Air Transport Management Course: Universidade Lusofona

Air Cargo Economics

Dr Peter Morrell

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Air Cargo Economics - Outline

- Air cargo participants
- Air cargo pricing, rates & yields
- Cargo related costs
- Freighter aircraft operating costs
- Methods of cost allocation
- Pax/combi vs freighter services
- Lufthansa's cargo strategy
- Quick change aircraft
- Aircraft wet leasing
- Conclusions

Which participants?

- *Airlines (airport to airport)*
- Forwarders (airport delivery & collection)
- Consolidators (airport delivery & collection)
- Integrators (door to door))
- Commercialised postal services (eg Dutch and German - door to door)

Which airlines?

- **Air cargo subsidiaries**

  eg Lufthansa, SAS and Singapore Airlines

- **Major freight airlines (cargo revenues > 20% of total)**

  eg Air France-KLM, Korean and Cathay

- **Passenger focused airlines (cargo revenues < 10% of total)**

  eg BA, American, Aer Lingus

- **Passenger airlines that carry no air cargo**

  eg Many low-cost airlines

Major areas of concern

1. **Declining yields (31%)**
2. **Over-regulation (25%)**
3. **Security (14%)**
4. **Over-capacity (11%)**

Source: TIACA survey of 500 air cargo executives worldwide (2002)

Air Cargo Rates: Combination Carriers

- General commodity rates (incentive for heavier shipments through weight breaks)
- Specific commodity rates (originally designed to attract certain types of shipment)
- ULD/Container rates (for shipper or forwarder packed ULDs)
- Class rates (requiring special handling)
- FAK rates (freight all kinds – low rates based on minimum weight break-points)
- Contract rates (for specific clients meeting minimum annual or weekly volumes)
- Premium product rates (eg td-flash, td-x)

London - Tokyo Cargo Rates (April 2001)

Rate Classification	Min. Kgs	£ per Kg
N		£ 8.20
Q (NP)	5	£ 4.99
Q (BG)	10	£ 4.96
Q	100	£ 6.52
Q	300	£ 5.27
Q	500	£ 4.49
6		£ 2.42
386		£ 3.73
1024	100	£ 3.54
4402	100	£ 4.24
6002	100	£ 4.58
7119	250	£ 2.42
8277	250	£ 2.42

Lufthansa fuel price surcharges

Fuel price index: 100 = 53.35 US cents per US gallon
Fuel price average of five most important markets
Fuel price index (3 June 2005): 291

Fuel surcharge = 0 for fuel price index of 100, then for example:

Fuel price index exceeds 240 for a period of two consecutive weeks:
Fuel surcharge adjusted to €0.30 per kg

Fuel price index exceeds 265 for a period of two consecutive weeks:
Fuel surcharge adjusted to €0.35 per kg

Fuel price index exceeds 290 for a period of two consecutive weeks:
Fuel surcharge adjusted to €0.40 per kg

Two weeks' notice for all changes

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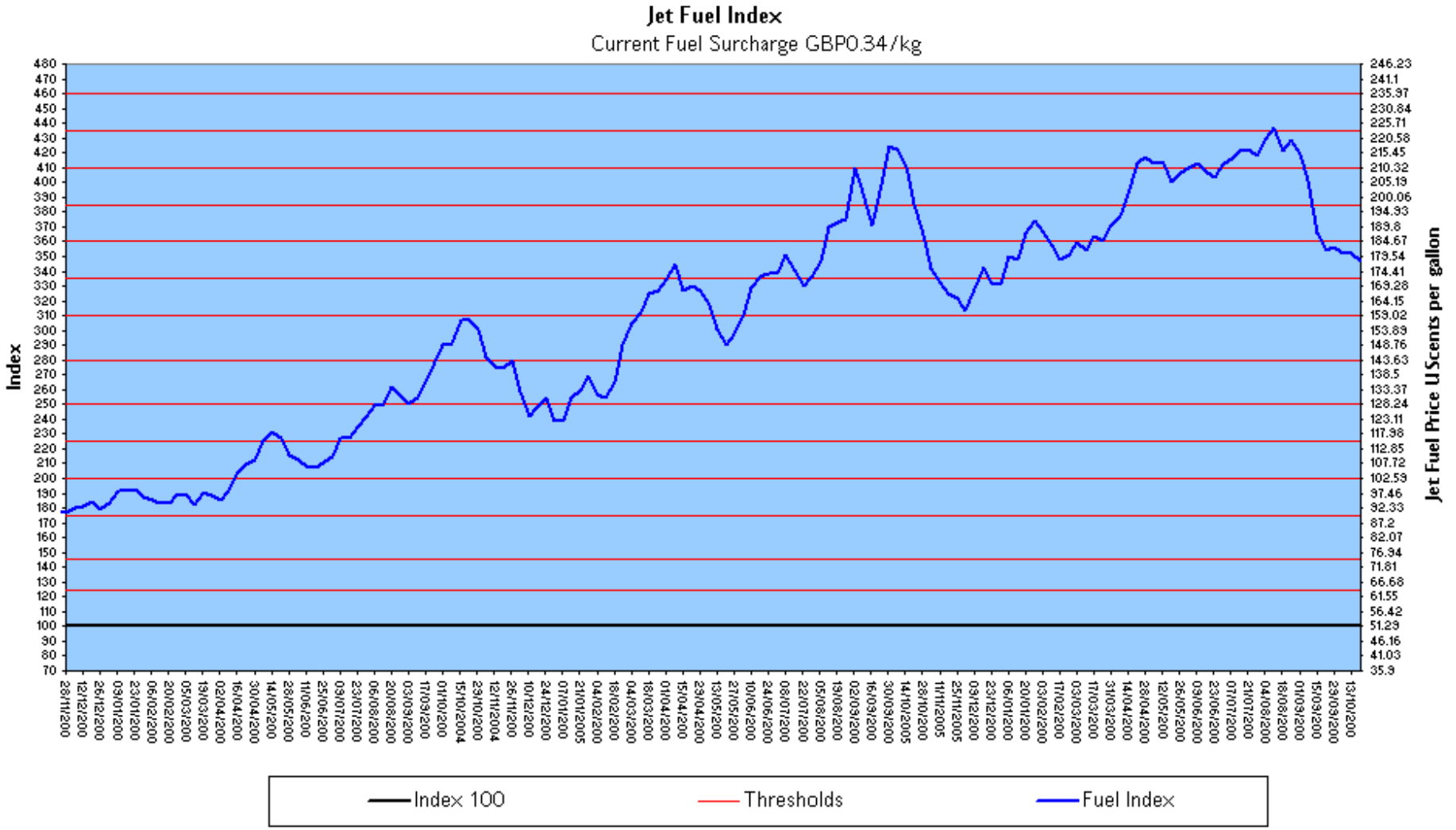
Downloaded from www.baworldcargo com



Pricing: volume conversion

- Aircraft tend to ‘cube out’ rather than ‘weigh out’
- B747-400 has only 70 cu.m. available for cargo in lower deck, but 20 tonnes (3.5 cu.m per tonne)
- Low density shipments converted to *chargeable weight* using 6 cu.m/tonne (IATA proposed reducing this to 5 cu.m. per tonne from 1/10/03, but withdrew this in March 2005)
- Shippers and forwarders need to take care using voluminous packaging materials
- Change reflects change in shipments from heavy machinery to DVDs, CDs, fresh produce
- Change also reflects less lower deck space available for cargo in latest versions of B747 (more passengers and range/fuel)

Consolidation and rates

	Pieces	Volume (cu.metres)	Actual weight (kg)	Chargeable weight (kg)	Cost ($)
Pillows	1,000	12	227	2,004	1,804
Crane parts	3	2	2,268	2,268	2,041
Consolidated	1,001	14	2,495	2,495	2,246
kg per cu.m	167	or 6 cu.m per tonne			
Rate: $/kg	0.9				

Consolidator pays airline $2,246; Shippers could pay consolidator $1,804 + $2,041 = $3,845 ($4,175 under proposed conversion)

Rate Examples: London/New York

- ***TNT (Door to door):***

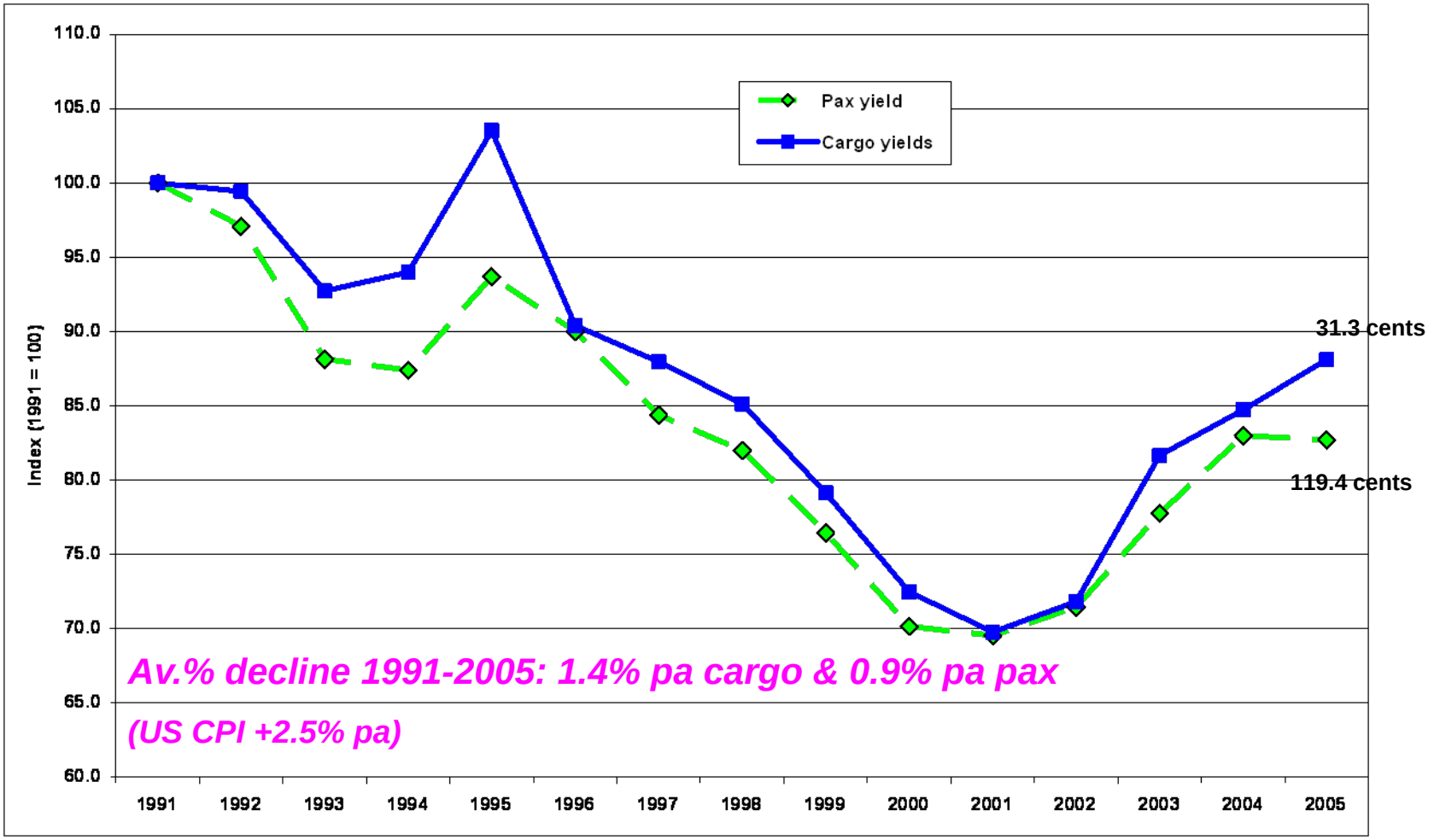
Global Express (10kg)	**£122**
Global Express priority (10kg)	**£147**

- ***IATA Airlines (airport to airport):***

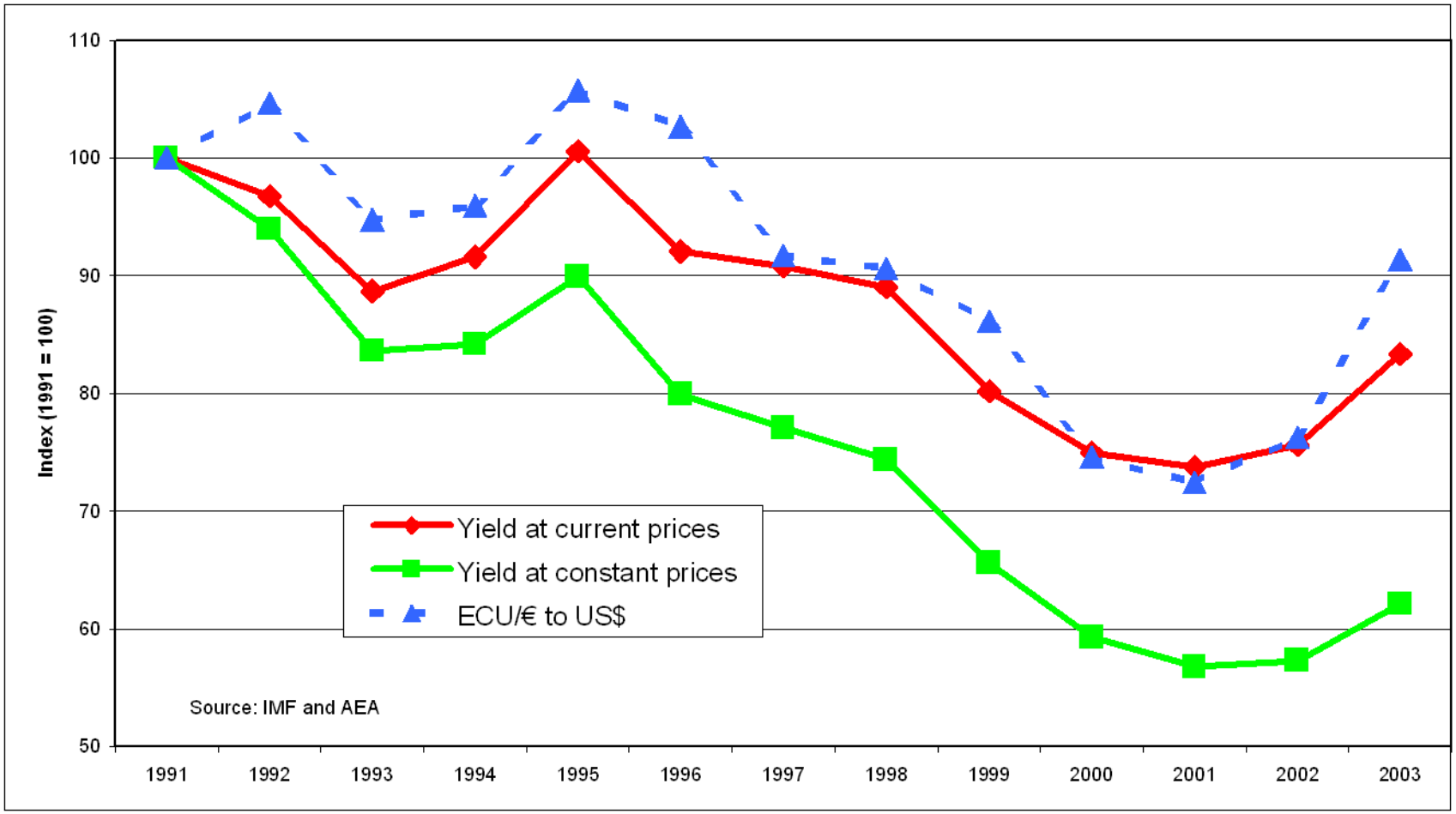
General cargo rates: Minimum charge - £50

Standard rate	**£4.03 per kg**
Consignment > 100kg	**£2.15 per kg**
Consignment > 300kg	**£1.34 per kg**
Consignment > 500kg	**£1.24 per kg**
ULD rate	**£0.95 per kg**

AEA scheduled service yields (current price US$)



AEA North Atlantic air cargo yields vs exchange rates



Costs of Freighter Aircraft

- Fuel
- Aircraft Rental
- Maintenance & Overhaul
- Crew Salaries & Expenses
- Airport & Navigation
- Handling & Parking
- Advertising & Promotion
- General & Administrative

Fuel share of aircraft operating costs, 2006

	Fuel price: US$/gal	Fuel %
B747-400 (Atlas)	2.15	64
B747-2/300 (Atlas)	2.15	62
B747-400 (NW)	2.08	61
MD-11 (UPS)	2.14	58
MD-11 (Gemini)	2.15	54
B747-1/200 (UPS)	2.14	51
DC-10 (FedEx)	1.93	40
MD-11 (FedEx)	1.94	36

Source: US Form 41 in the Airline Monitor

Freighter Fuel Efficiency (US$2.15/gallon)

(Derived from US Form 41 data - 2006)

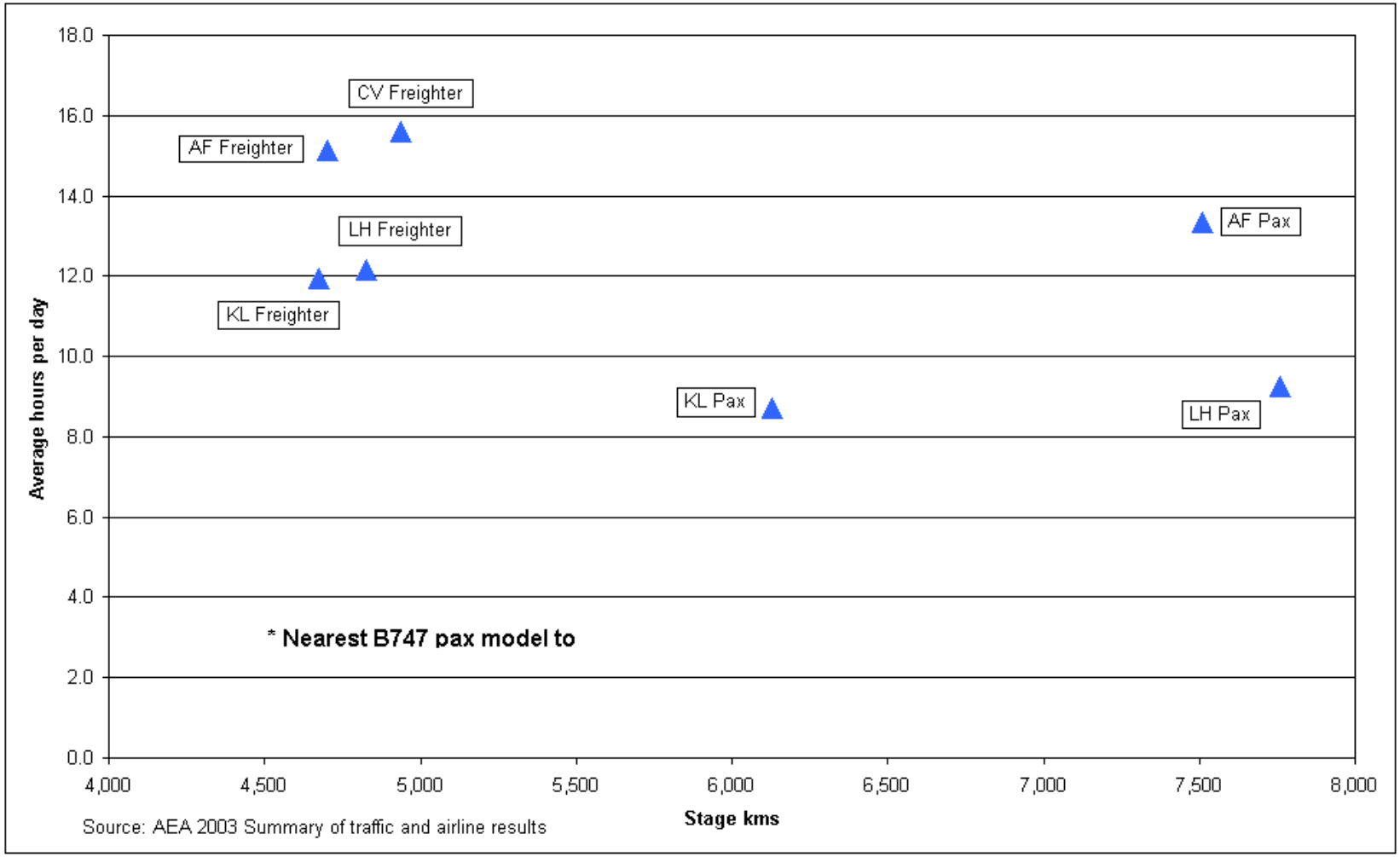
Aircraft type	Max. capacity (tonnes)	Fuel US$ per block hour	Fuel US cents per ATM
A310-200F	38	1,561	23.0
A300F	45	3,256	19.8
DC10-30F	76	2,233	18.0
MD-11F	88	2,465	12.3
B747-200F	112	3,571	15.5
B747-400F	112	2,905	12.1

Impact of higher fuel prices on freighters

	MD-11F	B747-200F	B747-400F
Fuel price (cents/gallon)	0.70	0.70	0.70
US gallons per hour	2,465	3,571	2,905
LHR/HKG gallons consumed	27,115	39,281	31,955
Trip fuel cost (US$)	18,981	27,497	22,369
Difference vs MD11F (US$)	-	8,516	3,388
	MD-11	B747-200	B747-400
Fuel price (cents/gallon)	2.20	2.20	2.20
US gallons per hour	2,465	3,571	2,905
LHR/HKG gallons consumed	27,115	39,281	31,955
Trip fuel cost (US$)	59,653	86,418	70,301
Difference vs MD11F (US$)	-	26,765	10,648

+ 24 tonnes

Freighter vs passenger aircraft utilisation: B747*



Long-haul Freighter Aircraft Operating Costs:2006

(Source: DOT Form 41; fuel @ US$2.15/gal)

	B747-400F Atlas/Polar	MD-11F UPS	Percent Difference
Trip distance (km)	5,482	4,875	
Available payload (tonnes)	113	90	25.0
Block time (hrs)	6.8	6.4	
Block fuel (US gals)	21,512	15,337	
Annual trips	9,068	11,280	
Annual block hours	61,810	72,298	
Operating costs:			
Flight crew	7,963	7,420	
Fuel	46,250	32,974	
Aircraft dry lease	6,060	21	
Maintenance	8,056	5,569	
Depreciation	2,165	7,222	
Other costs	209	704	
Total trip costs (US$)	70,703	53,910	31.2
Total per block hour ($)	10,373	8,411	23.3
Total per ATK (cents)	11.42	12.24	-6.7

Freighter lease rates (2003)

Aircraft	Year built	per month rate
A300F4	1980-84	$125-165,000
B757SF	1994-98	$185-235,000
DC10-30	1979-84	$125-185,000
MD-11	1994-99	$450-545,000
B747-200	1979-84	$130-220,000
B747-400	1993-03	$490-1,150,000

Rates firmer in June 2007: ie B747-400F: $1.0m to $1.4m a month

Cargo cost allocation methods

- ***By-product (revenue offset)***

  Cargo break-even

  Incremental cargo cost

- ***Joint product (fully allocated costs)***

  Weight, volume, zone, revenue, profit contribution or equivalent freighter methods

- ***Other (no cost allocation)***

  Profit proportional to revenue

Joint Passenger/Cargo Air Services

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Cargo specific/related costs:

- **Handling (loading/unloading/transhipment)**
- **Sales, promotion and commissions**
- **Cargo insurance and other**
- **Additional fuel (due to cargo payload)**

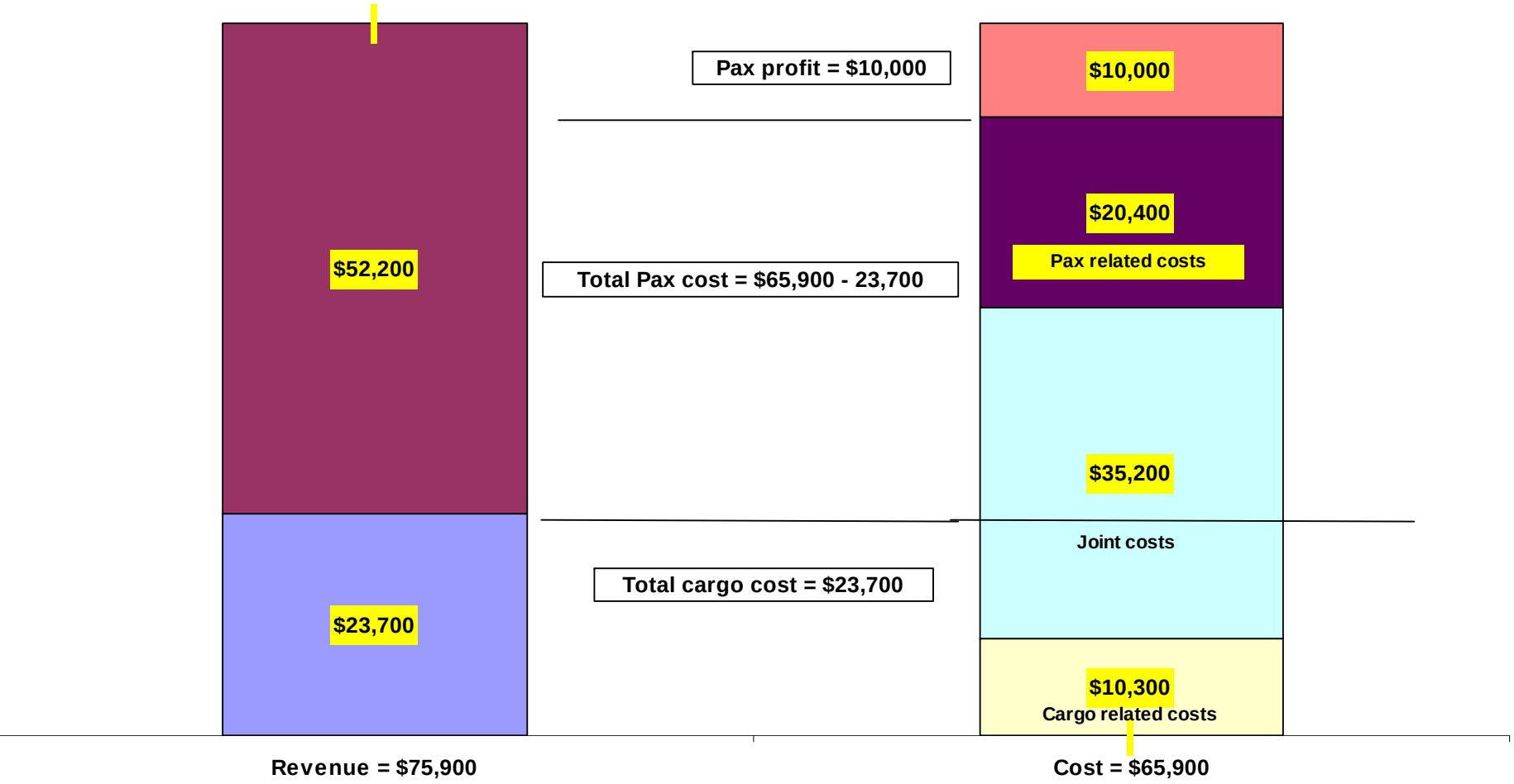
Passenger specific/related costs:

- **Handling (check-in, baggage, ramp, lounges)**
- **Cabin crew and in-flight catering**
- **Airport passenger departure fees**
- **Sales, ticketing, promotion and commissions**
- **Pax insurance and other**
- **Additional fuel (due to pax/bags payload)**

Joint Passenger/Cargo Air Services:
Joint costs to be allocated to products

- **Aircraft capital costs**
  Depreciation, lease rentals, interest
- **Aircraft insurance**
- **Basic fuel (without payload)**
- **Aircraft maintenance and overhaul**
- **Cockpit crew**
- **Landing fees**
- **Air navigation charges**

Cargo breakeven for 747-300
6 pallet combi (by-product)



Volume allocation for 747-300
6 pallet combi (joint product)

Effective volume of passenger cabin:

360 pax @ 36.1 cu.ft/pax = 12,996 cu.ft (65.4%)

Cargo cabin volume:

6 pallets + lower deck (ex pax bags) = 6,867 cu.ft (34.6%)

Total volume 19,863 cu.ft (100.0%)

Costs allocated to pax (65.4% x $35,200) = $23,000

Costs allocated to cargo (34.6% x $35,200) = $12,200

Pax profit = $52,200 – 20,400 – 23,000 = $8,800

Cargo profit = $23,700 – 10,300 – 12,200 = $1,200

Weight allocation for 747-300
6 pallet combi (joint product)

Weight payload of passenger cabin:

360 pax @ 100 kg/pax = 36,000 kg (53.5%)

Cargo main and lower deck weight payload:

6,867 cu.ft x density of 4.56 kg/cu.ft = 31,314 kg (46.5%)

Total weight 67,314 kg (100.0%)

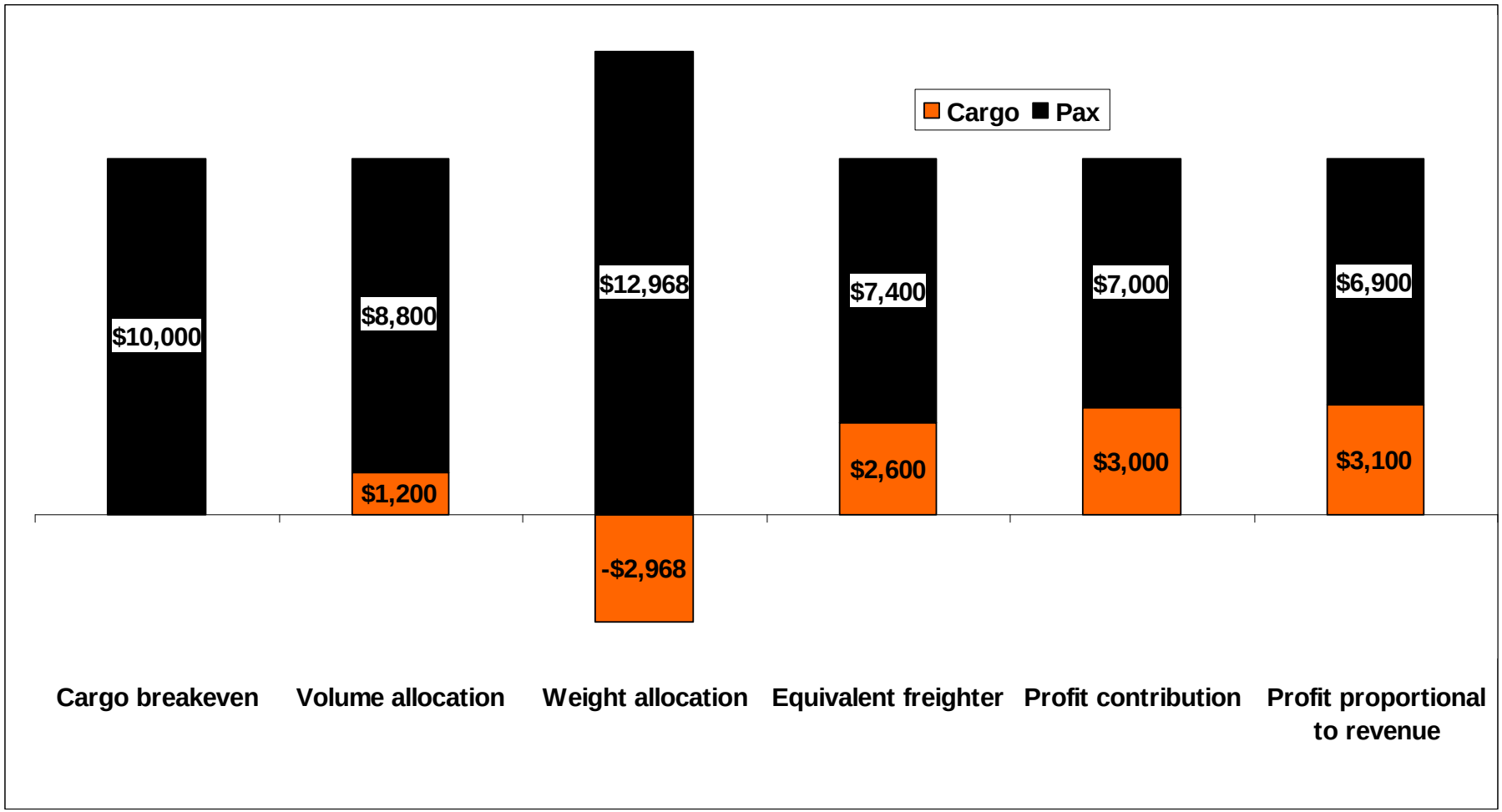
Costs allocated to pax (53.5% x $35,200) = $18,832

Costs allocated to cargo (46.5% x $35,200) = $16,368

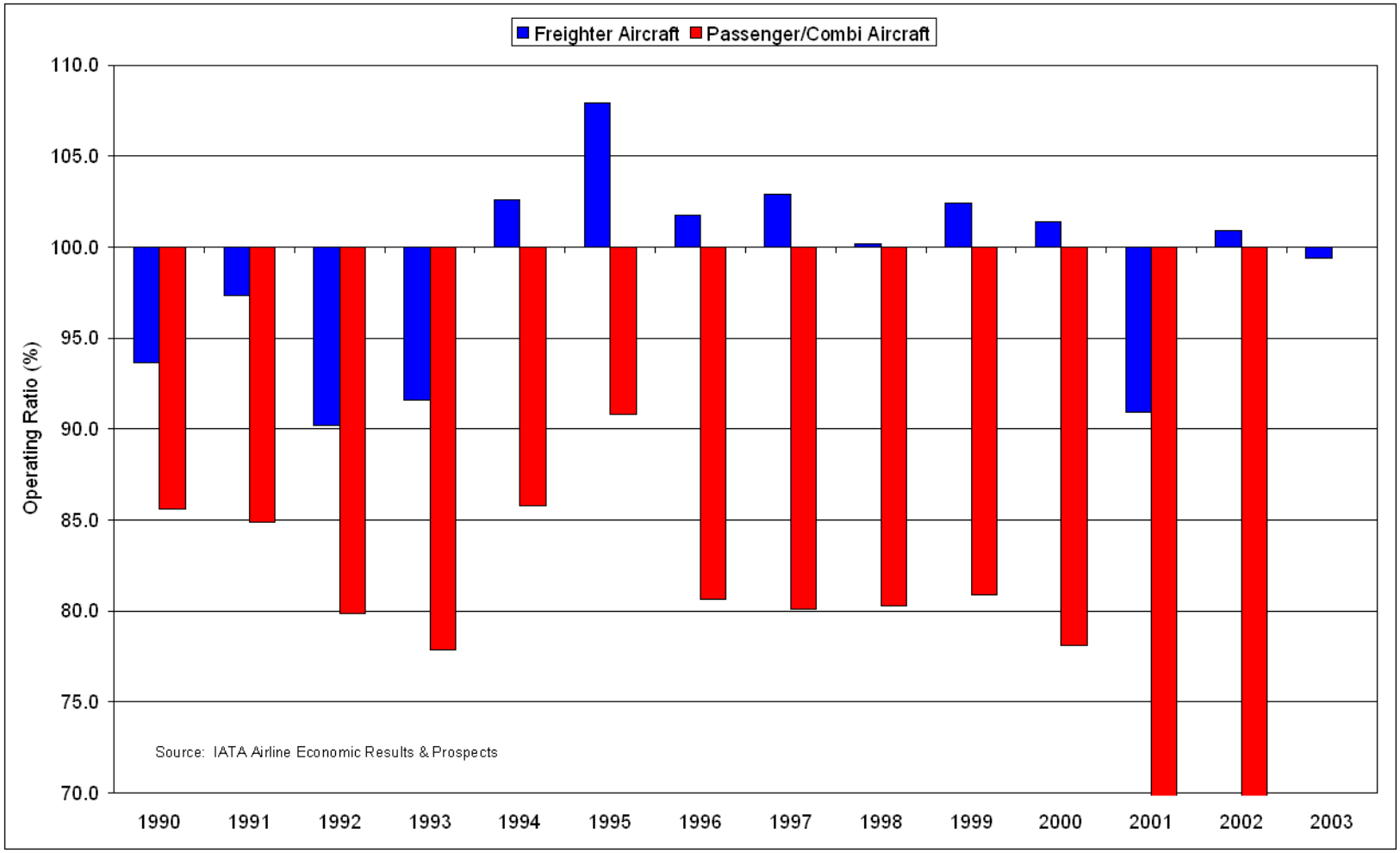
Pax profit = $52,200 – 20,400 – 18,832 = $12,968

Cargo profit = $23,700 – 10,300 – 16,368 = ($2,968)

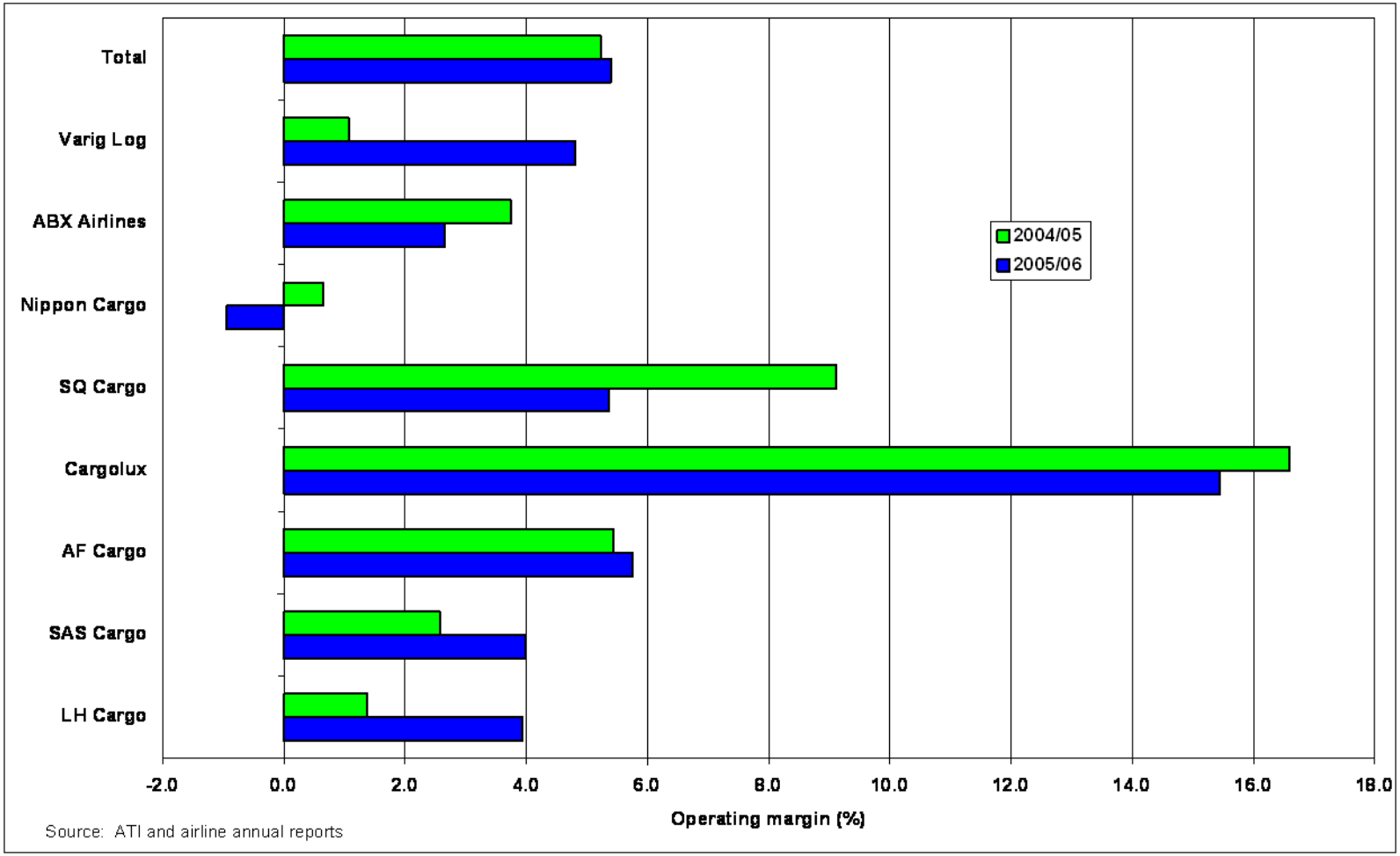
Profit Comparison: Allocation Methods for 747-300 Combi Example



IATA Airlines Air Cargo Financial Performance



Airline air cargo financial results



Lufthansa's Separate Cargo Corporation

- **Global Cargo Net**
- **Global Cargo Handling Services**
- **Global Freighter Operations**

Own planning and investment decisions

Greater cost and profit transparency

Better customer focus

But lose some economies of scale and need to negotiate rates for lower deck capacity with passenger business

Other WOW members follow, but JAL decides against

Quick Change Aircraft

- In Europe, passenger flights by day and cargo flights by night (Lufthansa/Deutsche Post and Aeropostale using B737-300)
- In USA, cargo flights during the week and passenger charters at week-ends (UPS using 113 seat B727 – to be discontinued end 2001)

Freighter Wet Leasing (1)

- Wet leasing of freighters from specialists such as Atlas Air (eg BA)
- Significant advantages for those airlines who could only justify small freighter fleet
- Allowed under EU Regulation 2407/92 only for ‘short-term’ or ‘exceptional needs
- Atlas formed UK company with 51% UK shareholding to get round restriction

Freighter Wet Leasing (2)

- **Forwarders and consolidators can also operate their own freighters on higher density routes:**

  Danzas on Hahn to Charlotte in US using A300F leased from Turkish carrier, MNG

  Panalpina on a number of routes using Cargolux (all part of Swissair group)

  EGL from Austin, Texas, to Taipei using Gemini DC10-30F

Conclusions

- ✓ **Cargo makes valuable contribution to passenger service economics, especially on long-haul flights**
- ✓ **Diversion of high yield cargo to integrators**
- ✓ **Cargo yields much lower than pax yields, but unit costs much lower; similar trends**
- ✓ **Fuel surcharges and exchange rates important in yield trends**
- ✓ **Cost allocation and pricing more complex than for passenger operations**
- ✓ **Aircraft utilisation (for new aircraft) and load factors for both directions crucial**