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The Impact of Multinational Enterprises’ Spillovers on Indigenous Entrepreneurial Ecosystems

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Declaration

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Acknowledgement

“Acquire knowledge from the cradle to the grave” — Prophet Muhammad (pbuh)

A step in the noblest of pursuits —

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In the final reckoning, it is in the depths of self-discovery that one finds their calling. A sentiment aptly captured in the following words:

“You are as I wished you to be, now mould me as You wish for me to be.” — Imam Ali ibn Abi Talib (a.s.).

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ABSTRACT

While the symbiosis of entrepreneurial ecosystems (EE) and large-scale businesses is well-established, the landscape shifts dramatically in contexts where established businesses are scarce. The silver lining? The potential of foreign direct investment (FDI) spillovers to fill this void. Although FDI and entrepreneurship have been extensively discussed, a persistent black box across all agglomeration theories and spillover literature remains: the mechanisms of these MNE spillovers. This gap becomes even more pronounced within the EE literature. Delving into this untapped dimension, our study unravels the intricate relationship between Multinational Enterprises (MNEs) spillovers and the development of native EEs. We steer this exploration through an overarching research question: 'How do MNE spillovers impact the development and evolution of indigenous entrepreneurial ecosystems?'.

My first paper stands as a foundational pillar, offering a panoramic view of the spillover literature, zoning in on the elusive mechanisms of MNE spillovers within the EE realm. In doing so, we present a roadmap from MNE entry to spillover mechanics, punctuating the route with untrodden research trajectories.

The second paper, enlivened by empirical veracity, focuses on Dublin's EE post-2003—following Google's entry. Despite its monumental transformation, marked by a confluence of global investors, venture capitalists, and unparalleled talent, Dublin's EE narrative remains underrepresented. We aim to bridge this gap, marrying the EE framework with Cantner et al. (2020)'s evolutionary model, offering a vivid portrayal of Dublin's entrepreneurial vibrancy.

My culminating paper takes a pragmatic step in unraveling the enigmatic 'black box' of MNE spillover mechanisms. Guided by hypotheses from the inaugural paper, we demystify the intertwined narrative of MNE spillovers and EE evolution, introducing our innovative conceptual tool, FARM. The culmination spotlights uncharted academic avenues, underscoring future research potentials.

Collectively, this triadic journey seeks to illuminate the pivotal, yet underappreciated, dynamics between MNE spillovers and entrepreneurial ecosystems, hoping to reshape scholarly discourse and practice alike.

1. Introduction

1.1 Aim of Thesis and Research Objective

The foundation of resilient entrepreneurial ecosystems (EE) is often attributed to established, large-scale businesses (Mason & Brown, 2014; Bhawe & Zahra, 2019; Wurth et al., 2020). But what transpires in environments where such incumbent giants are historically absent? Preliminary research posits an intriguing solution: these ecosystems can offset this deficit by harnessing spillovers originating from foreign direct investment (FDI) (Isenberg, 2010; Mason & Brown, 2014; Cho et al., 2021). In some cases, foreign direct investment is crucial for the development and growth of entrepreneurial ecosystems. The vast expanses of business and economics literature recognize four cardinal elements in the anatomy of spillovers: the resources, the actor initiating the spillover, the factors shaping its trajectory, and the actual mechanisms of the spillover (Porter, 1998; Stam & Spigel, 2016). The mechanics of spillover, however, remain largely unexplored in academic studies, especially in the growing field of entrepreneurial ecosystems.

Against this background, our research follows a three-part approach guided by the main research question: 'How do MNE spillovers impact the development and evolution of indigenous entrepreneurial ecosystems?'.

The inaugural paper is the bedrock, establishing the theoretical underpinning. It commences by sweeping through the extensive spillovers literature, discerning the vital role of Multinational Enterprises (MNEs) (Autio et al., 2018; Stam & Spigel, 2020) and then narrowing its gaze to decipher the mechanisms of MNE spillovers. Given the dearth of such discussions within EE literature, we draw upon external academic bodies, subsequently integrating these insights within the EE milieu. This integration is further enriched with Cantner et al. (2020)'s evolutionary blueprint. Our theoretical exposition culminates in a cohesive flowchart delineating the evolution from MNE entry to spillover mechanisms, punctuated with avenues for impending research endeavors.

Responding to our clarion call for revisiting ecosystems empirically, the second paper delves into the vivacity of Dublin's entrepreneurial landscape. Despite advancements, the dialogues on agglomeration economies still echo with bygone empirical conclusions. There's an imperative to revamp this discourse, assimilating the nuances of contemporary ecosystems and the visceral narratives of entrepreneurs, as championed by academic luminaries over the years (Stam & Spigel, 2016; Mack & Mayer, 2016; Audretsch & Belitski, 2017; Brown & Mason, 2017; Spigel, 2017; Lerner et al., 2021; Dotti et al., 2020; Malecki, 2018; Roundy et al., 2018; Ryan et al., 2020). Dublin, metamorphosed since Google's advent in 2003, emerges as an intriguing subject. Teeming with global investors, venture capitalists, and a mosaic of talent, Dublin epitomizes the seismic influence of MNEs. Yet, the academic lens seldom focuses on this vibrant EE. Our study endeavors to chronicle the entrepreneurial array of Dublin, amalgamating the EE framework and Cantner et al. (2020)'s evolutionary model, thereby providing an in-depth tableau of its ecosystem and the dynamics underpinning it.

Setting the stage for our finale, the third paper plunges deeper into the intricate webs of MNE spillover mechanisms. Revisiting Görg & Strobl (2004), who lamented the 'black box' treatment of these mechanisms, we endeavor to shed light into its depths. Empirically probing the hypotheses formulated in our inaugural paper, we craft a holistic narrative, unveiling the symbiotic relationship between MNE spillover mechanisms and EE evolution. This exploration is further augmented with our pioneering conceptual

instrument, FARM, enabling a thorough cartography of spillovers vis-à-vis EE evolution. Our trilogy concludes by spotlighting the remaining enigmas and charting territories for future scholarly quests. In this three-part introduction, we explore a comprehensive understanding of the intricate interplay between MNE spillovers and entrepreneurial ecosystems.

Table 1: Overview of Three Papers

Paper no.	Research title	Method	Analysis
1	MNE spillover mechanisms and the genesis of Entrepreneurial Ecosystems: What We Know and What Should We Know?	Systematic Literature Review	Bibliometric and Thematic analysis
2	Zooming in the Snapshot: A Close-up Assessment of Dublin's Entrepreneurial Ecosystem from the Perspectives of Local Entrepreneurs	Empirical study	Gioia method
3	Role of MNE Presence in Dublin's Entrepreneurial Ecosystem Evolution: An Investigation of Spillover Mechanisms.	Empirical study	Gioia method

1.2 Structure of Thesis and Contributions

Paper 1: MNE spillover mechanisms and the genesis of Entrepreneurial Ecosystems: What We Know and What Should We Know?

FDI has long been considered a potential catalyst for the formation of Entrepreneurial Ecosystems (EE). Scholars such as Mason & Brown (2014), Bhawe & Zahra (2019), and Cho et al. (2021) have indicated the influential role of FDI in triggering EE creation. While there exists some empirical backing (like the study by Ryan et al., 2020), the exact processes through which FDI facilitates EE formation often remain under-explained.

The trend of start-ups choosing to locate in proximity to large corporations is well-documented in the literature (as evidenced by works like Cheyre et al., 2015; Klepper, 2011; and others). Yet, when it comes to Multinational Enterprises (MNEs) acting as the prime movers behind EEs, empirical data is sparse. Notably, there's significant discourse on the potential negative implications of MNEs in local entrepreneurial environments, suggesting that their dominating presence could overshadow budding entrepreneurial endeavors. However, a recurring theme of tech start-ups emerging in areas close to MNEs globally pushes the narrative towards understanding the positive spillover effects from these entities. The EE literature, up until now, hasn't sufficiently demystified the exact mechanisms of these spillovers, particularly how they take root and grow. This gap leads to the guiding research question of this paper: What does the extant literature tell us about the role of MNE spillovers in the genesis and growth of an EE?

To address this, the paper embarks on an exhaustive systematic literature review, straddling multiple

disciplines, to understand the nexus between spillover effects and the concept of agglomeration economies. A significant part of this exploration leans into “non-EE”¹ literature, which includes foundational theories that have significantly shaped modern EE frameworks. By viewing these older theories through the modern EE prism, the study provides a rich, layered understanding of how MNE spillovers influence EE development and maturation. In essence, this paper not only furthers theoretical discourse in the realm of EE literature but also offers actionable insights for policymakers and industry leaders regarding the role of MNEs in galvanizing entrepreneurial activities. The findings have the potential to guide strategic policymaking around FDI, thereby influencing the trajectory, robustness, and eventual success of entrepreneurial ecosystems.

Paper 2: Zooming in the Snapshot: A Close-up Assessment of Dublin's Entrepreneurial Ecosystem from the Perspectives of Local Entrepreneurs

The entrepreneurial ecosystem (EE) has seen a rapid expansion in recent years, emphasizing entrepreneurship's pivotal role in bolstering regional economic growth. Despite its broad recognition and application across policymakers, entrepreneurs, and academic spheres, the mechanisms fostering successful venture creation and growth remain largely elusive. Current EE discourses, particularly on agglomeration economies, are based on older empirical data, and there's a pressing need for updated empirical assessments that capture contemporary ecosystem dynamics. The rapid expansion of the EE literature necessitates empirical studies to further refine its theoretical foundations, with a glaring deficiency in qualitative investigations that consider entrepreneurs' actual experiences. Dublin, given its metamorphosis post Google's establishment in 2003, epitomizes an ideal ground for such empirical scrutiny. While on one hand, it has evolved as a vibrant hub drawing international investors, venture capitalists, and a diversified talent pool, the academic exploration of Dublin's EE has been limited and often reduced to mere statistical evaluations. The real essence of any ecosystem lies in the experiences of its core stakeholders — the entrepreneurs, and this study embarks on capturing precisely that.

Research Question: 'How do local entrepreneurs experience Dublin's EE, and what insights can their experiences provide about and towards the effectiveness of the ecosystem?'

This research intends to bridge the existent gap in EE literature by conducting an in-depth, context-specific study of Dublin's EE, keeping the entrepreneurs' perspective at its core. Theoretical underpinnings for this study draw from the established EE framework, blending elements from the social network theory and the resource-based theory, which provide profound insights into entrepreneurial activity facilitators or barriers. Additionally, this study integrates the evolutionary model of entrepreneurial ecosystems to position Dublin's EE in a developmental continuum, allowing an analysis that respects the inherent dynamism of EEs. Harnessing these theoretical bases, this study aspires to offer an intricate, dynamic portrayal of Dublin's EE. The aim is not just to highlight the elements shaping entrepreneurial experiences but also to gauge the ecosystem's efficacy in promoting robust entrepreneurship. Leveraging rich theoretical paradigms, this study is poised to deliver a comprehensive understanding of Dublin's EE, placing emphasis on factors that mold entrepreneurial experiences and determine the ecosystem's ability to foster successful entrepreneurship.

Paper 3: Role of MNE Presence in Dublin's Entrepreneurial Ecosystem Evolution: An Investigation of Spillover Mechanisms.

The entrepreneurial ecosystem (EE) has become a pivotal framework in understanding the dynamics of local economic growth. This approach, which blends domains such as entrepreneurship, agglomeration economies, and spillovers, showcases regions like Silicon Valley as the epitome of successful EEs. Yet, a burgeoning question remains largely unanswered: How does foreign direct investment influence these ecosystems, especially in relation to the activities of Multinational Enterprises (MNEs)? MNEs, with their global knowledge, resources, and networks, can potentially enrich the local entrepreneurial fabric by diffusing innovation and expertise. However, their overpowering presence might also overshadow local enterprises, increasing competition and straining resources. While existing literature offers a multitude of perspectives on MNE activities, there is a conspicuous gap in understanding the intricate mechanisms of MNE-induced spillovers within the EE context.

This study, therefore, posits the research question (RQ): How do MNE spillovers influence local entrepreneurial dynamics within the entrepreneurial ecosystem? Delving deeper, we explore the specific causalities driving these interactions, transcending the broad generalizations that currently dominate the discourse. The objective is to decipher the nuances of this symbiotic relationship, shedding light on both its harmonies and dissonances.

As the global business landscape continually evolves, influenced by digital revolutions and changing paradigms, the need for a comprehensive study on this topic becomes ever more pressing. In this exploration, we will anchor our research in Dublin's EE, offering empirical insights into the relationship between MNE spillovers and local entrepreneurial activities. Through our investigation, we present the FARM map, a novel conceptual tool designed to trace the trajectory of these interactions, promising to reshape our understanding of EE dynamics.

1.3 Connection between Papers 1, 2 and 3

In the continuously burgeoning field of Entrepreneurial Ecosystems (EEs), Paper 1 identified a conspicuous gap: the intricate mechanisms through which Multinational Enterprise (MNE) spillovers impact EEs remained substantially underexplored. It postulated the exigency for empirical investigations to both decipher and appraise these spillover mechanisms across diverse EEs, thereby laying the intellectual foundation for future studies.

Responding to this academic appeal, Paper 2 embarked on a focused exploration of Dublin's EE. The research aimed to tackle a question that reverberated in scholarly corridors: does Dublin possess a significant and vibrant EE? The empirical evidence presented in this paper demonstrates that Dublin's EE was not merely existent but was dynamically positioned within the Growth phase, having maturely transitioned from its nascent Birth Phase, as delineated by Cantner et al., (2020). These findings not only ratified Dublin's EE as robust but also underscored its aptness as fertile ground for a nuanced exploration of MNE spillover mechanisms, especially given its evolutionary trajectory.

Drawing upon the scaffolding established by the preceding papers, Paper 3 embraced the challenge to empirically probe into the spillover mechanisms presented in Paper 1's systematic literature review. It harnessed the validation proffered by Paper 2, positing Dublin as an emblematic ecosystem to study these intricate mechanisms, especially in the crucible of its ongoing evolution. As it ventured deeper, the paper

sought to demystify what Görg & Strobl, (2004) memorably termed the big “black box” that are spillover mechanisms. Concurrently, it also blazed a methodological trail, showcasing how one might qualitatively appraise an EE, as evinced in Paper 2, and subsequently delineate the unfolding of spillover mechanisms through its evolutionary phases.

Collectively, these academic endeavours synergistically converge to address a grand overarching question: “How does the presence of MNEs catalyze the growth trajectory of indigenous Entrepreneurial Ecosystems?” Through a careful interplay of literature integration and empirical exploration, this triad of papers not only responds to this query but also augments the broader scholarly discourse on EEs and MNE spillovers.

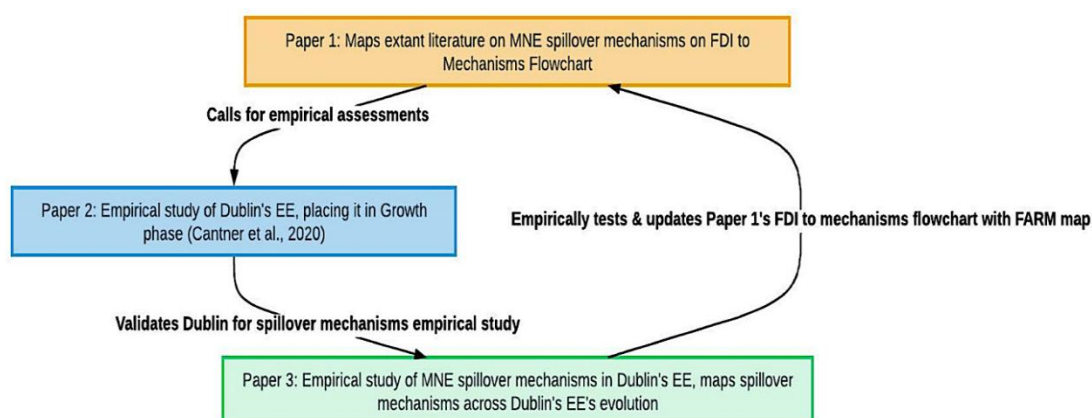


Figure 1: Papers connection
Source: Author, made on Lucid.

2. Methodology

2.1 Research Design Framework

Academic research often resembles a journey, navigating through both the epistemic terrains of knowledge creation, a fundamental ontological concern, and the methodological pathways of inquiry. At its core, this journey is underpinned by a research design that serves as a blueprint, guiding the scholarly endeavor towards meaningful conclusions. As we embark on elucidating our research methodology for this study, it is pertinent to lay down the foundational scaffolding upon which the subsequent discussions are anchored. At the outset, our research design is constructed upon a specific ontological and epistemological foundation. The choice of Critical Realism (CR) as our research philosophy signifies our belief in the existence of an objective reality, albeit one that can be comprehended only through the interpretive lenses of human cognition. This standpoint bridges the chasm between positivism and constructivism, allowing for a nuanced understanding of phenomena that is both objective and contextually rich.

The architecture of our research methodology can be visualized as a cascading structure (see Fig. T1). Commencing with the broader philosophical stance of Critical Realism, it then delineates the research strategy, marked by the principles of retroductive and abductive reasoning. This strategy provides the intellectual fulcrum for our research design, which is further partitioned into three distinct papers, each with its own research focus and methodological nuances. Further to our research methodology is the mode of data collection, which relies on qualitative semi-structured interviews considering the analytical, inductive nature

of this study. This choice emphasizes our commitment to capturing the depth and richness of the participants' experiences and perspectives. Following this, the 'Gioia Method' (GM) is employed for data analysis, a testament to its robustness and capability to distill meaningful themes from qualitative data. Lastly, our research journey remains steadfastly committed to ethical principles, ensuring the integrity and credibility of the entire process.

This chapter endeavors to delve deeply into each facet of the framework. Guided by this structure, we will elucidate the rationale behind our choices, illuminating the pathways we tread in our quest for knowledge.

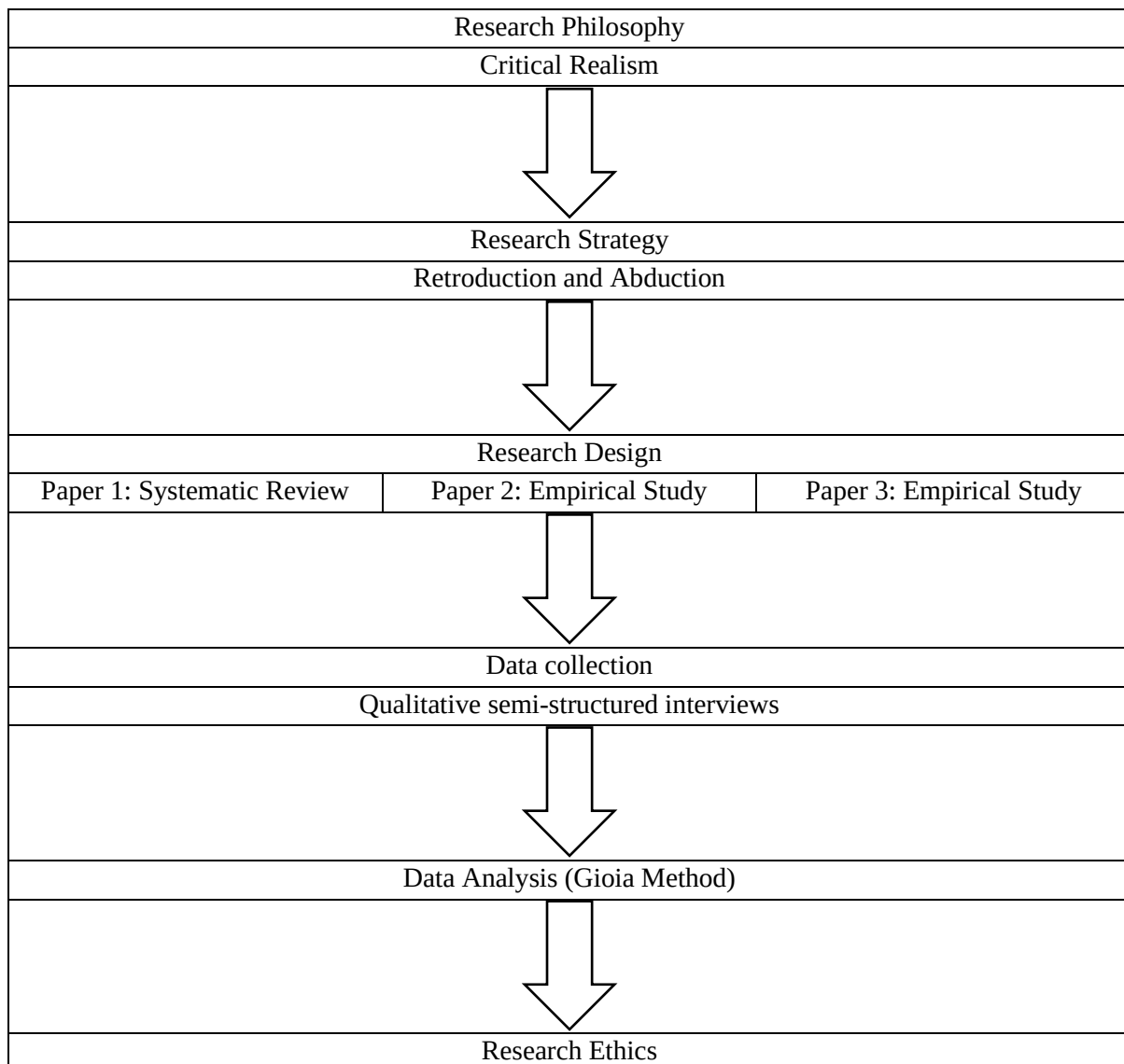


Figure 2: Research Design Framework

2.2 Research Philosophy: Critical Realism

The central query anchoring this thesis is, “How do MNE spillovers impact the development and evolution of an indigenous entrepreneurial ecosystem”. Implicit within this question is a quest for understanding the underlying mechanisms—a shift from merely discerning correlations to probing the intricate pathways linking MNE presence and EE development. Such an inquiry naturally gravitates towards exploring the interplay between the dominant actor in the ecosystem, the entrepreneur, and its interplay with

the various domains of the ecosystem (Isenberg, 2010). This dynamic interaction, as posited by Stam & Spiegel (2016), holds the potential to catalyze productive entrepreneurship within the region.

Critical realism emerges as a particularly fitting research philosophy to scaffold this investigation. As underlined by Stutchbury (2022), critical realism endeavors to uncover causal mechanisms by focusing on individual agency and its interplay within broader social structures. This resonates deeply with the understanding that perceptions of relevant stakeholders underpin an EE (Wurth et al., 2021). Guided by this foundational understanding of CR, we gravitated towards the deployment of semi-structured in-depth interviews (Bygstad et al., 2016; Sayer, 1992; Danermark et al., 2019). Such a methodological choice facilitates a meticulous foray into the investigation of MNE spillovers' role in an EE's evolutionary trajectory, particularly when examining entrepreneurs operating within a cohesive framework.

The entrepreneur's decisions mould the evolution of an EE, and are concurrently guided by the EE, displaying a cyclical, recursive interplay of the structure and agency within this ecosystem. , (Cohen, 2006; Stam & Spiegel 2016). Bhaskar's exposition on CR underscores the symbiotic relationship between structure and agency, adeptly highlighting their dual existence without collapsing into a reductionist trap (Bhaskar, 1994; Stutchbury, 2022). This conceptualization resonates profoundly with our quest to unpack the interdependencies within the entrepreneurial ecosystem. The entrepreneurial ecosystem, as defined by Stam and Spiegel (2016), is conceptualized as "a set of actors and factors coordinated in such a manner that they enable productive entrepreneurship within a region." This characterization dovetails perfectly with the structure-agency analogy intrinsic to CR. In essence, the entrepreneurial ecosystem can be viewed as a manifestation of structures (factors) and agents (actors) synergistically interacting to catalyze productive entrepreneurship. In this light, Bhaskar's philosophy, rooted deeply in philosophical discourse, finds practical application in the realm of entrepreneurial studies. His introduction of 'analytical dualism' and endorsement of a 'morphogenetic approach' (Archer, 1995) serve as theoretical tools to interpret how entrepreneurial structures arise and evolve, shaped by the concerted actions and responses of its constituent agents. The emphasis on structure and agency, central to CR, provides a nuanced lens to comprehend, analyze, and interpret the complex dynamics governing entrepreneurial ecosystems.

Beyond its conceptual congruence with the EE framework, critical realism possesses a nuanced epistemology, blending objective realities with perceptual subjectivities. This dual recognition—that while an objective reality exists, our access to it is mediated through subjective perceptions—facilitates a bridge between abstract theorizing and empirical grounding. Thus, critical realism not only buttresses the philosophical foundations underpinning the three papers but also harmoniously aligns with their methodological imperatives of empirical study. While it does not insist on any particular methodology (Zachariadis et al., 2013), it provides a robust platform, seamlessly integrating the qualitative rigor of Papers 2 and 3, thereby aiding both in theory proposition with the literature review (paper 1), empirical assessments (paper 2) and theory testing (paper 3) (Stutchbury, 2022).

2.3 Research Strategy: Retroduction and Abduction

Retroduction is a central component of critical realist studies, where researchers iteratively engage in the analysis process, moving between data and the emerging explanation (Chiasson, 2005; Danermark et al., 2002; Tsang, 2014). It serves as a recursive application of abduction, induction, and deduction, aiding in the delineation of the trajectory from empirical observations to the conceptualization of underlying

mechanisms and their contextual conditions (Johnson and Duberley, 2000; Chiasson, 2005). Diverging from mere empirical observations, retroduction transcends to acquire knowledge by questioning and conceptualizing phenomena beyond what is immediately observable (Danermark et al., 2019; Sayer, 2004). It is instrumental in hypothesizing potential mechanisms that elucidate outcomes, avoiding deterministic pitfalls (Bygstad et al., 2016). Additionally, it underscores the importance of reasoning and imagination in constructing models of structures or mechanisms, facilitating a comprehensive understanding of the observed phenomena (Blaikie, 2007; Meyer & Ward, 2014). Tsang (2014) further nuances our understanding of retroduction by identifying four types: overcoded, undercoded, creative, and meta-retroduction. While overcoded retroduction draws mechanisms directly from literature, undercoded evaluates multiple potential mechanisms to discern the most fitting. Creative retroduction invites researchers to conceive mechanisms in the absence of existing literature, and meta-retroduction suggests that certain observations could lead to paradigmatic shifts in understanding, as highlighted by Kuhn (1962).

Abduction, as characterized by Charles Pierce, was initially used interchangeably with retroduction but was later distinguished in its application (Chiasson, 2005). At its core, abduction can be perceived as formulating a 'hunch' about the underlying mechanisms or causes based on observed phenomena (Chiasson, 2005). Danermark et al. (2002) postulate that the essence of abduction is found in its ability to redescribe and recontextualize structures and events. Such a process can be pivotal in theorizing within CR, facilitating researchers to provocatively question the converse causality, leading to the redescription or recontextualization of observed phenomena (Welch et al., 2011). Both abduction and retroduction are often used interchangeably, acting as iterative processes throughout data collection and analysis phases of research (Peirce, 1965; Van Maanen et al., 2007; Wynn Jr & Williams, 2012). The interplay between these processes, particularly within CR, allows researchers to bridge the observed with the theoretical, ensuring a rich, multi-faceted understanding of complex phenomena.

In our three-paper format, spanning from an SLR, through an empirical assessment of Dublin's Entrepreneurial Ecosystem (EE), and culminating in an empirical test of theory, our choice of methodological underpinnings hinged heavily on the concepts of abduction and retroduction. Researchers frequently engage in retroductive analysis during critical realist studies, moving iteratively between their data and emerging explanations (Chiasson, 2005; Danermark et al., 2002; Tsang, 2014). This resonates with the very fabric of our methodological progression.

2.3.1 Application of Retroduction and Abduction to Papers 1, 2 and 3

Charles Pierce's distinction between 'abduction' and 'retroduction' (Chiasson, 2005) served as foundation. While abduction often involves making a 'hunch' about underlying mechanisms, a key element includes the redescription and recontextualization of structure and events (Danermark et al., 2002). This mirrors the approach taken in Paper 1, where the SLR mapped extant literature on MNE spillovers. Such redescription can trace the contours of complex research terrains, providing clarity to otherwise obfuscated domains.

Our journey into Dublin's EE in Paper 2 was primarily to assess Dublin's EE and locate it on the evolutionary trajectory (Cantner et al., 2020), as this was the big question mark on Dublin's EE in scholarly corridors. Successfully positioning Dublin on this trajectory not only validated its relevance but also underscored its suitability as a case study for Paper 3, wherein we aimed to explore MNE spillover

mechanisms in-depth. This approach exemplifies retroduction, as characterized by Johnson and Duberley (2000): a progression from empirical observations to the conceptualization of underlying mechanisms and their specific contexts. Such a process, combining abduction, induction, and deduction, necessitates an iterative engagement with data and theory. This iterative nature is mirrored in our research methods, particularly in our use of qualitative interviews and the incorporation of a Likert-type scale, echoing the insights of Chiasson (2005).

Furthermore, CR refutes the convention of purely inductive or deductive theory development. Explanation within the CR realm often commences with a startling contrast or arises from a perceived disconnect between observation and theory (Lawson, 2003; Welch et al., 2011). Such was the case in Paper 3, where the empirical testing of Paper 1's findings was pursued, seeking both affirmation and avenues for further theory-building. Theoretical constructs in CR exemplify a process of conceptualization (Sayer, 1992), and retroduction, as a pillar of CR, leans on reasoning and imagination to formulate models of structures or mechanisms which elucidate the phenomena in question (Blaikie, 2007; Meyer & Ward, 2014). Applying Tsang (2014)'s categorization, our retroduction can be viewed as a blend of 'overcoded', where mechanisms are extracted from literature, and 'creative', where researchers conceive mechanisms in the absence of literary evidence. Our SLR, as depicted in Paper 1, inherently borrows from existing mechanisms in the literature, while the empirical aspects of Paper 2 and 3 can be seen as creative explorations. In alignment with Zachariadis et al. (2013), our research employed retroductive analysis, harmonizing with a critical realist stance rather than being confined within positivist or interpretivist philosophical boundaries. This methodological choice was steered by the intricate dance between data analysis and the emergence of theory, refining theoretical perspectives along the way (Dubois & Gadde, 2002, 2014). Lastly, considering the analytical depth and rigor required for our research, a structured three-stage process of coding and analysis, resonating with Farquhar (2012) and Saldaña (2013), was deemed necessary. The resemblance of our approach to grounded theory (though not classic grounded theory), especially due to the continuous oscillation between data and theory, further reaffirms the aptness of our methodology (Douglas, 2003; Hunter et al., 2005; Walsh et al., 2015). In sum, through the combined lenses of abduction and retroduction, our trilogy of papers endeavors to bridge theoretical gaps, shed light on uncharted territories, and enrich the domain with methodological rigor, empirical answers and theoretical advancements.

2.4 Case Study

Case study research is a highly recommended method for critical realist research, as it focuses on exploring the intricate interactions, underlying mechanisms, and context of the phenomena being studied (Ackroyd, 2010; Easton, 2010; Miles & Huberman, 1994; Mingers, 2004; Yin, 2003). Critical realism's emphasis is on the understanding of underlying mechanisms, rather than merely establishing generalized laws or predicting outcomes (Bygstad et al., 2016). Such a perspective is essential for research aimed at illuminating the 'black box' of MNE spillover mechanisms in entrepreneurial ecosystem (EE) evolution.

Mechanisms, as understood in the CR paradigm, denote the ways entities act due to inherent physical and social structures (Bhaskar, 1975; Sayer, 2000; Smith, 2006). Such mechanisms can either be thought of as causal powers—potentials rooted in the essential nature of entities (Fleetwood, 2004)—or as tendencies, which outline the characteristic courses of action for specific classes of things, though not always realized (Bhaskar, 1975; Manicas, 1987). These causal mechanisms, while often unobservable, are pivotal in the realm

of CR; however, their existence is determined not by their observability but by their effects (Bhaskar, 1975; Bhaskar, 1998; Sayer, 2000).

To effectively uncover these mechanisms, 'process tracing' is utilized, aiming to discern the causal processes between variables, thus furnishing a robust explanation for the phenomena under scrutiny (George & Bennett, 2005; Gerring, 2008; Hall, 2006). The 'case study' methodology serves as a bridge, constructing causal chains that connect discrete events (Roberts, 1995). Such an approach aligns with the layered ontology inherent to CR, encompassing events, mechanisms, and overarching structures (Sayer, 1992). In the endeavor to further delve into these mechanisms, critical realism relies on the techniques of abduction and retroduction (Fletcher, 2017; Oliver, 2012). The Gioia method of abstraction, in particular, is invaluable in transitioning from raw data to analytical categories, making it a preferred tool among critical realists (Corley & Gioia, 2011; Gioia et al., 2012; Maxwell, 2012; Yeung, 1997). Wynn and Williams (2012) have extolled the virtues of the case study method for CR research, especially when it comes to probing mechanisms, the emergence of systems, and experiences. The research's focus on EE emergence and evolution aligns seamlessly with their recommendations, thus reinforcing the aptness of the case study methodology. The method offers the granularity required to elucidate on the experiences, the evolution of systems, and most crucially, the mechanisms — an area our research is keenly attuned to.

Critical realism fundamentally acknowledges that reality is stratified and independent. This means that there's a deep structure to the reality that doesn't always present itself on the surface. The use of the case study methodology, as advocated by Wynn and Williams (2012), enables a detailed exploration of the layers of this stratified ontology. Specifically, case studies are adept at peeling back the layers of observed events to uncover the underlying mechanisms that drive them, often situated within specific structures and contexts.

2.4.1 The Role of Process Tracing and the Gaia Method

While CR posits that some mechanisms might be unobservable, it doesn't reject the notion of deriving knowledge from their effects. These effects can be captured by conducting qualitative case studies. This is where process tracing, a methodological tool recommended by many CR scholars, comes into play. By tracing the causal chains of events and identifying potential mechanisms at play, researchers can make informed conjectures about the unobservable driving forces. The Gaia method for abstraction further allows researchers to streamline vast amounts of qualitative data into cohesive analytical categories, which is a boon in case study research.

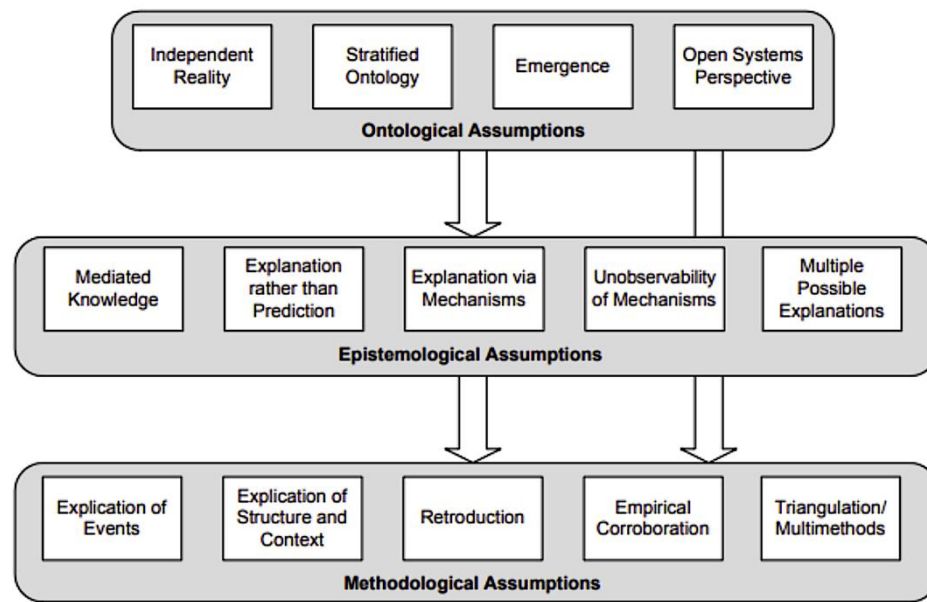


Figure 3 Ontological and Epistemological Assumptions of CR and the Methodological Principles
Source: Wynn and Williams (2012)

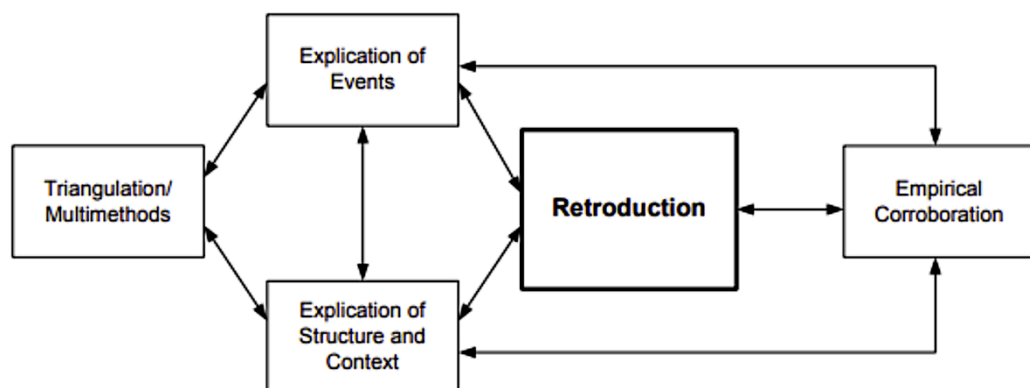


Figure 4 Relationships among the Methodological Principles
Source: Wynn and Williams (2012)

Paper 1 aligns with the mediated knowledge principle of CR. Instead of merely predicting outcomes, it focuses on elucidating the underlying mechanisms, acknowledging their unobservable nature. The systematic literature review (SLR) aids in sifting through extant knowledge, highlighting the existing gaps, and pointing out the dire need for new empirical studies to both validate known mechanisms and uncover new ones. It places reviewed mechanisms along an evolutionary trajectory, employing retroduction and paving the path for ‘explication of structure and context’ in paper 2 and ‘empirical corroboration’ in paper 3. Paper 1 acknowledges the unobservability of certain mechanisms, an inherent epistemological trait of CR, and thus calls for empirical corroboration of known mechanisms while staying open to discovering new ones.

Paper 2 intricately weaves into the methodological assumption of explicating structure and context. By providing an exhaustive account of the structure and the milieu in which these mechanisms operate, it strengthens our understanding and interpretation of the mechanisms, reinforcing the argument laid out by Wynn and Williams (2012). This aligns with Figure T3, emphasizing the importance of understanding both the structures at play and the events they produce.

Paper 3 contributes significantly by empirically corroborating the mechanisms discussed in the previous papers, effectively addressing their unobservability. By aligning the findings with the methodological principles showcased in the figures, this paper strengthens the argument for the chosen methodology.

2.5 Case Selection

In scholarly endeavors, achieving methodological rigor demands a keen focus on case selection. As aptly noted by Lincoln & Guba (1985), establishing the rationale for case selection is paramount for instilling both validity and reliability in the representation of the studied phenomena. Purposeful case selection offers an avenue to explore the distinctive dynamics and intricacies of an observed phenomenon (Lincoln & Guba, 1985). The emergence and dynamism of entrepreneurial ecosystems has been an area of intensified focus, as demonstrated in Paper 1, highlighting the significant influence of multinational enterprise (MNE) spillovers. Yet, the effect of MNE entry can be multifaceted, especially considering the evolutionary phase during which they integrate into the ecosystem. Our concentration aligns with ecosystems that underwent a genesis and subsequent growth spurred by MNE incorporation.

In this vein, Dublin stands out as a compelling case. Its transformative journey, marked by the infusion of MNEs like Google in 2003, exhibits the latent potential of an ecosystem that metamorphosed in response to MNE integration. As underscored by Yin (2009), the selection of such a case is validated by its uniqueness, criticality, and revelatory nature, offering rich insights into the EE phenomenon.

Following our detailed exploration, Paper 1 demonstrated the profound influence of MNE spillovers on the fabric of entrepreneurial ecosystems (EE). The systematic literature review conducted therein unearthed pivotal mechanisms through which MNEs inadvertently catalyze entrepreneurial activity. But to ground these findings in practical settings and truly understand the symbiotic relationship between MNEs and EEs, a focused case study becomes paramount.

Dublin's narrative serves as a stellar exemplar. Over the years, it has transformed into a vibrant entrepreneurial hub, primarily catalyzed by the establishment of major MNEs. An instrumental milestone in this narrative was Google's decision to establish its European headquarters in the city, a testament to Dublin's strategic importance. This influx of tech behemoths, as detailed in our case study, boosted Dublin's global standing, birthing a burgeoning tech workforce and an effervescent startup ecosystem. FDI-friendly policies, especially the enticing corporation tax rate of 12.5%, further added fuel to this entrepreneurial fire.

But where does the city's EE stand along the evolutionary trajectory as posited by Cantner et al. (2020)? Paper 2 provides an answer. Although Dublin has been somewhat of a well-kept secret in academia, with only statistical snapshots available, it generates contrasting perceptions. On one hand, it is hailed as the Silicon Valley of Europe, but on the other, there are discussions among scholars questioning the very existence of a significant ecosystem in Dublin. While the presence of MNEs is well-acknowledged, we spotted a pressing need to delve deeper into its documented profile to truly assess Dublin's EE. Through a thorough examination, Paper 2 validates Dublin's EE's significance, cementing its position as a thriving EE in its growth phase. Such an affirmation underscores Dublin's suitability as a focal point of our research, tackled in the third paper.

Thus, the connection between Papers 1 and 3 is forged, with all working together to address the overarching research question: "How do MNE spillovers impact the development of an EE?" The empirically

derived mechanisms in Paper 3 trace back to the systematic literature review in Paper 1, allowing us to not only test theories but also refine the findings of Paper 1 considering empirical discoveries.

2.6 Secondary Data Collection

To provide a robust and comprehensive snapshot of Dublin's entrepreneurial ecosystem, our research employed a rigorous secondary data collection approach. Drawing upon publicly available datasets and reports, our efforts revolved around a multi-faceted analysis of data furnished by the likes of IDA Ireland, the Central Statistics Office (CSO), and other authoritative sources, such as TechIreland and Dublin.ie. These sources were invaluable in tracking the historical evolution and contemporary state of entrepreneurship in Dublin, from strategic decisions made by the IDA, the rise of tech giants like Google in the city, to the vibrant startup scene and state policies that foster innovation. Additionally, specific corporate developments, such as acquisitions by multinational corporations and the rise of unicorn startups in Dublin, further shaped our understanding. This secondary data, while quantitative in nature, offered a crucial backdrop, setting the stage for our qualitative exploration into the lived experiences of Dublin's entrepreneurs. By juxtaposing the macro-level data with micro-level narratives, we aimed to ensure a comprehensive, holistic analysis that captures the true essence, opportunities, and challenges of Dublin's entrepreneurial landscape.

2.7 Interviews

2.7.1 Rationale for Focusing on Entrepreneurs

Central to the research on Dublin's entrepreneurial ecosystem is the entrepreneur. While the aspiration for a comprehensive understanding of the ecosystem is commendable, the approach must be pragmatic. The entrepreneurial ecosystem, as grounded in the tenets of critical realism (Wurth et al., 2020), hinges primarily on perception. And it is this very perception that catalyzes and molds entrepreneurial intentions and pursuits. Delving into the framework of Theodoraki et al. (2018), an entrepreneurial ecosystem pivots around three pillars: the actors with their multifarious interactions, the tangible infrastructure, and the deeply embedded culture. Given these dynamics, the entrepreneur, as the main actor, emerges as a focal point. It is through their lens that we can vividly visualize and understand the ecosystem's fabric. Thus, the decision to spotlight entrepreneurs is rooted in the belief that an ecosystem's efficacy is intrinsically tied to entrepreneurial perception.

2.7.2 Rationale in Paper 2 and Paper 3

In Paper 2, the aim was to contextualize Dublin's entrepreneurial ecosystem along the evolutionary phases posited by Cantner et al. (2020). This quest aimed not just to identify the current status but to detail its development. Hence, I chose qualitative assessment to surface insights and mechanisms under the statistical snapshot. In-depth interviews with entrepreneurs illuminated a spectrum of insights, offering both a snapshot of the current ecosystem and an understanding of its evolving nature. Entrepreneurs, in their multifaceted roles, are the ecosystem's heartbeat, making them indispensable to this narrative.

Similar to Paper 2, Paper 3 necessitated a deep dive into the Dublin entrepreneurial milieu. Leveraging paradigms from notable publications like Ryan et al. (2020), a rigorous methodology was employed. A diverse cohort of entrepreneurs was assembled, representing a melange of backgrounds, valuations, and experiences. These entrepreneurs were not just participants but pivotal contributors, having

navigated the ecosystem's terrain for over three years. Their insights were mined through a combination of structured scales and open-ended queries, ensuring depth in understanding. The selection process was multifaceted, with entrepreneurs being identified through varied channels, from local entrepreneurial hubs to dedicated social platforms. By integrating a rich mix of gender, nationality, and entrepreneurial journeys, the study aimed to encapsulate the breadth and depth of experiences. Ethical tenets were upheld throughout, ensuring the participants' comfort and trust.

Interviews were the backbone of this research, accentuated by structured Likert scales and probing open-ended questions. This duality facilitated a profound exploration of entrepreneurial narratives, revealing the underlying motivations, challenges, and perceptions. With data saturation as a guiding principle, the research balanced depth with breadth. The ensemble of entrepreneurs showcased a gamut of journeys, from nascent fundraisers to those riding the crescendo of multi-million-dollar acquisitions. This mosaic of experiences, buoyed by the diversity of participants, enabled an intricate understanding of Dublin's entrepreneurial landscape.

Table 2: Interview List

Interviewee	Estimated Valuation	Interview Date	Sector	Interview Duration	Position
Interviewee 1	Above €10,000,000	15-Jul-23	Equestrian Technology	30 mins	Founder
Interviewee 2	€ 18,000,000	26-Jul-23	Grocery Platform	30 mins	Founder
Interviewee 3	Acquisition by Notable Tech Entity	2-Feb-23	Mental Health Application	40 mins	Founder
Interviewee 4	€ 1,000,000	4-Jan-22	Medical Technology	30 mins	Co-Founder and CEO
Interviewee 5	€ 1,000,000	13-Feb-22	Medical Technology	30 mins	Co-Founder and CTO
Interviewee 6	Above €100,000	28-Jul-22	Language Learning Tech	30 mins	Founder
Interviewee 7	€ 1,500,000	24-Aug-22	Market Insight	30 mins	Founder
Interviewee 8	Acquisition by Notable Tech Entity	4-Aug-22	Graphics Technology	60 mins	Founder
Interviewee 9	Exceeding €150,000	18-Jan-23	Malware Technology	35 mins	Founder
Interviewee 10	Acquisition by Notable Tech Entity	1-Mar-23	Hardware Technology	50 mins	Founder

2.7.3 Interview Methodology and Process

The research process was systematically executed to ensure a rigorous exploration of Dublin's entrepreneurial ecosystem. Comprising 12 interviews, this qualitative inquiry followed a structured yet flexible approach, grounded in the principles of iterative analysis. Notably, the iterative process led to data saturation, indicating a thorough representation of perspectives within the scope of this study.

Table 3: Interview Structure

Step 1: Structured Introduction:	As a foundational step, every interview commenced with a structured introduction. The primary investigator delineated the objectives, underpinnings, and expected outcomes of the research, thus ensuring that the interviewees were acquainted with the central theme. This procedure aimed to prime the interviewee's focus towards the six domains of an entrepreneurial ecosystem as identified by Isenberg (2010).
Step 2: Confidentiality Assurance	Ensuring an environment of trust was paramount. Participants were provided with a confidentiality declaration that ensured that their identities and responses would remain anonymous. This step was crucial to uphold the ethical standards of the research and foster candid discussions.
Step 3: Likert-Type Scale Assessment:	Once the foundations were set, participants were introduced to a digital interface (Google form) featuring a Likert-type scale for each of the six domains of the entrepreneurial ecosystem. Options ranged from 'Very Bad' to 'Very Good.' The intention was to gauge their instantaneous reactions towards each domain, which served as an anchoring point for deeper discussions.
Step 4: Probing for Depth:	After selecting a rating, the interviewee was prompted to elucidate the reasoning behind their choice, focusing on specific experiences associated with each domain. This probing mechanism not only added depth but also brought to light intricate nuances of their entrepreneurial journey.
Step 5: Delving into MNE Presence:	The conversations subsequently shifted to explore the direct and indirect influences of Multi-National Enterprises (MNE) on the participants' entrepreneurial journey. Encouraging open-ended responses ensured a broader narrative, which would later be categorized based on the MNE spillover mechanisms identified in the systematic literature review (SLR) of Paper 1. To guide participants facing challenges in articulating their thoughts, a flowchart from Paper 1 delineating FDI to mechanisms was used as a reference.

2.8 Data Analysis

The data analysis for this research, anchored in the iterative paradigms of grounded analysis, was meticulously executed using the Gioia method—a systematic approach increasingly acknowledged for its application in both International Business (IB) and International Entrepreneurship (IE) research domains (Corley & Gioia, 2011; Gioia, 2021) and thus, by extension, applicable to entrepreneurial ecosystem framework.

For Paper 2, our methodology combined both quantitative and qualitative approaches, echoing the sentiments that IB and IE research stand to benefit immensely from grounded theory's holistic perspective (Gligor, et al., 2016). Grounded theory, as posited by Glaser & Strauss (1967), and later elaborated by Charmaz (2006), is fundamentally apt for theory-building, allowing theories to be developed directly from data rather than being driven by pre-formed hypotheses. Utilizing the Likert-like scale, we aggregated a generalized response for each of the domains in the entrepreneurial ecosystem. This quantitative approach is

reflective of a recent shift towards more quantitative methods within IB research (Birkinshaw et al., 2011). Grounded in the principles of interpretivism and constructivism (Cohen et al., 2011), our sensemaking approach sifted through the multifaceted perspectives from the interviews. Leveraging Cantner et al. (2020)'s evolutionary pathway, we strategically assigned each domain of the EE to its appropriate evolutionary phase, offering both depth and explanation in understanding Dublin's EE development.

For Paper 3, we employed the Gioia Methodology, which has been regarded as an effective qualitative approach, striking a balance between the need for inductive concept development and academic rigor (Gioia et al., 2012; Reay et al., 2019). The GM's emphasis on stages of data coding, theory development, and narrative presentation (Gioia et al., 2022) provided a structured yet flexible framework for our data analysis. The initial coding phase allowed for raw data deconstruction into preliminary themes, a cornerstone in building theory, as traditionally seen, in IB and IE research (Eisenhardt, 2020; Welch et al., 2022). The rigorous application of the GM, combined with our iterative and layered coding, allowed for both the confirmation and discovery of MNE spillover mechanisms in Dublin's EE. Such an approach addresses the recent urging for qualitative researchers to provide more rigorous studies in the domain of IB (Welch & Piekkari, 2017).

2.9 Research Ethics

Upholding ethical standards of TCD's ethics guidelines in addition to GDPR guidelines was pivotal throughout the research process. Confidentiality was prioritized, ensuring that participants' identities remained anonymous in all published materials. All data was securely stored and strictly restricted to the research team. Participants were briefed about the intent, ensuring informed consent. Importantly, the research emphasized genuine individual experiences, dissuading generalizations or assumptions. This commitment to ethics ensured that the participants felt respected and valued, promoting authenticity in their narratives.

3 .Paper 1: MNE spillover mechanisms and the genesis of Entrepreneurial Ecosystems: What We Know and What Should We Know?

Author: Syed Ali Adnan Rizvi, Giulio Buciuni, Paul Ryan

Abstract

Incumbent large businesses can be anchors for resilient entrepreneurial ecosystems (EE). But what if a location has historically lacked large incumbent firms? Some early research has shown that an EE can compensate for this absence through spillovers from inwardly attracted foreign direct investment (FDI). FDI can be, in specific cases, essential to the genesis and evolution of an EE. In the broad business and economics literature, spillovers have been shown to have four fundamental aspects: the resources, the actor responsible for the spillover, the factors influencing the spillover, and the spillover mechanisms. Of these fundamental aspects of spillovers, the mechanisms remain largely under-explored in the wider academic discourse. This is even more the case in EE literature, despite its recent burgeoning. Therefore, we first address this gap from the broad spillover mechanisms coverage in our systematic literature review, which extends beyond the narrower scope of mere EE literature. From our mapping of the literature, we present a future research agenda to advance academic discussion on the mechanisms of spillovers from multinational enterprises (MNEs) in an EE.

Keywords: entrepreneurial ecosystem, spillover, mechanism, MNE, FDI, review

1. Introduction

Entrepreneurship has long been known to foster local economic growth. This truism has been established across a wide array of theoretical lenses that point to the interactions of agglomeration, spillovers, and entrepreneurship. Theoretical frameworks such as Porter's cluster theory (1998) relating to agglomeration economies, and the knowledge spillover theory of entrepreneurship by Audretsch and Keilbach (2007) have made significant contributions to the discourse on local economic development. Despite an early acknowledgment of the deep interconnection between these interwoven elements of local economic development (Pennings, 1982; Dubini, 1989; Van de Ven, 1993; Chang & Kozul-Wright, 1994; Porter, 1998; Bahrami & Evans, 1995; Acs, 2006), research in these fields has been largely contained within their respective silos as these distinct yet related bodies of literature evolved in isolation. Disparate frameworks provide only a partial view, lacking a holistic, systemic approach that could more usefully tie these concepts together. Over time, it became increasingly evident that a more integrative, overarching framework was needed.

Cohen's (2006) introduction of the entrepreneurial ecosystem (EE) approach presented policymakers and academics with a framework for interpreting economic growth as a function of entrepreneurship rather than considering entrepreneurship merely as a contributor to economic growth. For example, while "productive entrepreneurship" is the ultimate output of an entrepreneurial ecosystem (Cohen, 2006; Stam & Spiegel 2016), it is dependent on the interplay of all relevant elements within the economic region, improving visibility of complex interdependencies and mutual causalities between the fields of agglomeration and entrepreneurship. However, the transition from agglomeration economies to a systemic EE framework has proven challenging. The theory building process has been gradual and yet largely incomplete, building upon existing foundations and frequently incorporating new elements into an evolving theoretical structure. In essence, despite its wide adoption and burgeoning literature, the EE conceptual framework is still mired in adolescence.

The development of the EE framework usefully signaled a shift from a static to a more dynamic understanding of entrepreneurship and economic growth. It incorporated elements of time and evolution, understanding that economies are not static entities but continuously evolving systems (Alvedalen & Boschma, 2017). This new perspective allowed for a more comprehensive analysis of agglomeration, the ensuing spillovers, and entrepreneurial activities, considering regional conditions and the evolutionary trajectories of industries and economies. However, the mechanisms that trigger its genesis, evolution, and sustainability have yet to be fully understood (Mason & Brown, 2014; Alvedalen & Boschma, 2017; Wurth, Stam, and Spiegel, 2020; Cho et al., 2021).

Amongst the myriad of reasons for EE formation, some scholars find that FDI can serve as a trigger mechanism (Mason & Brown, 2014; Bhawe & Zahra, 2019; Cho et al., 2021). However, despite some empirical evidence (Ryan et al., 2020), how FDI ignited the formation of an EE is more assumed than explained. Whilst the phenomenon of start-ups co-locating with large corporations is well illuminated in the literature (e.g., Cheyre et al., 2015; Klepper, 2011; Klepper, 2010; Klepper, 2007; Buenstorf & Klepper, 2009; Buciuni & Pisano, 2018; Brown & Mason, 2017; Bhawe et al., 2019), empirical evidence for MNEs acting as EE instigators is often lacking (Cho, 2022). In fact, it could be argued that the crowding out behaviour of FDI is more pronounced in the literature (De Backer & Sleuwaegen, 2003; Ayyagari & Kosová, 2010; Albulescu & Tămășilă, 2013) insofar as MNEs frequently devour entrepreneurial ambitions

through resource and talent acquisition and dominance in the local milieu. Nevertheless, despite the focus on such negative impact, persistent evidence of concentrations of technical start-ups around MNEs in host locations worldwide prompts us to reconsider how MNE presence influences entrepreneurial activity, particularly with spillover effects that include but extend beyond mere spinouts. The EE literature thus far has not effectively illuminated the precise mechanisms by which these spillovers transpire and how they effectively eventuate and evolve.

Considering these gaps, our investigation will seek to delve into the unexplored complexities of these spillover mechanisms within the context of EEs. The objective is to paint a comprehensive picture of how these mechanisms unfold over time and how they contribute to the birth and evolution of EEs. Our paper is guided by the following research question:

What does the extant literature tell us about the role of MNE spillovers in the genesis and growth of an EE?

In our effort to answer this research question, we conducted a comprehensive systematic literature review that spans across disciplinary boundaries, exploring the interwoven tapestries of spillover and agglomeration economy literature. Our extensive literature exploration allows us to unearth critical insights and weave together a cohesive narrative about the role and, importantly, underlying mechanisms of MNE spillovers in the evolutionary trajectory of entrepreneurial ecosystems. Given the current constraints of the EE literature, we expand our scope to include what we refer to as “non-EE” literature. This “non-EE” literature encompasses complementary or antecedent frameworks of agglomeration theories that have considerably contributed to the emergence and evolution of the EE framework. We view this antecedent and complementary literature through the EE lens, a strategy that allows us to provide a nuanced understanding of MNE spillovers in shaping and evolving EEs. This broader perspective allows us to identify common themes and contradictions, and to understand the various contexts in which MNE spillovers affect the growth and development of EEs. We contribute to the theoretical progression in the field by organizing and unpacking the complex spillover literature. Moreover, our research not only aims to contribute to the theoretical advancement of the EE literature but also intends to provide practical insights for policymakers and business leaders on the role of MNEs in fostering entrepreneurial activity and supporting the sustainable growth of EEs. Our paper may potentially serve as a roadmap for strategic policy decisions regarding the attraction and management of FDI. These decisions, in turn, hold the potential to influence the evolution, resilience, and success of entrepreneurial ecosystems.

The paper unfolds in the following order. We first expound on our systematic literature review's research methodology, characterized by its uniquely interdisciplinary nature. Following this exposition, we delve into the Findings section, where we present a detailed mapping of the relevant literature, thereby establishing the requisite theoretical context for our review. This effort meticulously sets the stage for a comprehensive exploration of the mechanisms at play. Subsequently, we segue into the Discussion section, where we interpret and synthesize our findings in greater depth. Here, we also introduce a visual aid: an FDI-to-mechanisms flowchart. This tool provides a clear depiction of MNE spillover dynamics and their significant role in the evolution of entrepreneurial ecosystems (EEs). Moreover, this section sheds light on some of the semantic debates encountered during our review, enhancing the discussion with critical insights. Finally, we conclude by proposing avenues for future research. This includes a suggested in-depth examination of spillover occurrence and capture mechanisms through empirical case studies, as well as a

reflection on the implications these findings hold for the EE framework and the broader process of theory building. In conclusion, we acknowledge the limitations of our study, positioning it as a foundation for further academic inquiry.

2. Research Methods and Systematic Literature Review

In conducting this literature review, we analyse how MNEs' spillovers contribute to local economic development through fostering entrepreneurship. Accordingly, we go beyond mere EE literature in using the keywords "entrep*+spillover" to more completely map and dissect the literature on the role of MNE spillovers in EE genesis. Given the limitations of the EE literature, we expand our literature search scope to include what we refer to as "non-EE" literature. This "non-EE" literature encompasses studies done with complementary or antecedent frameworks of EE in agglomeration theories that have considerably contributed to the emergence and evolution of the EE framework. In this stage, the process of retroduction was employed, allowing us to iteratively move between the data gathered and the emerging conceptualizations of spillover mechanisms. We piece together the puzzle across this antecedent and complementary literature through the EE lens, a strategy that allows us to present a more comprehensive narrative of MNE spillovers in shaping and evolving EEs. We achieve that by using manual coding to collate categories of spillovers identified in the literature.

The format of the systematic literature review was based on model SLRs that have been previously published in *Small Business Economics* (for example, Cho et al., 2022; Dabi et al., 2019), in addition to a semantic review in the field that was conducted by Alvedalen & Boschma (2017). This review was carried out in the following stages: with the first step consisting of a comprehensive curation of studies, systematic filtering to ensure traceability, and sifting research articles from top-tier publications based on clearly defined relevance criteria. We chose the keywords 'entrep*' and 'spillover' to ensure the widest possible coverage of works in the field of research pertaining to entrepreneurship and spillovers. In order to ensure that the investigation is exhaustive, a search was carried out that included all varieties of studies conducted in English across four databases for the maximum amount of time permitted. In order to make the most of "mapped vocabulary," expanders such as "apply equivalent subjects" and "apply related words" were used. This was done to ensure that the subject would be thoroughly covered.

The following databases were used: 1) EBSCO Academic Search Complete (The world's most valuable and comprehensive scholarly, multi-disciplinary full-text database), 2) Business Source Complete (the world's definitive scholarly business database, providing the leading collection of bibliographic and full text content), 3) EconLit with Full Text (contains all of the indexing available in EconLit, plus full text for nearly 600 journals, including the American Economic Association journals with no embargo), 4) Social Sciences Full Text (provides access to a wide assortment of the most important English-language journals published in the social sciences. This resource provides detailed indexing for over 625 periodicals dating back as far as 1983—nearly 400 of which are peer-reviewed). The original search using the string "entrep* + spillover" produced a total of 1249 different articles. These included 122 books, 87 working papers, 12 dissertations, 12 magazines, and 8 reports and news articles. The first exclusion criterion was to only include research that had been published in journals that had been subjected to peer review. This led to the collection of 919 publications that spanned the years 1975 to 2022. After reading the titles and abstracts of the research papers by hand to get rid of duplicates, outliers, and other strange things, 717 articles were left. Next, the well-established ABS rating system was used to ensure quality standards. Only research papers published

in journals ranked 3 or above by the ABS were kept, yielding a total of 314 research publications. The papers were then disassembled to determine their purpose, methodology, findings or contributions, location, theoretical lens used, type of research methods, whether establishing co-relation or addressing spillover mechanisms, citations, year, and author; all of this information was then compiled into a single worksheet.

Next, we tagged studies based on relevance, and filtered down to 179 papers. The relevance criteria were designed with the topic at hand in mind, which was the mechanisms through which MNE spillovers contribute to an EE. “Highly Relevant” studies dealt with spillovers induced by multinational firms, focused on mechanisms, or employed the EE approach. Studies addressing spillovers from players other than MNEs were deemed “relevant”. Finally, research on the repercussions of spillovers that had a peripheral or nonexistent focus on any major actors and used agglomeration approaches rather than EE was marked as “somewhat relevant.” Others were deemed irrelevant. A total of 179 papers were thus finalized. Our approach was broad-to-narrow, wherein we first mapped the entirety of spillovers based on the actor each study focused on and the theoretical lens they employed, thus initiating the process of abduction across this range of literature. This was done to build a comprehensive yet refined bedrock, inclusive of all potential spillover actors, for our literature mapping. This exercise laid bare the popularity of the players studied and the approaches of scholars through various theoretical lenses, leading to a systematic categorization (see Table A1) based on Braun & Clarke's (2006) method. The landscape we mapped showed two actors — universities and MNEs — dominating the research focus across all theoretical lenses, with other actors significantly less represented (see Fig. 1). Considering the dynamic evolution of MNEs compared to universities over the years, we honed in on MNE spillovers. Through this manual coding and categorization process, we were able to systematically discover and contextualize the categories of spillover mechanisms as they emerged from our analysis of the literature. Thus, guided by our data-driven analysis, papers were analyzed in relevance to our central theme: the mechanisms through which MNE spillovers stimulate EE evolution.

In summary, the methodology employed in this study, grounded in critical realism, used a systematic literature review to identify and conceptualize spillover mechanisms categories. This process was characterized by an iterative interplay of retroduction and abduction, allowing for the redescription and recontextualization of pre-defined spillover mechanisms in the literature findings, leading to the collation of distinct spillover mechanisms categories in the context of MNEs and entrepreneurial ecosystems. Further, our systematic review underscored a marked scarcity of empirical studies within the EE literature as compared to other theoretical (non-EE) approaches. This discovery, highlighting the need for more empirical exploration, subsequently shaped our research recommendations.

The systematic categorization and thematic analysis of the literature, particularly focusing on 'highly relevant' studies addressing MNE spillovers and mechanisms, informed our detailed exploration of spillover themes in Section 3.3. This selection process was guided by our aim to illuminate the specific mechanisms through which MNE spillovers influence entrepreneurial ecosystems, addressing a noted gap in empirical exploration within the EE framework.

3. Findings

3.1 Mapping the Spillover Literature

In the spillover literature, this review discovered 97 different individual (82) and combination (15) topics of focus across 23 theoretical lenses (see Appendix Table 5, Appendix Figure 8). These topics were

clubbed together in groupings for effective mapping of the literature. The breakdown of the groupings can be seen in Table 5 and Figure 8 (see Appendix). Starting from the EE literature and the complementary non-EE areas, we noticed a strong skew towards MNEs and universities as key contributors (See Figure 5). Led by the data, we strategically concentrated our research on MNEs, primarily due to their dramatic evolution over the past two decades, thereby warranting research priority. Intriguingly, despite a robust presence of empirical approach within non-EE literature, the EE sector displayed a marked scarcity in the same. (Refer to Table 4, Figure 6).

This empirical void within EE literature stands out, particularly given the concurrent expansion of non-EE spillover studies and the comprehensive growth of EE literature post-2010. This checkpoint, 2010, is critical as the EE literature truly flourished significantly thereafter, with 94% (3275 of 3483) of the body published post 2010. But the period around 2010 seems a curiously significant checkpoint for the non-EE research body too. When we compared with the counterpart non-EE literature in our curation (which includes studies as far back as 1975), we found a curious surge in publications after 2010, accounting for 74% (936 of 1260 papers) of the total spillover literature body. And specifically, of the spillover literature focusing exclusively on MNEs, 77% emerged after 2010 (See Figure 6).

This suggests an interesting trend: despite the broader academic community's concurrent interest in the topic, their approaches varied. While the percentage of non-EE studies examining MNE spillovers accounted for almost half that of EE studies, they displayed a considerably higher proportion of empirical research, almost twice as much (See Table 4). This differential academic behaviour offers a curious insight into the research approaches. Granted, the total number of studies under EE is significantly lower, but the proportion of focus does show where scholars put their attention, and logic demands a much higher proportion of empirical studies from EE scholars.

Table 4: Comparison of non-EE and EE literature on spillovers. (Percentage rounded to nearest integer for convenience)

	Non -EE literature	EE literature
Total papers on spillovers	211	30
Focus on MNE spillovers	13%	27%
Empirical works (focused on MNE spillovers)	79%	42%

* Source: Authors



Figure 5 Groupings in Spillovers Literature by Popularity (Excluding Overlaps)
 *Source: Authors. Generated on Microsoft Excel

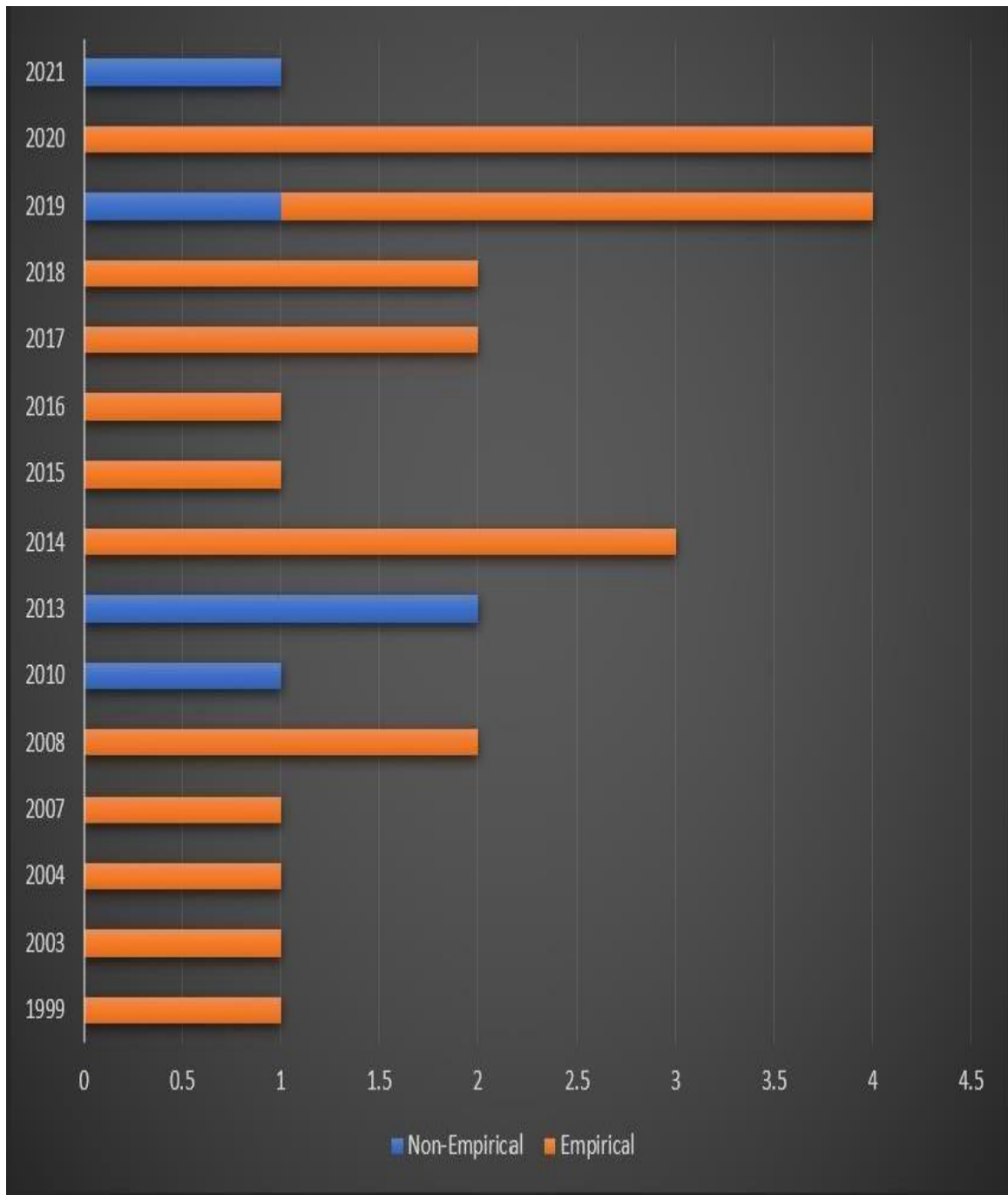


Figure 6: Number of Empirical and non-empirical studies with MNE/FDI as focus in the non-EE literature
 * Source: Authors. Generated on Microsoft Excel.

If the majority of publications focus on developing theory, it must rest on up-to-date empirical foundations. However, we find that a majority of the empirical papers investigating specifically the mechanisms of MNE spillover in non-EE literature span from 1986 to 2002. This is concerning because the MNE landscape has evolved drastically in the past two decades. Our findings clearly indicate concurrent examination of spillovers with an MNE or FDI focus in tandem with the emergence of EE literature, yet an empirical emphasis is conspicuously missing within EE research. This threatens the promise of EE as an unprecedented systemic approach that can explain the complicated relationship between MNE spillovers and entrepreneurship in a region. In the next section of the paper, we present the theoretical context required to

present our review and discussions.

3.2 Theoretical Context for Findings

3.2.1 Evolution of the Literature

From Marshall's (1890) classical treatise of geographically bounded industrial concentration to Porter's (1990, 1998) analytical exegesis of competitive clusters, the theoretical discourse on local economic development has been continuously evolving. The bedrock of these theories — the principles of agglomeration spillovers and the benefits of proximity — have been enduring constants, reinforced further by the seminal contributions — For instance, van de Ven (1993) and Chang & Kozul-Wright (1994), departing from a purely economic outlook, injected the critical role of social, institutional, and political factors into the discourse on entrepreneurial outcomes. Similarly, Bahrami & Evans (1995) underscored the necessity for organizations to adapt swiftly within rapidly changing technological landscapes, reorienting the focus from static constructs to the dynamics of organizational adaptability and learning.

The narrative took a marked turn when Spilling (1996) introduced the notion of entrepreneurship as a localized, interactive process. Building on this, Porter's (1998) work on clusters intertwined concepts of knowledge spillovers and their role in innovation, thereby bridging the gap between the existing discourse on agglomeration economies and the emergent discourse on entrepreneurial ecosystems. This evolution, however, was beset with gaps — a glaring absence of the role of the entrepreneur in Porter's cluster theory, a narrowly focused lens on industry-specific or geographically concentrated economies, and a static, compartmentalized view of knowledge spillovers.

The EE framework not only broadened the scope beyond the geographical and industry-specific confines but also elevated the role of knowledge, stressing purposeful knowledge sharing and the importance of relationships, culture, and institutional structures in facilitating spillovers. In essence, the EE framework was a paradigm shift, signaling a move from a static snapshot to a living, breathing, and evolving tableau of entrepreneurship and economic growth. With this move, the theoretical discourse on local economic development, once disparate and fragmented, found a meeting point in the EE framework. Thus, we intend to leverage the EE framework's visibility over agglomeration, spillovers, and entrepreneurship and provide tools to facilitate a more nuanced understanding of the complex interplay at work.

3.2.2 Why Spillovers Matter in EE Emergence

Spillovers, in the EE context, can be defined as the unintended transfer or leakage of knowledge, ideas, resources, or capabilities from one entity to another within an ecosystem (Frischmann & Lemley, 2007; Griliches, 1992). These spillovers can occur horizontally among firms operating in the same industry, vertically between suppliers and buyers, or across industries and sectors. They encompass various forms such as knowledge, technology, social, and resource spillovers, facilitated through multiple channels including informal networks, formal collaborations, industry events, and knowledge-intensive intermediaries. Within the dynamic context of entrepreneurial ecosystems, spillovers critically shape the diffusion of innovation and drive the genesis of an EE in a region (Cantner et al., 2020). Their occurrence and effective harnessing significantly influence firms' performance and competitiveness, the rate of innovation, and overall economic growth (Cohen and Levinthal, 1990; Audretsch and Feldman, 1996). Hence, understanding the role of spillovers in an entrepreneurial ecosystem holds significant implications for policymakers, entrepreneurs, and researchers. However, a scarcely understood and inadequately studied aspect remains: the mechanisms

through which spillovers occur within an entrepreneurial ecosystem.

The roots of the spillover literature lie in the study of agglomeration economies, with early works highlighting the benefits of spatial proximity and concentration of economic activity (Marshall, 1890; Arrow, 1962; Romer, 1986). This body of research underscores the importance of knowledge spillovers in facilitating information transfer, productivity enhancement, and innovation promotion. Building on these foundations, the Knowledge Spillover Theory of Entrepreneurship (KSTE) (Audretsch & Keilbach, 2007), provides a seminal theoretical framework for understanding knowledge spillovers' role in innovation. According to KSTE, knowledge is a non-rival and partially excludable good. This means that knowledge can be shared among individuals and organizations without being depleted, and its benefits can spillover to others. This perspective emphasizes the positive externalities generated by knowledge spillovers, which can foster increased innovation, productivity, and economic growth.

Shifting our gaze to the entrepreneurial ecosystem literature, we detect a striking gap. Despite the pivotal role spillovers play in the evolution of entrepreneurial ecosystems, our understanding of their role within this context is still in its nascent stages. While certain works mention spillovers (e.g., Acs et al., 2017; Stam, 2015; Spiegel, 2017; Bhawe & Zahra, 2019; Cantner et al., 2020), they often refer to them cursorily without delving into their underlying mechanisms and impacts. Every region, irrespective of its level of development, harbors an entrepreneurial ecosystem, a concept underscored by research in the field. Isenberg (2014) puts forth the assertion that, despite inevitable variations, essential elements of an entrepreneurial ecosystem are embedded in every region. Spiegel (2017) builds on this, positing that even when formal ecosystem structures elude visibility, informal networks and relationships often lay the groundwork for these ecosystems, reinforcing the universal prevalence of these entrepreneurial structures. The relevance of an ecosystem, however, is not merely a question of existence but rather a matter of visible emergence and evolution (Alvedalen & Boschma, 2017; Ryan et al., 2020). Consistent with its critical realism foundations, while the objective existence of an EE is acknowledged in a region, its emergence is only recognized when it becomes tangibly visible within that region. This visibility could take the form of a handful of conspicuous entrepreneurs within an increasingly risk-averse culture (Mack and Mayer, 2016), or the growing attractiveness of a region due to the presence of large firms underpinned by a robust technological and institutional base (Mason & Brown, 2014). The awakening of a dormant ecosystem from its underlying elements, or its genesis within a region, occurs through the capture of spillovers from a source such as incumbent firms or FDI (Audretsch and Keilbach, 2007; Buenstorf and Klepper, 2009; Feldman, 2003; Ryan et al., 2020; Cho et al., 2021). In this paper, we respond to the call from entrepreneurial ecosystem literature (Cho et al., 2021) to investigate the balance between the advantages and disadvantages of foreign direct investment in the creation, evolutionary growth, and strengthening of an entrepreneurial ecosystem.

3.2.3 Discussing Evolutionary Lenses and Delineating EE Boundaries for Findings

The ongoing discourse in the field towards understanding the drivers of ecosystem genesis, evolution, maturation, and renewal, offers a variety of models to elucidate the evolutionary trajectory of an entrepreneurial ecosystem. An ongoing debate persists between proponents of a linear life cycle approach and those advocating for a complex adaptive perspective to comprehend EE evolution. This debate, illuminated in the recent systematic literature review by Cho et al. (2021), published in *Small Business Economics*, provides certain key considerations for our research. For instance, the adaptive life cycle

approach, as proposed by Auerswald and Dani (2017), has been recognized for its merits, particularly its alignment with the 'ecosystem' analogy that signifies a continuous renewal of the ecosystem (Malecki, 2018). This stands in contrast to the life cycle approach, which suggests a weakening and eventual demise of the system (Cantner et al. 2020; Colombelli et al. 2019; Mack and Mayer 2016; Thompson et al., 2018). Consider Mack and Mayer's (2016) life cycle model, for instance, which posits two outcomes: expiration or rebirth. However, this linear approach may not fully encapsulate the inherent continuous renewal and evolution in EEs. Therefore, the adaptive system perspective, with its emphasis on the non-linear, self-organizing nature of EEs, offers a more fitting approach for handling the complexity of these ecosystems.

However, the genesis of an EE requires specific attention. The adaptive life cycle approach, while valuable in capturing established ecosystems' dynamics, may not fully explain the factors contributing to an EE's birth (Cho et al., 2021). Here, Cantner et al.'s (2020) life cycle model becomes crucial, encompassing the birth and early stages of an EE. This perspective illuminates the critical initial phases of ecosystem development, leading to a comprehensive understanding of an EE's dynamic evolution. While incorporating Cantner et al.'s (2020) model allows for exploration of the factors driving an EE's formation, such as innovative ideas, key stakeholders, and supportive institutions and policies, it is necessary to delineate our understanding of business ecosystems and entrepreneurial ecosystems within a region. Cantner et al. (2020) suggest that the coexistence of business ecosystems and entrepreneurial ecosystems within a regional economic system depends on the locus of innovation. They propose that when innovation predominantly occurs outside of large, established firms, the focus should be on entrepreneurial ecosystems. Conversely, when innovation primarily takes place within big firms, its relevance shifts to business ecosystems. However, Spiegel & Harrison (2018), caution that such clear-cut compartmentalization may oversimplify the intricate boundaries and dynamics among regional economic systems, business ecosystems, and EEs. To further explicate this complex interplay, we turn to the definition of EEs.

Stam & Spiegel (2016) define entrepreneurial ecosystems as coordinated sets of actors or factors that enable productive entrepreneurship within a particular region. Thus, as Wurth et al., (2020) elaborate, entrepreneurship within a region cannot be isolated from innovation in its institutions. They state that 'new value creation is an emerging property of a complex system of economic agents and their interactions: the entrepreneurial ecosystem' (Wurth et al., 2020). Indeed, innovation spawns further innovation (Arthur, 2013); and they feed each other via spillovers, knowledge transfers, or externalities across individuals in large firms and startups within an ecosystem. Therefore, intrapreneurial innovation within large businesses, referred to as spillovers from the 'business ecosystems' of a particular region, is incorporated into the conceptual definition of the entrepreneurial ecosystem and serves as a vital anchor for its development (Mason & Brown, 2014; Bhawe & Zahra, 2019).

In this context, Audretsch and Keilbach (2007) underscore the generation of new opportunities through knowledge spillovers, primarily emanating from institutions like universities or large businesses within the same territory. This implies that falling rates of entrepreneurship or a temporal shift of innovation towards larger firms within a regional economic system do not diminish the relevance of the EE framework. Instead, as entrepreneurial activity and innovation become more concentrated within large organizations, the relevance of the EE lens is indeed heightened, as it can be employed strategically to revive and sustain high rates of productive entrepreneurship within such maturing systems.

However, this distinction does not undermine the value of Cantner et al.'s (2020) lifecycle model,

which provides insightful analyses into the evolutionary trajectory of an EE. For instance, Cantner et al. (2020) posit that the evolution of an EE is driven by ideas that occur as a result of knowledge spillovers. Our research, focusing on the mechanisms of MNE spillovers within an EE, aligns with the first stage of their lifecycle model. This stage highlights the crucial role of knowledge spillovers from MNEs in stimulating increased opportunity recognition within the entrepreneurial ecosystem. As we delve deeper into the discussion, it becomes evident that this heightened opportunity recognition strengthens the ecosystem's capacity to capture and leverage spillovers, effectively bridging the gap between FDI and entrepreneurial traction.

In the next section of our paper, we delve into a review of knowledge spillover mechanisms. Often, the exact methodologies of these spillovers, especially concerning the role of MNEs, are obscured in a metaphorical “black box” (Görg & Strobl, 2004). Our exploration centers around how MNEs, as pivotal knowledge sources and active EE players, stimulate spillovers and how these are absorbed by other ecosystem participants (Mason & Brown, 2014; Audretsch and Belitski, 2021; Colombelli, 2016). Through this inquiry, we aspire to shed light on EE's complex interactions, enhancing our comprehension of its evolution and offer pragmatic insights for policy and strategy.

3.3 MNE Spillover Mechanisms in an EE

3.3.1 Spillovers Selection

3.3.1.1 Co-Specialization

Although policymakers all over the world have encouraged foreign investment to foster spillovers that lead to entrepreneurship (Spencer et al., 2005; Spencer, 2008), MNE spillovers are not always captured in an EE. The capacity of an ecosystem to assimilate these spillovers—its absorptive capacity—is a crucial element in shaping its evolution over time (Cantner et al., 2020; Mack & Mayer, 2016). This raises a key consideration for scholarly discussion: How can we define absorptive capacity within a regional entrepreneurial ecosystem? We understand that absorptive capacity enhances a firm's ability to leverage acquired knowledge and maximize realized spillovers (Meyer & Sinani, 2009; Blomström and Sjöholm, 1999). Therefore, can the absorptive capacity of an EE be considered an aggregate measure of an ecosystem's firm-level learning capabilities?

According to the discussion by Meyer & Sinani (2009) on the topic, absorptive capacity is ‘fundamentally a function of human capital of the receiving unit’ and their ability to connect existing knowledge bases to foreign knowledge. While absorptive capacity has been studied at various levels, such as the firm level (Cohen and Levinthal, 1990), subsidiaries (Minbaeva et al., 2003), and joint ventures (Lyles and Salk, 1996), Meyer & Sinani (2009) argue that it is human capital that fundamentally drives absorptive capacity. Thus, the level of absorptive capacity within an entrepreneurial ecosystem is also closely associated with the level of income in the economy (Gershenberg, 1987; Aitken, Harrison, and Lipsey, 1995). They further argue that the entry of MNEs may crowd out local firms that lack absorptive capacity. Conversely, entities equipped with strong human capital and 'innovation-facilitation-organizational structures' are more likely to benefit from the knowledge they receive (Keller, 1996; Blomström and Kokko, 2003; Spencer, 2008). Thus, what Meyer & Sinani (2009) define as 'innovation-facilitation-organizational structures' represents the true essence of the systemic approach of the EE framework and prompts a holistic examination

that the EE framework facilitates.

Drawing on Cantner et al. 's (2020) model of EE evolution, we can observe a progression of spillovers in the first two phases, i.e., birth and growth; especially during the transition into the growth stage. The emergence of the first entrepreneurs, prompted by knowledge spillovers from MNEs or universities, marks the emergence of the entrepreneurial ecosystem. This emergence subsequently seeds an entrepreneurial culture in the ecosystem. This culture, in turn, plays a pivotal role in enhancing the ecosystem's absorptive capacity, thus enhancing the potential for capturing and utilizing further knowledge spillovers. This suggests that by encouraging a culture of entrepreneurship and investing in human capital and innovation, an ecosystem can improve its ability to absorb knowledge. This creates a positive feedback loop in which an ecosystem's increased ability to absorb knowledge leads to a systemic change enabling better use of knowledge spillovers, which in turn drives the evolution of the ecosystem.

Bhawe and Zahra (2019) investigate further into how MNEs disseminate knowledge as spillovers and the ecosystem's absorptive capacity. They argue that if MNEs bring a lot of innovation to the ecosystem, high absorptive capacity may lead to lock-ins, which would in turn lead to more MNE innovation, whereas low absorptive capacity may lead to heterogeneity, bringing opportunities for competition and collaboration depending on whether the start-ups are replicative or innovative. This may result in a situation in which indigenous companies develop capabilities complementary to MNE operations, or in which MNEs themselves invest to enable new ventures that could provide required input, which is referred to as co-specialization within the EE (Bhawe & Zahra, 2019; Ryan et al., 2020), exemplifying the interaction between actors (entrepreneurs, MNEs) and resources (knowledge spillovers), resulting in an evolution of the ecosystem culture towards co-specialization as it enters Phase -2 of Cantner et al. (2020)'s model.

The fundamental notion underlying co-specialization, however, is not novel. Its manifestation varies depending on the degree to which an EE is centered on supply chains, for instance. This notion presents curious insight into the evolution of spillover mechanisms over time, corresponding to the technological advancements over the last two decades among key actors, such as MNEs and firms with high absorptive capacity. Despite this evolution in mechanisms, consistency can be observed. For instance, FDI firms frequently try to mitigate spillovers to avoid competition, circumvent lock-ins, or avert a "red-queen" scenario (Barnett & Hansen, 1996; Bhawe & Zahra, 2019). Yet, these firms occasionally find it beneficial to allow, or even encourage, knowledge or technology appropriation. Within the manufacturing industries, for example, MNEs can derive significant benefits from cooperative agreements that facilitate knowledge transfer to upstream and downstream suppliers, thereby enhancing overall efficiency. This dynamic is examined further in later sections.

In contrast, the tech era's elimination of traditional supply chain processes has reduced MNEs' incentives to share best practices as opportunities for cooperation diminish without a supply chain. Recognizing the profound implications of this shift, Porter (1998) acknowledges that the advent of the internet era and global connectivity has 'diminished the role of supply chains' within manufacturing industries, necessitating a reassessment of our understanding of agglomeration economies. This underscores the changes in spillover mechanisms in keeping with the evolving nature of entrepreneurial ecosystems and the importance of updating our theoretical frameworks to stay abreast of these changes. This consideration opens up an intriguing question: Is there a corollary for upstream and downstream players in today's digital tech industry, where the traditional supply chains do not represent a cost overhead? In this context, Lorenzen

(2019) performed an empirical study on Bangalore's Digital Creative Industries (DCI), attempting to trace how local businesses and new MNE subsidiaries evolve and aggregate into a cluster — a process analogous to the growth stage in Cantner et al.'s (2020) EE life cycle. Challenging the notion that indigenous enterprises are subservient within supply chain linkages (Lewin, Massini, & Peeters, 2009; Luo et al., 2012), Lorenzen found scant evidence of such relationships within Bangalore's animation and VFX industries. However, when considering gaming companies, which inherently demand more ready-to-use inputs due to their modularity, a different picture emerges.

Lorenzen's (2019) findings about supplier instances echo Mason & Brown's (2014) assertion on the importance of resources in EEs. Briefly, MNE subsidiary spinoffs and existing firms often may morph into suppliers or even rivals, as showcased by Dhruva Interactive's spinoff that emerged as a competitor (see Lorenzen, 2019). This trend aligns with research indicating local firms can learn from and occasionally surpass international rivals (Ge & Ding, 2008; Lorenzen, 2019), potentially piquing MNE interest in fostering outsourcing or co-specialization. Lorenzen (2019) highlights distinct capability acquisition strategies: MNE subsidiaries tend to rely on parent transfers through locally deployed, trained managers, while indigenous firms often boost capacities through targeted infrastructure investments.

This process, often referred to as “catching up”, signifies the rapid development of technological or personnel capabilities by local firms. Such evolution typically unfolds through repeated exposure to and dealings with offshore clients or via indigenous firms' proactive investments in local infrastructure. This “catch-up” phenomenon depicts a dynamic shift in ecosystem culture, highlighting an advancement towards a more balanced interplay between international and indigenous firms. This shift echoes the maturation stage within Cantner et al.'s (2020) life cycle of entrepreneurial ecosystems and underlines the interplay mechanism of spillovers between various actors and resources within the EE, evolving its culture within the context of Mason & Brown's (2014) taxonomy.

3.3.2 Spinoffs & Spinouts

When an MNE's innovation takes the form of a spinoff subsidiary or an independent start-up (spin-out), it significantly contributes to the economy. This relationship between MNE innovation and spinoff formation has been the subject of considerable attention both within and outside the field of entrepreneurial ecosystem (EE) literature (e.g., Cheyre et al., 2015; Wang et al., 2014; Klepper, 2011; Klepper, 2010; Klepper, 2007; Buenstorf & Klepper, 2009; Golman & Klepper, 2016; Buciuni & Pisano, 2018; Brown & Mason, 2017; Bhawe et al., 2019). Given that MNEs are silos of knowledge and attract ambitious talent, it is not surprising that employees might acquire skills and then leave to establish their own businesses, forming spinoffs (Klepper, 2007). This dynamic aligns well with Cantner et al.'s (2020) first proposition, which states that unexploited knowledge within established firms leads to the creation of new ventures, which they categorize as the birth stage of an EE. Specifically, Cantner et al. (2020) argue that the phenomenon of spinoffs persistently emerges as a response to established corporations' failure to organize teamwork, especially in high-risk and human capital-intensive industries, such as ICT and high-tech industries. In these high-risk environments, the verification of team members' abilities is more effective when carried out by the team members themselves, rather than by their superiors. This self-evaluation, coupled with the motivation to capitalize on overlooked or neglected opportunities, promotes incentives to specialize and enhances the possibility of new venture creation, thereby fostering the growth of entrepreneurial ecosystems.

In other words, spinoffs and then EE formation can be triggered by the desire to utilize untapped or underutilized knowledge in innovative ways. Cantner et al. (2020) further articulate how entrepreneurial firms, owing to their flexible structures and self-motivated teams, can respond more swiftly to exogenous shocks and environmental changes compared to incumbent firms. The spinoffs and new ventures, consequently, become the core constituents of an entrepreneurial ecosystem.

Aligned with this, Klepper & Thompson (2006 a, b) have their “theory of disagreement,” wherein spinoffs result from the convergence of superior talent and ambition. They contend that highly talented employees, often characterized by strong ambition, present management challenges, leading to disagreements. Such disagreements frequently result in the formation of new companies by these experienced and ambitious employees, who bring fresh ideas slightly divergent from those of their former employer. Further, according to Klepper and Thompson (2006b), better firms are more likely to experience disagreement-driven spinoffs that produce better performing competition because employee quality determines the quality of the firm. As previously discussed, the heterogeneity of spinoffs in an ecosystem is determined by firms' absorptive capacity (Bhawe & Zahra, 2019). High heterogeneity can strengthen the ecosystem, facilitating its transition to the maturity stage of the EE lifecycle (Cantner et al., 2020), as evidenced by Ryan et al. (2020), who evaluated the contribution of MNEs in Galway, a hotspot for med tech MNEs.

Ryan et al. (2020) illustrate the dynamic nature of EEs and the importance of spinoffs in their longitudinal study of Galway's EE. They noted how perceptions on MNEs' departure evolved, from a significant loss in 2005 to a manageable setback in 2017. This change underscores the growing acknowledgement of spinoffs' positive impact. Pioneer entrepreneurs often branch out, creating new ventures and nurturing the EE through mentorship and financial support (Ryan et al., 2020). This resonates with Cantner et al.'s (2020) proposition that the intricate, mutually beneficial relationships among entrepreneurs within an EE significantly lower the opportunity costs of new venture creation, thus further stimulating the growth and evolution of the EE. As the ecosystem matures, the spinoff mechanism evolves. The EE may now be fueled not just by success, but also by the ‘whale fall’ of blockbuster ventures (Isenberg, 2011), bolstering the entrepreneurial richness of the ecosystem (Buenstorf and Fornahl, 2009; Brown & Mason, 2017).

3.3.3 Demonstration Effects

This particular mechanism arises when a new MNE enters a territory and “demonstrates” its capabilities (Spencer, 2008; Meyer & Sinani, 2009). According to Saaggi (2002), these effects emerge when the host country's enterprises imitate or reverse-engineer an MNE's products or activities. The local presence of multinational corporations could encourage and push local innovators to create new products and methods (Cheung and Lin, 2004). On mapping this observation to Cantner et al.'s (2020) lifecycle model of an entrepreneurial ecosystem, the demonstration effects could notably contribute to the “Growth” phase, apart from catalyzing the “Birth” stage. As the ecosystem expands with the addition of new actors, MNEs play a significant role in stimulating the growth of local enterprises through demonstration effects. Drawing from the work of Kshetri (2014), these MNEs, along with local innovators, shape the direction and evolution of the ecosystem, by providing a benchmark to aspire to or surpass, and thus acting as influential actors within the system.

Based on the definition by Saaggi (2002), the types of spillovers that occur via this mechanism are

not directly pecuniary but pertain to knowledge of technology and practices. This involves the dissemination of knowledge about new manufacturing technologies, competing techniques, marketing strategies, inventory management systems, workforce handling techniques, organizational methods, and other know-how to validate market opportunities (Blomström & Kokko, 1998; Leyden & Link, 2013). This accelerates local enterprises' attempts at innovation because FDI firms' products and technologies have already been tested in foreign markets, reducing the risk of domestic firms developing similar items (Cheung & Lin, 2004). Meyer and Sinani (2009) note that demonstration effects allow local firms to have the opportunity to observe MNEs employing various levels of technology tailored to local conditions before making moves (Kokko, 1992; Wang and Blomström, 1992), and thus, in economies with a significant technology gap, conventional demonstration effects tend to have a more pronounced impact.

In an empirical study spanning 26 provinces in China, Cheung and Lin (2004) provide evidence of firms engaging in reverse engineering or replication by demonstrating the replication of design patents by new MNEs (Saagi, 2002). In another study in China, Hale and Long (2006) were the first to find evidence of a different mechanism. They found that a type of network externality took place when locals went to the same conferences or production shows as foreign employees, where knowledge spillovers occurred as a result of social interaction, networking, and subsequent relationships. This underlines the important role of geographic proximity and specific geographic boundaries in shaping interactions among ecosystem actors (Spigel, 2017; Audretsch and Belitski, 2021).

According to other empirical studies, demonstration effects are often applicable to horizontal spillovers because such knowledge is most valuable to firms in the same industry as the MNE (e.g.: Saggi, 2002; Görg & Strobl, 2004; Görg & Greenaway, 2004). All spillovers from MNE demonstrations might not be captured, though. Potential alternative conditions for their emergence and capture have received little theoretical and empirical attention (Spencer, 2008). This leaves room for further exploration and understanding of the specific mechanisms and conditions under which demonstration effects can stimulate the evolution of entrepreneurial ecosystems.

3.3.4 Local Linkages

The literature has devoted a significant amount of attention to vertical linkages, as seen in empirical studies (e.g., Javorcik, 2004; Javorcik & Spatareanu, 2008; Kugler, 2006; Bwalya, 2006; Schoors & van der Tol, 2001; Blalock & Gertler, 2008), theoretical models (e.g., Rodriguez-Clare, 1996; Markusen and Venables, 1999; Lin & Saagi, 2005; Saggi, 2006), and reviews (e.g. Smeets, 2008). When a new MNE enters a market, typically at the onset of Cantner et al. (2020)'s expansion phase, it relies on local suppliers for input in order to complete the product and bring it to market, which creates conduits for spillovers. Smeets (2008) discusses early theoretical models that sought to demonstrate the spillover mechanisms of vertical linkages, namely those by Rodriguez-Clare (1996) and Markusen and Venables (1999). Notably, the Rodriguez-Clare theoretical model (1996) imitates and explains a mechanism of backward and forward linkages based on input-demand effects that occur with new MNE entries. MNEs, due to the relatively higher complexity of their products, often require a diverse and large input array, encouraging forward linkages. This 'love of variety' — an inclination for diverse inputs — fosters specialization and diversification amongst local suppliers, adding to the ecosystem's vibrancy, as proposed in Cantner et al.'s (2020)'s expansion stage of the EE, where specialized relationships develop between actors.

In a different vein, the Markusen and Venables (1999) model postulates a situation where the MNE isn't the solitary producer, allowing analysis in a more competitive context. They venture into an examination of the intersection between linkages and competition effects. This exploration allows for an understanding of the transformative implications of MNE entry on EEs in varying stages of evolution. In their model, they focus on two interconnected, imperfectly competitive industries. They hypothesize that an MNE can bring foreign investment into the final goods sector. This investment, in turn, acts as a catalyst to create backward linkages to intermediate goods suppliers. This mechanism is a critical component of the ecosystem's second stage, as per Cantner et al.'s (2020) model, where, yet again, specialized relationships start to form, contributing to a more vibrant and intricate entrepreneurial ecosystem.

One of the paper's pivotal inquiries revolves around the impact of MNE entry on the domestic industry, with two predominant forces emerging. The first force is the competition effect, where MNEs substitute local final-goods producers. The second is a linkage effect, which cascades back to intermediate-goods producers and creates complementarities potentially beneficial for domestic final-goods producers. This dynamic embodies the intricate balance between cooperation and competition (co-opetition) often observed in mature entrepreneurial ecosystems. The theoretical model suggests that equilibrium can shift from a state with no local production to one with local production in both intermediate and final-goods industries, thereby enhancing welfare. This transformative process mirrors the advancement from the second to the third stage of Cantner et al.'s (2020) lifecycle model.

The paper then delves into the strategic decision-making process of MNEs, considering whether to produce a product variety abroad or commence production locally. These decisions generate backward linkages that may trigger the evolution of local industries, and hence the EE. However, the subsequent growth of local production may reach such a scale that it ultimately displaces multinational firms. Here, the paradoxical outcome aligns with the mature stages of the entrepreneurial ecosystem, where robust local industries could outcompete initial MNEs, leading to a landscape dominated by home-grown entities.

These results concur with other empirical results, as noted by Markusen & Venables (1999), like the case-study findings by Hobday (1995), who illustrated how MNEs can instigate industrial evolution in emerging markets. This dynamic interplay between local and multinational firms results in continuous cycles of backward and forward linkage effects. Such cycles embody the iterative, evolutionary nature of entrepreneurial ecosystems, as per Cantner et al.'s (2020) lifecycle model, where the initial impetus from MNEs can trigger the emergence and subsequent dominance of local entities. Thus, Markusen & Venables' (1999) model offers valuable insights into the nuanced mechanisms driving the evolution of entrepreneurial ecosystems.

According to Spencer (2008), while the initial engagement of multinational enterprises (MNEs) with local suppliers may create crowding effects, it eventually leads to positive horizontal spillovers. This is because local enterprises often struggle to secure input resources due to MNEs enticing local suppliers with larger budgets. However, the increase in demand for supplies might allow locals to outperform their competitors, and it may also make investments in ancillary businesses more attainable, thus enhancing economic welfare. During the process of appropriating these spillovers, local suppliers could become conduits for transmitting knowledge to the local economy. This outcome has often been encouraged by MNEs, as exemplified by Javorcik's (2004) finding that 33% of MNEs' total suppliers in Latvia reported receiving assistance from MNEs.

Furthermore, socially embedded MNEs could benefit from vertical linkages, which some MNEs actively encourage through skill training and technology transfer. Such practices have been demonstrated to lower prices and increase the utility of products from local suppliers (Meyer, 2004; Blalock & Gertler, 2008). To mitigate potential bottlenecks, MNEs may also choose to collaborate with and train multiple suppliers, thus benefiting a larger segment of the host economy (Blalock & Gertler; Spencer, 2008). However, while MNEs might attempt to create barriers around proprietary or sensitive information to control appropriation (Mansfield & Romero, 1980), the inherent informality of long-term interactions between MNEs and local suppliers may challenge these defenses, as argued by London and Hart (2004). London and Hart (2004) further suggest that “coinventing” initiatives with locals, rather than trying and failing to manage undesired spillovers, best utilizes MNEs' deep embeddedness (Spencer, 2008). In addition, an MNE's forward and backward linkages can positively impact local competitors through horizontal spillovers. The spillovers resulting from enhancing infrastructure for product delivery and distribution could be viewed as general economic benefits (Spencer, 2008, Blalock & Gertler, 2008; Kinoshita, 1998). Since the MNE is not compensated for these benefits, they fall within Smeets' (2008) definition of “spillover,” which will be further explored in this paper.

3.3.5 Workforce Mobility & Turnover

MNE entry, a significant event typically in the genesis stage of an entrepreneurial ecosystem as per Cantner et al. (2020), sets in motion a myriad of complex dynamics, one of which is the impact on the local workforce. As MNEs possess significant resources, they attract skilled labor, often leaving small firms struggling to attract talent (Dunning, 1993). This situation, while initially appearing to disadvantage local firms, can result in complex spillover effects as the ecosystem evolves. As the entrepreneurial ecosystem moves into the growth phase, the workforce dynamics begin to adjust. MNEs, initially attracting a large portion of the talent pool, can inadvertently lead to the broadening of the local skills base. Spencer (2008) emphasizes the role of local managers employed by MNEs in this process. Accustomed to the host country's language and culture, these managers can become conduits for knowledge dissemination, leading to horizontal spillovers over time. Moreover, these local managers are more likely to transition to local firms eventually, compared to their expatriate counterparts (Spencer, 2008). With their MNE experience, they may enhance the utilization of resources in local firms (Kogut & Zander, 1992), contributing to knowledge spillovers.

Another facet of workforce mobility is the presence of foreign workers in MNEs. Studies have shown significant implications for the local workforce due to this factor. Hale and Long (2006) found in their study of China that the presence of foreign workers can increase firm productivity. Similarly, Poole's (2007) research in Brazil and the work of Markusen and Trofimenko (2009) in the Colombian manufacturing industry revealed that foreign workers could boost wages in the host country. This wage increase, while a direct financial benefit, also denotes an enhancement in the local workforce's skills and awareness due to the presence of foreign workers, facilitating knowledge spillovers (Poole, 2007).

As the ecosystem enters the maturity phase, the local managers' employment experience within MNEs can become an asset. They can leverage their employment experience to build social capital, which translates into valuable networks and knowledge. As they transition into the local job market, they can carry these assets with them, contributing to further horizontal spillovers (Spencer, 2008). Therefore, while the

initial MNE entry can create workforce displacement in local firms, the resulting workforce mobility and turnover can trigger knowledge spillovers. Over time, these spillovers can significantly contribute to the development and maturation of the entrepreneurial ecosystem, illustrating the dynamic interplay of actors, factors, and mechanisms within this context.

3.3.6 Competition effects

When an MNE with deep pockets and resources from a foreign market enters a local market, the owners of local firms face both a threat to their potential to remain in service, which could make their operations worse, and an opportunity to learn and grow, which could uplift their performance and resourcefulness. An MNE presence creates a race for resources like talent, real estate, and suppliers, which can make it challenging for small businesses to keep up. On the other hand, this may cause managers to increase efficiency by leveraging their slack resources (Haddad & Harrison, 1993). For local firms that are already operating with high resource efficiency, the competition created by MNE entry can provide the required push to innovate, advance technology, or improve management methods in order to match pace. (Blomström & Koko, 1998).

In addition to the battle for resources, there is also competition for market share. Due to their higher productivity than local competitors (Haddad & Harrison, 1993), MNEs are typically able to dominate market share. The surge in competition caused by MNE entry could have either positive horizontal spillovers or negative crowding out effects, and the MNE firms' choice of target markets will influence the degree to which they occur. One such mechanism is discussed by Spencer (2008). For instance, if an MNE invests in a country with the intention of ramping up manufacturing efficiency in order to export goods to the global market, its presence won't put indigenous firms servicing the host market at a competitive disadvantage. Instead, local businesses may profit from spillovers by showcasing their export expertise, as exporting related know-how is easily appropriable (Görg & Greenway, 2004; Aitken et al., 1997).

As highlighted by Meyer and Sinani (2009), firms under direct competition are more likely to respond when there are no institutional safeguards, a concept also supported by Smith et al. (1991) and Chen et al. (2007). This suggests that the intent to respond among local firms can be triggered by foreign entry, provided that the firms are appropriately motivated. The entry of foreign investment often intensifies competitive pressures within the industry, driving firms to devise strategies that enhance their competitive advantage (Bowen and Wiersema, 2005).

This dynamic of competition and response aligns with the second and third stages of Cantner et al. (2020)'s lifecycle model. As MNEs enter the market and competition intensifies, local firms are driven to adapt and innovate, contributing to the maturation and sophistication of the entrepreneurial ecosystem. The institutional setting, which includes domestic and international markets as well as the national innovation system, is crucial in shaping these motivations. This is where Cantner et al.'s lifecycle model converges with North's (1990), Peng's (2003), and Tihanyi and Roth's (2002) perspectives. All emphasize the role of institutions in shaping economic behavior and outcomes. Cantner et al. (2020) describe a lifecycle of an entrepreneurial ecosystem, evolving from nascent to mature ecosystems influenced by factors like competition, knowledge spillovers, and institutional frameworks. North (1990), Peng (2003), and Tihanyi and Roth (2002) highlight the critical role of institutions — the formal and informal rules that guide societal interactions — in influencing economic outcomes. Institutions, according to North, shape the incentives for

individuals and firms, thereby influencing their economic decisions and outcomes.

In the specific context of Meyer and Sinani's (2009) discussion of MNE spillovers, institutions shape how local firms react to the entry of MNEs. Depending on the institutional framework, local firms may be more or less motivated to compete, innovate, and adapt in response to foreign entry. This aligns with the second and third stages of Cantner et al.'s lifecycle model, where local firms adapt to the presence of MNEs, creating an intricate ecosystem characterized by competition and collaboration. This "framework", analogous to the EE metaphor, guides both knowledge assimilation and innovation (North, 1990; Peng, 2003; Tihanyi and Roth, 2002). This spillover effect facilitates the transition of an ecosystem from a growth stage to attaining maturity, and indeed, if unchecked, it may propel the ecosystem into a decline stage (Cantner et al., 2020).

In a rapidly globalizing world, the liberalization of international trade, as explored by Meyer & Sinani (2009), presents an expanded arena of innovation, technology, and customer engagement for entrepreneurs. These broader vistas can act as a springboard for creativity and competitive edge. However, the business landscape is not only shaped by opportunity but also by constraints. Keller (1996) posits that the integrity of market institutions, which uphold regulations and foster fair competition, lends a level of predictability that can quell the competitive fire of innovation. Stability often prompts firms to protect their market foothold by charging ahead into the volatile tides of innovation-driven competition. Similarly, the concept of 'privileged access' to primary customers, as described by Hoekman, Maskus, and Saggi (2005), adds another layer of complexity. In situations where firms enjoy secure connections to key customers, whether through contracts, established relationships, or unique offerings (Meyer & Sinani, 2009), the urgency to innovate and compete may be eclipsed by the comfort of an ensured client base.

In summation, while firms with a secure market share or customer base might not feel the immediate competitive pressures that typically incite continuous innovation, Peng (2003) underscores the long-term necessity of persistent innovation for maintaining competitiveness and relevance amid rapid shifts in the global business environment. Consequently, as Meyer & Sinani (2009) conclude, while trade liberalization undoubtedly widens opportunities and stimulates innovation, the precise impact and the resultant strategic responses are extensively moderated by the complexities of the institutional environment and the intricacies of market dynamics, a concept deeply rooted in the EE approach.

Furthermore, Meyer & Sinani's (2009) exploration of the technology gap between local firms and foreign investors draws yet another significant parallel with Cantner et al.'s (2020) EE lifecycle model. In environments characterized by low levels of development, where the technology gap is significant, we observe an analogy with the first stage of Cantner et al.'s model; its genesis. Here, the local firms, much like the nascent entrepreneurial ecosystem, possess limited absorptive capacity. Meaning that, although the potential for knowledge gains and innovation is high, the ability to actualize these benefits is constrained due to a lack of resources, technical capabilities, or robust institutional frameworks.

As the ecosystem transitions from low to medium levels of development, and the technology gap narrows, we see a parallel with Cantner et al.'s establishment stage of the EE. In this stage, local firms start to become more competitive, developing their capacities to absorb and utilize new technologies and knowledge. This mirrors the entrepreneurial ecosystem's evolution, where the increasing capabilities and resources within the ecosystem start to catalyze more complex interactions and synergies, fueling overall growth.

The subsequent emergence of competition, potentially leading to 'market stealing' effects, can be compared to the maturity phase in Cantner et al. 's (2020) model. In this phase, the local entrepreneurial ecosystem is well-developed, with strong competition driving innovation and growth. Despite the competitive pressure, the maturing ecosystem fosters diverse business models and strategies, creating a more dynamic and robust business environment.

3.3.7 Mitigating Crowding Out Effects and Consequent Positive Externalities for Indigenous Firms

Although, as previously stated, MNE entry may initially impede local enterprises due to a sudden surge in competition, crowding out effects may result in beneficial spillovers over time. De Backer and Sleuwaegen (2003) present data from the Belgian manufacturing industries “to support theoretical occupational choice models that predicted that FDI would crowd out domestic enterprises through product and labour market selection.” However, their empirical evidence also suggests that this crowding out effect may be mitigated or even reversed over time as other mechanisms come into play, like demonstration effects, linkage effects, networking, and learning.

Supporting this, a longitudinal study by Kosová (2007) from the Czech Republic questions whether these crowding-out effects are transient or persist in deteriorating the productivity of local firms. She found that the crowding-out is primarily a short-lived static phenomenon immediately following MNE entry, marked by an increased exit rate of domestic firms. Yet, this trend reverses as MNE sales increase, generating more demand that local firms can cater to. She estimates that it takes about two years to counterbalance the crowding effect with this 'demand creation' externality (Kosová, 2010). This falls in line with the recovery of the EE theorized by Cantner et al. (2020)

Although initially, the entry of MNEs into a new market may impede local enterprises due to heightened competition, over time, crowding-out effects can transmute into beneficial spillovers. Again, this phase can be conceptualized as a part of Cantner et al. 's (2020)'s lifecycle model of entrepreneurial ecosystems, where the ecosystem must face certain challenges to continue its evolution towards maturity. De Backer and Sleuwaegen (2003) utilized data from Belgian manufacturing industries to validate theoretical models that predicted FDI would displace domestic enterprises through product and labour market selection. However, their empirical evidence indicates that this displacement effect could be alleviated or even reversed over time due to mechanisms such as demonstration effects, linkage effects, networking, and learning.

As the ecosystem matures, governmental intervention may play a significant role in influencing the balance between MNEs and local firms. This could potentially occur through protectionist policies, especially trade policies controlling MNE entry or market dominance. Some propose that foreign dominance can be eased in favor of local entrepreneurs by imposing tariffs on MNEs and offering subsidies to start-ups (Bhawe et al., 2019). While these policies could increase profit margins for local start-ups and raise costs for competing MNEs, they might deter foreign direct investment. Therefore, such policies should be considered judiciously, primarily in ecosystems that can anchor their MNE presence or are prepared for potential MNE exits.

The global economy is still recovering from aggressive protectionism policies enacted in response to the Global Financial Crisis (Evenett, 2019), and the role these policies play in benefiting local businesses is still empirically unclear (Lux et al. 2011; Peters et al. 2012). Model-based studies by Bhawe et al. (2019) suggest that protectionist policies may benefit economies with low absorptive capacities for MNEs, as these

economies are more likely to experience innovative entrepreneurship from MNE spillovers. In contrast, tariffs may lead to replicative entrepreneurship in economies with high absorptive capacities. However, they also suggest that subsidies to entrepreneurs can promote entrepreneurial diversity. As such, these studies provide a more nuanced view of the role of protectionist policies in the evolution of entrepreneurial ecosystems.

4. Discussion

4.1 Semantic Debates

Despite the term's appearance in the EE literature (e.g., Bhawe & Zahra, 2019), the existence of intentional spillovers remains debatable, as we learned from this review. In investigating the etymology of the ubiquitously used term “spillover”, we learned that Frischmann & Lemley (2007) contend that spillovers cannot be intentional. Essentially, the term refers to the uncompensated benefits (Epstein, 2002) that one party receives as a result of the actions of another party; it is a type of externality that is never intentional. Similarly, within the curation of literature for this review, Smeets (2008) argues that much research fails to discriminate between knowledge spillovers and knowledge transfers due to a dearth of theoretical investigations into spillovers. He defines knowledge spillovers at the firm level as knowledge created by one firm (a multinational enterprise) that is used by a second firm (a host-country firm) for which the host-country firm does not (fully) compensate the multinational enterprise. Although some authors have claimed that spillovers can be intentional, such as Bhawe & Zahra (2019) and Spencer (2008), in light of the discussion on the distinction between knowledge spillovers and knowledge transfers we might need to revise the model (Fig. 4), where the term “unwilling spillovers” may be replaced with “knowledge transfer”.

Similarly, terminological inconsistencies permeate the literature, resulting in arbitrary usage and a muddled understanding of key terms such as “spinouts”. For instance, the term is often used interchangeably with “spinoffs” without due differentiation (Nikolowa, 2014). Further, the relationship between “spinouts” and “spillovers” is fraught with ambiguity. For instance, Ryan et al. (2020) suggest a distinction between the two, using the phrasing “the MNE can both initiate an entrepreneurial ecosystem and promote its growth via spillovers and spinouts”. Conversely, Spencer (2008), presents 'spinoffs' as a subset of 'spillovers'. Adding to the semantic inconsistencies, literature that employs antecedent or complementary approaches to entrepreneurial ecosystems refers to 'spinouts' as a type of 'worker turnover', not as a unique spillover mechanism (see Smeets, 2008). The subtle inconsistencies in the usage of these terms, largely unchallenged in academic discourse, suggest that these discrepancies may not reflect well-articulated differences of opinion, but rather stem from a paucity of focused discussion on spillover mechanisms. Indeed, these semantic ambiguities underscore the urgency of our call to action. Future studies must more robustly consider the role of spillovers in the development of entrepreneurial ecosystems to enrich the discourse and bring clarity to the prevailing semantic landscape.

4.2 FDI to Spillover Mechanisms Flowchart

In traversing the academic discourse on EE, it's clear that our understanding of the operative mechanisms still leaves much room for growth. This gap stems from a lack of recent empirical studies dedicated to these dynamics. Though the need to grasp these mechanisms is universally recognized, our current knowledge is largely built on research nearly two decades old. Hence, we advocate for fresh empirical exploration of spillover mechanisms in entrepreneurial ecosystems worldwide to enrich our insight into this

critical area. Despite these challenges, we've striven to weave together the available literature into a cohesive narrative, resulting in a comprehensive flowchart—an amalgamation of our review and understanding of the underlying dynamics (see Fig. 4). This flowchart serves as our theoretical contribution—a tangible framework inviting critique, discussion, and further investigation. Our hope is it spurs rigorous empirical exploration of spillover mechanisms in entrepreneurial ecosystems, fostering the field's advancement.

We commence our flowchart with the entry of FDI or MNEs into an entrepreneurial ecosystem. This action ignites numerous spillover effects, both positive and negative. In alignment with Bhawe and Zahra's (2019) perspective, we categorize positive spillovers into 'willing' and 'unwilling,' a classification diverging from some scholars' interpretations of spillovers, a discussion highlighted in 'Semantic Debates' section. Positive spillovers include willingly acquired 'knowledge transfers' (Smeets, 2008) through co-specialization and supply chain optimization by MNEs, alongside unwittingly accrued benefits like demonstration effects, labor mobility, local linkages, positive competition effects, and spinoffs. Conversely, potential adverse effects are encapsulated, such as crowding out of start-ups due to resource competition with MNEs, and reactionary policies that may emerge in response to MNEs' market dominance. This flowchart illuminates the intricate dynamics triggered by the entry of FDI or MNEs into an entrepreneurial ecosystem, shedding light on the multifaceted and often paradoxical spillover effects that sculpt the evolving entrepreneurial landscape.

5. Future Research Agenda and Limitations

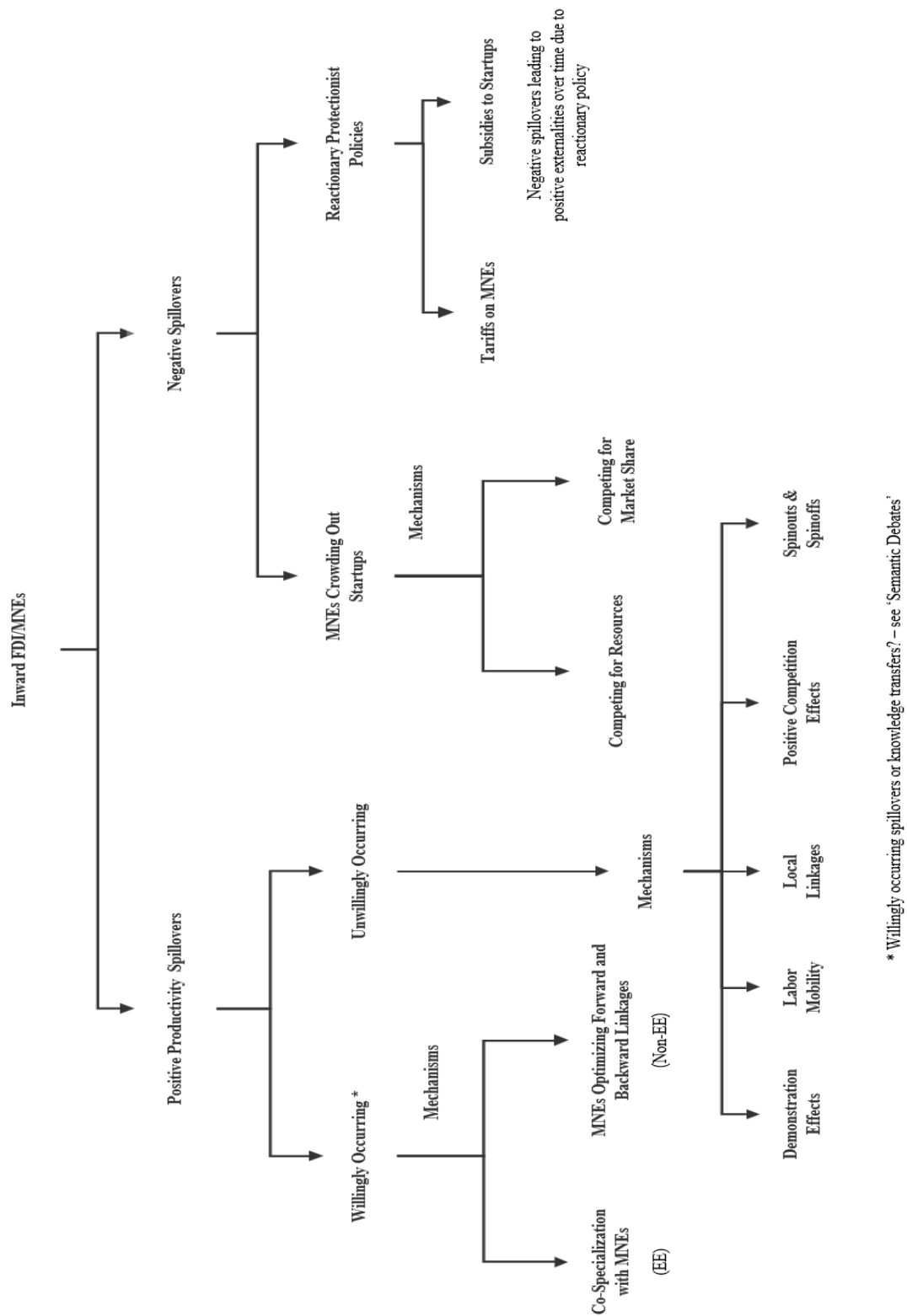
5.1 Future Research Agenda

As we traversed the diverse theoretical landscapes in our systematic literature review and its subsequent mapping, the need for an updated, geographical, and contextual approach to future research in this domain became increasingly apparent. The technological advancements, digital transformations, and global nature of business operations have reshaped the empirical realities of MNEs since the 2000s. The traditional wisdom relying heavily on the benefits of agglomeration, supply chains, and the physical proximity of enterprises, prevalent in much of the antecedent literature, is becoming less relevant in today's era of digital enterprises and global supply chains. As Porter (1998) posited, the ability to source capital, goods, information, and technology from virtually anywhere necessitates a significant shift in our understanding of agglomeration benefits.

However, the majority of studies surveyed in this review approach their analysis from a broad national perspective rather than delving into the specificities of individual regions. For instance, painting all clusters in India with the same brush when ecosystems as different as Bangalore and Kolkata exist is a significant contextual misrepresentation of the region. The EE framework, as highlighted by Theodoraki and Catanzaro (2021), offers a more granular and contextually sensitive lens that can highlight the unique characteristics of individual regions while still accounting for the broader national context. Unlike other theories, such as cluster theory, which relegates entrepreneurship to the side-lines, the EE framework places entrepreneurship as the culminating output. Our exploration of the broader agglomeration literature reveals a noticeable gap in this comprehensive, locally focused approach. This underlines the need for increased application of the EE framework in studying spillover mechanisms to capture the full richness and complexity of these phenomena. Therefore, we urge for further empirical examinations and theory development that not only reveal the distinct intricacies of individual entrepreneurial ecosystems, but also deepen our understanding of the dynamic interplay between MNEs, spillover mechanisms, and the nurturing of entrepreneurial resilience and growth.

Figure 7: FDI/MNE to Mechanisms (Literature Review Summary Flowchart)

* Source: Authors. Created using Microsoft Office.



* Willingly occurring spillovers or knowledge transfers? – see ‘Semantic Debates’

The EE framework remains a dynamic and complex model, a labyrinth of interdependent entities. Given the extensive interconnectedness within an EE, it becomes increasingly important to simplify the exploration process by first pinpointing the specific mechanisms at play before delving into the roles and interactions of individual actors. This approach unveils a clearer hierarchy of significance, especially when examining the unintended or spontaneous spillover effects. Existing literature and our flowchart present a generalized categorization of mechanisms. Still, the detailed intricacies of these mechanisms remain largely unexplored, thereby leaving a gap in our understanding. Further, the empirical landscape of MNEs has undergone substantial transformation since the dawn of the 21st century. This shift profoundly influences the validity of our current knowledge about MNE spillovers, emphasizing the need to re-evaluate existing theories.

Therefore, we advocate for an evolving research agenda that encourages the conduct of empirical case studies across diverse EEs. The purpose is not only to identify and analyze these mechanisms in their various forms and iterations but also to bridge the knowledge gap, thus enhancing our understanding of MNE spillovers in the context of contemporary entrepreneurial ecosystems. Our work underscores the criticality of understanding the nuanced mechanisms that foster spillovers within the broader EE context. This understanding, once obtained, can serve as an essential guide for policymakers, MNEs, and entrepreneurs in harnessing the potential of MNE spillovers effectively, thereby shaping entrepreneurial ecosystems conducive to innovation, resilience, and growth.

5.2. Limitations

While our research provides valuable insights into the mechanisms of spillovers in entrepreneurial ecosystems, it is important to acknowledge its limitations. Primarily, this study is a systematic literature review, and as such, it is inherently limited to the scope and quality of the extant literature. The existing body of research is fraught with inconsistencies, varying interpretations, and obsolete empirical data — factors that may have influenced our understanding of the subject. Another limitation stems from the considerable heterogeneity across entrepreneurial ecosystems, making it challenging to develop a universally applicable model. EEs are idiosyncratic occurrences, shaped by a myriad of factors, including regional, cultural, economic, and industrial elements, which were not extensively accounted for in this review. Furthermore, the complexity of the EE framework and the multitude of interdependent entities within it make it difficult to capture every nuance of the spillover mechanisms. This paper primarily focused on broader categories of mechanisms, and as a result, certain nuanced or lesser-known mechanisms might have been overlooked. Finally, the dynamic and evolving nature of MNEs and EEs means that our understanding of spillover mechanisms is subject to change as new empirical evidence emerges.

6. Conclusion

This research paper endeavours to illuminate the obscure landscape of mechanisms that guide the flow of MNE spillovers in the genesis and growth of entrepreneurial ecosystems. Our endeavor was guided by the research question: What does the extant literature tell us about the role of MNE spillovers in the genesis and growth of an EE? We conducted a systematic literature review that spanned both the EE literature and relevant studies done with theoretical approaches antecedent to EE research. In the course of our comprehensive investigation, we have accomplished several critical objectives: We have comprehensively

mapped the existing literature on spillovers, synthesized our findings into an easily digestible flowchart, and charted out prospective research avenues in this vital area of EE literature.

The journey of this research, while marked by many intricate theories and empirical studies from diverse academic disciplines, ultimately served as a convergence and synthesis across interdisciplinary boundaries in pursuit of our research question. From the onset, we acknowledge that the pursuit of this research is not in uncharted waters. EE scholars have much to benefit from and much to offer the studies conducted within antecedent frameworks. We ventured into the broad academic terrain that discusses spillovers across multiple theoretical lenses (see Appendix table 6). These non-EE or complementary approaches provided us with a rich backdrop and understanding of spillover mechanisms, which were subsequently examined through the lens of the EE framework.

In conclusion, our research not only bridges the gap between various academic approaches but also lays the foundation for future explorations. It underscores the pressing need for empirical studies that resonate with the modern realities of EEs, thus contributing to the extant body of literature on MNE spillovers in entrepreneurial ecosystems. This research is a clarion call to rethink, revisit, and renew our understanding of spillover mechanisms, and provides an effective guidepost for further elaboration of EE theory building.

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Appendix

Table 5: Appendix: Groupings of Focus Points of Academic Interest in Spillovers + Entrep* Literature

*Source: Authors

Row Labels	Count
Academia	32
Academic entrepreneur	1
Academic (university)	2
Entrepreneurial University	1
University	25
University entrepreneurs	1
University scientists	1
University/knowledge bases	1
MNE or FDI	27
FDI	19
MNE	8
Entrepreneurship Related	12
Entrepreneur	2
Entrepreneurial employee activity	1
Export-oriented entrepreneurship	1
Immigrant entrepreneurs	1
Information on local entrepreneurial success rate	1
Intrapreneur	1
Legitimacy (success/failure of prior entrepreneurship)	1
Portfolio entrepreneurship	1
Returnee Entrepreneur	3
Government Policy	12
Globalization Policy	1
Government	2
Government (Loans)	1
Government Policy (German case study)	1
Policies (Green entrepreneurs)	1
Policies (Loans to small businesses)	1
French Policy	1
Specific Policy	2
Subsidized firms	1
Tax Policy	1
Geography Related	10
Agglomeration	2
Co-location	2
Geography	1
Location	1
Science Parks	1
Settlement patterns (urbanization)	1
Spatial proximity	2
Human Capital Related	9
Collective Turnover (Labour mobility)	1

Human Capital	4
Human Capital externalities	1
Labour market discrimination	1
Labour mobility	2
Knowledge spillovers	8
Business services that are knowledge intensive	1
Knowledge	1
Knowledge bases	4
New Knowledge	1
Technology	1
Patent Related	6
Patent	5
Patent+Trademarks+firm appropriation	1
Related Variety	4
Related Variety	3
Related Variety* + Unrelated variety (absorptive capacity)	1
Industry Related	4
Industry specialization + Industry diversity + Industry density	1
IT industry	2
IT industry + Fintech industry	1
Firm Related	4
Firms (appropriability)	1
Incumbent firms	2
Small firms	1
Finance Related	4
Capital	2
Liquidity Shocks/ Financial constraints	1
Venture Capitalist	1
Externalities	3
Externalities	3
Corruption	3
Corruption	3
Institution Related	3
Institutional	1
Institutional diversity	1
Institutional environment	1
Incubator	2
Incubator	2
Network capital	2
Relational capital	1
social capital (entrepreneurial networks)	1
Culture	2
Cultural Diversity	1
Culture	1
Competition Related	2
Spin out Related	2
Research Based Spin off companies	1

Spin outs	1
R&D Related	2
R&D cooperation	1
Internal R&D investments in forms+ R&D policy + external sources of innovation	1
Creativity	2
Creativity	2
Open-innovation strategies	1
Open-innovation strategies	1
Innovation systems	1
Innovation systems	1
Cluster's social status	1
Cluster's social status	1
Scientists	1
Scientists	1
Military	1
Military	1
absorptive capacity	1
absorptive capacity	1
Unproductive rent seeking	1
Unproductive rent seeking	1
technological relatedness	1
technological relatedness	1
End user innovation	1
End user innovation	1
Grand Total	164

Table 6: Appendix: Theoretical lenses referred by papers in the SLR

* Source: Authors. Generated on Microsoft Excel.

No.	Theoretical lens/framework Reference	Year	Authors	Title
1	Cluster Theory	2019	Girma, Sourafel; Görg, Holger; Kersting, Erasmus	Which boats are lifted by a foreign tide? Direct and indirect wage effects of foreign ownership
		2020	Luo, Lingli; Ma, Xufei; Makino, Shige; Shinkle, George A.	Cluster status and new venture creation
2	Cluster Theory & Marshallian externalities	2016	Pinch, Steven; Sunley, Peter	Do Urban Social Enterprises Benefit from Agglomeration? Evidence from Four UK Cities
3	Cluster Theory & Entrepreneurial Ecosystem	2019	Lorenzen, Mark	How Early Entrants Impact Cluster Emergence: MNEs vs. Local Firms in the Bangalore Digital Creative Industries
4	Crépon–Duguet–Mairesse (CDM)	2017	Antonelli, Cristiano; Colombelli, Alessandra	The locus of knowledge externalities and the cost of knowledge
5	Economic growth & Knowledge Spillover & International entrepreneurship Theories	2015	Gonzalez-Pernia, Jose L.; Pena-Legazkue, Inaki	Export-Oriented Entrepreneurship and Regional Economic Growth
6	Entrepreneurial Ecosystem	2018	Autio, Erko; Nambisan, Satish; Thomas, Llewellyn D. W.; Wright, Mike	Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems
			Schillo, R. Sandra	Research-Based Spin-Offs as Agents in the Entrepreneurial Ecosystem
		2019	Bhawe, Nachiket; Zahra, Shaker A.	Inducing Heterogeneity in Local Entrepreneurial Ecosystems: The Role of MNEs
			Civera, Alice; Meoli, Michele; Vismara, Silvio	Do Academic Spinoffs Internationalize?
			Wagner, Marcus; Schaltegger, Stefan; Hansen, Erik G.; Fichter, Klaus	University-Linked Programmes for Sustainable Entrepreneurship and Regional Development: How and with What Impact?
		2020	Ryan, Paul; Giblin, Majella; Bucini, Giulio; Kogler, Dieter F.	The Role of MNEs in the Genesis and Growth of a Resilient Entrepreneurial Ecosystem
		2021	Bhawe, Nachiket; Zahra, Shaker A.; Chao, Chen; Bruton, Garry D.	Protectionist Policies and Diversity of Entrepreneurial Types
			Yi, Lingfeng; Wang, Yue; Upadhaya, Bedanand; Zhao, Sijia; Yin, Yishuai	Knowledge spillover, knowledge management capabilities, and innovation among returnee entrepreneurial firms in emerging markets: Does entrepreneurial ecosystem matter?
7	Entrepreneurial Ecosystem & Knowledge Spillover Theory of Entrepreneurship	2019	Lange, Stephanie; Wagner, Marcus	The Influence of Exploratory versus Exploitative Acquisitions on Innovation Output in the Biotechnology Industry
8	Gennaioli et.al Theoretical Framework (Quarterly Journal of Economics 2013; 128: 105-164)	2017	Sanso-Navarro, Marcos; Vera-Cabello, Maria; Ximenez-De-Embun, Domingo P.	Human Capital Spillovers and Regional Development
9	Geography of Innovation	2001	Piergiovanni, Roberta; Santarelli, Enrico	Patents and the Geographic Localization of R&D Spillovers in French Manufacturing
10	Institutional Theory	2013	Stenholm, Pekka; Acs, Zoltan J.; Wuebker, Robert	Exploring country-level institutional arrangements on the rate and type of entrepreneurial activity
11	Internationalization Theory	2007	Acs, Zoltan; O'Gorman, Colm; Szerb, Laszlo; Terjesen, Siri	Could the Irish Miracle be Repeated in Hungary?
		2020	McGaughey, Sara L.; Raimondos, Pascalis; la Cour, Lisbeth	Foreign influence, control, and indirect ownership: Implications for productivity spillovers.
12	Jacobs externalities	2018	Wixe, Sofia	Neighbourhood related diversity, human capital and firm innovation
13	Marshallian	2014	Potter, Antony; Watts, H. Doug	Revisiting Marshall's Agglomeration Economies: Technological Relatedness and the Evolution of the Sheffield Metals Cluster
		2020	Faggio, Giulia; Silva, Olmo; Strange, William C.	Tales of the City: What Do Agglomeration Cases Tell Us about Agglomeration in General?
		2021	Andersson, Martin; Larsson, Johan P.	Mysteries of the trade? Skill-specific local agglomeration economies

Table 6 (continued)

14	Neofunctionalism	2005	Moravcsik, Andrew	The European Constitutional Compromise and the neofunctionalist legacy
15	Regional Innovation Systems	2016	Grillitsch, Markus	Institutions, Smart Specialisation Dynamics and Policy
		2019	Corradini, Carlo	Location Determinants of Green Technological Entry: Evidence from European Regions
16	Regional Innovation Systems & Entrepreneurial Ecosystems	2016	Brown, Ross	Mission Impossible? Entrepreneurial Universities and Peripheral Regional Innovation Systems
17	The Resource Theory of the Firm	2006	Audretsch, David B.; Lehmann, Erik	Entrepreneurial Access and Absorption of Knowledge Spillovers: Strategic Board and Managerial Composition for Competitive Advantage
18	Schumpeterian 'creative destruction' theory	2020	Agarwal, Rajshree; Audretsch, David	Looking forward: Creative construction as a road to recovery from the COVID-19 crisis
19	Social Capital Theory	2010	Liu, Xiaohui; Wright, Mike; Filatotchev, Igor; Dai, Ou; Lu, Jiangyong	Human mobility and international knowledge spillovers: evidence from high-tech small and medium enterprises in an emerging market
		2005	Audretsch, David B.; Lehmann, Erik E.	Does the Knowledge Spillover Theory of Entrepreneurship hold for regions?
			Oerlemans, Leon; Meeus, Marius	Do Organizational and Spatial Proximity Impact on Firm Performance?
		2006	Honig, Benson; Lerner, Miri; Raban, Yoel	Social Capital and the Linkages of High-Tech Companies to the Military Defense System: Is There a Signaling Mechanism?
		2007	Agarwal, Rajshree; Audretsch, David; Sarkar, M. B.	The process of creative construction: knowledge spillovers, entrepreneurship, and economic growth
		2008	Audretsch, David B.; Keilbach, Max	Resolving the Knowledge Paradox: Knowledge-Spillover Entrepreneurship and Economic Growth
			Wong, Poh Kam; Lee, Lena; Foo, Maw Der	Occupational Choice: The Influence of Product vs. Process Innovation
		2009	Acs, Zoltan J.; Braunerhjelm, Pontus; Audretsch, David B.; Carlsson, Bo	The Knowledge Spillover Theory of Entrepreneurship
			Isaksen, Arne	Innovation Dynamics of Global Competitive Regional Clusters: The Case of the Norwegian Centres of Expertise
			Li, Xibao; Mitchell, Ronald K.	The Pace and Stability of Small Enterprise Innovation in Highly Dynamic Economies: A China-Based Template
		2010	Agarwal, Rajshree; Audretsch, David; Sarkar, Mb	Knowledge spillovers and strategic entrepreneurship
			Braunerhjelm, Pontus; Acs, Zoltan J.; Audretsch, David B.; Carlsson, Bo	The Missing Link: Knowledge Diffusion and Entrepreneurship in Endogenous Growth
		2012	Acs, Zoltan; Audretsch, David; Braunerhjelm, Pontus; Carlsson, Bo	Growth and entrepreneurship
		2013	Acs, Zoltan J.; Audretsch, David B.; Lehmann, Erik E.	The Knowledge Spillover Theory of Entrepreneurship
			Audretsch, David B.; Belitski, Maksim	The Missing Pillar: The Creativity Theory of Knowledge Spillover Entrepreneurship
			Hayter, Christopher S.	Conceptualizing knowledge-based entrepreneurship networks: perspectives from the literature
			Qian, Haifeng; Acs, Zoltan J.	An Absorptive Capacity Theory of Knowledge Spillover Entrepreneurship
			Stam, Erik	Knowledge and Entrepreneurial Employees: A Country-Level Analysis
		2014	Guerrero, Maribel; Urbano, David	Academics' Start-Up Intentions and Knowledge Filters: An Individual Perspective of the Knowledge Spillover Theory of Entrepreneurship
			Herrera-Echeverri, Hernán; Haar, Jerry; Estévez-Bretón, Juan Benavides	Foreign direct investment, institutional quality, economic freedom and entrepreneurship in emerging markets
			Plummer, Lawrence A.; Acs, Zoltan J.	Localized competition in the knowledge spillover theory of entrepreneurship

Table 6 (continued)

20	The Knowledge Spillover Theory of Entrepreneurship (TKSE)	2015	Ghio, Niccolò; Guerini, Massimiliano; Lehmann, Erik E.; Rossi-Lamastra, Cristina	The Emergence of the Knowledge Spillover Theory of Entrepreneurship
		2016	Braunerhjelm, Pontus; Ding, Ding; Thulin, Per	Labour as a Knowledge Carrier: How Increased Mobility Influences Entrepreneurship
			Ghio, Niccolò; Guerini, Massimiliano; Rossi-Lamastra, Cristina	University knowledge and the creation of innovative start-ups: an analysis of the Italian case
			Lafuente, Esteban; Szerb, Laszlo; Acs, Zoltan J.	Country Level Efficiency and National Systems of Entrepreneurship: A Data Envelopment Analysis Approach
		2017	Audretsch, David B.; Lehmann, Erik E.; Warning, Susanne	University spillovers and new firm location
			De Clercq, Dirk; Hessels, Jolanda; Van Stel, Andre	Knowledge Spillovers and New Ventures' Export Orientation
			Garcia-Vicente, Florencia; Garcia-Swartz, Daniel; Campbell-Kelly, Martin	Information Technology Clusters and Regional Growth in America, 1970-1980
			Hervas-Oliver, Jose-Luis; Lleo, Maria; Cervello, Roberto	The Dynamics of Cluster Entrepreneurship: Knowledge Legacy from Parents or Agglomeration Effects? The Case of the Castellon Ceramic Tile District
			Leyden, Dennis Patrick; Link, Albert N.	Knowledge Spillovers, Collective Entrepreneurship, and Economic Growth: The Role of Universities
		2018	Colombelli, Alessandra; Quatraro, Francesco	New Firm Formation and Regional Knowledge Production Modes: Italian Evidence
			Yoon, Hyungseok (David); Kim, Namil; Buisson, Bernard; Phillips, Fred	A cross-national study of knowledge, government intervention, and innovative nascent entrepreneurship
		2019	Belitski, Maksim; Aginskaja, Anna; Marozau, Radzivon	Commercializing university research in transition economies: Technology transfer offices or direct industrial funding?
			Del Monte, Alfredo; Pennacchio, Luca	Historical Roots of Regional Entrepreneurship: The Role of Knowledge and Creativity
			Jarchow, Svenja; Rohm, Andrea	Patent-Based Investment Funds: From Invention to Innovation
			Minola, Tommaso; Hahn, Davide; Cassia, Lucio	The Relationship between Origin and Performance of Innovative Start-Ups: The Role of Technological Knowledge at Founding
		2020	Antonietti, Roberto; Gambarotto, Francesca	The role of industry variety in the creation of innovative start-ups in Italy
			Caiazza, Rosa; Belitski, Maksim; Audretsch, David B.	From Latent to Emergent Entrepreneurship: The Knowledge Spillover Construction Circle
			Cojoianu, Theodor F.; Clark, Gordon L.; Hoepner, Andreas G.F.; Veneri, Paolo; Wójcik, Dariusz	Entrepreneurs for a low carbon world: How environmental knowledge and policy shape the creation and financing of green start-ups
		2021	Audretsch, David B.; Belitski, Maksim; Korosteleva, Julia	Cultural diversity and knowledge in explaining entrepreneurship in European cities
			Kitagawa, Fumi; Marzocchi, Chiara; Sánchez-Barrioluengo, Mabel; Uyarra, Elvira	Anchoring talent to regions: the role of universities in graduate retention through employment and entrepreneurship
			Mathias, Blake D.; McCann, Brian T.; Whitman, Daniel S.	A meta-analysis of agglomeration and venture performance: Firm-level evidence
21	Theory of Knowledge Spillover Entrepreneurship & Endogenous growth theory	2011	Delmar, Frédéric; Wennberg, Karl; Hellerstedt, Karin	Endogenous growth through knowledge spillovers in entrepreneurship: an empirical test
		2015	Huggins, Robert; Thompson, Piers	Entrepreneurship, innovation and regional growth: a network theory
22	The Knowledge Triangle framework (Triple Helix, Third Mission, smart specialization models, etc)	2020	Unger, Maximilian; Marsan, Giulia Ajmone; Meissner, Dirk; Polt, Wolfgang; Cervantes, Mario	New Challenges for Universities in the Knowledge Triangle
23	The Knowledge Spillover Theory of Intrapreneurship	2018	Braunerhjelm, Pontus; Ding, Ding; Thulin, Per	The Knowledge Spillover Theory of Intrapreneurship

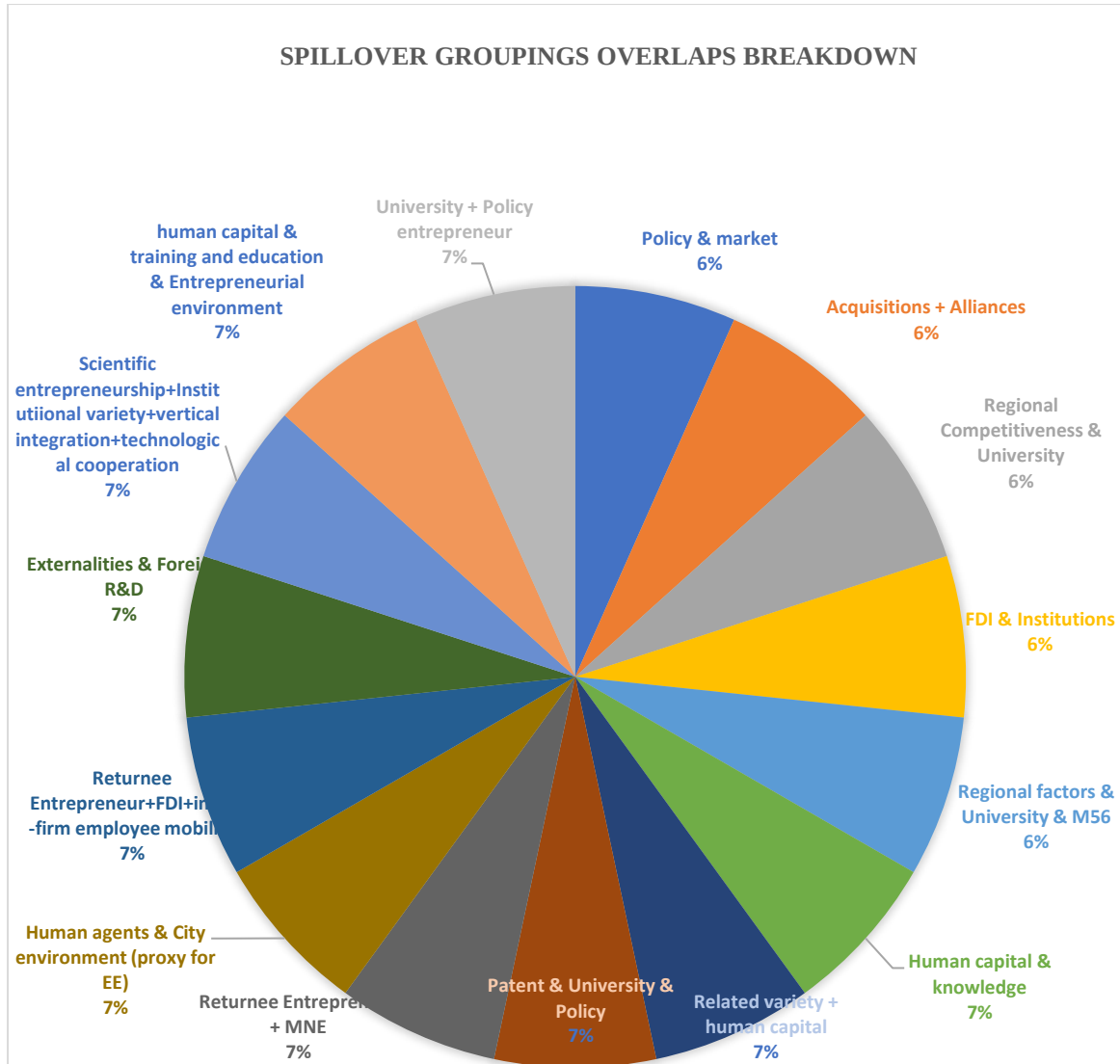


Figure 8: Appendix: Shows the overlaps between groupings of spillovers.
 * Source: Authors. Generated on Microsoft Excel.

4. Paper 2: Zooming in the Snapshot: A Close-up Assessment of Dublin's Entrepreneurial Ecosystem from the Perspectives of Local Entrepreneurs

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Abstract

The entrepreneurial ecosystem (EE) framework has gained significant momentum in recent academic discourses, emphasizing its critical role in propelling regional economic growth (Acs et al., 2017; Stam, 2015). Yet, there exists a discernible gap in understanding the practical mechanisms that bolster successful entrepreneurial ventures. While current debates, particularly around agglomeration economies, often hinge on dated empirical findings, there is a burgeoning demand for empirical studies that shed light on contemporary ecosystem intricacies (Isenberg, 2010; Mason & Brown, 2014; Cho et al., 2021). This research addresses this lacuna by focusing on Dublin's EE, which, since Google's establishment in 2003, has burgeoned into a dynamic entrepreneurial hub. Despite its significance, academic inquiries into Dublin's EE have been conspicuously missing and any reports predominantly quantitative. This study seeks to bridge this gap by exploring the lived experiences of Dublin's entrepreneurs, offering a juxtaposition of the ecosystem's documented profile against the real-time experiences it affords. Grounded in the EE framework (Acs et al., 2017; Isenberg, 2010) and enriched by theories such as the social network theory (Aldrich & Zimmer, 1986; Granovetter, 1973) and resource-based theory (Barney, 1991; Penrose, 1959), this research strives for a holistic understanding of Dublin's EE. By integrating Cantner et al. (2020)'s evolutionary model, the study adds a temporal layer to its findings, positioning Dublin's EE within a developmental spectrum. The core ambition is to elucidate the myriad elements shaping entrepreneurial experiences in Dublin, aiming to enhance the theoretical and practical understanding of entrepreneurial ecosystems at large.

1. Introduction

The entrepreneurial ecosystem (EE) literature has experienced rapid growth in recent years, developing an unprecedented systemic framework that emphasizes entrepreneurship's role in driving regional economic growth (Acs et al., 2017; Stam, 2015). However, despite its widespread adoption by policymakers, entrepreneurs, and academics, much remains to be understood about the mechanisms that foster the creation and growth of successful ventures. Addressing the various puzzles surrounding the entrepreneurial ecosystems (EE) framework, including its origins and the mechanisms at play, requires empirical assessments of EEs (Isenberg, 2010; Mason & Brown, 2014; Cho et al., 2021). Notably, the discourses on agglomeration economies, despite their recent theoretical advances, are to a large extent hinged on antiquated empirical findings. Theoretical advancements incur inaccuracies when relying on outdated empirical data, necessitating the reassessment of contemporary ecosystems to capture the local context intricacies and first-hand experiences of entrepreneurs (Porter, 1998; Stam & Spigel, 2016). The rapid and unbridled growth of literature has led to echoing calls for additional empirical studies are essential for advancing the theoretical development of the EE literature (Autio et al., 2018; Stam & Spigel, 2020; Cho et al., 2021). In particular, there has been a noticeable lack of qualitative assessments that delve into the lived experiences of entrepreneurs within these ecosystems.

Dublin serves as an excellent candidate for such empirical analysis. Since Google's arrival on Barrow Street in 2003, the city has transformed into a bustling hub, attracting international investors, venture capital

firms, and a diverse talent pool. This evolution underscores the profound impact of MNEs and situates Dublin as fertile ground for investigating the ecosystem's dynamics; a situation similar to other ecosystems who have managed to attract FDI to transform themselves. Despite its relatability to other ecosystems that have managed to attract FDI, there has been no academic research on Dublin's EE, and any existing reports are limited to mere statistical snapshots. Consequently, it is crucial to conduct empirical research that captures the Dublin ecosystem from the vantage point of its central stakeholders — the entrepreneurs. There has been

This research aims to fill this exigent gap by investigating the experiences of entrepreneurs in Dublin's entrepreneurial ecosystem, highlighting any similarities or discrepancies between the ecosystem's on-paper profile and the actual experiences it offers, ultimately providing a more nuanced and comprehensive understanding of its dynamics. The study aligns with recent calls for more empirical case studies of entrepreneurial ecosystems (Mason & Brown, 2014; Autio et al., 2018; Stam & Spigel, 2020; Cho et al., 2021) and seeks to contribute to the EE literature by conducting an empirical case study of Dublin's EE from the entrepreneur's perspective. This approach resonates with the increasing emphasis on understanding the local context and entrepreneurs' experiences in the literature (Stam & Spigel, 2016; Mack & Mayer, 2016; Audretsch & Belitski, 2017; Brown & Mason, 2017; Spigel, 2017; Lerner et al., 2021; Dotti et al., 2020; Malecki, 2018; Roundy et al., 2018; Ryan et al., 2020), which is essential for enriching the theoretical development of entrepreneurial ecosystems. Against this backdrop, we guide our efforts to answer the following research question:

'How do local entrepreneurs experience Dublin's EE, and what insights can their experiences provide about and towards the effectiveness of the ecosystem?'

By investigating this question, this study aims to bridge a gap in the entrepreneurial ecosystem literature, contributing a detailed, context-specific examination of Dublin's entrepreneurial ecosystem through the lens of the entrepreneurs themselves. In charting this investigative course, we leverage the EE framework (Acs et al., 2017; Isenberg, 2010), a theoretical perspective that benefits from influences of theories such as the social network theory (Aldrich & Zimmer, 1986; Granovetter, 1973) and resource-based theory (Barney, 1991; Penrose, 1959), both of which offer valuable understanding into the mechanisms that enable or constrain entrepreneurial activity and are woven into the fabric of the EE perspective. In addition, we incorporate Cantner et al. (2020)'s evolutionary model of entrepreneurial ecosystems, with an aim to situate our qualitative snapshot of Dublin within its developmental continuum. This placement not only adds a temporal dimension to our findings but also provides a steppingstone to track and predict future trajectories of Dublin's EE. In doing so, we maintain the processual integrity of the EE, thereby honoring the evolution inherent in such ecosystems.

Capitalising on these theoretical foundations, the aspiration of this study is to unravel a richly detailed and dynamically nuanced depiction of Dublin's entrepreneurial ecosystem. The focus is to illuminate the multifarious elements that sculpt entrepreneurial experiences and calibrate the ecosystem's capacity to cultivate productive entrepreneurship. Evidencing our reliance on insightful theoretical frameworks, this study is poised to unveil a detailed, textured, and kinetic comprehension of Dublin's entrepreneurial ecosystem. Our ambition is to spotlight the determinants sculpting the experiences of entrepreneurs and those influencing the ecosystem's capacity to cultivate fruitful entrepreneurship.

This study acknowledges the innately processual and ever-evolving character of entrepreneurial ecosystems. We offer a qualitative snapshot of Dublin's EE, yet we go beyond a static view, aligning it with

the continuum of Cantner et al.'s (2020) evolutionary model. This alignment is an important step, situating our work within the broader dialogue about the development and progression of entrepreneurial ecosystems. Diving into the experiences of Dublin's entrepreneurs, we strive to illuminate the mechanics that facilitate or restrict entrepreneurial undertakings, and to pinpoint areas where the ecosystem could be fortified to encourage the proliferation of new ventures. This research will broaden the frontiers of the EE literature by delivering a profound, context-saturated exploration of the phenomenon. It lays an empirical bedrock for theoretical crafting on EEs and elucidates an array of pragmatic, policy-driven, and theoretical ramifications. By delving into Dublin's entrepreneurial narratives, we aim to illuminate the mechanisms that foster or restrict entrepreneurial pursuits. This venture seeks to offer practical insights with policy implications, while providing a solid empirical substrate for theoretical advancements in the EE arena. Our contextually immersive, empirically rich analysis of the ecosystem dynamics serves to pinpoint opportunities for reinforcing the ecosystem and guiding scholarly pursuits in the field.

This study is structured as follows: we commence by establishing the theoretical backdrop, segueing into our methodological design. This foundation paves the way for an exposition of an empirical snapshot of Dublin for context, followed by our Findings section, culminating in a comprehensive discussion that contextualizes our insights within the broader Entrepreneurial Ecosystem discourse.

2. Theory Development

2.1 The origins of EE

The EE conceptual framework is not a mere creation of new age thought but a distillation of a refined lineage primarily rooted in the literature of agglomeration economies. Its inception represents a deliberate weaving of spatial characteristics, one that reflects evolutionary economic geography's nuances, with the strategic importance of novel value creation, a concept central to business strategy literature (Cho, 2022). This synthesis is an artful and intricate collection, embodying an intellectual convergence of multifaceted ideas. It incorporates concepts from regional innovation systems (Cooke, 2008; Sternberg, 2007; Ylinenpää, 2009), and structural configurations as seen in the 'ecosystem' metaphor within business ecosystems (Moore, 1993; Adner, 2017; Van de Ven, 1993). Additionally, the EE approach reverberates with the entrepreneurship literature's discourse on knowledge creation dynamics and spillovers (Audretsch and Keilbach, 2007; Welter, 2011; Autio et al., 2014).

In the annals of historical contributions that shaped the EE framework, the embryonic development can be traced back to the regional ecosystems approach. Herein, the concepts of Marshallian and Italianate industrial districts stand prominent. Marshall (1920), for instance, discerned the merits of industry localization, emphasizing skill inheritance, shared goals, and operational simplicity. Van de Ven (1993) further enriched the theoretical landscape, emphasizing the interplay of actors across various dimensions. This perspective opened doors to a more comprehensive community-centered view around industries, one that integrated social, political, institutional, and cultural aspects (Staber, 2007; Owen-Smith & Powell, 2004; Ottati, 1994; Spilling, 1996). The recurring theme across these frameworks was the listing of benefits tied to geographical co-location.

The technological revolution, characterized by a shift from manual labor to science and technology-led industries, brought about seismic global changes. During this transformative phase, the cluster theory emerged, led by Michael Porter's seminal work (1990, 1998a, 1998b). Porter's elucidation of 'Clusters' as geographic concentrations of interconnected entities reinvigorated global interest in agglomeration's

economic impacts. Emphasizing cooperation between competitors, the cluster theory resonated with policymakers and academics alike, finding robust application in diverse contexts such as Silicon Valley (Saxenian, 1994). However, the appeal of the ‘Cluster Theory’ was not without flaws. Some critiques (Pitelis, 2012; Glaeser, 2010) argued that the cluster theory merely extended existing traditions, with a predominant focus on logistical advantages like transport cost savings. This limited perspective became starkly evident with the rise of online businesses, exposing inadequacies in understanding agglomerating benefits. In the aftermath of the cluster theory's waning relevance, a new era of understanding was ushered in with the introduction of the entrepreneurial ecosystem concept. Despite initial resistance, the concept gained momentum, shaped by influential contributions like Isenberg's (2010) Harvard Business Review Article and Feld's book called *Startup Communities* (2012). Isenberg's (2010) call to stop ‘emulating silicon valley’, in the aftermath of a series of two decades worth of unsuccessful attempts to replicate the valley, resonated strongly with policy makers. Organizations like the Kauffman Foundation (Bell-Masterson & Stangler, 2015), OECD (Mason & Brown, 2014), and World Economic Forum (2014) readily embraced this perspective, ensuing an unbridled growth of the literature body on EE (Wurth et al., 2021)

2.2 EE Assessment Challenges

In the contemporary academic discourse on economic geography and strategic management, the EE approach has rapidly ascended to the echelons of popular frameworks. Its allure lies in its systemic lens, offering an intricate view of entrepreneurship's spatial and strategic terrain. Yet, it's very intricate — the rich framework of interrelations and components — presents profound challenges when devising pragmatic assessment metrics. As a consequence of these challenges, policymakers and scholars have hesitated in its full-scale adoption, with some critiques even dismissing the EE approach as mere rebranding or “old wine in a new bottle”.

The earliest significant attempt to lay the groundwork for EE assessment came from Bell-Masterson and Stangler (2015). Their seminal model presented four cardinal indicators of entrepreneurial vibrancy: Density, Fluidity, Connectivity, and Diversity. This framework was not merely theoretical. Auerswald & Dani (2017) found it sufficiently robust to adapt and apply it to the U.S. context. Their study focused on the biotechnological entrepreneurship cluster in the US National Capital Region, marking a pioneering effort in capturing the dynamism of an industry cluster within a broader regional ecosystem's adaptive lifecycle. Although Bell-Masterson and Stangler's model remains foundational, it has not been the sole proposition. Multiple models, varying in their focus and granularity, have emerged, albeit with varying degrees of academic and pragmatic acceptance. Ács et al. (2014) ventured into national assessments, unbonded by the pure EE theme. They proposed a quantitative method for assessing a National System of Entrepreneurship, creating an index that factors in bottleneck considerations. Similarly, Radosevic (2013) presented a composite index methodology published in *Research Policy*. However, this methodology was tailored more towards measuring knowledge-intensive entrepreneurship and entrepreneurial opportunities, and not, strictly speaking, an EE; and like Ács et al., it was nationally oriented.

A significant shift in focus is evident in recent literature, with a tilt towards regional assessments. This seems logical since, as Feldman (2001) aptly noted, “entrepreneurship is largely a regional event”. Leendertse et al. (2022) embraced this regional emphasis in their direct address of EE assessment. Their approach was two-pronged: quantitative and qualitative. The former yielded statistical measures of quantifiable components, while the latter offered insights into the intricate interdependence of ten ecosystem

elements, as identified from prior studies (Stam, 2015; Stam and Van de Ven, 2021; Wurth et al., 2021). However, despite its methodological rigor, Leendertse et al.'s (2022) model presents challenges. While adept at pinpointing ecosystem areas in need of bolstering, it struggles in providing actionable pathways for enhancement, as they self-acknowledge. Additionally, the metric expresses a gradient that heavily abstracts nuances and could be perceived as generalizing and lacking specific insights in certain ecosystem domains. As it stands, the dynamic nature of EEs, enriched by diverse elements and intricate interrelations, poses a formidable challenge for scholars aiming to devise universally applicable metrics. While commendable strides have been made, especially with models that emphasize regional vibrancy, a universally accepted and actionable assessment model remains the field's holy grail.

In our quest to pragmatically assess Dublin's Entrepreneurial Ecosystem, we find it imperative to ground our methodology within the established theoretical frameworks of the EE domain. By doing so, we not only align our study with the broader discourse on EE but also enhance its academic rigor and practical relevance. A foundational guidepost for our approach emerges from the scholarly work of Isenberg (2010). Isenberg presents a nuanced yet overarching taxonomy for understanding EEs. Although the ecosystem is characterized by a multifarious ensemble of actors and factors that showcase idiosyncratic interactions — a web of complexity — Isenberg distills these into six seminal domains: conducive policy, markets, capital, human skills, culture, and supports. Such a categorization offers a coherent frame that remains foundational in the field. Using this as our analytical bedrock ensures that our methodology is both grounded and expansive.

While aiming for a holistic understanding is laudable, it is also pivotal to recognize the constraints of such a research endeavor. Instead of attempting an exhaustive mapping of the entire ecosystem, our methodological slant prioritizes the most central stakeholder: the entrepreneur. The EE framework, rooted in the philosophy of critical realism (Wurth et al., 2020), posits that an EE's essence is predominantly perception-based. It is this very perception that steers and shapes entrepreneurial aspirations and actions. Echoing this sentiment, Theodoraki et al. (2018) postulate that the entrepreneurial ecosystem comprises three dimensions: the actors and their multifaceted interactions (encompassing both formal and informal networks), the tangible physical infrastructure, and the ingrained culture. Drawing upon this triadic structure, our approach is guided towards a qualitative assessment. By delving into in-depth interviews, we aspire to sketch a detailed, rich, and vibrant portrait of Dublin's EE. Furthermore, we infuse a temporal dimension into our analysis, anchoring Dublin's EE within Cantner et al. (2020)'s evolutionary phases of EE progression. This not only offers a snapshot of the ecosystem's current status but also provides a dynamic trajectory of its evolutionary journey.

Having elucidated our theoretical foundation and approach, the subsequent section will delve deeper into the specific methodologies we have employed. This granular exposition is essential to convey the robustness of our approach and the intricacies involved therein. Thereafter, to offer readers a contextual backdrop, we will present the empirical landscape of Dublin's EE. By capturing the ecosystem's macro characteristics, we set the stage for unveiling the profound insights that emerge from our participant interactions.

3. Methodology

To comprehensively understand Dublin's entrepreneurial ecosystem from the perspective of active entrepreneurs, we employed a rigorous methodology based on established frameworks and exemplar publications in entrepreneurship research like Ryan et al. (2020) from *Entrepreneurship & Regional*

Development. We began our process with the purposeful selection of a diverse group of entrepreneurs. Our study included a diverse group of entrepreneurs who had been actively engaged with various facets of the ecosystem including Government institutions, policies, incubators and accelerators, venture capitalists, markets, MNEs and culture for three or more years. Our sample was chosen based on the active engagement of entrepreneurs in the ecosystem for three or more years. The entrepreneurs were identified via a multi-pronged approach encompassing local entrepreneurship networks, social media platforms dedicated to Dublin's entrepreneurial community, and references from previously interviewed entrepreneurs.

For the qualitative interviews, a balanced mix of entrepreneurs was ensured, representing gender diversity, Irish nationals, and diaspora entrepreneurs on a visa. The diversity in their backgrounds, motives, investment routes, predispositions, and challenges allowed us to gather a kaleidoscopic understanding of the ecosystem. Prior to these interviews, the entrepreneurs were briefed on the study objectives and the definition of the entrepreneurial ecosystem to ensure focused and relevant responses (Creswell, 2013). Ethical considerations were given prime importance, and all participants were assured of their confidentiality and gave informed consent for participation in the study and the use of their responses in research publications.

The study relied on in-depth interviews, a widely used and effective method in entrepreneurship research, to capture the subjective perceptions and experiences of entrepreneurs (Gibcus & Groen, 2006). During the interviews, we employed a Likert-type scale to rate the different aspects of the ecosystem, followed by open-ended questions to explore the reasoning and experiences of entrepreneurs (Chandler & Lyon, 2001). This combination of structured Likert scales and open-ended questions facilitated a deeper exploration of the entrepreneurs' experiences and perspectives. Our data collection process continued until data saturation was reached at 10 interviews, indicating that further interviews were unlikely to yield new insights (Guest, Bunce, & Johnson, 2006). In line with principles of qualitative research, we prioritized depth over breadth, deeming the rich insights from these interviews sufficient in capturing a broad spectrum of entrepreneurial. Data analysis involved conducting a thematic analysis of the responses to the open-ended questions (Braun & Clarke, 2006). This allowed us to identify the most salient themes across the different aspects of the ecosystem and explore their implications for entrepreneurial activity.

The entrepreneurs in our study represented a diverse range of valuations, from 100K to 160m euros, and included those who raised their first rounds of funding, those who were acquired by big MNEs for multi-million dollar deals, those who exited, those who quit their jobs to become successful entrepreneurs, academic turned entrepreneurs, and serial entrepreneurs (Stam & Spigel, 2016; Wurth, 2020). This diversity of use cases, along with the gender diversity and mix of Irish and diaspora entrepreneurs, allowed us to gain a comprehensive understanding of the strengths and weaknesses of Dublin's entrepreneurial ecosystem from the perspective of active entrepreneurs.

4. An Empirical Snapshot of Dublin's EE

Dublin's entrepreneurial landscape has witnessed substantial evolution over the last two decades, asserting its place on the global stage as a nexus for entrepreneurial activities and innovative ventures. This dynamism is inextricably linked to strategic decisions made by the Industrial Development Agency (IDA) Ireland, instituted in 1949 to stimulate, support, and expand export-led commerce and entrepreneurship in the Irish region (IDA Ireland, 2023). Particularly notable was IDA's reorientation in the mid-1990s towards the attraction and nurturing of high-caliber foreign direct investment within Ireland, with special emphasis on the manufacturing and international services domains (IDA Ireland, 2023). In an illustrative act of strategic

success, Google inaugurated its European headquarters in Dublin in 2003, marking a crucial juncture in the city's entrepreneurial narrative (Kenny, 2015). Subsequently, Dublin has served as a welcoming hub for numerous technological conglomerates, thereby amplifying its international stature. As expounded by Rejman (2022), this encompasses a significant tech workforce comprising approximately 2,000 Microsoft employees, 2,500 Dell employees, 5,500 Apple employees, and close to 6,000 Google employees. This influx of tech behemoths has co-evolved with a vibrant start-up scene, substantiated by the Central Statistics Office (CSO, 2021), which cataloged over 2,000 startups active in the city as of 2021. By 2023, this figure augmented to an estimated 2,500 startups, a remarkable growth trajectory fueled by domestic innovation and the infusion of international talent drawn to the flourishing technology and startup sectors (TechIreland, 2023).

Such entrepreneurial vigor and foreign investment have been attracted and sustained, in part, by Ireland's FDI-friendly climate, epitomized by a corporation tax rate of 12.5%. This makes Ireland the third lowest in the EU and the fourth lowest in the OECD group of developed economies, surpassed only by Switzerland, Hungary, and Chile (Dublin.ie, 2023). While this move has been crucial in anchoring the ecosystem, it's important to note that relaxations in MNE taxation often lead to compensatory taxation of other stakeholders. Over time, the persistence of these compensatory measures could potentially trigger protectionist policies (Rizvi et al., 2023). In July 2021, 130 countries agreed on a two-pillar plan to reform international taxation rules as part of the OECD/G20 Inclusive Framework on Base Erosion and Profit Shifting (BEPS) initiative (OECD, 2021). The plan is intended to ensure that multinational enterprises pay tax where they operate and earn profits, while adding certainty and stability to the international tax system. One major part of this agreement, Pillar Two, involves the introduction of a global minimum corporate tax rate. While the rate is yet to be finalized, it is expected to be set at around 15%. This could potentially impact countries like Ireland, which have used a lower corporate tax rate (12.5% in Ireland's case) as a tool to attract foreign investment. The introduction of a global minimum corporate tax rate, and stricter rules on profit shifting, could alter the landscape of tax incentives, potentially influencing the decisions of multinationals considering investment in Ireland. Although concerns have been raised locally about the potential challenges emerging from these ongoing developments (Pinsent Masons, 2023), repercussions of these changes on Ireland's ability to attract foreign investment are yet to be fully understood. Notably, despite seismic developments in recent years, such as Brexit and COVID-19, the Irish ecosystem as a whole has demonstrated remarkable resilience and recovery. After a temporary downturn nationwide in 2022, the Irish entrepreneurial ecosystem recorded an unprecedented number of start-up deals exceeding €10m in Q1 of 2023 (Morahan, 2023).

Alongside low corporate taxes, the state offers generous R&D tax credits and additional reliefs, such as the Knowledge Development Box (KDB), providing a deduction of up to 50% on profits arising from new innovations (Dublin.ie, 2023). This is intended to encourage Dublin's track record of fostering high-growth innovation that has led to unicorn startups, but discourage the relocation that has occasionally followed, for instance, Intercom, a customer messaging platform originally conceived in 2011 in Dublin and valued at \$1.3 billion in 2018 (Intercom, 2018). Fenargo, a financial services software company was originally established in Dublin in 2009 that reached a valuation of \$1.64 billion in 2021 after a successful funding round (Silicon Republic, 2021).

Moreover, Dublin has witnessed a series of high-profile acquisitions, with Intel acquiring Irish-

founded software company Movidius for approximately \$408 million (Intel, 2018), and American firm Sitecore buying Irish marketing software company Boxever for an estimated \$80 million (Irish Times, 2021). Furthermore, Dublin offers academic-turned entrepreneurs such as Eric Risser, whose company Artomatix was acquired by Unity in 2018 (Matney, 2020), and Mark Cummins, whose company Pointy was bought by Google in 2020 (TechCrunch, 2020) with multi-million valuations.

Dublin's resilient entrepreneurial spirit was noted in 2022, as it reported the highest number of newly registered companies in the country, pointing to a robust market recovery and potential growth post recent dips (McNeice, 2022). Thus, it's crucial to highlight that the city's growth doesn't simply reflect a flurry of new businesses, but also a distinct resilience. As per the data by OECD (2017), while Dublin sees a high number of startups, maintaining sustainability and longevity in business is a significant challenge many face. However, the ability of Irish businesses to outpace the OECD average in terms of survival rates, especially those in the services sector, further attests to the city's resilience and the sustainability of its entrepreneurial ecosystem (OECD, 2017).

This growth and resilience in entrepreneurial activity has been supported by a range of initiatives and organizations aimed at fostering innovation and entrepreneurship in Dublin. The city is home to several incubators and accelerators, such as the National Digital Research Centre (NDRC), which has supported over 100 startups since its establishment in 2011 collectively amassing upwards of €400 million (Dogpatch Labs, 2021). Additionally, the Irish government's Enterprise Ireland agency has played a key role in providing funding and support to startups, investing over €232 million in 2020 alone (Enterprise Ireland, 2021). Driven by the presence of major tech multinationals, the emergence of successful startups and unicorns, and the influx of international talent, Dublin's entrepreneurial ecosystem has experienced rapid growth and development in the last two decades. With the possession of the “triple helix” (Etzkowitz, 2003) of prestigious research-intensive universities attracting talent, a government focused on entrepreneurship, and a vibrant private sector with ongoing additions to its VC portfolio, Dublin carries all the ingredients prescribed for a resilient entrepreneurial ecosystem.

Dublin's entrepreneurial ecosystem, while promising, faces challenges due to its small size and limited local market. The high cost of living and intense competition for talent and resources also pose obstacles for entrepreneurs in the city. So, the question that remains is, what experience does Dublin offer to its entrepreneurs? While descriptions such as the one given above offer a valuable snapshot, they may not be sufficient to determine whether the entrepreneurial ecosystem truly promotes productive entrepreneurship as defined by Baumol (1990) and provides opportunities to scale.

Furthermore, while the availability of quantitative data provides a useful backdrop for our investigation, our research extends beyond these figures to unearth the qualitative aspects of Dublin's entrepreneurial ecosystem. Through this, we aim to offer a more comprehensive view of the ecosystem, considering not only the number of active startups but also the lived experiences and narratives of the entrepreneurs behind these ventures. We believe this dual focus on both macro-level trends and micro-level experiences will add nuance to our understanding of Dublin's entrepreneurial ecosystem.

Despite the wealth of information available on the structural and institutional elements of Dublin's entrepreneurial ecosystem, a deeper, nuanced understanding necessitates exploring the lived experiences of those who navigate it daily — the entrepreneurs. They offer invaluable insights that not only reflect the reality of their entrepreneurial journey, but also shape the trajectory of the ecosystem's evolution. Therefore, to fully

comprehend the intricate dynamics and complexities of this vibrant ecosystem, we turn our attention to the perceptions, experiences, and evaluations of the entrepreneurs themselves.

In the next section, we delve into our findings drawn from in-depth interviews with Dublin's entrepreneurs, thereby illuminating the real-world implications of the ecosystem's characteristics, opportunities, and challenges as seen through their eyes.

5. Findings

5.1 Government Policy and Ease of Enterprise Building

5.1.1 Startup Programs

The intricate web of entrepreneurial ecosystems is anchored firmly by a multitude of components (Isenberg, 2010), with governmental policies often sitting as the bedrock affecting all interplay. Being the most controllable variable in the complex ecosystem make-up, Government policy warrants a proportionately longer discussion, which we attempt within reasonable length. From the point of view of the interviewed entrepreneurs, the Dublin government's initiatives harbor commendable aspects, yet bear areas necessitating further enhancements, as unpacked below.

Dublin's pre-seed funding landscape is not only a "well-defined path" but a dynamic catalyst, animated by government pillars like the Local Enterprise Offices (LEO) and Enterprise Ireland, interviewees highlight. These bodies serve as more than financial arteries; they act as nurturing forces, sparking the city's entrepreneurial pulse. Interviewee 2 emphasizes multifaceted assistance that ranges from securing office space to providing invaluable guidance and networking opportunities. "It's very structured... for singular entrepreneurs, when you're just starting your idea, you get a lot of support... the path is well-defined for pre-seed funding... They actually give you a lot of support in terms of setting up your office. Like you get smaller grants to set up your company and all that kind of stuff," affirms Interviewee 4, encapsulating the government's proactive stance. It begins with LEO's foundational equity-free grants and peaks with more mature investments and resources offered by Enterprise Ireland's High Potential Startup (HPSU) program. The collective narrative coalesces into a compelling testament to the indispensable roles that these entities play in anchoring Dublin's thriving entrepreneurial ecosystem.

Additional emphasis was given to several other startup-oriented programs, like New Frontiers and The National Digital Research Centre (NDRC). Interviewees echo a positive evaluation, considering them "really good, very good". New Frontiers serves as a good "sniff test" to qualify for further funding programs. The sense of community and solidarity within the Dublin entrepreneurial environment is another theme that finds resonance, which is significantly abetted by these programs. The interviewees single out NDRC Dogpatch Labs as an important resource, which besides offering budget-friendly office spaces, grants access to mentorship, cloud services, and a vibrant entrepreneurial community. "Because of the ecosystem, you don't feel isolated. There are other entrepreneurs around you who can give you ideas, who can help you and they're very helpful," shares a participant. To encapsulate, the shared narratives spotlight the impactful support provided to Dublin-based startups, especially during their initial developmental stages. A consensus views the pre-seed aid as "best in class," demonstrating robust foundational support for startups. However, this positive evaluation doesn't dismiss the room for further improvements, reinforcing that the quest for an optimal entrepreneurial ecosystem is an ongoing endeavor.

5.1.2 Bureaucratic Complexity

Indeed, when delving into the nuances of government support for startups in Ireland, particularly Dublin, a dichotomy surfaces — one that embodies a tug between commendable initiatives and bureaucratic hurdles. As per one interviewee's observation, while the government's pre-seed funding is above the international threshold, it can be an arduous process, riddled with paperwork, demanding “draconian” term sheets and a pace that hardly matches the rapid pulse of the entrepreneurial world. Another experienced participant shares their two cents on taxation, noting that Ireland taxes entrepreneurs upfront on contingent earn-outs — potential future earnings based on hitting specific targets — even if the entrepreneur hasn't realized these earnings. In essence, entrepreneurs pay taxes on money they might never see. If that money doesn't realize, the taxes can be redeemed but this system is not only perplexing but also burdensome, leading to increased documentation costs primarily benefiting lawyers and accountants. The participant further shares that although this complexity might be designed to ensure giants like Google, Facebook, and Apple employ local professionals, it becomes an undue burden for small businesses.

Predictably, bureaucratic convolutions have nudged entrepreneurs such as Interviewee 10 (2023) to gravitate towards private investments. Complementing this, Interviewee 8, in an unprompted reflection, expressed an intention to circumvent the HPSU for their next venture, a program that matches a quarter million-euro fund, due to such complications for their subsequent venture. Other participants echoed this sentiment, but some deemed it ‘tolerable’ considering the benefits of the program. Such challenges may be expected in a government funded program due to the lack of “personal skin in the game” as opposed to private investors, justified one interviewee.

5.1.3 Research tax Credit and Employee Stock Options

Furthermore, the research environment, especially in technology and autonomous technology, has seen considerable government encouragement. Participants voiced their approval of this proactive stance, acknowledging, “we have a very, very good research environment... I think we've got great supports happening from the government” (Interviewee 2, 2023). However, the R&D tax credit, meant to incentivize research and innovation, has a rather complex application process. While Interviewee 10 (2023) acknowledged the credit as helpful, the burden of applying for it is high, and its benefits, spread over three years, make it a less optimal fit for early-stage companies. Furthermore, interviewees reported some ambiguity around the ownership of research which lowered their incentive to opt for the lucrative programs in which 80% of the cost is funded by the Government.

The battle for talent within an MNE-dominated ecosystem like Dublin puts startups at a unique disadvantage, with early-stage companies grappling against established businesses for top talent, often without the leverage of competitive salaries. Instead, the magnetism of future rewards, as conveyed through a share in the company, becomes a salient recruiting strategy. Ireland's current approach to this, though operational, is mired in inefficiencies. Several interviewees reflect on the complexities of tax laws and mechanisms like the Key Employee Engagement Programme (KEEP), which, while ostensibly advantageous, proves restrictive in practice. The KEEP, a tax-efficient share option scheme tailored for small and medium enterprises (SMEs), may not require explicit Revenue approval, yet the lived experience of our participants reveals its access to be fraught with challenges. Interviewee 10's observation paints it as “too limited” and “quite difficult,” echoing a broader sentiment that underscores the urgency to not only simplify but also

democratize the scheme with bureaucratic relaxations. Such refinement could foster an environment that elevates entrepreneurial vitality, minimizing barriers, and widening gateways for burgeoning companies in Dublin.

5.1.4 Tax Relief for Private Investors and Entrepreneurs

In addressing the complexities surrounding the “revised entrepreneur relief,” which stands at a reduced rate of 10%, the contours of this issue become more pronounced when considering its application to lifetime gains of merely up to EUR 1 million. This relief tends to favor outright sales of businesses rather than partial disposals and notably excludes business angel investors from benefiting. Interviewee 8 (2022) offered an astute critique, illuminating the inherent incongruities of the policy. They comment that the reduction in entrepreneur relief to a lifetime limit of one million is misguided, as it inadvertently incentivizes entrepreneurs to sell small startups early in the process. By making this a lifetime cap, the government effectively retires experienced entrepreneurs, damping their appetite for risk and innovation. This threshold must be revised, as it limits growth and innovation by encouraging exits at an early stage. In fact, unlimited relief may even serve governmental interests. The current structure, limited to a small lifetime gain, disincentivizes growth beyond a certain point and thus may lead to premature exits at lower valuations. There's a dice roll element in entrepreneurship, and the government's stance shouldn't be construed as 'heads, the government wins; tails, you lose.' The existing policies may be hindering rather than enabling startup entrepreneurs, and the need for more venture-friendly legislation that genuinely incentivizes risk-taking is evident.

5.1.5 Visa Policies

Diving into the nuances of Ireland's visa policies, particularly focusing on employment visas for startups and entrepreneur visas for foreign talents, a complex tapestry emerges. Interviewee 10 (2023) commended Ireland for its forward-thinking stance on employee visas. Amongst participants, this global perspective generally stood out as above average, though processing delays were noted as areas ripe for improvement.

However, when the lens shifts to expatriate entrepreneurial prospects, a more intricate challenge surfaces. While obtaining entrepreneurial visas is universally tough, Ireland has made strides by crafting policies that cater to its enterprising diaspora. Yet, a closer examination reveals a perplexing bottleneck within Ireland's Startup Entrepreneur Program (STEP). The framework mandates expats to garner a sum of €50,000, alongside other stipulations, to qualify for a visa that permits business registration. Ironically, the lion's share of pre-seed government incentives for budding entrepreneurs is contingent upon this very registration, culminating in a paradoxical deadlock that creates a steep challenge for expatriate entrepreneurs. [66]

The OECD's extensive 286-page report on entrepreneurship policy in Ireland (2019) thoroughly canvasses an array of topics yet glaringly omits discussion on the thorny issue of visa policies. This neglect unearths a critical sphere that not only calls for scrutiny but also mirrors the convoluted realities relayed by participants. The visa acquisition process, even for established entrepreneurs, remains strenuous and unpredictable. Based on the reports from interviewees, their journey through various legal hurdles and unresponsiveness from official channels underscores the inefficiency of the current system. Even when aided by legal teams, the pathway to obtaining the appropriate visa was marked by significant barriers,

inconsistencies, and an apparent lack of awareness among authorities about existing provisions. This account amplifies the need for a more streamlined, efficient, and informed visa process. The process has been improved in the past few years by the Government, however the participants deem them as marginal. The existing hurdles present not merely administrative inconveniences but fundamental barriers that might deter valuable international talent. A reevaluation of current policies, coupled with practical implementations that ease the visa acquisition process, will align Ireland's entrepreneurial landscape with its global ambitions and make it more receptive to rich international talent.

5.2 Culture and Community

Dublin's entrepreneurial culture exhibits a fascinating duality, rooted in the lingering effects of a colonized past. Drawing from our illuminating interviews, it becomes evident that the indigenous culture often projects an “underdog” mentality, particularly holding back innovation. This perspective was vividly captured by an interviewee's statement: “...it's [inherently] very much a culture of a colonized nation. We do not step out of the norm.” Interestingly, this attitude was reported to be amplified for women entrepreneurs, adding another layer of inertia. But beyond the reluctance to innovate is an equally intriguing disposition towards success. The interviewee recounts how, after winning three awards in the U.S., the advice given was to downplay their achievements: “Everyone told us [to] mention one award because three was too many. It would be seen as too successful...” This narrative, corroborated with other participants' experiences, seems to suggest that while Dublin celebrates its successful entrepreneurs, there exists a subtle yet deep-rooted resentment or envy. In understanding Dublin's entrepreneurial landscape, it's imperative to recognize these cultural nuances. This mix of pride and prejudice offers invaluable insights for entrepreneurs and businesses aiming for success in a context that is both supportive and skeptically watchful.

While Dublin's overall culture might seem stifling for innovation, its startup ecosystem tells a contrasting story. Remarkably, the entrepreneurial community has evolved into a nurturing, supportive environment. As one interviewee passionately describes, “It's brilliant, for as bad as a general culture is, the startup ecosystem has become so enclosed and protected.” This protective nature emerges as a response to the broader cultural resistance to innovation, manifesting in warnings against entrepreneurial endeavors due to perceived risks. Entrepreneurs in Dublin, having experienced this resistance, band together, adopting the principle of mutual aid. The ethos of “give first” resonates strongly in the community, encouraging entrepreneurs to extend help proactively. Moreover, this encouraging atmosphere is not confined to Dublin alone. The interviewee insightfully points out that this culture transcends Dublin, reaching across Ireland, seen in places like Belfast or Cork. The connection between cities creates a unified community, characterized by the words: “It's not Dublin versus the world. It's Ireland as one because there are so few of us.”

Things have been looking upwards in the past decade, concede participants. Although the community is still relatively small compared to other global tech hubs, Dublin boasts numerous coworking spaces, networking events, and support programs that foster collaboration and knowledge-sharing among startups. The progression of the cultural attitude towards entrepreneurship has been significant. As noted by one entrepreneur, “When I first started out an entrepreneurship when I was 21, I would say we were bad and we have progressed through to average through what I think now is good” (Interviewee 2, 2022). This marks the dynamic nature of Dublin's entrepreneurial ecosystem and the continuous efforts made towards its improvement.

Tolerance for risk and failure, fundamental elements of entrepreneurship, has improved over time. This shift aligns with global entrepreneurial perspectives, where “I may fail in my businesses, and it should be seen as a good thing that someone's actually tried to do things. And so, I think that respect, we've gotten much more tolerant of that” (Interviewee 2, 2022). However, there remains some stigma attached to failure in Dublin's entrepreneurial culture, which may impact risk tolerance among entrepreneurs. The culture of success has also evolved, with a shift from what was previously described as “begrudgery” to a culture more supportive of successful ventures. As expressed by an interviewee, “our media culture has become much more about supporting the early-stage business and technology sphere, giving them a good amplification” (Interviewee 2, 2022).

Finding experienced mentors, advisors, and peers is becoming easier but still has room for improvement. This is a crucial aspect of nurturing an entrepreneurial culture and facilitating the growth and development of startups in Dublin. The continuous efforts and strides taken by the community indicate an encouraging future for Dublin's entrepreneurial ecosystem.

5.3 Market

The market landscape in Dublin presents a complex yet promising canvas for entrepreneurs. Generally rated as average with a significant emphasis on the technology sector, Dublin's market notably lacks in niche industries. However, these perceived limitations often serve as catalysts for a unique entrepreneurial climate. Dublin's market, while modest in size, stands as an advantage for ambitious entrepreneurs. Two interviewees who benefited from high-value MNE acquisitions shared that the market's limited size not only compels entrepreneurs to think internationally from the outset but also allows businesses to rise to the top and attract the attention of international investors or multinational enterprises (MNEs), further underlining Dublin's potential as a lucrative playing field.

The phenomenon described as the “degrees of separation” within Dublin's entrepreneurial ecosystem complements this narrative, observed a participant. This close-knit fabric enables quick introductions, faster decision-making, and aids in securing that vital initial customer. The adage, “the hardest customer is the first one,” finds a unique resolution in Dublin, where connectivity is not just a buzzword but an operational reality. Moreover, with the UK nearby and US investors more inclined to invest if a service works well in a market like Ireland, the country serves as an excellent proving ground. The small market, therefore, becomes somewhat good as it facilitates the chance to meet the right person and get that door open because everyone knows everyone.

However, not all is smooth sailing. The availability of home-grown investments remains a concern, pointing towards an area that needs attention and potential policy intervention. The market's very nature, simultaneously limited and enabling, underscores the multifaceted entrepreneurial journey in Dublin. It serves as a testament to how constraints can be transformed into opportunities and how a seemingly average market can turn into fertile ground for innovation and growth.

5.4 Financing Options:

The exploration of Dublin's financial environment reveals an intersection of two core themes: the small market paradox and the shifting landscape of funding opportunities. Together, they shape the city's financial ecosystem in ways that are both inviting and inhibiting. Dublin faces the double-edged sword of

being a small market; a modest population of approximately five million means that while Dublin can offer an intimate, close-knit business community, its financial infrastructure lacks the heft required to propel startups onto a global stage.

Dublin's finance sector, previously skewing towards the 'somewhat bad' end of the spectrum, has gradually ascended to an 'average' rank in the last few years. The central critique pivots around the limited venture capital (VC) presence in Dublin. Although there are over 15 renowned VCs available in Ireland (Mikhalchuk-Kananenka, 2022), the ecosystem often finds itself in a financial straitjacket, pushing many entrepreneurs towards the UK and US in their quest for substantive capital. Interviewee 10 adds richness to this narrative in saying, " ... the number of funds in Ireland now is few and far between. It's definitely improved significantly, like the number of firms in Ireland now is 2 or 3 times, if not more, of what it used to be in Ireland. A lot of really good funds like Frontline Ventures is an excellent fund, Elkstone is good and entrepreneur friendly... it's not equivalent to the depth of capital you find in London and it's not anywhere near the depth of capital you find in Silicon Valley but it's a lot better than it used to be".

Moreover, a deeper dive into the financial milieu reveals more than just size constraints. The financial landscape, especially from a venture capital perspective, shows signs of a herd mentality, where the practice of due diligence often takes a back seat, report participants. The resultant bandwagon effect, with VCs primarily following lead investors rather than engaging in rigorous evaluation, was raised as a significant concern by certain participants. Some interviewees expressed skepticism regarding the prospects of the financial landscape shifting above 'average', casting a somber note on the prospects for home-grown financial support.

Hope, however, does glimmer on the horizon with the entry of international VCs. Their inclusion might introduce not only more substantial funds but also a more diverse and thorough approach to investing, counteracting the prevailing local trends. A contending discourse emerges considering the insights shared by the more experienced and successfully exited participants, offering both contrasts and complements to the themes already uncovered. It primarily rests on one theme: the need to access international capital, and quickly.

The participants note that the dynamics of international capital have evolved, shifting from a once U.S.-centric model to a more accessible one. Interviewee 10 elucidates further on the paradigm shift where European startups began to appear more appealing to international investors. These startups were better valued at lower valuations compared to their counterparts elsewhere, and their success rates were commendable. What intensified this allure was the reduced cost of hiring talents such as engineers in Europe. This trend ignited a flow of money out of the overheated U.S. market into Europe. The sudden emergence of COVID-19 further facilitated this process. By normalizing remote meetings, the pandemic inadvertently made it easier to access international capital. Though traditionally raising funds in the home market has been more straightforward, the barriers lessened. It still presents a slight disadvantage, but it is no longer a significant hurdle in the ever-globalizing business world.

While the spotlight often falls on venture capital and angel investment, the financial ecosystem is richer and more varied. Debts, crowdfunding, and loans, though more minor parts of the picture, have their role and are fairly active. A notable player in this sphere is the Ireland Strategic Investment Fund (ISIF). ISIF has backed several venture funds, a support that's not without its conditions. These funds must deploy a certain amount to Ireland, a stipulation that underscores the delicate balance of local interests within a global

landscape.

5.5 Supports

5.5.1 Early Stage Supports

In Dublin's burgeoning entrepreneurial environment, the views of an early-stage entrepreneur cast a favorable light on the available supports, reflecting a rich aggregation of resources and expertise that seem readily accessible. This perspective diverges from a more established player's assessments, painting a picture of a vibrant ecosystem well-tailored to the needs of budding enterprises. The early-stage entrepreneur emphasizes the significance of the accelerator ecosystem within Dublin. Once embraced by this tightly knit community, startups seem to find themselves in an empowering network, imbued with a spirit of collaboration and excellence. Legal, accounting, technical experts, and advisors are not only accessible but are described as "dominating within their fields." This access to top-tier professionals across varied disciplines forms a powerful underpinning to the early growth of startups, as attested by the entrepreneur's own experience of readily finding needed expertise. Beyond the tangible support structures, the human aspect is marked with commendation as "very good," and "reliable." The theme that emerges is of a human-centric approach that fosters genuine relationships and mutual respect within the ecosystem. While competition for talent within Dublin is acknowledged, the integration of educational institutions and a focus on human resources emerge as factors contributing to a healthy and dynamic environment. It reflects an ecosystem where the collective wisdom of seasoned experts is leveraged in support of nascent ventures, underscoring the vital roles these entities play in supporting early-stage entrepreneurs.

5.5.2 Supports for Mature Enterprises

The successfully exited entrepreneurs, while corroborating the early-stage support narrative, paint a slightly contrasting picture for advanced supports for entrepreneurship in Dublin, encompassing non-governmental bodies, legal, accounting, and technical experts. Rated "average" by interviewees, while the quality of services and professionals within the region is not called into question, the startup dynamics exhibit a certain shortfall. One participant who has successfully penetrated both Irish and the US markets contrasts the entrepreneurial support system in Dublin with that of the United States. In the latter, it is not uncommon for leading law firms to defer their fees, essentially "betting on the company," until the startup raises its first round of funding. This strategic "freebie" often acts as a form of lead generation, reflecting the firm's ambition to associate with the next big success story. Such a practice, however, seems virtually nonexistent in Ireland, possibly attributable to a lack of experience with emerging companies. Consequently, this lack of familiarity appears to extend into the realm of critical fundraising aspects, such as the negotiation of term sheets with venture capitalists. Though competent in delivering legal advice, Irish firms may fall short in dissecting these documents with the acumen exhibited by top U.S. counterparts, prompting some entrepreneurs to seek U.S. legal counsel for their funding rounds. For Mergers & Acquisitions (M&A), the account of interviewees illuminates the Irish legal landscape's adaptability, highlighting how an Irish law firm adeptly handled M&A negotiations. While proficiency in corporate transactions stands out, firms are still strangers to higher rounds of international fundraising, making it a niche requiring further expertise. When assessing technical experts and advisors for the more tech-centric or niche industries, interviewees' insights remain consistent with the theme of "average" support. Some pockets of excellence exist, particularly stemming from individuals with

backgrounds in multinational corporations, who bring valuable sales expertise to the table. However, this appears to be more of a sporadic occurrence rather than a systemic feature.

In summary, Dublin's infrastructure for entrepreneurship exhibits a fundamental proficiency in offering supports. Yet, a deeper dive into this scenario reveals the absence of a pioneering approach, especially in the legal domain, that characterizes more mature startup ecosystems. This assessment seems to hint at an emergent phase where the ecosystem is still adapting to the unique requisites of startups. Improvements may be on the horizon, reflecting a growing awareness and practice in these specialized areas, but the existing state underscores an opportunity for broader collaboration and innovation within the non-governmental support bodies. The present circumstances may be sufficient for conventional corporate matters, but elevating these supports to align with global startup trends could catalyze Dublin's aspiration to become a leading entrepreneurial hub.

5.6 Human Capital

5.6.1 Talent

The situation of human capital, particularly in the context of Dublin, presents a rich spectrum that's influenced by cultural nuances, legal frameworks, and entrepreneurial appetites. The interviewees' insights truly allowed us to probe deeper into this intricate interplay. In Ireland, as is true in much of Europe, there's an implicit recognition of talent, and the region is by no means seen as second-class in this aspect, echo participants. However, a comparison with the U.S. and Israel reveals a relative lack of hunger, perhaps driven by cultural and legal differences. In these regions, the laws are characterized by their pro-employee stance, leaning to the extent of appearing anti-company. This legal framework presents itself in stark contrast to the U.S., for instance, where the playing field between employers and employees is more even.

For instance, in the U.S, hiring and firing are more straightforward, without the need to build extensive cases against underperformers. This fluidity in human capital management enables companies to dangle lucrative salaries, attracting the best talent, and letting go of those who do not meet expectations. The situation in Ireland is markedly different. The legal complexities tied to terminating employment relationships make hiring a significant long-term commitment. It's not uncommon to find companies gravitating towards contractual relationships rather than full-time employment, mitigating risks associated with long-term commitments to untested individuals. This legal climate inadvertently leads to a perception of lower average talent, not because of inherent deficiencies in skills, but due to difficulties in weeding out underperformers.

Interestingly, this doesn't render the human capital inferior; it merely shifts the dynamics of employment. The somewhat lower price points in Europe as compared to the States mean the equation still balances out, report participants. However, this landscape does underline the unique challenges and opportunities in leveraging human capital across different entrepreneurial ecosystems, shaped by cultural, legal, and practical realities. Talent is often drawn away by MNEs, making it difficult to find specific skill sets for startups, such as growth marketers, product managers, and UX designers, to name a few. These skills are typically acquired through experience at other startups, but there are not enough startups in Dublin to provide a pool of trained professionals. Consequently, entrepreneurs may need to relocate employees to Dublin or hire them remotely. However, if enterprises exhibit stable leadership and visible momentum, employee retention is relatively higher, while long-term regrettable attrition is low.

5.6.2 Redundancy Category

Startups, by their very nature, are dynamic and ever-changing entities. They often pivot, explore various avenues, and redefine themselves in their early stages. The traditional employment laws, designed for large and stable corporations like Tesco's, may not fit neatly with the agility and uncertainty that characterize startups. This discrepancy in legal frameworks poses a specific challenge in managing human capital within a startup environment. In the beginning, startups may opt for hires that fit within a limited budget, often engaging those fresh out of or even dropping out of college. Since the startup's product and market may not yet be well-defined, these initial hires might quickly become redundant as the startup evolves and pivots. Unlike in established companies, where redundancy might signal a financial issue or major structural change, redundancy within a startup often merely reflects the natural evolution of the business. This normal and necessary process is stigmatized and legally fraught, with current employment laws branding it as constructive dismissal.

In many instances, these laws meant to protect employees inadvertently make the situation more challenging. They prevent an open and adult conversation between employer and employee about the changing nature of the work and the employee's fit within the evolving business model. It creates a scenario where both the employee and employer are dissatisfied, unable to honestly address the changing job requirements. This dilemma underscores the need for a legal category specific to startups — a 'startup redundancy' category, perhaps — that recognizes the inherent fluidity and potential changes within young companies. Such a legal framework would facilitate healthier management of human capital, allowing for more transparent conversations and alignment with the rapidly changing needs of the business. In sum, the current legal structures may not only hamper the flexibility needed within the startup ecosystem but also worsen the employee-employer relationship. To fully harness human capital in this vibrant sector, a rethinking of these frameworks, considering the unique characteristics of startups, could be instrumental. The interplay between human capital, legal boundaries, and the agile nature of startups warrants a more nuanced approach, fitting the realities of entrepreneurial ventures.

6. Discussion

Dublin's entrepreneurial ecosystem, as assessed through our research, presents a multifaceted landscape that traverses the evolutionary stages of birth, growth, and maturity, as identified by Cantner et al., (2020). We find that the six essential components, as outlined by Isenberg (2010), are situated across these stages, shaping the character and dynamism of the ecosystem. In this discussion, we'll delve into each component's particular stage, grounding our observations in the context of Dublin and drawing implications for its continued evolution.

“Culture” in Dublin's ecosystem is in its nascent phase, which we can liken to the birth stage of Cantner et al.'s (2020) evolutionary model. The emphasis on community and collaboration, rather than cutthroat competition, indicates a nurturing environment that is gradually building an identity. This cultural inclination towards a human-centric approach fosters an inclusive environment, encouraging diversity in thought and action. However, it's a space that needs further development to align with global standards, to infuse a greater sense of drive and ambition.

The “Markets” within Dublin also exhibit signs of being at the intersection of the birth and growth phases. The ecosystem currently reflects an orientation towards early-stage startups with a predominant focus

on local needs. The proving ground nature of the Dublin market for UK, US, or wider European markets signifies an ecosystem that's still defining its positioning. While serving as an excellent testing ground, Dublin's markets need to evolve to support global ambitions, moving beyond the glass ceiling and becoming a launching pad for entrepreneurial success at a larger scale.

The “Policy” framework is nearing maturity, marked by a blend of nuanced understanding and readiness to adapt. Dublin's policies are characterized by pro-employee stances, reflecting a sensitivity to both entrepreneurial needs and employee rights. However, it's at a stage where there needs to be more alignment with global entrepreneurial trends to foster a competitive edge. The excellent dedicated programs like LEO, New Frontiers, and EI need to be complemented by effective incentives for local private investment, a step that can elevate Dublin's policy framework to global standards of maturity.

“Human Capital” in Dublin is reaching the maturity stage, evidenced by the availability of quality talent at competitive prices relative to neighboring markets like the US and the UK. There's an underlying acknowledgment of the value of talent, and the ecosystem isn't perceived as second-class in this aspect. However, the presence of Multinational Enterprises (MNEs) poses a challenge in hiring or retaining employees long-term. As our participants revealed, those who are committed to growth within startups need convincing support systems and incentives, such as employee stock options. The policy landscape needs to facilitate this engagement, enabling startups to combat the draw of MNEs and foster a thriving talent pool.

The “Finance” component is in the growth stage, reflecting Dublin's challenges in moving beyond pre-seed funding. While there is a mature understanding of financial mechanisms, the ecosystem faces a glass ceiling in later-stage funding. The looming arrival of international Venture Capitalists glimmers as a ray of hope, signaling the possibility of broader financial support. The ecosystem needs to cultivate a culture of risk-taking and innovation in investment to move beyond this growth phase into full maturity.

“Supports” for entrepreneurship in Dublin are between the growth and maturity stages. The integration of education, mentorship, and early-stage support signify a developed framework. However, established players have noted gaps in advanced supports for investments and acquisitions, indicating a space that, while robust, still holds potential for further refinement and sophistication.

To contextualize our findings that present a nuanced understanding by delving into a static snapshot of Dublin's EE on an evolutionary trajectory, we present our findings in Figure 9, as seen below, to facilitate a quick placement of Dublin's EE on Cantner et al.'s (2020) scale, by unpacking Dublin's EE using Isenberg's domain breakdown and placing it on the scaled based on our findings results.

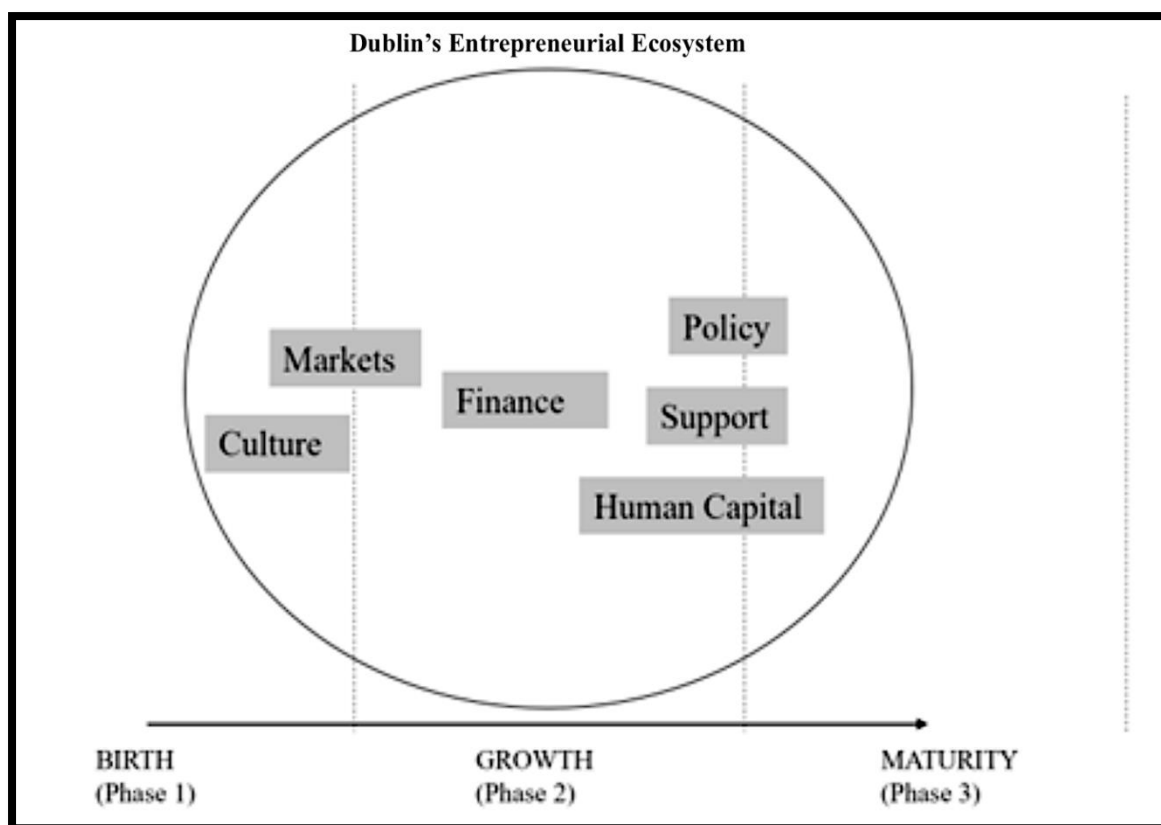


Figure 9: Unpacking Dublin's EE on Cantner et al.'s (2020) Evolutionary Model
 *Source: Authors — adapted from Isenberg (2010) and Cantner et al. (2020)

In summary, Dublin's entrepreneurial ecosystem exhibits a rich and complex interplay across the stages of birth, growth, and maturity. The cultural nurturing at the birth stage, policy insights nearing maturity, the evolving dynamics of human capital, the growth-oriented finance landscape, and the intersection of growth and maturity in markets and supports reflect an ecosystem in flux. It's a vibrant space learning, adapting, and aligning itself with global entrepreneurial trends, transitioning through stages, building resilience, complexity, and offering profound insights for other emerging entrepreneurial environments. The insights from our study shed light on both strengths and opportunities, providing critical guidance for policymakers and practitioners, and propelling Dublin forward as a global entrepreneurial hub.

Briefly, the analysis of Dublin's entrepreneurial ecosystem reveals a complex landscape characterized by both opportunities and challenges. While the city demonstrates a strong foundation in terms of market access, early-stage funding, and a growing entrepreneurial culture, it is the scaling phase where the ecosystem exhibits its most significant shortcomings. Despite its small size, Dublin's proximity to major markets such as the UK and the US, along with an expanding network of support structures like coworking spaces and mentorship programs, positions the city as an attractive location for aspiring entrepreneurs. However, to bolster Dublin's potential as a thriving entrepreneurial center, it is crucial to address the identified limitations systematically. Developing a more robust post-seed investment landscape, refining government policies to incentivize private investment in SMEs, and streamlining bureaucratic processes are crucial steps towards fostering a more conducive environment for business growth. Additionally, focusing on cultivating

specialized talent within the local workforce and encouraging universities to incorporate startup-specific skill sets in their curricula will help bridge the existing talent gap. By addressing these challenges, Dublin can reinforce its entrepreneurial ecosystem, supporting startups not only during their initial stages but throughout the entire scaling process. This holistic approach will ultimately enhance the city's reputation as a competitive and dynamic hub for entrepreneurship and innovation.

The findings of this study offer critical insights into the strengths and weaknesses of Dublin's entrepreneurial ecosystem as experienced by active entrepreneurs. By examining their perspectives and experiences, we have obtained a more nuanced understanding of the factors that can drive success or hinder the progress of entrepreneurial ventures within Dublin's ecosystem. These findings hold significant implications for policymakers, investors, and other stakeholders who seek to foster the growth and development of Dublin's entrepreneurial landscape.

7. Limitations And Future Research

Despite the valuable insights garnered through this research, several limitations must be acknowledged, which open avenues for future research pursuits. To begin with, the principal aim of our study was to amplify the voices of entrepreneurs, weaving a narrative from their vantage point. While this perspective offers rich, textured insights into the nuances of Dublin's entrepreneurial ecosystem (EE), it inadvertently misses the vantage points of other critical stakeholders. As a consequence, our findings, though robust, do not claim to represent an objective truth about the EE but rather a slice of its multifaceted reality. The methodological approach also lends itself to certain constraints. Relying predominantly on qualitative tools, specifically in-depth interviews, our study honed in on the qualitative dimensions of entrepreneurial experiences. Such an approach, albeit rich, could potentially gloss over some emergent patterns or broader trends characteristic of the ecosystem. Future studies could bolster the robustness of these insights by employing quantitative surveys or even adopting mixed-method paradigms. Such diversified methodologies could not only augment the depth of understanding but also facilitate the juxtaposition of Dublin's EE against other entrepreneurial landscapes, whether regional or industry specific. Additionally, one conspicuously underexplored dimension in our research was the intricacies surrounding the spillover effects of multinational enterprises (MNEs). Given the formidable footprint of MNEs in shaping entrepreneurial climates globally, and more so in regions like Dublin, the absence of a focused investigation into their influence stands as a limitation. Future research endeavours could delve deeper into discerning how MNEs mould the entrepreneurial milieu, shedding light on the channels through which their vast reservoirs of knowledge, capital, and networks percolate down to buoy nascent ventures.

In closing, while our study offers a significant leap forward in understanding Dublin's EE from the entrepreneur's lens, the journey of exploration is far from complete. The limitations underscored here not only inform the boundaries of our present understanding but, more importantly, sketch the contours of the next phase of research in this domain.

8. Contributions and Conclusion

This research delves into the intricacies of Dublin's entrepreneurial ecosystem through the lens of entrepreneurs themselves, yielding a wealth of practical, policy-oriented, and theoretical implications. Practically, it elucidates the salient aspects of the ecosystem, equipping stakeholders with the requisite

knowledge to cultivate an environment conducive to business expansion and prosperity. Regarding policy ramifications, this investigation underscores the necessity to refine government policies, stimulate private investments in SMEs, and streamline bureaucratic procedures to bolster startups throughout their developmental journey. Additionally, it advocates for nurturing specialized human capital within the local workforce and prompting academic institutions to integrate startup-centric skills into their curricula.

Besides answering the recent calls for empirical, qualitative studies in the EE literature, this research constitutes a significant theoretical contribution to the extant literature on entrepreneurial ecosystems by illuminating the distinctive challenges and prospects entrepreneurs encounter in Dublin. By scrutinizing the entrepreneurs' perspectives, this study enriches our comprehension of the multifaceted interdependencies among various determinants that mold the success and growth of startups within a geographically defined context. Consequently, this research bolsters the scholarly discourse on entrepreneurial ecosystems by offering an in-depth, contextually rich analysis of the phenomenon.

While scaling has indeed been a focal point in certain empirical studies, such as those by Mellander and Sturgeon (2018), and Schwabe et al. (2018), a cohesive understanding of how entrepreneurial ecosystems can elevate themselves to foster sustainable economic growth continues to be elusive. Mason and Brown (2014) astutely note that the discourse amongst policymakers and scholars has largely revolved around ecosystem development, often sidelining the pivotal aspect of scaling up these ecosystems. This underrepresentation in the existing literature motivated the crux of our contributions. Our paper seeks to push the boundaries of this critical exploration by rigorously examining how ecosystems in Dublin can offer startups the leeway to scale and further analyzing the cascading effects of scaling on ecosystem development. By navigating through the intricate challenges of scaling, we position ourselves at the forefront of a more nuanced and encompassing understanding of entrepreneurial ecosystem dynamics. In doing so, we not only illuminate the support mechanisms required to underpin growth and sustainability but also invigorate the fabric of EE literature, offering new insights and vistas that have, until now, remained relatively obscure.

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5. Paper 3: Role of MNE Presence in Dublin's Entrepreneurial Ecosystem Evolution: An Investigation of Spillover Mechanisms

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Abstract

MNE integration in regional economies can serve as a catalyst, culminating latent elements into a thriving entrepreneurial ecosystem (EE). However, this integration can simultaneously pose challenges for local entrepreneurship (Mason & Brown, 2014). While the phenomena of knowledge spillovers, human capital infusion, and crowding effects have been subjects of interest in understanding MNEs' influence on local entrepreneurship (Cantner et al., 2021; Colombelli et al., 2019), the mechanisms remain elusive. Rizvi et al. (2023) made progress by systematizing potential MNE spillover mechanisms within the entrepreneurial ecosystem (EE) context, signaling a pressing need for empirical studies to bridge existing gaps. Despite the depth of literature on MNE-generated spillovers, there's a conspicuous lack of empirical investigation into the strategies local entrepreneurs adopt to harness and capitalize on these spillovers (Schäfer & Henn, 2018; Kapturkiewicz, 2021; Bhawe & Zahra, 2019). Our research tackles this gap, offering a deep dive into the transformative role of MNE spillovers in Dublin's EE landscape. Through case-by-case analyses, we champion the narratives of Dublin's entrepreneurs, shedding light on their nuanced interactions with MNE spillovers. A hallmark of our study is the unveiling of the FARM map — an innovative tool tailored to dissect and understand the entrepreneurial ecosystem dynamics intricately. This methodological leap not only offers profound insights but also lays a robust foundation for upcoming research, aimed at optimizing the benefits of MNE influences within entrepreneurial ecosystems.

1. Introduction

Entrepreneurship, as a driver of local economic growth, finds contemporary expression in the entrepreneurial ecosystem (EE) framework. The EE framework has swiftly reached buzzword status due to its unprecedented ability to offer systemic visibility across disciplines—such as agglomeration economies, spillovers, and entrepreneurship—that were once examined in silos. This surge in popularity, despite the EE framework's infancy, can be traced back to the inflection point that is Silicon Valley, a unique archetype of EE success (Isenberg, 2010). Although Silicon Valley has set the gold standard for entrepreneurial ecosystems (Isenberg, 2010), attempts to replicate its trajectory in other regions have consistently fallen short (Isenberg, 2010; Mason & Brown, 2014). Given the global tilt towards an oligopolistic arrangement of world economy within standout EEs, the imperative for policymakers has been to secure and leverage the knowledge-rich spillovers that stem from top-tier EEs for local economic growth. This leads us to the dialogue surrounding foreign direct investment (FDI) in the EE context.

While it is well recognized that MNEs can act as vectors for global markets, resources, and networks, which in turn, can facilitate the diffusion of knowledge and innovation to local entrepreneurs (Cho et al., 2021; Autio et al., 2018; Sussan & Acs, 2017; Brown & Mason, 2017; OECD, 2000), this benefit is not without its perils. The influx of MNEs can also quell local entrepreneurship and sharpen competition for essential resources or market (Rizvi, et al., 2023; De Backer & Sleuwaegen, 2003; Ayyagari & Kosova, 2010). Admittedly, there is a wealth of research in the agglomeration economies literature, as detailed in the comprehensive listing in Appendix Table 8, that has meticulously examined MNE activities and their impacts

across diverse sectors and stakeholders in various regions, however the specific mechanisms underpinning these MNE-induced spillovers remain largely ignored (Cho et al., 2021; Görg & Strobl, 2004; Wurth et al., 2020). Meaning, our current understanding primarily outlines broad correlations, as shown with only a peripheral focus or, more usually, complete omission of the specific causal mechanisms underpinning these spillovers within the entrepreneurial ecosystem context. This omission is hardly arbitrary but arises from the thorny complexity and idiosyncrasy of these spillover mechanisms, as evidenced by empirical studies across multiple ecosystems (e.g., Girma et al., 2008). Moreover, the empirical studies that have aimed at uncovering mechanisms were predominantly conducted during a time when supply chains were key to agglomeration, a few examples of which include Saggi (2002), Cheung and Lin (2004), Rodriguez-Clare (1996), Markusen and Venables (1999), Lin & Saggi (2005), Saggi (2006), Poole's (2007), and Markusen and Trofimenko (2009). This underscores a poignant realization; much of our current grasp on MNE spillover mechanisms heavily borrows from the pre-internet business era (Rizvi et al., 2023), when agglomeration was largely a quest for optimizing supply chains and paring down transportation costs (Glaeser, 2010). Such motivations, while still relevant, no longer remain the primary driving force for agglomeration (Porter, 1998). As the business landscape has evolved, especially with the internet revolution, so too have spillover mechanisms. However, scholarly efforts in updating empirical assessments remain scarce in catching up. This makes the research gap more exigent.

The gap starkens as we shift our gaze to the EE literature, where the discussion on MNE spillover mechanisms is far more scant, likely due to the fledgling state of the EE concept. The limited studies that do broach the topic are fraught with conspicuous semantic inconsistencies regarding spillovers. For instance, Ryan et al. (2020) conducted a longitudinal study, offering novel empirical analysis of the micro mechanisms responsible for the formation and development of the EE in Galway in the form of MNE spinouts. Their discussion, however, implies a semantic distinction between spillovers and spinouts, unlike Spencer (2008), who considers spinouts as a subset of 'spillovers'. Similarly, Bhawe and Zahra (2019) suggest that spillovers can be either intentional or unintentional, a viewpoint that is at odds with the view that spillovers are typically unintentional (Frischmann and Lemley, 2007). This discrepancy resonates with Smeets' (2008) observation that the literature often conflates knowledge spillovers and knowledge transfers due to a lack of in-depth theoretical exploration of spillovers in the agglomeration economies or entrepreneurship literature. In an attempt to highlight these disparities and provide a comprehensive overview of MNE spillover mechanisms, a systematic literature review was conducted by Rizvi et al. (2023) which resulted in a comprehensive FDI-to-mechanisms flowchart that organizes and maps MNE spillover mechanisms (See Appendix Figure 12). However, this flowchart aims only to synthesize extant knowledge, highlighting the need to update it with contemporary empirical studies focused on mechanisms. More importantly, it highlights only mechanism categories and does not detail the specific micro mechanisms, that are the real blind spot, thus beckoning a gap to be filled by further studies.

Furthermore, while it is evident that policy makers attract FDI to “fertilize the soil” of entrepreneurial ecosystems (Mason & Brown, 2014), they often grapple with crafting policies that could “irrigate this soil” to produce expected value. To bridge this gap, empirical studies need to be conducted across entrepreneurial ecosystems to determine which of the identified potential spillovers are being captured within a specific territory (Rodríguez-Pose & Crescenzi, 2008). The possibility that investment-driven spillovers remain unrealized stresses the need to investigate the underlying mechanisms (Crescenzi et al.,

2016). This knowledge would empower practitioners and policy makers to facilitate the judicious capture of these spillovers by local entrepreneurs, ultimately enhancing the overall ecosystem's productivity (Narula & Driffield, 2012). Additionally, from an academic viewpoint, theory does not make it very clear what spillover mechanisms to look for while conducting an empirical study. Meanwhile, theoretical advancements await empirical insights, thus creating a thorny deadlock that remains unaddressed.

To address this clamant research gap, our study takes a pragmatic first step. We investigate the specific MNE spillover mechanisms within Dublin's Entrepreneurial Ecosystem (EE) guided by the research question: How do Dublin's entrepreneurs experience MNE spillovers mechanisms, and how have these mechanisms unfolded across the evolution of Dublin's EE?

To tackle this question, we conduct a qualitative study with Dublin's entrepreneurs, unveiling the lived experiences of entrepreneurs from the FDI-rich EE of Dublin to uncover how MNE presence has affected their journey along with the EE's evolution. Entrepreneurs serve as the linchpin of an EE, as the entire EE's ultimate output, "productive entrepreneurship", comes from driving the entrepreneur's decisions (Stam & Spigel, 2016). Additionally, entrepreneurs are often directly the stewards of these resources, capturing and harnessing them to fuel their ventures. Thus, our inquiry delves deep into these mechanisms, seeking to understand how entrepreneurs' experience these spillovers and thus develop a rich understanding of the micro-mechanisms at play. Additionally, we provide a structured, temporal lens to this investigation, by introducing the FARM map—an original conceptual tool adapted from Canter et al. (2020) evolutionary model of an EE, designed to chart spillover mechanisms over time across an evolving entrepreneurial ecosystem. Using this model, we map our persice analysis of the MNE spillover mechanisms across the evolution of Dublin's ecosystem.

2. Empirical Context: Why Dublin?

To critically analyze MNE spillover mechanisms, it is conducive to select a setting characterized by an emerging entrepreneurial ecosystem that ideally has historically possessed latent supportive elements that only culminated into an EE after MNE integration. Dublin emerges as an impeccable archetype, especially considering its rapid transformation over the past twenty years since Google's entry—a transformation that has yet to be explored in broader academic discourses.

The city's renaissance as an entrepreneurial hub can be largely attributed to the Industrial Development Agency (IDA) Ireland. Their prescient endeavors in attracting high-quality FDI have been pivotal. The 2003 inauguration of Google's European headquarters in Dublin stands as a landmark event, initiating a cascade of technological titans to the city. This, in conjunction with a burgeoning start-up culture, has gestated a noteworthy entrepreneurial ecosystem exuding sustained vibrancy. As discussed by Rizvi, Buciuni (2023), the considerable employment statistics stemming from industry stalwarts such as Microsoft, Dell, Apple, and Google, (Rejman, 2022) coupled with an impressive roster of over 2,500 active startups as of 2023 (TechIreland, 2023), serve as compelling attestations of Dublin's prowess in fostering innovation and entrepreneurial pursuits. Furthermore, this dynamism is buttressed by Ireland's enticing corporate tax rate of 12.5%. Nevertheless, it's prudent to consider the prospective implications of burgeoning global tax paradigm shifts on Ireland's allure for MNEs.

It's noteworthy that, amid macroeconomic convolutions such as Brexit and the COVID-19 pandemic, Dublin's entrepreneurial audacity has displayed remarkable resilience. This fortitude is manifest

in the uptick of start-up deals surpassing €10 million in the inaugural quarter of 2023. Dublin's strategic government policies, exemplified by R&D tax credits and the Knowledge Development Box (KDB), are meticulously crafted to invigorate innovation and deter the departure of aspiring entrepreneurs. This nurturing milieu is further evidenced by the spate of high-profile acquisitions and the illustrious trajectory of native entrepreneurs (Rizvi, Buciuni, 2023). Distinctively, Dublin couples its rapid entrepreneurial growth with an emphasis on sustainability. Even amidst its abundant startup ecosystem, the city exhibits laudable enterprise longevity rates, underlining its adeptness in engendering enduring business success. Integral infrastructural supports, epitomized by incubators, accelerators, and eminent governmental entities like the National Digital Research Centre (NDRC) and Enterprise Ireland, further enhance Dublin's entrepreneurial scaffold. Complementing this is the city's adept adoption of the “triple helix” paradigm (Etzkowitz, 2003), intertwining academia, government, and industry in a synergy fostering a rapid evolution. Thus, Dublin's intricate fabric of factors consolidates its stature as an impeccable arena for answering our RQ. Through our exploration, we aim to demystify the multifaceted mechanisms of MNE spillovers, offering discerning insights into the mechanics that have sculpted Dublin's distinguished yet widely relatable EE.

3. Theoretical Context

Tracing the evolution of agglomeration theories up to Porter's seminal Cluster Theory, a constant factor emerges: all theories attribute agglomeration's purpose to reducing transport costs and improving logistical efficiency (Glaeser, 2010). However, this enduring constant faced was challenged with the internet-led revolution in Silicon Valley. Software giants rooted themselves in proximity, not to reduce transportation budgets, but through entirely different mechanisms. Porter (1998) highlighted the need to revisit traditional wisdom on agglomeration due to unfolding developments. Silicon Valley distinguished itself by housing elite academic institutions and attracting top-tier talent. This led to increased accessibility to funding as venture capitalists staked their claims, amplifying the region's entrepreneurial audacity. Thus, the Valley's trajectory exhibited a unique sequence of events—an inimitable recipe of enabling actors and factors, establishing the region's global oligopolistic foothold.

Worldwide efforts to replicate Silicon Valley's entrepreneurial success often included mimicking its composition, adopting the triple-helix model, or seeking direct spillovers through FDI from the Valley. However, these endeavors, experiencing varying levels of failure, underscored the need to move beyond mere replications of the Valley's make-up (Isenberg, 2010). A clear disconnect existed between the presence of local universities, MNEs, or research institutions and the cultivation of organic entrepreneurship in a region. Explaining this phenomenon became a passionate pursuit for scholars studying agglomeration economies or entrepreneurship (Wurth et al., 2021).

Amidst this academic maelstrom, where the agglomeration literature grappled to produce the holism that could facilitate a comprehensive outlook, an embryonic concept emerged in entrepreneurship literature—the Knowledge Spillover Theory of Entrepreneurship (KSTE) (Audretsch & Keilbach, 2007). Moving beyond compartmentalized academic perspectives, KSTE posited entrepreneurial opportunity as intimately tied to knowledge spillovers from incumbent institutions — this innovative clustering of data reveals spillovers and entrepreneurship disciplines. This epiphany was no academic footnote; it was a clarion call that reoriented the scholarly compass, acknowledging the indispensable interplay between these disciplines. Shortly, spillovers from a number of local knowledge fonts, including multinational enterprises, academic institutions,

research bodies, and patents, were studied in relation to entrepreneurship as illustrated in Appendix Table 9. Yet this transformative momentum did not gather overnight; it was gradually accrued, marking significant milestones in the evolution of the entrepreneurial ecosystem framework, some of which hold significant relevance to our research.

In 2005, Audretsch & Lehmann tested whether the KTSE holds for regions like it does for industries, thus expanding the scope, and found it to hold true. The localization of knowledge spillovers plays a pivotal role in fostering regional entrepreneurial activities, emphasizing the need to examine regional perspectives (Oerlemans & Meeus, 2005). The study by Audretsch & Lehmann linked universities and firms located near it, using binomial regression to estimate how the number of high-tech startups around universities depends on regional factors and the output of universities. Thus, this emphasized the ecosystem element around these spillovers all channeled towards local firm growth, a concept later laid as one of the fundamental tenets of the EE approach (Stam & Spigel, 2016).

The reason why spillover mechanisms have been ignored is that they are challenging to comprehensively study as they involve the complex interplay of 4 aspects: the resources like type of capital or the type of knowledge or, the actor responsible for the spillover, i.e. the individual or institution facilitating the spillover, the factors influencing the spillover like absorptive capacity, heterogeneity or proximity, and the spillover mechanisms (Rizvi et al., 2023). The nature of knowledge itself, whether it's product-oriented or process-oriented, can lead to varied entrepreneurial outcomes (Wong, Lee, & Foo, 2008), further underscoring the complexity and diversity of spillover mechanisms. Be it spillovers from MNEs or Universities or any other font of spillovers, most studies focused on correlations between their presence in the region and their effects on various elements of the region, but as mentioned earlier, few empirically studies or theorized about the actual mechanisms (Spencer, 2008; Smeets, 2008).

On this count, within the KTSE literature, Audrestch, Lehmann, Warning, (2005) then investigated the actual spillover mechanisms from universities, which touched on all 4 aspects of a spillover. The KSTE literature, in its richness and depth, has gone beyond traditional perspectives to encompass a diverse range of elements like creativity (Audretsch & Belitski, 2013), entrepreneurial employee activities (Stam, 2013), and strategic entrepreneurial perspectives (Agarwal, Audretsch, & Sarkar, 2007). Audrestch, Lehmann, Warning (2005) specifically focused on the interplay between spillovers from natural or social sciences i.e. resources, research, and human capital as carriers of the spillover, i.e. actors, the occurring mechanisms, and its effect on the proximity to the universities i.e. factors. This seconds the idea posited by Rizvi et al., 2023, of the four aspects relevant to a spillover and serves as a foundation for us to develop further on it.

Using the findings of our interviews, in this study we meticulously analyze and present the interplay of these 4 aspects of spillovers across the evolution of Dublin's EE with a novel contribution termed as the F-A-R-M map (Factors-Actors-Resources-Mechanisms, refer Discussion). This map has resulted from our grounding in the EE literature, especially the evolutionary trajectory of an EE as proposed by Cantner et al. (2020) combined with our insightful discoveries about spillover mechanisms and micro mechanisms from the interviews of Dublin's entrepreneurs. We also used these insights on mechanisms to update the FDI-to mechanisms flowchart representation of the SLR conducted by Rizvi et al. (2023), adjusting for semantic and empirical discoveries made in this study to provide a more accurate version. While the Flowchart allows discussion on the broader taxonomy of MNE spillover mechanisms, the FARM map allows to effectively map and represent the spillovers-EE evolution interplay, thus arming the academic community with two

pragmatic tools to employ in further studies. We realize that although these contributions are a significant first step in EE literature to effectively study MNE spillover mechanisms across various EEs, much remains to be refined and improved. In the next section we present our findings to facilitate a foundation, inviting criticisms and development to carry these contributions to practical fruition.

4. Methodology

This study adopts a qualitative research design, thoroughly constructed to unearth answers to the primary research question: Through which mechanisms do Dublin's entrepreneurs experience MNE spillovers, and how do these map across the evolution of Dublin's entrepreneurial ecosystem (EE)? To address this central inquiry, we pursued a rigorous methodological trajectory.

Our sample was curated to encompass a diverse and eclectic set of entrepreneurs active within the Dublin ecosystem for at least three years, ensuring a longitudinal and evolutionary lens on the topic (Gibson & Birkinshaw, 2004). These participants span a wide array of valuations (from €100K to €160m) and backgrounds—ranging from those initiating their first funding rounds, traversing acquisitions, seeking exits, transitioning from academic or employment avenues, to serial entrepreneurs. A conscious effort was made to ensure gender diversity and the inclusion of both native and diaspora entrepreneurs on visas. Our purposive sampling strategy was underpinned by the intent to capture participants without a pre-existing inclination towards known MNE spillover linkages, thereby maintaining objectivity in the assessment of their relationship with these mechanisms (Patton, 2015; Weterings & Boschma, 2009).

In total, 12 interviews were conducted. Through our iterative data collection and analysis process—where each new set of data was critically analyzed as it was gathered—we discerned that the entrepreneurial landscape in Dublin is relatively homogenous. Data saturation was reached after the 10th interview. The subsequent 11th and 12th interviews were thus set aside due to their lack of relevance and absence of any incremental value to the study.

Our primary method of data collection encompassed open-ended, semi-structured interviews. These delved deep into the entrepreneurs' journeys within the ecosystem, their multifaceted interactions within its domains (Isenberg, 2010), and the influence of MNE presence on these trajectories. The architecture of our interview guide was firmly rooted in the categories of MNE spillover mechanisms, as elucidated in a previously conducted systematic literature review (SLR) (Rizvi, et al., 2022; ref. Appendix Figure 12). Post-interview, data transcription was succeeded by a thematic analysis, systematically segregating the data into categories and themes that echoed the research queries (Braun & Clarke, 2006). The exhaustive flowchart of MNE spillover mechanisms from the SLR (Rizvi, et al., 2023; ref. Appendix Figure 12) guided our coding endeavors. A master table was meticulously crafted, linking interview responses to appropriate spillover mechanism categories, offering an organized snapshot of their manifestations within Dublin's EE.

Drawing upon our painstakingly curated methodology, we engaged in a comprehensive analysis of our findings to provide insights into the manifestations of MNE spillovers within Dublin's EE. This analysis was pivotal in achieving two salient outcomes. First, it enabled us to refine the existing FDI to mechanisms flowchart as originally presented by Rizvi et al. (2023). Second, it birthed the FARM map, a depiction that captures the evolutionary trajectory of Dublin's EE, which we present in the Discussions section. This innovative representation charts the mechanisms unearthed through our study, serving as a testament to the rigor and depth of our inquiry.

The ensuing findings section, informed by our robust methodology and validated by the expertise of my seasoned co-author, delves deeper into these mechanisms, offering a glimpse of the intricate integration of MNE spillover mechanisms within Dublin's EE. The totality of our findings offers more than just a reaffirmation of the MNE spillover mechanisms documented in the SLR (Rizvi, et al., 2022; ref. Appendix Figure 12), which we reflect in our revised model in the discussion section. It also shines a spotlight on nuanced micro-mechanisms and their complex interrelations, all of which enrich our understanding of the ecosystem's dynamics.

5. Findings

5.1 Spillover Mechanisms in Dublin

We begin our section by presenting Table 7 which presents succinctly all mechanisms and micro mechanisms that we validated or discovered from our qualitative investigation with Dublin's entrepreneurs. These findings confirm the existence of the mechanisms listed by Rizvi et al. (2023), while also including micro mechanisms (and factors) freshly found and labelled as part of this study. We then discuss some of these mechanisms in more detail to showcase the nuanced micro-mechanisms discovered and the factors abetting or inhibiting them.

Table 7: MNE Spillover Mechanisms with Interview Quotations

Category	Mechanism Category	Micro Mechanisms	Interview Quotations
		Startup solutions addressing MNEs' problems	"The problem with the large organisation is that too big... and innovation is a subtle thing...for which they need the small guys
Positive — Willing Spillovers/ Knowledge Transfers	Co-specialization with multinational enterprises	Grooming young startups	"It brings in students and then on top of it, it brings in a lot of accelerators who want to go" (Interviewee, 2023)
	Multinational enterprises optimizing forward and backward linkages in local supply chain	Extended Onboarding Dilemma	"to take a small guy on is also a problem...validation and then to take them on board actually takes six months, which is probably the life expectancy of the start up anyway"
Positive - Unwilling	Demonstration effects	Insights into corporate problems of MNEs	"I would not know what Microsoft goes through on a daily basis... we do get some sort of an insight from them when you sit into a presentation"

	Labor mobility	Hiring Challenges due to high thresholds set by MNEs	"It brings intelligence from everywhere in the world" (Interviewee, 2023) "So having these big companies come and share their knowledge or best practices, it definitely helps to accelerate the learning process"
	Local linkages		"They (MNEs) put the threshold really high. So if you look at the collar level, the collar is very high"
	Spin outs or spin offs		"So six months in a startup, graduate learns, more than they would learn two years in Facebook"
Externalities	Market Expansion	Portfolio Building	"This could give the startups tremendous value. This will give tremendous validation to the smaller companies."
		International Visibility and Validation	"I think the advantage of having a multinational company is that you have big customers that you can target and they can kind of give you validation and credibility"
	Other Resource Conduit	"Talent Magnet" Phenomenon	"We have a lot of multinational companies and those multinational companies can give us access to a lot of talent that we wouldn't have otherwise"
Negative Spillovers	Crowding Out — Resources	Attrition of skilled employees: MNE Presence	"I had a data scientist. Who actually hadn't anything going on at all. And he was very, very interested in joining us...Learnt everything and then he went and to join IBM"
	Crowding Out — Market Share	Tendering Exclusions: Barriers to entry in the tendering process due to unachievable financial thresholds	"The tendering process. Like if you if you're a big player, you obviously have higher resources you have higher bandwidth than you can do those, which I think is very difficult to compare to and we are almost non-competitive in that market because we cannot even qualify."
			"Well who will the big company go with? Now particularly we work in a med tech sector, right? In a medtech sector if you are working with. Say, for instance, HSE, even to apply for it, even to qualify for a tender. The amount of

			financial strength, you have to have just qualify for the tender — I will never achieve it to be honestly because I will not remain with “company name ” by the time I achieve it
			"...before I could actually qualify those standards because they need a lot of security, then a lot of financial background...it is something like a half a million per year for the last three years at least or something like that."
		Reverse Market Penetration by MNEs	"...a startup aims to sell to the big company...I'm getting sold by Microsoft or AWS... they're not interested in buying from the small parties, instead selling."

5.2 Positive Spillover Mechanisms:

5.2.1 Demonstration Effects and Insights into Corporate Problems:

Multinational enterprises (MNEs) play a pivotal role in shaping local entrepreneurial ecosystems, with their presence often serving as a beacon of business practices, strategies, and challenges. For startups and local entrepreneurs, these MNEs inadvertently serve as “demonstration” hubs, offering a window into the operations of large corporations.

One interviewee highlighted the sheer power of this demonstration effect when they mentioned, “I would not know what Microsoft goes through on a daily basis... we do get some sort of an insight from them when you sit into a presentation.” This quote resonates with the often-understated benefit of merely existing in proximity to these global giants — the unintentional yet invaluable insights gained just by observing them. MNEs indirectly provide entrepreneurs with an understanding of large-scale corporate challenges, operational nuances, and potential areas of innovation. Another entrepreneur captured the essence of the demonstration effects when they pointed out the difference in operational scales: “The problem with the large organisation is that [it's] too big... and innovation is a subtle thing...for which they need the small guys.” This quote reflects a dual sentiment. Firstly, the sheer scale of MNEs can make rapid innovation challenging. Secondly, it underscores the necessity of startups in introducing and driving innovation — effectively making the case for how startups can bridge this gap by providing solutions tailored to these “big” challenges.

The demonstration effects aren't merely passive. They influence startups to devise strategies, develop solutions, or innovate in ways that specifically cater to the challenges observed in MNEs. Furthermore, by understanding the pain points of these multinational corporations, startups can also better position themselves for potential collaborations or acquisitions — by offering solutions tailored to these problems. This mechanism, therefore, nurtures an environment of co-specialization, where startups are more attuned to the requirements of MNEs and can craft their offerings accordingly. The demonstration effects also serve as a precursor to other spillover mechanisms. For instance, by understanding an MNE's challenges, startups might be more equipped to enter into co-specialization relationships, or they may become more attuned to the talent requirements and consequently tap into the labor mobility mechanism.

5.2.2 Market Expansion due to Global Visibility and Validation:

In the grand arena of global business, recognition and endorsement from well-established entities carry immense weight. The presence of multinational enterprises (MNEs) within a local ecosystem inherently elevates its status on the global stage. The association with these giants doesn't just open doors to international markets, but also imparts a stamp of credibility, signaling that the startups from this ecosystem are potentially on par with global standards. The influence of MNEs in elevating the stature of local startups is well-documented in the interviews. An entrepreneur insightfully remarked, "This could give the startups tremendous value. This will give tremendous validation to the smaller companies." This attests to the power of association. By being in proximity to, or even by just having the chance to collaborate with MNEs, startups can leverage this connection as a testament to their capabilities.

Another interviewee further emphasized the potential for growth that comes with this association, saying, "I think the advantage of having a multinational company is that you have big customers that you can target, and they can kind of give you validation and credibility." Here, the narrative isn't just about visibility but also about potential market penetration. An endorsement or collaboration with an MNE acts as a significant boost, giving startups a more substantial foot in the door when targeting other big players internationally. This mechanism goes beyond just the startups; it uplifts the entire ecosystem. As startups gain international visibility and validation, they inherently put their ecosystem on the global map. This can attract more investors, talent, and resources, driving a virtuous cycle of growth and further validation. Startups in the ecosystem also benefit from the "halo effect" — the phenomenon where the reputation of top players (in this case, MNEs) positively influences how others (like startups) in the same circle are perceived.

The mechanism of market expansion due to international visibility and validation closely ties with several other mechanisms. For instance, the enhanced reputation can lead to increased labor mobility, with top talent being attracted to the ecosystem because of its international recognition. Similarly, it can foster a conducive environment for "co-specialization with MNEs" as startups are seen as more credible partners.

5.2.3 Co-specialization with Multinational Enterprises

Co-specialization illustrates a symbiotic relationship between startups and multinational enterprises (MNEs) within the ecosystem. Startups possess agile innovation capacities, often addressing nuanced problems that MNEs face, while the latter offer vast resources, including access to markets, capital, and advanced infrastructure. However, this partnership often comes with its own set of challenges. One micro mechanism shaping this dynamic is "Addressing MNE Problems with Start-up Agility." Startups uniquely innovate swiftly, frequently sidestepping the bureaucratic barriers that beleaguer MNEs. An interviewee astutely captured this by stating, "The problem with the large organisation is that [they are] too big... and innovation is a subtle thing...for which they need the small guys." This sentiment underscores the invaluable nimbleness startups introduce, tailored specifically to meet MNE needs.

Another reason for co-specialization stems from "Grooming the Future." MNEs often play an instrumental role in nurturing budding startups, viewing it as an investment into potential future solutions or collaborations. This proactive approach benefits both: startups obtain essential mentorship and resources, while MNEs stay abreast of innovative breakthroughs. This viewpoint is echoed by a participant who mentioned, "It brings in students and then on top of it, it brings in a lot of accelerators who want to go."

However, “The Extended Onboarding Dilemma” presents a tangible tension in the co-specialization trajectory. Startups, characteristically fragile during their initial phases, grapple with the protracted onboarding demands of MNEs. An interviewee aptly pointed out, “to take a small guy on is also a problem...validation and then to take them on board actually takes six months, which is probably the life expectancy of the startup anyway.” This highlights the imperative for MNEs to revisit their onboarding and validation methods to be more attuned to startup needs. Co-specialization offers a promising path forward for both startups and MNEs, enabling them to leverage their complementary strengths. However, for this partnership to truly flourish, MNEs must recognize and address inherent challenges, particularly the protracted onboarding processes, to ensure they don't inadvertently stymie the very innovation they seek. The ecosystem's future dynamism largely depends on how effectively these entities can co-specialize and collaborate.

5.3 Negative Spillovers:

5.3.1 Competing for Resources

5.3.1.1 Hiring Challenges due to High Thresholds set by MNEs:

The presence of multinational enterprises (MNEs) in an ecosystem isn't solely a boon; it comes with its own set of negative externalities, notably in the area of human capital acquisition. MNEs often set high benchmarks for skill and experience, creating a talent magnet phenomenon that inadvertently drains smaller startups of essential human resources. MNEs often have stringent hiring requirements, demanding a level of expertise and experience that is often out of reach for most startups. This creates a talent monopoly that is almost impossible for small enterprises to contend with. An interviewee mentions: “They (MNEs) put the threshold really high. So, if you look at the collar level, the collar is very high.” MNEs typically attract top-tier talent from all corners of the globe, elevating the overall human capital within the ecosystem. While this enhances the skill set available in the market, it also increases competition for local startups. An interviewee highlights: “It brings intelligence from everywhere in the world.”

The dynamic interplay between MNEs and startups around talent acquisition serves as a double-edged sword. On the one hand, the high standards set by MNEs may inspire a generally more skilled labor market, potentially lifting all boats. On the other hand, the very benchmarks that elevate the ecosystem also threaten to undermine the hiring capabilities of startups, robbing them of both potential and current human capital. For an ecosystem to truly flourish, a balanced approach to human capital acquisition and retention is vital. Consideration must be given to the unique challenges faced by startups, possibly through policy interventions or collaborative frameworks that level the playing field. Another phenomenon observed was the attrition of skilled startup employees due to MNEs present at the doorstep. During the interviews, entrepreneurs in Dublin's ecosystem expressed concern about the potential attrition of skilled employees to MNEs. As one interviewee stated, “I had a data scientist. Who actually hadn't anything going on at all. And he was very, very interested in joining us...Learnt everything and then he went and to join IBM” (ref. Table 7). This phenomenon can pose a challenge for local startups, as they may invest significant time and resources in training and developing skilled employees, only to lose them to MNEs with greater resources and higher salaries.

5.3.1.2 Tendering Exclusions: Barriers to Entry in the Tendering Process Due to Unachievable Financial Thresholds.

Qualifying for tendering processes presents a significant challenge for startups, especially when confronted with seemingly insurmountable financial thresholds. One interviewee from the medtech sector highlighted the gravity of this challenge when dealing with entities like the HSE: “The financial criteria to qualify for a tender is beyond my startup's reach. By the time I might meet it, my company will have fundamentally changed” (ref. Table 7). Such financial barriers place startups in a precarious position against MNEs, who wield vast resources. The standards for these tendering processes, set with large corporations in mind, inadvertently sideline startups. As an interviewee succinctly stated: “The tendering process is skewed. Major players, with their abundant resources, leave us startups struggling to even qualify.” But the implications of these barriers extend beyond immediate opportunities. They jeopardize the longevity and viability of startups. Missing out on tendering opportunities can stifle growth, eroding resources and pushing startups to the brink of obsolescence. An interviewee offered a poignant perspective: “The financial bar set by HSE's tendering is one I fear I'll never surpass; and even if I did, the company that succeeded would hardly resemble its original self. "strength required is something I will never achieve; by the time I might, I won't remain the same company.

The tendering system, with its current financial prerequisites, is inadvertently biased towards MNEs. They not only have the financial muscle to qualify but also the infrastructure to meet associated demands, such as stringent security measures. An interviewee elucidates: “Before I could actually qualify, they need a lot of security, then a lot of financial background...it's something like half a million per year for the last three years at least.” For a thriving entrepreneurial ecosystem, the barriers of entry need to be reassessed. If the primary motive behind the financial thresholds in tendering processes is to ensure quality and capability, alternative evaluation metrics that don't cripple startups should be considered. Such systemic biases, if left unchecked, could diminish startup participation and innovation, robbing the market of diversity and dynamism. Creating a balanced and inclusive system will be paramount for fostering a holistic entrepreneurial environment where entities of all sizes can contribute and flourish.

5.3.2 Reverse Market Penetration by MNEs (Competing for Market Share):

Multinational enterprises (MNEs) not only dominate the buyer's market but also aggressively enter spaces typically reserved for smaller entities. This reverse market penetration phenomenon complicates the standard business model for startups, who find themselves in the unenviable position of competing for sales against the very MNEs they initially aimed to sell to. Traditionally, startups look to MNEs as potential clients, offering innovative solutions or services. However, in this environment, the tables are often turned. MNEs like Microsoft and AWS aren't just buyers but also competitors in the startup's niche. One interviewee observed, “A startup aims to sell to the big company...I'm getting sold by Microsoft or AWS...they're not interested in buying from the small parties, instead selling.”

This kind of reverse market penetration has a double-edged impact on startups. On one side, they lose out on what could have been substantial sales to MNEs. On the other, they are also contending with these corporate behemoths in an already crowded marketplace, leading to a potential loss of market share. The sheer scale and reach of MNEs give them an upper hand, and this phenomenon accentuates the power asymmetry further. MNEs not only have the financial clout but also the brand recognition that can overshadow startups, making

it a daunting challenge for smaller entities to make any headway.

5.3 Piecing the Narrative Together

In our exploration of MNE spillovers in Dublin's entrepreneurial ecosystem, we focus on the mechanisms that drive these occurrences. We present two case studies to elucidate the relationship between MNE spillovers and the evolution of startups in Dublin.

Google's initiative in seeking a startup that could cater to a specific need in the SME retail sector provides a telling narrative. Parallel to this, an Oxford (UK) PhD graduate, driven by his cohort's lack of entrepreneurial alignment, was drawn to the Dublin ecosystem due to its "talent magnet" appeal. Our scrutiny reveals the profound impact of MNEs like Google on entrepreneurial trajectories, emphasizing the role of sourcing talent that they offer and the consequential local spillovers. A prime example is the entrepreneur's leverage of the "labour mobility" mechanism. Attracted to his venture were skilled professionals who, having grown disenchanted with the bureaucratic nuances of large MNEs, brought with them valuable technological and managerial knowledge. This influx of talent was instrumental in the startup's remarkable growth, catching Google's attention for a potential partnership. Although initial hesitations prevailed, the startup's inclination towards co-specialization with Google became evident. Anticipating acquisition prospects, the startup even adopted subsidized operational rates. The spatial closeness to Google's Dublin arm further cemented the collaboration, with the ready availability of senior executives boosting MNE confidence. Such narratives underscore the importance of "international visibility/validation" as a by-product of MNE presence.

The second case sheds light on the "local linkages" mechanism. This tale begins with an entrepreneur gaining insights about a market gap through interactions with MNE employees at events. Their strategic positioning near Dogpatch Labs and the central MNE hub in Dublin was pivotal in this knowledge spillover. However, this proximity wasn't without its challenges, manifesting in the form of "reverse market penetration" where MNEs became aggressive vendors. Undeterred, the startup not only secured significant clientele but also amassed close to a million euros via grants. In synthesizing all the case studies in our study which provide diverse yet interconnected narratives, we've shaped a comprehensive story of how MNE entry moulds entrepreneurial ecosystem evolution in an ecosystem like Dublin. We further visualize these findings through the FARM map in the subsequent section.

6. Discussion

6.1 FARM Concept Map (Factors — Actors — Resources — Mechanisms)

6.1.1 Introducing the Conceptual Grounding for FARM Map

In an attempt to place our empirical findings in Dublin's EE's evolutionary context, we propose the Factors, Actors, Resources, and Mechanisms (FARM) map — a conceptual tool designed to map the spillover mechanisms of an EE across its evolution based on Cantner et al.'s model (2020). Our objective is to address the scarce understanding of two pivotal concepts — evolution and spillover mechanisms, as emphasized by numerous scholars such as Wurth et al., (2021) and Cho et al., (2021). The academic community broadly acknowledges the need to strengthen the EE framework such that it factors in the complex interplay within entrepreneurial ecosystems.

In response to these identified gaps, Rizvi et al. (2023) embarked on a comprehensive systematic literature review, facilitating the distillation of four central themes pertinent to spillover analysis. These

themes are: the resource in question, such as knowledge from MNEs or universities, the actors (ranging from academic entrepreneurs to MNE employees), factors that influence the process such as absorptive capacity, proximity or heterogeneity (for e.g. Bhawe & Zahra, 2019), and the mechanisms of spillover (for e.g. Ryan et al., 2020; Colombelli et al., 2019; Grillitsch & Nilsson, 2017; Christopher S. Hayter, 2016; Olufunmilola et al., 2016). These resources and actors set the stage for the exchange of knowledge, while the influencing factors can either stimulate or impede this exchange process (Qian, Acs, 2013; Bhawe & Zahra, 2019). The mechanisms represent the routes through which the accumulated resource is harnessed, fostering the emergence of new enterprises beyond the confines of academia (Audretsch et al., 2005; Wagner et al., 2019).

Our RQ inherently recognizes the need to address the limited understanding of the EE evolution and the interplay of spillover mechanisms. To bridge this gap, we propose a comprehensive map, christened the FARM map, due to its focus on Factors, Actors, Resources, and Mechanisms. This map allows for the charting of these elements and their intricate interactions throughout the evolution of an EE as posited by Cantner et al. (2020). In this study, we focus on MNEs as our primary actor and resource pool, tracing its potential trajectories across the various stages of EE evolution. While our focus is on the MNE, it's important to note that the FARM map is flexible and can be employed with other permutations of Actors, factors, mechanisms and resources. It is a tool designed to enhance our understanding of the complex interplay and evolution within an EE, regardless of the specific actors involved. We present this FARM map not as a prescriptive blueprint but as a starting point to unravel the journey of an entrepreneurial ecosystem from genesis to maturation. We hope it sparks further academic exploration and debate, leading to a more nuanced understanding of entrepreneurial ecosystems' dynamics. The following is an aggregated summary, in light of the analysis of our empirical findings of Dublin's EE, of how a typical ecosystem may evolve from its inception to maturity, charted out on our proposed FARM map.

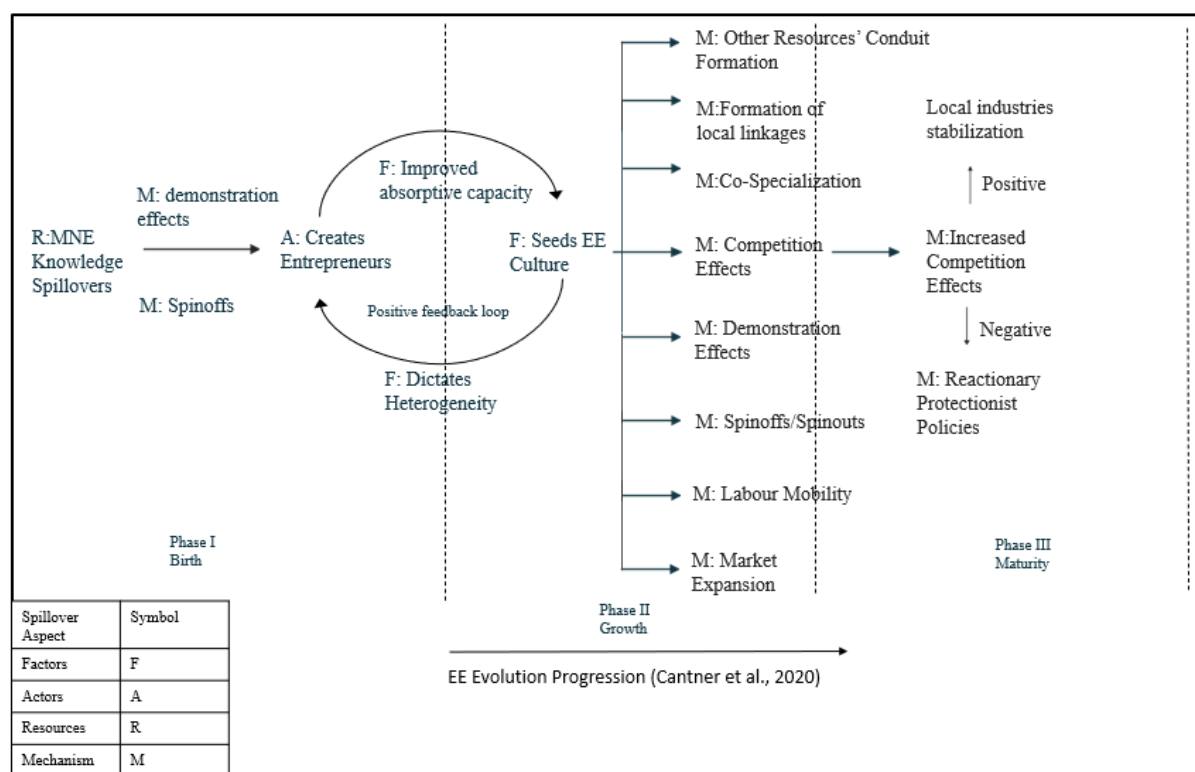


Figure 10: A FARM Map: Tracing the Spillover Mechanisms through the Birth, Growth, and Maturation Stages of

*Source: Authors

Mapping out the evolution of an entrepreneurial ecosystem (EE) using the FARM (Factors, Actors, Resources, Mechanisms) concept allows us to systematically understand how different components interact and evolve over time. While MNEs can enter an EE at any phase of evolution, Dublin exemplifies an ecosystem that evolved after MNE integration, which we choose as the starting point for this instance of FARM map. We now present a generalized narrative, as unfolded by empirical analysis of Dublin's EE, with a focus on highlighting the various Factors, Actors, Resources, and Mechanisms at play.

6.1.2 Summarizing Findings with a FARM Map — Evolution of EE post MNE Entry based on Dublin's Empirical Analysis.

6.1.2.1 Birth Stage

Upon entry into an entrepreneurial ecosystem during the Genesis or Birth phase, as described by Cantner et al. (2020), MNEs bring along a wealth of “Resources” including unexploited knowledge, social capital, linkages, advanced technologies, and specialized skills. MNEs act as talent magnets, attracting skilled talent within the ecosystem, thereby setting off a complex interplay of mechanisms and dynamics within the entrepreneurial ecosystem. One such interplay of knowledge (resource) and skilled employees (actors) is spinoffs (mechanism). Drawn into the ecosystem by the MNEs, these skilled employees may absorb the latent knowledge within these large corporations but differ in views on how to exploit it (Cantner et al., 2020). These disagreements can inspire seasoned, ambitious employees to venture out on their own, leading to spinoffs or spinouts (Buenstorf and Klepper, 2009). Simultaneously, the presence of MNEs (resource, actor pools) may also stimulate demonstration effects (mechanism), as was seen in our empirical study of Dublin, prompting the local workforce (actors) to initiate their own businesses. As these entrepreneurial activities gain momentum, they seed an entrepreneurial culture (factor), thereby strengthening the absorptive capacity (factor) of the ecosystem. This absorptive capacity feeds back positively into the ecosystem (mechanism), leading to the emergence of more entrepreneurs (actors), thereby setting a solid foundation for the ecosystem's culture & growth.

Adding to this dynamic landscape is the heterogeneity (factor) introduced by the new startups. These startups range from firms that predominantly imitate the practices of the MNEs to those that innovate and introduce new products or services, depending upon the level of absorptive capacity in the EE (Bhawe & Zahra, 2019). This diversity of entrepreneurial activities not only enriches the ecosystem but also enhances its resilience, adaptability, and innovation capacity (factors). As the ecosystem evolves, another key mechanism begins to take shape: workforce mobility). As the MNEs operate and expand within the local ecosystem, their local employees, armed with new skills, experience, and insights (resources), may transition to local firms or even start their own ventures. This labour mobility leads to the transfer of knowledge and skills within the ecosystem, creating additional layers of complexity and richness. Thus, while the initial entry of might induce a competitive challenge for local firms, the resulting spinoffs, demonstration effects, and workforce mobility have the potential to substantially mitigate that, leading to the evolution and maturation of the entrepreneurial ecosystem (Mechanism). (Figure 10. Phase 1)

6.1.2.2 Growth Stage

As the ecosystem enters the Growth stage, more Actors come into play — the new startups. Formed as a result of earlier phases' mechanisms such as spinoffs and demonstration effects, these startups begin to establish local linkages, serving as crucial input suppliers for other firms and fostering co-specialization opportunities (mechanisms). Other spillover mechanisms contributing to the EE's growth in this stage include the strengthening demonstration effects and the creation of potential spin-offs, both driven by the success of the MNEs and local businesses. These effects are underpinned by the ever-strengthening entrepreneurial culture (resource), which further fuels the creation of new ventures. Additionally, workforce mobility (mechanism) becomes more pronounced. Employees who have been trained and have gained considerable experience and insights within MNEs start moving towards local firms, thus bringing the knowledge and skills they acquired within MNEs into the wider ecosystem, thereby enriching the pool of resources available to local firms. Another factor emerging in this phase is competition. As local firms grow, buoyed by the enhanced knowledge (resource) and improved skills (resource), they start to challenge the MNEs' dominance. This competition may serve as a potent driver of innovation, prompting firms to continually improve and adapt, or start creating a scarcity of resources or market share. The forthcoming outcomes of the competitive dynamics, whether they lead to co-specialization agreements, mergers and acquisitions (M&As), failures, or a decline in entrepreneurial rates, hinge predominantly on the strategic decisions made at the MNE and local firm levels at this stage. This complex interplay of mechanisms, factors, actors, and resources in the Growth phase propels the entrepreneurial ecosystem towards maturation. (Figure 10. Phase 2)

6.1.2.3 Maturity Stage

In the maturity stage, the Factors, Actors, Resources, and Mechanisms have evolved significantly. The Actors now comprise a diverse range of thriving local businesses and potentially dominant MNEs. The competition mechanism has become pronounced and can either contribute positively to the growth of local businesses or negatively if MNEs dominate the market. An important factor in this stage is the implementation of protectionist policies, a tool to mitigate and monitor the evolutionary trajectory of the EE. These policies may serve as a safeguard, creating a beneficial externality for local startups by increasing costs for MNEs and providing subsidies to startups — a new Resource. Whether these policies are implemented depends on the EE's ability to anchor their MNE presence or prepare for MNE exits. (Figure 10. Phase 3)

In sum, the evolution of an EE can be mapped out using the FARM concept, where Factors, Actors, Resources, and Mechanisms are all interacting and evolving concurrently. This approach offers a systematic and comprehensive way to understand the dynamic nature of EEs. This understanding, depicted visually in Figure 10, can be a valuable tool for policymakers, entrepreneurs, and researchers alike.

6.2 Revised MNE to Mechanisms Flowchart

In our quest to holistically understand the repercussions of MNE presence on local EEs, it became evident that the spillover effects extended beyond just spillovers of knowledge. A plethora of externalities, whether fostering linkages, enhancing visibility, nurturing social capital, or even conferring pecuniary conduits, permeates the ecosystem, all of which play instrumental roles. It's worth noting that spillovers are a species of externality, as expounded by Frischmann & Lemley (2007). Yet, in the context of our study, the term “spillover” predominantly signifies knowledge transfers, leading us to introduce an additional category:

'Other Externalities'. This category encapsulates those influential dynamics that aren't strictly knowledge-based but are quintessential to paint a comprehensive picture of the MNE's influence.

The structure of our flowchart, which delineates the myriad ways MNE presence impacts EEs, draws a foundation from the framework proposed by Rizvi et al.'s (2023) systematic literature review. However, based on our empirical study and semantic comprehension, we have made nuanced yet significant modifications to their model to better align with our insights and findings. The flowchart lays out an array of mechanisms, from the positive spillovers anchored in collaborative endeavors and knowledge transfers, such as co-specialization and forward and backward linkages, to the more intricate externalities like market expansion and protectionist policies. Negative spillovers also find a mention, emphasizing the potential challenges posed by MNEs in terms of market and resource competition.

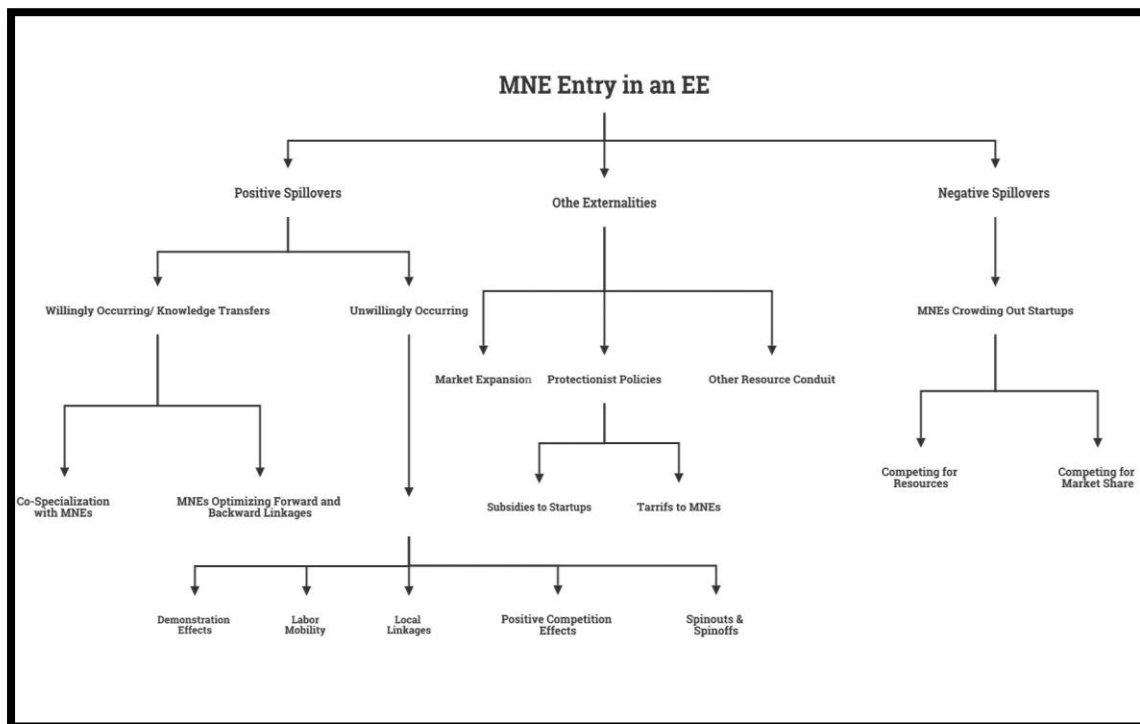


Figure 11: An updated MNE to Spillover Mechanisms map adopted from the SLR by Rizvi et al. (2023)

*Source: Authors

For a detailed exploration and elaboration on each of these mechanisms, readers are directed to refer to the comprehensive analysis and model presented by Rizvi et al. (2023). Here, we restrict our narrative to provide an overarching glance at our flowchart while spotlighting the modifications and additions we have integrated into the model. Moreover, it's paramount to mention that this chart captures the key mechanisms and intentionally omits the granular micro-mechanisms discussed in our Findings section. This conscious choice was made to ensure simplicity and clarity, making it more digestible for readers looking for a macroscopic view of the landscape.

7. Limitations

While our research encompasses a broad range of MNE spillover mechanisms, it was paramount to strike a balance between comprehensive coverage and detailed exploration. Given the complexity and depth of each mechanism, we opted to delve deeply into select mechanisms that particularly stood out in our study or showcased unique intricacies. This approach was adopted to ensure we provide rich, detailed insights

without overwhelming the reader with an extensive narrative. The mechanisms not explored in detail in this paper are by no means less important; they are areas we believe warrant individual studies to truly capture their essence. We acknowledge this limitation and call upon the academic community to further explore these mechanisms, providing a more holistic understanding in future research

Additionally, while the FARM concept map provides a valuable framework to understand the evolution of entrepreneurial ecosystems, it's crucial to recognize its limitations and disclaimers for a balanced perspective. Firstly, the FARM model presented here is a generalized narrative based on our empirical analysis of Dublin's EE. It is meant to serve as a broad guide rather than a detailed blueprint. Each entrepreneurial ecosystem is unique, shaped by its specific context, cultural nuances, policy environment, and economic conditions. The instance of FARM map presented in this paper focuses on MNE entry in the Birth Phase of the EE. Thus, the mechanisms, actors, resources, and factors identified here might vary in their occurrence, sequence, and impact across different ecosystems. Secondly, our model focuses on the genesis to maturation stages of the ecosystem's lifecycle, omitting the decline or re-emergence phases. This omission is deliberate as decline stages offer increased complexity, often driven by diverse and context-specific factors such as economic downturns, changes in consumer behaviour, policy shifts, or technological disruptions. As our intention is to provide a foundational understanding of ecosystem evolution, we have concentrated on the more universally applicable birth, expansion, and maturity stages. Future research could expand upon our model to explore these later stages in more detail. Thirdly, while the FARM map integrates a broad range of factors, actors, resources, and mechanisms, it does not claim to be exhaustive. Other relevant components could exist in specific ecosystems, warranting exploration and inclusion. Lastly, the FARM map, by virtue of its nature, simplifies the complexities of real-world entrepreneurial ecosystems. Real ecosystems are more dynamic, non-linear, and chaotic than can be represented by any model. The FARM concept map should be seen as a tool to facilitate understanding rather than a comprehensive representation of reality. Despite these limitations, we believe that the FARM concept map serves as a valuable first step in developing a comprehensive understanding of entrepreneurial ecosystem evolution. It provides a structured, systematic approach to study the interplay of various elements in the ecosystem, thus offering a solid foundation for further research in this domain.

8. Conclusion and Future Research

In our quest to unravel the multifaceted MNE spillover mechanisms using Dublin's entrepreneurial ecosystem, we embarked on a theoretically grounded empirical analysis addressing the pivotal question: How do Dublin's entrepreneurs experience MNE spillover mechanisms, and how have these mechanisms unfolded across the evolution of Dublin's EE? This analysis begets several seminal contributions to academic literature.

Foremost, this study captures the quintessence of Dublin's entrepreneurial landscape by empirically documenting the real-life experiences of its entrepreneurs and their intricate interactions with MNE spillovers. Leveraging rich, context-specific case studies, we unravel the multifaceted interplay of diverse spillover mechanisms and delve into the nuances of specific micro-mechanisms. Our meticulous analysis, encapsulated in Table 7, not only offers a comprehensive breadth of verified occurring mechanisms but also illuminates the criticality of each in Dublin's unique yet rather relatable entrepreneurial ecosystem. Dublin stands as a testimony to the transformative power of strategic policy interventions. Capitalizing on a well-educated, English-speaking populace and its strategic proximity to global trade epicenters, the Irish

government prudently harnessed FDI as the catalyst for the ecosystem's meteoric rise. However, harnessing the full potential of such an ecosystem mandates informed policy design. It is imperative, then, for the EE framework to evolve, and our study effectively champions this cause.

Our work also demonstrates methodological novelty. By adopting the FDI spillover mechanisms flowchart by Rizvi et al. (2023) as our analytical anchor, we could methodically yet creatively utilize our copious qualitative data to answer our research question. This structured approach not only epitomizes academic rigor but also paves the way for subsequent research endeavors to emulate or refine our methods. By intertwining a qualitative approach with immersive interviews and case studies, we delved deep into the subtleties of MNE spillover mechanisms and EE evolution, thereby providing a rich assortment that complements existing quantitative explorations. Our pioneering FARM map also augments the research toolbox, beckoning future scholars to traverse similar paths, leading to the potential creation of archetypal spillover-EE evolutionary narratives for MNEs across diverse EE evolutionary phases. While our study illuminates previously uncharted terrains, it also underscores the expanse of what remains unexplored. Future explorations should probe MNE entries across varying phases of the EE evolution trajectory, as outlined by Cantner et al. (2020). The intricate dance of entrepreneurial ecosystems is a ceaseless evolution, and as these ecosystems morph, so should our scholarly frameworks and understanding. In conclusion, our research serves as a beacon, guiding both policy and academia towards a richer understanding of entrepreneurial ecosystems. Yet our work is but the first step in a long, promising journey. We eagerly beckon the global academic community to join us, to probe deeper, challenge prevailing paradigms, and collaboratively enhance our collective comprehension of entrepreneurial ecosystems worldwide.

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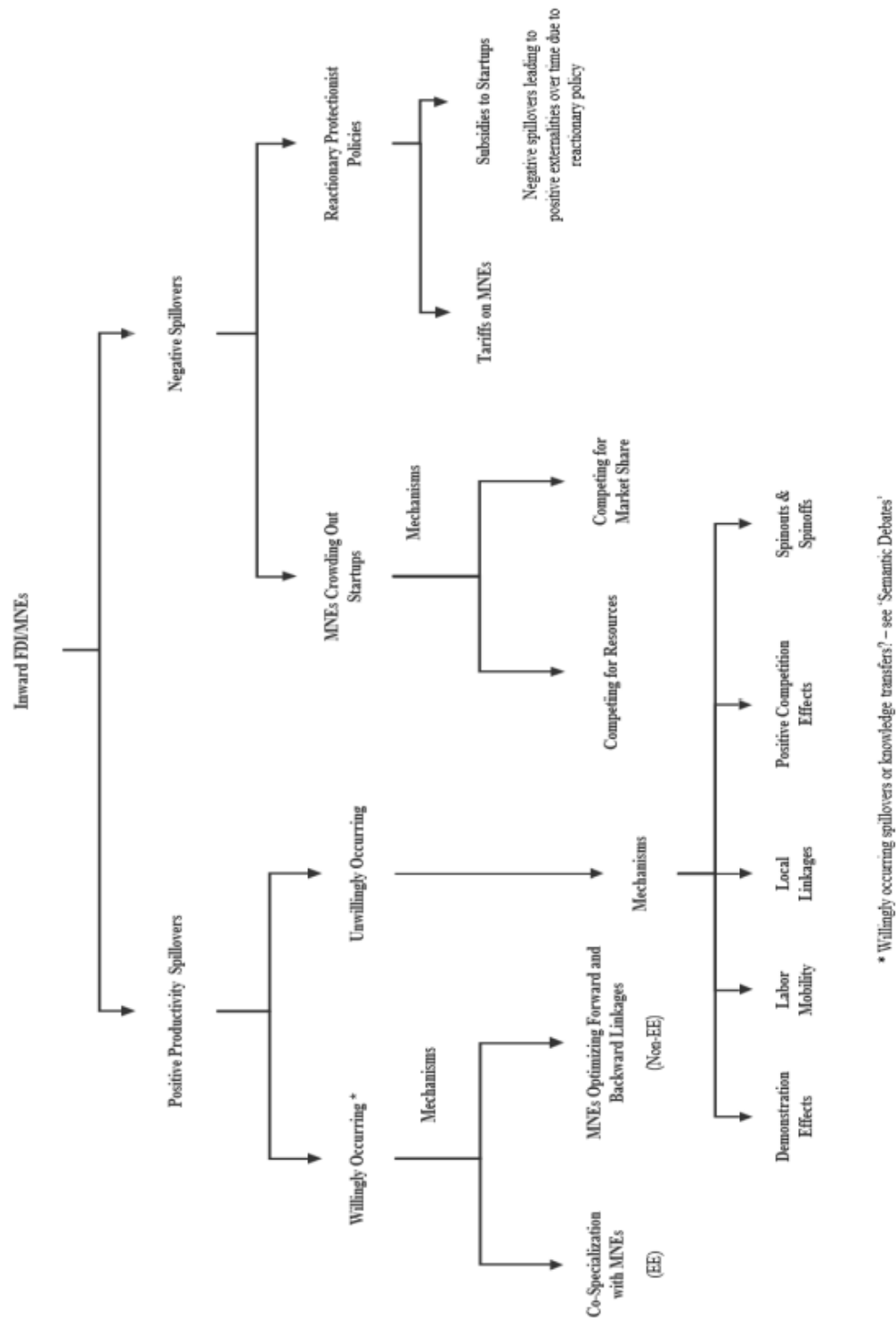
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* Source: Authors. Created using Microsoft Office.

Appendix Figure 12: MNE presence to Mechanisms (SLR-based flowchart, currently under review with SBE; Rizvi, Buciuni, Ryan, 2023)

Table 8: List of papers found on EBSCO database exploring FDI and entrepreneurship with an emphasis on co-relations over mechanisms.

*Source: Authors

Aim	Author	Year	ABS Rank	Journal Title	Summary
Does Foreign Direct Investment Stimulate New Firm Creation? In Search of Spillovers through Industrial and Geographical Linkages	Sun, Laixiang; Lee, In Hyeock; Hong, Eunsuk	2017	3	Small Business Economics	Examines how FDI correlates with new firm creation, finding positive impacts in low-tech industries and intra-sectoral correlations in high-tech industries.
Knowledge Spillovers and New Ventures' Export Orientation	De Clercq, Dirk; Hessels, Jolanda; Van Stel, Andre	2017	3	Small Business Economics	Investigates the relationship between FDI and export-oriented ventures, emphasizing correlation differences across income levels.
The moderating role of education in the relationship between FDI and entrepreneurial activity	Berrill, Jenny; O'Hagan-Luff, Martha; van Stel, André	2020	3	Small Business Economics	Investigates the correlation between FDI and entrepreneurial activity, highlighting education's moderating role in shaping correlations.
Born Local: Toward a Theory of New Venture's Choice of Internationalization	Acs, Zoltan J.; Terjesen, Siri	2013	3	Small Business Economics	Presents a theory on new venture internationalization, emphasizing the correlation between knowledge spillovers and resource utilization.
Could the Irish Miracle be Repeated in Hungary?	Acs, Zoltan; O'Gorman, Colm; Szerb, Laszlo; Terjesen, Siri	2007	3	Small Business Economics	Explores how FDI correlates with entrepreneurial activity in Ireland and Hungary, suggesting policy directions.
Does Foreign Direct Investment Always Enhance Economic Growth?	Mencinger, Joze	2003	3	Kyklos	Examines the correlation between FDI and economic growth, revealing a negative correlation in specific contexts.
Far from Silicon Valley: How emerging economies are re-shaping our understanding of global entrepreneurship	Hill, T.L.; Mudambi, Ram	2010	3	Journal of International Management	Describes processes in emerging economies, questioning the nature of entrepreneurship and its governance in correlation with globalization.
Foreign direct investment and entrepreneurship: Does the role of institutions matter?	Slesman, Ly; Abubakar, Yazid Abdullahi; Mitra, Jay	2021	3	International Business Review	Examines the moderating effects of institutions on the FDI-entrepreneurship nexus, emphasizing the correlation with institutional capacity thresholds.

Foreign Direct Investment and Entrepreneurship: Gender Differences across International Economic Freedom and Taxation	Goel, Rajeev K.	2018	3	Small Business Economics	Explores the correlation between FDI and entrepreneurship activity, highlighting variations and gender differences in crowding-out effects.
Foreign direct investment, institutional quality, economic freedom and entrepreneurship in emerging markets.	Herrera-Echeverri, Hernán; Haar, Jerry; Estévez-Bretón, Juan Benavides	2014	3	Journal of Business Research	Investigates the correlation between FDI, institutional quality, economic freedom, and entrepreneurship in different country categories.
Foreign influence, control, and indirect ownership: Implications for productivity spillovers.	McGaughey, Sara L.; Raimondos, Pascalis; la Cour, Lisbeth	2020	4*	Journal of International Business Studies	Explores how controlled foreign firms correlate with productivity spillovers in domestic firms, highlighting the pivotal role of indirect ownership.
Foreign subsidiary CSR as a buffer against parent firm reputation risk.	Zhou, Nan; Wang, Heli	2020	4*	Journal of International Business Studies	Examines the correlation between parent firm reputation risk and foreign subsidiary CSR activities, considering various influencing factors.
Home court advantage? Knowledge-based FDI and spillovers in emerging economies.	Matusik, Sharon F.; Heeley, Michael B.; Amorós, José Ernesto	2019	4	Global Strategy Journal	Investigates the correlation between local and foreign ownership of innovations and the spillovers in emerging economies, considering technology characteristics.
How Early Entrants Impact Cluster Emergence: MNEs vs. Local Firms in the Bangalore Digital Creative Industries	Lorenzen, Mark	2019	3	Management and Organization Review	Addresses the correlation between early entrants and cluster emergence, emphasizing spillover variations between MNEs and local firms.
Examine FDI's impact on entrepreneurship	Kim, Phillip H.; Li, Mingxiang	2014	4	Journal of Business Venturing	FDI positively relates to business creation, strongest in countries with weak institutions.
Analyze regional FDI spillovers in South Korea	Lee, In Hyeock; Hong, Eunsuk; Sun, Laixiang	2014	4	Regional Studies	FDI spillovers influence new firm creation in regions with curvilinear effects.
Investigate spillovers in the Polish food industry	Jensen, Camilla	2004	4	Regional Studies	Examines spillovers and agglomeration effects in the Polish food industry.

Study spatial proximity in MNE productivity spillovers	Mariotti, Sergio; Mutinelli, Marco; Nicolini, Marcella; Piscitello, Lucia	2015	4	Regional Studies	Correlates spatial proximity with productivity spillovers from foreign MNEs in Italy.
Link inward investment regimes to state strategies	Rutherford, Tod D.; Murray, Gregor; Almond, Phil; Pelard, Matthieu	2018	4	Regional Studies	Links inward investment regimes to state strategies in Quebec and Ontario.
Compare subsidiary development in German and Japanese firms	Hood, Neil; Taggart, James H.	1999	4	Regional Studies	Compares subsidiary development patterns in German and Japanese manufacturing subsidiaries.
Analyze the impact of employment protection on FDI	Kandilov, Ivan T.; Senses, Mine Z.	2016	3	Canadian Journal of Economics	Correlates employment protection measures with FDI transactions in the US.
Examine FDI's impact on new firm survival in the UK	Burke, Andrew; Görg, Holger; Hanley, Aoife	2008	3	Small Business Economics	Correlates FDI with business start-up survival, considering dynamic vs. static industries.
Investigate direct and indirect wage effects of foreign ownership	Girma, Sourafel; Görg, Holger; Kersting, Erasmus	2019	4	Journal of International Business Studies	Analyzes direct and indirect wage effects of foreign ownership, considering industry and location factors.

Table 9: Appendix: Timeline and Insights from Pivotal EBSCO Papers on Knowledge Spillover Theory of Entrepreneurship.

Name of the Paper	Authors	Year (EBSCO)	ABS Rank	Journal Title	Summary
Does the KSTE hold for regions?	Audretsch, D.B., & Lehmann, E.E.	2005	4*	Research Policy	Validates the KSTE's relevance at a regional level.
Do Organizational and Spatial...	Oerlemans, Leon; Meeus, Marius	2005	4	Regional Studies	Study on the interplay of firm resources, networking, and spatial proximity.
Social Capital and the Linkages of High-Tech Companies to the Military Defense System: Is There a Signaling Mechanism?	Honig, Benson; Lerner, Miri; Raban, Yoel	2006	3	Small Business Economics	Investigates how social capital, signaling, and knowledge spillovers influence resource acquisition in Israeli high-tech companies.
Occupational Choice: The Influence of Product vs. Process Innovation	Wong, Poh Kam; Lee, Lena; Foo, Maw Der	2008	3	Small Business Economics	Explores how an organization's innovation activities influence business founding.
The KSTE	Acs, Z.J., Braunerhjelm, P., Audretsch, D.B., & Carlsson, B.	2009	3	Small Business Economics	Analyzes knowledge spillovers' role in driving entrepreneurship.
Innovation Dynamics of Global...	Isaksen, Arne	2009	4	Regional Studies	Analyzes innovation practices within Norwegian regional clusters.
The Pace and Stability of Small Enterprise Innovation in Highly Dynamic Economies: A China-Based Template	Li, Xibao; Mitchell, Ronald K.	2009	3	Journal of Small Business Management	Analyzes dynamics of knowledge spillover entrepreneurship in Chinese transitional contexts.
Knowledge spillovers and strategic entrepreneurship	Agarwal, Rajshree; Audretsch, David; Sarkar, Mb	2010	4	Strategic Entrepreneurship Journal	Links knowledge spillovers with strategic entrepreneurship for future research.

The Missing Link: Knowledge Diffusion and Entrepreneurship in Endogenous Growth	Braunerhjelm, Pontus; Acs, Zoltan J.; Audretsch, David B.; Carlsson, Bo	2010	3	Small Business Economics	Argues that entrepreneurs are essential for converting knowledge into economically relevant forms, supporting endogenous growth theory.
Growth and entrepreneurship.	Acs, Zoltan et al.	2012	3	Small Business Economics	Discusses entrepreneurship's influence on knowledge spillover and economic growth.
An Absorptive Capacity Theory of KSTE	Qian, H., & Acs, Z.J.	2013	3	Small Business Economics	Integrates 'absorptive capacity' into KSTE, emphasizing its role in entrepreneurship.
The Missing Pillar: The Creativity Theory of KSTE	Audretsch, D.B., & Belitski, M.	2013	3	Small Business Economics	Introduces creativity to KSTE, emphasizing its importance alongside human capital.
Conceptualizing knowledge-based...	Hayter, Christopher S.	2013	3	Small Business Economics	Exploration of networks in knowledge-based entrepreneurship.
Knowledge and Entrepreneurial Employees: A Country-Level Analysis	Stam, Erik	2013	3	Small Business Economics	Focuses on knowledge spillovers and prevalence of entrepreneurial activities among employees.
Academics' Start-Up Intentions and Knowledge Filters...	Guerrero, M., & Urbano, D.	2014	3	Small Business Economics	Small Business Economics
Localized competition in the KSTE	Plummer, L.A., & Acs, Z.J.	2014	4*	Journal of Business Venturing	Examines localized competition's impact on the KSTE.
Foreign direct investment...	Herrera-Echeverri, Hernán et al.	2014	3	Journal of Business Research	Investigates the relationship between FDI, entrepreneurship, and institutional quality.
Entrepreneurship, innovation...	Huggins, Robert; Thompson, Piers	2015	3	Small Business Economics	Analyzes the relationship between network dynamics, entrepreneurship, and regional growth.

Country Level Efficiency and...	Lafuente, Esteban et al.	2016	3	Journal of Technology Transfer	Assessment of entrepreneurial resource efficiency at the country level.
Labour as a Knowledge Carrier: How Increased Mobility Influences Entrepreneurship	Braunerhjelm, Pontus; Ding, Ding; Thulin, Per	2016	3	Journal of Technology Transfer	Validates KSTE by exploring the impact of labour mobility on entrepreneurship in Sweden.
Knowledge Spillovers and New Ventures' Export Orientation	De Clercq, D., Hessels, J., & Van Stel, A.	2017	3	Small Business Economics	Connects export ventures to knowledge spillovers from foreign investments.
Knowledge Spillovers, Collective Entrepreneurship...	Leyden, D.P., & Link, A.N.	2017	3	Small Business Economics	Discusses university- business collaborations, emphasizing government-backed programs.
Information Technology Clusters...	Garcia-Vicente, Floencia et al.	2017	3	Small Business Economics	Explores the impact of IT clusters on regional growth in 1970s America.
The Dynamics of Cluster Entrepreneurship: Knowledge Legacy from Parents or Agglomeration Effects? The Case of the Castellon Ceramic Tile District	Hervas-Oliver, Jose- Luis; Lleo, Maria; Cervello, Roberto	2017	4*	Research Policy	Explores the roles of knowledge legacies and agglomeration in industry clustering using the case of the ceramic tile cluster in Spain.
A cross-national study of knowledge...	Yoon, H., Kim, N., Buisson, B., & Phillips, F.	2018	3	Journal of Business Research	Analyzes the impact of government interventions on knowledge-to- entrepreneurship conversion across countries.
New Firm Formation and Regional Knowledge Production Modes: Italian Evidence	Colombelli, Alessandra; Quatraro, Francesco	2018	4*	Research Policy	Studies the impact of local knowledge configurations on new firm formation in Italian regions.

Historical Roots of Regional Entrepreneurship...	Del Monte, A., & Pennacchio, L.	2019	3	Small Business Economics	Relates historical knowledge to contemporary entrepreneurial activities.
Commercializing university research...	Belitski, Maksim et al.	2019	4*	Research Policy	Examines commercialization of research in transition economies.
Patent-Based Investment Funds: From Invention to Innovation	Jarchow, Svenja; Rohm, Andrea	2019	3	Journal of Technology Transfer	Examines patent-based funds as intermediaries in knowledge spillover processes.
The Influence of Exploratory versus Exploitative Acquisitions on Innovation Output in the Biotechnology Industry	Lange, Stephanie; Wagner, Marcus	2019	3	Small Business Economics	Analyzes effects of different modes of external knowledge sourcing in the biotechnology industry.
From Latent to Emergent Entrepreneurship...	Caiazza, R., Belitski, M., & Audretsch, D.B.	2020	3	Journal of Technology Transfer	Explores knowledge transformation into entrepreneurship, suggesting a cyclical KSTE.
Entrepreneurs for a low carbon world...	Cojoianu, Theodor F. et al.	2020	4*	Research Policy	Examines how environmental knowledge influences the rise of green startups.
Cultural diversity and knowledge in explaining entrepreneurship...	Audretsch, D.B., Belitski, M., & Korosteleva, J.	2021	3	Small Business Economics	Links cultural diversity, knowledge, and entrepreneurial activities in European cities.
A meta-analysis of agglomeration and venture performance...	Mathias, B.D., McCann, B.T., & Whitman, D.S.	2021	4*	Strategic Entrepreneurship Journal	Assesses agglomeration's mixed effects on venture performance, highlighting the key role of knowledge spillovers.
Anchoring talent to regions...	Kitagawa, Fumi et al.	2021	4	Regional Studies	Universities' role in graduate retention with a focus on KSTE.

6. Discussion and Conclusion

6.1 Paper 1 Summary and Contribution

Paper 1 provides an exploration into the mechanisms influencing multinational enterprise (MNE) spillovers in entrepreneurial ecosystems (EEs), acknowledging the foundational theories of Porter (1998) and Audretsch and Keilbach (2007) while highlighting the necessity for a more integrated approach beyond these isolated frameworks (Pennings, 1982; Dubini, 1989). By conducting a diligent systematic literature review, the study delves into the nuances of these interactions, emphasizing the role of foreign direct investment (FDI) in potentially igniting EEs' formation, a concept that previous empirical studies, such as those by Ryan et al. (2020), assumed rather than explicitly explained.

Our study contributes to the theoretical landscape by exploring several key areas. We transcend the traditional disciplinary boundaries with an exhaustive systematic literature review, drawing from both extant and innovative inclusion of what we term as “non-EE” literature. This amalgamation ensures that antecedent frameworks, often overlooked, such as agglomeration theories, are granted their due significance in understanding the evolutionary trajectory of the EE framework. This research reviews a diverse range of literature through the EE lens, providing insights into prevalent themes and contradictions that help clarify the role of MNE spillovers in entrepreneurial ecosystems. In essence, our research acts as a bridge, meticulously organizing and deciphering the intricate spillover literature, simplifying complex constructs, and fostering clearer theoretical constructs within the domain.

The methodology of this paper is grounded in a thorough literature review, aiming to provide a comprehensive analysis. It doesn't confine itself to the EE framework but ventures into antecedent and complementary frameworks that have considerably influenced the emergence of the EE paradigm. This broad perspective offers a more holistic view, allowing the identification of recurring themes, contradictions, and various contexts where MNE spillovers significantly impact EEs' growth and development. The synthesis of findings into an easily digestible flowchart provides an innovative methodological approach, making complex data more accessible and paving the way for further research.

Apart from its profound academic implications, the research also delivers tangible benefits for real-world application. It furnishes policymakers and business leaders with critical insights into the role of MNEs in catalyzing entrepreneurial activity and ensuring the sustainable growth of EEs. The findings can serve as a guiding beacon for strategic policy decisions concerning FDI attraction and management, influencing the resilience, evolution, and success trajectory of entrepreneurial ecosystems. This paper seeks to connect various academic discourses and lays a groundwork for future research in this area. It accentuates the imperative to rethink, revisit, and renew our grasp of spillover mechanisms, thereby positioning itself as a pivotal piece in the ever-evolving puzzle of EE theory building. This inaugural exploration sets the stage, making a compelling case for further deep dives into the vast ocean of entrepreneurial ecosystems and their myriad intricacies.

6.2 Paper 2 Summary and Contribution

Paper 2 responds directly to the clarion call initiated by Paper 1, emphasizing the imperative of empirical scrutiny within multinational enterprise (MNE) influenced entrepreneurial ecosystems. By homing in on Dublin's entrepreneurial landscape—a prototype of transformation catalyzed by substantial foreign direct investment (FDI), primarily marked by Google's establishment in 2003—this study pioneers in-depth empirical exploration within the EE literature. There exists a stark contrast between the city's documented economic profile and the grassroots realities faced by its entrepreneurial denizens. This divergence is what the paper thoroughly addresses, delving into the textures of lived entrepreneurial experiences versus theoretical postulations or macro-economic statistics. By harnessing the EE framework, underpinned by seminal theories such as social network theory (Aldrich & Zimmer, 1986; Granovetter, 1973) and the resource-based view (Barney, 1991; Penrose, 1959), this study crafts a panoramic yet intricate portrayal of Dublin's EE. The research, in essence, is an act of validation, verifying Dublin as a quintessential landscape for continued investigation into the spillover mechanisms articulated in Paper 3, thereby building a cohesive narrative across the studies. The alignment with Cantner et al.'s (2020) evolutionary model infuses a temporal dimension, enabling a diachronic analysis that respects the ecosystem's evolutionary nature.

The contributions of this research are manifold, significantly advancing both theoretical constructs and empirical richness within the EE literature. Firstly, by adopting a qualitative stance rooted in the first-hand accounts of entrepreneurs, the study elevates the discourse from a predominantly theoretical or quantitative dialogue to one resonating with the actual voices from the ecosystem's ground zero (Stam & Spigel, 2016; Mack & Mayer, 2016). This shift is not just methodological but also philosophical, acknowledging the ecosystem's organic and evolutionary character—a concept central to Cantner et al. (2020).

Secondly, the research serves as a beacon, guiding future scholarly inquiries in the field (Autio et al., 2018; Cho et al., 2021). By establishing an empirical benchmark, it lays the groundwork for subsequent theoretical explorations and refinements, particularly regarding the dynamics of MNE-led EEs. It's an academic forerunner, shedding light on the under-explored terrains of entrepreneurial experiences within burgeoning EEs like Dublin.

Moreover, the study wields policy implications, translating entrepreneurial narratives into insights for ecosystem fortification (Mason & Brown, 2014; Stam & Spigel, 2020). It bridges the gap between macro-economic ambitions and micro-economic realities, offering tangible strategies to leverage Dublin's inherent potential and sculpt an environment conducive to entrepreneurial proliferation and sustenance.

Finally, by illuminating the intricate mechanisms that either nourish or hinder entrepreneurial activities, the research broadens the EE theoretical spectrum. It reinforces the literature's empirical layer, ensuring that theoretical advancements are congruent with ground truths (Roundy et al., 2018; Ryan et al., 2020). In synthesizing these entrepreneurs' testimonies, the study contributes a kaleidoscopic perspective to the academic, pragmatic, and policy-oriented dimensions of EEs, ultimately enriching the entrepreneurial dialogue from Dublin's streets to the global scholarly arena.

6.3 Paper 3 Summary and Contributions

In the realm of entrepreneurship and local economic growth, the entrepreneurial ecosystem (EE) framework has become a buzzword, offering a holistic perspective across once-siloed fields like agglomeration economies, spillovers, and entrepreneurship. Despite Silicon Valley's success, replicating such an EE has proven elusive. A pivot in the dialogue emerges with the role of foreign direct investment (FDI) in the EE. While multinational enterprises (MNEs) can foster global linkages and knowledge diffusion, they can also dampen local entrepreneurial spirits. The broader strokes of MNE impacts are known, but the specifics of these spillover mechanisms, especially in the EE context, are a big black box. This paper particularly narrows in on Dublin's EE to examine these mechanisms.

Paper 3 significantly amplifies our understanding of the entrepreneurial ecosystem (EE) by shedding light on a domain previously shrouded in ambiguity: MNE spillover mechanisms. The subject of MNE spillovers, particularly within the EE framework, has largely been nebulous, with prior literature primarily offering broad correlations without delving into the intricate causalities underpinning these spillovers. This gap in knowledge becomes even more pronounced considering the evolution of the business landscape, especially the post-internet revolution.

The first key contribution is the empirical Investigation & theory testing carried out for paper 1's findings. This paper offers valuable empirical insights into MNE spillover mechanisms by centering its investigations around Dublin's EE. By exploring how Dublin-based entrepreneurs experience MNE spillovers, the paper serves as an empirical response to the theoretical postulates and gaps highlighted in Paper 1. Through this exploration, Paper 3 not only enriches our understanding but also tests the theories laid out in Paper 1.

Further, it also provides temporal insights by proposing a key conceptual and methodological contribution. An innovative aspect of Paper 3 is its introduction of the FARM map, a conceptual tool designed to track spillover mechanisms over time in an evolving EE. This not only addresses the call for a temporal dimension, highlighting the evolutionary nature of EEs and MNE spillovers, but it also offers a groundbreaking approach to future studies. By delving into the micro-mechanisms and elucidating the specificities of how entrepreneurs experience these spillovers, this paper offers a granular understanding, thus addressing the broader strokes often presented in past research.

Paper 3 coherently integrates findings from the fields of agglomeration economies, entrepreneurship, and spillovers, thereby bridging disparate domains. In doing so, it provides a roadmap for understanding the complex interplay between MNEs and entrepreneurial ecosystems. The FARM map introduced in this study doesn't just serve a theoretical purpose; it offers a practical tool for stakeholders, be it policymakers, entrepreneurs, or academic researchers, to examine and understand the trajectory of MNE spillover mechanisms across various EEs. It sets the stage for further empirical investigations in diverse entrepreneurial ecosystems, considering different points of entry of MNEs, and even extending to other key actors beyond MNEs.

In conclusion, the contribution of this thesis represents a quantum leap in the EE literature with the addition of paper 3. It illuminates the pathway to exploring the long-standing black box of MNE spillover mechanisms. By empirically investigating the underexplored realm of MNE spillover mechanisms in the Dublin EE, and introducing a time-sensitive mapping tool, this paper paves the way for holistic

understandings, targeted policy-making, and future research, progressively illuminating what has been a substantial blind spot in the field.

6.3 Limitations

In the course of investigating the impact of MNE spillovers on the development and evolution of entrepreneurial ecosystems (EEs), several limitations emerged that warrant thoughtful consideration. In the first paper, our reliance on a systematic literature review, though methodologically sound, brought forth inherent challenges. The current literature, replete with inconsistencies and dated empirical data, constrained the depth and breadth of our insights. Moreover, the multifaceted nature of EEs, influenced by a plethora of regional, cultural, economic, and industrial factors, further complicated the endeavor to craft a universally applicable model. This complexity, coupled with the dynamic nature of MNEs and EEs, implies that our comprehension of spillover mechanisms remains fluid, subject to refinement as fresh empirical evidence comes to light.

Our second paper offers a perspective uniquely tailored to the experiences of entrepreneurs, especially within the confines of Dublin's EE. However, this singular vantage point, while rich in its depth, may inadvertently overlook the perspectives of other essential stakeholders. Despite the textured insights derived from qualitative tools, there's an inherent risk of glossing over broader ecosystem trends. A conspicuous gap in this paper is the nuanced exploration of the spillover effects of MNEs within the Dublin region, given their significant influence on global entrepreneurial climates.

The third investigation, while encompassing a broad spectrum of MNE spillover mechanisms, necessitated a focused approach for tractability. In doing so, some mechanisms, albeit significant, might have been sidestepped. The introduced FARM model, a conceptual guide, is specifically rooted in the empirical analysis of Dublin's EE. As such, its applicability may wane when transposed to distinct entrepreneurial ecosystems with unique cultural, economic, and policy nuances. Notably, the model prioritizes the genesis to maturation phases of the ecosystem, eschewing the equally pertinent decline or re-emergence stages. This emphasis was strategic, designed to offer foundational insights, though it does underscore the model's non-exhaustive nature. Furthermore, the FARM concept map, while instrumental in delineating ecosystem dynamics, runs the risk of oversimplifying the intricate, often chaotic, nature of real-world EEs.

To encapsulate, while this thesis offers substantial strides in understanding the relationship between MNE spillovers and EEs, it also underscores the intricate nature of this relationship. The presented limitations not only delineate the boundaries of our current understanding but also chart potential avenues for subsequent scholarly pursuits. It is imperative that future research endeavors adopt a more holistic, diversified approach, ensuring a more comprehensive capture of the intricate dynamics at play between EEs and MNE spillovers.

6.4 Future Research

Paper 1: In our extensive review of the relevant literature, several pivotal areas of future research became discernible. The changing nature of today's global business environment, accentuated by technological advancements and digital transformations, underscores a pressing need to re-evaluate and rejuvenate the current theoretical constructs surrounding MNEs, especially since the 2000s. As enterprises have shifted from relying primarily on physical proximity to embracing the digital and global realm, there's a clear challenge to the traditional understanding of agglomeration benefits. Further, broad national-level analyses fall short in capturing the true essence of varied regional entrepreneurial ecosystems. This glaring omission, when coupled with the intricacies inherent to the EE framework, emphasizes the demand for a more nuanced, contextually apt, and granular approach.

The persistent gaps within the agglomeration literature and the EE framework necessitate an extensive exploration that goes beyond generalized categorizations, focusing more on the intricate mechanisms, particularly regarding unintended spillover effects. Moreover, the evolving empirical landscape of MNEs since the turn of the century calls for a thorough re-examination of established theories. Thus, a transformative research agenda is required—one that is dedicated to empirical case studies across varied entrepreneurial ecosystems. The ultimate aim is to enrich the understanding of MNE spillovers within modern entrepreneurial settings and, in doing so, guide key stakeholders in optimizing these spillovers for innovation, resilience, and growth.

Paper 2: This research presents a comprehensive understanding of Dublin's entrepreneurial ecosystem, spotlighting its strengths and areas requiring attention. The city's foundation in market access, funding, and an evolving entrepreneurial culture is robust. Yet, gaps emerge, notably during the startup scaling phase. To truly realize Dublin's entrepreneurial promise, addressing these shortcomings is essential. Through the lens of entrepreneurs, this study provides a detailed narrative on their experiences within this ecosystem. However, there are limitations tied to the chosen methodology and the singular focus on entrepreneurs' viewpoints. Future investigations would benefit from widening the scope to incorporate other stakeholders and adopting mixed methodologies to offer a more encompassing portrait of Dublin's entrepreneurial landscape.

Paper 3: In this study, a deep dive was taken into the intricate MNE spillover mechanisms within Dublin's entrepreneurial ecosystem, bringing to light the real-life experiences of entrepreneurs and their interactions with these spillovers. By leveraging Dublin's unique yet relatable entrepreneurial context, the study unearthed a myriad of spillover mechanisms and their critical roles. Methodological innovations were also at the forefront, with the adoption of the FDI spillover mechanisms flowchart, the intertwining of qualitative research methods, and the introduction of the FARM map, providing a new foundation for analyzing entrepreneurial ecosystems. However, as the study sheds light on certain areas, it also accentuates the vast expanse yet to be explored. It calls for future explorations to probe MNE entries across varying EE evolutionary phases, and as EEs continuously evolve, it emphasizes the need for our scholarly frameworks to adapt in tandem. This research, while groundbreaking, is merely the initiation of an extensive explorative journey, and it invites the global academic community to delve deeper into understanding entrepreneurial ecosystems.

Table 10: Future Research Questions

Paper 1	Research Focus	Research Questions
	Modern implications of digital transformations on MNE spillovers	1. How have global digital supply chains altered the traditional understanding of MNE spillovers and agglomeration benefits? 2. How do digital enterprises leverage or challenge existing MNE spillover theories?
	Contextual specificity in studying entrepreneurial ecosystems	1. How do the entrepreneurial ecosystems of regions like Bangalore differ from those like Kolkata, even within the same national context? 2. Can a universal model be applied across different EEs, or is there a need for tailored approaches?
	Comprehensive, locally-focused approach to the broader agglomeration literature	1. How does the EE framework enhance our comprehension of regional-specific MNE spillovers, especially when compared to other prevailing theories like cluster theory? 2. How can we bridge the evident gap in this comprehensive approach?
	Mechanisms fostering spillovers within the EE context	1. What are the uncharted mechanisms pivotal for MNE spillovers in the EE framework? 2. How do these mechanisms vary across different EEs, and what's their hierarchy of significance?
	Empirical transformations of MNEs in the 21st century and its impact on existing theories	1. Given the evolving nature of MNEs since the 2000s, how have established theories held up or evolved? 2. What new theories or modifications are necessary to encapsulate the contemporary realities of MNEs?
	Role of MNE spillovers in shaping entrepreneurial ecosystems	1. How do MNE spillovers directly and indirectly influence the innovation, resilience, and growth trajectories of EEs? 2. What strategies can policymakers and business leaders employ to optimize these spillovers?
Paper2	Research Focus	Research Questions
	Stakeholder Perspectives	1. How do perspectives of investors, mentors, and policymakers differ from entrepreneurs in assessing Dublin's entrepreneurial ecosystem?
	Methodological Diversification	2. What emergent patterns or broad trends become evident when applying quantitative surveys to Dublin's entrepreneurial scene?

	Startup Scaling Challenges	3. What specific hurdles do startups face in the scaling phase in Dublin compared to other comparable entrepreneurial ecosystems?
	Investment Landscape	4. How can Dublin further diversify and strengthen its post-seed investment landscape to support startups better?
	Bureaucratic Process Efficiency	5. What bureaucratic processes pose the most significant challenges to startups in Dublin, and how might they be streamlined?
	University and Educational Contribution	6. How can university curricula in Dublin be better tailored to nurture startup-specific skill sets and foster entrepreneurship?
	Comparison with other Entrepreneurial Ecosystems	RQ7: How does Dublin's entrepreneurial ecosystem compare with other emerging ecosystems in Europe in terms of strengths and challenges?
Paper 3	Research Focus	Research Questions
	MNE Entry Points	1. How do MNE spillover mechanisms differ in diverse entrepreneurial ecosystems beyond Dublin? 2. How do MNE spillover mechanisms vary across different phases of entrepreneurial ecosystem evolution?
	Methodological Refinement	1. How can the FARM map be adapted or expanded for diverse entrepreneurial ecosystems across various regions? 2. How can the FARM map be refined or adapted to better represent spillover mechanisms across different global contexts?
	EE Evolution and Policy	1. How do strategic policy interventions impact the nature and efficacy of MNE spillovers in evolving entrepreneurial ecosystems? 2. How can policy interventions be designed to optimize the benefits of MNE spillovers in evolving entrepreneurial ecosystems?
	Comparative Analyses	How do entrepreneurial experiences with MNE spillovers differ across multiple global entrepreneurial ecosystems?
	Spillover Mechanism Dynamics	What specific micro-mechanisms drive MNE spillovers in entrepreneurial ecosystems undergoing rapid transformation?

6.5 Conclusion

In this endeavor, we have embarked on a pragmatic journey to unravel the often-enigmatic blackbox of MNE spillover mechanisms within the evolving framework of entrepreneurial ecosystems (EE). Acknowledging the inherent limitations, this thesis has nevertheless made significant strides in bridging the identified research gap. Not only have we pinpointed areas ripe for further investigation, but we have also equipped the scholarly community focused on entrepreneurial ecosystems with robust theoretical, methodological, and conceptual tools. Moreover, by providing a solid foundation for critical discourse, this work fosters an environment where the field can mature and expand, ensuring that the complexities of EE dynamics are better understood and appreciated in future scholarly pursuits.

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