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Flagship enterprises, entrepreneurial clusters, and business entry rates: insights from the knowledge spillover theory of entrepreneurship

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ABSTRACT

Employing a panel setting of 88 counties in the State of Ohio over the five-year period ending in 2006, this study aims to investigate the applicability of the knowledge spillover theory of entrepreneurship in explaining the relationships between flagship enterprises, entrepreneurial clusters, and business entry rates. The study confirms the overall positive relationship between flagship enterprises and startup rates, and the negative relationship between entrepreneurial clusters and startup rates. It further demonstrates that the effect of clusters is moderated by local unemployment rates so that higher rates of unemployment weaken the negative impact of entrepreneurial clusters on startup rates. Based on the evidence collected, policy makers should increase support for flagship enterprises in their regions, and would-be business owners should consider locating their ventures in proximity to flagship companies.

KEYWORDS

Flagship enterprises; entrepreneurial clusters; knowledge spillover theory of entrepreneurship; business entry rates

1. Introduction

Entrepreneurship is often cited as one of the major driving forces behind regional economic development (Ferreira et al. 2017; Haugh 2019; Huggins and Williams 2011; Jayawarna, Jones, and Macpherson 2011; Smith and Bagchi-Sen 2012), and scholars have given considerable attention to the factors explaining cross-regional startup rate differences (Bergmann 2011; Kibler 2013). Among the many factors considered by the scholarly community, recent literature suggests that knowledge spillovers provide a powerful framework for understanding the creation of new firms at the regional level (Audretsch and Lehmann 2005). Yet, beyond the impact of public expenditure on knowledge creation through universities, empirical support for the role of knowledge spillover theory in the regional context is largely lacking. In so far as innovative ideas pursued by startups may originate elsewhere, the lack of attention to alternative sources of entrepreneurial opportunities is startling. This study aims to address this notable shortcoming by re-introducing flagship enterprises and entrepreneurial clusters as possible sources of knowledge spillovers that would-be entrepreneurs may consider when contemplating business entry.

Generally, entrepreneurship is often seen through the lens of the individual-opportunity nexus (Shane and Venkataraman 2000; Venkataraman 1997). It requires the presence of individuals choosing to pursue entrepreneurial opportunities by creating *de novo* startups. The scholarly literature

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largely agrees that regions with an above-average supply of opportunities and qualified human capital will likely display higher entry rates compared to less-endowed regions (Audretsch and Keilbach 2004; Wagner and Sternberg 2004). Of the various types of entrepreneurial opportunity to which startups may respond (Anokhin, Wincent, and Autio 2011), innovative opportunities are of key importance and interest to scholars (Audretsch and Lehmann 2005; Oksanen and Rilla 2009) because they enable qualitative shifts in economic efficiency and ensure economic development (Anokhin and Schulze 2009; Wong, Ho, and Autio 2005). At the same time, where such opportunities come from is a matter of considerable academic debate (see, e.g., Dimov 2007; Holcombe 2003; McMullen, Plummer, and Acs 2007; Török, Tóth, and Balogh 2019). The knowledge spillover theory of entrepreneurship provides a useful framework for understanding the sources of opportunities to which entrepreneurs respond (Acs et al. 2009; Acs, Audretsch, and Lehmann 2013; Audretsch and Lehmann 2005).

This approach, which is consistent with the Schumpeterian view (1942), postulates that large firms[1] are the creators of new knowledge leading to novel resource combinations. Recent empirical evidence confirms that a higher concentration of flagship enterprises in the region is positively associated with regional innovation (Anokhin et al. 2019). Decision makers at those firms, who exercise full control over the new ideas generated through research, may choose to commercially pursue or ignore new resource combinations (Acs et al. 2009). If they deem new opportunities unattractive and choose to disregard them, the knowledge may spill over and cross organizational boundaries. Employees originally engaged in the creation of new knowledge may then choose to commercialize it by initiating new ventures outside the originating firm (Acs et al. 2009). Therefore, the disproportionate presence of flagship enterprises in the region should give rise to powerful knowledge spillover flows that can sustain above-average rates of entrepreneurial entry.

Apart from flagship enterprises, entrepreneurial clusters are seen as a prominent source of regional innovation (Anokhin et al. 2019). Interestingly, however, and in contrast to the largest firms, clusters are unlikely to serve as a source of knowledge that spills over to potential *new* entrants. Clusters carry substantial agglomeration benefits for participating firms (Gordon and McCann 2000; Pe'er and Keil 2013; Porter 1996) and support their members' innovativeness in many ways (Bell 2005; Eraydin and Armatli-Köroğlu 2005; Parida et al. 2017). Yet, because members are independent, the number of decision makers who can stake a claim to a potentially interesting technology born of cluster projects is large enough for one or more members to adequately evaluate the commercial attractiveness of any given idea and retain it within the cluster boundaries. Unlike the decision-maker hierarchy of a flagship enterprise that, due to biases or bad luck, may miss out on an interesting technology (Acs et al. 2009) or choose not to pursue it for strategic reasons (Blind, Cremers, and Mueller 2009), the sheer number of independent firms in a cluster that are aware of the new knowledge ensures that its potential will be discovered and acted on. Naturally, some of these firms try to appropriate the ensuing benefits, which prevents the out-of-cluster knowledge spillover. In clusters, consequently, high-potential knowledge moves relatively freely among member firms but its transfer beyond the cluster is less likely (Meng and Rong 2019). Accordingly, regions with high cluster concentrations may be deficient in innovative opportunities spilling over to new entrants and, hence, should see lower startup rates (Guijarro-Garcia, Carrilero-Castillo, and Gallego-Nicholls 2019; Ferreira and Teixeira 2019), even though regional innovativeness may be high.

In both cases, the availability of human capital is essential for spilt-over opportunities to prompt and sustain the creation of new firms (Acs and Armington 2004; Armington and Acs 2002; Cetindamar et al. 2012). Access to labour is an important determinant of regional venture creation, and we expect the positive effect of flagship enterprises on entry rates to be strengthened and the negative effect of entrepreneurial clusters to be weakened when regions have high unemployment rates. The availability of a labour pool to draw on makes it easier for budding entrepreneurs to build their ventures, and it can encourage entry even when the opportunities in question are inherently uncertain or weak (Huggins, Prokop, and Thompson 2017; Koellinger and Thurik 2012). Accordingly,

we expect unemployment rates to significantly moderate the relationships between flagship enterprises, entrepreneurial clusters, and new venture creation in the region.

The paper closes a major empirical gap in the knowledge spillover literature by providing unequivocal evidence for the role of alternative sources of knowledge that would-be entrants may consider when contemplating their entrepreneurial initiatives. It accounts for the overall availability of innovative opportunities in the locations and isolates the effects of flagship enterprises and entrepreneurial clusters on business entry dynamics. In doing so, it provides novel insights of scholarly and practical value.

The paper proceeds as follows: In the next section, we review the relevant literature and formulate testable hypotheses that link flagship enterprises and entrepreneurial cluster concentration to business entry rates. This is followed by introducing our data and explaining our research methodology. Next, we present our results and discuss their implications for entrepreneurs, policy makers, and the scholarly community. Our paper concludes by discussing the study's limitations and offering suggestions for future research.

2. Literature review and hypotheses development

Entrepreneurship presupposes the existence of the individual-opportunity nexus (Shane and Venkataraman 2000); the presence of opportunities to which potential entrepreneurs respond is critical for the act of business creation to take place. Historically, the literature on entrepreneurship has focused on innovative opportunities – the new ends, new means, or new means-ends framework (Eckhardt and Shane 2003) – as the key factor explaining new venture formation. Although there is an ongoing debate on the specific role and prominence of innovation as the driving force behind business venturing (see, e.g., Anokhin & Wincent 2012b), most scholars attribute the central role in shaping the entrepreneurial landscape to innovative opportunities (Ucbasaran et al. 2003; Vaghely and Julien 2010). Naturally, innovative opportunities are presumed to be the outcome of the creative process undertaken by the entrepreneur and, in this sense, they are often seen as endogenous to the individual(s) who start(s) a business (Delmar, Wennberg, and Hellerstedt 2011; Vaghely and Julien 2010).

Yet, despite the conceptual elegance of this viewpoint, empirical tradition has long established that entrepreneurs disproportionally contribute to the innovative outputs in comparison to their meagre investments in research and development (see the detailed analysis by Audretsch 1995). The conceptual solution to this apparent paradox is offered by the knowledge spillover theory of entrepreneurship or KSTE (Acs et al. 2009; Audretsch and Keilbach 2007; Audretsch, Keilbach, and Lehmann 2006), which has recently emerged as one of the major entrepreneurship frameworks (Ferreira, Fernandes, and Kraus 2019). According to the KSTE framework and consistent with the Schumpeterian (1942) view on entrepreneurship, given the inherent complexity and resource intensity that innovation requires, larger organizations, specialized R&D centres, and research universities – not small firms or individual entrepreneurs – are advantageously positioned to introduce new combinations (innovative opportunities) that can pave the way to successful commercial exploitation. At the same time, because of various 'filters' built into the decision-making hierarchies through which such discoveries are made – including their rather conservative stance on risk-taking – larger entities may choose not to exploit the newly discovered innovative opportunity (see, e.g., Chandy and Tellis 1998; Van Heerde, Srinivasan, and Dekimpe 2010). Moreover, larger organizations may have strategic reasons to patent but not exploit many of their inventions (Blind, Cremers, and Mueller 2009). Indeed, the underwhelming rates of conversion of patents into new products or services in general (Jaffe and Lerner 2011) further supports this line of reasoning.

In such circumstances, knowledge workers with intimate knowledge of the opportunities created within the decision-making hierarchies may choose to pursue them outside the organizational boundaries. In particular, if their risk preference/uncertainty tolerance is substantially greater than that of the decision-making hierarchy, they are likely to launch new ventures to commercialize

innovative opportunities without the opposition from larger entities. In cases where large corporations are the source of innovative opportunities, some resistance can be expected to such outflow of knowledge away from the financing corporations. Yet, when the innovation originates from public R&D expenditure, new venture creation by the inventors tends to be actively stimulated and supported by the policy makers (Audretsch and Lehmann 2005). The growing body of literature on academic entrepreneurship clearly illustrates this phenomenon (Grimaldi et al. 2011; Powers and McDougall 2005; Shane 2004). Yet, even in the case of for-profit corporations that tend to guard their innovation stock under the old conceptual frameworks, there is a growing acceptance of the open innovation paradigm that explicitly guides large companies in seeking alternative ways to profit from their knowledge (see, e.g., Chesbrough 2006; Öberg and Alexander 2019). Letting startups 'exogenize' the opportunities that are endogenously created by the corporations is one such way.

It follows that in a region with a substantial presence of flagship enterprises, such processes may be particularly pronounced, and much higher rates of new venture creation can be expected. The wealth of innovative opportunities bypassed by the decision-making hierarchies who created them but potentially available to risk-taking, uncertainty-tolerant entrepreneurs should facilitate the creation of new firms. Accordingly, all else being equal, the mere presence of flagship enterprises in the region should drive startup rates. Stated formally:

Hypothesis 1. There is a positive relationship between flagship enterprises in the region and new venture formation rates.

Apart from flagship enterprises, entrepreneurial clusters are often postulated as another important source of new knowledge (Belso-Martínez, Mas-Tur, and Roig-Tierno 2017; Roig-Tierno, Ribeiro-Soriano, and Mas-Verdú 2017). Anecdotal examples often attribute impressive innovative consequences to the regional concentration of new firms (see, e.g., Isaksen 2016; Saxenian 1996). In fact, in some economies, governments explicitly acknowledge such clusters as a critical element in generating new knowledge and, consequently, provide financing for networks of firms to support their joint innovation initiatives and facilitate intra-network information exchange (Parida et al. 2017; Wincent, Anokhin, and Örtqvist 2013). Ample empirical evidence supports the view of clusters as sources of innovative opportunities (Capozza, Salomone, and Somma 2018; Scott, Hughes, and Kraus 2019). Whereas individual entrepreneurs and small firms can fail due to their liability of smallness (Stinchcombe 1965), clusters pool resources in ways long described by proponents of the agglomeration framework (Gordon and McCann 2000; Pe'er and Keil 2013; Porter 1996), enabling them to successfully innovate on par with larger incumbents.

Lost in this view of entrepreneurial clusters is the fact that, unlike larger incumbents, many independent decision-making hierarchies exist within clusters, all or most of which have access to information on new ends, means, or means-ends frameworks created within the network. Whereas many of these discoveries may be missed or purposely ignored by a single corporate decision-making hierarchy, because of the ease with which the information flows within the cluster, many independent firms may try to stake a claim to a particularly promising technology (García-Villaverde, Parra-Requena, and Molina-Morales 2018). Namely, innovative opportunities of any commercial significance are likely to be acknowledged and acted on by at least some cluster members (Franco and Esteves 2020), and they are far less likely to be exogenized by would-be startup founders who do not currently belong to the cluster. Therefore, where clusters dominate regional economies, the availability of innovative opportunities for new entrants will be considerably lower, and this should be reflected in the startup rates observed in such regions. Stated formally:

Hypothesis 2. There is a negative relationship between cluster concentration in the region and new venture formation rates.

Because the availability of human capital is a key contributor to entrepreneurial dynamics in the region (see, e.g., Baptista, Karaöz, and Mendonça 2014), and in line with the individual-opportunity nexus view of entrepreneurship (Shane and Venkataraman 2000; Venkataraman 1997), we suggest that the relationships described above are further moderated by the unemployment rates in the region. Koellinger and Thurik (2012) provide evidence for the positive impact of unemployment rates on entrepreneurship. Although it may be argued that not all new ventures stemming from high unemployment rates are triggered by innovative opportunities and may, in fact, reflect necessity-driven processes (Block et al. 2015), since the pursuit of innovative ends requires human agency (Feldman and Francis 2002), the availability of otherwise unengaged labour should be instrumental in converting spilled-over knowledge into new startups. Importantly, we are not necessarily suggesting that the unemployed start ventures per se; rather, having a pool of available labour makes it easier for knowledge workers who have an intimate knowledge of the technology in question to establish a company and draw from that pool to marshal the resources that business venturing requires. Accordingly, the positive relationship between flagship enterprises and startup rates in the region is likely to be strengthened when unemployment is high.

In the case of knowledge spilled over from entrepreneurial clusters, an available labour pool should mitigate the negative impact that clusters have on local startup rates for two reasons. First, the unemployed may pursue opportunities of a different type – arbitrage – and, by so doing, minimize the net loss in startup rates due to the tight control of clusters over the innovative opportunities they create. Second, even if the innovative opportunities that escape clusters are of a lesser quality than those that spill over from incumbents and research institutions, the lack of mainstream employment opportunities may encourage the unemployed to join the newly created startups irrespective of the likelihood of success (Wierenga 2019). In a sense, the sheer size of the labour pool makes it easier for those with entrepreneurial intentions to 'sell' their ideas to potential workers. This does not guarantee new venture survival – in fact, new venture demise may be higher in regions dominated by entrepreneurial clusters – but it should weaken the negative impact of clusters on venture creation as such. Formally stated:

Hypothesis 3. Unemployment rates moderate the positive relationship between flagship enterprises in the region and new venture formation rates such that the relationship is stronger when unemployment rates are high.

Hypothesis 4. Unemployment rates moderate the negative relationship between cluster concentration in the region and new venture formation rates such that the relationship is weaker when unemployment rates are high.

3. Method

3.1. Data

The hypotheses were tested on a sample of all 88 counties in the State of Ohio over the five-year period ending in 2006. This period was chosen because it ensured the requisite stability in the economic system. The economic conditions prior to 2001 were affected by the dot.com bubble, and the economic crisis of 2007–2008 has led to major government interventions such as quantitative easing. Such exogenous shocks distort economic incentives for starting new companies and cause major change in entrepreneurial behaviour (Morgan et al. 2020). The local/county level of analysis was deemed appropriate (Anokhin et al. 2019; Armington and Acs 2002; Bosma, Stam, and Schutjens 2011; Feldman 2001; Fritsch and Schmude 2006). Moreover, the State of Ohio closely resembles the entire country on several key dimensions and offers sufficient variability in terms of rural, suburban,

and urban counties, hence serving the requirement of generalizability. The data were sourced from reputable secondary sources as explained below.

3.2. Dependent variable

New venture formation rates were operationalized by standardizing the number of new firms in the county by the number of active firms.[2] The variable was obtained from the Ohio Department of Development. As a robustness check, we re-estimated the models using an alternative approach to operationalizing the variable by using population counts as the basis for normalization. The results obtained were highly consistent with those reported here and are available upon request.

3.3. Independent and moderator variables

Following emerging empirical literature (Anokhin et al. 2019), we operationalized *flagship enterprises* as the number of the largest Ohio employers in the county. The Ohio Department of Development consistently tracks the 200 largest employers. Occasionally, however, when enterprises are too close in size, it may add more companies to the list to ensure that the cut-off threshold is not seen as arbitrary. Thus, the variable reflects the county distribution of between 200 and 228 of the largest companies per year.

Entrepreneurial *cluster concentration* was operationalized with the help of the Herfindahl-Hirschman index (HHI) as suggested by Anokhin and colleagues (2019). The data used to calculate the indices originated from the Bureau of Economic Analysis. Higher values of this variable indicate that the county has higher representation of same-industry firm clusters that operate in close proximity. Extant research has utilized such measures previously (see, e.g., Knoben, Ponds, and van Oort 2011), and often used them to capture entrepreneurial clustering (see, e.g., Glaeser, Kerr, and Ponzetto 2010).

The county *unemployment rate* was operationalized as the ratio of unemployed to the total labour force. The numbers were sourced from the Ohio Department of Job and Family Services.

3.4. Control variables

Because flagship enterprises and entrepreneurial clusters are not the only sources of spilled-over opportunities to which startups may respond, it was deemed necessary to control for the overall presence of *innovative opportunities* in the region. This was done with the per-capita number of utility patents granted to the county's assignees. The data on patents granted to Ohio-based assignees were obtained from the National Bureau of Economic Research's Patent Data Project and aggregated to the county level based on information from the Ohio Secretary of State. The county population estimates used to normalize patents by population count were sourced from the U.S. Census Bureau.

New venture formation rates may be affected by competition from existing and relocating companies. To that end, we controlled for industry intensity and venture migration rates. *Venture migration* rates were operationalized as the county-level change in the number of active firms registered in the state that could not be attributed to startup or liquidation processes, normalized over the population of active firms (Anokhin 2013). *Industry intensity* was calculated as the number of establishments per 100 people (Armington and Acs 2002; Lee, Florida, and Acs 2004). As argued by Knoben and colleagues (2011), this variable is relevant when dealing with agglomeration (urbanization economies) issues, an approach that has played a meaningful role in our conceptual development. For the same reason, we controlled for the presence of major cities in the county with a dummy variable *metropolis* (Eriksson and Rata 2019). Specifically, seven cities in Ohio had a population of over one hundred thousand residents at some point in time during the last 25

Table 1. Descriptive statistics and correlations.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Entry rates	10.51	3.11	1.00												
2. Flagship enterprises	2.40	3.61	.15	1.00											
3. Entrepreneurial clusters	.11	.03	−.23	−.32	1.00										
4. Per capita patents	.91	1.46	.02	.75	−.16	1.00									
5. Venture migration rates	−1.87	2.72	−.26	−.30	.09	−.07	1.00								
6. Industry intensity	2.01	.37	−.34	.09	−.08	.13	.02	1.00							
7. Metropolis	.08	.27	.15	.74	−.33	.66	−.34	.11	1.00						
8. Bachelor degree or higher	.15	.07	.36	.48	−.39	.44	−.17	−.05	.43	1.00					
9. Per capita income	26.14	6.18	.16	.35	−.21	.26	−.09	.03	.15	.49	1.00				
10. Population growth (log)	9.90	.15	.32	−.34	−.04	−.34	−.16	−.12	−.36	.24	.11	1.00			
11. Income tax	.63	.37	.02	.57	−.29	.53	−.16	.19	.56	.49	.30	−.17	1.00		
12. Property tax	49.17	7.91	.13	.60	−.23	.53	−.19	−.01	.59	.54	.21	−.23	.55	1.00	
13. Sales tax	1.13	.32	−.15	−.35	.30	−.33	.12	−.09	−.22	−.50	−.20	−.12	−.41	−.33	1.00
14. Unemployment rate	5.85	1.49	−.03	−.18	.20	−.27	.03	−.10	−.05	−.50	−.28	−.21	−.26	−.26	.33

Correlation coefficients larger in absolute value than .10 are significant at $p < .05$ level

years (Akron, Cincinnati, Cleveland, Columbus, Dayton, Toledo, and Youngstown). None of the counties hosted more than one such city.

Since not only the quantity but the quality of labour may be important for the conversion of spilled-over opportunities into new ventures, we controlled for the education level of the local workforce calculated as the *share of college graduates* (with a bachelor's degree or above) among the county's adult population. The U.S. Census Bureau was the source of data. The attractiveness of the locale to startups may depend on the economic and market conditions within the region, and so we controlled for the *per capita income* and *population growth* in the county. The estimates of per capita income were provided by the Ohio Department of Development, and the population estimates were sourced from the U.S. Census Bureau. Finally, we controlled for the county *income tax, property tax*, and *sales tax* rates because they affect the incentive structure in the region and may, therefore, affect entry rates. The information was derived from the Ohio Department of Taxation data and the Ohio Secretary of State.

3.5. Models and estimation

The panel nature of our data set necessitated the use of proper econometric techniques when estimating the models. Following the advice of Beck and Katz (1995), we employed Prais-Winsten estimation with panel-corrected standard errors and a common AR1 autocorrelation across panels.[3] The method provides conservative estimates and is beneficial vis-à-vis several alternatives such as fixed effects, random effects, and feasible generalized least squares estimates. In total, we present three models in this study. Model 1 is a baseline comparison model that features only control variables. Model 2 adds independent and moderator variables to the set of predictors. Finally, Model 3 adds the interactions of our independent and moderator variables to the set of predictors.

All predictor variables were standardized, in line with Marquardt (1980). The initial examination of the correlation table did not reveal prohibitively high correlations (see Table 1). Nevertheless, we calculated variance inflation factors and condition indices to ensure valid statistical inference. Mean VIF was 1.83, with the highest VIF (associated with the share of the population with a bachelor's degree or higher) being 2.88, which is substantially lower than the recommended cut-off value of 10 (Aiken, West, and Reno 1991). Similarly, the condition number was 4.11, well below the suggested cut-off value of 15. Therefore, we conclude that multicollinearity does not jeopardize an adequate interpretation of the results.

Table 2. Results.

	Model 1	Model 2	Model 3
Flagship enterprises		.46 (.20) *	.41 (.20) *
Entrepreneurial clusters		−.42 (.17) *	−.52 (.17) **
Flagship enterprises x Unemployment rate			−.20 (.27)
Entrepreneurial clusters x Unemployment rate			.27 (.15) †
Unemployment rate		.43 (.21) *	.27 (.20)
Per capita patents	−.27 (.13) *	−.15 (.19)	−.12 (.19)
Venture migration rate	−.25 (.08) **	−.34 (.11) **	−.34 (.12) **
Industry intensity	−.98 (.14) ***	−.86 (.17) ***	−.84 (.16) ***
Metropolis	.77 (.16) ***	.31 (.19)	.28 (.19)
Bachelor degree or higher	.85 (.22) ***	.90 (.27) ***	.80 (.26) **
Per capita income	−.03 (.12)	−.04 (.12)	.00 (.12)
Population growth	.62 (.17) ***	.72 (.19) ***	.67 (.18) ***
Income tax rate	−.43 (.17) *	−.41 (.18) *	−.38 (.18) *
Property tax rate	−.26 (.17)	−.15 (.19)	−.11 (.19)
Sales tax rate	−.02 (.14)	.05 (.16)	.08 (.16)
Intercept	10.53 (.13) ***	10.22 (.15) ***	10.18 (.15) ***
Model fit	$\chi^2_{(10)} = 201.31$ ***	$\chi^2_{(13)} = 217.21$ ***	$\chi^2_{(15)} = 225.75$ ***
R^2	.37	.40	.40
Dependent Variable: Entry rates			
N = 440			
† $p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.			
Standard errors in parentheses.			

4. Results

The results of the hypotheses testing are summarized in Table 2. As can be seen, all models are highly significant. Model 1 estimated the effects of the control variables and explained approximately 37% of variance in the dependent variable. It fits the data well: Wald $\chi^2_{(10)} = 201.31$, $p < .001$. Most control variables are significant as expected, and the direction of the effect is in line with prior literature. Thus, venture migration rates, industry intensity, and income tax rates exert negative effects on startup rates, whereas the effects of education level, population growth, and location beside a major city are positive. Per capita income, property tax rates, and sales tax rates did not significantly affect the entrepreneurial dynamics in the locales.

Model 2, which provides empirical evidence for Hypotheses 1 and 2, is significant as well: $\chi^2_{(13)} = 217.21$, $p < .001$, and explains approximately 40% of variance in the dependent variable. Flagship enterprises have a significant positive effect on new venture formation ($\beta = .46$, $p < .05$), thus lending support to Hypothesis 1. Entrepreneurial clusters are negatively related to new venture formation ($\beta = -.42$, $p < .05$), thus providing support to Hypothesis 2. By itself, the unemployment rate has a positive significant effect on startup rates ($\beta = .43$, $p < .05$). Once the effect of flagship enterprises and clusters is taken into account, the per-capita patent variable loses its significance. Signs and significance of the remaining control variables remain largely unchanged.

Finally, Model 3, which tests Hypotheses 3 and 4, is also highly significant with $\chi^2_{(15)} = 225.75$, $p < .001$. The R^2 remains at approximately 40% such that the effects of the interactions introduced at this stage did not increase the predictive power of our model substantially. The sign and significance of key variables remain largely unchanged. The interaction of flagship enterprises and unemployment, contrary to our expectations, does not attain statistical significance. Accordingly, Hypothesis 3 is not supported. At the same time, the interaction of clusters and unemployment is (marginally) significant: ($\beta = .27$, $p < .10$). Thus, Hypothesis 4 is supported. To facilitate interpretation, we plot the interaction in Figure 1.

As can be seen from Figure 1, in counties where entrepreneurial cluster concentration is low, unemployment plays little or no role in explaining new venture formation rates. However, in counties with high cluster concentration, entry rates are higher when unemployment is high as

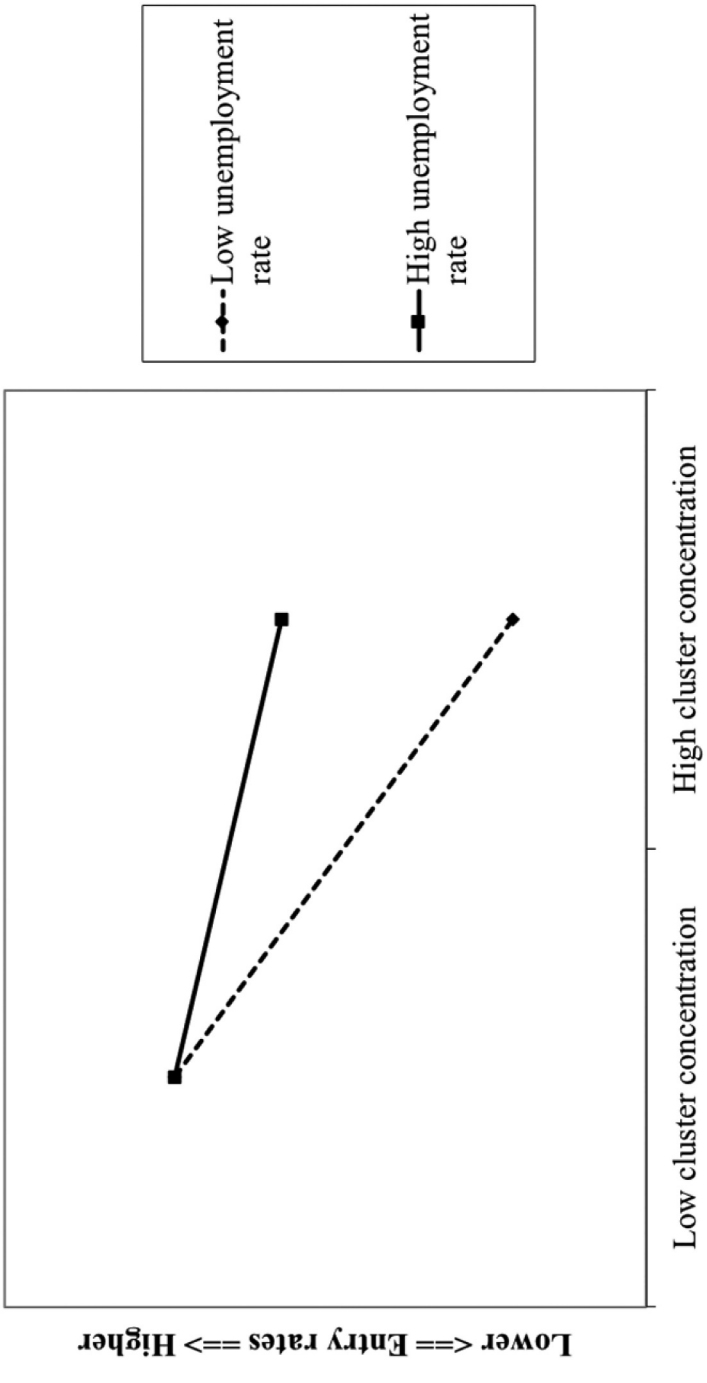

Figure 1. The impact of cluster concentration on entry rates in counties with low and high unemployment rates.

opposed to low. In all cases, however, startup activity appears to be suppressed in counties with a high concentration of clusters. This fully supports the reasoning behind Hypotheses 2 and 4.

For a robustness check, we re-estimated our models using an alternative operationalization of the dependent variable – startup rates normalized over the county population rather than the number of active businesses. We also considered an alternative estimation technique using Driscoll-Kraay non-parametric standard errors that are robust to cross-sectional and temporal correlation as suggested by Hoechle (2007). In all cases, the results (available from the authors on request) were highly consistent with those reported here and provided no new insights.

5. Discussion

This study provides empirical support to the recently popularized knowledge spillover theory of entrepreneurship at the county level in the U.S. It augments the literature by investigating the effects of two possible sources of knowledge that may spill over to provide startup opportunities for would-be entrants – flagship enterprises and entrepreneurial clusters – whereas prior literature had focused primarily on the publicly funded R&D expenditure as a source of such opportunities. The results are fully consistent with our conceptual reasoning and serve to underscore the critical role of decision makers in determining the fate of new discoveries. Prior literature has established that, by themselves, both flagship enterprises and clusters encourage local innovation (Anokhin et al. 2019). This study demonstrates that flagship enterprises tend to share innovative opportunities with *de novo* startups whereas clusters tend to appropriate most opportunities of value created by their members.

It is interesting to note that absent flagship enterprises and entrepreneurial clusters, the overall relationship between innovative opportunities in the county and business entry rates is negative and not positive, as could be expected by the proponents of the knowledge spillover theory of entrepreneurship. Two considerations may explain this surprising finding. First, it is possible, even likely, that the majority of new firms are created in response to arbitrage and not innovative opportunities because arbitrage opportunities are relatively risk-free and certain. This has been established in recent empirical studies (see, e.g., Anokhin 2013; Anokhin and Wincent 2012b; Anokhin, Wincent, and Autio 2011). Incidentally, it implies that innovation, at least in the empirical context of this study, may be associated with incumbent corporations and not *de novo* startups, in similar vein to what Schumpeter (1942) indicated in his later writings. Second, the entrepreneurship literature has shown that the positive link between entrepreneurship and innovation is typically observed in relatively wealthy environments (Anokhin & Wincent 2012a). If true, it is possible that the sign of the relationship may flip if the study is conducted in relatively well-to-do regions such as Silicon Valley.

Consistent with individual-opportunity nexus thinking (Shane and Venkataraman 2000), we provide evidence for the key role of available human resources in affecting the relationship between clusters and new venture formation. The negative relationship between these constructs weakens when unemployment rates are high. Two possibilities appear equally likely in explaining this phenomenon. One, when regular employment opportunities are not available, the unemployed may support even sub-par innovative opportunities that the cluster with its multiple decision makers choses to ignore. Two, it is possible that, when unemployment rates are high, people increasingly pursue a different kind of opportunity – the so-called arbitrage opportunity – to start their ventures. Future research should investigate the dynamic relationship between the pursuit of innovation and arbitrage in detail. At the same time, unemployment rates do not seem to affect the relationship between flagship enterprises and startup rates. This was a surprise to us. It appears that flagship firms are a robust predictor of local startup rates regardless of the economic and institutional conditions. Future research would be prudent to investigate this in detail, particularly given the diverging pattern observed in entrepreneurial clusters.

Taken together, our results suggest that in addition to publicly funded research efforts, there are alternative sources of knowledge that may spill over to potential entrepreneurs. This extends the domain of the knowledge spillover theory of entrepreneurship and offers novel insights into regional startup

processes. These new insights have direct practical implications for policy makers and entrepreneurs, and it is our hope that future policy initiatives would reflect these newly discovered relationships.

6. Conclusions, limitations, and future research

Our results should be considered in the light of the study's limitations. First, we infer the mechanisms at play from the secondary measures, and we have no way of verifying with certainty the source of each opportunity that entrepreneurs have responded to when establishing their companies. We believe that our use of proxies, consistent with prior research, makes it reasonable to postulate the relationships that we claim to capture, and we control for a number of other factors that could provide alternative explanations for the observed phenomenon. Yet, caution should be exercised not to extend our results too far. Future research should consider conducting qualitative investigations of the sources of the opportunities to which entrepreneurs respond to flesh out the unique trajectories that innovative ideas take before resulting in new venture formations.

The very concept of flagship enterprises remains rather novel in entrepreneurship research, and its measurement in this paper, while consistent with research previously undertaken, may appear somewhat arbitrary in nature. Until the literature establishes an unambiguous set of proxies for this concept, we are inclined to work within the framework of what the policy makers make available. But, ultimately, this is a matter that may require the concerted effort of both scholars and policy makers to settle. Regardless of the measurement challenges, the results obtained in this study are fully consistent with the KSTE and provide a fresh perspective into the nature of local startup dynamics. This deserves further attention from scholars, policy makers, and practitioners alike. Future research should consider alternative breakdown points for classifying enterprises as flagship and develop an approach to designating companies as flagship based on regional conditions.

The empirical setting for the study was limited to the State of Ohio. Ideally, one would prefer to extend the study beyond one state to increase the generalizability of findings. Yet, the Ohio context has previously been declared a fitting context to study entrepreneurship in the U.S. (see, e.g., Anokhin et al. 2019; Mendoza-Abarca, Anokhin, and Zamudio 2015) and to make international comparisons (e.g., Braunerhjelm and Carlsson 1999). Overall, we feel optimistic that the results will hold when looking at broader geographic settings. At the same time, it would be beneficial to replicate our study in high- and low-income regions to explore the robustness of our findings in economic and institutional conditions that entrepreneurs may respond to with their business entry efforts.

That said, our results have important implications for policy makers, corporate decision makers, and individual entrepreneurs. For policy makers, it appears that providing support to flagship enterprises is an effective way of generating 'second-hand' opportunities for startups as well. Prior practitioner literature has noted the impact of flagships in supporting local employment opportunities and a number of other socially desired outcomes (Bullard 2011). Our study suggests that the benefits of having flagships firmly established in the locale go far beyond supporting the economic well-being of county residents and provide ample opportunities to harness the local entrepreneurial initiative. For corporate decision makers, it provides a road map to understand the entrepreneurial environment that may emerge in response to various corporate processes. Even if the corporate decision maker chooses to disregard a specific innovative opportunity, would-be entrants may capitalize on it and contribute to the development of the environment that will provide growth opportunities for flagship firms. Finally, for individual entrepreneurs, our results suggest where opportunities for innovative profiteering may be concentrated. One would be wise to study innovative opportunities in the vicinity of flagship enterprises, as those may turn out to be of superior quality and within easy reach.

Our findings with respect to entrepreneurial clusters are harder to process. Extant literature seems to be very enthusiastic when it comes to supporting the self-organizing efforts of local entrepreneurs from the largely case-based writings on Silicon Valley dynamics (see, e.g., Saxenian 1996) to the

rather rich empirical literature on small- and medium-sized firm networks (see Thorgren, Wincent, and Örtqvist 2009; Wincent, Anokhin, and Boter 2009). While we do not question the effectiveness of innovative processes within clusters nor doubt the impact of clusters on the broad range of socially desirable outcomes, we make a case – and support it empirically – for the negative impact of entrepreneurial clusters on startup processes in the locale. This is a major point of departure from mainstream thinking about entrepreneurial clusters. Importantly, it is fully consistent with the knowledge spillover theory of entrepreneurship.

In conclusion, our results paint a picture that offers novel insights while remaining consistent with the conceptual literature in the field. We believe that incorporating the notion of flagship enterprises and entrepreneurial clusters into theorizing on the locally sustainable levels of entrepreneurial activity will provide novel, non-trivial insights for scholars and policy makers to further explore.

Notes

1. Strictly speaking, the literature acknowledges public institutions as another source of knowledge spillover, and empirical support for the theory itself is often based on the effects of public R&D expenditures (see, e.g., Audretsch and Lehmann 2005). Small firms, in contrast, are often seen as beneficiaries of spillovers. In this paper, we empirically control for the innovativeness of regions regardless of the source (through the region's patent endowment) and focus on the two sources of spillovers conceptually acknowledged but rarely investigated empirically in the extant literature – flagship enterprises and entrepreneurial clusters.
2. This reflects the so-called ecological approach to normalizing entrepreneurial statistics as opposed to the labour market approach that standardizes startup rates to the population.
3. xtpcse procedure in Stata

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