



SIP/2009-WP/11
Business case

Traffic Forecasts

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**Workshop on the Development of Business Case
for the Implementation of CNS/ATM Systems
(Antigua, 25 – 29 May 2009)**



Outline

- Planning parameters
- When ?
- Why ?
- How ?
 - Input
 - Basic forecasts
 - Peak period forecasts
 - Output
- Alternative forecast techniques



Planning parameters

- Annual number of flights
- The average daily number of flights
- The number of flights in the peak day
- The number of flights in the peak hour
- Peak instantaneous aircraft count
- Others



When?

- **New Air Navigation Services Facility**
- **Existing Operations**



Why?

➤ Physical Planning

- To define the air navigation services facilities required
- To determine the scale and timing of implementation

➤ Financial Planning

- To estimate capital and operating expenditure
- To estimate operating revenues
- To carry out Cost/Benefit & Cash Flow Analysis



Facts to consider

- Peak demand rather than annual demand must be used in order to evaluate requirements
- Traffic Peaks by hour of the day, by day of the week, and by week and month of the year
- The level of detail of the forecast requirements will depend on the planning phase



Why study peaking

- Capacity utilization most critical during daily and hourly traffic peaks
- Peaking continues as markets grow
- The distribution of demand over any period is predictable



Peak-period analysis examples

- ASECNA FIRs
- Jeddah FIR
- Muscat FIR

Available on the CAFEIA website



Input: Historic data

- **Yearly, monthly and daily aircraft movements**
- **Fleet mix and capacity**
- **Load factors**
- **Peak period parameters**
- **Historic data for passenger traffic**



Basic forecasts

- Forecast of passenger traffic
- Assumptions of future trends for fleet mix & average aircraft size
- Assumptions for future load factors
- Unconstrained aircraft movements by type



Movements forecast development

$$\text{Movements} = \frac{\text{Passengers}}{(\text{Load factor}) * (\text{Average Seat})}$$



Peak period forecasts

- Analysis of time profile of air traffic
- Ratios of busy periods applied to annual, monthly or weekly traffic
- Trend projection of these ratios
- Factors affecting peak period traffic trends:
 - Business & holiday traffic mix
 - Curfews at airports
 - Changing route patterns



Output:

Planning parameters

- **Annual number of flights**
- **The average daily number of flights**
- **The number of flights in the peak day**
- **The number of flights in the peak hour**
- **Peak instantaneous aircraft count**
- **Others**
 - **Average day of the peak month or week traffic**
 - **Peak day of the average month or week traffic**
 - **Peak hour of the average day traffic**



Alternative Forecast Techniques

Quantitative

Time-Series Analysis

Causal Methods

Ratio Analysis

Trend Projection

Moving Averages

Spectral Analysis

Adaptive Filtering

Box-Jenkins

Qualitative

Judgement

Delphi

Technological

Decision

Analysis

Market Research

System Dynamics

Heuristic

Probabilistic

Regression

Econometric

Simulation

Bayesian

Spatial Equilibrium

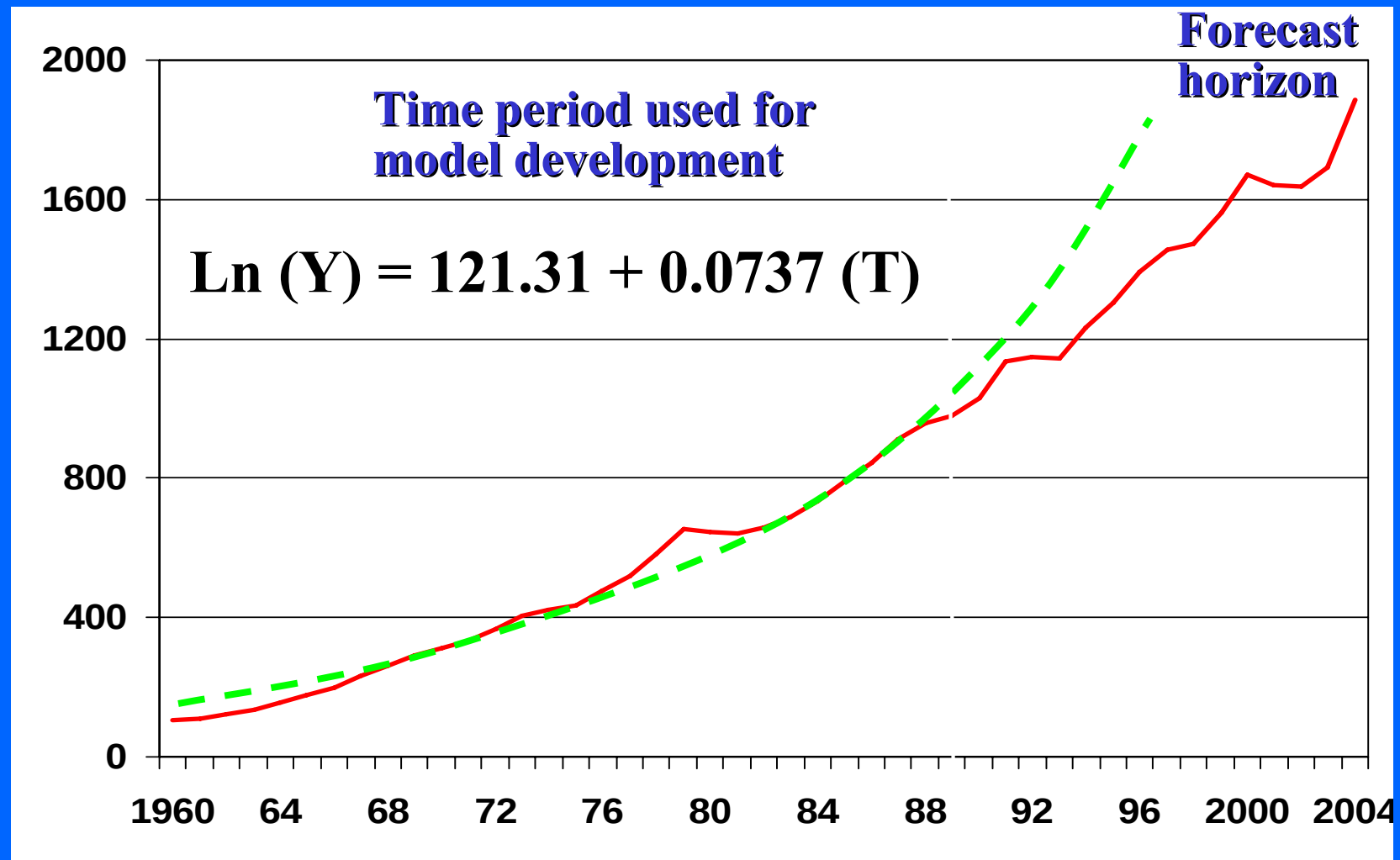


Time series analysis



An example of trend projection

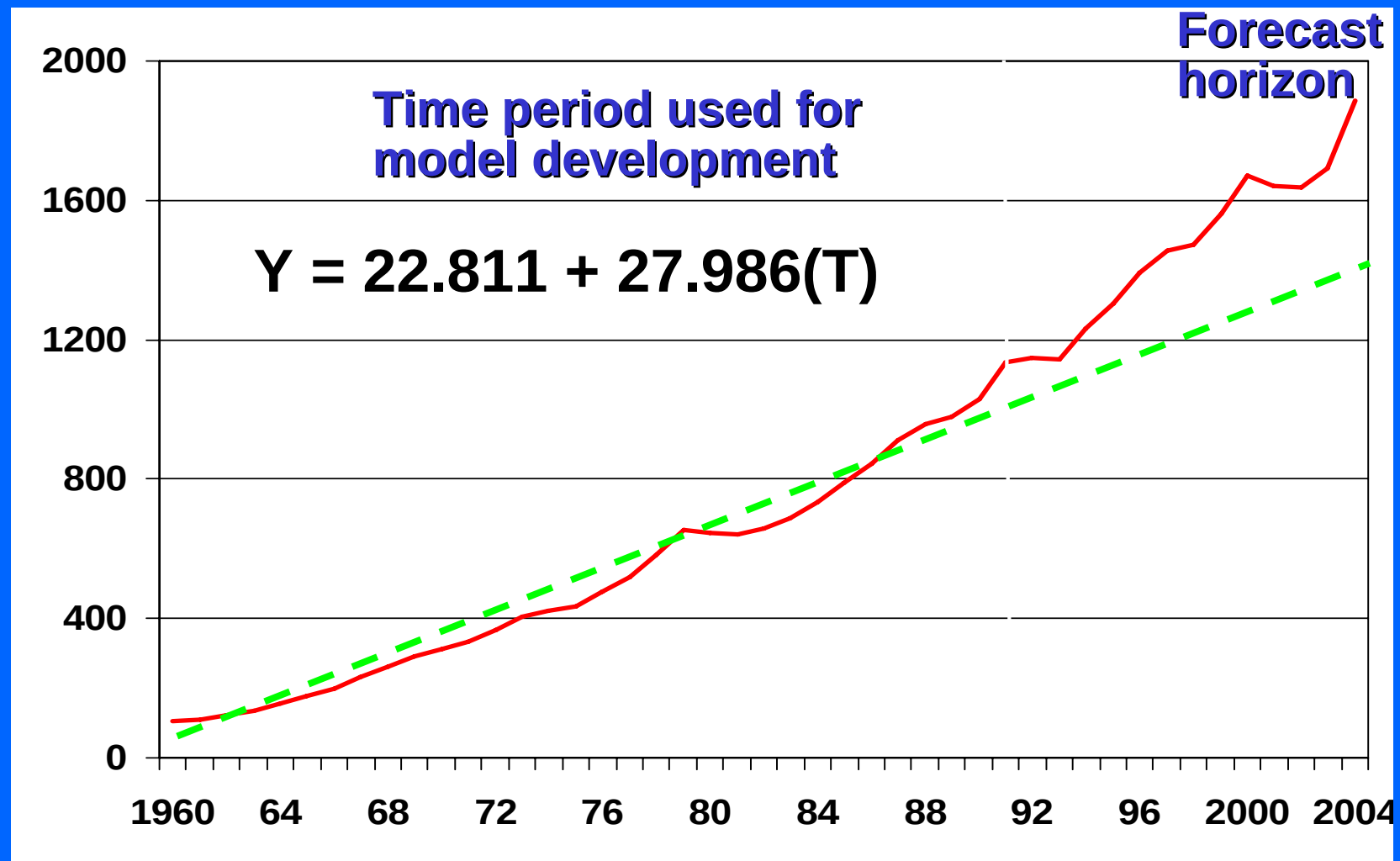
World Passenger Traffic (Scheduled Services)





An example of trend projection

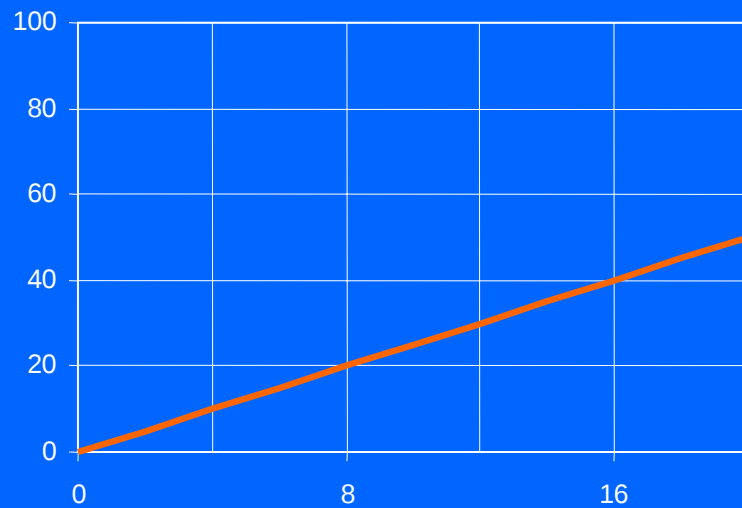
World Passenger Traffic (Scheduled Services)



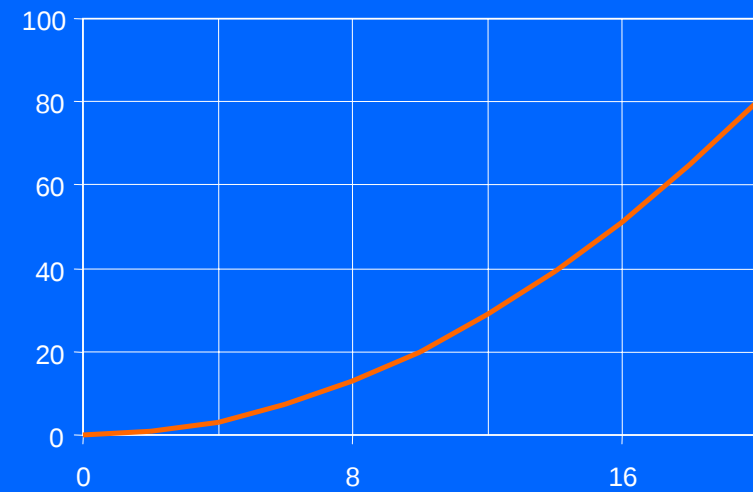


Types of Trends

Linear



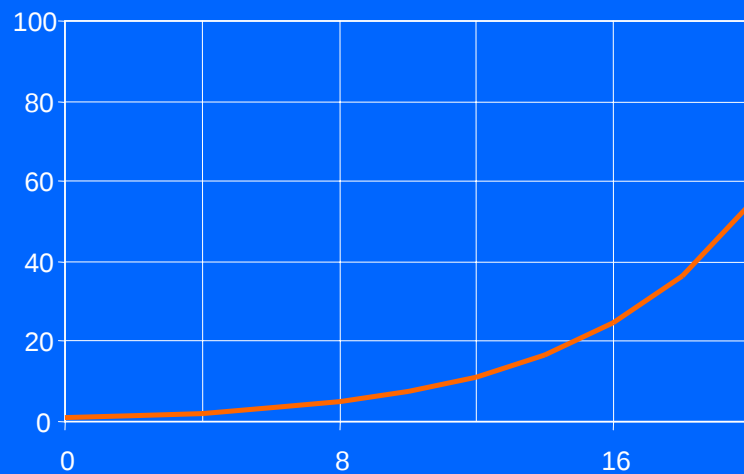
Polynomial



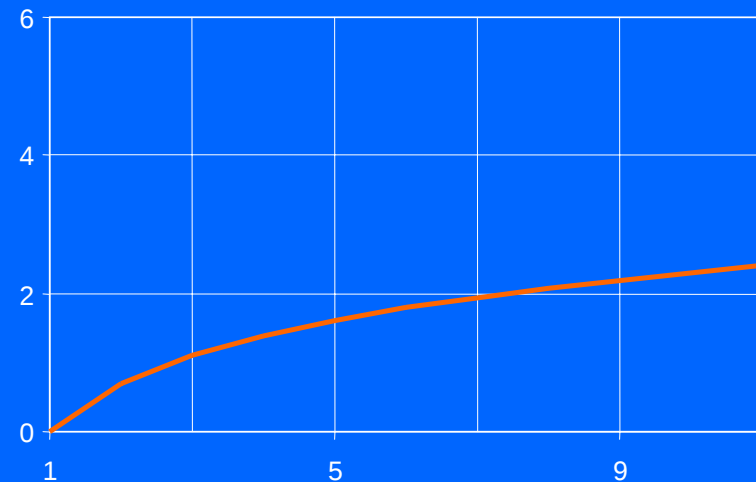


Types of trends

Exponential



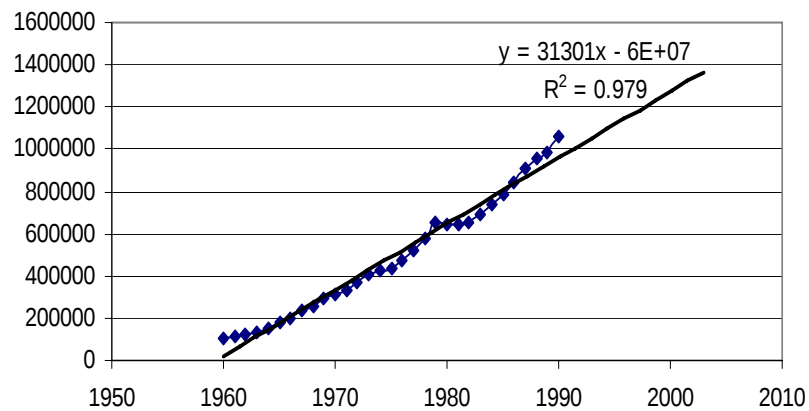
Logarithmic



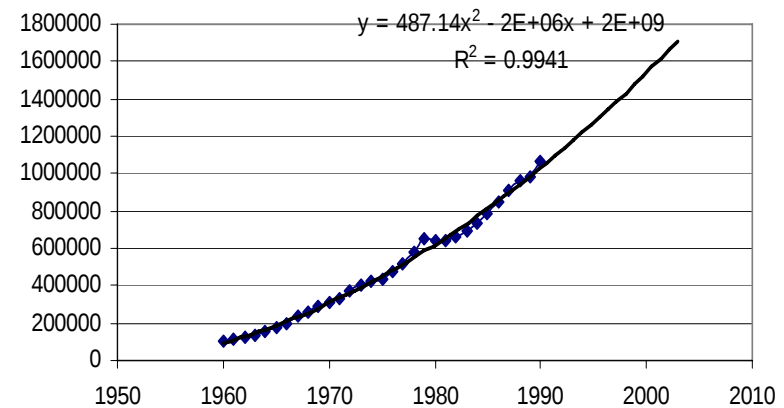


World passenger air traffic trend

Linear Trend



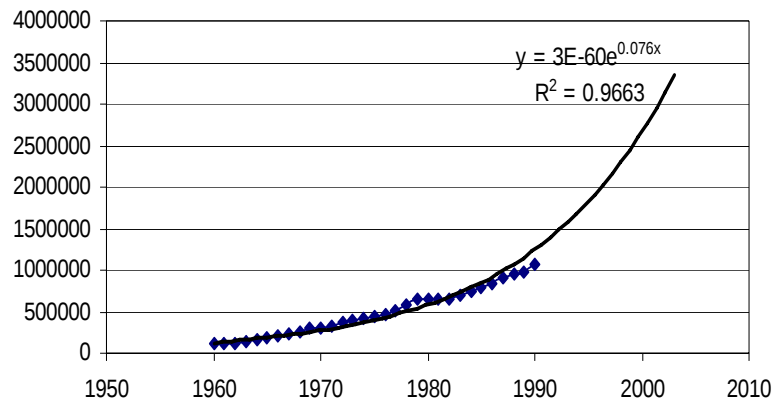
Polynomial Trend



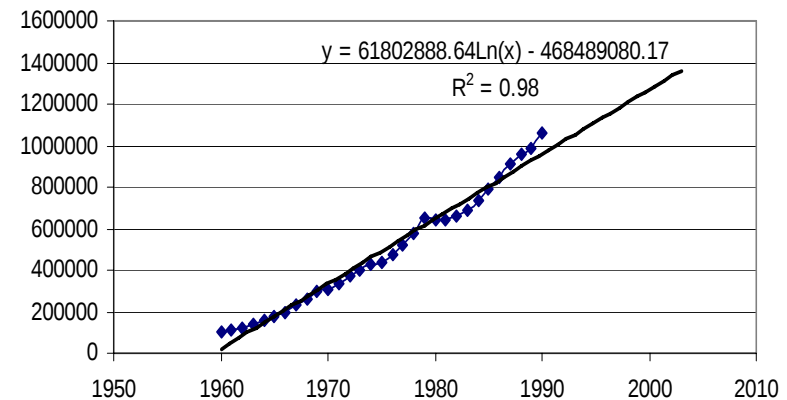


World passenger air traffic trend

Exponential Trend

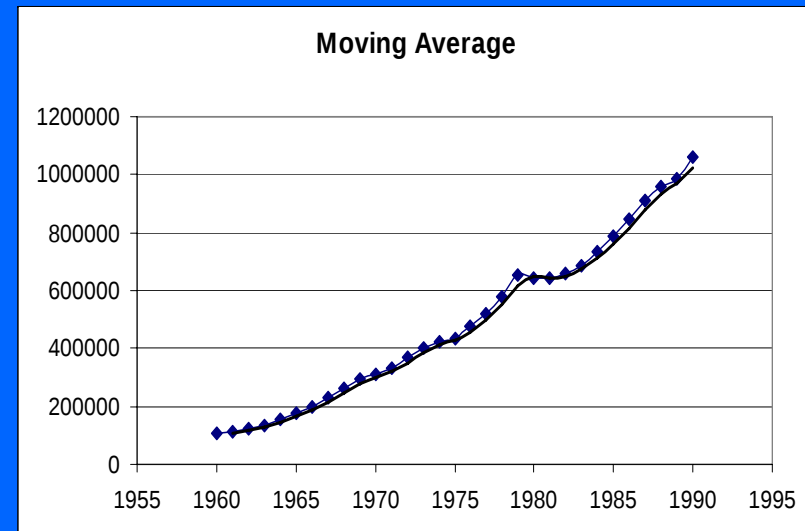
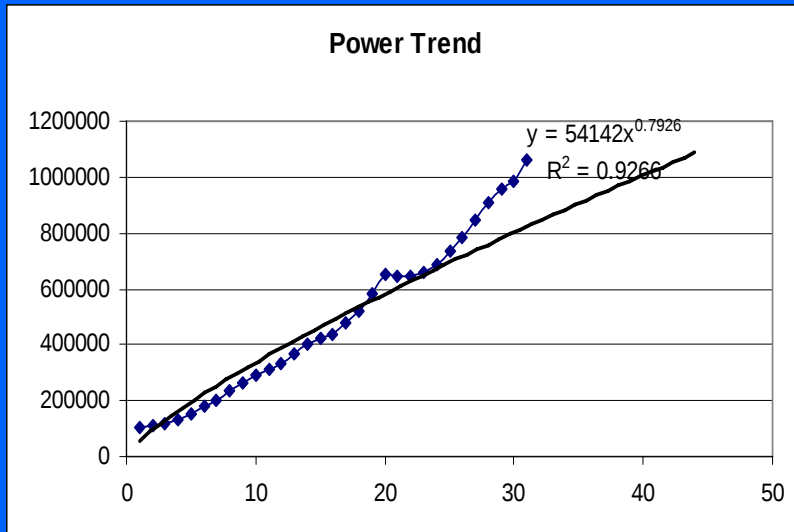


Logarithmic Trend





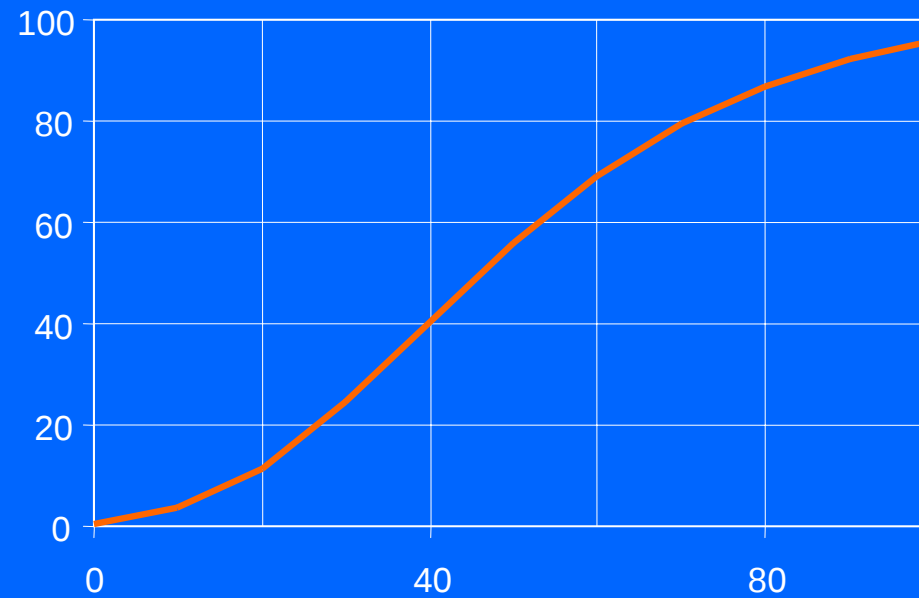
World passenger air traffic trend





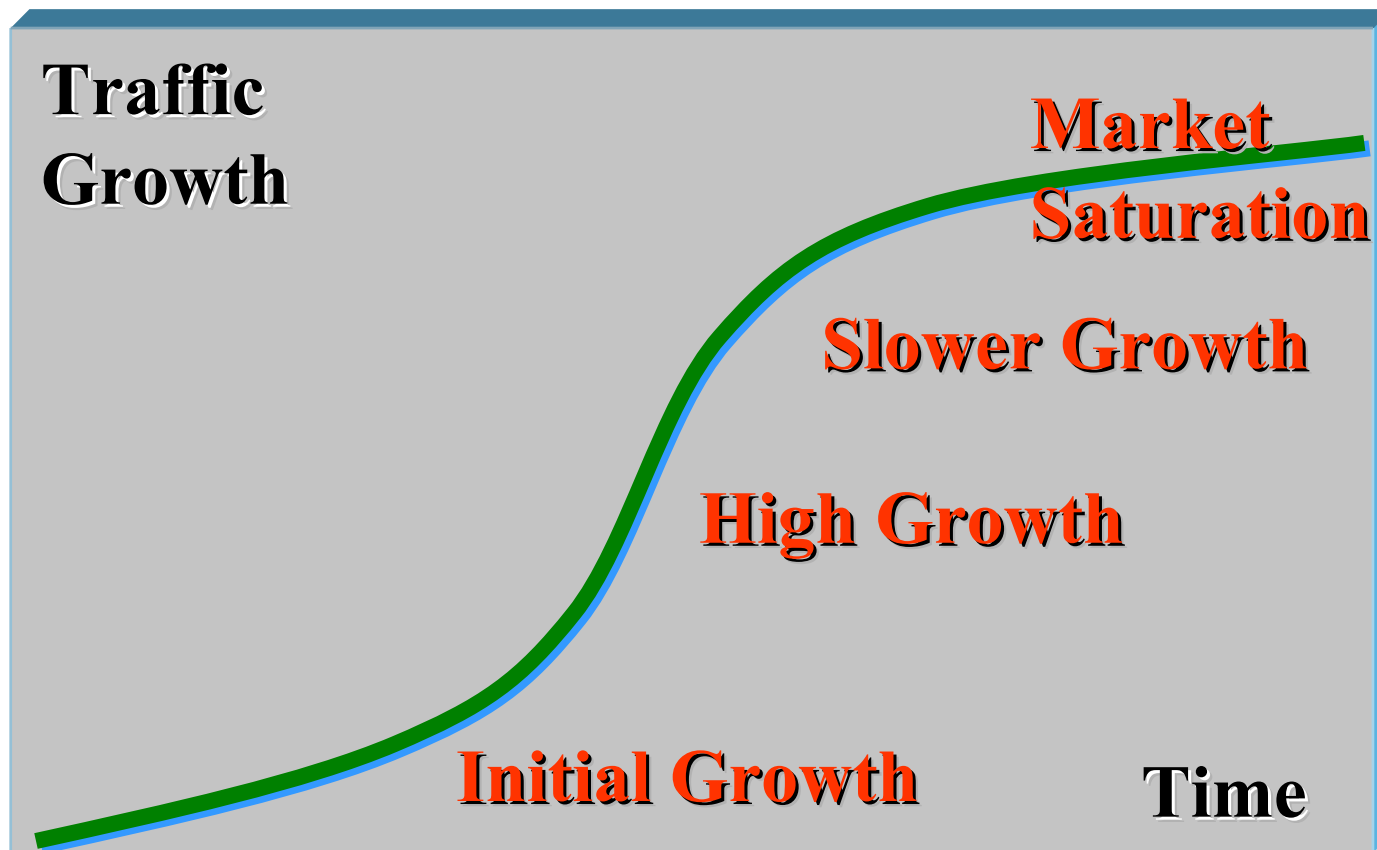
Types of trends

Gompertz





Non-linear growth trends (S-Curves)





Econometric analysis

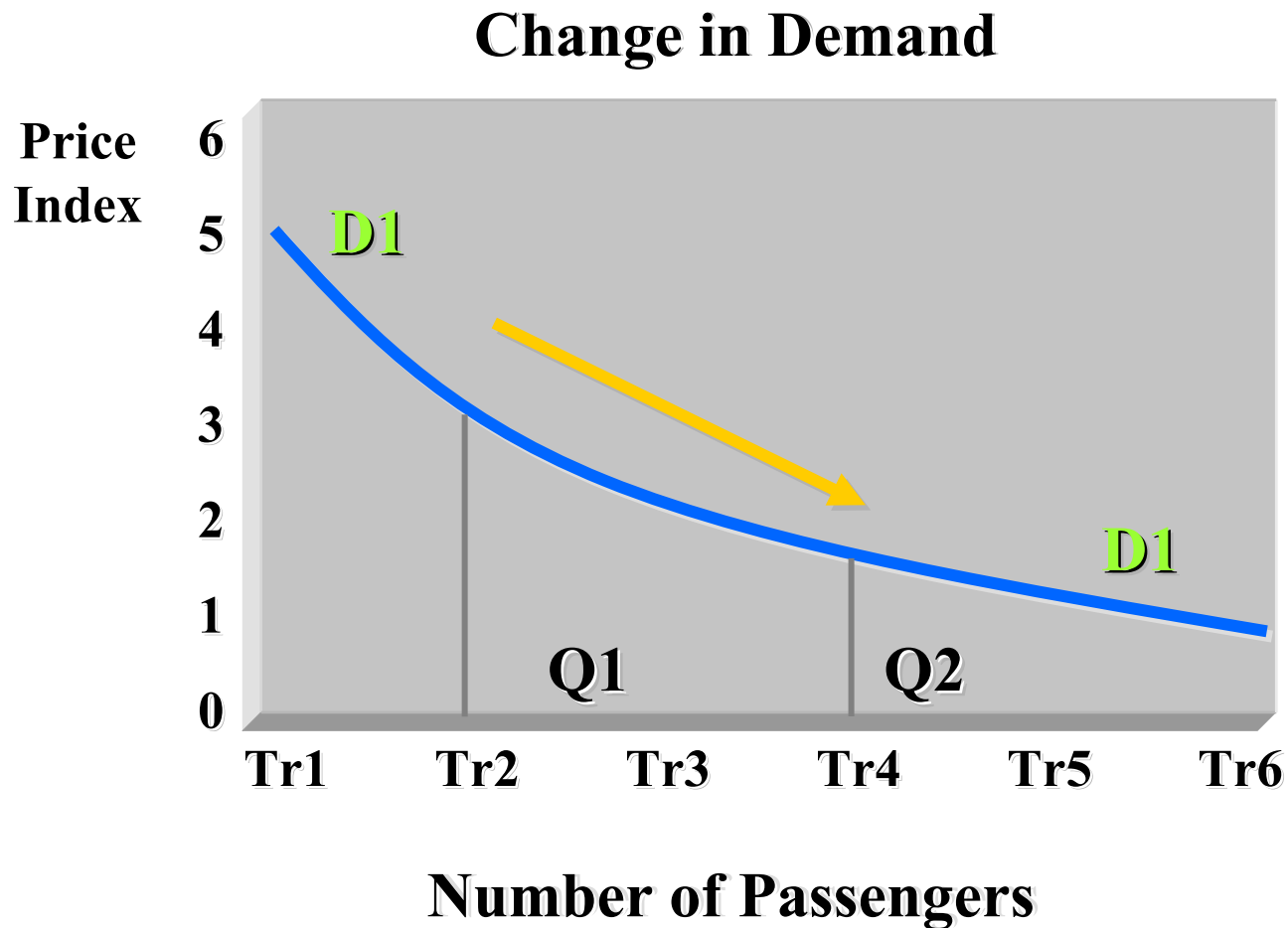


Variables' impact on traffic growth trends

- **Cause a change in the demand curve**
- **Cause a shift in the demand curve**



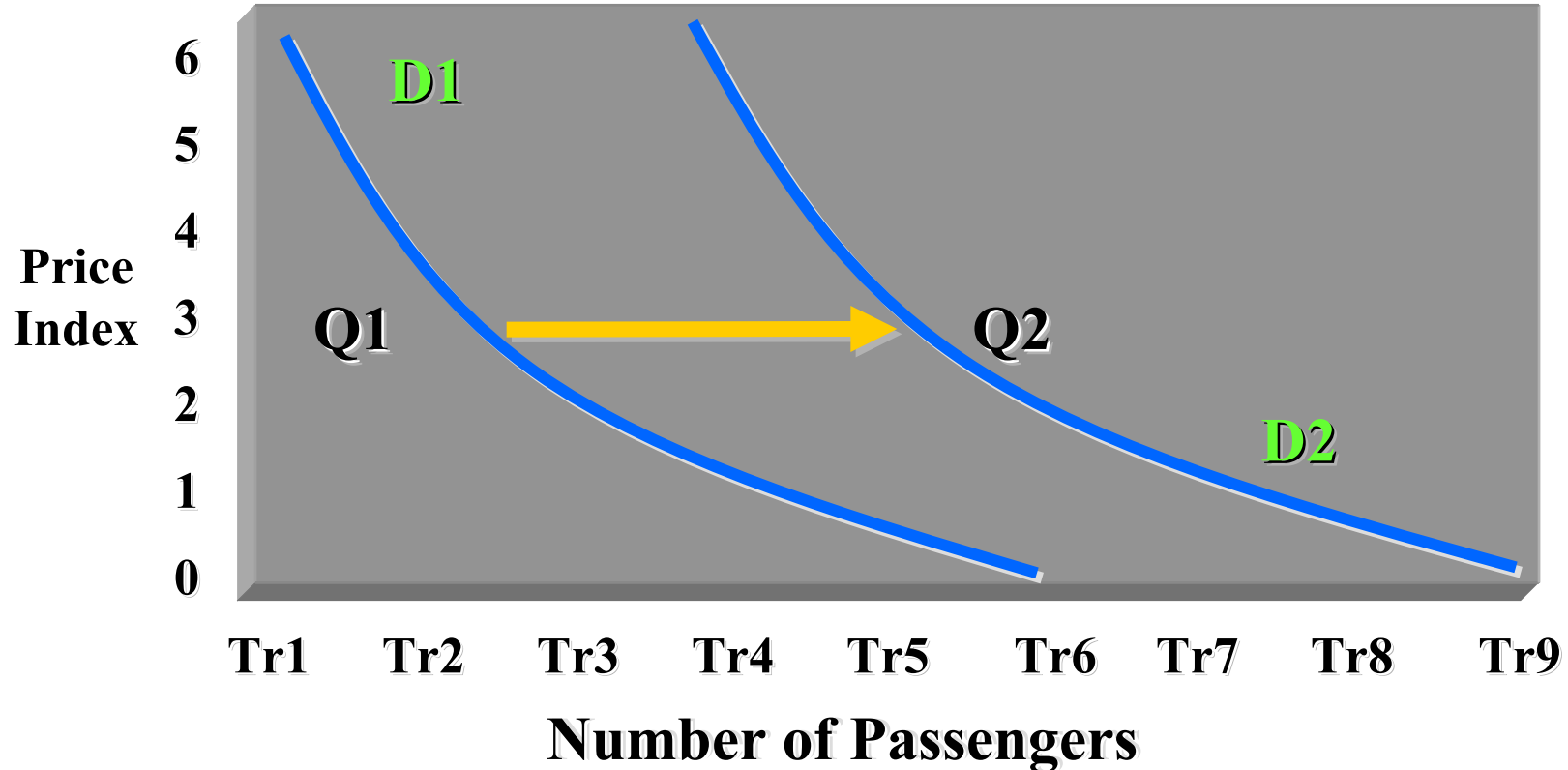
Variables' impact on traffic growth trends ...





Variables' impact on traffic growth trends ...

Demand Shifts with Time





Market Potential





References

- ICAO Airport Planning Manual (Doc 9184-AN/902), part 1, Chapter 3
- ICAO Manual on Air Traffic Forecasting (Doc 8991/2)
- Reports on the Traffic Forecasting Groups (TFGs)

