
Forecasting the Success of Governmental "Incentivized" Initiatives: Case Study of a New Policy Promoting the Replacement of Old Household; Air-conditioners

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Governments often use budget so as to provide incentives for citizens to adopt new policies, especially when these are promoting eco-friendly technologies e.g. to subsidise the price of a hybrid-car. The public money spent on each policy, is considered to be value-for-money only if many citizens do adopt the proposed policy. This is also known as the 'cost-effectiveness' or the 'economic success' of a new policy. The latter should not be confused with the 'economic impact' of the new policy, as this is usually referred to the respective macro/micro socio-economic impact. This study reports on a experiment with semi-experts using Structured Analogies (SA) forecasting the success of a new policy promoting replacing old household air conditioners with energy saving units under a new environment and technology initiative implemented by a European government. The findings shows evidence that Structured Analogies (SA) is a useful forecasting tool for policy making, however all methods

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predicted results that were considerably off the mark, indicating the difficulty of the forecasting task under examination.

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Introduction

Forecasting is a vital tool for any government seeking to implement a medium or long term strategic initiative or policy. Governments very often use their budget so as to provide incentives for citizens to adopt new policies, especially when these are promoting environmental friendly technologies. The public money spent on each policy (e.g. Subsidising the price of a hybrid-car, or reducing the cost of road tax for such vehicles), is considered to be value-for-money only if many citizens do adopt the proposed policy. This is also known as the 'cost-effectiveness' or the 'economic success' of the proposed policy, and is usually measured via the adoption rate of this new policy implementation (Savio and Nikolopoulos, 2009). The latter should not be confused with the 'economic impact' of the new policy, as this is usually referred to the respective macro/micro socio-economic impact (e.g. increase of the competitiveness of an economic sector benefiting from the new policy).

This study reports on an experiment with semi-experts, designed to evaluate the utility of judgemental forecasting approaches including Unaided Judgement (UJ), Structured Analogies (SA) as performed by individuals as well as groups of forecasters. The task involved forecasting the success of a new environmental policy promoting the replacement of old household air conditioners with energy saving units under a new environment and technology policy implemented by a European government.

The Case

The forecasting problem concerned the cost-effectiveness of a new policy promoting the replacement of old household air-conditioners. Under the auspices of the Ministry of Development, the Greek government agreed to subsidise 35% of the costs of purchasing and installing new energy saving air-conditioning units and the withdrawal of older models. It was announced that the total cost of the program, which was to be rolled out across Greece, would amount to 15 million € and that the measure would be in place for a period of six months. A ceiling of 500 € was set and residents of Greece could withdraw up to two 9,000-24,000 BTU air-conditioners. To qualify for this initiative, consumers had to purchase an energy class A or B inverter air-conditioning system at a retail outlet of their choice and were also required to provide a copy of their ID or passport number for identification purposes and a recent copy of their electricity bill to ensure that the air -conditioner was being purchased for use in a residence rather than a place of business. The initial budget figure of 15 million € was revised to account for excess public demand, the eventual relative public expense came to 46.9 million €. The initiative was thus 'abandoned' after only 2.5 months duration, due to the shortage of funding resulting from the unexpected success.

Forecasting with semi-experts

Forecasters were trained in forecasting techniques, however were not necessarily versed in the specific forecasting context i.e. forecasting for the public sector, and were thus considered semi-experts. The participants were randomly divided into two separate groups of 32 members per group. To avoid contamination of ideas and techniques, each group was then introduced to only one method of judgmental forecasting. Group A learnt how to use UJ and Group B learnt how to use SA. Both groups have already been trained in the whole spectrum of quantitative techniques.

In phase one of the experiment, each participant was asked to provide forecasts on their own. In phase two, Groups A and B were subdivided into smaller groups of five or six students per group. These sub groups were then asked to provide group forecasts, thus to do so in a

collaborative fashion. Appendix A provides an example of a completed questionnaire that was submitted by a forecaster using Structured Analogies.

In UJ, forecasts are made without the provision of instructions and without recourse to a formal or structured methodology. Forecasters rely on their own judgement, taking into account situation-specific variables, and may also draw on the judgemental predictions of others who know of the situation. Research has shown that experts using UJ, often ignore key evidence and avoid potential help, at the expense of forecasting accuracy. Consequently, such forecasts usually tend to be over-optimistic (Green, 2002). SA was initially applied for conflict forecasting (Green and Armstrong, 2007). Experts studying a particular forecasting problem select as many situations as possible (the 'Analogies'), that are similar to the target situation, describing the similarities and differences of each case. Subsequently, an overall similarity rating is produced for each analogous situation. These outcomes are then used to forecast the outcome of the target situation.

The use of multiple experts to forecast the outcomes of a particular problem via a traditional group meeting is another common approach. However, group meetings are often hindered by a lack of effective behaviour and collaboration and groups can also be overconfident. Here, we intend to study the effect of collaboration in groups when participants use UJ or SA so as to make their final forecasts.

Results

Semi-experts were asked to forecast two outcomes for the new policy:

- *Question 1* concerned the percentage of consumers that would participate in the Initiative, taking into account that the budget had initially been set at 15.000.000 €. As this target was exceeded the actual outcome on this question was 100%.
- *Question 2* concerned the 'speed' in which the consumers would participate in the initiative. 50% of the sales were completed within the first 20 days. This gave us an actual outcome of 0.7 months for this question.

We used the Mean Absolute Percentage Error (MAPE) for evaluating the alternative forecasting approaches (Table 1).

Comparing the mean forecast errors of all methods, we can see that for the first question the best forecasts were done with UJ and for the second question with Group SA.

Table 1: Forecasting Accuracy

| MAPE | UJ | SA | Group UJ | Group SA |
|-------------------|------------|------------|-----------------|-----------------|
| <i>Question 1</i> | 44.5 % | 52.7 % | 46.7 % | 52.8 % |
| <i>Question 2</i> | 2.1 months | 1.8 months | 1.6 months | 1.3 months |

Conclusions

The students that made forecasts with SA gave on average 2.6 analogies with regard to the individual forecasts. The maximum was four analogies and the minimum was one analogy. With regard to the group forecasts there was a mean of 4.5 analogies per forecasting group. This result is reasonable since in group forecasts the members of subgroups had the possibility of exchanging opinions and ideas and the most individual analogies coincided with the analogies coming from the corresponding groups.

It is important to mention that the semi-experts that gave analogies with good results were also optimistic in the forecasts of the initiative even though they recalled analogies with medium outcomes. We speculate that their judgment was probably influenced by the timing of the initiative, just before summer, coupled with the initiative having been widely advertised to consumers.

The fact that the Government decided to increase the initial budget devoted to the policy, due to the early success, was the main reason that affected negatively the accuracy of the forecasts. This is a problem that forecasters need to deal with, in cases of forecasting Policy Implementation. The use of analogies for such a task provides an attractive prospect as

valuable information can be taken from analogous initiatives (from the past or other circumstances) and applied to the target situation (Lee *et al.*, 2007). Concluding, this study showed that there were no significant differences between the examined forecasting approaches. Moreover, all methods predicted results that were considerably off the mark. Coupled with the impact of changing conditions in the implementation phase of the policy, these results made it difficult to accurately assess the effectiveness of each approach. This points to limitations in the use of judgemental forecasting techniques and suggests that further research is required to ascertain their effectiveness.

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Appendix A

Example of a complete questionnaire

Funding for purchasing air conditioners.

The Initiative is nick-named 'Replace your air conditioner'. It refers to funding the replacing and recycling of old domestic Air Conditioners and purchasing energy-efficient inverter type units. This is a new initiative part-financed by the European Regional Development Fund and by the Greek government. The whole budget of this initiative amounts to 15.000.000€.

Each citizen has the possibility of withdrawing up to two (2) appliances. These can be bought from any retail outlet that is participating in this initiative.

The citizens can qualify for a 35 percent discount of up to 500€. The customer pays only his share and the amount of funding will be given to the shops after submitting the essential supporting documents and after a process of verification.

All the withdrawn appliances will be recycled by the company 'Appliances' recycling'. The customers can buy new air conditioners from 10th of June 2009. The initiative will last up to 6 months (9 December 2009).

Forecasts

You are asked to forecast the success of the new Policy. For that reason, you should answer the questions that follow.

In the table below, please briefly describe

- i. Any analogous cases that you can remember from other policies in Greece or abroad;
- ii. Your sources (e.g. your own experience, media reports, history, literature, etc.);
- iii. The main similarities and differences between your analogies and this situation.

(B) Rate the analogies out of 10 (0 = no similarity... 5 = similar... 10 = high similarity).

(C) Give the outcome of your analogy (response percent or response rate in weeks).

| (A) | (i) Description | (ii) Source | (iii) Similarities & differences | (B) Rate | (C) Outcome |
|-----|--------------------|-------------------------------|--|-------------|----------------|
| a. | Car withdrawal | Media/ Personal experience | Similarities: funding Differences: withdrawal of old ones | 9 | 100% success |

| | | | | | |
|-------------|--|-------------------------------|--|---|---|
| b. | Funding for solar heaters | Media | Similarities:Funding Differences: no withdrawal | 6 | 70% success |
| c. | Funding for laptops to fresher top students | Media/ Personal experience | Similarities:Funding Differences: no withdrawal | 6 | 100% success |
| <i>E.g.</i> | <i>Similar Action in France for withdrawal of old appliances of air conditioning</i> | <i>Media</i> | <i>Similarities: Funding for withdrawal Differences: different country, funding for cars instead of air conditioners</i> | 6 | <i>The response in the Action was about 80%</i> |

[1] What percent of the citizens that already have air conditioner will eventually buy a new one?

Exact percent: [30] % Interval*: from [15]% up to [45]%

[2] How soon do you believe that the 50% of eligible citizens will participate in the Action?

Exact number: [2] months Interval: from [1] up to [3] weeks