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.

[Graph showing GDP and娱乐部门值 additives over years, with peaks correlating to years with international events.]
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
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• 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