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Corruption and Business Demography in European Regions: Evidence of Context-Dependent Relationships

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Abstract
Corruption is widely recognised as an important determinant of economic performance, yet its relationship with business demography remains insufficiently understood, particularly at the regional level. This study examines how corruption relates to enterprise birth, death, and survival rates across European Union countries and NUTS 2 regions over the period 2008–2023. Fixed-effects panel models are estimated while controlling for economic development, labour-market conditions, human capital, and population density. Corruption is primarily measured using the corruption pillar of the European Quality of Government Index (EQI), with the Worldwide Governance Indicators' Control of Corruption index employed as an additional robustness measure at the national level.
The results show that corruption has a limited association with business demography in aggregate national and regional models. Across most specifications, corruption is statistically insignificant, while GDP per capita, unemployment, and population density show more consistent associations with business demographic outcomes. However, disaggregating regions by corruption levels reveals substantial heterogeneity that is obscured in the aggregate models. In the most corrupt regions, higher corruption is significantly associated with higher enterprise birth rates, a pattern consistent with the *grease-the-wheels* argument. In moderately corrupt regions, higher corruption is weakly associated with lower enterprise birth rates, whereas no statistically significant association is found in the least corrupt regions. Formal interaction tests indicate that the relationship in the most corrupt regions differs significantly from those in both the moderate- and low-corruption groups, while the latter two groups do not differ significantly from each other.
These findings suggest that the relationship between corruption and entrepreneurial dynamics is context-dependent rather than universal, with the strongest evidence of heterogeneity concentrated in highly corrupt regional environments. By combining national and regional evidence and explicitly examining heterogeneity across corruption environments, the study helps reconcile conflicting findings in the corruption literature and extends research on corruption and entrepreneurship to the underexplored domain of business demography. The results further suggest that anti-corruption and entrepreneurship-support policies should account for differences in regional institutional environments rather than relying on uniform approaches across regions.

Keywords: Corruption; Business demography; Entrepreneurship; European Union; Regional development.

1 INTRODUCTION

Corruption is widely recognised as an important factor shaping economic development. A substantial body of literature has shown that corruption may reduce economic growth, weaken productivity, discourage investment, and undermine competitiveness by increasing transaction costs, distorting resource allocation, and reducing the effectiveness of public institutions (Mauro, 1995; Mo, 2001; Tiganasu et al., 2022; Zhang et al., 2023; Deng and Gu, 2026). Consequently, corruption has become a central topic in institutional economics and public policy, particularly in debates concerning economic performance, regional development, and long-term competitiveness.

In recent years, growing attention has been devoted to the relationship between corruption and entrepreneurial activity. Entrepreneurship represents an important mechanism through

which the broader economic and governance environment shapes development, as new firms contribute to innovation, employment creation, competition, and structural transformation. Existing research suggests that corruption may discourage entrepreneurial activity by increasing uncertainty, weakening trust in public institutions, and creating barriers to market entry (Jauregui et al., 2021; Wittberg et al., 2024). At the same time, corruption may under certain conditions facilitate economic activity by allowing firms to circumvent excessive bureaucracy and administrative inefficiencies, giving rise to the long-standing debate between the *"sand the wheels"* and *"grease the wheels"* perspectives (Méon and Sekkat, 2005; Nur-Tegin and Jakee, 2020). The coexistence of these competing mechanisms suggests that the consequences of corruption for entrepreneurial activity may not be uniform across economic and regional contexts.

Despite the growing literature on corruption and entrepreneurship, comparatively little attention has been devoted to business demography. Business demography captures the dynamics of firm creation, survival, and exit and is increasingly regarded as an important indicator of entrepreneurial dynamism and economic renewal (OECD and Eurostat, 2008; OECD, 2017). Enterprise birth rates reflect the capacity of economies to generate new businesses, enterprise death rates capture processes of market restructuring and selection, and enterprise survival rates indicate the ability of firms to remain active over time. Taken together, these indicators provide a broader perspective on the vitality and sustainability of entrepreneurial ecosystems than measures focusing solely on firm entry or entrepreneurial intentions (Andrei et al., 2021).

Yet empirical evidence linking corruption to business demography remains limited. Most previous studies examine entrepreneurship, firm entry, investment, innovation, or broader economic outcomes, while comparatively few investigate how corruption relates simultaneously to enterprise births, deaths, and survival. Moreover, much of the empirical evidence relies on national-level data, potentially overlooking substantial within-country variation. This limitation is particularly relevant in the European Union, where corruption levels can differ considerably across regions despite their operation within common national and European regulatory frameworks (Charron et al., 2014). National-level estimates may therefore conceal regional differences in the relationship between corruption and entrepreneurial dynamics and provide only a partial account of its economic consequences.

The regional dimension is particularly important because there is little reason to assume that corruption affects entrepreneurial dynamics uniformly across different corruption environments. Regions characterised by persistently high levels of corruption may exhibit different patterns of firm creation, survival, and exit from those observed in relatively low-corruption regions. While recent research increasingly emphasises the importance of regional governance and institutions for economic development (Charron et al., 2014; Aparicio-Pérez et al., 2025), evidence specifically examining the relationship between corruption and business demography across regions with different corruption levels remains scarce. This leaves an important unresolved question: does corruption have a broadly uniform relationship with entrepreneurial dynamics, or does this relationship vary systematically across regional corruption environments?

This study addresses this gap by examining the relationship between corruption and business demography at both national and regional levels within the European Union over the period 2008–2023. The analysis considers enterprise birth, death, and survival rates and combines conventional national- and regional-level fixed-effects models with an explicit assessment of regional heterogeneity. Specifically, NUTS 2 regions are classified into corruption terciles based on their long-term corruption levels, allowing the analysis to assess whether the relationship between corruption and entrepreneurial dynamics differs among highly

corrupt, moderately corrupt, and least corrupt regions. This design makes it possible to determine whether aggregate estimates conceal patterns that become visible only when different regional corruption environments are considered separately.

The study makes three contributions. First, it extends the corruption literature beyond commonly examined outcomes such as economic growth, productivity, and competitiveness by focusing on multiple dimensions of business demography—enterprise birth, death, and survival. Second, it combines national- and regional-level evidence within a unified empirical framework, thereby capturing variation that may remain hidden in analyses conducted exclusively at the country level. Third, and most importantly, it explicitly examines heterogeneity across corruption environments, providing evidence on whether the relationship between corruption and entrepreneurial dynamics changes across regions characterised by different long-term corruption levels. This perspective offers a potential explanation for why previous research has produced competing evidence consistent with both the *"sand the wheels"* and *"grease the wheels"* arguments: the relationship may depend, at least partly, on the corruption environment in which economic activity takes place. The findings therefore contribute to a more context-sensitive understanding of the relationship between corruption, entrepreneurship, and regional development.

Beyond its academic contribution, this issue carries direct societal relevance: enterprise creation and survival are closely tied to employment, regional cohesion, and citizens' trust in public institutions, making the corruption–business demography relationship a matter of concern not only for researchers but also for policymakers responsible for EU cohesion and anti-corruption policy.

2 LITERATURE REVIEW

2.1 Corruption and Economic Outcomes

Corruption is widely recognised as an important factor shaping economic performance. The dominant perspective, commonly referred to as the "sand the wheels" hypothesis, argues that corruption distorts market mechanisms, increases transaction costs, weakens the functioning of public institutions, and reduces incentives for productive investment, ultimately constraining economic growth and development (Mauro, 1995; Mo, 2001). Early studies identified lower investment and political instability as key transmission channels through which corruption adversely affects economic performance, providing the theoretical foundation for a substantial body of subsequent research (Mauro, 1995; Mo, 2001).

Recent empirical evidence largely supports this perspective. Corruption has been associated with lower economic growth, weaker labour-market performance, reduced effectiveness of public institutions, and lower public-sector efficiency (Zhang et al., 2023; Elsayed and Mandikiana, 2026; Islam, 2026; Lu et al., 2026). It has also been linked to lower productivity and economic efficiency through distorted resource allocation, weaker investment incentives, and reduced innovation performance (Mo, 2001; Finocchiaro and Guccio, 2025). Similar conclusions emerge from the competitiveness literature, which suggests that corruption undermines the conditions required for innovation, investment, and long-term development (Tiganasu et al., 2022; Zhang et al., 2023; Deng and Gu, 2026).

Despite the predominance of the *"sand the wheels"* perspective, the literature does not provide a uniform conclusion regarding the economic consequences of corruption. The competing *"grease the wheels"* hypothesis suggests that, under certain circumstances,

corruption may facilitate economic activity by allowing firms to circumvent excessive bureaucracy, administrative delays, and inefficient regulations. While Méon and Sekkat (2005) found little evidence that corruption compensates for weak governance, more recent studies suggest that its consequences may vary across economic contexts and levels of development (Nur-Tegin and Jakee, 2020; Fleta-Asín and Muñoz, 2023; Kesar et al., 2024). The relevance of the two competing mechanisms may therefore depend on the context in which corruption occurs.

Overall, the literature indicates that corruption is generally associated with weaker economic growth, lower productivity, reduced competitiveness, and poorer performance of public institutions (Mauro, 1995; Mo, 2001; Zhang et al., 2023; Tiganasu et al., 2022; Elsayed and Mandikiana, 2026). At the same time, growing evidence suggests that its consequences are not necessarily uniform across contexts (Nur-Tegin and Jakee, 2020; Fleta-Asín and Muñoz, 2023; Kesar et al., 2024). The coexistence of predominantly negative effects with context-dependent findings suggests that aggregate estimates may conceal differences across corruption environments. This ambiguity provides the theoretical basis for examining whether the relationship between corruption and economic outcomes varies across regions characterised by different levels of corruption and whether such heterogeneity extends to business demography.

2.2 Corruption and Entrepreneurial Activity

While the literature on corruption has traditionally focused on economic growth, productivity, and competitiveness, increasing attention has been devoted to its relationship with entrepreneurial activity. Entrepreneurship represents an important channel through which the broader economic and governance environment affects economic development, as new firms contribute to innovation, employment creation, competition, and structural transformation. Corruption may therefore influence economic outcomes not only through its direct consequences but also through its relationship with firm creation, investment decisions, innovation, and the broader business environment.

A substantial body of research suggests that corruption can affect entrepreneurial activity already at the stage of market entry. By increasing uncertainty, raising transaction costs, and creating administrative barriers, corruption may discourage the establishment of new businesses and reduce entrepreneurial activity (Dreher and Gassebner, 2013; Bosma et al., 2018; Chowdhury et al., 2019). Since formal business entry often requires interactions with public institutions and regulatory authorities, entrepreneurs can be particularly sensitive to the quality and predictability of these interactions. Recent evidence further shows that governance conditions are important determinants of entrepreneurial dynamics and business creation across countries and regions (Audretsch et al., 2022; Skica et al., 2025; Wosiek, 2025). Corruption may weaken trust in public institutions, reduce regulatory transparency, and increase uncertainty regarding the enforcement of formal rules, thereby creating a less predictable environment for entrepreneurial activity (Chowdhury et al., 2019; Audretsch et al., 2022; Skica et al., 2025).

Another important channel concerns investment and innovation. Entrepreneurs often depend on access to financial resources and predictable conditions when establishing or expanding businesses. Higher levels of corruption may increase uncertainty regarding future returns, raise the costs associated with permits and public services, and reduce investor confidence, particularly among new and small firms with fewer resources to absorb such additional costs (Bosma et al., 2018; Audretsch et al., 2022; Chen and Liu, 2023). Corruption may also weaken incentives for innovation by distorting competition, reducing expected returns from innovative activities, and favouring politically connected firms over more productive

competitors. Previous studies have consistently linked corruption to weaker innovation performance and entrepreneurial development (Anokhin and Schulze, 2009; Chadee et al., 2021).

The relationship between corruption and entrepreneurial decision-making nevertheless remains complex. Although the dominant perspective suggests that corruption discourages entrepreneurship, some studies indicate that firms may adapt to corrupt environments and that corruption may partially offset the constraints imposed by excessive regulation, reflecting the broader "grease the wheels" argument (Dreher and Gassebner, 2013). More recent evidence suggests that corruption can influence entrepreneurial intentions, career choices, intrapreneurial activity, and broader entrepreneurial behaviour, while local government corruption may discourage entrepreneurial activity by weakening trust in public institutions (Haddoud et al., 2024; Sánchez-Vidal et al., 2024; Wittberg et al., 2024). The relationship between corruption and entrepreneurship may therefore be context-dependent rather than uniform across different economic and governance settings (Dreher and Gassebner, 2013; Audretsch et al., 2022; Wittberg et al., 2024).

Overall, the literature suggests that corruption is related to entrepreneurial activity through multiple channels, including market entry, investment decisions, innovation performance, and entrepreneurial behaviour. While the predominant evidence points towards adverse consequences, existing research also suggests that the relationship may vary across contexts. This distinction is particularly relevant for business demography because these entrepreneurial processes ultimately translate into observable differences in enterprise creation, exit, and survival. Examining these outcomes directly therefore provides a broader perspective on how corruption is associated with the dynamics of business populations.

2.3 Business Demography as a Measure of Economic Dynamism

Business demography has become an increasingly important framework for analysing entrepreneurial activity and economic dynamism. According to the OECD and Eurostat, business demography captures the processes of enterprise creation, survival, growth, and exit, thereby providing valuable insights into the capacity of economies to generate and sustain entrepreneurial activity over time (OECD and Eurostat, 2008; OECD, 2017). Unlike traditional macroeconomic indicators, which primarily reflect aggregate economic performance, business demography focuses on firm dynamics and entrepreneurial ecosystems, offering a more detailed perspective on the processes underlying regional and national economic development.

The growing importance of business demography reflects the recognition that economic development depends not only on the performance of existing firms but also on the continuous renewal of the business sector. New firms contribute to innovation, employment creation, competition, and structural transformation, while firm exits facilitate resource reallocation and market restructuring. Business demography indicators therefore provide a dynamic perspective on entrepreneurial ecosystems and economic renewal (OECD, 2017; Andrei et al., 2021).

Among the most widely used indicators is the enterprise birth rate, which reflects the ability of an economy or region to generate new businesses and is frequently used as a proxy for entrepreneurial activity. Previous studies indicate that enterprise births are shaped by economic, social, and institutional conditions, including labour-market characteristics, human capital, and regional development factors (Andrei et al., 2021; O'Leary, 2022; Queiró, 2022). Entrepreneurial activity itself is widely recognised as an important mechanism supporting economic growth and development (Wosiek, 2025; Skica et al., 2025).

Enterprise death rates capture firm exits and represent another important dimension of entrepreneurial dynamics. Although business closures are often viewed negatively, the literature emphasises that firm exits are a natural component of market competition and economic development. From a Schumpeterian perspective, business closures contribute to creative destruction by facilitating the replacement of less productive firms with more efficient and innovative enterprises (OECD, 2017; Andrei et al., 2021).

A complementary perspective is provided by enterprise survival rates, which measure the ability of newly established firms to remain active over time. While birth rates capture the creation of entrepreneurial activity, survival rates reflect its sustainability. Existing research suggests that firm survival is influenced by both firm-specific and environmental characteristics, including human capital, innovation capacity, labour-market conditions, regional economic structures, and institutional quality (Brixy and Grotz, 2007; Queiró, 2022; Chatzoudes et al., 2022; Plummer and Acs, 2022; Danley et al., 2022; Mitze and Makkonen, 2024).

Business demography is particularly relevant for regional analysis because regions differ substantially in their ability to generate, sustain, and renew entrepreneurial activity. Regional characteristics such as urbanisation, industrial structure, economic concentration, and diversification have been shown to influence firm dynamics and entrepreneurial performance (O'Leary, 2023). Similarly, the OECD (2017) highlights the usefulness of business demography indicators for evaluating the resilience and adaptability of regional entrepreneurial ecosystems.

Taken together, enterprise birth, death, and survival rates capture complementary dimensions of entrepreneurial dynamism. These indicators provide a dynamic perspective on regional and national economic development by reflecting not only the creation of new firms but also their exit and ability to remain active over time. This multidimensional perspective makes business demography particularly suitable for examining whether corruption is associated differently with the creation, exit, and survival of enterprises rather than treating entrepreneurial activity as a single outcome.

2.4 Corruption, Business Demography and Regional Heterogeneity

Although extensive research has examined the relationship between corruption and economic performance, considerably less attention has been devoted to its relationship with business demography. Existing studies primarily focus on economic growth, productivity, competitiveness, investment, or entrepreneurship, while relatively few investigate how corruption relates to firm creation, survival, and exit. The relationship between corruption and different dimensions of business dynamics therefore remains only partially understood.

Theoretically, corruption may affect different dimensions of business demography through different mechanisms. Higher corruption can increase market-entry costs and administrative barriers, potentially reducing enterprise births, while greater uncertainty and less predictable business conditions may affect firm survival and exit. Conversely, the "grease the wheels" perspective suggests that corruption may under certain conditions facilitate business activity by allowing firms to circumvent inefficient regulations. The relationship between corruption and business demography may therefore differ across both business demographic outcomes and corruption environments.

The limited empirical evidence available supports the relevance of the regional dimension. Jauregui et al. (2021) found that corruption significantly influences firm births across Mexican states, with its magnitude varying across territories, while Wittberg et al. (2024)

showed that local government corruption may discourage entrepreneurial activity. More broadly, business demography varies substantially across regions due to differences in economic structure, labour-market conditions, institutional quality, urbanisation, and industrial specialisation (OECD, 2017; O'Leary, 2022; O'Leary, 2023). Andrei et al. (2021) similarly emphasise that business demography reflects broader regional development processes and should be considered within its specific economic and institutional context.

The relevance of sub-national variation is also supported by research on regional governance. Charron et al. (2014) demonstrated substantial differences in governance quality both between and within European countries, while Aparicio-Pérez et al. (2025) found that regional institutions contribute to economic development beyond national-level characteristics. Although these studies address governance more broadly, they demonstrate why national-level indicators may fail to capture relevant sub-national variation. In the case of corruption, national estimates may similarly conceal differences among regions characterised by substantially different corruption levels.

Despite increasing interest in regional governance and entrepreneurship, empirical research combining corruption, business demography, and regional heterogeneity remains scarce. In particular, little is known about whether corruption is associated with enterprise birth, death, and survival in a broadly uniform way or whether these relationships differ across regional corruption environments. This unresolved question is important because aggregate estimates may conceal relationships that emerge only when regions with different corruption levels are considered separately.

To address this gap, the present study examines the relationship between corruption and business demography at both national and regional levels within the European Union. In addition to conventional fixed-effects models, NUTS 2 regions are classified into terciles according to their long-term corruption levels. This allows the relationship between corruption and enterprise birth, death, and survival to be compared across highly corrupt, moderately corrupt, and least corrupt regions.

3 METHODOLOGY

3.1 Data and Variables

The empirical analysis is based on national- and regional-level panel datasets covering the period 2008–2023. The datasets combine information from Eurostat, the Quality of Government Institute (QoG Institute, University of Gothenburg), and the Worldwide Governance Indicators (WGI) database. This multi-level research design makes it possible to examine the relationship between corruption and business demography across both European countries and NUTS 2 regions, thereby providing a more comprehensive assessment of corruption-related entrepreneurial dynamics.

3.1.1 National-Level Dataset

The national-level dataset includes business demography indicators, corruption measures, and a set of control variables. Business demography is represented by enterprise birth rates, enterprise death rates, and one-, two-, three-, and four-year survival rates, allowing a comprehensive assessment of firm creation, market exit, and business sustainability.

Corruption is measured using two alternative indicators. The first is the corruption pillar of the European Quality of Government Index (EQI), developed by the Quality of Government Institute, which captures citizens' perceptions and experiences of corruption within public institutions (Charron et al., 2014; Charron et al., 2015). The second is the Control of Corruption indicator from the Worldwide Governance Indicators (WGI), which measures the extent to which public power is exercised for private gain and is widely used in cross-country empirical research (Kaufmann et al., 2011).

To account for differences in economic and structural conditions, the models include GDP per capita, population density, tertiary education, and the unemployment rate. These variables capture economic development, labour-market conditions, human capital, and agglomeration effects that may influence entrepreneurial activity and business demography.

3.1.2 Regional-Level Dataset

The regional-level dataset is constructed at the NUTS 2 level and combines information from Eurostat and the Quality of Government Institute. Business demography is measured using enterprise birth rates, enterprise death rates, and enterprise survival rates. While birth and death rates are available throughout the study period, survival analysis is limited to the three-year survival rate due to data availability constraints at the regional level.

Corruption is measured using the corruption pillar of the EQI at the NUTS 2 level. Unlike national indicators, this measure captures regional variation in perceived corruption and therefore allows the investigation of within-country heterogeneity in corruption environments (Charron et al., 2014; Charron et al., 2015).

To examine potential heterogeneity in the relationship between corruption and business demography, NUTS 2 regions were classified into terciles according to their average corruption score across all available EQI waves (2010, 2013, 2017, and 2021). This procedure resulted in three groups representing regions with the highest, moderate, and lowest levels of corruption. The tercile classification was chosen to distinguish high-, moderate-, and low-corruption environments while maintaining a sufficiently large and broadly balanced number of regions within each group for panel estimation. The classification is time-invariant and is intended to capture long-term differences in corruption levels rather than short-term fluctuations in corruption perceptions.

The regional models include the same set of control variables as the national analysis: GDP per capita, population density, tertiary education, and the unemployment rate. Compared with national-level data, the regional dataset provides substantially greater spatial variation and allows a more detailed assessment of heterogeneity in the corruption–business demography relationship.

3.1.3 Corruption Measures and Control Variables

The study employs two corruption indicators. The primary measure is the corruption pillar of the European Quality of Government Index (EQI), developed by the Quality of Government Institute (University of Gothenburg), which is used in both the national- and regional-level analyses. At the regional level, the EQI corruption pillar represents one of the few available measures capturing sub-national variation in perceived corruption across European NUTS 2 regions. The indicator is z-score standardised, with a mean of zero and a standard deviation of one. Higher EQI corruption scores indicate lower levels of perceived corruption, whereas lower scores indicate higher levels of corruption (Charron et al., 2014; Charron et al., 2015).

To assess the robustness of the national-level results, the analysis additionally employs the Control of Corruption indicator from the Worldwide Governance Indicators (WGI) database, which measures the extent to which public power is exercised for private gain (Kaufmann et al., 2011). The use of alternative corruption measures reduces dependence on a single indicator and provides an additional robustness check.

The empirical models include four control variables commonly used in the literature on entrepreneurship, business demography, and regional development. GDP per capita serves as a proxy for economic development and market potential (Zarkua et al., 2025; Wosiek, 2025). The unemployment rate captures labour-market conditions that may influence entrepreneurial incentives (O'Leary, 2022; Wosiek, 2025). Tertiary education is included as an indicator of human capital and entrepreneurial capacity (Queiró, 2022; Andrei et al., 2021), while population density reflects agglomeration economies, market potential, and the spatial concentration of economic activity (O'Leary, 2023; Andrei et al., 2021).

GDP per capita is transformed using the natural logarithm to reduce skewness, limit the influence of extreme observations, and improve comparability across countries and regions with substantially different income levels. The logarithmic transformation is widely employed in empirical studies examining economic development and regional performance.

The selection of control variables is grounded in previous research identifying economic development, human capital, labour-market conditions, and agglomeration effects as important determinants of entrepreneurial activity and firm dynamics (O'Leary, 2022; Wosiek, 2025; Skica et al., 2025). Consequently, these variables are included to account for structural characteristics that may influence business demography independently of corruption. Table 1 summarises all variables included in the empirical analysis together with their definitions, territorial level, and data sources.

Table 1 Definition of Variables and Data Sources

Variable	Definition	Level	Source
Birth Rate	Number of enterprise births as a percentage of active enterprises	National, Regional	Eurostat – Business Demography
Death Rate	Number of enterprise deaths as a percentage of active enterprises	National, Regional	Eurostat – Business Demography
Survival Rate 1	Percentage of enterprises surviving one year after establishment	National	Eurostat – Business Demography
Survival Rate 2	Percentage of enterprises surviving two years after establishment	National	Eurostat – Business Demography
Survival Rate 3	Percentage of enterprises surviving three years after establishment	National, Regional	Eurostat – Business Demography
Survival Rate 4	Percentage of enterprises surviving four years after establishment	National	Eurostat – Business Demography
EQI Corruption	Corruption pillar of the European Quality of Government Index, reflecting perceived corruption in public institutions	National, Regional	Quality of Government Institute (QoG), University of Gothenburg
Control of Corruption	Perception of the extent to which public power is exercised for private gain	National	Worldwide Governance Indicators (WGI), World Bank
ln GDP per capita	Natural logarithm of GDP per capita (EUR per inhabitant)	National, Regional	Eurostat
Population Density	Number of inhabitants per square kilometre	National, Regional	Eurostat

Variable	Definition	Level	Source
Tertiary Education	Share of population aged 25–64 with tertiary education attainment (%)	National, Regional	Eurostat
Unemployment Rate	Unemployed persons as a percentage of the labour force (%)	National, Regional	Eurostat

Notes: Business demography indicators are derived from Eurostat's Business Demography database. While the national dataset includes one-, two-, three-, and four-year survival rates, the regional analysis is limited to the three-year survival rate due to data availability constraints at the NUTS 2 level. GDP per capita is included in logarithmic form to reduce skewness and improve comparability across countries and regions. For the regional tercile analysis, NUTS 2 regions were classified according to their average EQI corruption score across all available EQI waves (2010, 2013, 2017, and 2021).

Source: own processing

3.2 Construction of Corruption Terciles

To examine whether the relationship between corruption and business demography varies across different corruption environments, an additional heterogeneity analysis was conducted using corruption terciles. This approach relaxes the assumption of a uniform relationship across European regions and allows potential differences in the corruption–business demography relationship to be examined across regions characterised by different long-term levels of corruption.

The terciles were constructed using the average EQI corruption score for each NUTS 2 region across all available EQI waves (2010, 2013, 2017, and 2021). Regions were subsequently ranked according to their average scores and divided into three groups representing distinct corruption environments. The classification is time-invariant and is intended to capture long-term differences in corruption levels rather than short-term fluctuations in corruption perceptions.

The first tercile (T1) comprises the most corrupt regions (n = 61), the second tercile (T2) contains regions with moderate levels of corruption (n = 60), and the third tercile (T3) includes the least corrupt regions (n = 61). The choice of terciles, rather than a finer-grained classification (e.g., quartiles or quintiles), reflects a trade-off between capturing meaningful heterogeneity and retaining sufficient statistical power within each group given the regional sample size (n = 182 NUTS 2 regions). While the pooled interaction model reported in Section 4.5 formally confirms that the corruption–business demography relationship differs significantly across the constructed terciles, it does not test sensitivity to the specific threshold used to define the groups; assessing whether the pattern holds under alternative classifications (e.g., quartiles) is left for future research.

Figure 1 presents the spatial distribution of corruption terciles across European NUTS 2 regions. This classification forms the basis of the subsequent heterogeneity analysis and enables a comparison of the relationship between corruption and business demography across regions characterised by different long-term levels of corruption.

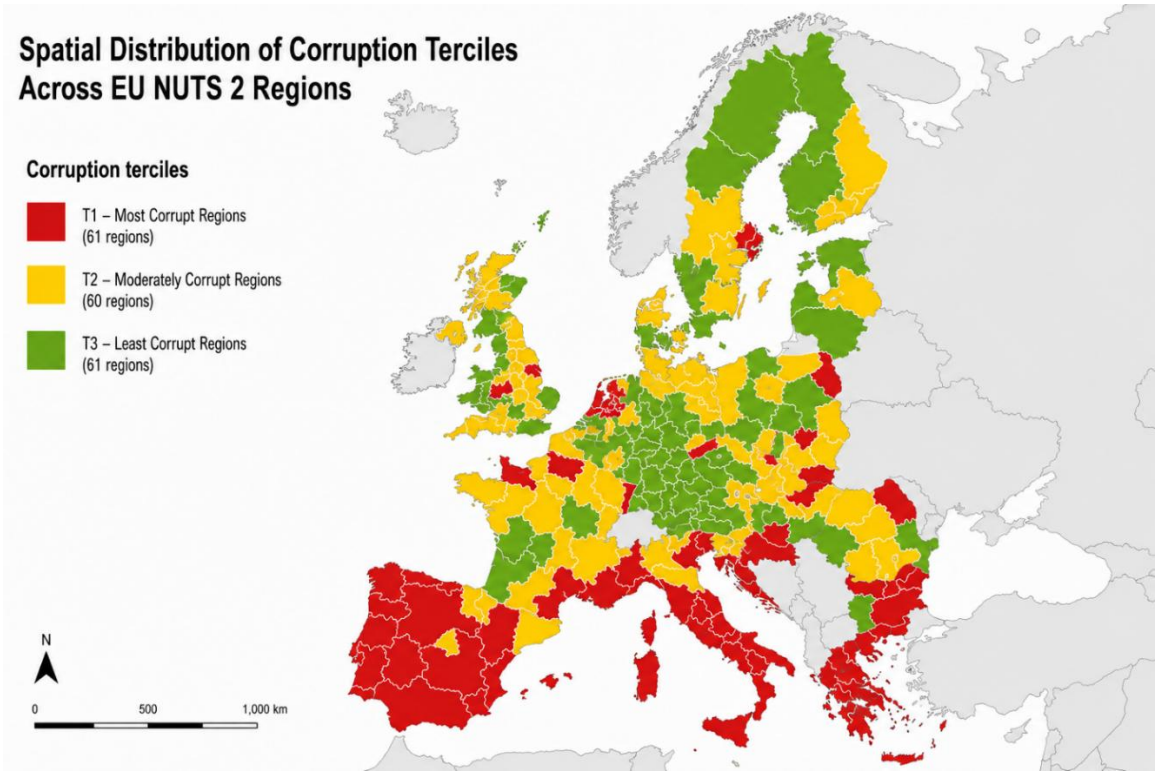


Figure 1 Spatial distribution of corruption terciles across EU NUTS 2 regions.

Source: own processing based on Quality of Government Institute, 2025

3.3 Research Hypotheses

The literature suggests that corruption may influence entrepreneurial activity and business performance through several channels, including higher transaction costs, weaker institutional trust, greater uncertainty, reduced transparency, and lower incentives for productive investment and innovation (Mauro, 1995; Mo, 2001; Jauregui et al., 2021; Wittberg et al., 2024). Through these mechanisms, corruption may affect the ability of economies and regions to generate, sustain, and renew entrepreneurial activity. However, existing empirical evidence remains inconclusive. While many studies report negative effects of corruption on entrepreneurship, firm creation, and economic performance, other studies suggest that the relationship may depend on institutional context and governance conditions (Méon and Sekkat, 2005; Nur-Tegin and Jakee, 2020; Fleta-Asín and Muñoz, 2023).

Furthermore, previous research has predominantly relied on national-level analyses, potentially overlooking substantial variation within countries. Recent studies emphasise that regional differences in governance and corruption may significantly shape economic and entrepreneurial outcomes (Charron et al., 2014; Aparicio-Pérez et al., 2025). Consequently, the relationship between corruption and business demography may not be uniform across regions characterised by different corruption environments.

To address these issues, this study examines the relationship between corruption and business demography at both national and regional levels and investigates whether this relationship varies across regions characterised by different long-term corruption levels.

Based on the theoretical arguments and empirical evidence discussed in the literature review, the following hypotheses are formulated:

H1: Corruption is associated with business demography outcomes, including enterprise birth rates, death rates, and survival rates, at both the national and regional levels.

H2: The relationship between corruption and business demography differs across regions characterised by different levels of corruption.

The first hypothesis examines whether corruption is related to entrepreneurial dynamics and business sustainability. The second hypothesis reflects the possibility that the relationship between corruption and business demography is context-dependent and varies across corruption environments. To examine this issue, NUTS 2 regions are classified into terciles according to their long-term level of corruption based on the average EQI corruption score across all available EQI waves (2010, 2013, 2017, and 2021). This classification enables the assessment of whether the relationship between corruption and business demography differs between high-corruption, moderate-corruption, and low-corruption regions.

3.4 Econometric Specification

To estimate the relationship between corruption and business demography, the study employs two-way fixed-effects (FE) panel models. This approach controls for unobserved time-invariant heterogeneity across countries and regions while exploiting within-unit variation over time. In addition, robust inference techniques are applied to account for heteroskedasticity, serial correlation, and potential cross-sectional dependence, thereby improving the reliability of statistical inference (Bai et al., 2024; Han and Kim, 2023; Spierdijk, 2023).

The baseline specification is defined as:

$$BD_{it} = \beta_0 + \beta_1 Corr_{it} + \beta_2 lnGDPpc_{it} + \beta_3 PopDen_{it} + \beta_4 TerEdu_{it} + \beta_5 Unemp_{it} + \mu_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where *BD* represents the selected business demography indicator (enterprise birth rate, enterprise death rate, or enterprise survival rate) for country or region *i* in year *t*; *Corr* denotes the corruption indicator; *lnGDPpc* is the natural logarithm of GDP per capita; *PopDen* captures agglomeration effects; *TerEdu* represents tertiary education as a proxy for human capital; and *Unemp* reflects labour market conditions. The terms μ_i and λ_t denote entity and time fixed effects, respectively, while ε_{it} is the error term.

Separate models are estimated for enterprise birth rates, death rates, and survival rates. To investigate heterogeneity in the relationship between corruption and business demography, additional fixed-effects models are estimated separately for each corruption tercile. This approach makes it possible to assess whether the relationship between corruption and business demography differs across regions characterised by different long-term corruption environments.

The use of fixed-effects estimation is particularly appropriate in studies examining institutional determinants of economic outcomes because many institutional characteristics change only gradually over time. Consequently, the estimator identifies within-country and within-region variation while controlling for unobserved heterogeneity.

To formally assess whether the association between corruption and business demography differed across corruption environments, an additional pooled fixed-effects specification was estimated including interactions between the EQI corruption indicator and corruption-tercile membership. Pairwise linear restriction tests were subsequently used to assess whether the estimated corruption slopes differed significantly across terciles.

3.5 Robustness Checks

Several robustness checks were conducted to assess the stability of the results. First, the national-level analysis was replicated using the Control of Corruption indicator from the Worldwide Governance Indicators database, providing an alternative measure of corruption. Second, one-year and two-year lagged values of corruption were introduced to account for the possibility that institutional conditions influence entrepreneurial dynamics with a temporal delay. Together, these robustness checks reduce the likelihood that the results are driven by measurement choices or model specification and provide additional confidence in the reported findings.

Because the analysis involves multiple business demography indicators, territorial levels, and corruption terciles, the possibility of false-positive findings arising from multiple comparisons is acknowledged. The main conclusions of the study rely not on isolated significant coefficients but on a consistent pattern across specifications — in particular, the significant interaction tests reported in Section 4.5, which formally confirm that the corruption–birth rate relationship in the most corrupt tercile differs from the other two groups. This convergence across independent tests reduces, without eliminating, the likelihood that the central finding reflects a Type I error.

4 RESULTS

4.1 Descriptive Statistics

Table 2 presents descriptive statistics for the national-level dataset. The results indicate substantial variation across EU Member States in economic conditions, labour-market characteristics, business demography, and corruption levels. GDP per capita, population density, and unemployment rates exhibit considerable dispersion, reflecting the diverse economic environments in which entrepreneurial activity takes place.

Table 2 Descriptive Statistics of Variables Used in the National-Level Analysis

Variable	Mean	Median	SD	Min	Max
Control of Corruption	0.968	0.785	0.791	-0.381	2.436
EQI Corruption	0.041	-0.090	0.999	-1.522	1.974
Birth rate	10.421	9.980	3.498	3.480	25.430
Death rate	11.175	9.220	6.124	2.900	41.740
Survival rate (1 year)	82.653	83.160	7.960	53.680	97.180
Survival rate (2 years)	68.704	68.620	9.608	44.110	90.090
Survival rate (3 years)	59.088	58.960	10.371	24.830	91.470
Survival rate (4 years)	51.786	51.315	10.753	19.850	92.240
ln(GDP per capita)	11.478	11.161	1.523	8.497	14.980
Tertiary education (%)	38.249	40.000	11.071	12.800	63.000
Unemployment rate (%)	8.504	7.250	4.458	2.000	27.800
Population density	176.660	103.700	281.160	17.500	1766.000

Source: own processing

Business demography indicators reveal notable differences in entrepreneurial dynamics across countries. The average enterprise birth rate reaches 10.4%, while the average death rate amounts to 11.2%. Firm survival declines progressively over time, from 82.7% after one year

to 51.8% after four years, highlighting the importance of examining business sustainability in addition to firm creation and market exit.

The corruption indicators also display substantial variation. EQI Corruption ranges from −1.52 to 1.97, while the Control of Corruption indicator ranges from −0.38 to 2.44. These differences suggest that the sample captures a broad spectrum of institutional environments, providing suitable conditions for analysing the relationship between corruption and business demography.

Table 3 reports descriptive statistics for the regional-level dataset. Compared with the national sample, the regional data reveal substantially greater heterogeneity, particularly in population density, corruption levels, and business demography indicators. Population density ranges from 2.7 to more than 6,500 inhabitants per square kilometre, reflecting the coexistence of sparsely populated rural areas and highly urbanised metropolitan regions within the European Union.

Table 3 Descriptive Statistics of Variables Used in the Regional-Level Analysis

Variable	Mean	Median	SD	Min	Max
EQI Corruption	-0.044	-0.161	0.992	-2.652	2.572
Birth rate	9.962	9.480	3.183	4.650	53.870
Death rate	7.933	7.380	3.128	1.510	27.480
Survival rate (3 years)	59.187	59.390	8.274	16.430	87.240
ln(GDP per capita)	10.006	10.135	0.617	8.039	11.720
Tertiary education (%)	27.856	27.100	10.053	6.800	62.100
Unemployment rate (%)	8.860	7.500	5.718	1.200	37.000
Population density	306.260	104.750	743.040	2.700	6512.800

Source: own processing

Regional business demography indicators also exhibit considerable variation. The average birth rate is 9.96%, the average death rate is 7.93%, and the average three-year survival rate reaches 59.2%. The wide ranges observed for all three indicators point to significant differences in entrepreneurial dynamics across European regions.

The regional EQI corruption indicator varies from −2.65 to 2.57, indicating substantially greater dispersion than observed in the national dataset. This finding supports the relevance of a regional perspective and suggests that national averages may conceal important within-country differences in corruption environments and entrepreneurial activity.

4.2 Correlation Analysis

Prior to the econometric analysis, pairwise correlations were examined to identify potential relationships among the variables and assess possible multicollinearity concerns. Overall, the results provide no evidence of severe multicollinearity, as none of the correlation coefficients exceed commonly accepted thresholds.

The strongest association was observed between EQI Corruption and GDP per capita at the regional level, indicating a close relationship between corruption environments and regional economic development. Across both territorial levels, corruption exhibits weak to moderate negative correlations with enterprise birth and death rates and positive correlations with firm survival indicators. These preliminary correlations indicate differing bivariate relationships across business demography outcomes, which are examined further in the multivariate analysis.

At the same time, the stronger correlations observed in the regional dataset point to the presence of substantial within-country heterogeneity. This finding further supports the need for regional-level analyses and suggests that national-level studies may overlook important variation in both corruption and entrepreneurial dynamics. Given the potential influence of multiple economic and structural factors, the relationship between corruption and business demography is examined further using multivariate fixed-effects models.

4.3 Fixed-Effects Analysis

Table 4 presents the results of the fixed-effects estimations for business demography indicators at both the national and regional levels. Overall, the findings provide only limited evidence of a systematic relationship between corruption and business demography. Across most model specifications, the EQI corruption indicator is statistically insignificant, suggesting that corruption alone does not consistently explain variation in enterprise birth rates, death rates, or survival rates once structural characteristics and unobserved heterogeneity are taken into account.

At the national level, the EQI corruption indicator is statistically insignificant in most models. A significant association is identified only for the two-year survival rate, where lower levels of perceived corruption are associated with lower firm survival. No significant associations are observed for enterprise birth rates, death rates, one-year survival rates, three-year survival rates, or four-year survival rates. Given that this relationship is confined to a single survival horizon, the overall evidence of an association between corruption and business sustainability at the national level remains limited.

The regional-level analysis reveals a similar pattern. Corruption is not significantly associated with enterprise birth or death rates in the aggregate regional models. However, a positive and marginally significant relationship is identified for the three-year survival rate. Given the direction of the EQI scale, this result indicates that lower perceived corruption is associated with higher three-year firm survival at the regional level, although the relationship remains relatively modest.

Several control variables exhibit stronger and more consistent associations with business demography than corruption. Population density is positively associated with enterprise birth and death rates at the national level and with three-year survival, although these relationships are not confirmed in the regional birth and death models. GDP per capita is negatively associated with selected longer-term survival rates at the national level and with all three business demography indicators in the regional analysis. Unemployment is negatively associated with four-year survival at the national level and with enterprise birth rates at the regional level. Overall, the results indicate that economic and structural characteristics display more consistent associations with business demography than corruption in the aggregate models.

Taken together, the findings provide only partial support for Hypothesis 1. While corruption exhibits significant associations with selected survival indicators, its relationship with enterprise birth and death rates remains statistically insignificant in the aggregate models. At the same time, the limited and partly contrasting associations observed at the national and regional levels suggest that the relationship between corruption and business demography may not be uniform across different corruption environments. Consequently, aggregate estimates may conceal important forms of regional heterogeneity. To examine this possibility, the following section investigates whether the relationship between corruption and business demography differs across regions characterised by different long-term levels of corruption.

Table 4 Fixed-Effects Estimates for Business Demography Indicators

Panel A. National-Level Analysis

Variables	Birth Rate	Death Rate	Survival Rate 1	Survival Rate 2	Survival Rate 3	Survival Rate 4
EQI corruption	1.375	3.760	-4.133	-6.529**	-3.568	2.448
ln GDP per capita	0.208	0.585	-1.014	-1.009	-150.549**	-81.794***
Tertiary education	-0.066	-0.155	-0.074	-0.069	-0.358	-0.125
Unemployment rate	-0.038	-0.043	0.551	0.324	-0.349	-1.279***
Population density	0.032***	0.028***	-0.019	-0.069	0.310***	0.083
Observations	78	77	50	48	47	46
Within R^2	0.209	0.862	0.162	0.303	0.531	0.536

Panel B. Regional-Level Analysis

Variables	Birth Rate	Death Rate	Survival Rate 3
EQI corruption	0.245	-0.031	2.616*
ln GDP per capita	-9.051***	-5.382***	-184.201***
Tertiary education	0.064	0.151**	-1.031***
Unemployment rate	-0.271***	-0.050	-0.149
Population density	-0.064	-0.001	-0.047***
Observations	173	173	141
Within R^2	0.250	0.349	0.880

Notes: Fixed-effects estimates with time dummies. Robust standard errors clustered by unit. Higher EQI corruption scores indicate lower levels of perceived corruption. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: own processing

4.4 Robustness Checks

To assess the robustness of the main findings, additional fixed-effects models were estimated using one-year and two-year lagged values of the corruption indicator. The lagged specifications largely confirmed the baseline results. Corruption remained statistically insignificant in most models explaining enterprise birth rates, death rates, and survival rates, providing little evidence of delayed associations between corruption and business demography.

In addition, the national-level analysis was replicated using the Control of Corruption indicator from the Worldwide Governance Indicators database. The results remained broadly consistent with those obtained using the EQI corruption measure.

Overall, the robustness checks support the conclusion that corruption shows only limited aggregate associations with business demography once structural characteristics and unobserved heterogeneity are taken into account.

4.5 Heterogeneity Across Corruption Terciles

To further investigate whether the relationship between corruption and business demography differs across corruption environments, NUTS 2 regions were divided into three terciles according to their long-term EQI corruption scores. Separate fixed-effects models were subsequently estimated for the most corrupt regions (T1), moderately corrupt regions (T2), and least corrupt regions (T3).

In addition, pooled fixed-effects models including interactions between the EQI corruption score and corruption-tercile indicators were estimated to formally test whether the corruption coefficients differ across terciles. Cluster-robust standard errors and time fixed effects were retained in these specifications. The results of the tercile-specific estimations are reported in Table 5.

Table 5 Fixed-Effects Estimates Across Corruption Terciles

Variables	Most Corrupt Regions (T1)		Moderately Corrupt Regions (T2)		Least Corrupt Regions (T3)	
	Birth Rate	Death Rate	Birth Rate	Death Rate	Birth Rate	Death Rate
EQI Corruption	-1.358**	-0.605	1.828*	1.075	0.984	-1.119
ln GDP per capita	-8.338**	-4.253***	-5.229*	4.095	-9.836	-32.773***
Population density	0.036***	0.023***	-0.038	0.016	-0.001	-0.008***
Tertiary education	-0.046	-0.149*	-0.148	-0.058	0.084	0.191***
Unemployment rate	-0.619***	-0.343***	-0.188	0.015	-0.631***	-0.355
Constant	86.594***	47.913***	76.056*	-32.915	115.085	354.959***
Observations	151	151	146	146	142	132
Within R^2	0.381	0.625	0.270	0.386	0.434	0.565

Notes: Fixed-effects estimates with time dummies. Higher EQI corruption scores indicate lower levels of perceived corruption. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Source: own processing

- **Most Corrupt Regions (T1)**

The results for the most corrupt regions reveal a pattern consistent with the *"grease the wheels"* argument. As reported in Table 5, the EQI corruption score exhibits a statistically significant negative association with enterprise birth rates. Given that higher EQI scores indicate lower levels of corruption, this result implies that higher corruption is associated with higher enterprise birth rates in the most corrupt regions. Although this finding should not be interpreted as evidence that corruption is generally beneficial for entrepreneurship, it is consistent with the possibility that, in highly corrupt environments, informal practices may facilitate market entry by helping firms overcome bureaucratic inefficiencies and administrative constraints.

No statistically significant relationship is observed between corruption and enterprise death rates. Instead, business exits are more strongly associated with economic and structural factors, particularly GDP per capita, unemployment, and population density. Overall, the findings suggest that the relationship between corruption and business demography in highly corrupt regions is primarily reflected in enterprise creation rather than firm exit.

- **Moderately Corrupt Regions (T2)**

A different pattern emerges in the middle tercile. As shown in Table 5, the EQI corruption score displays a positive and marginally significant association with enterprise birth rates. Because higher EQI scores correspond to lower levels of corruption, this result indicates that higher corruption is weakly associated with lower enterprise birth rates. Although the relationship is relatively modest and only marginally significant, its direction is consistent with the traditional *"sand the wheels"* hypothesis, according to which corruption may increase uncertainty, transaction costs, and barriers to market entry.

At the same time, no statistically significant relationship is observed between corruption and enterprise death rates. Taken together, the results indicate that the relationship between corruption and enterprise creation differs across corruption environments: a positive association between corruption and enterprise births emerges in the most corrupt regions, whereas a weak negative association is observed in regions characterised by moderate corruption levels.

- **Least Corrupt Regions (T3)**

The results for the least corrupt regions differ from those observed in the previous terciles. According to Table 5, corruption is not significantly associated with either enterprise birth rates or enterprise death rates. Instead, business demography appears to be more strongly associated with economic and structural factors, including GDP per capita, educational attainment, unemployment, and population density.

These findings suggest that variation in corruption may be less relevant for entrepreneurial dynamics within relatively low-corruption environments. One possible interpretation is that firms operating in such regions face more predictable and transparent conditions, reducing the relative importance of corruption for market entry and exit.

Overall, the results reported in Table 5 reveal substantial heterogeneity in the relationship between corruption and business demography across European regions. Higher corruption is associated with higher enterprise birth rates in the most corrupt regions, whereas a weak negative association emerges in moderately corrupt regions and no statistically significant association is observed in the least corrupt regions. Importantly, the pooled interaction model confirms that these differences are not merely an artefact of estimating the terciles separately. For enterprise birth rates, the corruption slope differs significantly between the most corrupt regions and both the moderately corrupt regions (interaction coefficient = 3.088, $p = 0.005$) and the least corrupt regions (interaction coefficient = 3.907, $p = 0.004$). By contrast, the difference between the moderate- and low-corruption terciles is not statistically significant (robust $F(1,172) = 0.341$, $p = 0.560$). For enterprise death rates, evidence of heterogeneity is weaker: the difference between the most corrupt and moderately corrupt regions is statistically significant ($p = 0.014$), whereas the difference between the most corrupt and least corrupt regions is not ($p = 0.843$). The difference between the moderate- and low-corruption terciles is also not statistically significant at the 5% level (robust $F(1,172) = 3.526$, $p = 0.062$). These results provide formal statistical support for Hypothesis 2, particularly with respect to enterprise creation, and indicate that the observed heterogeneity is primarily driven by the distinct relationship found in the most corrupt regional environment.

The tercile analysis also helps explain why the aggregate fixed-effects models reported in Table 4 identified only limited relationships between corruption and business demography. Opposing associations across different corruption environments may offset each other in aggregate estimations, thereby concealing important regional heterogeneity. Consequently, analyses based solely on aggregate national or regional samples may provide an incomplete picture of how corruption relates to entrepreneurial dynamics across European regions.

Importantly, the findings suggest that corruption should not be viewed as having a single universal relationship with business demography. Instead, patterns consistent with both the *"grease the wheels*" and *"sand the wheels"* perspectives emerge across regions characterised by different corruption levels. The fact that the grease pattern is observed in the most corrupt regions, the sand pattern in moderately corrupt regions, and no significant relationship in the least corrupt regions reinforces the importance of considering the corruption environment when interpreting aggregate results. Figure 2 summarises these heterogeneous relationships.

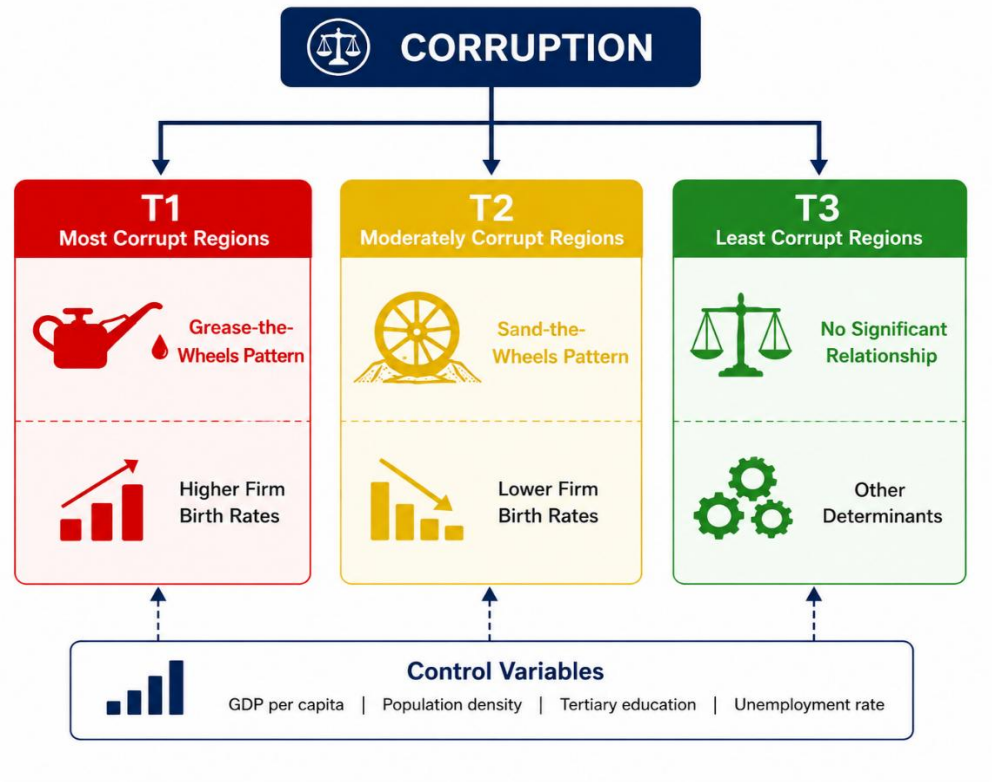


Figure 2 Heterogeneity in the relationship between corruption and enterprise birth rates across regional corruption terciles.

Source: own processing

5 DISCUSSION AND POLICY IMPLICATIONS

Understanding how corruption relates to entrepreneurial dynamics matters not only theoretically but also for the everyday economic opportunities of citizens and regions: enterprise creation and survival directly shape employment, local economic resilience, and public trust in institutions, particularly in regions already struggling with weak governance.

The relationship between corruption and entrepreneurial activity remains widely debated in institutional economics. While a substantial body of literature associates corruption with weaker economic performance, lower competitiveness, and reduced entrepreneurial activity (Mauro, 1995; Mo, 2001; Zhang et al., 2023; Wittberg et al., 2024), the findings of this study reveal a more nuanced pattern. Across both national and regional fixed-effects models, corruption was statistically insignificant in most specifications, whereas economic and structural factors such as GDP per capita, unemployment, and population density showed

stronger and more consistent associations with business demographic outcomes. These results suggest that corruption is not uniformly associated with business demography and that aggregate estimates may conceal important differences across regional corruption environments.

At the aggregate level, the findings provide only limited support for a systematic relationship between corruption and enterprise births, deaths, or survival. This contrasts with studies reporting predominantly negative relationships between corruption and entrepreneurial outcomes (Jauregui et al., 2021; Wittberg et al., 2024; Chen and Liu, 2023). One possible explanation is that aggregate analyses conceal substantial territorial variation. Pooling regions characterised by different corruption levels may obscure relationships that emerge within particular corruption environments. This interpretation is consistent with research emphasising substantial sub-national variation and the limitations of relying exclusively on national indicators (Charron et al., 2014; Aparicio-Pérez et al., 2025).

The central contribution of this study emerges from the tercile analysis. Once regions were classified according to their long-term corruption levels, substantially different patterns became apparent. In the most corrupt regions, higher corruption was significantly associated with higher enterprise birth rates, a pattern consistent with the "grease the wheels" argument. Rather than indicating that corruption is beneficial for entrepreneurship, this finding may reflect the role of informal practices in facilitating market entry in environments where corruption is already widespread. In such settings, informal mechanisms may help firms overcome bureaucratic inefficiencies and administrative constraints, consistent with research showing that corruption can under certain conditions facilitate economic activity (Nur-Tegin and Jakee, 2020; Fleta-Asín and Muñoz, 2023).

In contrast, moderately corrupt regions exhibit a weak negative relationship between corruption and enterprise birth rates. Although only marginally significant, the direction of this relationship is consistent with the traditional "sand the wheels" hypothesis. Corruption may increase uncertainty, transaction costs, and barriers to market entry, thereby discouraging the creation of new firms. This interpretation accords with previous research linking corruption to weaker entrepreneurial activity and market entry (Jauregui et al., 2021; Wittberg et al., 2024) and with the broader literature emphasising the adverse economic consequences of corruption through higher transaction costs and inefficient resource allocation (Mauro, 1995; Méon and Sekkat, 2005).

In the least corrupt regions, no statistically significant relationship was found between corruption and enterprise birth or death rates. Rather than indicating a specific corruption threshold, this result suggests that variation in corruption within relatively low-corruption environments is less closely associated with entrepreneurial dynamics. In these regions, economic and structural characteristics appear to play a more prominent role in business demography, consistent with evidence on the importance of labour-market conditions, human capital, economic development, and other regional characteristics for entrepreneurial activity (O'Leary, 2022; O'Leary, 2023; Skica et al., 2025).

Overall, the results suggest that patterns consistent with both the *"grease the wheels"* and *"sand the wheels"* perspectives may coexist across regions characterised by different corruption levels. However, the formal interaction tests provide a more nuanced interpretation of this heterogeneity. For enterprise birth rates, the relationship between corruption and business demography in the most corrupt regions differs significantly from that observed in both moderately corrupt and least corrupt regions, whereas the latter two groups do not differ significantly from each other. The evidence therefore points primarily to the distinct position of highly corrupt regional environments rather than to three statistically discrete corruption

regimes. This finding helps reconcile apparently conflicting strands of the corruption literature: positive, negative, and insignificant associations need not necessarily represent contradictory evidence if the relationship between corruption and entrepreneurial dynamics depends on the broader regional corruption environment.

The findings also contribute to the regional dimension of the corruption literature by showing why analyses based solely on aggregate national or regional samples may provide an incomplete picture. The tercile analysis, supported by the formal interaction tests, demonstrates that relationships observed within distinct corruption environments may be obscured in aggregate estimations. This is particularly evident for enterprise birth rates, where the most corrupt regions exhibit a statistically distinct relationship compared with the other corruption environments. The contribution therefore lies not only in extending corruption research to enterprise birth, death, and survival, but also in demonstrating that regional heterogeneity can materially change the conclusions drawn from aggregate estimates.

From a policy perspective, the positive association between corruption and enterprise creation observed in the most corrupt regions should not be interpreted as implying that corruption should be tolerated or encouraged. Rather, it may indicate that firms operating in highly corrupt environments rely on informal practices to overcome administrative and bureaucratic constraints. Policy interventions in these regions should therefore combine anti-corruption measures with efforts to reduce administrative burdens, increase regulatory transparency, and simplify interactions between firms and public authorities, thereby reducing incentives to rely on informal mechanisms. Outside the most corrupt regional environments, the evidence for distinct corruption-related patterns is considerably weaker, suggesting that entrepreneurship policies should not be mechanically differentiated according to corruption tercile alone. Instead, greater emphasis may be placed on economic and structural conditions, including labour-market conditions, education, innovation capacity, and business-support ecosystems. Overall, the results support a place-based approach that recognises differences in regional institutional environments while avoiding uniform assumptions about how corruption relates to entrepreneurial dynamics.

6 CONCLUSION

This study examined the relationship between corruption and business demography at both national and regional levels within the European Union. Using panel data covering the period 2008–2023, the analysis investigated whether corruption is associated with enterprise birth, death, and survival rates and whether these relationships differ across regions characterised by different corruption environments.

The findings provide only limited evidence of a systematic relationship between corruption and business demography in aggregate models. Across both national and regional fixed-effects estimations, corruption was statistically insignificant in most specifications, while economic and structural factors such as GDP per capita, unemployment, and population density showed stronger and more consistent associations with business demographic outcomes. These results suggest that corruption alone does not systematically explain entrepreneurial dynamics once broader economic conditions and unobserved heterogeneity are taken into account.

The central contribution of the study emerges from the regional tercile analysis. While the aggregate models revealed limited evidence of a relationship between corruption and business demography, substantially different patterns emerged once regions were classified according to their long-term corruption levels. Higher corruption was associated with higher

enterprise birth rates in the most corrupt regions, while a weak negative association emerged in moderately corrupt regions and no statistically significant association was found in the least corrupt regions. Importantly, formal interaction tests confirmed that, for enterprise birth rates, the relationship observed in the most corrupt regions differs significantly from those in both the moderate- and low-corruption groups, whereas the latter two groups do not differ significantly from each other. The findings therefore indicate that regional heterogeneity is driven primarily by the distinct relationship observed in highly corrupt environments rather than by a gradual pattern across three statistically discrete corruption regimes.

The study contributes to the literature in three ways. First, it extends corruption research beyond traditional outcomes such as economic growth, productivity, and competitiveness by focusing on multiple dimensions of business demography. Second, it combines national- and regional-level analyses within a unified empirical framework, allowing within-country variation to be considered alongside national patterns. Third, it demonstrates that aggregate estimates can conceal meaningful regional heterogeneity in the relationship between corruption and business demography, with the strongest evidence of such heterogeneity emerging for enterprise creation in highly corrupt regional environments. This provides a possible explanation for the coexistence of positive, negative, and insignificant associations reported in the broader corruption literature and contributes to a more context-sensitive understanding of the *"grease the wheels"* and *"sand the wheels"* perspectives.

From a policy perspective, the positive association between corruption and enterprise creation in the most corrupt regions should not be interpreted as evidence that corruption is beneficial for entrepreneurship. Rather, it may indicate that firms operating in highly corrupt environments rely on informal practices to overcome administrative and bureaucratic constraints. Policy interventions in these regions should therefore combine anti-corruption measures with efforts to reduce administrative burdens, increase regulatory transparency, and simplify interactions between firms and public authorities, thereby reducing incentives to rely on informal mechanisms. Outside the most corrupt regional environments, the evidence for distinct corruption-related patterns is considerably weaker, suggesting that entrepreneurship policies should not be mechanically differentiated according to corruption tercile alone. Instead, greater emphasis may be placed on economic and structural conditions, including economic development, education, labour-market conditions, innovation capacity, and broader business-support ecosystems. Overall, the findings support a place-based approach that recognises differences in regional institutional environments while avoiding uniform assumptions about how corruption relates to entrepreneurial dynamics.

Several limitations should be acknowledged. First, the availability of regional business demography data, particularly survival rates, restricted the temporal coverage of some analyses. Second, the study focuses exclusively on European Union countries and regions, which may limit the generalisability of the findings to other geographical contexts. Third, corruption was measured using perception-based indicators that may not fully capture all dimensions of corrupt behaviour. Finally, although the fixed-effects specification controls for time-invariant unobserved heterogeneity, the observational design does not allow causal effects to be established. Reverse causality is a particular concern: weaker business demography could itself shape perceptions of corruption captured by the EQI, for instance if declining entrepreneurial activity erodes public trust in local institutions. An instrumental-variable approach was not feasible given the absence of a plausible time-varying instrument for regional corruption that is not itself correlated with economic development; this remains an important avenue for future research. Time-varying omitted factors, such as changes in local enforcement quality or EU structural fund allocations, also cannot be fully excluded despite the inclusion of time and entity fixed effects.

Future research could examine sector-specific relationships, explore longer-term dynamics, and investigate whether similar patterns emerge outside the European Union. It could also formally investigate potential non-linearities or threshold levels in the relationship between corruption and business demography using methods specifically designed to identify such patterns. Such research would complement the present analysis and contribute to a deeper understanding of how corruption relates to entrepreneurial development across different regional contexts.

DATA AVAILABILITY

The data analysed in this study are derived from publicly available datasets provided by Eurostat, the Quality of Government Institute at the University of Gothenburg, and the Worldwide Governance Indicators of the World Bank. The analytical dataset used in this study is provided as Supplementary Information.

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ETHICS DECLARATION

This study is based exclusively on publicly available aggregated secondary data and did not involve human participants, personal data, or experimental procedures. Ethical approval and informed consent were therefore not required.

AUTHOR CONTRIBUTIONS

The author was solely responsible for the conceptualisation and design of the study, data collection and preparation, methodology, statistical analysis, interpretation of the results, visualisation, and writing and revision of the manuscript.

COMPETING INTERESTS

The author declares no competing interests.

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