Connecting People and Knowledge: Knowledge Spillovers, Cognitive Biases, and Entrepreneurship

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Abstract Having served under David at the Max Planck Institute in Jena, the authors witnessed first hand as he worked to build up entrepreneurship as an academic discipline. While he was building this community in the field writ-large, he was also building a strong network of entrepreneurship scholars within the team itself. While reflecting upon the benefits of cognitive biases such as optimism for entrepreneurial knowledge spillovers and demonstrating context-dependency of the benefits and drawbacks of cognitive biases, the authors also connect this to how they have experienced David's way of developing a research network.

Introduction

When the two authors of this paper started working at the Max Planck Institute (MPI) of Economics in Jena a long time ago, they each had very different scientific backgrounds. While one was a postdoctoral economist working in the field of industrial organization and innovation, researching the link between ***knowledge spillovers*** and productivity, the other author had just completed his Master's in both business administration and computer science and was going to work on *cognitive biases* of entrepreneurs in his doctoral dissertation. Meanwhile their research agendas converged and they regularly collaborate in various research projects. They started, for instance, researching links between biology and

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entrepreneurship (Bönte et al. 2016), something neither had considered prior to starting at the MPI. This leap was possible because David Audretsch established an open and creative atmosphere in his "Entrepreneurship, Growth, and Public Policy Group" at the MPI of Economics, encouraging scholars to look at the entrepreneurial process from very different angles, to test limits, and to end up combining very different strands of research. The two authors of this paper, along with other former members of the EGP group, benefited greatly from David's support, even after leaving Jena, since he continues to wholeheartedly foster their research and personal development. While this paper's title in its first part is meant to describe and honor how we have experienced David Audretsch, the second part shows that that although the authors' research agendas look unrelated at first glance, but actually are related and jointly also relate to how the authors have experienced David Audretsch.

This paper links two strands of literature that focus on different aspects of the entrepreneurial process. First, we refer to the literature linking entrepreneurship to knowledge spillovers. On the one hand, the Knowledge Spillover Theory of Entrepreneurship suggests that knowledge created endogenously by other agents, like incumbent firms, results in knowledge spillovers that allow entrepreneurs to identify and exploit opportunities (Audretsch and Keilbach 2007; Audretsch et al. 2008). While endogenous growth theory suggests that profit-maximizing firms' R&D activities are an important driver of economic growth (Romer 1990), the essential role of the entrepreneur is emphasized by Acs et al. (2009) arguing that new ventures exploit intra-temporal knowledge spillovers that are not appropriated by incumbent firms. On the other hand, new ventures started by entrepreneurs may not just be an *outcome* of knowledge spillovers, but may also be a *source* of knowledge spillovers (De Clercq et al. 2008), which tends to be especially true for new technology-based firms where founders' human capital is essential for firm growth (Colombo and Grilli 2010). Moreover, Acs et al. (2016) state that new ventures may generate externalities because they demonstrate that entrepreneurship is rewarding and viable, requiring certain capabilities and competencies (demonstration externalities) and because even when businesses fail, other firms may benefit from the information generated by the failed entrepreneurial firms (failure externalities). Consequently, different types of market failures associated with knowledge and information creation may lead to an underinvestment in entrepreneurship. Some justifications of entrepreneurship policies are driven by efforts to overcome this underinvestment and to generate related positive knowledge spillovers.

Second, we refer to a strand of entrepreneurship literature suggesting that the decision to enter entrepreneurial activities may not only be driven by expected profits but also by individual differences in perceptions of activities associated with entrepreneurship. Unrealistic optimism regarding the risk associated with entrepreneurship (Palich and Bagby 1995; Busenitz and Barney 1997; Chen et al. 1998; Forbes 2005) and regarding chances of winning entrepreneurial competitions (cf., Camerer and Lovallo 1999) might, in fact, trigger a tendency to excessively enter entrepreneurship and, thus, might lead to an overinvestment into entrepreneurial

activities. Cognitive biases may be so strong that they eventually reduce entrepreneurs' performances, with empirical evidence suggesting that unsuccessful entrepreneurs might be those who excessively exhibit specific biases (Baron 1998). In accord with this view, Koellinger et al. (2007) find that in countries characterized by more confident and possibly overconfident entrepreneurs, failure rates are also relatively higher. At the firm level, Hmieleski and Baron (2009) report a possibly negative relationship between entrepreneurs' optimism and their new venture's revenues and employment growths. Consequently, some scholars argue that policy makers should discourage biased entrepreneurs from becoming entrepreneurs (see, e.g., Parker 2007). Similarly, Kahneman and Riepe (1998) argue that the 'potent brew' of overconfidence and unrealistic optimism should be avoided and investors should be trained to suffer less from these biases. We even observe efforts to debias people through law (Jolls and Sunstein 2006). In line with these efforts, business and entrepreneurship education often also seeks to provide future managers and potential entrepreneurs more realistic beliefs about their ventures (e.g., Fischhoff 1982; Soll et al. 2015). However, there is also literature suggesting that these individual cognitive biases may, in fact, create information externalities that benefit an entrepreneurial ecosystem, such that the overinvestment due to cognitive biases might counterbalance the underinvestment due to information externalities (Bernardo and Welch 2001).

We take this observation as starting point to explore the relationship between cognitive biases and information externalities created by entrepreneurship. We briefly discuss an analysis provided by Bernardo and Welch (2001), which demonstrates the information externalities and the resulting social benefits of individuals being overconfident in their private evaluations of business opportunities. We discuss the model's limitations in the context of entrepreneurship research and explore extensions of it. We eventually link these analyses back to the discussion of entrepreneurship policy either stimulating entrepreneurship or related investments into education de-biasing entrepreneurs.

Cognitive Biases Revealing Ex Ante Knowledge

Some researchers argue that cognitive biases may trigger socially beneficial information externalities, thereby suggesting that deviations from expected payoff maximization may actually create positive knowledge externalities (Bernardo and Welch 2001; Kariv 2005; Urbig 2010). Building on such information diffusion arguments, in general, and the model by Bikhchandani et al. (1992), in particular, Bernardo and Welch (2001) theoretically show that potential entrepreneurs who exaggerate their own ability to evaluate business opportunities are beneficial for society. The information externality is created through individuals observing other individuals' decisions to either exploit or not exploit a business opportunity. Without any public information, individuals might base their decisions purely on their private

evaluations of the opportunity and their decisions, hence, through their decisions reveal private information. Since potential entrepreneurs may recognize an opportunity at different points in time and typically no two share the exact same information set at the exact same time (Shane and Venkataraman 2000), other entrepreneurs' private evaluations as revealed by their decision can be informative to a potential entrepreneurs. If a sufficient number of individuals have decided to either exploit or not exploit an opportunity, the public information becomes so dominant that individuals just join the crowd. By exaggerating the precision of their individual ex ante evaluations of business opportunities, however, overconfident individuals are less likely to follow fads and fashions. If these private ex ante evaluations drive their observable decisions, their individual evaluations become additional public information, such that an ex ante information externality is triggered by the overconfidence bias. Extending this discussion and also building upon the model introduced by Bikhchandani et al. (1992), Urbig (2010) analyzes the effects of another cognitive bias: the base rate neglect (Kahneman and Tversky 2000). He demonstrates that in a society of interacting individuals, neglecting the base rate enables social learning processes even in situations where due to an unfavorable base rate no single individual would even consider evaluating that opportunity; that is, even if private ex ante information might indicate a favorable business opportunity, the base rate is so negative such that individuals do not act upon that opportunity. Hence, through their decisions, individuals neglecting the base rate reveal their private information to the public and, thus, benefit society.

While Bernardo and Welch (2001) describe their overconfident individuals as entrepreneurial, their model does not capture essential entrepreneurship elements. Information that can be gained by individuals before these individuals actually engage in any entrepreneurial action related to an emerging opportunity does not need entrepreneurial action to be explored. Instead, a publicly funded large-scale market research and distributing the aggregated information to potential entrepreneurs could be more efficient than any support of entrepreneurship. Such publicly supported research would avoid inefficiencies resulting from parallel, private, and competitive information searches. Hence, the revelation of ex ante available knowledge is not what most entrepreneurship researchers would consider the core exploratory function of entrepreneurship. As Candida Brush (2014) succinctly formulates it in a Forbes mini-blog, *"Entrepreneurship is, by definition, about experimenting – trying something, seeing what the results are, learning from the results, and then trying it again."* Kerr et al. (2014, p. 25) referring to Hayek (1948) emphasize that *"the solution of the economic problem of society is... always a voyage of exploration into the unknown"* and summarize that, *"for entrepreneurs, it can be virtually impossible to know whether a particular technology or product or business model will be successful, until one has actually invested in it."* Hence, the unique knowledge created by entrepreneurs results from acting and doing and cannot otherwise be created, such as by merely passively observing and analyzing markets (Brush 2014; Kerr et al. 2014). Thus, further developments of social learning models focusing on the exploratory and knowledge-generating function of entrepreneurship

should not focus on the revelation of *ex ante* available knowledge (such as in models by Bernardo and Welch 2001, and Urbig 2010), but on knowledge generated through the exploitation of opportunities.

Cognitive Biases Revealing Knowledge from Entrepreneurial Action

While in Bernardo and Welch's (2001) model, entrepreneurs collected information about the value of an opportunity before exploitation and, hence, any related information externality is about ex ante available information, related subsequent entrepreneurial action will ex post either validate or invalidate the *ex ante* knowledge. As Shane and Venkataraman (2000, p. 221) emphasize, *"[a]s opportunities are exploited, information diffuses to other members of a society who can imitate the innovator and appropriate some of the innovator's entrepreneurial profit."* While knowledge about successful exploitations is emphasized by Shane and Venkataraman, knowledge about failure can also be helpful. Future entrepreneurs can then avoid replicating the same strategy, following different routes if not exploiting other business opportunities, thereby, saving costs and increasing their success probabilities. At first glance, one might argue that observable outcomes perfectly reveal the characteristics of an opportunity in the real economy, however, there are substantial idiosyncratic risks and chances that make an observed success just an imperfect signal. These idiosyncrasies may make individuals fail although most others would succeed or vice versa.

Cao and Hirshleifer (2000) extend the original model of Bikhchandani et al. (1992) to include observable outcomes as well as idiosyncratic risks. Although Cao and Hirshleifer only investigate rational decision-making, Urbig and Weitzel (2009) note that the inclusion of idiosyncratic risks allows an additional analysis of cognitive biases related to this type of risk; e.g. ignorance of idiosyncratic risks as reported by Moskowitz and Vissing-Jørgensen (2002) and Wu and Knott (2006). Cao and Hirshleifer (2000) emphasize that their model brings together two different mechanisms: the diffusion of private information revealed through decisions and acquired before the actual decision, but also the revelation of new previously completely unknown information through observation of actual exploitations of opportunities. We believe this combination is particularly promising for the analysis of entrepreneurial dynamics.

We now briefly and informally explore the interdependencies of cognitive biases and information externalities resulting from entrepreneurial action itself rather than from revealed decisions to act entrepreneurially. A simple initial implication is that, since the action is the source of externalities, any cognitive bias that favors action is likely to trigger related information externalities. However, the two biases explored in the context of the model by Bikhchandani et al. (1992) – overconfidence in one's own evaluation of an opportunity (Bernardo and Welch 2001) and base rate neglect

(Urbig 2010) – only trigger action-related information externalities under very specific conditions and may suppress information in others. Overconfident individuals will only become more optimistic and, thus, become more likely to act entrepreneurially than others, if the opportunity is *ex ante* positively evaluated. The resulting information externality would be particularly strong and, in fact, be a combination of ex ante and action-related information, if the odds associated with an opportunity are very low (e.g. low base rate for succeeding) and individual ex ante evaluations are not very informative (e.g. very disruptive technologies that are difficult to evaluate ex ante). Under such conditions, rational individuals who positively evaluate an opportunity would nevertheless not exploit the opportunity. The base rate neglect would also have its strongest positive effect on triggering entrepreneurial action just under the same conditions. While both overconfidence and base rate neglect might not be unambiguously in favor of action, it seems that the scenario where they are able to trigger entrepreneurial action and, hence, generate information externalities, very much coincide with how entrepreneurial contexts are described and where innovation – even disruptive innovations – are important, that is, for low odds of succeeding and often difficult to evaluate opportunities.

The existence of two types of information externalities, that is, information gained through pre-exploitation activities (ex ante information) and information gained through exploitation activities themselves (action-based information), can lead to situations where biases may reduce the likelihood of one information externality while increasing the likelihood of the other. Consider, for example, that an individual faces very positive public information, e.g. through some people already starting to exploit an opportunity and perhaps already observing initial successes, but her own evaluation still indicates that the opportunity is not a sustainably good one. An unbiased individual would perhaps, nevertheless, engage in entrepreneurial activities, thereby not revealing the ex ante knowledge but generating additional information from action. An individual overconfident in her private evaluation might not be as entrepreneurial, thereby revealing her unfavorable private evaluation to the public, but not generate the action-based information. Whether or not the overconfidence is beneficial in this setting obviously depends on the relative strengths of the two types of information externalities. The less success of one individual implies success of another one (weak action-based knowledge externality) and the better a business can be evaluated ex ante (strong ex ante knowledge externality), the more beneficial overconfidence would be. Note that this trade-off only appears for negative private evaluations in face of positive public information, but not in the opposite case. If public information would suggest to not exploit an opportunity, but private evaluation turns out to be more favorable, then not being overconfident would not trigger entrepreneurial action and, hence, not reveal any action-related information. Hence, for unfavorable public information and favorable private information, overconfidence would nevertheless be beneficial and it would, because it increases the likelihood of entrepreneurial action, trigger additional action-based information externalities. This asymmetry with respect to the presence of favorable public and private information only shows up in the model once

outcomes of actions can be observed in addition to observed decision to act and this feature affects the social benefits of overconfidence. Hence, it is important to revisit the analysis by Bernardo and Welch (2001) and to augment their model such that observable outcomes and, more generally, information externalities resulting from entrepreneurial action itself are included in the model (cf., Cao and Hirshleifer 2000).

Overconfidence in own evaluations and base rate neglect, however, are not the only cognitive biases that are discussed in the context of entrepreneurship. Optimism and an underestimation of the idiosyncratic risks are also attributed to entrepreneurs (Moskowitz and Vissing-Jørgensen 2002; Wu and Knott 2006). Further, lower loss and risk aversion are attributed to entrepreneurs (e.g., Caliendo et al. 2009; Wu and Knott 2006). Any distortion of beliefs and decisions that directly and unconditionally leads to more exploitation will also lead to more action-based information externalities. Hence, even unrealistic optimism that is independent of one's privately available evaluation and independent of the general base rate can trigger positive information externalities. As for overconfidence in private evaluations, also the effects of unrealistic optimism are subject to trade-offs. Individuals with negative private evaluation facing moderately positive public evaluations might still abstain from exploitation, thereby, revealing their negative information. If such an individual is unrealistically optimistic, she may exploit regardless, hence, suppressing the revelation of the ex ante available information but, due to exploiting, create an action-based information externality. In such situations, unrealistic optimism can increase the likelihood of one at the expense of the likelihood of the other information externality. However, for individuals with positive private information facing very negative public evaluations, who without being biased would not engage in entrepreneurial actions, unrealistic optimism unambiguously generates more information externalities. They might follow their private information, which generates an ex ante information externality and their action generates an action-based information externality.

In sum, cognitive biases can create substantial information externalities and the existence of different types of information externalities, i.e. ex ante available information and action-based information, renders related analyses of social effects rather complex. Furthermore, the interplay between the different biases implies that bundles of cognitive biases may eventually maximize a society's welfare. Our preliminary discussion seems to suggest that under certain conditions Kahneman and Riepe's 'potent brew' of both overconfidence and unrealistic optimism may indeed have substantial socially beneficial effects and related de-biasing efforts may possibly hurt an entrepreneurial ecosystem more than it helps. The conditions seem to be characterized by very negative public evaluations, that is, when ex ante evaluations of success rates are rather negative. Furthermore, the combination might be especially beneficial if action-based information externalities are stronger than ex ante information externalities. Such conditions seem to be rather consistent with evaluations of disruptive innovations before they have been successfully exploited.

Policy Implications for Schumpeterian and Kirznerian Entrepreneurship

While many politicians see policies fostering entrepreneurship as a promising way to increase social welfare, entrepreneurship scholars tend to be less optimistic, pointing to the downsides of such policies, even providing arguments why it could be a good idea to discourage new start-ups and to educate entrepreneurs in ways that reduce the cognitive biases causing unrealistic optimism (Acs et al. 2016; Parker 2007; Shane 2009). The observation that most startups are non-innovative makes it unlikely that the majority of entrepreneurial investments exhibit high social rates of return. This is a major argument put forward against entrepreneurship policies generally fostering the creation of new ventures (Acs et al. 2016). Even worse, empirical evidence suggests that the average private rate of return is also relatively low since individuals who become self-employed are, on average, worse off than employees in terms of income, as the typical "entrepreneurial discount" is between 5 and 15% per year (Åstebro 2012; Åstebro and Chen 2014). Nevertheless, many people start new ventures and our previous discussion suggests that market entry could be induced by cognitive biases that may have negative or positive effects on social welfare depending on contextual conditions. We argue that cognitive biases can lead to overinvestment in entrepreneurship if it is not associated with positive externalities whereas the same cognitive biases due to the same mechanism can counteract underinvestment in entrepreneurship in the case of and resulting from strong information externalities. Contextual conditions tend to influence whether ex ante or action-based information spillovers are generated and what combinations of biases are beneficial for an entrepreneurial ecosystem. Thus, from a policy perspective, entrepreneurship policies fostering start-up activities or discouraging entrepreneurs should account for different types of externalities and cognitive biases as well as the specific contexts.

Ex ante and *action-based* information externalities are related to two different types of entrepreneurship, as described by Kirzner (1973) and Schumpeter (1934). Kirznerian and Schumpeterian entrepreneurship not only differ with respect to their function within an economic system, but also with respect to the type of information externalities they may generate. Ex ante information externalities arise when entrepreneurs identify market disequilibria, enter markets, and these decisions reveal information about their ex ante identified opportunities to other entrepreneurs. According to Acs et al. (2016, p. 37), Kirznerian entrepreneurship can be described as *routine entrepreneurship* based on the assumption "that there are always agents that are ready to enter an industry if profits are above equilibrium" and that "while some uncertainty remains, no new knowledge is being applied in the process." This type of entrepreneurship refers to "competition in the market" where no new products or processes are introduced. Routine (Kirznerian) entrepreneurship, hence, mostly reveals *ex ante* knowledge about market disequilibria rather than technological or market uncertainties. In contrast, Acs et al. (2016, p. 37) describe Schumpeterian entrepreneurship as *novel entrepreneurship*, which means

"activities necessary to create or carry on an enterprise where not all the markets are well established or clearly defined." Novel (Schumpeterian) entrepreneurship is characterized by a general uncertainty about markets and the potential of technologies, an uncertainty that requires testing through actual entrepreneurial action. Knowledge about new markets and technologies generated by actual entrepreneurial action is what other entrepreneurs can learn from the Schumpeterian entrepreneur. Hence, the Schumpeterian entrepreneurs generate action-based knowledge externalities.

Linking Kirznerian and Schumpeterian entrepreneurship to our discussion of externalities and cognitive biases, we can conclude that the benefits of certain cognitive biases promoting action-based knowledge spillovers are most beneficial for Schumpeterian entrepreneurship. They are most beneficial in contexts where ex ante knowledge is weak and substantial uncertainties are present, which can only be resolved by acting rather than thinking. As discussed above, if uncertainties are as large as to make even rational entrepreneurs who hold weak but favorable private evaluations of business opportunities to not engage in entrepreneurial action, then the 'potent brew' of overconfidence and unrealistic optimism might actually be the key to letting society explore such opportunities. High uncertainty and difficulties to predict outcomes seem to match with characteristics associated with disruptive innovations. In contrast, benefits of cognitive biases triggering the revelation of ex ante information is most likely to be particularly beneficial in contexts characterized by Kirznerian entrepreneurship, when the key is to spot market disequilibria rather than developing and testing new products and services. While cognitive biases may counteract potential underinvestment in both, Kirznerian entrepreneurship, characterized by arbitrage, as well as in Schumpeterian entrepreneurship, characterized by innovation, it can be expected that the social rate of return to Schumpeterian entrepreneurship is much higher than the social rate of return to Kirznerian entrepreneurship. This is likely to be the case, because Schumpeterian entrepreneurship is associated with stronger uncertainty that requires action to be resolved, while such action-based externalities are less important for Kirznerian entrepreneurship. On the one hand, this implies that debiasing potential entrepreneurs, e.g. by forcing the development and systematic analysis of business plans, thereby, reducing their inappropriately high tendency to engage in entrepreneurship, might be the right entrepreneurship policy for Kirznerian-type of entrepreneurship. Such an entrepreneurship policy might prevent potential entrepreneurs with cognitive biases, like unrealistically optimistic individuals, from entering "into highly contested markets, with products and services that are typically already offered, and where there is already a large supply present" (Acs et al. 2016, p. 46). On the other hand, de-biasing might not be the right and possibly a welfare-reducing entrepreneurship policy when it comes to Schumpeterian entrepreneurship. In the latter case, cognitive biases may counteract underinvestment in entrepreneurship and might, therefore, be beneficial for the society as they motivate Schumpeterian entrepreneurs to enter market and to generate knowledge externalities, even if their true private returns are low. Without cognitive biases, like unrealistic optimism, market entry of information externality generating Schumpeterian entrepreneurs would have to be motivated by extrinsic

incentives, like governments' financial support to Schumpeterian start-ups, with all the disadvantages of potential crowding out of intrinsic motivation and resulting effects on entrepreneurs' motivation and perseverance. Consequently, entrepreneurship policy, including education and training related to de-biasing, needs to take into account different types of entrepreneurs and entrepreneurial contexts.

These thoughts are just the beginning of a deeper analysis and we leave open a large set of questions and aspects that deserve much more attention. The models of Bikhchandani et al. (1992) and, building on it, of Bernardo and Welch (2001) are based on many critical assumptions and relaxing these assumptions and enriching their analyses of knowledge externalities is likely to provide new insights on the social benefits of cognitive biases. One of these assumptions relate to how information externalities can be exploited. Social learning models assume that each potential entrepreneur can benefit from the information externality. Shane and Venkataraman (2000, p. 221) emphasize that *"[a]s opportunities are exploited, information diffuses to other members of a society who can imitate the innovator and appropriate some of the innovator's entrepreneurial profit.* "This implies that the benefits of the information externality are strategically related to other entrepreneurs' benefits and that the benefits may fall the more other people learn. We suggest future research should more deeply investigate the role of such strategic interaction for social learning processes.

Furthermore, we observe increased competition between entrepreneurial ecosystems of different regions or countries. The learning within each of these ecosystems and the externalities between these systems are likely to create different dynamics. While the learning within an entrepreneurial ecosystem may generate many positive externalities, competition between ecosystems may limit how individual ecosystems may organize their learning. If, for instance, a slower exploitation would generate more reliable public information within an entrepreneurial ecosystem in the long run, by exploiting faster, a competing ecosystem might simply take over markets and reduce the benefits that the former ecosystem can generate from their learning. In fact, such competition creates endogenous windows of opportunities for the exploitation of entrepreneurial opportunities. Hence, while studies like those by Bernardo and Welch (2001) and Urbig (2010) might be interesting for the sake of creating awareness for fundamental social learning processes, the strategic management of places introduces an aspect that should be acknowledged in these models, that is, the possibly endogenous creation of windows of opportunities (Audretsch and Lehmann 2017).

Conclusion

Our discussion shows that in the context of entrepreneurship, cognitive biases, like unrealistic optimism or overconfidence, might not necessarily be bad for the society as a whole if they trigger market entry by innovative Schumpeterian entrepreneurs engaging in entrepreneurial activities resulting in positive knowledge externalities.

However, this effect of cognitive biases might not only be relevant for entrepreneurship, but may also apply to science and the decisions of scientists. Often scientists tend to be unrealistically optimistic and may also be overconfident when starting new research projects. This implies that such cognitive biases may trigger engagement in new research, even though the "private return" to scientific research is often low and chances of failing high. Nevertheless, such research, possibly driven by the highly idiosyncratic judgments of scientists, may result in remarkable knowledge, while these externalities snowball through communication among scientists. By establishing an open, creative, and diversity-welcoming atmosphere in his "Entrepreneurship, Growth, and Public Policy Group" at the MPI of Economics, David Audretsch created an environment that allowed senior scientists as well as young scientists to engage in new research of their own, possibly biased, choices and to share knowledge with other members of the group and research fellows, thereby generating knowledge spillovers. By focusing on people rather than research topics, by encouraging exploration and accepting a wide range of research and research outcomes, David Audretsch reveals his focus on generating action-based knowledge externalities. With respect to this paper's contribution to this book, we may conclude that, after all, this paper is merely a rational justification for the long-standing entrepreneurial research management that David Audretsch is well known and appreciated for, with very positive externalities.

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