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How do judgmental overconfidence and overoptimism shape innovative activity?

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ABSTRACT

Recent field evidence suggests a positive link between overconfidence and innovative activities. In this paper we argue that the connection between overconfidence and innovation is more complex than the previous literature suggests. In particular, we show theoretically and experimentally that different forms of overconfidence may have opposing effects on innovative activity. While overoptimism is positively associated with innovation, judgmental overconfidence is negatively linked to innovation. Our results indicate that future research is well advised to take into account that the relationship between innovation and overconfidence may crucially depend on what type of overconfidence is most prevalent in a particular context.

1. Introduction

Recent field evidence indicates that there is a positive link between overconfidence of managerial decision makers and innovative activities. For example, Galasso and Simcoe (2011) and Hirshleifer et al. (2012) show that CEOs who are overoptimistic regarding the future performance of their company, are more likely to pursue innovation, obtain more patents and patent citations, and are more likely to take their firms in a new technological direction. In this paper we argue that the connection between overconfidence and innovation is more complex than the previous literature suggests. Existing work focuses almost exclusively on overoptimism, the tendency of individuals to overestimate their abilities or chances of success. However, while there is indeed ample evidence indicating that people often exhibit this bias (see, e.g., Svenson, 1981; Dunning et al., 1989; Alicke et al., 1995), many studies show that other forms of overconfidence are also prevalent. In particular, it is a well established fact that many people have a tendency to overestimate the precision of their information. This phenomenon is commonly referred to as judgmental overconfidence (see, e.g., Lichtenstein et al., 1982; Russo and Schoemaker, 1992). In this paper we show theoretically and experimentally that the effect of judgmental overconfidence on innovative activity goes in the opposite direction of the effect of overoptimism, i.e., judgmental overconfidence is negatively associated with innovation. Our results indicate that future research is well advised to take into account that the relationship between innovation and overconfidence may crucially depend on what type of overconfidence is most prevalent in a particular context.

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To cleanly isolate the effects of judgmental overconfidence and overoptimism on innovative activities, we rely on the methods of experimental economics. We implement a modified version of a management task developed by Ederer and Manso (2013) in our laboratory. This task confronts our participants with one of the core features of the innovative process: the trade-off between exploration and exploitation (see, e.g., March, 1991, for an extensive discussion).[1] Specifically, our subjects take on the role of a manager of an ice cream stand, whose aim is to find the product mix that maximizes the profit of the ice cream stand. The participants are provided with a default business strategy which delivers a known level of profit. Fine-tuning this strategy (exploitation) allows to increase profits to a certain extent. However, in order to increase profits substantially, the participants need to be willing to change the product mix radically (exploration). In addition to completing the innovation task, our subjects also participate in a number of experimental tests that allow us to elicit measures for judgmental overconfidence and overoptimism, as well as to gather proxies for intelligence and ambiguity aversion.

To substantiate the intuitive hypothesis that judgmental overconfidence and overoptimism have opposing associations with innovative activity, we formally analyze a stylized version of our laboratory environment. We consider a setup in which an agent has the choice between exploitation of the best business strategy currently available to him and exploration of a novel business strategy in each of a finite number of periods. We show that overoptimism (formalized as an upwardly biased belief about the average profitability of exploration) leads to excessive exploration, while judgmental overconfidence (formalized as an underestimation of the variance in exploratory profits) implies that there is too little exploration.

The experimental data confirm the theoretical prediction that judgmental overconfidence has a significantly negative predictive effect on innovative activity. Participants who exhibit higher degrees of judgmental overconfidence engage in shorter exploratory phases, stop exploring at lower profit levels, are less likely to systematically keep track of their exploratory outcomes, and explore a smaller number of new flavors. Moreover, the data also support the hypothesis that judgmental overconfidence is associated with suboptimal business strategies which lead to both lower overall profits as well as lower maximum per-period profits. Taken together, these results corroborate the fact that judgmental overconfidence has a decisive impact on innovative activity at the individual level.

With regard to overoptimism our theoretical analysis predicts an exploration enhancing effect, which ultimately leads to the implementation of a superior business strategy. However, while the implementation of a superior business strategy boosts maximum per-period profits, the additional costs necessary to obtain such a strategy exceed the additional benefits so that the effect on total profits is hypothesized to be negative. Our experimental data provides some support for a positive association between overoptimism and exploration and a negative association with profits, but these associations are weak and remain mostly insignificant. Note, however, that the prediction that overoptimism leads to the implementation of superior business strategies is well aligned with the field evidence mentioned above. Galasso and Simcoe (2011) and Hirshleifer et al. (2012) both find a robust positive association between CEO overconfidence, R&D expenditures and citation-weighted patent counts, confirming that overconfidence leads to more and ultimately better innovations.[2]

One potential concern with our approach to study individual innovative activity is that the results may not be generalizable to settings outside the laboratory. Previous studies have not tested whether the experimental exploration–exploitation trade-off implied by the experimental management game is related to real-life innovative activity. To close this gap we test the external validity of our behavioral measure using a sample of middle-managers of a financial services company. The managers not only participated in our laboratory experiment, but we also surveyed their superiors in their company to collect external data on their individual innovative activity and performance at the workplace. We find a strong and significant correlation between performance in the experimental task and external measures of creativity, performance, gestalt motivation and taking charge behavior. These findings suggest that our laboratory setting is well suited to study the determinants and antecedents of innovative behavior at the individual level.

Our paper extends existing research in several ways. First, our study contributes to a small, but growing literature on the individual determinants of innovative activity. While the literature on the role of innovation at the industry and firm level has made immense progress in recent years (for recent reviews of this literature see, e.g., Hulten, 2010; Arora and Gambardella, 2010; Hall and Lerner, 2010; Fagerberg et al., 2010), our understanding of the individual determinants of innovative activity is still quite limited.[3] However, there is an emerging literature suggesting that behavioral biases such as overconfidence may have an important impact on people's entrepreneurial and innovative behavior. The general view taken in this research is that individuals are overoptimistic with regard to the returns of potential innovations, for example by overestimating success probabilities of implementing an innovation, which in turn leads to excessive innovation, entrepreneurial activity and market entrance (see, for example, Camerer and Lovallo, 1999; Bernardo and Welch, 2001; Lowe and Ziedonis, 2006; Galasso and Simcoe, 2011; Hirshleifer et al., 2012). Our work not only confirms the relevance of this channel, but also clarifies that it is of great importance to distinguish between overoptimism and judgmental overconfidence. This point is crucial, because these two forms of overconfidence have not always been clearly distinguished in earlier

[1] Obviously, innovative activities also include other aspects such as creativity, initiative, and implementation. The focus of our study, however, is on the strategic part of innovation, i.e., on the decision when to stop the exploratory process of searching for novel ideas.

[2] Since they do not observe the opportunity costs of R&D, the net effect on firm profits cannot be properly addressed with these data.

[3] There is an extensive literature on individual determinants in the entrepreneurship literature. However, this work focuses mainly on characteristics such as wealth, age, education, risk and other socio-demographic characteristics (see, e.g., Kihlstrom and Laffont, 1979; Evans and Leighton, 1989; Blanchflower and Oswald, 1998; Hurst and Lusardi, 2004).