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The influence of product involvement and emotion on short-term product demand forecasting



Valeria Belvedere^{a,*}, Paul Goodwin^b

^a Catholic University of the Sacred Heart, Via Necchi 5, 20123 Milan, Italy

^b School of Management, University of Bath, Bath BA2 7AY, United Kingdom

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ABSTRACT

Sales forecasters in industries like fast-fashion face challenges posed by short and highly volatile sales time series. Computers can produce statistical forecasts, but these are often adjusted judgmentally to take into account factors such as market intelligence. We explore the effects of two potential influences on these adjustments: the forecaster's involvement with the product category and their emotional reactions to particular products. Two forecasting experiments were conducted using data from a major Italian leather fashion goods producer. The participants' judgmental adjustments tended to lower the forecast accuracy, but especially when the participants had strong preferences for particular products. This appeared to result from a false consensus effect. The most accurate forecasts were made when the participants had no knowledge of the product and only received time series information, though a high level of involvement with the product category also led to a greater accuracy.

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1. Introduction

Accurate demand forecasting for products is particularly critical in a number of industries that are characterized by strong time-based competition (Blackburn, 1991; Blackburn, 2012; Wallace & Choi, 2011; Stalk & Hou, 1990). However, managers who operate in sectors such as consumer electronics or fashion face the challenge of predicting future sales under conditions of an extremely high product variety, a significant demand variability and short demand histories (De Toni & Meneghetti, 2000; Fang, Zhang, Robb, & Blackburn, 2013; Forza & Vinelli, 2000; Thomassey, 2014). Accuracy requires forecasters to be able to combine this data, and any available statistical forecasts, with their knowledge of the product and the market (Seifert, Siemsen, Hadida, & Eisingerich, 2015). This is particularly necessary in volatile markets, where the

predictability of future sales is low and analytical forecasting models based on the extrapolation of time series can be highly inaccurate, especially given the short demand histories (Thomassey, 2014).

Even when forecasters have expertise relating to their market, their forecasts are still likely to be subject to a range of cognitive and motivational biases (Berg, 2016; Lawrence, Goodwin, O'Connor, & Onkal, 2006). For example, in new product forecasting it is known that being involved in the development of the product can lead to wishful thinking and the selective processing of information to confirm that the product will be a success. The resulting forecasts suffer from an optimism bias (Tyejee, 1987). Demand forecasts in sectors like the fashion industry may suffer from similar biases, as the products are particularly likely to trigger emotional reactions. This paper presents the results of two experiments that were designed to determine whether the accuracy of short-term demand forecasts is influenced by either the level of involvement of the forecasters with the product category, or their personal emotion-based preferences for products

* Corresponding author.

E-mail addresses: valeria.belvedere@unicatt.it (V. Belvedere), mnspg@management.bath.ac.uk (P. Goodwin).

within that category. We begin by reviewing the literature in order to outline the characteristics that are peculiar to the forecasting process in the fashion industry, and to identify the relevant psychological factors which can influence the accuracy of judgmental adjustments to forecasts. We then describe the experiments, before presenting the results and conclusions.

2. Review of the relevant literature

2.1. Forecasting in the fashion industry

The forecasting process in many fashion industries – and the textile-apparel sector in particular – is characterized by a number of features that can make it especially challenging. As was highlighted by [Thomassey \(2014\)](#), these features include strong seasonal patterns and very short product life-cycles, coupled with a huge variety of products and short planning horizons (generally a few weeks) for managing stock replenishment at retail outlets. In addition, there are several exogenous variables, some of which cannot be controlled directly by manufacturing companies, that can have strong influences on sales. These include macroeconomic conditions, marketing strategies, retailing strategies and fashion trends. These factors, coupled with the lack of long sales time series for most products, mean that the applicability of traditional forecasting techniques, such as exponential smoothing or regression models, is limited ([Nenni, Giustiniano, & Pirolo, 2013](#); [Sichel, 2008](#); [Thomassey, 2014](#)). This is in contrast to forecasting for “basic” fashion products such as men’s shirts, which are characterized by long life-cycles, a lack of seasonality and small fluctuations. Approaches such as neural networks, extreme learning machine algorithms and fuzzy inference systems have proved effective for the latter case ([Au, Choi, & Yu, 2008](#); [Choi, Hui, Liu, Ng, & Yu, 2014](#); [Sun, Choi, Au, & Yu, 2008](#); [Thomassey, 2014](#)).

For “non-basic” products, it is rather uncommon to adopt standard software systems for supporting the forecasting process because of their low accuracy. Instead, it is quite common for fashion companies to develop their own processes, centred largely on their practitioners’ experience, in the hope that these will lead to low forecast errors, with the associated benefits of reduced inventories and infrequent store-level stock-outs ([Sichel, 2008](#)). One approach involves providing practitioners with a statistical forecast of the demand for their product, where such forecasts are often based simply on extrapolations of past sales patterns. Thus, it is common practice, in both the fashion and other industries, for practitioners to apply judgmental adjustments to these forecasts, ostensibly in order to take into account market intelligence and other contextual information that has not been allowed for in the statistical algorithm ([Davydenko & Fildes, 2014](#); [Fildes, Goodwin, Lawrence, & Nikolopoulos, 2009](#)). When this contextual information is reliable and relates to events that will have significant effects on sales, such adjustments can improve the forecast accuracy ([Sanders & Ritzman, 2001](#)). For example, in a laboratory study, [Lim and O’Connor \(1996\)](#) found that adjustments based on reliable contextual information led to more accurate forecasts, while [Edmundson,](#)

[Lawrence and O’Connor \(1988\)](#) highlighted the positive impact of specific product information on the accuracy of judgmental sales forecasts. In the case of fashion products with short time series, the experimental evidence suggests that the provision of contextual information can have a positive influence on the forecast accuracy when a non-linear relationship is observed between the predictor variables and sales ([Seifert et al., 2015](#)). It has also been demonstrated that, while the use of point-of-sale (POS) data from local stores is crucial to the prediction of future sales, the value of this type of data can be enhanced by coupling it with available qualitative information, such as customers’ opinions collected by shop assistants or through virtual communities and social networks ([Belvedere & Stabilini, 2014](#); [Sull, 2010](#); [Sull & Turconi, 2008](#)). These kinds of approaches can enhance a company’s “market sensitivity” – that is, the ability to interpret market trends effectively and efficiently – thus allowing the company to identify, produce and deliver those items that enjoy better market potentials ([Christopher, 2000](#)).

However, although the use of practitioners’ experience and intuition can result in favourable outcomes in highly unpredictable environments, it can also involve some risk for companies, since judgmental interventions can be influenced strongly by cognitive biases. For example, various studies have found that the benefits obtained from judgmental adjustments of statistical forecasts are often reduced by managers falsely seeing systematic patterns in the noise in time series and making gratuitous adjustments to reliable forecasts ([O’Connor, Remus, & Griggs, 1993](#)). People also tend to use contextual information inconsistently or inefficiently. In particular, they may overweight recent or more salient information ([Tversky & Kahneman, 1974](#)). For example, when determining the market potential of a new fashion product, managers may base their estimate on an analogy; that is, they may take a similar product, launched in the past, as a reference and then adjust its sales on the basis of contextual information that is relevant to the new product ([Abernathy, Dunlop, Hammond, & Weil, 1999](#)). In doing this, they can be over-influenced by the cases that are most easily retrieved from their memory ([Goodwin, Meeran, & Dyussekeneva, 2014](#); [Lovallo, Clarke, & Camerer, 2012](#); [Tversky & Kahneman, 1974](#)). Even expertise is no guarantee of accurate forecasts. Experts may have closed mindsets, so that they are impervious to information that disconfirms their beliefs, and may exhibit overconfidence ([Tetlock, 2005](#)).

2.2. Product involvement, emotion and moods in forecasting

Surprisingly, few studies have addressed the effects of product involvement and emotion on judgmental adjustments to forecasts, and these factors may be particularly important when considering the forecasting of sales in the fashion industry. This omission is in spite of the fact that Nobel Laureate Daniel Kahneman pointed out that “emotion now looms much larger in our understanding of intuitive judgments and choices than it did in the past” ([Kahneman, 2011](#) p. 12). For product involvement, we adopt [Zaichkowsky’s \(1985\)](#) definition of involvement as: “A person’s perceived relevance of the object based on

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