First Air & Canadian North

A "Controversial" Airline Merger

Northern Canada

- Most communities are located on the islands which makes the road traffic network limited
- Due to the harsh geographical location, the northern communities heavily depend on air shipment for goods supply

Nunavut

Yukon

Northwest Territories

FirstAir

Canadian North
seriously northern

Timeline

First Air Founded

Serving 32 communities in Nunavut and NWT

1946

Canadian North Founded

Serving 16 communities in Nunavut and NWT

1989

Proposal to Merge

Inefficient operations of the overlapping flight schedules

2018

Competition Bureau Recommended Against the Merger

Concerns for “merger to monopoly”

2019

Merger Approved

Government of Canada approved the merger for “public interest”

2019

Anticompetitive Concerns

1

Significant Competition Between First Air & Canadian North

2

Airline Market Dynamics & High Barrier to Entry

- Extreme climate conditions
- High capital costs for the required equipments
- Small population density

3

Potential Merger to Monopoly

- Smaller passenger/cargo capacity
- Fewer flights
- Higher prices

Public Interests?

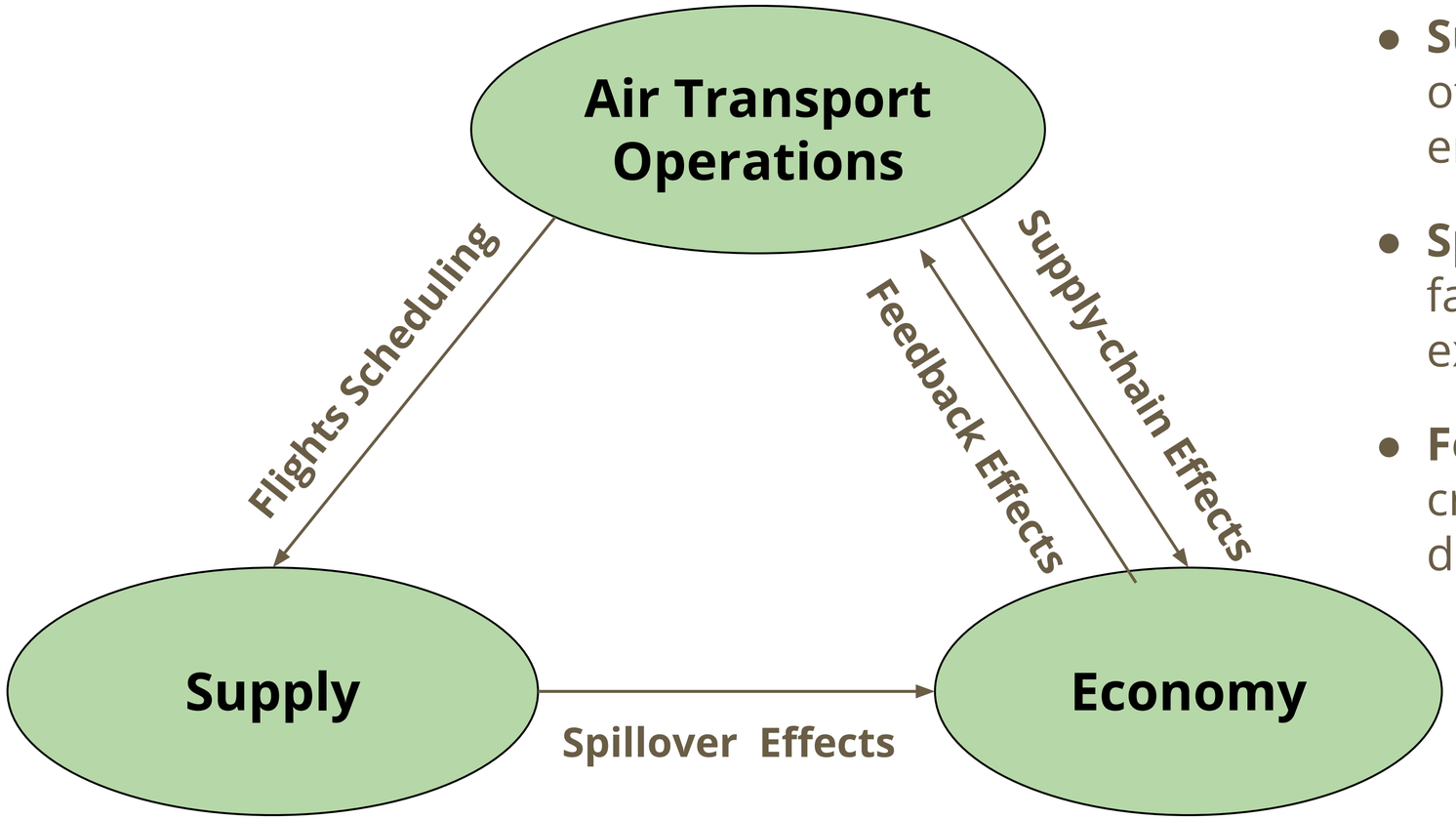
- **Anticipated benefits of the merger:**
  - Improved connections and new routes for Northern communities
  - Enhanced safety of aircrafts
  - Expanded business related to natural resources.

- The Government of Canada still approved the merger due to "**public interests**" considerations which were undefined.

Does the merger actually make an impact on public interests ?

Is there a causal relationship running from airline service to economic development in Northern Canada ?

Air service - Economy Interactions



- **Supply-chain Effects:** led by the operation of aviation industry, generating employment and expenditures.
- **Spillover Effects:** led by air service supply, facilitating tourism, trades, market expansion.
- **Feedback Effects:** led by economic growth, creating capital investments and travel demands.

Bidirectional Causality!

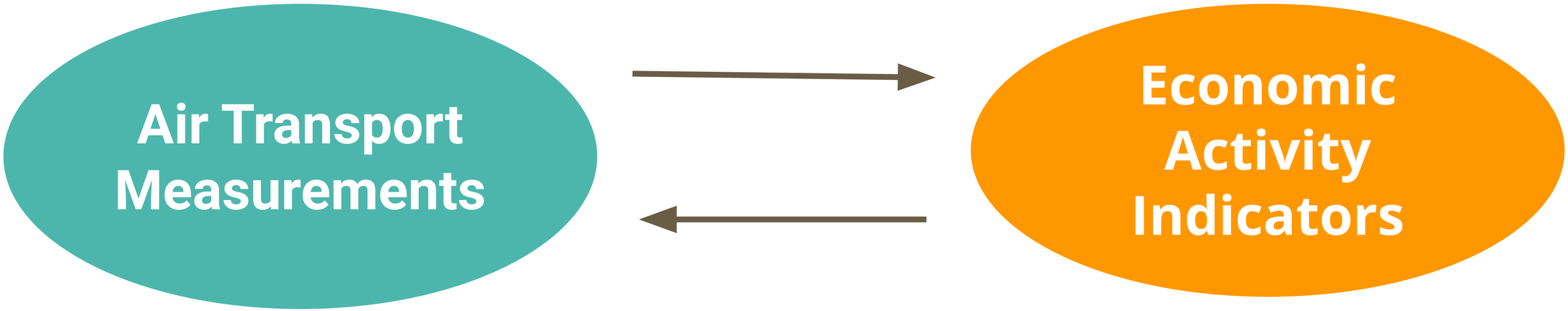
Data & Methodology

Granger Causality Test

Cointegration

Stationarity

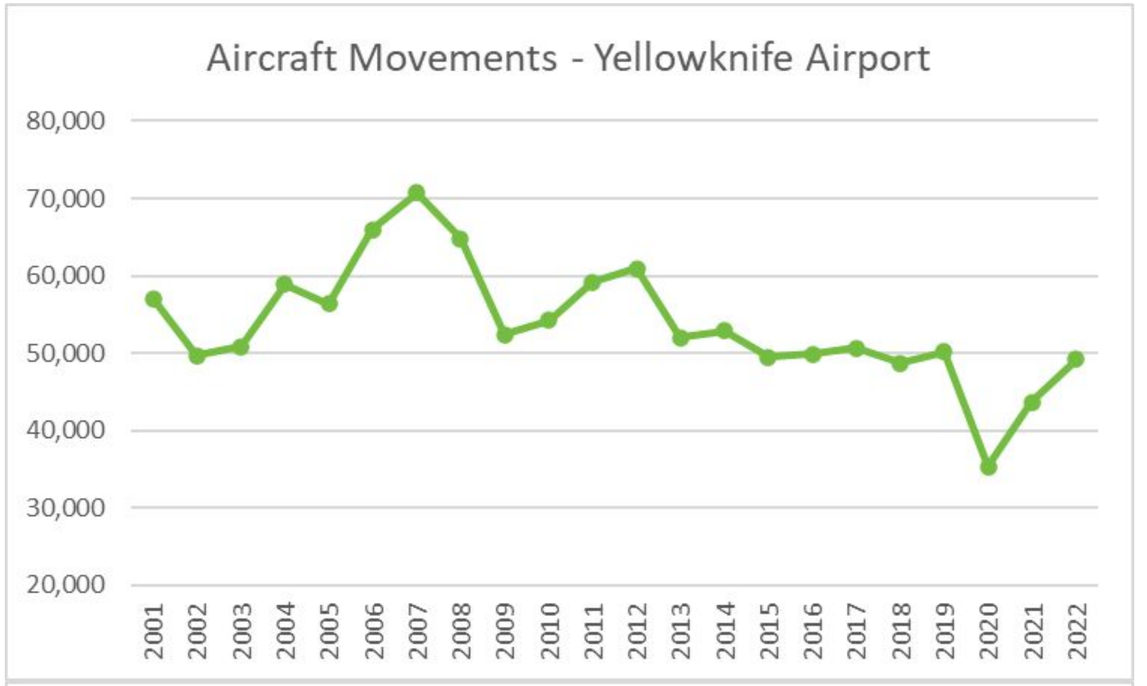
Causal Relationship

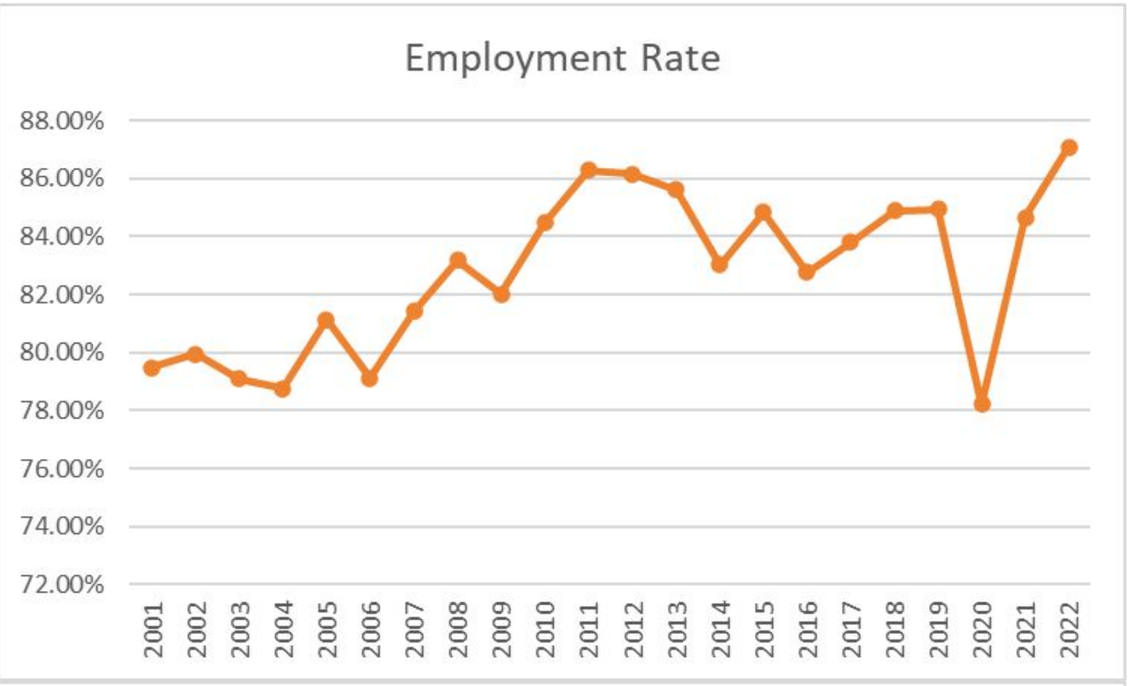


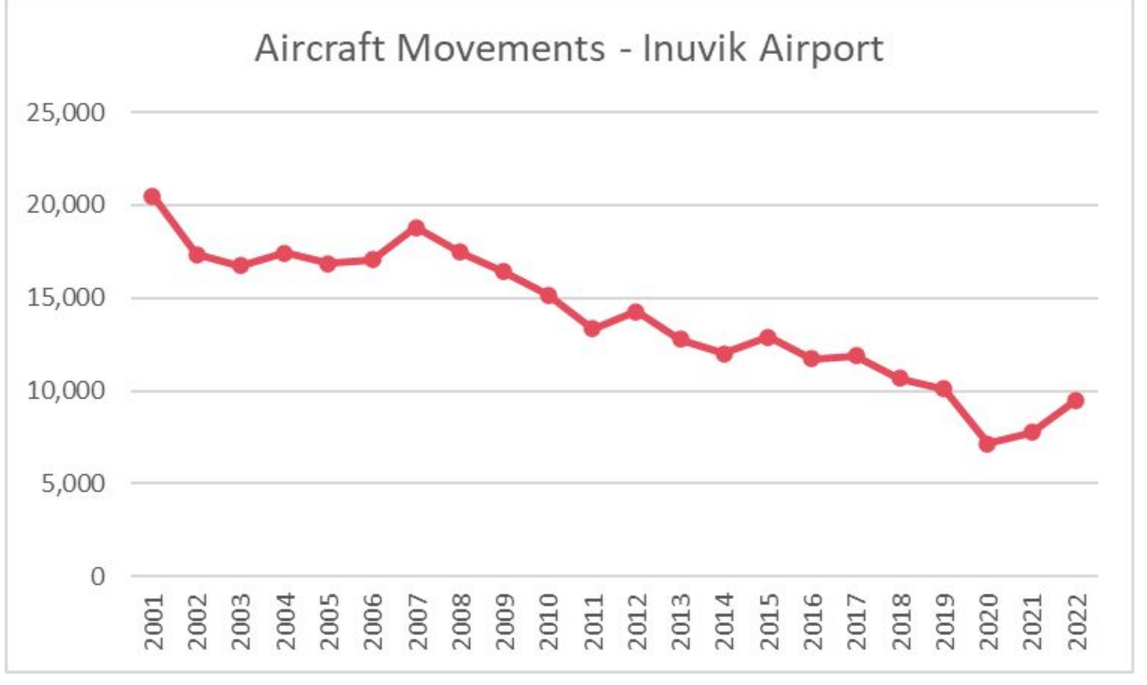
- Aircrafts Movements at **4** majors airports in Nunavut & NWT

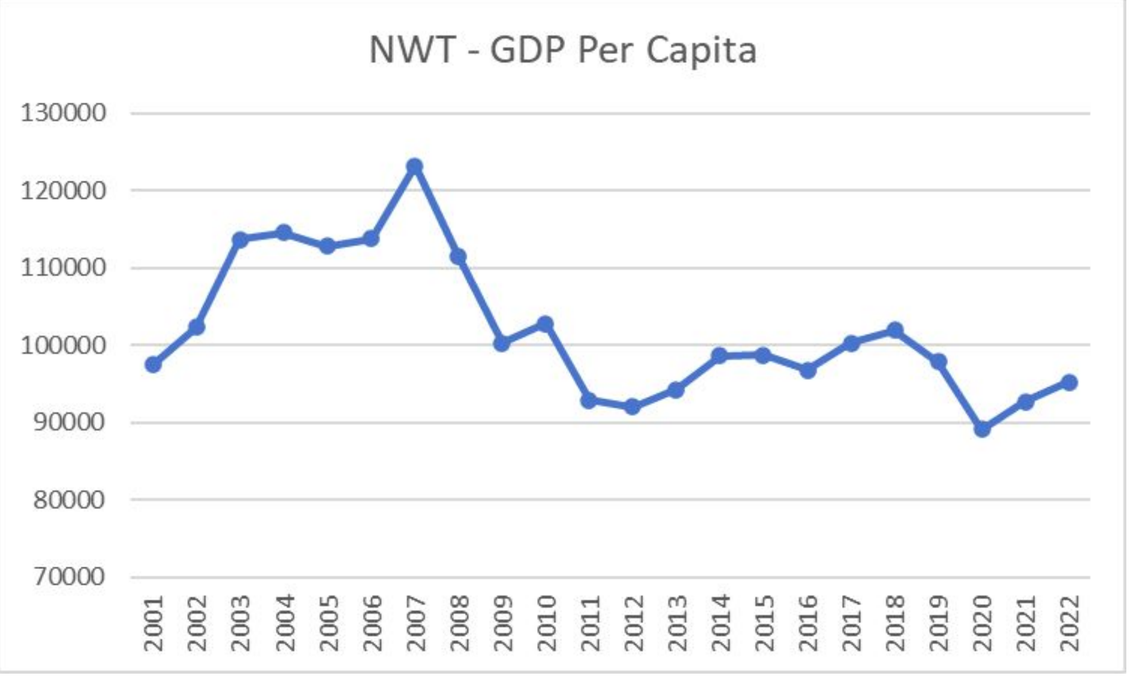
- GDP Per Capita of both NWT and Nunavut

Source: Statistics Canada


Aircraft Movements - Yellowknife Airport
80,000
70,000
60,000
50,000
40,000
30,000
20,000
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

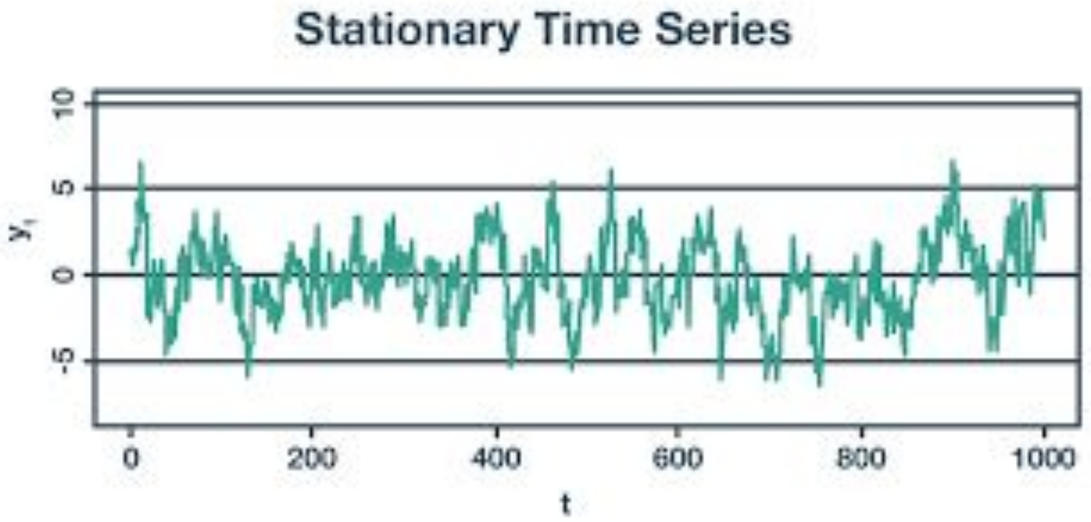

Employment Rate
88.00%
86.00%
84.00%
82.00%
80.00%
78.00%
76.00%
74.00%
72.00%
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

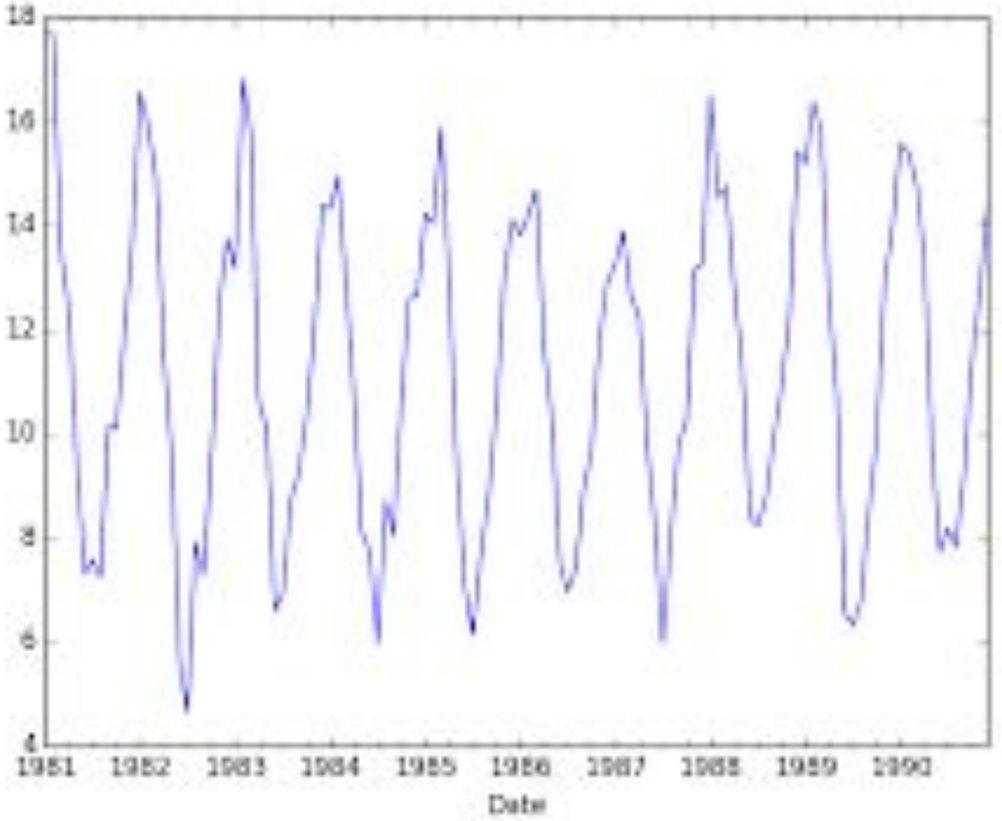

Aircraft Movements - Inuvik Airport
25,000
20,000
15,000
10,000
5,000
0
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022


NWT - GDP Per Capita
130000
120000
110000
100000
90000
80000
70000
2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

Stationarity

- Constant mean and variance over time
- Constant autocorrelation structures
- No periodic trend (seasonality)





Vector Autoregression Model

The VAR model of X and Y consists of the following two ADL (Autoregressive Distributed Lag) models:

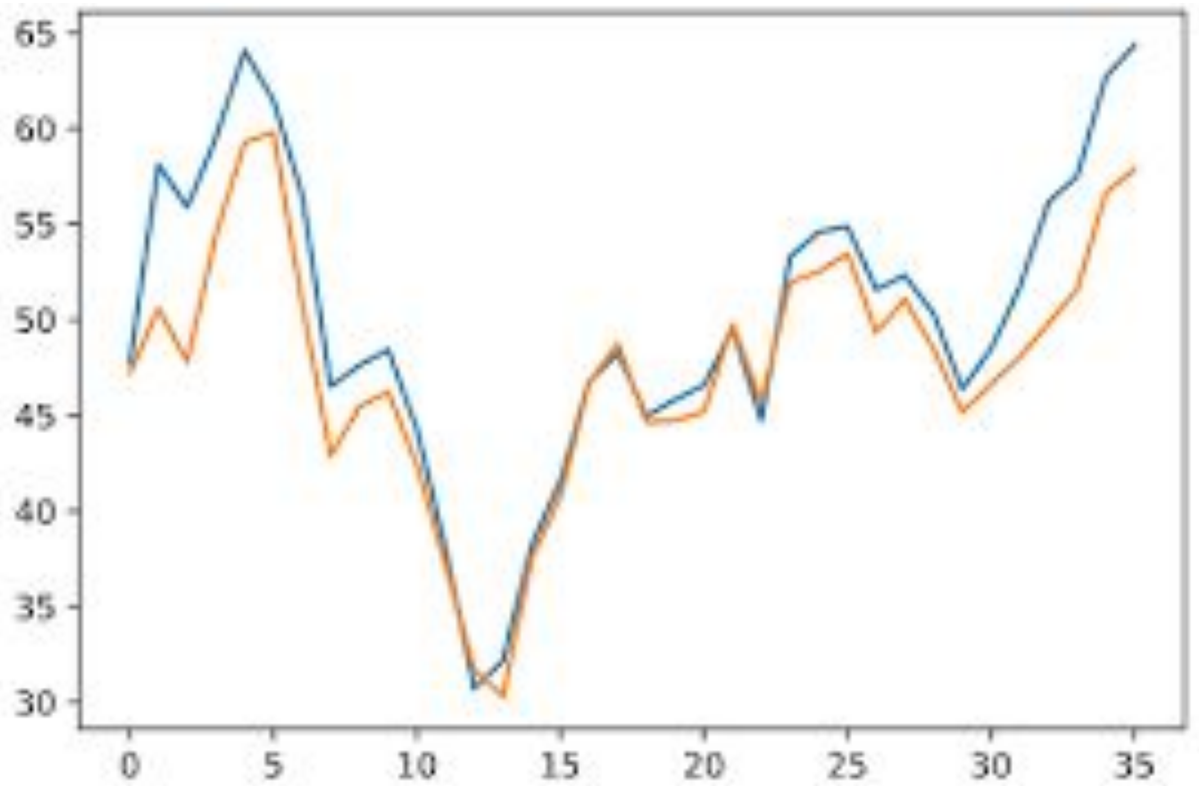
$$Y_t = \alpha_1 + \delta_{11} Y_{t-1} + \cdots + \delta_{1p} Y_{t-p} + \beta_{11} X_{t-1} + \cdots + \beta_{1q} X_{t-q} + \epsilon_{1t}$$

$$X_t = \alpha_2 + \delta_{21} X_{t-1} + \cdots + \delta_{2p} X_{t-p} + \beta_{21} Y_{t-1} + \cdots + \beta_{2q} Y_{t-q} + \epsilon_{2t}$$

- VAR Model captures short-run causal relationships only
- If no lagged values of X (or Y) are significant in equation for Y (or X), then it indicates that X (or Y) does not Granger-cause Y (or X).

Cointegration

- Macro-economic data are usually non-stationary by nature
- The linear combination of two or more non-stationary time-series data is stationary
- Relevant movements are constrained around some equilibrium



Vector Error Correction Model

- Specifically designed for cointegrated time-series data when there is a long-term relationship between X and Y
- Suppose the long-term relationship is modeled as $Y_t = b + kX_t + \varepsilon_t$

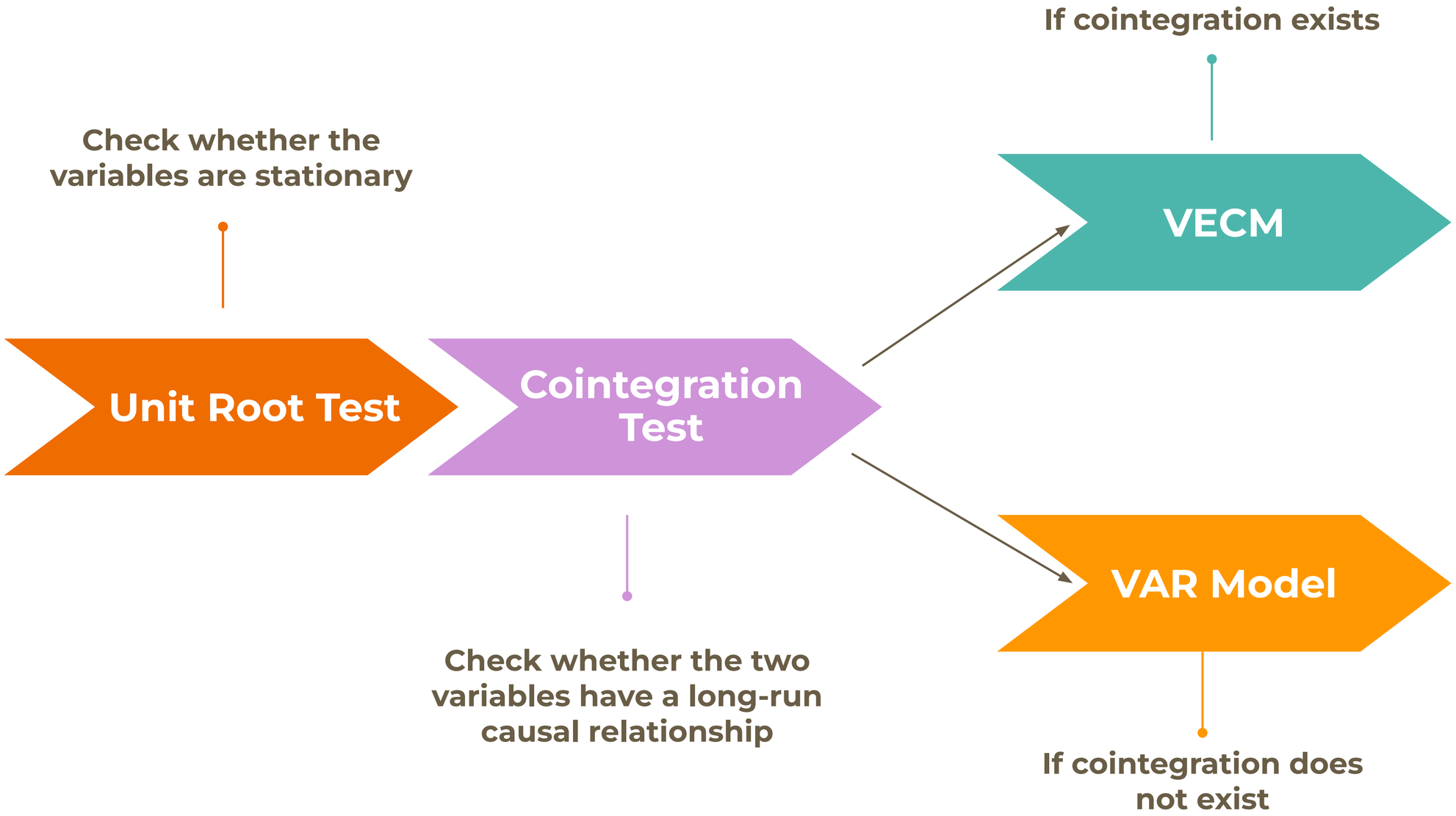
  with Error Correction Term $\mathrm{ETC_t} = Y_t - b - kX_t$.

- The VEC model captures both short-run dynamics and long-run equilibrium by the form

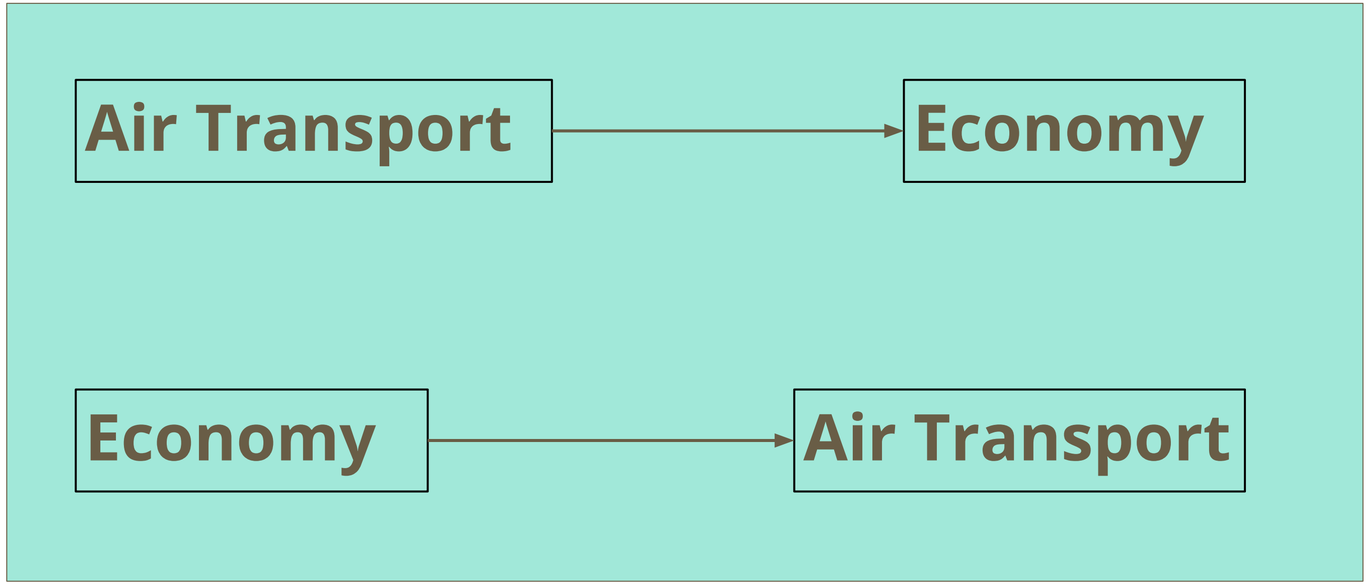
$$\Delta y_t = \alpha_1 + \sum_{i=1}^{p-1} \Delta y_{t-i} + \sum_{j=1}^{q-1} \Delta x_{t-j} + \varphi_1 ETC_{t-1} + \epsilon_{1t}$$

$$\Delta x_t = \alpha_2 + \sum_{i=1}^{p-1} \Delta x_{t-i} + \sum_{j=1}^{q-1} \Delta y_{t-j} + \varphi_2 ETC_{t-1} + \epsilon_{2t}$$

Causality Test Process



Causal Result Implications



Thank you
Q&A