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Multiyear Cycles: the Case of International Sport Events

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Multiyear Cycles – Introduction

- Seasonal adjustment removes predictable, recurrent **within-a-year** patterns (annual or higher frequency)
- Eurostat guidelines on seasonal adjustment:
  *"Usual seasonal fluctuations mean those movements which **recur** with similar intensity **in the same season each year** and which, on the basis of the past movements of the time series in question and under normal circumstances, **can be expected to recur**."*
- Goal of SA: remove repeating patterns or events; facilitate interpretation of underlying phenomena

Multiyear Cycles – Introduction

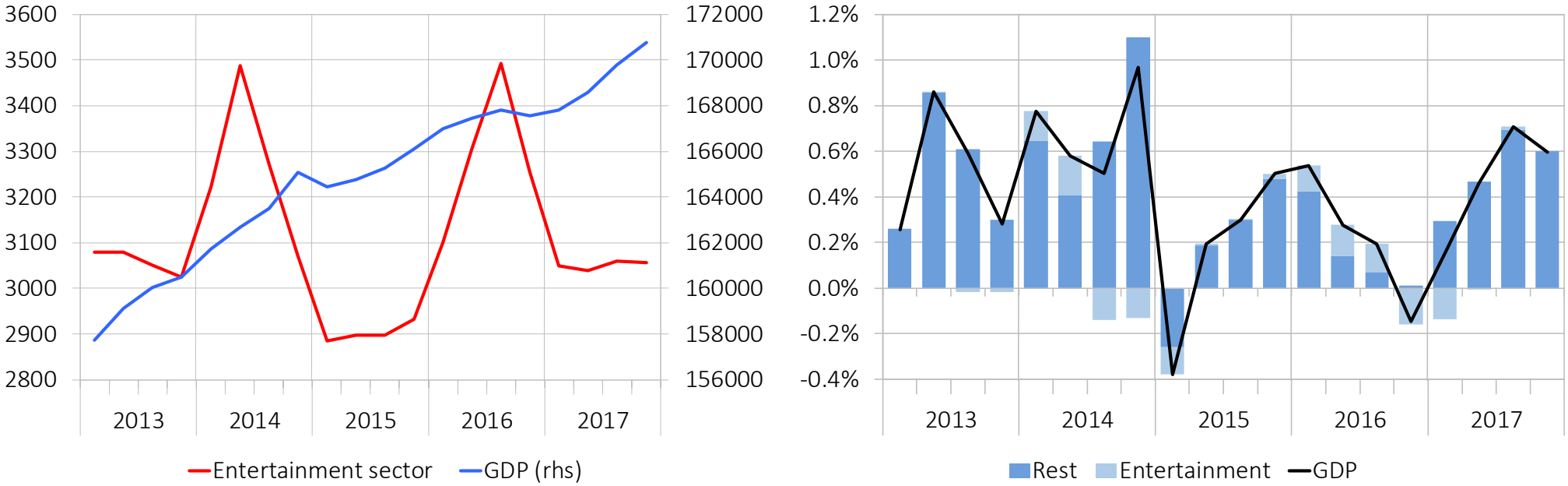
- SA: only concerned with patterns repeating every year
- However, there may be systematic, reoccurring patterns with a cycle of several years
  - Calendar effects such as leap year (four year cycle) or Easter (38'000 years, 500 years in X-13)
  - Events with a regular frequency (lower than annual)
  - (Administrative) price adjustments
- These patterns do – by definition – not represent a seasonality but fall into the frequency domain of business cycles
- Still, the arguments for adjusting seasonality also apply to multiyear cycles

Multiyear Cycles – The case of international sport events

- Switzerland's GDP rises when Olympic Games, FIFA world cup or UEFA EURO championship take place
  - Associations' head office is in Switzerland
  - Their value added is part of Swiss GDP
- International sport events induce predictable, recurring variation to both annual and quarterly GDP
- How to deal with this?
  - Frequency of four years
  - Not adjusted for by standard seasonal adjustment procedures
  - Not covered by usual guidelines
- Idea: treatment similar to calendar (e.g. leap year) effects to separate the sport event effects from underlying business cycle

Multiyear Cycles – The case of international sport events

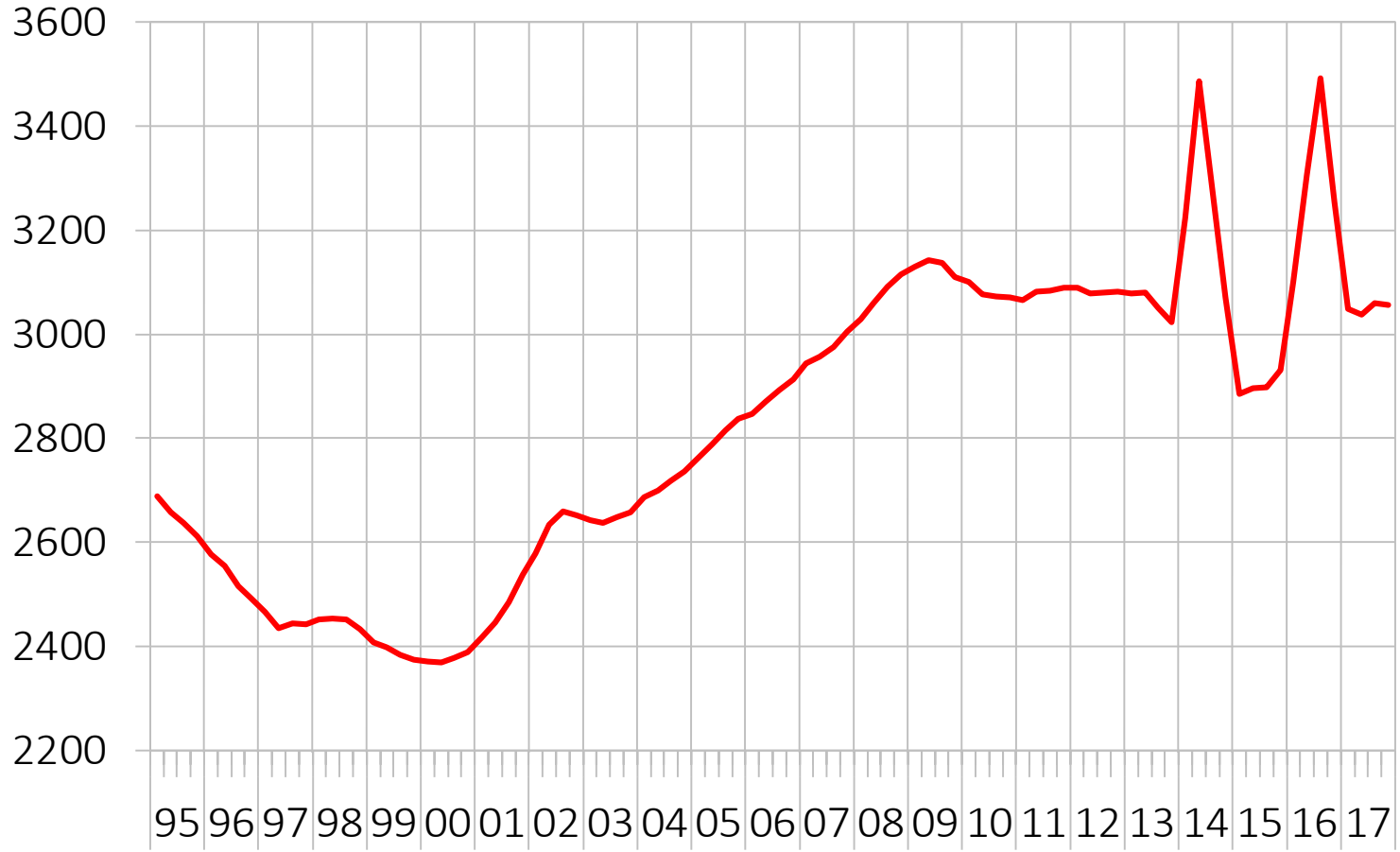
- Value added in “entertainment sector” is dramatically affected ⇨ impact on Swiss GDP is not negligible
- Multiyear cycle complicates business cycle analysis
- Complication is both at the annual and the quarterly frequency, because the event effect has a “seasonal” pattern



Multiyear Cycles – What do the guidelines say?

- Multiyear cycles are not explicitly covered by guidelines
- Eurostat: section on «Other calendar related and weather effects»
  - Recommendation not to adjust for anything else than season and calendar effects. However, suggestion to do studies on the effects and inform the data users.
  - Potential problems with further adjustments: counter-movements (catch-up effects), precision of estimates, revisions
- Application to sport event case
  - Hardly any countermovements to be expected
  - Event effect can be estimated quite precisely as value added in entertainment is smooth otherwise

Multiyear Cycles – What do the guidelines say?



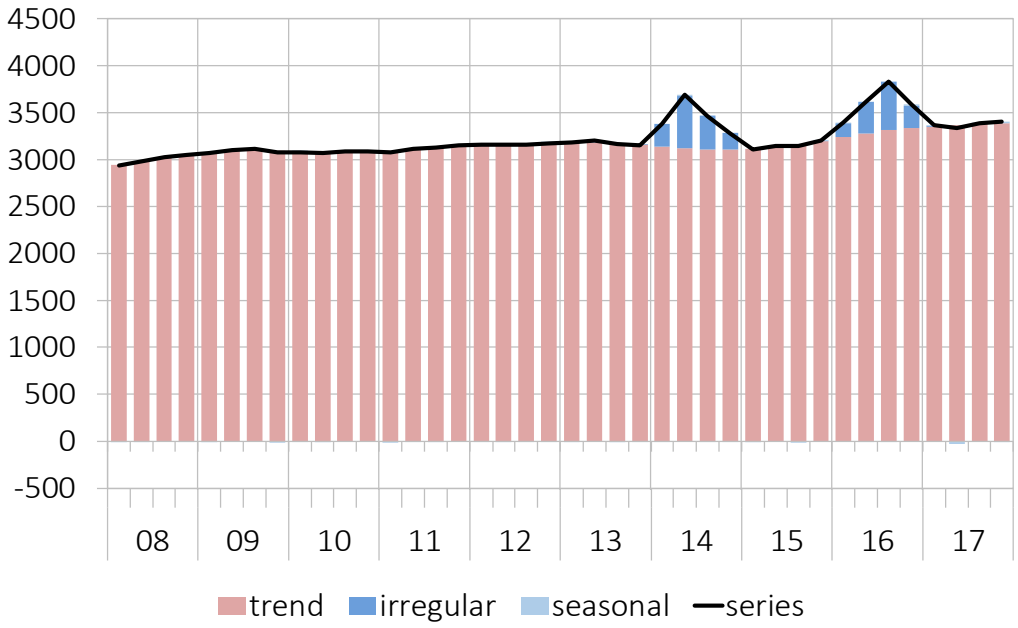
Multiyear Cycles – Need for adjustment?

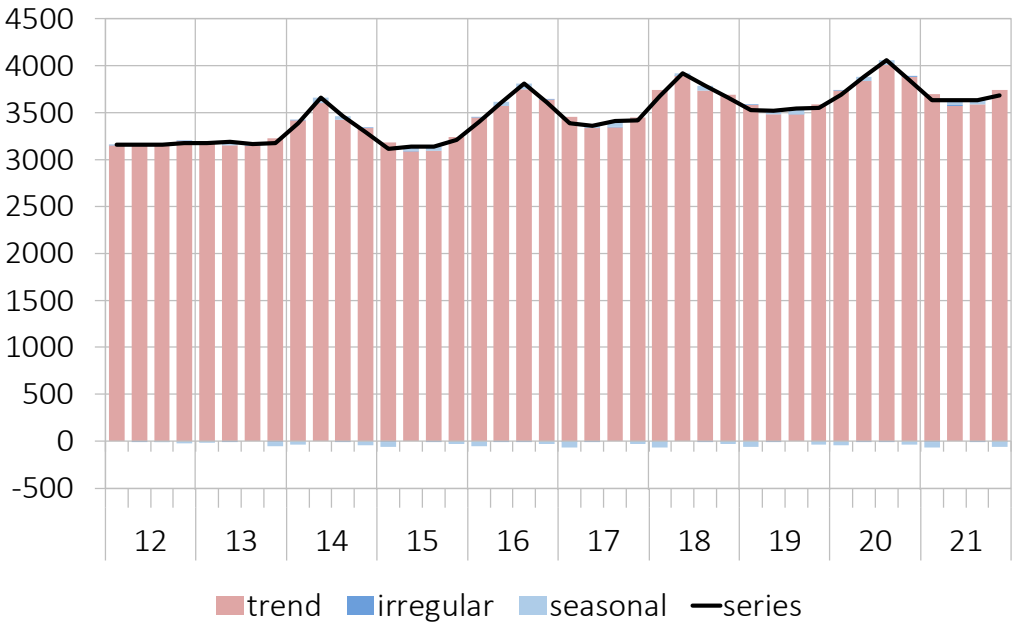
- Swiss GDP features a multiyear cycle of predictable variation that is not related to the business cycle (although, by standard definitions, it belongs to the business cycle frequency domain)
- The effect may mask turning points or cause artificial recessions
- Fiscal policy might be affected through institutional settings
- Users are interested in adjusted data

  ⇨ We should provide adjusted data (in addition to raw and SA)
- If the events took place every year, guidelines would suggest to adjust for the pattern
- Calendar effects: accepted case where cycles of frequencies lower than annual are adjusted for and annual values are affected

Multiyear Cycles – What methods to use?

- SA models attribute multiyear cycles to the trend cycle or irregular component
- Graphs: actual data (left), simulation of pattern continuing (right)





Multiyear Cycles – What methods to use?

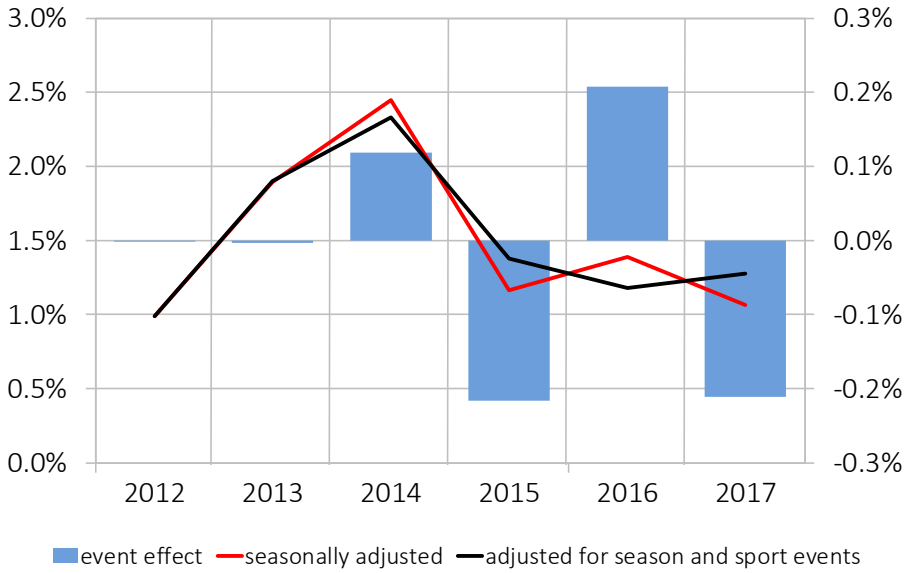
- Conceptually, the sport event effect is akin to the leap year effect
  - Olympic Summer / Winter games, FIFA World Championship and UEFA Euro take place every four years
  - Timing is known
  - Effect is estimated and may change over time
- Advantages of treating event effect as a calendar effect
  - Seasonal adjustment is not affected by event effect
  - Over the length of the cycle, event-adjusted data add up to the raw data
- Disadvantage
  - Annual growth rates do not match the raw data

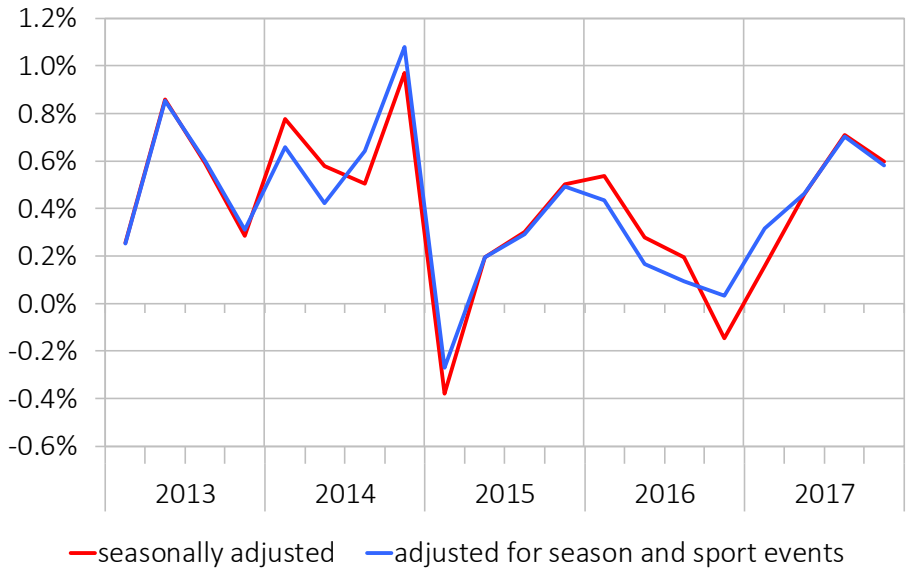
Multiyear Cycles – The case of international sport events

- Proposed solution: analogous to seasonal and calendar effects, distribute/smooth the effect over the frequency at which it occurs
  - Seasonal effects: repeat every year
  - Leap year effect: repeats every four years
  - Olympic games/FIFA World Cup/UEFA Euro: repeat every four years
- This event adjusted series could complement the publication of raw and seasonally adjusted series

Multiyear Cycles – The case of international sport events

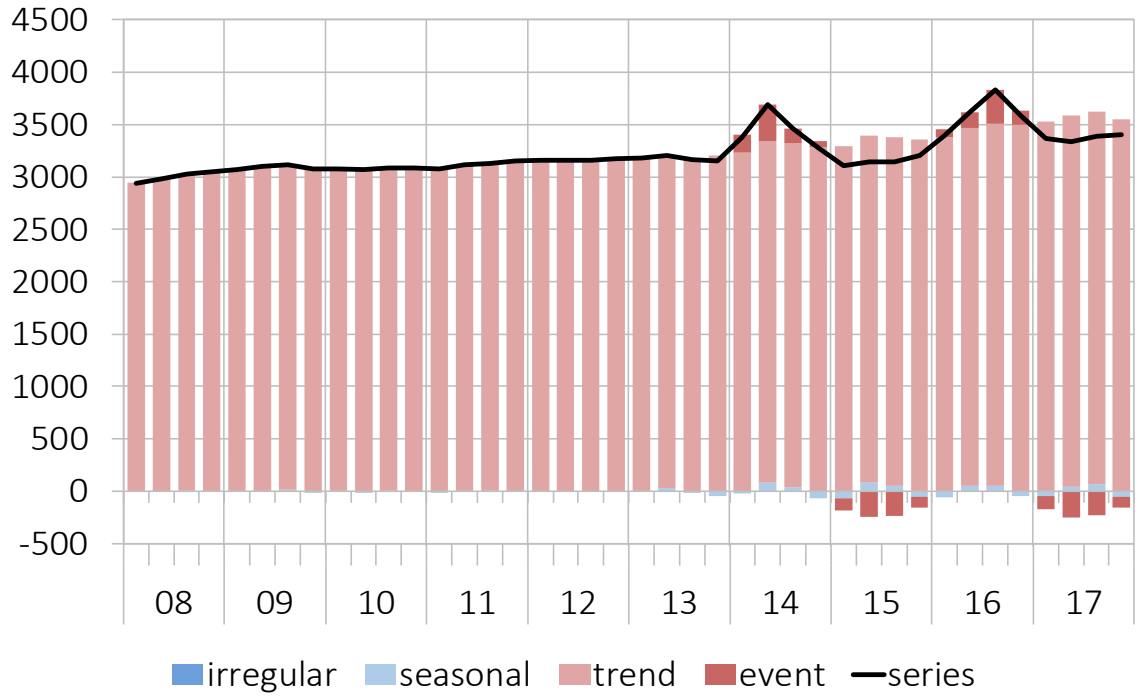
- Adjustment matters for GDP…
  - Reveals turning points of the business cycle
  - Potentially, the fading out of the event effect may cause technical recessions
- …but the big picture remains unchanged





Multiyear Cycles – The case of international sport events

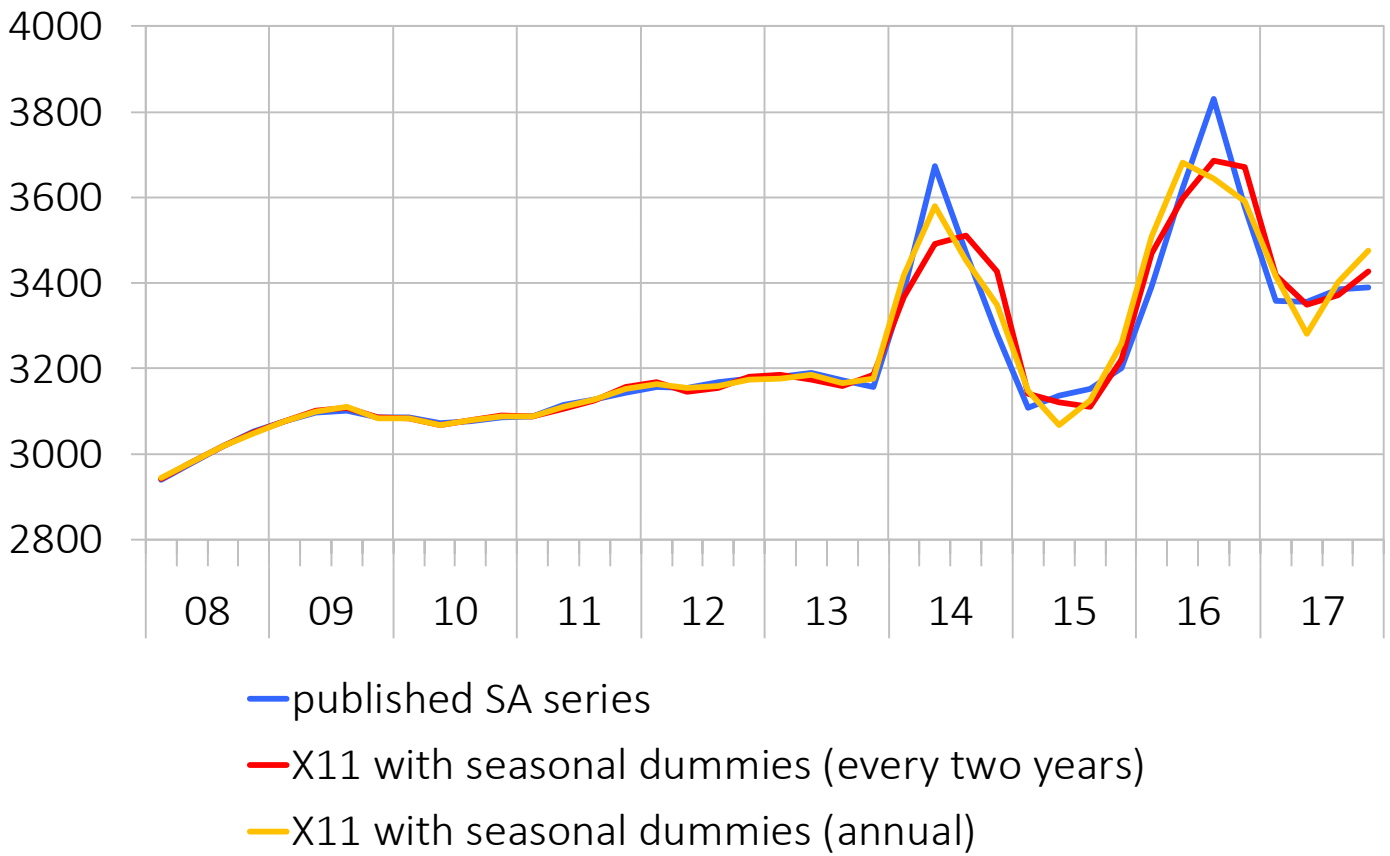
- Procedure fits naturally into X-13 methodology
  - Decompose time series into trend-cycle, season, event effects, and irregular component



Multiyear Cycles – Alternative ideas

- Alternative ideas to adjust for multiyear cycles
  - Explicit modeling of the seasonality (e.g. seasonal dummies that are non-zero in event years only)
    - Produces a smoother series than without adjustment but this series still includes predictable variation
  - Construct a filter eliminating the frequencies of the multiyear cycle (if known)
  - Additional ideas?

Multiyear Cycles – Alternative ideas



Note: models for seasonal dummies based on simulation till 2025 with “constant” seasonal pattern every two years

Multiyear Cycles – Conclusion

- Switzerland hosts organizers of big international sport events
- These sport events induce a multiyear cycle to Swiss GDP that is unrelated to the underlying business cycle and might mask turning points or complicate economic analysis (modeling, forecasting)
- There is a need for providing adjusted data (in addition to raw and seasonally adjusted data)
- Treatment of event effect as a calendar effect appears to be the most satisfactory and elegant option
- Advantages: compatible with standard SA procedures; easy to implement; seasonal adjustment not affected by event effect

THANK YOU FOR YOUR ATTENTION

Questions, remarks, ideas, suggestions?

Do not hesitate to contact me:

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Appendix – Another case of multiyear cycles

- Deflator of transportation value added features a two year cycle
- Railway company changes prices usually only every two years
- We would not adjust in this case because the decision about the timing of price changes could change at any time