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Regional Jet Aircraft Competitiveness: Challenges and Opportunities

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Regional Jet Aircraft Competitiveness: Challenges and Opportunities

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The Purpose of the Study

- To investigate the current trends in the aviation industry in regards to regional jet.
- To examine country-level factors that can potentially explain the number of Embraer and Bombardier regional jet deliveries. Possible factors include GDP, price of crude oil, prior aircraft deliveries and the land area of receiving RJ countries.

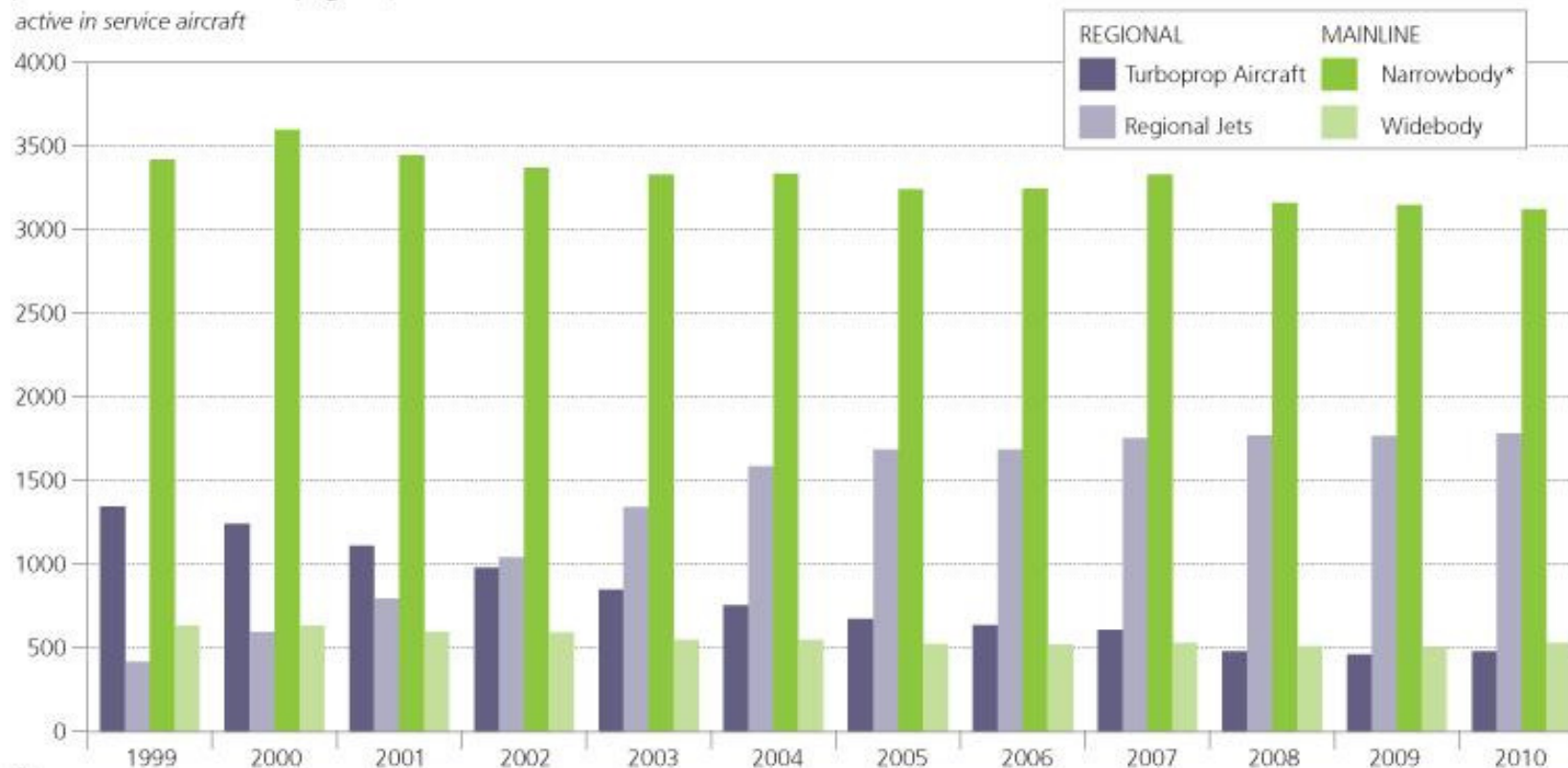
Commercial Aviation

- Large passenger jets with over 100-seating capacity, regional jet aircraft with up to 100-seats capacity, and smaller piston turboprop aircraft.
- In the U.S. regional jets are used by larger carriers to provide connecting services for passengers.
- Airlines are looking for new ways to lower their operating costs by utilizing more fuel efficient aircraft, eliminating unprofitable routes, and implementing other cost saving measures (*FAA, 2011*).

Scheduled Passenger Aircraft by Type

(see airline breakdown page 23)

active in service aircraft



Notes:





Includes most aircraft over 9 seats

*Mainline narrowbody aircraft include Embraer 190 aircraft operated by US Airways and JetBlue

Source: OAG Fleet Intel

Regional Airline Partnerships

(as of July 2011)

Mainline Carrier	Regional Brand	Operating Partners	
	N/A	Horizon Air Peninsula Airways SkyWest Airlines	
	American Eagle	American Eagle American Eagle/Executive	
	American Connection	Chautauqua Airlines	
	Continental Express	Chautauqua Airlines ExpressJet	
	Continental Connection	Cape Air Colgan Air CommutAir Gulfstream International Airlines	
	N/A	Atlantic Southeast Airlines** Chautauqua Airlines Comair Compass Airlines Mesaba Airlines Pinnacle Airlines Shuttle America SkyWest Airlines	
		United Express	Atlantic Southeast Airlines
			Colgan Air
			ExpressJet
			GoJet Airlines
			Great Lakes Airlines
			Mesa Airlines
			Shuttle America
SkyWest Airlines			
	US Airways Express	Trans States Airlines	
		Air Wisconsin	
		Chautauqua Airlines	
		Colgan Air	
		Mesa Airlines	
		Mesaba Airlines	
		Piedmont Airlines	
		PSA Airlines	
Republic Airlines			
		Trans States Airlines	

* SkyWest to end partnership with AirTran in September 2011

** Atlantic Southeast Airlines and ExpressJet will merge into single operation by the end of 2012

Source: OAG Schedules, July 2011

Global Trends-Boeing Forecast

- Growth in air travel, measured in revenue passenger-kilometers (RPK), historically outpaced the economic growth (GDP), by approximately 1.5 to 2% annually (*Boeing, 2011*).
- About 60-80% of air travel growth can be attributed to economic growth.

Global Trends-Boeing Forecast

- From 2010 to 2030 world economy is expected to grow by 3.3%, global airplane fleet by 3.6%, number of passengers by 4.2%, and revenue passenger-kilometers by 5.1%, a lead indicator of airline traffic.
- This will result in a near doubling of the global fleet from around 19,400 airplanes currently in service to more than 39,500 airplanes in 2030, totaling to an approximate market value of US \$4.0 trillion.
- 40% of the projected new airplane orders will come from the need to replace older and less efficient airplanes to meet the rising fuel costs.

Regional Jet Market

- Regional jets have been in service since 1992 and are defined as having less than a 100-seating capacity.
- However, this definition has been challenged as large regional jets such as the Embraer E190 and E195 as well as the Bombardier CS100/300 possess a 130-passenger capacity which is very similar to the smallest products offering by Airbus and Boeing.
- Airbus and Boeing aircraft are generally not considered to be regional jets.

Regional Jet Market

- The forecasted demand in the regional jet market will come from 60-120 seat aircraft category.
 - This category offers greater passenger capacity and lower operating costs per available seat.
- Although 20-59 seat aircraft comprise the majority of the current regional jet fleet, the demand for these planes will slowly diminish.

Regional Jet Market: FAA Forecast

- In 2010 the US commercial aircraft fleet consisted of 7,096 aircraft including 3,713 mainline large passenger aircraft with over 90 seats, 2,577 regional jets (jets, turboprop and pistons), and 806 cargo aircraft.
- Regional jets represent 41% of the commercial passenger fleet and 36% of the national fleet.



Bombardier CRJ NextGen

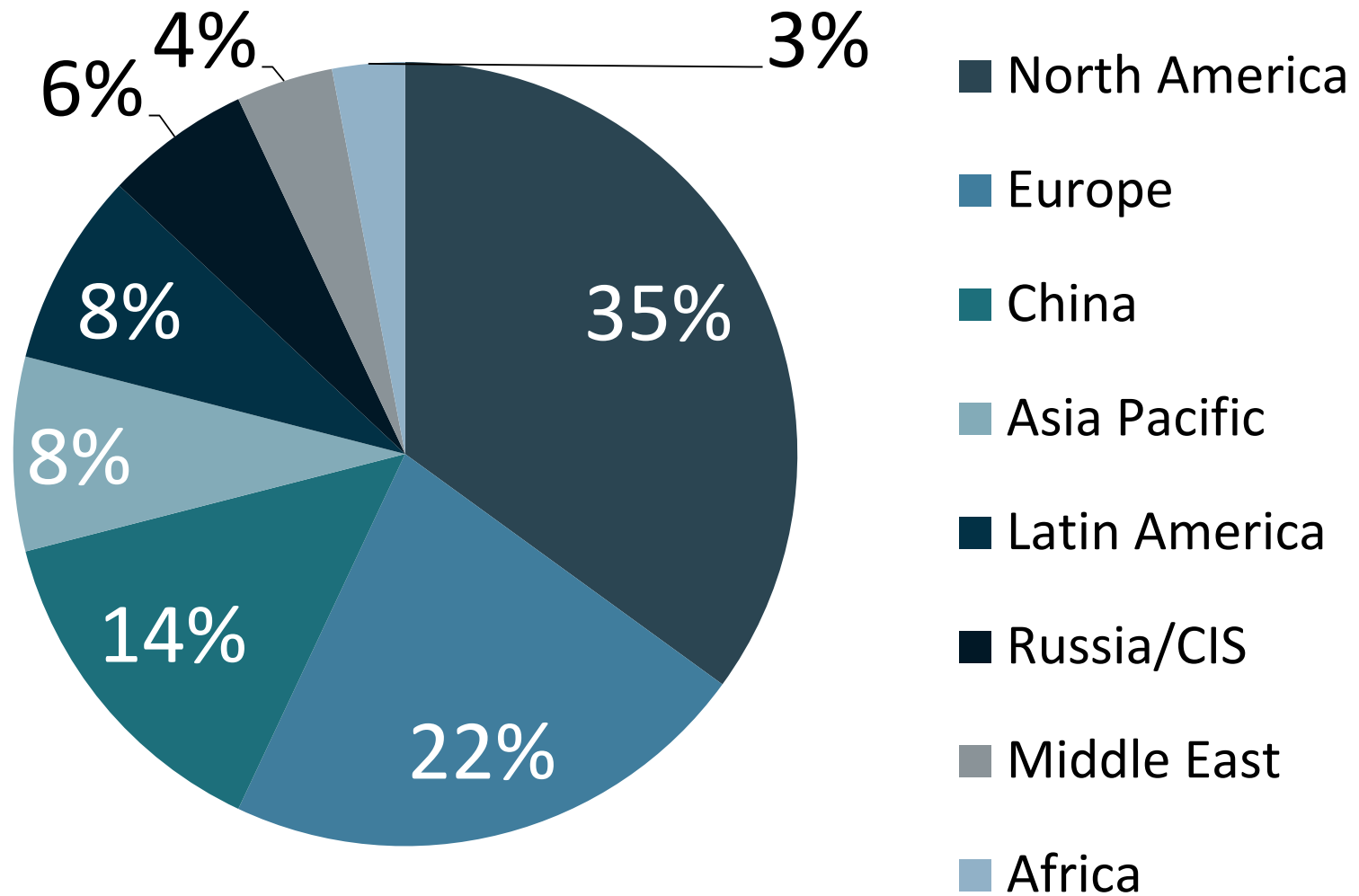
Regional Jet Market

- Traditionally the U.S. has been the largest market for regional jet deliveries. North America holds the dominant position with an expected 35% share in new deliveries.
- “Europe/Russia with 28 percent share and China with 14 percent are expected to be the next big markets in terms of deliveries of regional jets, even though their combined market share will be less than that for North America” (*Aerospace Global Report, 2011*).



Embraer ERJ 190

Regional Jet Demand by Geographic Area 2010-2029 (total 6,875)



Embraer



[Embraer](http://www.youtube.com/watch?v=qEmVMjFr3ZQ)

<http://www.youtube.com/watch?v=qEmVMjFr3ZQ>

Embraer

Table 1: Embraer Financial Indicators (in Euro € millions)

	Year	Revenue	Aero Revenue	Rev. Growth	Oper. Profit	Oper. Margin
All Business Segments:	2009	3,931	3,931	-9.20%	241	6.10%
Commercial aviation (61.6%)		2,422				
Executive aviation (16.4%)		645				
Aviation services (10.8%)		423				
Defense (9.1%)		359				
Other (2.1%)		83				
	2008	4,329		12.90%	367	8.50%
	2007	3,833		27.90%	273	7.10%

Adapted from Aerospace Global Report, 2011

Table 6: Embraer Regional Jet Deliveries - List of Countries

	Country		
1	ARGENTINA	25	KAZAKHSTAN
2	AUSTRALIA	26	KENYA
3	AUSTRIA	27	LIBYA
4	BAHRAIN	28	LUXEMBOURG
5	BELGIUM	29	MEXICO
6	BRAZIL	30	MOLDOVA
7	BRITISH VIRGIN ISLANDS	31	MONTENEGRO
8	CANADA	32	MOZAMBIQUE
9	CHINA	33	NETHERLANDS
10	COLOMBIA	34	NIGERIA
11	ECUADOR	35	OMAN
12	Egypt, Arab Rep.	36	PANAMA
13	EL SALVADOR	37	POLAND
14	FINLAND	38	PORTUGAL
15	FRANCE	39	SOUTH AFRICA
16	GERMANY	40	SAUDI ARABIA
17	GREECE	41	SPAIN
18	GUADELOUPE	42	SWEDEN
19	Hong Kong SAR, China	43	SWITZERLAND
20	INDIA	44	TAIWAN
21	IRELAND	45	THAILAND
22	ITALY	46	UNITED ARAB EMIRATES
23	JAPAN	47	UNITED KINGDOM
24	JORDAN	48	UNITED STATES

Source: Official Airline Guide, 2011

Bombardier



- A message from the Bombardier CEO, Pierre Beaudoin
- [Bombardier CEO, Pierre Beaudoin](http://www.youtube.com/user/bombardiervideos?feature=mhee)
<http://www.youtube.com/user/bombardiervideos?feature=mhee>



Bombardier

Table 2: Bombardier Financial Indicators (in Euro € millions)

	Year	Revenue	Aero Revenue	Rev. Growth	Oper. Profit	Oper. Margin
All Business Segments:	2010	13,927	6,729	3.30%	790	5.70%
Aerospace (44.3%)		6,729			340	5.10%
Rail transportation (51.7%)		7,198			449	6.20%
	2009	13,478		5.30%	977	7.20%
	2008	12,794		7.90%	547	4.30%

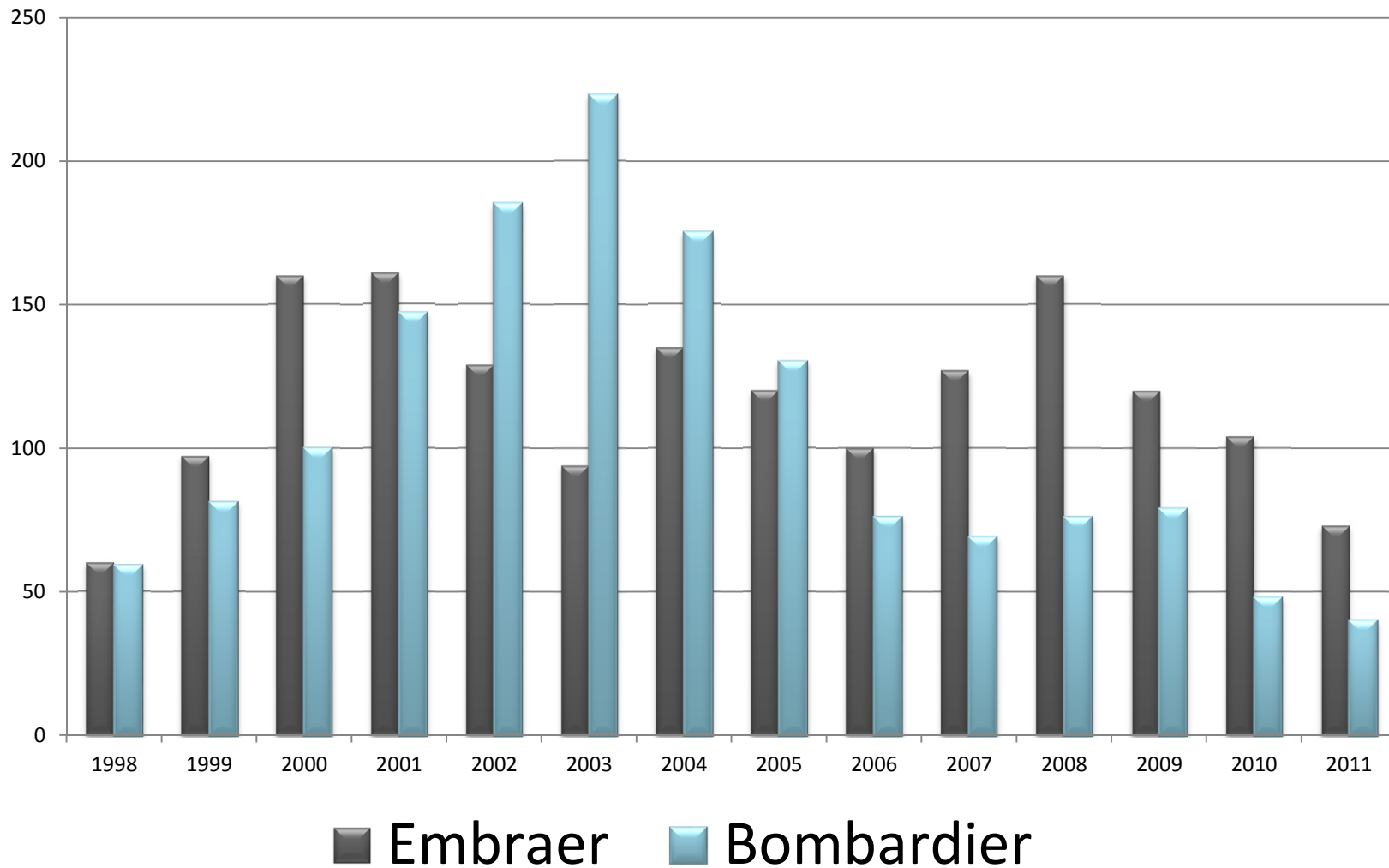
Adapted from Aerospace Global Report, 2011

Table 7: Bombardier Regional Jet Deliveries - List of Countries

Country	
1	AUSTRALIA
2	AUSTRIA
3	BERMUDA
4	BRITISH VIRGIN ISLANDS
5	CANADA
6	CHINA
7	DENMARK
8	ESTONIA
9	FRANCE
10	GERMANY
11	GREECE
12	HUNGARY
13	INDIA
14	IRAQ
15	IRELAND
16	ISLE OF MAN
17	ITALY
18	JAPAN
19	KAZAKHSTAN
19	LIBYA
20	Macedonia, FYR
21	NIGERIA
22	PHILIPPINES
23	South Africa
24	Russian Federation
25	SLOVENIA
26	SPAIN
27	SWEDEN
28	SWITZERLAND
29	TUNISIA
30	TURKEY
31	UKRAINE
32	UNITED ARAB EMIRATES
33	UNITED KINGDOM
34	UNITED STATES
35	URUGUAY
36	Yemen, Rep.

Source: Official Airline Guide, 2011

Regional Jet Deliveries Worldwide 1998-2011



Regional Jet Competition

1. *The Mitsubishi Aircraft Corporation*, a subsidiary of Japanese Mitsubishi Heavy Industries, was established in 2008 to develop the 70-90 seat Mitsubishi Regional Jet.
2. *AVIC / Commercial Aircraft Company* based in China.
3. *The Sukhoi Super Jet 100*, a Russian regional jet in the 75-95 seat category was jointly developed by the civil aircraft division of Sukhoi, a Russian aerospace company, in cooperation with Western partners.

Regional Jet Competition

4. *The Indian Regional Jet* or the HAL/NAL Regional Transport Aircraft (RTA) is a project of Hindustan Aeronautics Limited (HAL) and National Aerospace Laboratories (NAL).
 - This aircraft can be manufactured as a turboprop or as a jet with a capacity of 70-100 passengers.

Methodology

- *Dependent variable:* Official Airline Guide country-specific data was collected for regional jet deliveries for the ERJ family and the CRJ family between 1996 and 2011.
- *Independent variables:* GDP historical data for identified countries; historical price data for crude oil (WTI, Cushing Oklahoma); countries' land area.
 - A 2-year lag was applied to the GDP and crude oil pricing.
 - A 2-year lag was applied to test relationship between previous and present aircraft deliveries.

Methodology

- *Stepwise regression* method was employed in order to answer which of the possible four predictor variables included (GDP 2-year lag, crude oil 2-year lag, land area and deliveries 2-year lag) are relevant for predicting regional jet deliveries.
- Does the resulting regression equation allow for reliable predictions of regional jet deliveries?
- Data screening led to a total of 414 observations for Embraer and Bombardier RJ deliveries.

Data Analysis: SPSS Output

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.569 ^a	.324	.323	12.802	.324	197.673	1	412	.000
2	.609 ^b	.371	.368	12.361	.047	30.905	1	411	.000
3	.623 ^c	.389	.384	12.205	.017	11.548	1	410	.001
4	.632 ^d	.399	.393	12.114	.011	7.218	1	409	.008

a. Predictors: (Constant), GDP

b. Predictors: (Constant), GDP, SumOfDeliveries 2 year lag

c. Predictors: (Constant), GDP, SumOfDeliveries 2 year lag, WTI Crude Oil

d. Predictors: (Constant), GDP, SumOfDeliveries 2 year lag, WTI Crude Oil, Land Area km2

Discussion: GDP

- Approximately 60 to 80% of air travel growth can be attributed to economic growth (*Boeing, 2011*).
- Developed economies together with emerging market have been generating more than 70% of global GDP, which directly influences the air transport industry.
- *The results of this study are in support of this trend. A 2-year lag in GDP accounts for 32% of RJ deliveries worldwide.*
- *In order to accommodate air travel demand, airlines are in need to expand their fleet by placing new orders of RJs.*

Discussion: Fuel

- Fuel is an airline's second largest expense. For the past decade airlines' non-fuel costs have risen by 4.5% while fuel costs, as a percentage of revenue, rose from 14% in 2001 to 33.5% in 2008 (*Air Transportation Association, 2011*).
- These fuel cost increases parallel increases in crude oil prices from an average US\$19 per barrel in the 1990s to US\$114 per barrel in May 2011.
- *The results of this study provided a support that a 2-year lag in the crude oil pricing accounts for the RJs deliveries.*

Discussion: Prior Deliveries

- Prior aircraft deliveries are linked to the present aircraft deliveries ($r=0.59$).
- A 2-year lag was applied to the research model, which made an improvement in the regression model.
- *By operating a fleet of RJs airlines are more likely to order more this type of airplanes.*

Discussion: Land Area

- In the US, regional jets are usually utilized in the hub and spoke system to feed the large carriers. RJs fly on shorter routes than traditional jets, have faster turnaround times and higher frequency of service.
- Europe has different uses for RJs operation due to the extensive network of trains which can be used on the shorter trips.
- *Although a country's land area is positively linked to the aircraft deliveries ($r=0.463$), it does not improve the regression model by much.*

Conclusion

- The results of this study demonstrate that four variables (GDP, crude oil pricing, countries' land area and prior aircraft deliveries) account for almost 40% for variance in the RJs deliveries.
- However, there are many additional factors which play in effect. For example, in the US one of the major obstacle for RJs orders is labor scope clauses, which limits the number of regional jets that an airline can own and operate.
- Although Embraer and Bombardier presently enjoy a duopoly in the RJ market, new entrants from emerging markets are coming to the global arena.

Embraer

- Brazil Makes High Profile Investment in US
- [Embraer Invests in FL](#)
- [Embraer 40 Years](#)



THANK YOU

Any Questions ?

