Golden Rule of Forecasting: Conservatism, a unifying theory*

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*Drawn from Armstrong, Green, & Graefe paper forthcoming with commentary in *Journal of Business Research*

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Objectives of the session

1. To ensure that the paper is correct and does not overlooked disconfirming evidence.
   (Please email suggestions and omitted references to kesten@me.com).

2. To introduce the *Golden Rule of Forecasting Checklist software*.

Plan for this session

Introduction (Chair - Armstrong)   2

Summary of Golden Rule (Green)   20

Commentaries:
    Fildes   7
    Goodwin   7
    Soyer   7
    Reply by Green   5

Suggestions for improvements (Audience) 10

Conclusions (Chair - Armstrong)   2

Total   60

Golden Rule of Forecasting is to "Be Conservative"*

Use cumulative knowledge *on the situation*

- Subject matter expertise moderated by experimental evidence
- Behavior
- Long-run relationships
- Theory
- Levels
- Trends

Use cumulative knowledge *on evidence-based forecasting methods*

* Or "Forecast unto others as you would have them forecast unto you."

Are Golden Rule violations easily spotted?

Yes, if the description of the forecasting methods is adequate.

The *Golden Rule of Forecasting Checklist software* can be used by novices following a short preparation.

If the method description is not adequate, the Golden Rule *has* been violated.

When to be conservative

For *all* forecasting problems.

Especially important if situation is

- Complex

- Uncertain

– and

- Bias is likely…

A common conjunction in forecasting for

- government policies

- investment proposals

Example of a complex uncertain situation with biased forecasting

Demand forecasts for 24 *large rail transportation projects* are consistently optimistic, with a median overestimate of 96 percent for traffic (Flyvbjerg 2013).

Example:
Conservative extrapolation guidance

Modify trends, if the…

    a. series is variable or unstable

    b. historical trend conflicts with causal forces (contrary series)

    c. forecast horizon is longer than the historical series

    d. short and long-term trend directions are inconsistent

Conservative causal model checklist

1. Use prior knowledge to select important variables and estimate effects

2. Moderate effect estimates to reflect uncertainty

3. Use all important variables

4. Combine models that use different information, procedures.

Causal model guideline	Procedures in 8 US presidential election forecasting models	Application of the GR guidelines	Error reduction
Use prior knowledge to select important variables and estimate effects	All models use regression analysis to estimate weights from (few) data points	N/A	N/A
Moderate effect estimates to reflect uncertainty	None of the models uses procedures to moderate the estimated coefficients	Adjust the estimated coefficients towards (1) equality or (2) no effect	12%
Use all important variables	Models are limited to few variables.	Using all variables in an equal-weights model	23%
Combine models that use different information, procedures	N/A	Combine the model forecast with a naive no-change forecast or with forecasts from other models	23–32%

Conservatism via combining across methods & forecasters

Incorporates more prior knowledge

Reduces effects of:

- Data errors

- Computational errors

- Model selection errors

- Biased judgments

Error reductions, under ideal conditions, exceed one-half (Graefe *et al* 2014)

Experimental evidence on the Golden Rule

Found 150 experimental comparisons so far...

Number of comparisons supporting vs rejecting the Golden Rule, 150:0.

Violating a guideline will typically increase error by half again.

Causes of Golden Rule Violations

A. Big data: Why so?

1. Encourages evasion of *a priori* analysis.

2. Includes irrelevant variables.

B. Complex statistical procedures: Why so?

Regression analysis of non-experimental data on complex situations is invalid, no matter what the sample size (Armstrong, "*Illusions in regression analysis*")

We were unable to find a single experimental comparison showing that using complex methods on big data improves forecast accuracy versus reasonable alternatives.

Barriers to adoption of the Golden Rule

Expensive: Need to use comprehensive prior knowledge about relationships and forecasting methods

Unimpressive: Methods are easy to understand

Boring: Forecasts not newsworthy (e.g. PollyVote)

Clients pay for impressive, obscure, complex methods, and stories based on unaided expert opinions.

GR checklist can be used by novices to identify forecasts that violate the Golden Rule

The simplicity of the Guidelines and the use of checklists* gives clients the ability to assess the worth of forecasts in a rapid and inexpensive way.

If the method is too complex to understand, give it a failing mark.

*Our paper summarizes the evidence on the value of checklists.

Possible action steps

A. Apply the Golden Rule Checklist to a forecasting problem with which you are familiar? How many of the 28 checklist items were violated?

or

B. Consider a public policy issue, such as

"Will government mandated messages and images on cigarette packs increase consumer welfare?"

If you have suggestions for improvements, contact Andreas Graefe (a.graefe@lmu.de).

Further information

For latest versions of…

1. Slides
2. Golden Rule of Forecasting working paper
3. *Golden Rule of Forecasting Checklist*
   (available on paper, as Excel Sheet, and as an online tool)
5. Data on error increases from ignoring guidelines

   All at GoldenRuleofForecasting.com

Conclusions

Golden Rule can be unpopular as a constraint on dramatic forecasts

Applying complex statistical methods to large databases violates the Golden Rule by ignoring knowledge about the situation and forecasting methods.

Violating the Golden Rule of Forecasting increases forecast errors enormously – *Violating a typical guideline increases error by half again.*

Conservative models make best use of knowledge and data

1. F&P follow the Golden Rule…

    by using knowledge about the data to choose appropriate* extrapolation methods

2. Their deseasonalized damped trend method is consistent with most of the guidelines…

    and performs best of the tested methods

3. The appropriate methods for the situation may not always provide the most accurate forecasts, but are more likely to than alternatives.

*Methods that evidence shows provide the most accurate forecasts for the conditions.

Forecast unto others as you would have them forecast unto you

1. Goodwin asks whether conservative is the right term.

2. We ask, what else should we call forecasting in a way that is consistent with cumulative knowledge about the situation and about forecasting methods?

3. Would it be rational to act on the basis of a forecast that was made in ignorance or evasion of knowledge?

4. We think not, and propose that the Golden Rule is a universal rule and a unifying theory for forecasting.

5. We agree that because obtaining and using comprehensive knowledge can be expensive, forecasters need to weigh the cost of increased accuracy against the benefits.

Is the Golden Rule Checklist practical?

1. S&H express concern that the Checklist guidelines would be difficult to follow in practice…
   - We agree that interpretation of how a guideline applies to a situation may sometimes be difficult…
   - But is that any different from, say, the practice of medicine?
   - Seeking "a second opinion" (even a 5th) for a difficult diagnosis can help.

2. S&H argue that guidelines that calling for comprehensive knowledge are too burdensome…
   - Full disclosure allows reviewers and decision makers to determine whether greater efforts are justified

3. S&H suggest that success of TTB invalidates the GR…
   - We disagree. Good knowledge is needed to determine that one variable will continue to dominate in the future.

Further research: Useful, but delay in adopting the Golden Rule is costly

1. Reviewers all suggested further research would be useful...

2. We agree that more research might help to identify...
    - better understanding of conditions
    - better ways of summarizing cumulative knowledge
    - more guidelines
    - better wording for the guidelines

3. The Golden Rule should be applied now...
    - The evidence supporting the Golden Rule is very strong
    - The evidence shows substantial gains in accuracy
    - Ignoring the Golden Rule reduces benefits and increases costs

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