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Session 2.4 – Chair: Shiri Breznitz
Location – Board Room, 315 Bloor Street W.

Title: Global versus local star inventors: Human capital and firm innovation activities

Authors: Daniele Battaglia, Federico Caviggioli, Antonio De Marco

Presenter: Antonio De Marco

Abstract:

This paper aims to improve the understanding on the relation between a firm's innovation activity and the individual contribution of the employed inventors. The study builds on the literature linking the resource-based view of firms and the human capital theory, by focusing on the micro-foundations of strategic capabilities (Tzabbar and Kehoe, 2014). Previous research on firm innovation activities at the micro-level has focused on the role of inventors in shaping firm innovation output (Grigoriou and Rothaermel, 2014). Past works analyzed the role of star inventors and found a general positive impact on productivity, cumulative knowledge generation, and value of inventions (Hohberger, 2016). Moreover, they have been found to have positive network effects improving the productivity of coinventors (Oettl, 2012). Recently, negative effects associated to the presence of star inventors have been advanced: they could limit the emergence of other innovative leaders in an organization and fall in the trap of organizational myopia (Chen and Garg, 2018).

At the firm level, the presence of star inventors has been studied in relation to the company's technological scope and the level of exploitation of current technological assets with respect to the propensity to explore new technological fields. Previous research found mixed results on the correlation between the presence of start inventors and the commitment to exploitation / exploration.

This research aims to analyze and compare the innovation output of firms employing global star inventors (i.e. highly productive with respect to the technological field or the whole industry), firms relying on local star inventors (i.e. suboptimal stars but highly productive within the organization boundaries), and firms with an equally distributed involvement of the inventors' team. Our study will provide a quantitative analysis of the contribution of firm inventors to the innovation output with respect to different team configurations.

The empirical setting focuses on the teams of inventors working for US firms operating in the '*Medical Devices*' sector. The time window of analysis is between 2005 and 2010. The employed data repositories are the following: the last available version of PATSTAT for patents; the inventor names disambiguated by the application of the algorithm of Li et al. (2014); information on deaths from the US Death Master File.

The expected contributions of this research are twofold. First, we introduce a measure of concentration of the contribution of inventors that makes possible to distinguish the presence of global and local star inventors. Second, we follow the approach described in recent literature employing data on inventor deaths as an exogenous shock to evaluate the impact on firm-level innovation performance. The results will contribute to the understanding the role played by different type of inventors in sustaining innovation activities in firms, which constitute one of the resources to gain competitive advantage.

Title: Suppliers' ability to influence innovation of multinational automobile producers

Authors: Ana Hafner, Dolores Modic

Presenter: Dolores Modic

Abstract:

Studies on suppliers of the automobile producers (original equipment manufacturers, OEMs) have a long tradition. From studies that refer to particular country's suppliers to researching different aspects of suppliers' performance, e.g. their intellectual capital (Zerenler et al., 2008), B2B cooperation, (Iskandar et al., 2001), quality management (Curkovic et al., 1999), lean production paradigm (Holweg, 2006), etc. The global automotive industry is facing a period of disruption caused by four trends (Lazard and Ronald Berger, 2017): digitalization, autonomous driving, shared driving (mobility) and electrification. We can add another megatrend – circular economy (Ellen MacArthur Foundation, 2015). Trends are emphasizing increased innovative activity and closed loops.

Previous works suggest divergent reasoning, both supporting ideas that OEMs are susceptible to adapting suppliers' inventions, and contradicting this notion. Studies from 90's were frequently describing long-term relationships (Helper and Levine, 1992; Turnbull at al., 1992), however, there was a refocus on the chain configuration (Galankashi et al., 2016; Hingley et al., 2015). Different configurations might open or close door for innovation (Kamath and Liker, 1990; Wilhelm and Dolfsma, 2018). Challenges in supply chain, standardization (Prajogo and Sohaland, 2004) and the not invented here (NIH) syndrome (Katz and Allen, 1982) speak against OEMs' susceptibility to suppliers' inventions. The uncertainty on markets can also play a role (e.g. Borgstedt et al., 2017).

This article explores the influence of suppliers' inventions on OEMs, by investigating: i. Is there a discrepancy between the type of inventions (proposed) by suppliers and the type of inventions implemented by OEMs?; ii. What are the characteristics of suppliers' innovations that have been adopted by OEMs?; iii. Are the suppliers' innovations that have been adopted by OEM characterized by a push or pull mechanism and what is the nature of their origin (original intent or a by-product)?

We conduct a mixed method research analyzing Slovenian automotive industry, predominantly comprised of automotive suppliers of first and second tier, supplying global industry leaders – thus focusing a specific global loop segment. We analyzed all granted patents connected to automotive industry between 2003 and 2018, to investigate direct and indirect adoptions and the potential supply-demand mismatch. We also conducted in-depth interviews with representatives of supplier companies to understand the characteristic and the nature of successfully adopted suppliers' inventions.

Our research partly confirms findings of Trautrims et al. (2017) that innovation in car body technologies is dominated by OEMs, whereas innovation in car seats is supplier-led. However, our analysis reveals that suppliers invent in many car components seeking a global market niche - yet they are not equally successful in each field. The field of electric engines is strongly present, similar to findings of Borgstedt et al. (2017) who revealed that innovative pressure, based on uncertainty regarding electric vehicles, is passed on from OEMs to suppliers. Successful inventions refer to finding solutions for smaller, lighter, more durable and

safer components: i.e. OEMs in the past 15 years seek for incremental inventions. However - due to disruption - there are signs OEMs may become more susceptible to breakthrough inventions.

Title: Knowledge production and spillovers of academic R&D contests

Authors: Koichiro Okamura

Presenter: Koichiro Okamura

Abstract:

The innovation inducement contest is widely recognized as one of policy tools to accelerate the commercialization or development of technologies to solve societal and technological challenges in recent years. Witnessing its novelty as well as popularity, academic researchers have also initiated the R&D contests, which are organized in a manner similar to innovation inducement contests, but held in the basic and applied research domains, usually without monetary awards. They organize contests in the hope of educational effects on students who get involved in them as well as gaining momentum in their research field.

This study focuses on the academic R&D contests. Particularly, it analyzes the RoboCup Soccer Competition, an R&D contest in robotics. It is a soccer competition played by robots which are real robots in the physical world or computer programs in simulation, which was initiated in 1997 and has been annually held to date. RoboCup challenges participants to develop a team of robot soccer players that can beat a human World Cup champion team by 2050 (Kitano et al., 1998). In the RoboCup, participating teams who build and/or programmed original robots or simulation programs compete with one another in several areas, each of which focuses on specific research challenges.

The study examines the research performance of participants and the knowledge spillovers from them to robotics researchers in general. Particularly, it uses the number of papers published and the number of citations received from subsequent papers which are widely used as proxy indicators to capture the research productivity of researchers and the amount of knowledge transferred to the research community in bibliometric studies (Kostoff, 2002; Moed, 2005; Narin & Hamilton, 1996). It uses Elsevier's Scopus to collect the bibliometric information for major journals in robotics to compare RoboCup participants and other robotics researchers who do not take part in the contests. The data are a panel data, with researcher in one dimension and year in the other. The fixed-effect panel-data regression model is used for regression since there may exist individual-specific effects that are not fully controlled by control variables.

The study finds that the researchers who participate in the contests are more productive overall than those not. The knowledge spillover from the participants to the research community is likewise greater than others, but is not equally clear as research productivity. The effect of the contest participation is positive and significant with both research performance and knowledge spillover in early years; it decreases over time however. Secondly, there is a performance variation among the areas. The contests have more positive effects on the researchers participating in the areas where real robot teams play games against one another than those participating in simulation games overall. The findings have the implications about the optimal design and arrangement of the contests for researchers as well as policymakers.

Title: Creating high-potential alumni entrepreneurs: The imprinting effect of student work terms

Authors: Margaret Dalziel, Nada Basir

Presenter: Margaret Dalziel

Abstract:

Asymmetrical information on business possibilities is essential to the discovery of opportunities (Shane, 2000; Shane & Venkataraman, 2000), and while mature entrepreneurs benefit from prior experience as an entrepreneur, employee, or user (Agarwal et al., 2004; Westhead et al., 2009; Shah & Tripsas, 2007), for many young entrepreneurs, their only exposure to the world of business, health care, or transportation is as a consumer, patient, or passenger. In cases where an initial idea is wanting, the prospects of a successful venture may remain limited despite pivots and enabling inputs such as coaching and financing. An important question is therefore: How can young entrepreneurs get good ideas?

We begin with a sample of alumni entrepreneurs that have been identified as having raised venture capital financing by Pitchbook, a venture capital (VC) analytics firm, and investigate the sources of their ideas, focusing on the work terms in which they engaged while undergraduate students. Our hypothesis is that student work terms will have an imprinting effect on the ventures of alumni entrepreneurs. Our sample of alumni entrepreneurs are graduates of the University of Waterloo (UW), in Canada. UW has been identified as an exceptional university due to its inventor-owned intellectual property policy (Kenney & Patton, 2011) and its effect on local economic development (Bramwell & Wolfe, 2008). According to Pitchbook, UW ranks 1st in Canada and 20th in the world in terms of its ability to produce VC-funded alumni entrepreneurs (Pitchbook, 2016).

Our sample consists of 157 employer-venture pairs and up to 413 control group firm-venture pairs. We use over 150,000 USTPO patents to test our hypotheses, finding support. Our contributions to the academic literature are three. First, while entrepreneurship scholars investigating opportunity identification acknowledge the importance of available opportunities and asymmetric information relevant to those opportunities (Shane, 2000; Shane & Venkataraman, 2000), there is little empirical evidence on the relationship between idea sources and subsequent ventures. To this literature we contribute evidence of the technological antecedents of a sample of VC-backed ventures, based on an examination of patents and their references. Second, in so doing, we bring knowledge proximity measures, frequently used in studies of technological diversification and clustering, to the field of entrepreneurship and demonstrate the use of a knowledge proximity measure of proven reliability (Yan & Luo, 2017). Third, we provide evidence of the minimum "stamping" (Ellis et al., 2017) requirement for an imprinting effort. For policy makers interested in enhancing the viability of the ventures of young entrepreneurs, we point to the potential of cooperative education programs in enabling entrepreneurs, while simultaneously preparing students for the workforce and providing employers with fresh talent.