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**COMPARATIVE ANALYSIS OF ENTREPRENEURIAL ECOSYSTEMS IN
SELECTED NORTHERN AND WESTERN EUROPEAN COUNTRIES**

Master thesis

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We have written this Master's thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced

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Abstract

This thesis investigates how structural pillars of entrepreneurial ecosystems: policy, finance, and human capital, are associated with entrepreneurial activity across nine Northern and Western European countries over 2014-2022, with a particular focus on Estonia. Drawing on Stam's ecosystem framework and bottleneck logic, the study conceptualises these pillars as higher-level conditions shaping the environment in which entrepreneurship occurs. It operationalises them as composite indices built from harmonised international indicators. Entrepreneurial activity is measured using new business density, capturing the intensity of formal firm creation as a system-level outcome indicator. The empirical strategy combines descriptive comparison of country profiles with panel regressions estimated using pooled OLS and two-way fixed effects, interpreting coefficients as within-country associations rather than causal effects. The results show that within-country changes in finance and human capital are positively associated with changes in new business density. At the same time, the policy pillar, measured through broad governance indicators, exhibits weaker and less stable links, suggesting that its influence may be more indirect and longer-term. Estonia emerges as a distinctive configuration, combining very high new business density with only average finance and comparatively weaker human capital and governance conditions relative to Nordic countries, implying that high firm quantity does not automatically signal stronger ecosystem quality or scaling capacity. The findings underscore the importance of ecosystem configurations and bottlenecks and suggest that further development of Estonia's ecosystem may depend on strengthening financial depth and human capital conditions alongside its already favourable digital and administrative environment. This thesis contributes to comparative entrepreneurial ecosystem research by applying a focused pillar-based framework to a relatively comparable group of Northern and Western European countries. Its main contribution is to show that high levels of formal business creation do not necessarily indicate uniformly strong ecosystem conditions. In particular, the Estonian case demonstrates the importance of distinguishing between entrepreneurial quantity and ecosystem quality, as well as the need to interpret policy, finance, and human capital as interacting conditions rather than isolated explanatory factors.

Keywords: entrepreneurial ecosystems, new business density, panel data analysis, human capital, finance, policy, Estonia

CERCS codes: S180, S181, S190

Introduction

Over the last decade, entrepreneurial ecosystems have become a major point of reference in discussions of entrepreneurship, innovation, and regional development within the European Union (OECD, 2014; Stam, 2015). Rather than viewing entrepreneurship as the outcome of individual traits or firm-level decisions alone, the ecosystem perspective emphasizes the broader environment in which entrepreneurial activity takes place. Entrepreneurial ecosystems are generally understood as territorially embedded systems of interdependent actors, institutions, and resources that collectively support productive entrepreneurship (Stam, 2015; Stam & Spiegel, 2016; Spiegel, 2017). Within this view, entrepreneurial outcomes emerge through interactions between finance, policy, human capital, and other institutional conditions that shape how opportunities are created and exploited (Acs et al., 2014; Audretsch & Belitski, 2017; Mason & Brown, 2014).

The growing popularity of the ecosystem concept has also shifted attention towards the internal dynamics of entrepreneurial environments. Recent studies describe entrepreneurial ecosystems as evolving systems characterized by feedback effects, institutional interdependence, and path-dependent development processes (Content et al., 2020; Komlósi et al., 2024). Research increasingly highlights the importance of knowledge spillovers, complementarities between public and private investment, and entrepreneurial recycling processes through which successful founders reinvest experience, capital, and networks back into the ecosystem (Mason & Brown, 2014). This perspective moves beyond simple start-up counts and instead focuses on how ecosystem structures influence the direction, sustainability, and broader economic contribution of entrepreneurial activity (Acs et al., 2014; Stam & van de Ven, 2021).

Despite the rapid expansion of ecosystem research, comparative empirical evidence across European countries remains relatively uneven (Brown & Mason, 2017; Stam & van de Ven, 2021). Much of the existing literature relies on composite indices and benchmarking exercises, particularly the Global Entrepreneurship Index and similar approaches, to compare entrepreneurial performance across national settings (Acs et al., 2014; Leendertse et al., 2022). While these approaches are useful for identifying broad patterns and cross-country differences, they often compress diverse institutional mechanisms into single aggregate scores. As a result, they provide only limited insight into how particular combinations of ecosystem conditions are associated with entrepreneurial outcomes in different national contexts (Brown & Mason, 2017; OECD, 2014). Comparative studies frequently identify

strengths and weaknesses across countries without fully explaining how specific ecosystem conditions interact or reinforce one another over time.

To keep the empirical framework focused and methodologically consistent, the analysis concentrates on three structural pillars that can be measured comparatively across countries and over time: policy, finance, and human capital. Policy refers to the institutional and regulatory environment captured through governance-quality indicators that shape the coordination of entrepreneurial activity. Finance reflects both the availability and structure of capital accessible to firms, combining bank-based lending with venture capital investment, which may also provide strategic knowledge and network access (Cantner et al., 2021; Mason & Brown, 2014). Human capital captures the broader skill environment of the economy, including educational attainment, participation in adult learning, and labor-market integration (Audretsch & Belitski, 2017; Stam, 2015). These pillars are treated as higher-level structural conditions that influence the environment in which entrepreneurship develops rather than as direct measures of entrepreneurial behavior itself (Content et al., 2020; Stam, 2015). In the empirical analysis, each pillar is operationalized through composite indices constructed from comparable national-level indicators aligned with the methodological framework presented later in the thesis.

Entrepreneurial activity is measured using new business density, defined as the number of newly registered firms per 1,000 people aged 15-64 according to the World Bank indicator (Acs et al., 2014; World Bank, n.d.). The indicator provides a broadly comparable measure of formal business creation across countries and over time and is widely used in comparative entrepreneurship research. At the same time, it primarily captures the quantity rather than the quality of entrepreneurial activity, since it does not differentiate between high-growth innovative ventures and lower-productivity firms (Content et al., 2020; Komlósi et al., 2024). For this reason, the thesis interprets new business density as a system-level outcome indicator rather than a complete measure of ecosystem performance. The empirical analysis, therefore, focuses on identifying associations between structural ecosystem conditions and entrepreneurial activity rather than establishing strict causal relationships.

The main aim of the thesis is to examine how configurations of policy, finance, and human capital are associated with differences in new business density across selected Northern and Western European countries and to derive policy-relevant insights for Estonia's entrepreneurial ecosystem. This objective is reflected in the following research question:

How do policy, finance, and human-capital configurations differ across selected Northern

and Western European countries, and how are these configurations associated with differences in new business density, particularly in the case of Estonia?

To address this question, the thesis pursues four research tasks:

- To synthesize key theoretical perspectives on entrepreneurial ecosystems, with a focus on system-level interactions and the role of policy, finance, and human capital as structural pillars.
- To operationalize these pillars using comparable national-level indicators and construct cross-country composite indices for the period 2014-2022.
- To analyze how differences in these pillars are associated with variations in new business density across the selected countries using descriptive statistics and panel regression models (pooled OLS, country fixed effects, and two-way fixed effects), with an emphasis on comparative patterns rather than strict causal identification.
- To discuss the implications of these findings for Estonia, identifying potential structural imbalances and policy-relevant insights for ecosystem development.

The scope of the study is intentionally limited. Geographically, the analysis focuses on Northern and Western European countries in order to combine institutional comparability with meaningful variation in ecosystem structures (Content et al., 2020). The empirical period covers 2014-2022 and is based on a harmonized country-year dataset consisting of 81 observations. The study relies on national-level indicators and therefore does not examine regional or sector-specific ecosystems. Informal ecosystem dimensions, such as entrepreneurial culture, networks, and narratives, are recognized as important but are not directly quantified within the empirical framework. Instead, they are considered qualitatively in the interpretation of country differences and in the discussion of Estonia's ecosystem development (Roundy et al., 2018; Spigel, 2017).

The thesis is structured as follows. Chapter 1 develops the theoretical and analytical framework for entrepreneurial ecosystems and outlines the comparative perspective adopted in the study. Chapter 2 presents the research design, data sources, construction of the pillar indices, and empirical strategy. Chapter 3 provides the comparative empirical analysis of ecosystem conditions and new business density across the selected countries. The final chapter summarizes the main findings, discusses their implications for Estonia, and outlines the limitations of the study together with directions for future research.

1. Theoretical Overview

This chapter develops the theoretical foundation for analyzing entrepreneurial ecosystems in a comparative setting. The analysis adopts a system-level perspective in which entrepreneurial activity is understood not as the result of isolated individual decisions, but as an outcome shaped by broader institutional and structural conditions and by the interactions between them. The chapter begins by outlining the conceptual foundations of entrepreneurial ecosystems and defining the main institutional pillars examined in the thesis. It then discusses complementarities, bottlenecks, and system dynamics within entrepreneurial ecosystems before turning to comparative approaches and research gaps that motivate the empirical strategy adopted later in the study.

1.1 Entrepreneurial Ecosystems: Conceptual Foundations and Core Institutional Pillars

The concept of the entrepreneurial ecosystem has become increasingly influential in research on entrepreneurship, innovation, and regional economic development. Earlier approaches often concentrated on firm-level resources or the characteristics of individual entrepreneurs, whereas more recent work emphasizes the broader environment in which entrepreneurial activity takes place (Acs et al., 2014; Spigel, 2017). From this perspective, entrepreneurial outcomes emerge through interactions between institutional arrangements, economic structures, and ecosystem actors rather than through isolated entrepreneurial efforts alone (Audretsch & Belitski, 2017; Stam, 2015). Comparative evidence across European regions further suggests that similar levels of entrepreneurial activity may produce different economic outcomes depending on ecosystem quality and institutional configuration (Content et al., 2020; Komlósi et al., 2024).

Entrepreneurial ecosystems are commonly described as sets of interdependent actors and conditions organized within a specific territory to support productive entrepreneurship (Stam, 2015; Stam & Spigel, 2016). The emphasis extends beyond business creation itself toward forms of entrepreneurship capable of generating innovation, employment, and longer-term economic value (Baumol, 1990; Mason & Brown, 2014). In this sense, entrepreneurial ecosystems are linked not only to start-up activity but also to broader processes of productivity growth and economic transformation (Acs et al., 2014). The ecosystem metaphor highlights the circulation of resources such as capital, knowledge, and talent among entrepreneurs, investors, public institutions, and intermediary organizations (Isenberg, 2011; Moore, 1993). Unlike natural ecosystems, however, entrepreneurial ecosystems are socially

and institutionally constructed and are shaped by governance arrangements, policy choices, and strategic interaction between actors (Oh et al., 2016; Roundy et al., 2018).

Recent contributions increasingly describe entrepreneurial ecosystems as dynamic and adaptive systems characterized by feedback effects, path dependence, and non-linear development processes (Content et al., 2020; Malecki, 2018). Ecosystem performance depends not only on whether supportive elements exist, but also on how effectively they interact and reinforce one another over time. A particularly important distinction within this literature is the difference between framework conditions and systemic conditions (Stam, 2015). Framework conditions refer to broader institutional and socio-economic structures, including governance quality and regulatory arrangements, that shape incentives and opportunity structures within the economy. Systemic conditions constitute the most immediate functional environment of entrepreneurship and include factors such as access to finance, entrepreneurial networks, knowledge diffusion, and human capital formation. These dimensions are closely interconnected. Access to finance, institutional quality, knowledge circulation, and labor-market conditions influence entrepreneurial outcomes not independently, but through their interaction within the wider ecosystem environment. This broader systemic understanding forms the basis of the comparative framework developed in the present thesis, which focuses empirically on policy, finance, and human capital as the core structural pillars of the entrepreneurial ecosystem.

Entrepreneurial ecosystems also evolve over time through cumulative and reinforcing processes. One mechanism frequently highlighted in the literature is entrepreneurial recycling, whereby successful entrepreneurs reinvest capital, experience, and networks back into the ecosystem as investors, mentors, or serial founders (Mason & Brown, 2014; OECD, 2014). Ecosystem development is further shaped by path dependence and by long-term institutional trajectories. Structural economic shifts may release entrepreneurial talent and skilled labor into the market, while investments in education, innovation systems, and digital infrastructure often influence entrepreneurial activity only gradually over extended periods. Estonia's digital transformation is commonly discussed as an example of such long-term ecosystem development dynamics (Trabskaja & Mets, 2019). Because entrepreneurial outcomes emerge through these cumulative processes, ecosystem performance is rarely determined by isolated factors alone. Weaknesses in areas such as access to growth finance or skill availability may constrain broader ecosystem performance even when other conditions remain favorable. This bottleneck logic underlines the importance of complementarities between ecosystem components and provides an important foundation for comparative ecosystem analysis (Acs et

al., 2014; OECD, 2014).

In order to operationalize entrepreneurial ecosystems empirically, researchers have developed a number of conceptual frameworks identifying the main ecosystem components and their relationships. Early approaches, particularly Isenberg's six-domain model, mapped a broad range of ecosystem elements, including policy, finance, culture, human capital, support organizations, and markets (Isenberg, 2011). Such frameworks remain useful for descriptive and diagnostic purposes, especially in identifying the range of conditions commonly associated with entrepreneurial environments. At the same time, they provide limited guidance regarding analytical hierarchies or interaction mechanisms between ecosystem elements, which reduces their suitability for more structured comparative analysis (Alvedalen & Boschma, 2017; Spigel, 2017). The main ecosystem domains identified in early entrepreneurial ecosystem frameworks are illustrated in the next figure.

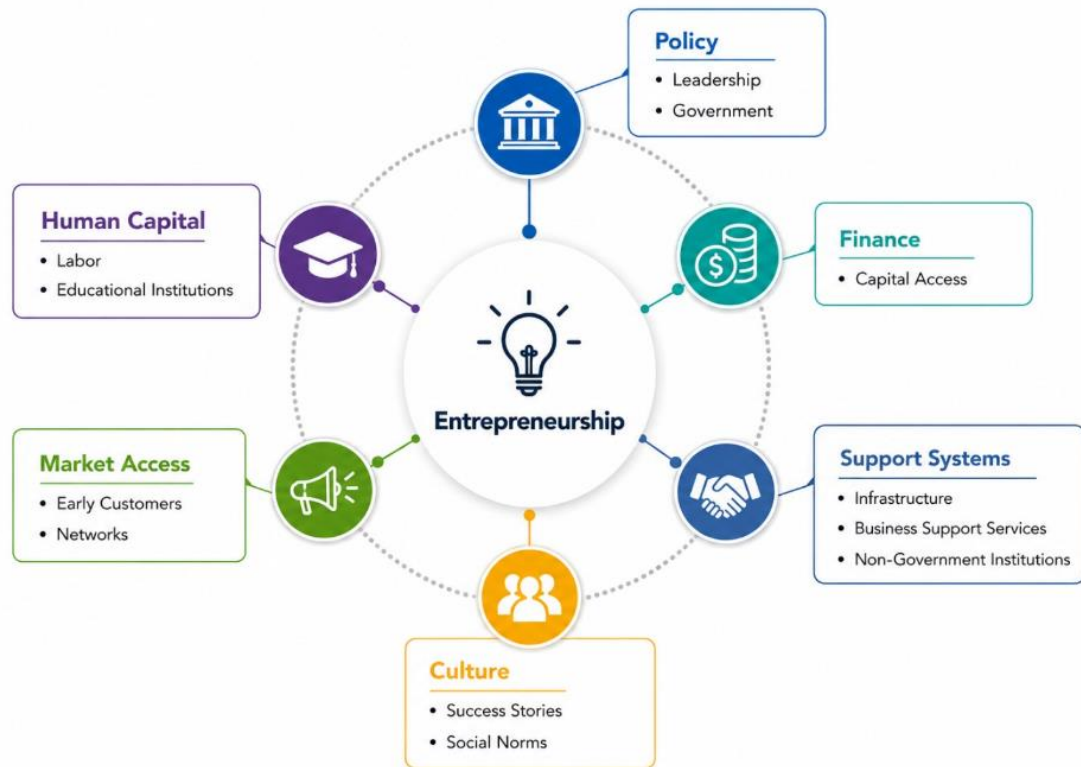


Figure 1. Core domains of the entrepreneurial ecosystem. Source: Created by authors based on Isenberg (2011).

While Figure 1 illustrates the main domains commonly associated with entrepreneurial ecosystems, the present thesis does not apply Isenberg's framework directly in the empirical analysis. Isenberg's framework is useful for identifying the different elements linked to entrepreneurial activity, including policy, finance, markets, culture, and support institutions (Isenberg, 2011). However, the framework remains relatively descriptive and gives less

attention to how these elements interact or which conditions play a more central role within the ecosystem (Alvedalen & Boschma, 2017; Spigel, 2017). By contrast, Stam's framework focuses more directly on the relationship between institutional conditions and the systemic factors connected to entrepreneurial outcomes (Stam, 2015). This provides a clearer structure for comparative empirical analysis, especially when examining how policy, finance, and human capital interact across countries and over time. At the same time, both approaches face a common difficulty in entrepreneurial ecosystem research: complex ecosystem dynamics are difficult to measure consistently using cross-country indicators. For this reason, the present thesis adopts a more focused pillar-based approach centred on policy, finance, and human capital. This makes the empirical analysis more transparent while still maintaining the broader ecosystem perspective. Stam's framework therefore serves as the main conceptual foundation of the empirical analysis, while Isenberg's model remains useful as a general reference point for understanding the multidimensional nature of entrepreneurial ecosystems.

For the purposes of comparative empirical analysis, the thesis primarily draws on Stam's ecosystem framework, particularly its distinction between broader framework conditions and more proximate systemic conditions. By linking these conditions to entrepreneurial outputs and broader economic outcomes, the framework allows entrepreneurial ecosystems to be examined as interconnected systems rather than as collections of isolated elements (Stam, 2015; Stam & van de Ven, 2021). This perspective is especially useful for analyzing how institutional environments interact with entrepreneurial finance, talent formation, networks, and knowledge circulation to shape entrepreneurial activity across countries (Trabskaja & Mets, 2019).

1.2 Interactions and Bottlenecks in Entrepreneurial Ecosystem Pillars

Entrepreneurial ecosystems are shaped not only by the presence of individual components but also by the ways in which these components interact within a broader institutional environment. Although policy, finance, and human capital can be separated analytically, entrepreneurial ecosystem research consistently emphasizes their interdependence. Ecosystem performance depends less on the isolated strength of individual pillars than on how effectively institutional conditions, financial systems, and the underlying skill base reinforce one another. This reflects a broader shift in ecosystem research away from static descriptions of entrepreneurial environments and toward an understanding of ecosystems as complex systems characterized by complementarities, feedback mechanisms, and non-linear relationships (Mason & Brown, 2014; Stam, 2015).

From this perspective, entrepreneurial activity emerges through multidirectional interactions between ecosystem elements rather than through simple additive effects. The ecosystem approach, therefore, helps explain why countries or regions with relatively similar institutional endowments may still exhibit very different entrepreneurial dynamics. It also clarifies why policy models that appear successful in one context often produce weaker results when transferred directly to another without considering local institutional configurations and ecosystem structures (Isenberg, 2011; OECD, 2014; Stam, 2015). A central implication of this interactional logic is that overall ecosystem performance may be constrained by its weakest component. Improvements in one dimension tend to generate limited returns if key bottlenecks remain unresolved elsewhere in the system, since weaknesses in critical areas effectively cap broader entrepreneurial outcomes (Acs et al., 2014; Stam, 2015).

This idea is formalized in the "penalty for bottleneck" approach associated with the Global Entrepreneurship Index, which conceptualises ecosystem performance as the outcome of interacting and mutually constraining conditions (Acs et al., 2014; Balawi & Ayoub, 2022). Within this framework, deficiencies in areas such as scale-up finance, talent availability, or network connectivity can impose disproportionate constraints on entrepreneurial activity even when other ecosystem dimensions remain relatively strong. Comparative studies of entrepreneurial ecosystems similarly demonstrate that regions differ significantly in how entrepreneurial activity translates into broader economic outcomes. Ecosystems often cluster into distinct types depending on their structural characteristics, and empirical evidence suggests that entrepreneurship contributes more strongly to economic growth where ecosystem conditions are aligned and mutually reinforcing (Content et al., 2020; Komlósi et al., 2024).

The emphasis on bottlenecks and interaction failures also has important implications for comparative policy analysis. Rather than replicating visible features of high-performing ecosystems, effective ecosystem policy requires identifying the specific constraints that limit productive interaction among institutional conditions, financial systems, and human-capital structures within a given context. Research on European regions suggests that balanced ecosystem configurations, in which major bottlenecks are minimized, are more strongly associated with productive entrepreneurial outcomes, whereas structural imbalances weaken the translation of entrepreneurial effort into economic value (Content et al., 2020; Komlósi et al., 2024). This helps explain why "one-size-fits-all" policy approaches rarely produce consistent outcomes across countries or regions with different institutional and economic structures.

Entrepreneurial ecosystems are also dynamic systems shaped by endogenous feedback mechanisms through which entrepreneurial outcomes influence future ecosystem development. One mechanism frequently discussed in the literature is entrepreneurial recycling, whereby successful entrepreneurial exits return financial capital, experience, and networks back into the ecosystem (Mason & Brown, 2014). Former entrepreneurs often re-enter the ecosystem as investors, mentors, or advisors, increasing the availability of informed capital and strengthening entrepreneurial networks. In this way, financial and institutional dynamics become closely interconnected. Successful ventures may expand access to entrepreneurial finance while simultaneously strengthening the legitimacy of entrepreneurial careers, influencing both talent allocation and long-term ecosystem development.

Policy plays an important role in shaping how financial and human-capital mechanisms interact within entrepreneurial ecosystems. Rather than directly generating entrepreneurial outcomes, policy influences the institutional environment within which private actors coordinate resources, assess risks, and make investment decisions (OECD, 2014; Stam, 2015). One key interaction channel concerns the relationship between institutional quality and finance. Stable and predictable regulatory environments can reduce uncertainty, improve investor confidence, and support the development of financial markets. Policy also interacts closely with human capital through institutional arrangements affecting education systems, labor markets, and skill formation processes (Audretsch & Belitski, 2017; Stam, 2015). These mechanisms shape not only the supply of skills within the economy but also the efficiency with which skills are allocated and utilized across entrepreneurial activity.

Where institutional conditions, financial systems, and human-capital structures reinforce one another, ecosystems may develop self-reinforcing growth dynamics. Improvements in governance quality can strengthen the functioning of financial systems and support more effective use of human capital, while stronger skill bases may increase firms' absorptive capacity and improve the productivity of financial resources. By contrast, persistent misalignment between ecosystem pillars can constrain overall ecosystem performance even when some individual dimensions remain relatively strong. For example, favorable institutional conditions and relatively strong human capital may still generate limited entrepreneurial scaling if access to growth finance remains weak (Content et al., 2020; Komlósi et al., 2024).

Recent research further suggests that entrepreneurial outcomes emerge from specific combinations of ecosystem conditions rather than from isolated factors acting independently. Studies applying configurational approaches, including fuzzy-set Qualitative Comparative

Analysis, demonstrate that different combinations of institutional quality, finance, and human-capital conditions may generate different entrepreneurial outcomes across contexts (Wurth et al., 2022). These findings reinforce the ecosystem perspective adopted in this thesis, which treats entrepreneurial activity as the outcome of interacting structural conditions rather than as the product of linear causal relationships between isolated variables. These differences across the literature also reflect a shift in entrepreneurial ecosystem research away from static descriptions of ecosystem components and toward more interactional and configurational interpretations. Earlier approaches often focused on identifying the presence of supportive ecosystem elements, whereas more recent work places greater emphasis on how institutional conditions reinforce, constrain, or compensate for one another within different national contexts. This perspective is particularly important for comparative analysis because similar ecosystem components may produce different entrepreneurial outcomes depending on how effectively they interact within the wider system.

Taken together, the interaction between policy, finance, and human capital highlights the importance of analyzing entrepreneurial ecosystems as configurational systems rather than as collections of independent components. Comparative analysis, therefore, requires attention not only to the strength of individual ecosystem pillars but also to how these pillars interact within specific institutional contexts and whether mechanisms observed in one ecosystem are compatible with the structural conditions of another (OECD, 2014; Stam, 2015). For the Northern and Western European countries examined in this thesis, this interactional perspective provides the analytical basis for assessing ecosystem bottlenecks and interpreting how different pillar configurations are associated with observed differences in new business density, particularly in the case of Estonia.

1.3 Measurement and Comparative Approaches and Research Gaps

Building on the conceptual and interactional foundations developed in the previous sections, this section shifts attention from the theoretical understanding of entrepreneurial ecosystems towards their comparative analysis and empirical operationalization. While Sections 1.1 and 1.2 examined how entrepreneurial ecosystems are structured and how their elements interact, the present section focuses on how these systems are measured and analyzed within the empirical literature. The section proceeds in two parts. It first reviews the main comparative approaches used in entrepreneurial ecosystem research, including index-based, survey-based, and policy-oriented frameworks. It then outlines the analytical approach adopted in this thesis

and identifies the research gaps motivating the empirical strategy developed in the later chapters.

1.3.1 Comparative Approaches to Entrepreneurial Ecosystem Analysis

Comparative entrepreneurial ecosystem research has developed largely through attempts to translate complex system-level characteristics into measurable and comparable indicators across countries and regions. Earlier approaches to measuring entrepreneurship typically relied on aggregate indicators such as self-employment rates, firm birth rates, or business density (Acs et al., 2014; Mason & Brown, 2014). Although these indicators provide useful descriptive benchmarks, they capture only limited dimensions of entrepreneurial activity and are often weakly connected to broader outcomes such as innovation, productivity, and long-term economic growth (Acs et al., 2014). As a result, ecosystem research has increasingly shifted towards approaches that seek to capture the wider institutional and structural environment within which entrepreneurship takes place.

One of the most influential comparative approaches is the Global Entrepreneurship Index (GEI), which combines institutional and individual-level indicators into multidimensional measures of ecosystem performance (Acs et al., 2014). A defining feature of the GEI is its "penalty for bottleneck" logic, according to which weaknesses in one dimension constrain the overall functioning of the ecosystem. This framework provides a structured way to identify imbalances across ecosystem components and compare relative strengths and weaknesses across countries. At the same time, index-based approaches also face important limitations. Aggregating diverse ecosystem conditions into a single composite score may obscure the mechanisms through which ecosystem elements interact and conceal meaningful differences in institutional configurations across countries (Brown & Mason, 2017; Content et al., 2020). As a result, ecosystems with similar index values may still differ substantially in terms of governance structures, financial systems, or human-capital conditions.

A complementary perspective is provided by the Global Entrepreneurship Monitor (GEM), which examines entrepreneurial attitudes, perceptions, and behavior through harmonized survey data (Bosma et al., 2020; Reynolds et al., 2005). This approach contributes valuable insight into informal and behavioral dimensions of entrepreneurship, including opportunity perception, entrepreneurial intentions, and self-assessed capabilities. However, because the framework focuses primarily on individual-level processes, it is less suitable for analyzing structural ecosystem conditions within a consistent comparative framework. Policy-oriented approaches, particularly OECD ecosystem diagnostics, also contribute to comparative

ecosystem analysis by systematically profiling ecosystem conditions and identifying potential bottlenecks relevant for policy design (OECD, 2014). These approaches are especially useful for distinguishing between ecosystem conditions and entrepreneurial outcomes and for identifying areas where policy intervention may be most effective. Nevertheless, they tend to focus more strongly on identifying constraints than on explaining how different ecosystem elements interact to generate entrepreneurial outcomes.

More recent ecosystem research increasingly adopts systemic and configurational approaches that align more closely with the interactional perspective developed earlier in this chapter.

Rather than relying primarily on aggregate scores, these approaches examine how combinations of ecosystem conditions shape entrepreneurial outcomes across contexts.

Comparative evidence suggests that countries and regions tend to cluster into distinct ecosystem types and that similar levels of entrepreneurial activity may produce different economic outcomes depending on how institutional, financial, and human-capital conditions are combined (Content et al., 2020; Komlósi et al., 2024).

Table 1. Main comparative approaches in entrepreneurial ecosystem research

Source: Created by authors

Approach /source	Level of analysis	Core logic used in comparisons	Main strength for comparative work	Main limitation highlighted in the literature
GEI (Acs et al., 2014;)	Country	Composite pillars with Penalty for Bottleneck	Identifies binding constraints; supports benchmarking beyond raw ranks	Aggregation can hide interaction mechanisms and context specificity
GEM (GEM, 2023/2024)	Country	Harmonised survey indicators of activity and perceptions	Provides comparable cross-country measures of entrepreneurial attitudes	Does not itself model systemic complementarities or

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				institutional configurations
OECD ecosystem diagnostics (OECD, 2014;)	Country	Multi-element profiling and bottleneck diagnosis	Policy facing diagnosis; distinguishes conditions from outputs	Less direct treatment of informal mechanisms unless supplemented
Systemic framework (Stam, 2015; Stam & van de Ven, 2021)	Conceptual and applied comparisons	Hierarchical system logic linking conditions to outputs	Preserves structure and complementarity logic for comparative analysis	Not a ranking instrument; requires empirical operationalisation choices
Configuration sensitive EU evidence (Content et al., 2020)	EU regions	Ecosystem “types” and heterogeneous entrepreneurship-growth links	Shows that different ecosystem configurations yield different growth links	Harder to translate into simple country rankings or policy templates

Taken together, these approaches demonstrate both the progress and the remaining limitations of comparative entrepreneurial ecosystem research. Existing frameworks provide increasingly sophisticated tools for cross-country comparison, yet many still capture only partial dimensions of ecosystem performance or provide limited insight into how ecosystem conditions interact. This creates a need for approaches that preserve analytical clarity while allowing a more transparent examination of how institutional quality, finance, and human-capital conditions jointly shape entrepreneurial activity across countries. The following subsection outlines the analytical approach adopted in this thesis in response to these limitations.

1.3.2 Operationalisation, Research Gaps, and Analytical Positioning

Building on the limitations identified in the previous subsection, this thesis adopts a comparative pillar-based approach centered on three structural dimensions: policy, finance, and human capital. These pillars are treated as higher-level framework conditions shaping the environment within which entrepreneurial activity develops rather than as direct measures of entrepreneurial behavior itself. This perspective remains consistent with the systemic and interactional logic developed earlier in the chapter while also allowing for a transparent and comparable empirical analysis across countries.

Rather than constructing a single composite ecosystem ranking or applying a formal bottleneck methodology, the analysis focuses on the three structural pillars both individually and in combination. This approach preserves interpretability and avoids some of the opacity associated with highly aggregated ecosystem scorecards, while still enabling structured cross-country comparison. The objective is therefore not to produce a universal ecosystem ranking, but to examine how differences in institutional quality, finance, and human capital are associated with variation in entrepreneurial activity across relatively comparable European contexts.

The policy pillar refers to the institutional and regulatory environment that shapes incentives, reduces uncertainty, and influences coordination among economic actors. The finance pillar captures the availability and structure of entrepreneurial finance, including both bank-based credit and risk capital such as venture capital. The human-capital pillar reflects the broader skill environment of the economy, including educational attainment, participation in lifelong learning, and labor-market integration. Together, these pillars provide a parsimonious but comparatively robust representation of ecosystem conditions that can be operationalized consistently across countries and over time.

Entrepreneurial outcomes are measured using new business density, defined as the number of newly registered firms per 1,000 people aged 15-64 (Acs et al., 2014; World Bank, n.d.). The indicator provides a comparable measure of formal business creation across countries and time periods, making it suitable for cross-country panel analysis. At the same time, it primarily reflects the quantity rather than the quality of entrepreneurship, since it does not distinguish between high-growth innovative ventures and lower-productivity firms. For this reason, new business density is interpreted as a broad ecosystem outcome indicator rather than as a direct measure of innovation-driven entrepreneurship.

Several research gaps in the existing literature further motivate the analytical approach adopted in this thesis. First, although many studies identify ecosystem bottlenecks and

structural constraints, they often provide limited insight into how institutional quality, financial systems, and human capital interact within specific national contexts. Second, much of the comparative literature relies on broad international rankings, whereas more controlled comparisons within relatively similar European institutional settings remain less developed. Third, policy, finance, and human capital are frequently examined separately even though entrepreneurial ecosystems are inherently interactional and configurational in nature, particularly in the context of smaller European economies. Finally, the literature repeatedly highlights the limits of direct policy transfer, since entrepreneurial outcomes depend heavily on context-specific institutional arrangements and cannot easily be reproduced through isolated interventions alone.

Against this background, the empirical strategy of the thesis adopts a comparative panel-based approach examining how differences in policy, finance, and human-capital conditions are associated with variation in new business density across countries and over time. By focusing on a group of relatively comparable Northern and Western European economies, the analysis provides a structured assessment of ecosystem configurations while paying particular attention to Estonia's position within this comparative setting. In this way, the empirical strategy directly connects the conceptual framework developed in Chapter 1 with the methodological design presented in the following chapter.

Although entrepreneurial ecosystems include a broad range of actors, institutions, networks, cultural conditions, and support mechanisms, the empirical analysis in this thesis concentrates on three measurable structural pillars: policy, finance, and human capital. These dimensions are treated as the key framework conditions associated with entrepreneurial activity across countries. The analytical framework presented below illustrates the simplified structure guiding the empirical analysis, where entrepreneurial activity is operationalized through new business density.

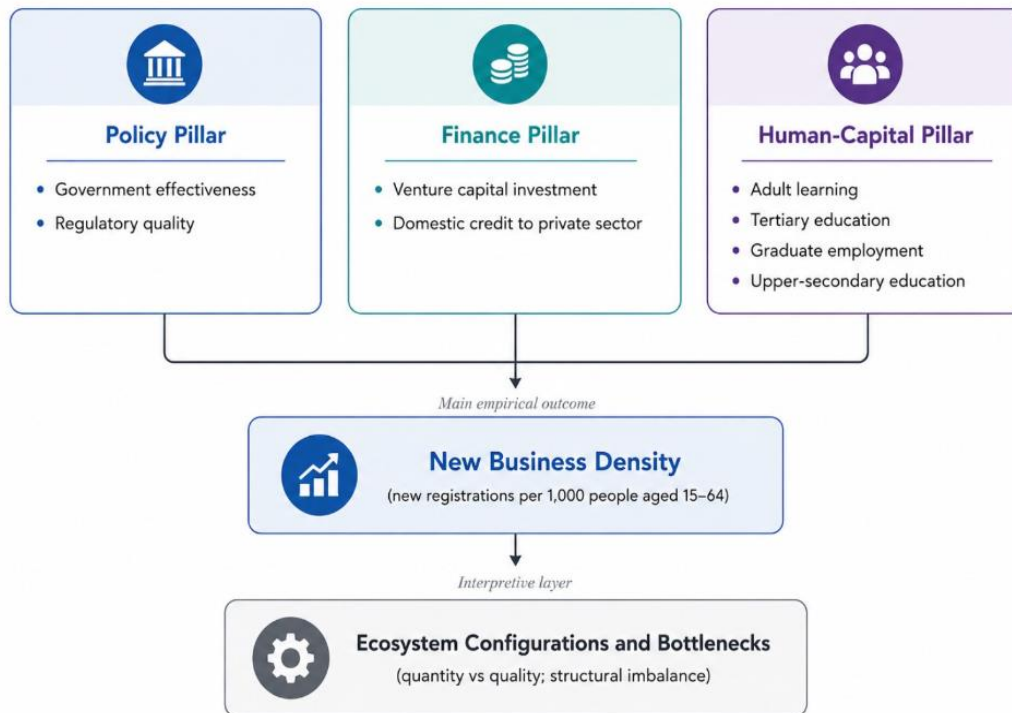


Figure 2. Analytical framework of the thesis

Source: Created by authors based on Stam (2015), Isenberg (2011), and Acs et al. (2014).

The analytical framework presented in Figure 2 serves as the link between the theoretical discussion and the empirical strategy of the thesis. While entrepreneurial ecosystems involve a broad set of interacting actors and institutional conditions, the present study narrows this complexity into three structural pillars that can be measured consistently across countries and over time: policy, finance, and human capital. These pillars are treated as framework conditions shaping the environment within which entrepreneurial activity develops, while new business density functions as the empirical outcome indicator reflecting the intensity of formal business creation. The framework therefore translates the broader ecosystem perspective into a focused comparative model that can be operationalized using internationally comparable indicators. Building on this structure, the following methodology chapter explains how the selected pillars are measured, how the country-year panel dataset is constructed, and how descriptive analysis together with panel regression models is used to examine the associations between ecosystem conditions and new business density across the selected countries.

2. Methodology

This chapter outlines the research design and empirical strategy used to examine how entrepreneurial ecosystem conditions are associated with differences in new business density across countries and over time. Building on the theoretical framework developed in the

previous chapter, the analysis operationalizes the three core ecosystem pillars, policy, finance, and human capital, using comparable country-level indicators and applies descriptive and panel-based methods to examine their relationship with entrepreneurial activity. The methodology is designed to maintain consistency between the conceptual ecosystem framework and the empirical analysis while allowing for transparent cross-country comparison within a relatively comparable European setting.

The chapter proceeds in four parts. It first explains the research design, country selection, and data sources used in the analysis. It then discusses variable construction, data preparation, and the operationalization of the ecosystem pillars. The following section presents the empirical models and estimation strategy, while the final section addresses diagnostic checks, methodological limitations, and the relationship between the empirical approach and the broader theoretical framework of the thesis. To provide a structured overview of the empirical strategy, the next table summarizes the main stages of the research design, including conceptual framing, data construction, variable operationalisation, descriptive analysis, econometric modelling, robustness checks, and interpretation of findings.

Table 2. Overview of research design and empirical strategy

Source: Created by authors

Research stage	Main activities	Output/result
1. Conceptual framing	Development of the entrepreneurial ecosystem framework and identification of core structural pillars: policy, finance, and human capital.	Theoretical foundation and analytical structure of the thesis.
2. Sample and data construction	Selection of countries and period (2014-2022) and collection of country-year indicators from World Bank, OECD, Eurostat, and WGI databases.	Comparative country-year panel dataset.
3. Variable operationalization	Transformation, standardization, and construction of composite ecosystem pillar indices.	Finance, human-capital, and policy indices suitable for comparative analysis.

4. Descriptive analysis	Examination of cross-country patterns, trends, and Estonia's relative position within the sample.	Descriptive overview of entrepreneurial ecosystem differences across countries.
5. Econometric analysis	Estimation of pooled OLS and two-way fixed effects panel regression models.	Empirical assessment of associations between ecosystem pillars and new business density.
6. Robustness analysis	Application of alternative model specifications and sensitivity checks.	Evaluation of stability and consistency of empirical findings.
7. Interpretation and discussion	Interpretation of Estonia's ecosystem configuration and discussion of findings within entrepreneurial ecosystem literature.	Theoretical and practical implications of the study findings.
8. Contribution and implications	Evaluation of findings in relation to the thesis framework, comparative European context, and Estonia's ecosystem development.	Summary of the theoretical, empirical, and practical contributions of the thesis.

The indicators summarized in Table 2 are subsequently transformed and standardized to ensure comparability across variables measured on different scales. Following this process, the individual indicators are aggregated into composite finance, policy, and human-capital indices representing the three ecosystem pillars examined in the thesis. The following section explains the data sources, transformation procedures, and operationalization logic underlying the empirical framework used in the analysis.

2.1 Research Design, Sample, and Data Sources

This study applies a quantitative country-year panel design to examine how policy, finance, and human-capital conditions are associated with differences in new business density across countries and over time. The empirical strategy combines descriptive cross-country comparison with panel regression analysis, making it possible to compare ecosystem configurations across countries while also examining whether changes within countries are

associated with changes in entrepreneurial activity over time. The analysis is therefore comparative and explanatory in nature, and the estimated relationships are interpreted as associations rather than causal effects.

The sample consists of nine European economies: Belgium, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Norway, and Sweden. These countries were selected as a theory-informed comparative group rather than as a random sample. The Nordic countries represent relatively mature and institutionally coordinated entrepreneurial ecosystems, while the Baltic countries reflect smaller and more recently transformed environments shaped by post-transition development and rapid digitalisation. Belgium and Ireland provide additional Western European comparison cases with distinct institutional and financial structures. Estonia serves as the focal case of the thesis because of its consistently high level of new business density relative to the rest of the sample. Together, the selected countries provide a balance between institutional comparability and meaningful variation in ecosystem configurations, making them suitable for comparative ecosystem analysis. The selected countries, therefore, provide both institutional comparability and sufficient variation in entrepreneurial activity and ecosystem conditions. The Nordic countries serve as mature benchmark ecosystems, the Baltic countries provide a smaller post-transition comparison group, while Belgium and Ireland add Western European cases with different institutional and financial structures. Estonia is treated as the focal case because it combines a small open economy, a distinctive digital-development trajectory, and exceptionally high new business density relative to the rest of the sample. This makes the country analytically useful for examining whether high business formation is matched by equally strong ecosystem-pillar conditions, or whether it reflects a more uneven ecosystem configuration.

Although the original data sources cover longer periods, the final estimation sample is restricted to 2014-2022 after harmonizing the indicators and retaining observations consistently available across the core variables used in the empirical analysis. The resulting dataset contains 81 country-year observations and forms a harmonized panel dataset used throughout both the descriptive and regression analysis. Restricting the estimation sample in this way ensures consistency between the empirical sections of the thesis and allows interpretation to focus on the realized analytical sample rather than on partially incomplete observations.

Data are drawn from established international databases and organized according to the three ecosystem pillars developed in the theoretical framework. The dependent variable, new business density, measures the number of newly registered firms per 1,000 people aged 15-64

and is used as a comparable indicator of formal business creation across countries and over time. The policy pillar represents the institutional and regulatory environment and is measured using indicators reflecting government effectiveness and regulatory quality. Together, these indicators capture broader governance conditions shaping policy implementation, institutional coordination, and private-sector activity. The finance pillar captures the availability and structure of capital relevant to entrepreneurial activity. It combines domestic credit to the private sector from the World Bank, representing bank-based finance, with venture-capital investment as a percentage of GDP from the OECD Venture Capital database, representing risk capital and entrepreneurial investment activity. The human-capital pillar reflects the broader skill environment of the economy and is constructed using Eurostat indicators covering adult participation in learning, tertiary educational attainment among 25-34-year-olds, the employment rate of recent graduates, and the share of the population aged 25-64 with at least upper-secondary education. Together, these indicators capture the stock of skills within the economy, their renewal through continued learning, and their integration into labor-market activity. All variables are aligned by country and year and organized consistently with the pillar-based ecosystem framework developed in Chapter 1. Observations with missing values for the dependent variable or the core explanatory indicators are excluded during the construction of the regression dataset. The resulting dataset provides a transparent and comparable basis for analyzing how differences in ecosystem conditions are associated with variation in new business density across countries and over time.

2.2 Variables and Preparation

Entrepreneurial outcomes are measured using the World Bank new business density indicator, defined as the number of newly registered firms per 1,000 people aged 15-64. The indicator provides a standardized and internationally comparable measure of the intensity of formal business creation across countries and over time. At the same time, it primarily captures the quantity rather than the quality of entrepreneurship, since it does not distinguish between high-growth innovative firms and lower-productivity ventures. For this reason, new business density is treated as a broad ecosystem outcome measure rather than as a direct indicator of entrepreneurial quality. In the regression analysis, the variable is used in logarithmic form to reduce skewness and allow coefficient interpretation in approximate percentage terms. The empirical analysis relies on one dependent variable together with a set of indicators representing the three ecosystem pillars examined in the thesis: finance, policy, and human capital. Table 3 summarizes the variables, data sources, transformations, and analytical roles

used in the empirical analysis.

Table 3: Overview of variables and data sources

Source: Created by authors based on World Bank, OECD, Eurostat, and WGI data.

Pillar	Indicator	Source	Transformation	Analytical role
Dependent variable	New business density (new registrations per 1,000 people aged 15-64)	World Bank	Natural logarithm transformation	Dependent variable measuring entrepreneurial activity
Finance	Venture capital investment (% of GDP)	OECD	Natural logarithm transformation with small constant adjustment	Finance component
	Domestic credit to private sector by banks (% of GDP)	World Bank	Standardisation (z-score)	Finance component
Policy	Government Effectiveness	Worldwide Governance Indicators (WGI)	Standardisation (z-score)	Policy component
	Regulatory Quality	Worldwide Governance Indicators (WGI)	Standardisation (z-score)	Policy component
Human capital	Adult participation in learning	Eurostat	Standardisation (z-score)	Human-capital component
	Tertiary educational attainment (ages 25-34)	Eurostat	Standardisation (z-score)	Human-capital component

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	Employment rate of recent graduates	Eurostat	Standardisation (z-score)	Human-capital component
	Population with at least upper-secondary education (ages 25-64)	Eurostat	Standardisation (z-score)	Human-capital component

Preparation of the dataset followed several sequential steps. First, the individual indicators were transformed where necessary, including the logarithmic transformation applied to venture-capital investment and new business density. Second, the indicators were standardized as z-scores in order to remove scale differences across variables. Third, the standardized indicators were averaged within each pillar to construct composite finance, policy, and human-capital indices. Finally, the three composite indices were standardized again to obtain variables with a mean of zero and a standard deviation of one, allowing the regression coefficients to be interpreted as the association between a one-standard-deviation change in each pillar and log new business density.

The explanatory variables are organized into three ecosystem pillars that follow the conceptual framework developed in Chapter 1. The finance pillar captures the availability and structure of capital relevant to entrepreneurial activity. It includes total venture-capital investment as a percentage of GDP from the OECD Venture Capital database, combining start-up, early-stage, and later-stage investment into a single risk-capital measure. Because this series is highly skewed and may contain very small values, it is transformed as $\log(\text{VC} + c)$, where c denotes a small positive constant applied uniformly across observations. The finance pillar also includes domestic credit to the private sector as a percentage of GDP from the World Bank, reflecting the depth and availability of bank-based lending within the economy. Together, these indicators capture both entrepreneurial risk capital and the broader availability of financial resources.

The human-capital pillar reflects the broader skill environment of the economy. It is constructed using Eurostat indicators covering adult participation in learning, tertiary educational attainment among 25-34-year-olds, the employment rate of recent graduates, and the share of the population aged 25-64 with at least upper-secondary education. These indicators capture the stock of skills within the economy, their renewal through continued learning, and their integration into labor-market activity. Human capital is therefore treated as an ecosystem condition rather than as a direct measure of entrepreneurial ability itself.

The policy pillar represents the institutional and regulatory environment shaping economic

coordination and entrepreneurial activity. It is measured using Government Effectiveness and Regulatory Quality from the Worldwide Governance Indicators. Government Effectiveness reflects the quality of public services, institutional capacity, and policy implementation, while Regulatory Quality captures the extent to which regulatory conditions support private-sector activity and market functioning. Within the ecosystem framework adopted in this thesis, these indicators are interpreted as higher-level framework conditions influencing how financial and human-capital resources are translated into entrepreneurial outcomes.

Before estimation, descriptive statistics and correlation matrices are examined to understand variable distributions and relationships across the sample. Correlation analysis is used primarily as a diagnostic tool rather than as evidence of causal relationships. The resulting composite indices are subsequently employed in the descriptive and regression analysis presented in the following sections.

2.3 Empirical Strategy and Models

The empirical analysis applies linear panel regression models to examine how the three ecosystem pillar indices are associated with log new business density across countries and over time. The models examine whether differences in policy, finance, and human-capital conditions are associated with differences in entrepreneurial activity across countries and over time while accounting for unobserved country-specific characteristics and broader time-related developments affecting all countries in the sample.

The main specification is estimated using a two-way fixed-effects model:

$$\ln(BD_{it}) = \alpha + \beta_1 Finance + \beta_2 HumanCapIndex_{it} + \beta_3 PolicyIndex_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where $\ln(BD_{it})$ denotes new business density in country i and year t ; the three indices capture the finance, human-capital, and policy pillars; μ_i denotes country fixed effects; λ_t denotes year fixed effects; and ε_{it} is the error term.

Country fixed effects absorb time-invariant characteristics such as geography, long-standing institutional structures, and persistent cultural differences, while year fixed effects capture shocks and broader developments common across countries, including EU-wide economic conditions and macroeconomic fluctuations. The model therefore examines whether within-country changes in the ecosystem pillars are associated with within-country changes in log new business density over time. All regressions use standard errors clustered at the country level in order to account for heteroskedasticity and serial correlation within countries over

time. Given the relatively small number of clusters in the sample, statistical significance is interpreted cautiously, and greater emphasis is placed on coefficient direction, magnitude, and robustness across specifications rather than on exact p-values alone. The two-way fixed-effects specification constitutes the main empirical model of the thesis. To complement this analysis, additional models are estimated as robustness and comparison checks. Pooled OLS models are first estimated using the same pillar indices and clustered standard errors. These models exploit both between-country and within-country variation and are useful for identifying broader comparative patterns, although they do not control for unobserved time-invariant country characteristics and are therefore treated as supporting rather than primary specifications.

Additional robustness checks include models estimated with country fixed effects only, excluding year effects, together with leave-one-country-out estimations assessing whether the main results are disproportionately influenced by individual country cases. These alternative specifications are used to evaluate the stability and consistency of the empirical findings across different modeling assumptions.

2.4 Diagnostics, Limitations, and Link to Theory

Several diagnostic checks are conducted before interpreting the regression results. Correlation matrices and variance inflation factors are used to assess potential multicollinearity among the explanatory variables, particularly when examining relationships between the ecosystem pillars. Residual patterns are also examined to identify possible heteroskedasticity or serial correlation within the panel structure. To address these issues within the constraints of the sample, all regression models employ country-clustered robust standard errors. Sensitivity analyzes are additionally performed to evaluate the robustness of the empirical findings. These include alternative variable transformations, reconstruction of the composite pillar indices through exclusion of selected indicators, and leave-one-country-out estimations assessing whether the results are driven disproportionately by individual country cases. Together, these procedures provide a broader assessment of the stability and consistency of the estimated relationships.

The empirical approach nevertheless remains subject to several limitations. The relatively small number of countries limits statistical power and constrains the complexity of the models that can be estimated reliably. Endogeneity also remains a concern, since entrepreneurial outcomes may be jointly determined with institutional quality, financial development, and human-capital conditions. Accordingly, the estimated relationships are interpreted as

associations rather than causal effects. In addition, new business density is a broad outcome measure capturing the quantity of formal business creation but not differences in firm quality, productivity, or long-term growth potential. Informal ecosystem dimensions such as entrepreneurial culture, networks, and social norms are likewise not measured directly and instead remain part of the broader qualitative interpretation of country differences. Despite these limitations, the empirical design remains closely aligned with the theoretical framework developed in Chapter 1. Policy, finance, and human capital are treated as ecosystem conditions whose configurations are examined in relation to observed patterns of entrepreneurial activity. By combining descriptive comparison with panel regression analysis, the study provides a structured empirical framework for assessing how differences in these pillars are associated with variation in new business density across countries, with particular attention to Estonia's comparative position within the selected European sample.

3. Empirical Results and Discussion

This chapter presents the empirical findings of the thesis and interprets them within a comparative framework of entrepreneurial ecosystems. Building on the theoretical framework and methodological approach developed in the previous chapters, the analysis examines how differences in policy, financial, and human-capital conditions are associated with variation in new-business density across countries and over time. Particular attention is given to Estonia's position within the comparative sample and to the broader ecosystem configurations underlying differences in entrepreneurial activity.

The chapter proceeds in several stages. It first establishes the empirical context of the analysis by presenting the characteristics of the final dataset and the distribution of the main variables. It then examines comparative country patterns and the relationships between the ecosystem pillars and new business density through descriptive analysis, correlation evidence, and panel regression models. The final sections assess the robustness of the findings and discuss the results from a broader ecosystem perspective, with particular emphasis on Estonia's distinctive entrepreneurial profile within the selected European context.

3.1 Empirical Context and Descriptive Statistics

Before presenting the comparative country patterns and regression results, it is useful to outline the main characteristics of the final estimation sample and the distribution of the variables used in the analysis. Table 4 reports descriptive statistics for the three ecosystem pillar indices and the dependent variable, log new business density. Across the final sample of

81 country-year observations, the mean value of log new business density is 1.96, with a standard deviation of 0.55. The observed values range from 1.08 to 3.38, indicating substantial variation in entrepreneurial activity across the selected countries despite their relatively comparable European institutional setting. Because the dependent variable is expressed in logarithmic form, these values correspond approximately to a range between 2.94 and 29.42 newly registered firms per 1,000 people aged 15-64 when converted back into level terms. This broad range suggests meaningful differences in the intensity of formal business creation both across countries and over time. The three ecosystem pillar indices are centered around zero and have standard deviations equal to one due to the standardization procedure applied during data preparation. More substantively, however, the observed minimum and maximum values indicate meaningful variation in ecosystem conditions across the sample. The finance index ranges from (-2.52) to 2.14, the human-capital index from (-2.43) to 2.27, and the policy index from (-1.72) to 1.48. Compared to the policy pillar, finance and human capital therefore display somewhat greater dispersion across the selected countries and years, suggesting that differences in entrepreneurial finance and skill environments are more pronounced within the sample than differences in broad institutional quality.

Table 4.

Descriptive statistics. Source: created by authors

Variable	Mean	SD	Min	Max	N
Finance index	0.000	1.000	-2.516	2.139	81
Human-capital index	0.000	1.000	-2.427	2.267	81
Policy index	0.000	1.000	-1.720	1.478	81
Log new business density	1.958	0.547	1.079	3.382	81

Overall, the descriptive statistics show that the selected countries differ not only in the intensity of entrepreneurial activity but also in the underlying ecosystem conditions associated with it. While the sample remains relatively comparable in broader institutional and regional terms, the observed variation across the three pillars and new business density provides a sufficient basis for comparative analysis and subsequent regression modelling.

3.2 Comparative Country Patterns

This section examines comparative patterns in new business density and ecosystem pillar configurations across the selected countries. It first analyses how entrepreneurial activity evolves over time and then compares average country-level differences in both new business density and the three structural ecosystem pillars. Together, these descriptive patterns provide an initial overview of how entrepreneurial outcomes and ecosystem conditions vary within the sample before turning to the regression analysis in the following sections.

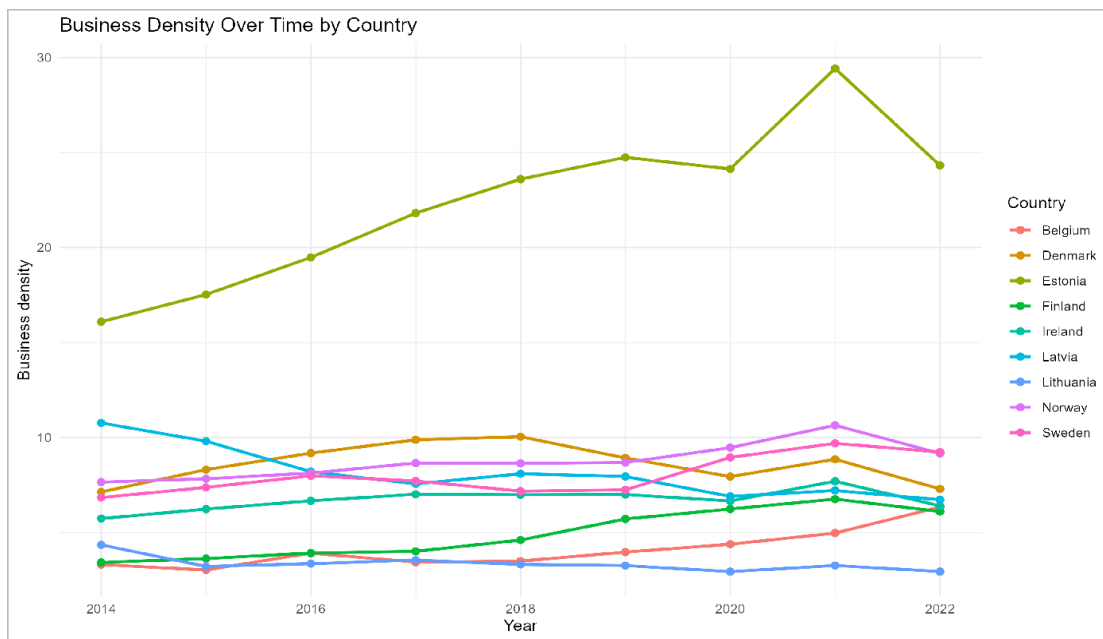


Figure 3. New business density (new registrations per 1,000 people aged 15-64) over time by country. Source: Authors' calculations based on World Bank data. (indicator: new business density, IC.BUS.NDNS.ZS).

Figure 3 shows that Estonia consistently records substantially higher new business density than the rest of the sample throughout the entire period. Its level increases steadily between 2014 and 2021 before declining slightly in the final year, although it remains clearly above all other countries. By contrast, most of the remaining sample follows narrower and comparatively stable trajectories over time. Norway, Denmark, Latvia, and Sweden form a middle group with relatively similar patterns, while Lithuania and Belgium remain at the lower end of the distribution across nearly the entire period. Overall, the figure suggests that differences in entrepreneurial activity across countries are more pronounced than changes within countries over time, indicating relatively persistent cross-country variation in formal business creation within the selected European context. The country averages reinforce Estonia's distinctive position within the sample. Estonia's average log new business density

equals 3.09, corresponding approximately to a level value of 22.00 after reversing the logarithmic transformation. This represents the highest country average in the sample by a substantial margin. Relative to the Nordic average, Estonia's average log new business density is higher by approximately 1.10 log points, corresponding to an estimated level difference of roughly 201 percent. Compared to the Baltic average excluding Estonia, the difference increases to approximately 1.45 log points, or about 325 percent in level terms. Relative to the full sample average, Estonia remains approximately 1.13 log points higher, corresponding to an estimated difference of roughly 211 percent in level terms. At the same time, Estonia's exceptionally strong entrepreneurial activity performance does not correspond to uniformly strong ecosystem pillar values. Its average finance index remains close to the sample average at (-0.02), while both its human-capital index (-0.67) and policy index (-0.31) remain below average. Relative to the Nordic countries, Estonia performs lower across all three pillars, particularly in human capital and policy. Compared to Latvia and Lithuania, however, Estonia records stronger finance and policy scores despite weaker human-capital performance. This pattern suggests that Estonia's ecosystem profile is characterised less by uniformly strong structural conditions than by a more uneven configuration combining exceptionally high new business density with mixed ecosystem-pillar performance.

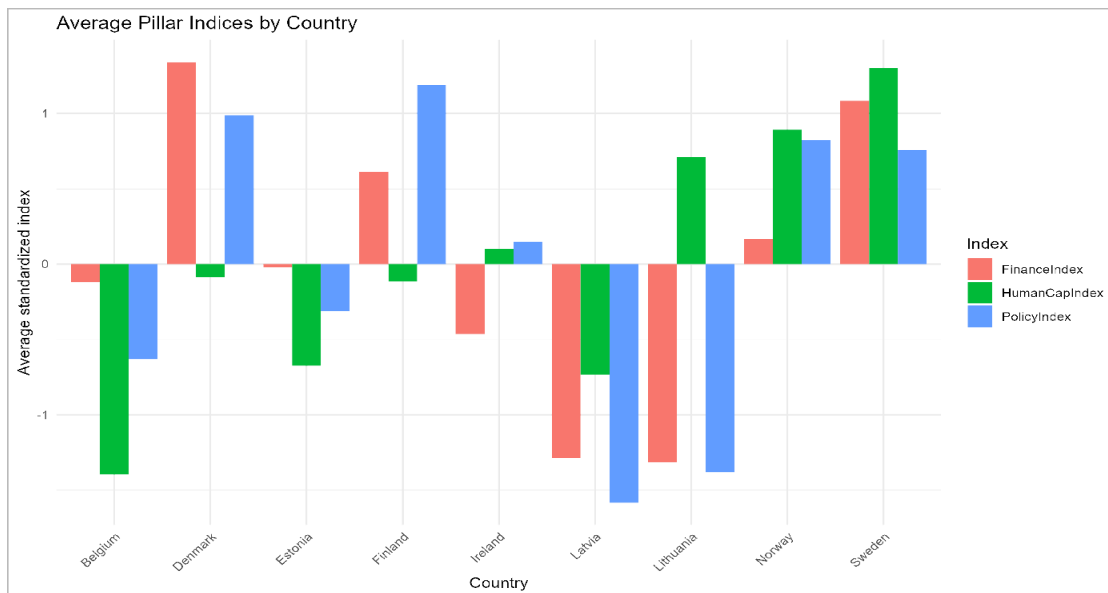


Figure 4. Average pillar indices by country.

Source: created by authors

The broader comparison of ecosystem pillars supports this configurational interpretation. Denmark and Sweden record the strongest finance profiles within the sample, while Sweden also achieves the highest human-capital score and Finland records the strongest policy

performance. By contrast, Latvia and Lithuania remain at the lower end of the finance and policy dimensions. More generally, the countries do not rank consistently across all three pillars, indicating that entrepreneurial ecosystems cannot be interpreted through a single linear hierarchy of “strong” and “weak” cases. Taken together, the descriptive evidence suggests that differences in entrepreneurial activity across countries are associated with broader ecosystem configurations rather than with uniformly strong performance across all structural pillars. Estonia represents the clearest example of this pattern, combining exceptionally high new business density with more mixed finance, policy, and human-capital conditions relative to the Nordic benchmark countries. This supports the ecosystem perspective developed earlier in the thesis, according to which entrepreneurial outcomes emerge from combinations of institutional and structural conditions rather than from isolated strengths in individual dimensions alone.

3.3 Preliminary Correlation Patterns

The correlation analysis provides an initial overview of the relationships between the ecosystem pillars and log new business density before introducing the regression models. These relationships remain descriptive and should not be interpreted as evidence of causal effects, since they combine both cross-country differences and within-country changes over time without controlling for country-specific characteristics or broader common trends. Nevertheless, the correlations are useful for identifying broad comparative patterns within the dataset and for assessing the extent to which the ecosystem pillars move together across the selected countries. The strongest simple relationship with log new business density is observed for the finance index, with a correlation coefficient of 0.28. The relationship between log new business density and the policy index is also positive, although weaker, at 0.18. By contrast, the correlation between log new business density and the human-capital index remains close to zero, at 0.02. Taken together, these patterns suggest that the clearest descriptive association with entrepreneurial activity within the sample is linked to financial conditions rather than to human capital or policy alone. At the same time, the relatively modest size of the correlations indicates that entrepreneurial activity cannot be explained by

any single ecosystem pillar in isolation, which is consistent with the broader configurational perspective developed earlier in the thesis.

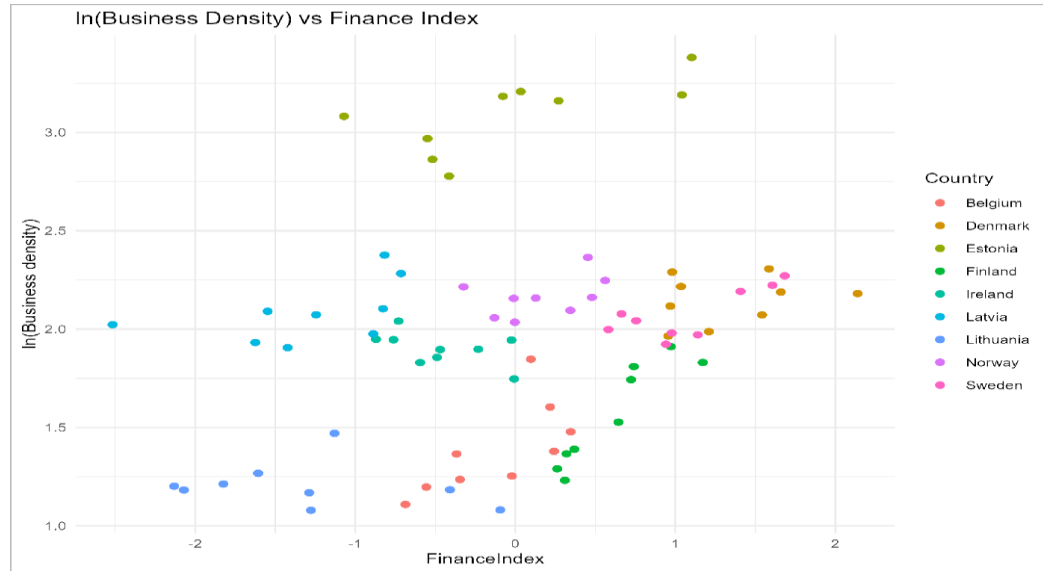


Figure 5. Scatter plot of log new business density and the finance index.

Source: created by authors

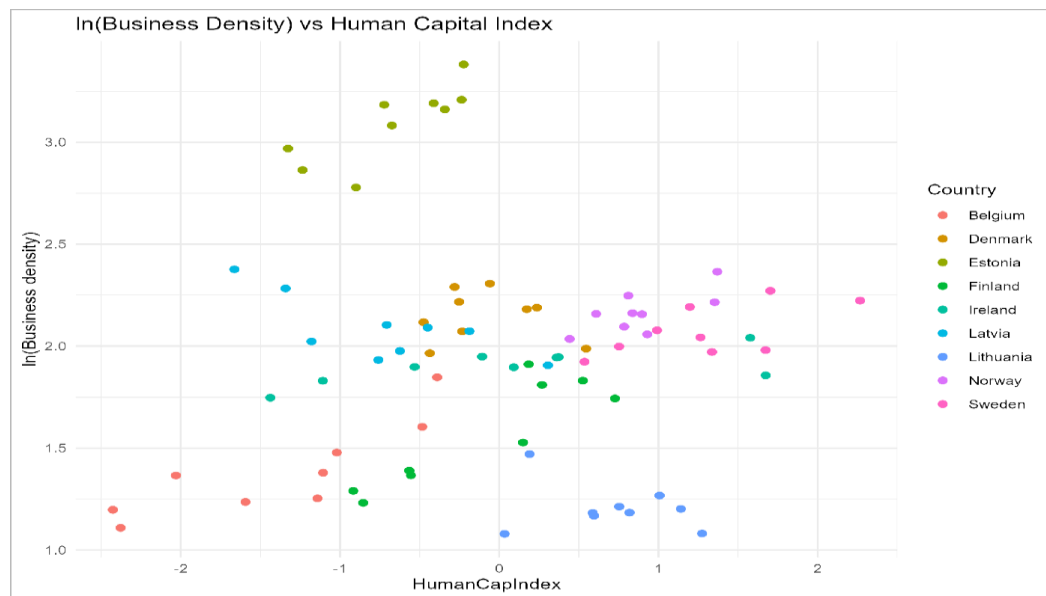


Figure 6. Scatter plot of log new business density and the human-capital index.

Source: created by authors

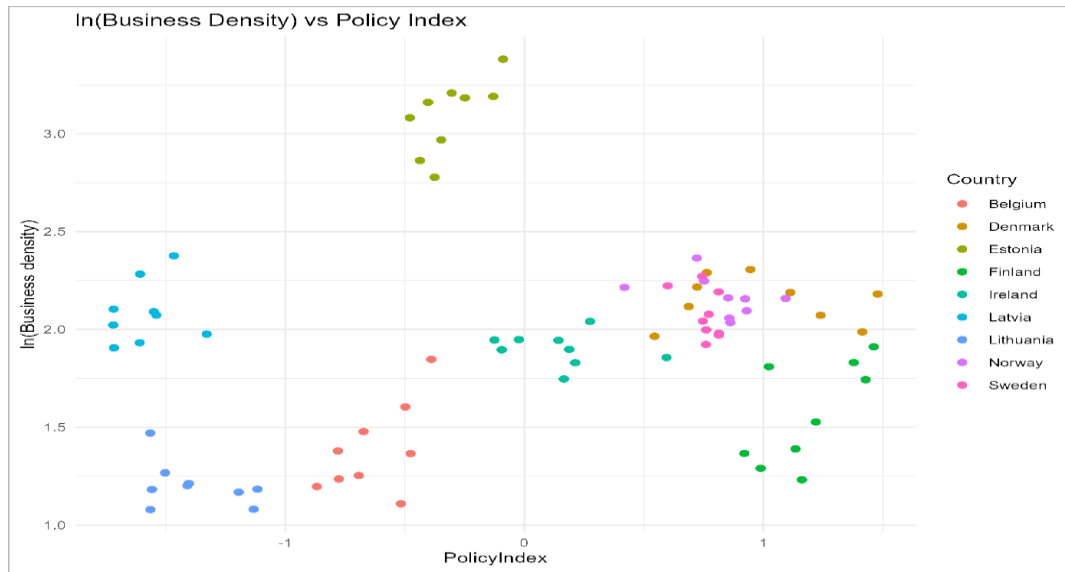


Figure 7. Scatter plot of log new business density and the policy index.

Source: created by authors

The scatter plots broadly reflect these descriptive relationships. Figure 5 suggests a moderately positive association between the finance index and log new business density, although considerable variation remains across countries. Figure 6 shows a substantially weaker overall relationship between human capital and entrepreneurial activity, while Figure 7 indicates a modest positive association between policy conditions and log new business density. Across all three figures, Estonia remains visually distinct from much of the sample because of its consistently high entrepreneurial-activity levels despite comparatively mixed ecosystem-pillar values, reinforcing the earlier interpretation that high new business density does not necessarily correspond to uniformly strong performance across all structural dimensions. An additional feature of the correlation matrix is the relatively strong association between the finance and policy indices, with a correlation coefficient of 0.81. Substantively, this is plausible because more developed financial systems and stronger institutional environments often evolve together within advanced economies. Methodologically, however, the relationship is also important because it becomes more difficult for regression models to separate the independent role of finance from the independent role of policy when the two variables move closely together. By contrast, the correlation between finance and human capital is 0.24, while the correlation between human capital and policy equals 0.34, indicating comparatively lower overlap across those ecosystem dimensions. Overall, the descriptive relationships presented in this section provide a preliminary indication of how entrepreneurial

activity and ecosystem conditions are connected within the sample, while also motivating the need for the panel regression analysis developed in the following section.

3.4 Regression Results

The regression analysis begins with a pooled OLS specification and then moves to fixed-effects models. The pooled OLS model serves as an initial baseline because it uses the full country-year dataset without accounting for unobserved country-specific characteristics. However, it is not treated as the preferred specification because countries may differ in relatively stable ways that are difficult to observe directly, including institutional traditions, administrative systems, or broader cultural attitudes toward entrepreneurship. For this reason, the analysis subsequently introduces country fixed effects and then two-way fixed effects to account more systematically for both stable country characteristics and common year-specific developments affecting all countries in the sample. The pooled OLS results show a positive association between the finance pillar and log new business density, although the coefficient is not statistically significant at conventional levels. Substantively, the estimated coefficient suggests that a one-standard-deviation increase in the finance index is associated with an approximately 24.0 percent higher level of new business density, holding the remaining pillars constant. By contrast, the human-capital and policy coefficients remain statistically insignificant in the pooled specification. Once country fixed effects are introduced, however, the relationship between finance and entrepreneurial activity becomes substantially clearer. In the country fixed-effects model, the finance coefficient remains positive and statistically significant, corresponding to an approximate 14.1 percent increase in new business density for a one-standard-deviation increase in the finance index. The human-capital coefficient also becomes positive, although only marginally significant, while the policy coefficient remains statistically insignificant.

The preferred specification is the two-way fixed-effects model, which includes both country and year fixed effects. This specification focuses more directly on whether within-country changes in the ecosystem pillars are associated with within-country changes in new business density after accounting for common time-related shocks and broader European developments affecting all countries simultaneously. Within this specification, the finance coefficient remains positive and statistically significant. The estimated coefficient of 0.141 implies that a one-standard-deviation increase in the finance index is associated with an approximately 15.1 percent higher level of new business density, holding the remaining pillars constant and controlling for both country and year effects. The relatively consistent role of the finance

pillar across specifications suggests that access to financial resources may represent one of the most immediate ecosystem mechanisms associated with formal business creation within the selected countries. Entrepreneurial finance does not only provide firms with capital needed for entry and expansion, but may also improve access to business networks, market knowledge, and strategic guidance, particularly in the case of venture capital investment. In smaller economies, where internal firm resources and domestic markets are often more limited, access to external finance may become especially important for transforming entrepreneurial ideas into operational businesses. The findings therefore support the broader ecosystem literature emphasizing that entrepreneurial activity depends not only on entrepreneurial motivation itself, but also on the surrounding financial structures that allow opportunities to be exploited and firms to survive beyond the initial entry stage.

Human capital is also positive and statistically significant in the preferred model. The estimated coefficient of 0.107 corresponds to an approximate 11.3 percent increase in new business density for a one-standard-deviation increase in the human-capital index. This result is particularly notable because the simple correlation between human capital and new business density is close to zero. Once country and year effects are introduced, however, the relationship becomes positive, suggesting that within-country changes in the human-capital pillar are more informative than simple cross-country differences alone. The policy coefficient remains negative and statistically insignificant in the two-way fixed-effects specification. This should not be interpreted as evidence that policy or institutional quality lacks importance within entrepreneurial ecosystems. A more plausible interpretation is that the selected policy indicators capture broad and relatively slow-moving governance conditions whose effects are likely to operate indirectly and over longer time horizons. Government effectiveness and regulatory quality may influence entrepreneurial activity through channels such as financial-market development, institutional trust, administrative coordination, and long-term investment incentives rather than through immediate annual changes in business formation rates alone. In addition, the relatively strong overlap between the finance and policy indices makes it more difficult for the regression model to isolate a separate independent association for the policy pillar once both variables are included simultaneously. In this sense, policy may function more as an enabling background condition shaping how effectively finance and human capital operate within the ecosystem rather than as a direct short-run driver of entrepreneurial entry itself.

Table 5.

Main regression results

Variables	(1) Pooled OLS	(2) Country FE	(3) Two-way FE
Finance index	0.215 (0.139)	0.132*** (0.041)	0.141** (0.058)
Human-capital index	-0.014 (0.173)	0.099* (0.053)	0.107** (0.047)
Policy index	-0.073 (0.224)	-0.098 (0.113)	-0.116 (0.120)
Constant	1.958*** (0.180)	1.478*** (0.110)	1.459*** (0.166)
Observations	81	81	81
Country fixed effects	No	Yes	Yes
Year fixed effects	No	No	Yes

*Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Note: Clustered standard errors at the country level in parentheses; Source: created by authors

Taken together, the regression results broadly support the ecosystem framework developed in the theoretical part of the thesis. Finance emerges as the most consistent structural pillar across specifications, while human capital becomes increasingly important once country and year effects are taken into account. By contrast, the policy pillar appears to operate more indirectly and less consistently within the short-run panel framework used in this study. Overall, the findings suggest that entrepreneurial activity is associated less with isolated institutional factors than with broader ecosystem configurations combining financial, institutional, and human-capital conditions.

3.5 Robustness Checks

The robustness checks broadly support the main interpretation of the empirical results and assess whether the observed relationships between the ecosystem pillars and log new business density remain stable across alternative model specifications and sample compositions. Additional regressions are estimated by modifying the baseline specification and by excluding individual countries from the sample in order to evaluate whether the main findings are disproportionately driven by specific variables or country cases. Together, these checks provide a broader assessment of the consistency and stability of the estimated relationships presented in the previous section. When the policy index is removed from the model, the finance coefficient remains positive at 0.124, while the human-capital coefficient also remains positive and statistically significant at 0.102. In approximate level terms, these coefficients correspond to increases of roughly 13.2 percent and 10.8 percent in new business density, respectively. In the finance-only specification, the finance coefficient likewise remains positive, although somewhat less precisely estimated, at 0.112. Overall, these results suggest that the positive association between finance and entrepreneurial activity is not fully dependent on the inclusion of the policy and human-capital pillars, even though the precision of the estimates varies across specifications. At the same time, the continued significance of the human-capital coefficient after excluding policy indicates that the relationship between human capital and entrepreneurial activity remains relatively stable once broader institutional overlap is reduced.

Table 6.

Robustness checks

Variables	(4) Drop Policy	(5) Finance Only
Finance index	0.124*	0.112*
	(0.063)	(0.067)
Human-capital index	0.102**	
	(0.048)	
Constant	1.527***	1.308***
	(0.138)	(0.077)
Observations	81	81

Country fixed effects	Yes	Yes
Year fixed effects	Yes	Yes

*Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.*

Note: Clustered standard errors at the country level in parentheses; Source: created by authors

The leave-one-country-out estimations provide an additional robustness check, particularly because Estonia represents a clear descriptive outlier in terms of new business density. In these estimations, the preferred model is re-estimated nine times, each time excluding one country from the sample. If the main findings were to disappear after excluding a single country, this would suggest that the estimated relationships are disproportionately driven by that particular case. The results, however, remain broadly stable across all specifications. The finance coefficient stays positive in all nine regressions, ranging from 0.096 to 0.186, corresponding approximately to increases between 10.1 percent and 20.4 percent in new business density. The human-capital coefficient also remains positive throughout, ranging from 0.076 to 0.136, which corresponds approximately to increases between 7.9 percent and 14.6 percent in level terms. Importantly, excluding Estonia does not overturn the main findings. Without Estonia, the finance coefficient remains positive at 0.132, while the human-capital coefficient equals 0.121, indicating that the core relationships are not mechanically driven by Estonia's exceptionally high entrepreneurial-activity levels. Excluding Lithuania increases the finance coefficient to 0.186, while excluding Latvia lowers it to 0.096, although the coefficient remains positive in all cases. The policy coefficient, by contrast, remains negative across all leave-one-country-out specifications, ranging from (-0.194) to (-0.027), reinforcing the need for cautious interpretation of the policy results within the short-run panel framework used in this study. Taken together, the robustness checks indicate that the main empirical patterns remain relatively stable across alternative specifications and sample compositions. In particular, the consistently positive associations for finance and human capital support the broader ecosystem interpretation developed throughout the thesis, while the weaker and less stable policy results suggest that institutional framework conditions may operate more indirectly and over longer time horizons than can be fully captured within the present empirical design.

3.6 Discussion: Ecosystem Configurations and Estonia's Position

The empirical findings support the broader ecosystem perspective developed in Chapter 1, particularly the idea that entrepreneurial activity emerges through the interaction of multiple structural conditions rather than from isolated institutional factors alone. Across the selected Northern and Western European countries, differences in entrepreneurial activity appear linked not simply to the absolute strength of individual ecosystem pillars, but to how policy, finance, and human-capital conditions are combined within specific national contexts. Estonia represents perhaps the clearest example of this within the sample. The central paradox revealed by the analysis is that Estonia records by far the highest level of new business density, while not displaying the strongest ecosystem-pillar profile. Its finance index remains close to the sample average, while both human-capital and policy conditions remain below the levels observed in countries such as Sweden, Denmark, and Finland, which means Estonia's exceptionally strong business-creation performance cannot be explained through uniformly stronger structural conditions alone. Instead, the findings point toward a more uneven ecosystem configuration in which entrepreneurial entry is highly supported, while some deeper conditions associated with scaling and long-term ecosystem maturity remain comparatively less developed. This contradiction is particularly interesting because it challenges a straightforward interpretation of new business density as evidence of overall ecosystem strength. Estonia's exceptionally high business formation rates suggest a system that enables entrepreneurial access very efficiently, supported by digital public infrastructure, administrative simplicity, and relatively low barriers to establishing firms. At the same time, the comparative pillar analysis indicates that conditions linked to scaling capacity, advanced financing, specialised talent, and deeper human-capital development remain comparatively weaker than in the Nordic benchmark economies. In this sense, Estonia's ecosystem appears highly effective at generating entrepreneurial dynamism and experimentation, while appearing less balanced in terms of long-term entrepreneurial depth and scaling capacity. This distinction may also help explain why finance emerges as the most stable ecosystem pillar within the regression analysis. Estonia's case suggests that ecosystems capable of supporting fast and accessible business entry may still face constraints in areas linked to long-term entrepreneurial scaling and ecosystem depth. In practice, creating a company and sustaining a high-growth firm are not necessarily driven by the same ecosystem mechanisms. Administrative simplicity and digital infrastructure may support entrepreneurial experimentation and formal business creation, while scaling-oriented entrepreneurship depends more heavily on advanced financing, specialised skills, and deeper institutional coordination. From this perspective, Estonia's ecosystem appears highly dynamic in terms of

entrepreneurial quantity, yet comparatively less balanced in some of the structural conditions associated with long-term ecosystem maturity and growth-oriented entrepreneurship. The contrast with the Nordic countries strengthens this interpretation further. The Nordic economies generally record lower business formation rates than Estonia, yet display more balanced ecosystem conditions across finance, policy, and human capital. This creates an important analytical distinction: Estonia's ecosystem appears more entry-oriented, whereas the Nordic ecosystems appear more depth-oriented and institutionally mature. Rather than suggesting that one model is universally stronger, the comparison shows that entrepreneurial ecosystems may generate very different forms of entrepreneurial outcomes depending on which structural conditions become most dominant within the system. A country may therefore perform exceptionally well in encouraging firm creation while remaining comparatively weaker in conditions associated with firm growth, productivity, and international scaling. The regression results reinforce this interpretation. Finance remains the most stable and consistent pillar across specifications, while human capital becomes increasingly important once country and year effects are introduced. By contrast, the policy pillar remains weaker and statistically unstable within the panel framework applied in this study. This should not be interpreted as evidence that institutional quality lacks importance. Instead, it more likely reflects the broader and slower-moving nature of governance conditions within entrepreneurial ecosystems, where institutional quality influences entrepreneurial outcomes indirectly through financial systems, coordination mechanisms, and long-term skill formation processes rather than through immediate annual changes in business formation rates. More broadly, the findings support the interactional logic emphasized throughout the entrepreneurial ecosystem literature. Countries do not rank consistently across all ecosystem dimensions, and stronger performance in one area does not necessarily compensate for weaker conditions elsewhere. The results therefore align with the idea that entrepreneurial ecosystems are shaped by complementarities, bottlenecks, and uneven structural development. Estonia illustrates this particularly clearly by combining exceptionally strong entrepreneurial activity with a more asymmetric ecosystem structure than the comparatively balanced Nordic cases. The robustness analysis further strengthens this interpretation because the positive relationships associated with finance and human capital remain relatively stable across alternative specifications and leave-one-country-out estimations. Importantly, the main empirical patterns persist even when Estonia is excluded from the sample, indicating that the findings are not driven solely by one exceptional country case. Overall, the findings suggest that entrepreneurial activity is associated less with isolated

institutional factors than with broader ecosystem configurations in which finance, policy, and human capital reinforce or constrain one another in different ways across countries and over time.

4. Conclusion

This thesis examined how structural entrepreneurial ecosystem conditions are associated with new business density across nine Northern and Western European countries, with particular attention to Estonia's position within the comparative sample. Using the entrepreneurial ecosystem perspective as a broader framework, the analysis focused on finance, human capital, and policy as structural conditions shaping entrepreneurial activity across different national contexts. By combining descriptive comparison with panel regression analysis, the thesis aimed not only to examine whether these ecosystem pillars matter, but also to better understand how different ecosystem structures are associated with entrepreneurial activity over time. Taken together, the findings show that entrepreneurial ecosystems are difficult to explain through isolated indicators or simple institutional rankings. Finance and human capital emerged as the most consistent correlates of new business density across the preferred model specifications, while the policy pillar became weaker and less stable once country and time fixed effects were introduced. This does not reduce the importance of institutions themselves. Rather, it reflects the fact that governance conditions tend to shape entrepreneurial activity more indirectly and over longer periods of time than can be fully captured through annual changes in business density alone.

Within this comparative framework, Estonia stands out as the most distinctive case in the sample. The country consistently records exceptionally high levels of new business density despite not displaying equally strong performance across finance, governance, or human-capital conditions. Relative to the Nordic benchmark countries, Estonia's ecosystem remains more uneven in several areas associated with longer-term ecosystem depth, particularly advanced skills, financial capacity, and parts of the institutional environment. At the same time, Estonia substantially outperforms the other Baltic countries in business formation, suggesting that its entrepreneurial performance cannot be explained simply through regional similarities alone. One of the more interesting conclusions emerging from the thesis is that Estonia does not fit comfortably into the way entrepreneurial ecosystems are often interpreted in comparative discussions. Looking only at business formation, Estonia would appear to be the strongest entrepreneurial ecosystem in the sample by a considerable margin. However, the broader pillar comparison presents a more complicated picture. Estonia clearly excels in entrepreneurial accessibility and business entry, yet it does not dominate the structural

ecosystem conditions in the same way as the Nordic economies. Looking at these findings together, Estonia appears less like a uniformly “stronger” ecosystem and more like a system built around a different type of entrepreneurial logic.

In practical terms, Estonia seems exceptionally effective at making entrepreneurship accessible. Digitally integrated public services, relatively efficient administration, and lower practical barriers to firm creation have helped create an environment where starting and operating a business is comparatively straightforward. This becomes even more visible when Estonia is compared with Latvia and Lithuania. Although the Baltic countries share certain regional and historical similarities, Estonia displays a substantially higher level of entrepreneurial activity throughout the observed period. At the same time, the comparison with the Nordic economies points toward a different ecosystem profile. Countries such as Sweden, Denmark, Finland, and Norway appear institutionally deeper and more balanced in areas linked to scaling capacity, advanced skills, financial depth, and broader ecosystem maturity, even though they generate lower levels of business creation. What emerges from these comparisons is not a simple ranking of “better” and “worse” entrepreneurial ecosystems, but different ways in which entrepreneurial systems can function and develop. Estonia appears especially strong in enabling entrepreneurial entry, experimentation, and dynamism, while the Nordic ecosystems appear stronger in sustaining the broader conditions associated with long-term scaling and ecosystem depth. This difference is important because it challenges the assumption that exceptionally high entrepreneurial activity automatically reflects uniformly stronger ecosystem development across all dimensions. For this reason, one of the central arguments of the thesis is that entrepreneurial quantity and ecosystem depth should not be treated as interchangeable concepts. A country can generate exceptionally high levels of business creation while still facing constraints related to specialised talent, financial depth, scaling opportunities, or broader institutional capacity. In Estonia’s case, the findings suggest that the next stage of ecosystem development depends less on creating more firms and more on strengthening the conditions that help firms grow, scale, remain competitive, and contribute to longer-term productivity development. In this sense, the thesis contributes to comparative entrepreneurial ecosystem research by showing how similar entrepreneurial outcomes may emerge from different structural ecosystem profiles. Countries may generate entrepreneurial activity through different combinations of institutional conditions, financial structures, human-capital dynamics, and entrepreneurial accessibility. The Estonian case illustrates this particularly clearly. Its ecosystem stands out not because it performs strongest across every structural dimension, but because it demonstrates how a highly accessible and

digitally efficient environment can generate exceptionally high entrepreneurial activity even under more uneven structural conditions. This provides a more nuanced way of interpreting entrepreneurial ecosystems beyond simple rankings or single-indicator comparisons.

From a practical perspective, the findings suggest that future ecosystem development in Estonia may depend less on increasing business entry itself and more on strengthening the conditions supporting firm scaling, productivity growth, and longer-term entrepreneurial development. In particular, the results point toward the importance of financial depth, advanced skills, and stronger complementarities between finance, human capital, and institutional conditions. More broadly, the thesis suggests that policymakers should evaluate entrepreneurial ecosystems not only through the quantity of new firms being created but also through the structural conditions shaping the sustainability and long-term quality of entrepreneurial activity. Despite these contributions, the findings should be interpreted in light of several limitations. The empirical analysis relies on a relatively small country-year panel, which limits statistical power and constrains the strength of inference. In addition, the dependent variable, new business density, captures the quantity of entrepreneurial activity but does not distinguish between innovative, high-growth firms and lower-productivity forms of business creation. The constructed pillar indices also rely on available cross-country indicators and therefore cannot fully capture more informal ecosystem dimensions such as entrepreneurial culture, social networks, knowledge spillovers, or founder experience. Finally, the empirical strategy identifies associations rather than causal relationships. Although the panel framework helps account for unobserved heterogeneity and common time effects, the results should not be interpreted as evidence of direct causal mechanisms.

Future research could build on these findings in several ways. Expanding the country sample and extending the time period would help test whether the patterns identified in this thesis remain stable across different institutional and economic contexts. Additional outcome indicators could also provide a clearer distinction between business creation itself and the longer-term quality or growth potential of entrepreneurial activity. At the same time, the findings of this thesis also suggest the value of combining quantitative analysis with more qualitative approaches. Case-study research, founder interviews, or ecosystem-level institutional analysis could help explain more clearly why countries with relatively similar structural conditions still produce different entrepreneurial outcomes. This may be especially important in the Estonian case, where the relationship between exceptionally high business creation and more uneven structural ecosystem conditions raises questions that are difficult to capture fully through quantitative indicators alone.

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Appendices

Table A1

Country averages of log new business density and pillar indices; Source: created by authors

Country	Log new business density	Finance index	Human-capital index	Policy index	Years available
Belgium	1.386	-0.119	-1.397	-0.630	9
Denmark	2.147	1.342	-0.086	0.990	9
Estonia	3.091	-0.020	-0.674	-0.313	9
Finland	1.567	0.613	-0.115	1.191	9
Ireland	1.901	-0.464	0.099	0.148	9
Latvia	2.085	-1.289	-0.734	-1.584	9
Lithuania	1.205	-1.314	0.711	-1.383	9
Norway	2.166	0.167	0.893	0.823	9
Sweden	2.076	1.084	1.303	0.758	9

Table A2

Mean values (2014-2022 averages): Estonia, Nordic, Baltic, and full-sample comparison; Source: created by authors

Group	Log new business density	Finance index	Human-capital index	Policy index
Estonia	3.091	-0.020	-0.674	-0.313
Nordic average	1.989	0.801	0.499	0.940
Baltic average excluding Estonia	1.645	-1.301	-0.011	-1.484
Full sample average	1.958	0.000	0.000	0.000

Table A3

Correlation matrix; Source: created by authors

Variable	Log new business density	Finance index	Human-capital index	Policy index
Log new business density	1.000	0.278	0.023	0.178
Finance index	0.278	1.000	0.242	0.814
Human-capital index	0.023	0.242	1.000	0.344
Policy index	0.178	0.814	0.344	1.000

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Table A4

Pooled OLS and alternative model specifications; Source: created by authors

Model	Variable	Estimate	Std. Error	t-value	p-value
Pooled OLS	Finance index	0.215	0.139	1.546	0.1261
Pooled OLS	Human-capital index	-0.014	0.173	-0.081	0.9355
Pooled OLS	Policy index	-0.073	0.224	-0.325	0.7462
Country FE	Finance index	0.132	0.041	3.224	0.0019
Country FE	Human-capital index	0.099	0.053	1.889	0.0630
Country FE	Policy index	-0.098	0.113	-0.871	0.3869
Two-way FE	Finance index	0.141	0.058	2.418	0.0186
Two-way FE	Human-capital index	0.107	0.047	2.302	0.0248
Two-way FE	Policy index	-0.116	0.120	-0.967	0.3374
Drop Policy	Finance index	0.124	0.063	1.958	0.0547
Drop Policy	Human-capital index	0.102	0.048	2.151	0.0354
Finance Only	Finance index	0.112	0.067	1.672	0.0995

Table A5

Country fixed-effects regression results (clustered standard errors); Source: created by authors

Variable	Estimate	Std. Error	t-value	p-value
(Intercept)	1.478	0.110	13.408	<0.0001
Finance index	0.132	0.041	3.224	0.0019
Human-capital index	0.099	0.053	1.889	0.0630
Policy index	-0.098	0.113	-0.871	0.3869
Country FE: Denmark	0.599	0.222	2.698	0.0088
Country FE: Estonia	1.652	0.056	29.282	<0.0001
Country FE: Finland	0.136	0.233	0.586	0.5595
Country FE: Ireland	0.489	0.127	3.852	0.0003
Country FE: Latvia	0.694	0.130	5.355	<0.0001
Country FE: Lithuania	-0.307	0.150	-2.039	0.0453
Country FE: Norway	0.658	0.219	2.999	0.0038
Country FE: Sweden	0.400	0.235	1.702	0.0933

COMPARATIVE ANALYSIS OF ENTREPRENEURIAL ECOSYSTEMS

Table A6

Two-way fixed-effects regression results (country and year effects); Source: created by authors

Variable	Estimate	Std. Error	t-value	p-value
(Intercept)	1.459	0.166	8.807	<0.0001
Finance index	0.141	0.058	2.418	0.0186
Human-capital index	0.107	0.047	2.302	0.0248
Policy index	-0.116	0.120	-0.967	0.3374
Country FE: Denmark	0.604	0.210	2.872	0.0056
Country FE: Estonia	1.651	0.052	32.011	<0.0001
Country FE: Finland	0.152	0.230	0.664	0.5093
Country FE: Ireland	0.494	0.132	3.733	0.0004
Country FE: Latvia	0.682	0.143	4.765	<0.0001
Country FE: Lithuania	-0.326	0.172	-1.900	0.0621
Country FE: Norway	0.663	0.210	3.156	0.0025
Country FE: Sweden	0.392	0.204	1.927	0.0586
Year FE: 2015	0.012	0.068	0.170	0.8656
Year FE: 2016	0.037	0.087	0.420	0.6756
Year FE: 2017	0.073	0.104	0.705	0.4837
Year FE: 2018	-0.002	0.098	-0.020	0.9841
Year FE: 2019	0.010	0.104	0.100	0.9203
Year FE: 2020	0.029	0.113	0.253	0.8009
Year FE: 2021	0.061	0.140	0.434	0.6659
Year FE: 2022	-0.035	0.153	-0.228	0.8205

Table A7a

Leave-one-country-out robustness summary: coefficient estimates; Source: created by authors

Excluded country	Observations	Countries	Finance estimate	Human-capital estimate	Policy estimate
Belgium	72	8	0.163	0.098	-0.194
Denmark	72	8	0.120	0.100	-0.027
Estonia	72	8	0.132	0.121	-0.118
Finland	72	8	0.139	0.090	-0.156
Ireland	72	8	0.133	0.136	-0.090
Latvia	72	8	0.096	0.119	-0.150
Lithuania	72	8	0.186	0.076	-0.093
Norway	72	8	0.151	0.123	-0.074
Sweden	72	8	0.142	0.107	-0.110

Table A7b

COMPARATIVE ANALYSIS OF ENTREPRENEURIAL ECOSYSTEMS

Leave-one-country-out robustness summary: clustered standard error; Source: created by authors

Excluded country	Finance std. error	Human-capital std. error	Policy std. error
Belgium	0.050	0.049	0.072
Denmark	0.065	0.059	0.185
Estonia	0.069	0.049	0.120
Finland	0.055	0.048	0.112
Ireland	0.087	0.090	0.168
Latvia	0.052	0.069	0.127
Lithuania	0.055	0.033	0.156
Norway	0.062	0.043	0.137
Sweden	0.061	0.047	0.125

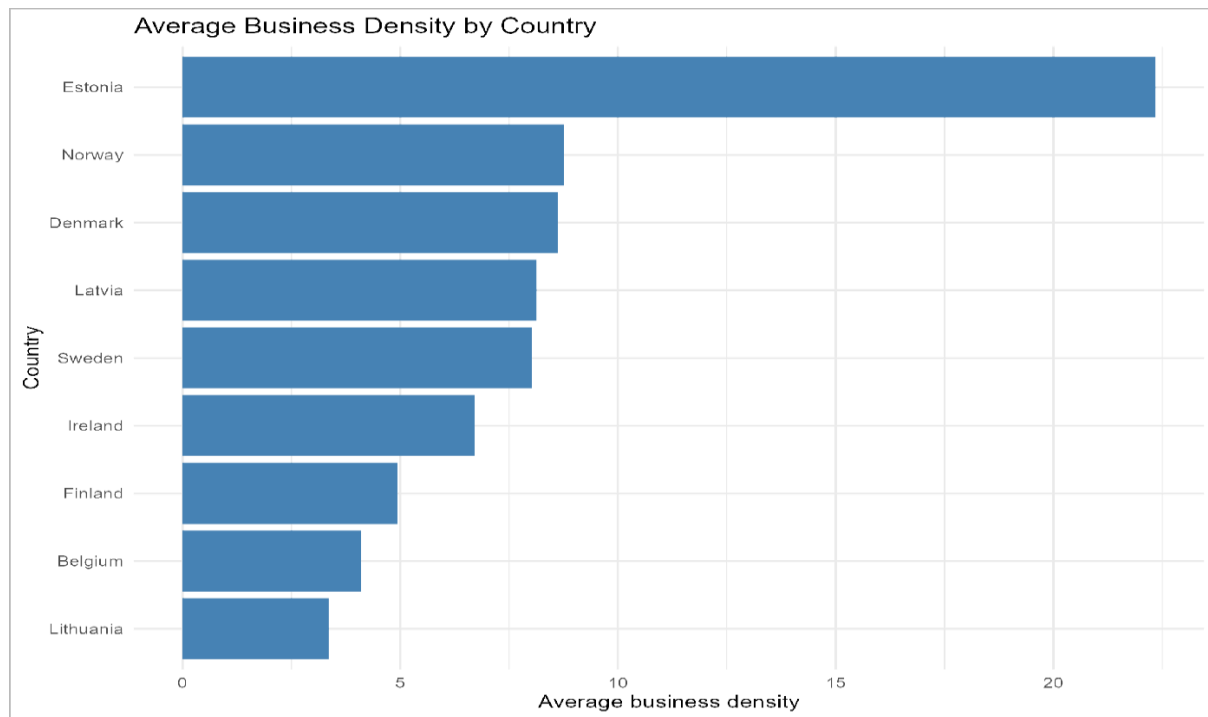


Figure 1. Average new business density (registrations per 1,000 people aged 15-64) by country. ; Source: created by authors

Resümee**ETTEVÕTLUSÖKOSÜSTEEMIDE VÕRDLEV ANALÜÜS VALITUD PÕHJA- JA LÄÄNE-EUROOPA RIIKIDES**

Ali Gadirov, Musavar Ahmadov

Käesolev magistritöö uurib, kuidas ettevõtlusökosüsteemide struktuursed tugisambad- poliitika, rahandus ja inimkapital- on seotud ettevõtlusaktiivsusega üheksas Põhja- ja Lääne-Euroopa riigis aastatel 2014–2022, pöörates erilist tähelepanu Eestile. Tuginedes Stam'i ökosüsteemiraamistikule ja kitsaskohtade loogikale (*bottleneck logic*), käsitleb uuring neid tugisambaid kõrgema taseme tingimustena, mis kujundavad ettevõtluse toimimise keskkonda. Need operationaliseeritakse koondindeksitena, mis on loodud harmoniseeritud rahvusvaheliste näitajate põhjal. Ettevõtlusaktiivsust mõõdetakse uute ettevõtete tiheduse (*new business density*) abil, mis kajastab ametlikult loodud ettevõtete loomise intensiivsust süsteemitasandi tulemusnäitajana. Empiiriline strateegia ühendab riikide profiilide kirjeldava võrdluse paneelregressioonidega, mis on hinnatud ühendatud vähimruutude meetodi (*pooled OLS*) ja kahepoolsete fikseeritud efektide mudelite abil, tõlgendades koefitsiente riigisiseste seostena, mitte põhjuslike mõjudena. Tulemused näitavad, et riigisisised muutused rahandusnäitajates ja inimkapitalis on positiivselt seotud muutustega uute ettevõtete tiheduses. Samal ajal näitab poliitika tugisammas, mida mõõdetakse laiapõhjaliste valitsemisnäitajate kaudu, nõrgemaid ja vähem stabiilseid seoseid, viidates sellele, et selle mõju võib olla kaudsem ja pikaajalisem. Eesti kujuneb eristuvaks konfiguratsiooniks, ühendades väga kõrge uute ettevõtete tiheduse vaid keskmise rahandusliku taseme ning võrreldes Põhjamaadega suhteliselt nõrgemad inimkapitali ja valitsemise tingimused. See viitab sellele, et suur ettevõtete arv ei tähenda automaatselt tugevamat ökosüsteemi kvaliteeti ega suuremat skaleerimisvõimekust. Tulemused rõhutavad ökosüsteemi konfiguratsioonide ja kitsaskohtade tähtsust ning viitavad sellele, et Eesti ettevõtlusökosüsteemi edasine areng võib sõltuda finantssügavuse ja inimkapitali tingimuste tugevdamisest koos juba soodsa digitaalse ja administratiivse keskkonnaga. Käesolev magistritöö annab panuse ettevõtlusökosüsteemide võrdlevasse uurimisse, rakendades fookuseeritud sambapõhist raamistikku suhteliselt võrreldavale Põhja- ja Lääne-Euroopa riikide rühmale. Töö peamine panus seisneb tulemuses, et ametliku ettevõtluse kõrge tase ei viita tingimata ühtlaselt tugevatele ökosüsteemi tingimustele. Eriti Eesti näide demonstreerib vajadust eristada ettevõtluse kvantiteeti ja

ökosüsteemi kvaliteeti ning käsitleda poliitikat, rahandust ja inimkapitali omavahel seotud tingimustena, mitte eraldiseisvate seletavate teguritena.

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During the writing and editing process, we used generative AI tools such as OpenAI's ChatGPT, including GPT-5 and GPT-5.2 models, for idea generation, language refinement, and structural support. Figure 1 was adapted from the source cited in the thesis with the assistance of AI-based design tools, while Figure 2 was developed by the authors using AI-assisted visualization and design support. All interpretations, empirical findings, analytical discussions, and final conclusions presented in this thesis were developed independently by the authors, Ali Gadirov and Musavar Ahmadov.

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