. The reasons for not applying the YD range from non-implementation of certain elements of the decision (for example, establishing competition rules, a dispute settlement mechanism and an operational monitoring body) to simply ignoring it by continuing to implement the traditional restrictive bilateral air service agreements (BASAs) (Schlumberger, 2010:6).

Although gradual liberalisation has taken place in the intra-African market since the inception of the decision, BASAs remain the primary instruments of air transport liberalisation in Africa. As a result, the intra-African market is characterised by restrictive bilaterals that limit capacity and inhibit competition and traffic growth, thereby driving up prices and making intra-African air transport costly and inefficient, especially in those cases where BASAs protect state-owned carriers.

Although some researchers have paid attention to the liberalisation of the African skies and its impact on commercial air traffic and tourism (Myburgh et al., 2006; Mills and Membreno, 2007; Mills and Swantner, 2008; Schlumberger, 2010), little is known about the relationship between South Africa's aviation policy in Africa and air passenger traffic flows. Since the impact of the South African aviation policy in Africa and its key market access features on air passenger traffic flows has not yet been measured and furthermore owing to the benefits of liberalisation, it is necessary to evaluate the dynamics and impacts of prevailing restrictions on such flows in the African context. The primary purpose of this study is the assessment of the impact of key market access features of South Africa's aviation policy in Africa, as reflected in the design of its BASAs, on air passenger traffic flows over two time periods: 2006 - 2010 and 2000 - 2010. In order to quantify the impact of the degree of restrictiveness or openness of the bilaterals among South Africa and its bilateral air services counterparts on air passenger traffic flows, this study used the Air Liberalisation Index (ALI), developed by the WTO Secretariat. The time periods selected are linked to the adoption of the Yamoussoukro Decision in 2000, the inception year of South Africa's Airlift Strategy in 2006 and the end year of air services liberalisation targets with African states as set by South Africa in its aviation policy for 2010.

This paper begins by providing a succinct overview of the intra-African air transport market and the role of the South African civil aviation policy in accelerating the implementation of the Yamoussoukro Decision between South Africa and African states. This is followed by the methodology section where the selection of the panel data approach is explained and where there is a discussion about the Air Liberalisation Index as a tool in measuring the impact of the South African aviation policy on air passenger traffic flows. The results are then presented with some reference to the limitations of the study and where further research should be conducted. This is followed by recommendations and conclusions.

2. Liberalisation progress in the South African and intra-African markets

South Africa experienced political isolation from about 1963 to 1990, a period marked by political strategizing and sanctions aimed at crippling the minority white-ruled government in South

Africa (Pirie, 2006), sanctions that included the aviation industry. The 1990s marked the beginning of liberalisation for both the domestic and the South African and intra-African markets. This period coincided with that of overseas airlines serving South Africa being confronted with deregulation, privatisation, mergers, alliances, technological shifts and route reconfiguration (Pirie, 2006:4). South Africa's domestic aviation market was deregulated in the early 1990s and this resulted in increased passenger volumes and a proliferation of low-cost airlines; thereby increasing airline competition and making air travel more affordable (Myburgh, Sheik, Fiandeiro & Hodge, 2006:8). Across Africa, South Africa has been engaged in setting up BASAs since 1992 and by the end of 2010, the Department of Transport (DOT) had entered into 45 BASAs with African states in four regions (as classified by the DOT in South Africa), namely North Africa, the Southern African Development Community (SADC), West Africa and East Africa, of which 17 were in line with the key YD principles. The bilaterals were with: Benin, Botswana, Cameroon, Egypt, Ethiopia, Gabon, Gambia, Ghana, Kenya, Lesotho, Liberia, Libya, Rwanda, Senegal, Sierra Leone, Togo and Uganda. Thus, the regional distribution of the 17 bilaterals between South Africa and the respective African counterparts was: nine bilaterals with the West African region, four with the East African region, two with the North African region and two with the SADC region (Sithole, 2012).

The South African civil aviation policy towards Africa is guided by its international civil aviation policy. The South African Government's actions have been directed at accelerating the implementation of the YD objectives with like-minded states and illustrating the importance afforded to the stimulation of trade and tourism on the Continent by adopting a more liberal approach to the regulation of air transport. The strategy aims to enhance the prospects of South Africa as a preferred air travel destination and to synchronise the basis for bilateral air services negotiations with other national priorities (International Air Services Council, 2008). In addition, the Strategy supports the Millennium Development Goals to increase African connectivity and access through the accelerated implementation of the decision and takes into account the continental integration initiatives, such as those embodied in the African Union (AU) and the objectives of the New Partnership for Africa's Development (NEPAD) (Department of Transport, 2008). Since the last aviation policy review in South Africa in the early 1990s, the Government has identified new goals and priorities which have impacted on its civil aviation (Department of Transport, 2008). In particular the five-year Airlift Strategy of 2006 was developed to effectively structure regulatory measures in order to increase tourism growth for South Africa and to unblock obstacles through regulatory mechanisms as well as bilateral and multilateral air services negotiations. Table 1 provides the liberalisation targets set for each year between 2006 and 2010 in respect of liberalising key elements

of BASAs, such as multiple designation of airlines, tariff regimes, code-share frameworks and implementation of the YD and summarises their respective implementation status based on year ending 2010.

Table 1
The Airlift's liberalisation targets.

Element	Current situation (year ending 2010)	Targets 2006 - 2010				
		2006	2007	2008	2009	2010
Implementation of the YD	17 African states have agreed to implement the key elements of the YD with SA, representing 32% of YD states.	15%	25%	35%	50%	65%
Multiple designation	Provided in 71% of total agreements	80%	85%	90%	95%	97%
Tariff liberalisation	Provided in 33% of total agreements	65%	70%	75%	80%	85%
Code-share	Provided in 60% of total agreements	50%	60%	70%	80%	90%

Sources: Department of Transport (2006) and Department of Statistics, University of Pretoria (2012).

Although none of the liberalisation targets as set forth by the Airlift Strategy had been fully attained by the end of 2010, gradual liberalisation progress was achieved on key elements of the YD in line with South Africa's pro-YD approach (table 1). Thus, measuring the effect of South Africa's aviation policy in Africa, as reflected in the design of its BASAs with African states, on air passenger traffic flows, requires an approach that would cater for a change in dynamics over time and at the same time allow for the quantification of the restrictiveness or openness of the aviation policy.

3. **Methodology**

In the case of aviation policy, changes over time are important as the amount of time needed for a market to respond to changes in the underlying regulatory approach could range from a few months to several decades (Inter*VISTAS*-ga[2] Consulting, Inc., 2006). As a result a panel data approach was selected. The panel data approach enabled the incorporation of an explanatory variable to account for the number of years a particular bilateral has been in place. The Ordinary Least Squares method that has been utilised in numerous cross-sectional studies (Inter*VISTAS*-ga[2] Consulting, Inc., 2006; Piermartini and Rousova, 2008; 2009; Inter*VISTAS*-EU Consulting, Inc., 2009; Grosso, 2010) to examine the relationship between dependent and independent variables for cross-sections could not be applied in this study due to the unique characteristics of the panel data. To quantify the

impact of the South Africa's aviation policy in Africa and its key market access features on air passenger traffic flows the study utilises the four variants of the Air Liberalisation Index (ALI).

In essence, the ALI is an informed index of the degree of liberalisation of air services for passenger traffic, whereby different provisions, pertaining to market access features of BASAs, namely *grant of rights*, *designation, withholding* or *ownership*, c*apacity clause, tariffs, statistics* and *cooperative arrangements*, are weighted on the basis of their importance in removing obstacles to trade in air services according to the judgments of experts in the sector. The ALI is the main feature of the regulatory part of the Quantitative Air Services Agreements Review (QUASAR), a database constructed by the WTO Secretariat with a base year of 2005, covering bilateral traffic between more than 180 countries. By categorizing the different provisions in BASAs and assessing them within a scoring system, the ALI provides a simple quantification of the regulatory system in place. The ALI scoring refers to seven market access provisions or features as relevant indicators of restrictiveness or openness for scheduled air passenger services. These are (WTO, 2006):

1. **Grant of rights** which defines the right to carry out services between two countries. In particular, the WTO has taken *fifth freedom, seventh freedom* and *cabotage* rights into account. More basic agreements grant "transit rights" (third and fourth freedoms). More liberal BASAs also include a *fifth freedom right*, which is the right of the designated airline to carry traffic to a third country providing that the flight originates or terminates in the partner country. Few BASAs grant the *seventh freedom right*, that is, the right to operate flights between two foreign countries without the flight originating or terminating in one's own country. *Cabotage,* or the right of a foreign carrier to operate domestic flights, is usually excluded from BASAs (ICAO, 2004);

2. **Designation** which is the right to designate one (*single designation*) or more than one (*multiple designation*) airline to operate a service between two countries. In restrictive agreements each government allows a single airline to be the national carrier. In more liberal agreements, multiple airlines are designated to operate services between partner countries;

3. **Withholding or ownership** which defines the conditions required for the designated airline of the other party to have the right to operate. Restrictive conditions stipulate that the designated airlines must be "*substantially owned and effectively controlled"* by nationals, which requires that the designated airline is the "flag carrier" of the foreign country. More liberal regimes include *community of interest* and *principal place of business*;

4. **Capacity clause** which identifies the regime which determines the capacity (in terms of volume of traffic, frequency or regularity of service and/or aircraft type(s)) that may be

carried out on the agreed services. The most commonly utilised clauses are: predetermination, Bermuda I and free determination. *Predetermination* is the most restrictive one and requires that the capacity is agreed prior to service commencement. *Bermuda I* provides limited rights to the airlines to determine their capacities without prior government approval, while *free determination* excludes the capacity from regulatory control;

5. **Tariff approval** which refers to the regime which governs the approval of the pricing of services between two countries. The most restrictive regime is *dual approval*, whereby both parties have to approve the tariff before it can become effective. Semi-liberal regimes are *country of origin* (tariffs may only be disapproved by the country of origin), *dual disapproval* (tariffs have to be disapproved by both countries to make them ineffective) and *zone pricing* (parties agree to approve prices falling within a specific range and meeting certain characteristics).

6. **Statistics** which provide rules on the exchange of statistics between countries or their airlines. Restrictive BASAs often contain a provision on the exchange of statistics between the signatory parties to monitor traffic or verify adherence to quantitative restrictions;

7. **Cooperative arrangements** which define the right of the designated airline to enter into cooperative marketing agreements such as code-sharing and alliances. More liberal BASAs tend to allow cooperative arrangements between the designated airlines such as code-sharing. The possibility of entering into cooperative arrangements confers a number of commercial advantages on the carriers concerned and is considered an indicator of relative openness in the bilaterals.

There are four variants of the ALI weighing system, namely standard (STD), fifth freedom traffic rights (5th+), withholding/ownership (OWN+) and multiple designation (DES+). The latter three have been developed by the WTO to accommodate three specific geographical and economic situations that appear to be relatively frequent and that may influence the commercial importance of the different market access features of bilaterals. For example, ALI (5th+) addresses the case of those states where their geographic location may limit the scope of point-to-point traffic or where their remoteness from densely populated areas may make it difficult for them to generate sufficient demand to maintain regular services to points which can only be served by larger aircraft. For such states, it is essential to secure fifth freedom rights for their carriers as these rights will allow their airlines to combine the demand for distant destinations with that of an intermediate stop. The value of the ALI ranges between zero for very restrictive agreements to 50 for very liberal ones (WTO,

2006). This method of measuring the restrictiveness of regulation has been shown to be consistent with results of other statistical methods, such as factor and cluster analyses (Piermartini and Rousova, 2008; 2009).

Table 2 summarises the weightings of the seven market access features considered in the four variants of the ALI. For example, under "designation", if the BASA stipulates multiple designation, 4 points will be allocated on the ALI (STD) variant, 3.5 points on 5th+ and OWN+ variants of the ALI weighting system and 7.5 points on the ALI DES+ variant. Each feature presents a number of alternative variants, with the exception of *grant of rights*, which is presented cumulatively.

Table 2
ALI weighting system

Features	Variants	ALI (points)			
		STD	*5th +*	*OWN+*	*DES+*
1. Grant of rights					
a. Fifth freedom rights	Not granted	0	0	0	0
	Granted	**6**	**12**	**5**	**5.5**
b. Seventh freedom rights	Not granted	0	0	0	0
	Granted	**6**	**5**	**5**	**5.5**
c. Cabotage rights	Not granted	0	0	0	0
	Granted	**6**	**5**	**5**	**5.5**
2. Designation	Single	0	0	0	0
	Multiple	**4**	**3.5**	**3.5**	**7.5**
3. Withholding/Ownership	Substantial ownership and effective control	0	0	0	0
	Community of interest	4	3.5	7	3.5
	Principal place of business	**8**	**7**	**14**	**7.5**
4. Capacity	Predetermination	0	0	0	0
	Other restrictive	2	1.5	1.5	1.5
	Bermuda I	4	3.5	3.5	3.5
	Other liberal	6	5	5	5.5
	Free determination	**8**	**7**	**7**	**7.5**
5. Tariffs	Dual approval	0	0	0	0
	Country of origin	3	2.5	2.5	2.5
	Dual disapproval	6	5	5	5.5

7

Features	Variants	ALI (points)			
		STD	5th +	OWN+	DES+
	Zone pricing	4 or 7	3.5 or 6	3.5 or 6	3.5 or 6.5
	Free pricing	**8**	**7**	**7**	**7.5**
6. Statistics	Exchanged	0	0	0	0
	Not exchanged	**1**	**1**	**1**	**1**
7. Cooperative arrangements	Not allowed	0	0	0	0
	Allowed	**3**	**2.5**	**2.5**	**2.5**
Maximum total ALI		50	50	50	50

Source: WTO (2006).

The first step in quantifying the impact of South Africa's aviation policy in Africa and its key market access features on air passenger traffic flows entailed a fixed one-way panel data regression model construction for all four variants of the ALI, which was then applied to the following five scenarios over an 11 year time period: the intra-African market (42 countries), the SADC (13 countries), West African (17 countries), East African (seven countries) and North African (five countries) regional markets. Notwithstanding that the focus of this research is on the impact of aviation policy, represented by the seven quantifiable market access features on air passenger traffic flows over selected time periods, a myriad of other factors affect this relationship, *inter alia*, the size of the GDP, population size and magnitude of the services trade flows (Inter*VISTAS*-ga[2] Consulting, Inc., 2006; Myburgh et al., 2006; Warnock-Smith and Morrell, 2008; Piermartini and Rousova, 2008; 2009; Inter*VISTAS*-EU Consulting, Inc., 2009; Schlumberger, 2010). The model therefore incorporated one dependent variable, namely traffic and six predictor variables: (1) number of years the BASAs have been in place, (2) the size of the GDP, (3) the presence of a low-income country in a country-pair, (4) the magnitude of the service trade flows, (5) the population size and (6) the aviation policy. The observations within each panel were dependent, but independent from the other panels or African states. In this study, the principal of partial correlation was applied.

The second step was to determine which of the features of the *ALI* predictor representing aviation policy had a significant partial impact on air passenger traffic flows, while controlling for all the other variables in the model. A second model was constructed to determine this impact and was applied to panel data over an 11 year time period (2000 – 2010) and a five year time period (2006 - 2010) in those markets where the aviation policy was found to be statistically significant. To obtain a

better understanding and a more detailed comparison of the results, it was important to run the same panel regression on the data for the five year time period and to compare these results to the 11 year time period. The five year time period from 2006 to 2010 represents the period over which South Africa embarked on the five year liberalisation campaign driven by the Airlift Strategy.

4. Results

5.1 The panel regression models

Fixed one-way panel regression was performed on 42 cross-sections or African countries over the 11 year time period. The final panel data regression model, constructed for each of the four variants of the ALI weighting system was formulated as follows:

$ln(Traffic)_{it} = α + β_1 ln(GDP)_{1,it} + β_2 (Low\_Inc)_{2,it} + β_3 (ASA\_age)_{3,it} + β_4 ln(Trade)_{4,it}$

$\qquad + β_5 ln(Population)_{5,it} + β_6 (ALI)_{6,it} + ε_{it}$

for i = 1, 2, 3, …, 42

t = 1, 2, 3, …, 11.

where ln denotes a natural logarithm,

α is a constant,

$β = (β_1 β_2 β_3 β_4 β_5 β_6)'$ is a row vector of partial regression coefficients,

$ε_{it}$ is an error term associated with country i and year t.

Four predictors, namely *traffic, GDP, trade* and *population*, were transformed through a natural logarithmic transformation as the distribution of these predictors was highly skewed to the left. Log transformation made the distribution more normal, enhanced the symmetry and stabilised the spread, as well as helping the predictors to fit better into the model. Similar models were defined for each of the four regional markets, namely the SADC, West, East and North African.

5.2 The fit and the significance of the panel regression models

The coefficient of determination or R-square value for modelling the South African – intra-African market returned an extremely high value of 0.976, which indicated that, for all four variants of the ALI weighting system, 97.6% of the variability of air passenger traffic flows was explained by

the six predictors. The coefficient of determination was also found to be extremely high for each of the regions, irrespective of the ALI variant, as summarised in table 3 below. These statistics confirmed that the estimated model fits the data extremely well for all five markets, irrespective of the ALI variant used.

Table 3
Model fitting statistics based on the four variants of the ALI weighting system

Market	Coefficient of determination (R-square)			
	STD	*5th +*	*OWN+*	*DES+*
South African – intra-African (42 countries)	0.9764	0.9764	0.9763	0.9764
South African – SADC region (13 countries)	0.9142	0.9144	0.9148	0.9129
South African – West African region (17 countries)	0.9791	0.9791	0.9791	0.9791
South African – East African region (7 countries)	0.9838	0.9839	0.937	0.9839
South African – North African region (5 countries)	0.9386	0.9386	0.9386	0.9386

Source: Department of Statistics, University of Pretoria (2012).

The results of the F test, testing the significance of the panel regression model for all four variants of the ALI for the five markets, were found to be statistically significant, indicating that there was a simultaneous impact of the six predictors on the dependent variable *ln(Traffic)* for the intra-African market, as well as for the regional markets, irrespective of the ALI variant used.

5.3. Panel regression results: significant predictors

The results of the panel regression confirmed that the predictors and the signs of the partial regression coefficients were the same for all four variants of the ALI weighting system. Thus, the choice of the ALI variant used was of less importance as it did not have an impact on the predictors' significance. Table 4 summarises the significant predictors and their partial regression coefficients in the five markets. The partial regression coefficients presented are based on the ALI standard system. The absence of crosses (X) in table 4 in the West African regional column indicates that none of the predictors were found to have a statistically significant impact on air passenger traffic flows in this market.

Table 4
Significant predictors and the respective partial regression coefficients

Significant Predictors	Market					Partial regression coefficient				
	Intra-African	SADC region	West region	East region	North region	Intra-African	SADC region	West region	East region	North region
Ln(Trade)	X	X		X		0.32	0.69		0.44	
ALI	**X**	**X**		**X**		**0.01**	**0.02**		**0.01**	
Ln(GDP)	X	X			X	-0.24	-0.57			-0.35
Low_Inc				X					-0.58	
Ln(Population)				X					-6.4	

Source: Department of Statistics, University of Pretoria (2012).

From table 4, it is evident that the *ALI* predictor was found to have a statistically significant impact in three air transport markets: South African – intra-African; South African – SADC and South African – East African. The partial regression coefficient sign was positive across the three markets, in line with the expectations that the degree of liberalisation or openness of BASAs had a positive impact on air passenger traffic flows. The impact of the *ALI* was found to be most significant in the SADC region (a 2% increase in *ln(Traffic)* for every unit increase in the *ALI*), followed by the East African region (1%) and intra-African market (1%).

5.4 The impact of the ALI features on air passenger traffic flows

The next step was to determine which of the features of the *ALI* predictor had a significant partial impact on air passenger traffic flows, while controlling for all the other variables in the model. Panel regression was performed in the three markets over two time periods, taking into account only the significant predictors and "unpacking" the individual features of the *ALI* predictor. *ALI* features which were constant or had a low variation within the countries were excluded from the analyses. Table 5 presents the panel regression output for the two time periods in each of the

respective markets. Market access features highlighted in yellow were found to have a partially significant impact on air passenger traffic flows.

Table 5
Summarised panel regression results of the impact of the ALI features on air passenger traffic flows

Market	Predictor	Partial regression coefficient				t-value				p-value			
		STD	*5th +*	*OWN+*	*DES+*	*STD*	*5th +*	*OWN+*	*DES+*	*STD*	*5th +*	*OWN+*	*DES+*
	2006 – 2010												
South African – intra-African	R5th	0.04	0.02	0.04	0.04	2.04	2.02	2.02	2.03	0.043	0.045	0.045	0.044
	Capacity	0.05	0.06	0.06	0.05	2.72	2.72	2.72	2.75	0.007	0.007	0.007	0.007
	Tariff	-0.03	-0.03	-0.03	-0.03	-1.34	-1.35	-1.35	-1.34	0.181	0.178	0.178	0.182
	Withhold	-0.04	-0.05	-0.02	-0.05	-1.96	-1.90	-1.90	-1.96	0.052	0.060	0.060	0.052
	Design	-0.25	-0.28	-0.28	-0.13	-5.45	-5.45	-5.45	-5.46	<.0001	<.0001	<.0001	<.0001
	CoopArr	0.36	0.43	0.43	0.43	4.87	4.87	4.87	4.88	<.0001	<.0001	<.0001	<.0001
	2000 – 2010												
	R5th	0.03	0.01	0.03	0.03	1.49	1.48	1.48	1.49	0.138	0.138	0.138	0.138
	Capacity	0.02	0.02	0.02	0.02	1.23	1.23	1.23	1.26	0.218	0.220	0.220	0.207
	Tariff	0.00	0.00	0.00	0.00	-0.24	-0.21	-0.21	-0.23	0.807	0.834	0.834	0.815
	Withhold	-0.01	-0.01	-0.01	-0.01	-0.65	-0.65	-0.65	-0.67	0.517	0.517	0.517	0.501
	Design	0.03	0.03	0.03	0.02	1.21	1.20	1.20	1.20	0.227	0.230	0.230	0.230
	CoopArr	-0.01	-0.01	-0.01	-0.01	-0.33	-0.34	-0.34	-0.33	0.739	0.732	0.732	0.743
	2006 – 2010												
South African – SADC region	R5th	0.04	0.02	0.04	0.04	1.27	1.27	1.27	1.25	0.211	0.211	0.211	0.218
	Capacity	0.10	0.12	0.12	0.11	3.86	3.87	3.87	3.85	0.000	0.000	0.000	0.000
	Tariff	0.02	0.03	0.03	0.02	0.55	0.58	0.58	0.59	0.587	0.567	0.567	0.560
	Withhold	0.00	0.00	0.00	0.00	0.01	-0.02	-0.02	-0.05	0.996	0.984	0.984	0.962
	Design	-0.14	-0.16	-0.16	-0.07	-2.15	-2.13	-2.13	-2.15	0.037	0.039	0.039	0.037
	CoopArr	0.21	0.25	0.25	0.25	2.23	2.20	2.20	2.25	0.031	0.033	0.033	0.030
	2000 – 2010												
	R5th	0.05	0.03	0.07	0.06	2.36	2.35	2.35	2.34	0.020	0.020	0.020	0.021
	Capacity	0.11	0.13	0.13	0.12	4.85	4.82	4.82	4.87	<.0001	<.0001	<.0001	<.0001
	Tariff	-0.05	-0.06	-0.06	-0.05	-2.22	-2.13	-2.13	-2.17	0.028	0.035	0.035	0.032
	Withhold	0.04	0.04	0.02	0.04	1.52	1.53	1.53	1.48	0.131	0.130	0.130	0.141
	Design	-0.01	-0.01	-0.01	0.00	-0.18	-0.22	-0.22	-0.24	0.856	0.829	0.829	0.813
	CoopArr	-0.03	-0.04	-0.04	-0.04	-0.73	-0.75	-0.75	-0.69	0.468	0.454	0.454	0.493

13

Market	Predictor	Partial regression coefficient				t-value				p-value			
		STD	5th +	OWN+	DES+	STD	5th +	OWN+	DES+	STD	5th +	OWN+	DES+
		2006 – 2010											
South African – East African region	R5th	-0.03	-0.01	-0.03	-0.03	-0.94	-0.94	-0.94	-0.94	0.359	0.359	0.359	0.359
	Capacity	0.02	0.02	0.02	0.02	1.25	1.25	1.25	1.25	0.225	0.225	0.225	0.225
		2000 – 2010											
	R5th	0.01	0.00	0.01	0.01	0.26	0.26	0.26	0.26	0.792	0.792	0.792	0.792
	Capacity	0.03	0.03	0.03	0.03	1.29	1.32	1.32	1.30	0.203	0.192	0.192	0.198
	Tariff	-0.04	-0.05	-0.05	-0.05	-1.04	-1.04	-1.04	-1.04	0.301	0.301	0.301	0.301
	Design	0.18	0.20	0.20	0.09	2.74	2.73	2.73	2.74	0.008	0.008	0.008	0.008

Source: Department of Statistics, University of Pretoria (2012).

In summary, *capacity* was the only feature found to have a statistically significant and partially positive impact on air passenger traffic flows in the South African – SADC regional air transport market, both in the five and 11 year periods. The results established that for every unit increase in the *capacity*, such flows would increase by between 10% and 12% for the five year period, and by between 11% and 13% for the 11 year period, depending on the ALI variant used. This was in line with the expectation that the increase in the level of openness of the *capacity* leads to increased air passenger traffic flows between countries and that restrictive regimes in relation to the *capacity* feature of bilaterals inhibit air passenger traffic growth. In their study, Piermartini and Rousova (2008) found that a restrictive *capacity* regime decreased air passenger traffic flows by between 4% (Bermuda I regime) and 13% (predetermination), while a liberal capacity regime, such as free determination, increased these flows by as much as 36%. Inter*VISTAS*-ga[2] Consulting, Inc. (2006) forecasted a 25% air passenger traffic increase if the capacity regime was changed from predetermined to free determination and an increase by 18% if it was changed from the Bermuda I regime to free determination.

In the 2006 – 2010 panel regression, three features were established to have a significant impact on air passenger traffic flows, both in the South African – intra-African market and the South African – SADC regional market: *capacity, designation and cooperative arrangements.* The impact of the *capacity* feature on flows of this type was once again found to be partially positive and significant; the results confirmed that for every unit increase in the *capacity*, the said flows would increase by between 5% and 6% in the South African – intra-African market, depending on the ALI variant used.

The results indicated a negative partial impact of the *designation* feature on air passenger traffic flows both in the South African – intra-African and South African – SADC air transport markets, which

was unexpected and contradictory to secondary research findings. It is therefore recommended that further research is conducted in these two markets. However, in the South African – East African air transport market, the results confirmed a statistically significant and partially positive impact of the *designation* feature on these flows over the 11 year time period. Thus, for every unit increase in the *designation*, the given flows would increase by between 9% and 20%, depending on the ALI variant used. The results once again confirmed that the restrictive features of the BASAs did not stimulate flows of this kind. Secondary research (Piermartini and Rousova, 2008; 2009) confirmed this positive impact and reported that a liberal *designation* regime (multiple designation) increased passenger traffic flows by between 15% and 21%. In addition a study by Inter*VISTAS*-ga[2] Consulting, Inc. (2006) established that restrictive *designation* regimes, in particular those with a single designation, led to a 21% decrease in such flows and also forecasted a 51% growth if the *designation* regime was changed from single to multiple.

The impact of the *cooperative arrangements* on air passenger traffic flows over the five year time period was found to be partially positive both in the South African – intra-African and South African – SADC air transport markets. This is in line with the expectation that *cooperative arrangements*, when allowed in BASAs, stimulate air passenger traffic through additional tools such as code-sharing and cooperation by maximising the route opportunities available. According to AFRAA (2012), code-sharing can be perceived as an effective tool for African airlines to widen their reach, increase frequencies and minimise costs. The panel regression results found that for every unit increase in the *cooperative arrangements*, air passenger traffic flows would increase by between 36% and 43% in the South African – intra-African air transport market and by between 21% and 25% in the South African – SADC regional air transport market over the five year time period, depending on the ALI variant used.

The panel regression results confirmed a partially positive impact of the *fifth freedom traffic rights* on air passenger traffic flows in the South African – intra-African air transport market over the five year period, as well as in the South African – SADC regional air transport market over the 11 year period. Thus, for every unit increase in the *fifth freedom traffic rights*, air passenger traffic would increase by between 2% and 4% in the South African – intra-African market and by between 3% and 7% in the South African – SADC air transport market, depending on the ALI variant used. In a study by Inter*VISTAS*-ga[2] Consulting, Inc. (2006) air passenger traffic flows were forecast to increase by 9% when *fifth freedom traffic rights* were stipulated in BASAs. This is in support of the notion that such rights establish new air services and expand the network, thereby providing increased access, consumer choice and encouraging competition, which should lead to lower airfares. For South Africa, *fifth freedom traffic rights* could benefit South African airlines through the creation of

additional opportunities to convey traffic, provided that *fifth freedom traffic rights* can also be obtained from the relevant third countries (Department of Transport, 2006). In essence, *fifth freedom traffic rights* will mainly benefit strong and effective African air carriers.

A partial negative impact was found between the *tariffs* feature and air passenger traffic flows in the South African – SADC regional air transport market over the 11 year time period, indicating that for every unit increase in the *tariffs*, such flows would decrease by between 5% and 6%, depending on the ALI variant used. The result was unexpected; it contradicted the expectations and evidence from secondary literature. It is therefore recommended that additional research is undertaken to investigate this relationship more comprehensively, as more liberal pricing regimes lead to a decrease in airfares, in turn stimulating additional passenger traffic. Secondary research established a 53% increase in air passenger traffic flows when free pricing, the most liberal tariffs regime, prevailed in BASAs (Piermartini and Rousova, 2009).

One of the limitations of the current study is that the independent variables do not fully represent potential demand in the context of Africa since the effects of historical, cultural links or common language, and supply as well as distance between the regions/countries on traffic, also play a role. The high air fares in Africa are the result of the combined effect of airline failures, protectionist aviation policies and restricted air transport supply, particularly in intra-African markets (SH&E, 2010). Further research in this area is thus necessary.

5. Conclusion

This research demonstrated that the impact of South African aviation policy in Africa on air passenger traffic flows, as measured by the ALI index, could not be tested in isolation, due to the fact that a number of identified predictors simultaneously played a key role. The methodological approach of testing the simultaneous impact of predictors, one of which is the aviation policy measured by the ALI index, over a number of years on air passenger traffic flows is one specific area which could be used in other regions of the world.

In those three markets where the *ALI* predictor was found to be significant, the individual features of the predictor were "unpacked" and tested for their significant impact on air passenger traffic flows. To obtain a better understanding and a more detailed comparison of the results, panel regression was performed on the data set for the two time periods: 2006 – 2010 and 2000 – 2010. The impact of the significant *ALI* features on air passenger traffic flows was found to be different in

each of the identified markets, presenting robust and several unexpected dynamics in the intra-African and regional markets.

The analysis of the South African – intra-African, the South African – SADC and the South African – East African markets confirmed a positive impact of a more liberal aviation policy on air passenger traffic flows. It is recommended that in the South African – intra-African and South African – SADC air transport markets, liberalisation initiatives should be focused on the following features: *grant of fifth freedom traffic rights*, *capacity* and *cooperative arrangements* as they were found to be the most traffic-enhancing provisions in the two markets. *Cooperative arrangements* were found to have the most significant impact on air passenger traffic flows both in the South African – intra-African (a 36 to 45% traffic increase) and South African – SADC air transport markets (a 21 to 25% traffic increase). *Cooperative arrangements* can be regarded as an interim measure in counteracting market access restrictions in relation to capacity and foreign ownership. In the South African – East African regional air transport market liberalisation initiatives should, in particular, be focused on the *designation* feature as the most traffic-enhancing one in this market. Additionally, it is recommended that further negotiations, pertaining to gradual liberalisation of the regulatory restrictions, should be pursued and prioritised in these markets, with the aim of becoming fully YD-compliant, while improving air accessibility, fostering trade, business activity and tourism.

As South Africa and its bilateral counterparts move forward in the pursuit of the YD implementation, it is recommended that a consistent and reliable database on air transport is developed. This will guide the airlines in identifying priority markets and will assist policy-makers in their evaluation of the impact of further liberalisation. Those countries that inhibit air transport market liberalisation in line with the YD may at a later stage find themselves in an uncompetitive situation. A mechanism should be established to assist countries with less developed air transport sectors to better integrate themselves into the liberalised air transport market. In addition, there should be regulatory measures designed to create a healthy and fair competition environment in which strong and less strong carriers can coexist on a sustainable basis.

This study closed the existing gap in the limited empirical research available of the impact of the aviation policy, in particular its market access features, on air passenger traffic flows in the African context. Furthermore, the quantitative results should effectively fill the gap in the existing literature, pertaining to the empirical evidence of air services liberalisation in the South African – African context using a panel data technique instead of a cross-sectional approach and by expanding on the cross-sectional 2005 QUASAR database. This valuable information could be used by the decision- and policy-makers, particularly at the Department of Transport, to establish what progress has been

achieved in terms of the liberalisation of air services agreements in line with the YD and the Airlift liberalisation targets.

Acknowledgements

References

AFRAA, 2012. How can airlines change the status quo?

Grosso, M.G., 2010. Air passenger transport in APEC: regulation and impact on passenger traffic.

ICAO, 2004. Manual on the regulation of international air transport. (9626). Quebec: ICAO.

International Air Services Council, 2008. Annual report – 2007/08. Pretoria: International Air Services Council.

Inter*VISTAS*-ga^2 Consulting, Inc., 2006. The economic impact of air service liberalisation. Washington: Inter*VISTAS*-ga^2 Consulting, Inc.

Inter*VISTAS*-EU Consulting, Inc., 2009. The impact of international air service liberalisation on the United Arab Emirates. London: Inter*VISTAS*-EU Consulting, Inc.

Meshela, B. 2006. Implementation of the Yamoussoukro Decision: progressing or stalled? Paper presented at the ICAO/ATAG/WB Development Forum, Montreal, 24-26 May. [Online] Available from: http://legacy.icao.int/DevelopmentForum/Forum_06/Docs/YamousoukroDecision.pdf [Downloaded: 2009-04-19].

Mills, G., Membreno, L., 2007. Air hubs: a checklist for Africa. South Africa: the Brenthurst Foundation.

Mills, G., Swantner, L., 2008. Wings over Africa? Trends and models for African air travel. South Africa: the Brenthurst Foundation.

Myburgh, A., Sheik, F., Fiandeiro, F., Hodge, J., 2006. Clear skies over Southern Africa: the importance of air transport liberalisation for shared economic growth. Woodmead, South Africa: the ComMark Trust.

Piermartini, R., Rousova, L., 2008. Liberalisation of air transport services and passenger traffic.

Piermartini, R., Rousova, L., 2009. Free sky and clouds of restrictions.

Pirie, G. 2006. 'Africanisation' of South Africa's international air links, 1994-2003. Journal of Transport Geography, 14:3-14.

Schlumberger, C.E., 2010. Open skies for Africa. Implementing the Yamoussoukro Decision. Washington, USA: the Office of the Publisher.

SH&E (2010). Competitive Africa: Tourism Industry Research Phase II Air Transport Sector Study. Report for the World Bank, Washington, DC.

Sithole, B. 2012. Researcher, Department of Transport, South Africa. Verbal communication on 23 January 2012. Pretoria.

South Africa. Department of Transport. Chief Directorate: Civil Aviation, 2006. Airlift Strategy 2006. Pretoria: Government Printer.

South Africa. Department of Transport, 2008. Draft white paper on national civil aviation policy. Pretoria: Government Printer.

University of Pretoria. Department of Statistics, 2012. Analyses performed on data for this thesis.

Warnock-Smith, D., Morrell, R., 2008. Air transport liberalisation and traffic growth in tourism-dependent economies: a case-history of some US-Caribbean markets. Journal of Air Transport Management 14, 82-91.

World Trade Organisation, 2006. Second review of the air transport annex. Developments in the air transport sector (part two). Quantitative air services agreements review (QUASAR), volume I. (S/C/W/270/Add.1).

Highlights

The role of the South African civil aviation policy in accelerating the implementation of the Yamoussoukro Decision is studied.

The research employs the Air Liberalisation Index (ALI) to measure the impacts.

A fixed one-way panel regression technique in five markets (intra-African, the SADC, East African, West African and North African) is used.

There are significant results in three markets: intra-African, the SADC and East African.