Benchmarking, Seasonal Adjustment and Time series analysis for QGDP

- Benchmarking Principles in QNA
- The Denton PFD method
- Enhanced formula for extrapolation
- Benchmarking and revisions
- What is seasonal adjustment?
- Principles of time series decomposition
- Seasonal adjustment methods
- Seasonal adjustment – particular issues
- Revisions Policy
- Aggregation Constraints
- Unusual events: outliers

Benchmarking

- Benchmarking refers to the procedures used to maintain consistency among the time series available at different frequencies for the same target variable.

- In the QNA, benchmarking usually consists of adjusting quarterly data to match annual (or quinquennial) benchmarks.

- Quarterly values of indicators are modified so that the annual sums (or average) of the adjusted values are equal to the corresponding ANA benchmarks, which are considered the more comprehensive and accurate measurement in level of national accounts variables.

Objectives of Benchmarking

Quarterly compilation involves:

- Establishing a set of quarterly national accounts for periods the annual estimates are available

- Updating a set of quarterly national accounts - derivation of quarterly estimates for most current periods with no annual estimates

Golden rules of Benchmarking

- A benchmarking procedure should satisfy two requirements at the same time:
  - *Preserve as much as possible the short-term movements in the quarterly source data under the restrictions provided by the annual data*
  - *Ensure, for the forward series, that the sum of the four quarters of the current year is as close as possible to the unknown future annual data*

What is Seasonal Adjustment?

■ It is a process intended to *identify* and *remove* seasonal fluctuations and calendar effects from time series data.

– *These effects occur repeatedly and regularly every year, and are commonly identified as:*

■ Seasonal component (or seasonality)
■ Calendar (related) component

Seasonality

- ■ It refers to events that take place periodically, i.e. year to year, with a similar pattern and magnitude
  - – *Weather seasons: to a greater or lesser extent, weather conditions change during the year, more/less rain, warmer/colder environment => natural growth cycle.*
  - – *Induced seasonality: inherited condition due to a relationship with seasonal activities => canning fruit industry, wrapping paper production.*

Calendar related effects

- Since a solar year is not divided in an exact number of weeks (365 is not a multiple of 7), the occurrence of each type of days of the week within same months/quarters will/may not be the same.

  - *For example: January 2011 and 2012 have both 31 days, however, Jan. 2011 includes 10 weekend days while Jan. 2012 only 9.*

  - *If a daily pattern "of activity" exists within the week, and such differences of days exist, then there will be an impact in monthly/quarterly measures. This is called:* **Trading (or working) day effect**

- The last effect we would like to account for is related to moving holidays.
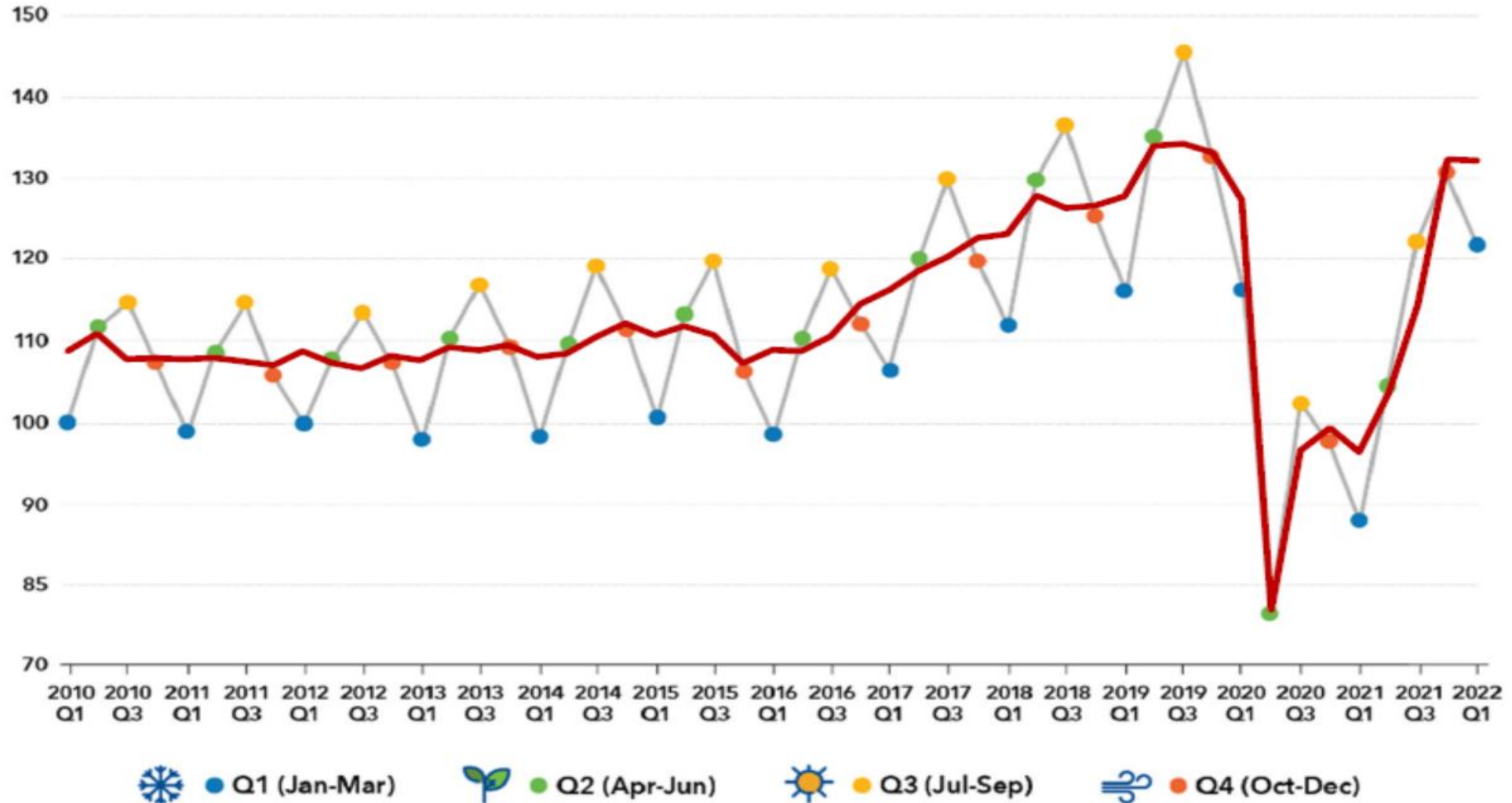
  - *Ramadan, Eid-Ul-Azha etc.*

Seasonal Adjustment

Example of Quarterly Series with Seasonality

Legend:
- Q1 (Jan-Mar)
- Q2 (Apr-Jun)
- Q3 (Jul-Sep)
- Q4 (Oct-Dec)
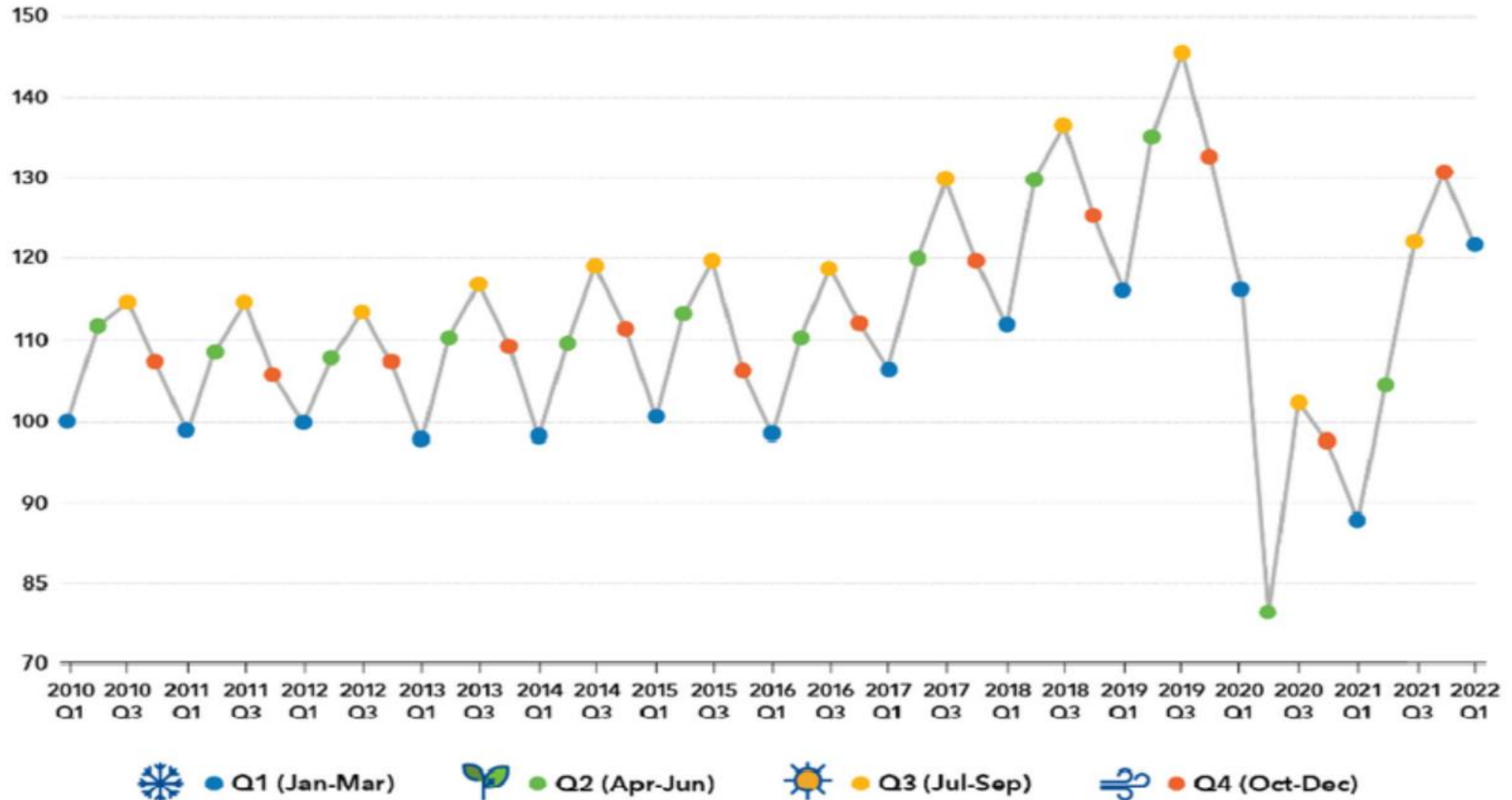
Seasonal Adjustment

Example of Quarterly Series with Seasonality

Calendar Related Effects

▶ **Trading day or working day effect**

- ◆ The occurrence of each type of days (number of Mondays, Tuesdays, etc.) of the week within same months may not be the same from year to year

- ◆ If a daily pattern "of activity" exists within the week, and such differences of days exist, then there will be an impact in monthly/quarterly measures.

January													
2011							**2012**						
Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
					1	1							1
1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1
1							1	1					
Total 5	4	4	4	4	5	5	5	5	4	4	4	4	5
Week days					21		Week days					22	
						10							9
					Weekend days							Weekend days	

Growth rate   4.8   -10.0

In 2011, January had 21 working days, but in 2012 it had 22!