



Araştırma Makalesi / Research Article

Türkiye'nin bölgelerinde girişimcilik ve yaratıcı yıkım

Entrepreneurship and creative destruction in Turkish regions

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Makale Bilgisi	Öz
<i>Alındı:</i> 17.04.2026	Bölgesel girişimcilik dinamikleri ile işgücü piyasası arasındaki etkileşimin yapısal olarak çözülmesi, sürdürülebilir kalkınma ve bölgeye özgü istihdam politikalarının tasarımı açısından kritik öneme sahiptir. Bu çalışma, Türkiye'nin 12 İBBS Düzey 1 bölgesinde, 2010–2024 dönemini kapsayan panel veri seti aracılığıyla, bölgesel girişimcilik ile işsizlik arasındaki dinamik ilişkiyi incelemektedir. Fırsat odaklı "Schumpeterian Çekme" ile zorunluluk odaklı "Mülteci İtme" mekanizmalarını ayırtmak amacıyla, firma kuruluş oranları işgücü yaklaşımıyla hesaplanmıştır. Sabit etkili panel OLS ve Granger nedensellik analizlerinden elde edilen ampirik bulgular, iki yönlü bir dinamik döngünün varlığını ortaya koymaktadır. Model I bulguları, geçmiş dönem girişimsel girişlerin bir yıllık gecikmeyle mevcut bölgesel işsizliği istatistiksel olarak anlamlı biçimde azalttığını doğrulamaktadır. Model II sonuçları ise Türkiye genelinde zorunluluk tabanlı "itme" etkisinin yapısal olarak baskın olduğunu ortaya koymaktadır. Söz konusu ampirik dualite, tek tip politikalar yerine bölge koşullarına duyarlı, asimetrik girişimcilik stratejilerinin tasarımı zorunlu kılmaktadır. <i>Anahtar Kelimeler: Bölgesel girişim, işsizlik, Schumpeterian çekme etkisi, mülteci itme etkisi</i>
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Article Information	Abstract
<i>Received:</i> 17.04.2026	Structurally analysing interaction between regional entrepreneurial dynamics and the labour market is critical to sustainable development and the design of region-specific employment policies. This study examines the dynamic relationship between regional entrepreneurship and unemployment across 12 NUTS Level 1 regions in Türkiye, utilising a panel dataset covering the 2010–2024 period to disentangle the opportunity-driven “Schumpeterian pull” and necessity-driven “refuge push” mechanism, firm entry rates are operationalised via the labour market method. Drawing on fixed-effects panel OLS and Granger causality analysis, the findings point to a more nuanced picture than a simple push-or-pull dichotomy. Model I confirms that entries in previous periods reduced unemployment in one-year lag. Model II reveal push effect is dominant across Türkiye. Taken together, these results argue against blanket entrepreneurship promotion and in favour of policies tailored to each region’s actual structural conditions. <i>Keywords: Regional Entrepreneurship, Unemployment, Schumpeterian Pull effect, Refugee Push Effect</i>
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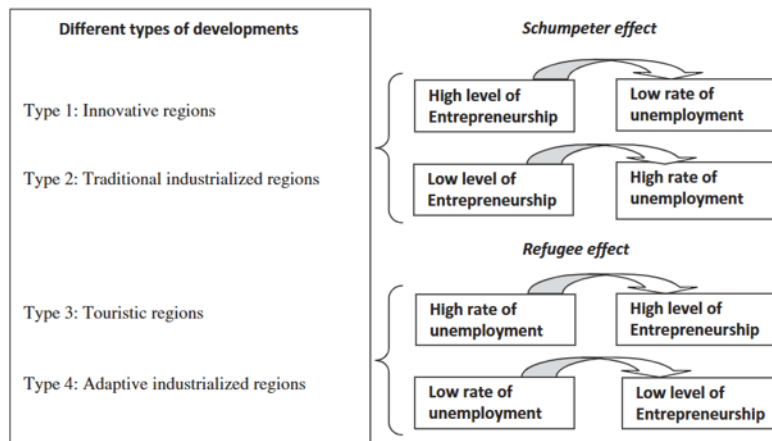
1.Introduction

Few questions in regional economics have attracted as much sustained interest as the relationship between new firm formation and employment. The intuition behind the interest is straightforward: new businesses compete, innovate, and hire, and regions that generate more of them should, over time, grow faster and employ more people (Ashcroft and Love, 1996). Schumpeter's (1911; 1942) theory of creative destruction lends this intuition a more precise shape. The constant churn of firm births and deaths is not economic noise; it is the mechanism through which resources migrate from less productive to more productive uses, and through which industries restructure themselves. Empirically, there is reasonable support for this view in the long run. Audretsch and Fritsch (2002) showed that regions with high start-up rates in the 1980s grew noticeably faster in the following decade, and Reynolds and Maki (1990) documented a broadly positive association between new firm births and job creation across a range of regional settings.

In the short run, however, the picture is considerably less tidy. Most new firms are small, many fail quickly, and only a handful ever grow large enough to make a visible dent in local employment (Hart and Hanvey, 1995; Gerlach and Wagner, 1993; Dunne et al., 1989). Fritsch (1997) found that higher start-up rates were actually associated with negative short-run employment effects in West German planning regions, as competitive pressure from new entrants displaced workers in incumbent firms before the entrants themselves had grown sufficiently to absorb them. This complicates the policy case for simply encouraging more entry, and it shifts attention toward a more fundamental question: why do people start businesses in the first place?

The literature has settled on two broad answers, which pull in opposite directions. The Schumpeterian, or pull, account holds that entrepreneurship is fundamentally opportunity-driven: people start firms when they see profitable openings, when markets are expanding, and when the expected returns from running their own business look attractive relative to wage work (Reynolds et al., 1995). The refugee, or push, account tells a different story. When labour markets deteriorate — through job losses, limited prospects, or wage stagnation — self-employment becomes a fallback rather than a choice (Gawel, 2010). As unemployment rises, the opportunity cost of starting a business falls, and people who might otherwise remain in wage employment are effectively pushed into entrepreneurship by the absence of alternatives (Verheul et al., 2006; Thurik et al., 2008). Gawel (2010) adds that the longer someone has been unemployed, the more this dynamic intensifies, since prolonged joblessness steadily erodes expected future wages relative to whatever a new venture might yield.

Figure 1. Development types in relation to Schumpeter / Pull and Push/Refugee Effects



Source: Abdesselam et. al., 2014:3440

Figure 1 maps these two dynamics onto a simple typology. Where the Schumpeterian effect dominates, entrepreneurship and unemployment tend to move in opposite directions: a region is either entrepreneurially active with low unemployment, or entrepreneurially sluggish with high unemployment. Where the refugee effect dominates, the two variables move together — high unemployment coincides with high startup activity, because distress is driving entry rather than opportunity.

The typology distinguishes four regional configurations. Type 1 regions are technologically advanced areas with strong knowledge infrastructure — universities, innovative firms, well-educated labour forces — that allow new entrants to convert ideas into market opportunities relatively quickly. These regions exhibit the Schumpeterian pattern most clearly: high startup rates accompanied by falling or low unemployment. Type 2 regions are traditional industrial areas struggling with structural change. Weak human capital, limited innovation capacity, and high unemployment suppress both startup activity and job creation from new firms — a reversal of the Schumpeterian dynamic. Type 3 regions are shaped more by residential and amenity factors, where inflows of retirees, seasonal workers, or the unemployed from elsewhere create a context of simultaneously high unemployment and high

startup rates; here, necessity rather than innovation is the primary driver of entry. Type 4 regions are adaptable industrial areas that manage to absorb competitive pressures by updating their products and processes. They tend to combine moderate startup rates with relatively low unemployment, sustained mainly through SME development and ownership transitions rather than breakthrough innovation.

Which of the two effects dominates in practice turns out to be highly context-dependent, and the evidence is genuinely mixed. Baptista and Thurik (2006) and Baptista and Preto (2007), working with Portuguese data across several decades, found both directions operating: unemployment spurs new firm creation, and entrepreneurial activity subsequently brings unemployment down — though the employment gains take longer to materialise than in most OECD comparators. Van Stel et al. (2007) reached similar conclusions for Japan. But the push mechanism is not universal. Carree (2002) found no meaningful rise in business registrations in high-unemployment U.S. regions, casting doubt on the refugee hypothesis as a general rule. Carree and Dejardin (2020), looking at Belgian municipalities, identified push-driven entry in certain sectors but also found that high-unemployment areas experienced elevated exit rates, producing a revolving-door pattern where new entrants displace incumbents without generating net employment gains. What unites these otherwise divergent results is the reminder that the balance between push and pull forces cannot be read off from aggregate statistics alone; it depends on the institutional setting, the structure of the local economy, and the specific character of the labour market — factors that vary considerably across space, a revolving-door dynamic in which new entrants quickly displace incumbents without generating net employment gains. These divergent findings underscore that the balance between push and pull forces is shaped by local institutional conditions, regional economic structure, and the characteristics of the labour market — factors that vary substantially across space.

Against this backdrop, regional context matters a great deal. Armington and Acs (2004) showed that human capital is one of the strongest predictors of startup rates, with more educated regional workforces generating substantially more new firms, particularly in knowledge-intensive sectors. Fritsch (1992) observed that new businesses cluster near their founders' places of residence, which means that regional human capital and entrepreneurial culture are not easily substituted from outside. There is also a measurement question that carries real consequences for how we interpret the evidence. Audretsch and Fritsch (1994) distinguished between the ecological approach — which expresses new firm counts relative to the stock of existing firms — and the labour market approach, developed by Evans and Jovanovic (1989), which scales entry by the employed population. In regions dominated by a few very large employers, the ecological measure can be misleading: the same number of startups looks very different depending on whether you divide by ten incumbent firms or ten thousand. The labour market approach avoids this distortion and is better suited to studying the interplay between entrepreneurship and unemployment, which is why it is adopted here.

Research on the entrepreneurship-unemployment relationship in Türkiye remains thin, and what exists has tended to work at the national level or rely on static cross-sectional designs. Kum and Karacaoglu (2012), using FMOLS and DOLS estimators over the 1985–2009 period, found an asymmetric picture: a one-percentage-point rise in unemployment was associated with a roughly 1.1% fall in self-employment, but the reverse channel — self-employment feeding back into unemployment — was statistically insignificant. In other words, entrepreneurship in Türkiye appeared to react to labour market conditions without meaningfully reshaping them. A somewhat different picture emerged from Guner and Korkmaz (2011), who used survey data from Business Development Centres (İSGEMs) to show that firms receiving institutional support generated employment at about 2.5 times the national average — a finding that suggests the weak aggregate performance of Turkish entrepreneurship may partly reflect a lack of targeted support rather than an absence of potential.

More recently, Moiz and İleri (2025) turned to the post-2008 period and found, at the NUTS 2 and NUTS 3 levels, that unemployment does indeed stimulate new firm formation — consistent with the push story — but that firm formation had no detectable effect on unemployment in the other direction. Taken together, these studies point fairly consistently toward necessity-driven entrepreneurship as the dominant mode in Türkiye, while leaving open the question of whether a Schumpeterian pull effect exists but has so far been too localised or too slow-moving to show up in aggregate national estimates. The dynamic feedback between entrepreneurship and employment, and the degree to which it varies across regions, remains largely unexplored.

This paper attempts to fill some of these gaps. Using a balanced panel covering Türkiye's twelve NUTS 1 regions over 2010–2024, we examine both directions of the entrepreneurship-unemployment relationship within a common analytical framework. Rather than relying on contemporaneous correlations or national aggregates, the analysis combines lead-lag cross-correlation methods with fixed-effects panel OLS and Granger causality tests, all operationalised through the labour market approach to measuring firm entry. This allows us to ask not only whether entrepreneurship and unemployment are related, but in which direction causality runs, over what time horizons, and whether the answer differs systematically across regions. The 2010–2024 window is particularly informative in the Turkish context, spanning a period of considerable macroeconomic volatility and allowing us to observe how regional entrepreneurial dynamics respond to labour market shocks of varying severity. Section 2 describes the data and empirical framework. Section 3 presents the findings, and Section 4 concludes with policy implication

2.Data and Methodology

This section outlines the empirical framework and econometric design engineered to investigate the dynamic relationship between regional entrepreneurship and labour market performance in Türkiye. It begins with a detailed description of the data compilation process, geographical classifications, and the operationalisation of core entrepreneurial indicators using the labour market method. Subsequently, the section presents the panel data specifications and the dynamic panel Granger causality framework used to disentangle the coexistence of the Schumpeterian pull and refugee-systematic push mechanisms across Turkish regions

2.1. Data Source and Regional Classification

The empirical analysis in this study is based on regional data from Türkiye covering the period 2010–2024. To ensure alignment with international standards and European Union legislation, regional statistics are structured according to the Nomenclature of Territorial Units for Statistics (NUTS) classification system. Specifically, this paper focuses on the NUTS 1 level, which aggregates neighbouring provinces into 12 distinct statistical regions.

The raw data regarding new firm establishments and liquidations were obtained on a city-by-city basis from the official registry of the Union of Chambers and Commodity Exchanges of Türkiye (TOBB). The author then aggregated these city-level metrics to construct the regional indicators. For example, the statistics for the TR2 region (Statistical Region of West Marmara) were calculated by pooling the individual data of its five constituent provinces: Tekirdağ, Edirne, Kırklareli, Balıkesir, and Çanakkale.

Complementary macroeconomic and demographic control variables—including regional Gross Domestic Product (GDP), labour force participation, unemployment rates, population, and research and development (R&D) indicators—were compiled from the official databases of the Turkish Statistical Institute (TurkStat). After accounting for dynamic lag structures and first-difference transformations, the final dataset yields a balanced panel matrix of 168 region-year observations, effectively resolving sample size limitations.

2.2. Measurement of Entrepreneurial Indicators: The Labour Market Method

In the regional science literature, two primary methods are utilised to standardise and calculate firm entry and exit rates: the Ecological Method and the Labour Market Method. The ecological approach defines start-up activity relative to the existing stock of incumbent firms. However, as argued by Garofoli (1994) and Audretsch and Fritsch (1994), the ecological method can introduce severe measurement bias due to regional variations in average establishment sizes. Regions dominated by a few massive industrial enterprises might show artificially inflated entry rates, while regions with a dense population of micro-SMEs might appear less dynamic. To circumvent this distortion and accurately estimate the probability that an individual will initiate a business venture, this study explicitly adopts the Labour Market Method (Audretsch & Fritsch, 1994; Fritsch & Mueller, 2004). This framework assumes that the regional workforce represents the true "seedbed" of potential entrepreneurs. Within this paradigm, the key market dynamism and turbulence indicators are calculated as follows (Fritsch, 1997):

$$Entry Rate_{it} = \frac{Number\ of\ New\ Firms_{it}}{Workforce_{it}} \quad Eqn.1$$

$$Exit Rate_{it} = \frac{Number\ of\ Closed\ Firms_{it}}{Workforce_{it}} \quad Eqn.2$$

$$Turbulence Rate_{it} = \frac{Number\ of\ New\ Firms_{it} + Number\ of\ Closed\ Firms_{it}}{Workforce_{it}} \quad Eqn. 3$$

$$Net\ Entry\ Rate_{it} = \frac{Number\ of\ New\ Firms_{it} - Number\ of\ Closed\ Firms_{it}}{Workforce_{it}} \quad Eqn. 4$$

Where $Workforce_{it}$ represents the total regional labour force in the region i at time t . The turbulence rate serves as a direct proxy for the intensity of "Creative Destruction" and market fluctuation, reflecting the simultaneous entry and exit of firms within the local economy.

2.3. Preliminary Analysis: Lead – Lag Cross – Correlation Framework

Before executing the formal panel econometric regressions, this study employs a dynamic lead-lag cross-correlation analysis as an exploratory data tool. This approach is highly critical given that the socioeconomic impacts of entrepreneurial activity—such as job creation or business failures—rarely manifest instantaneously within the same calendar year.

To map the temporal trajectory and short-term co-movements between the calculated labour market method indicators (Entry Rate_{it}, Exit Rate_{it}, Turbulence Rate_{it}, Net Entry Rate_{it}) and labour market outcomes (Employment_{it}), we calculate Pearson correlation coefficients across multiple time lags and leads ($t+k$, where $k=0,1,...,5$). The primary objective of this preliminary step is twofold; (1) identifying the temporal window, which detects the exact time horizon at which a shock in regional startup activity yields the strongest statistical association with regional employment growth, (2) a priori regional classification: Following the framework of Fritsch (1997) and Abdesselam et al. (2014), the joint behaviour of these lag-lead correlations allows for an initial taxonomy of the 12 NUTS 1 regions, distinguishing between areas dominated by the innovation-driven Schumpeterian pull effect versus the necessity-driven refugee push effect.

This exploratory phase establishes the stylised facts of Türkiye's regional dynamics, directly informing and justifying the lag structures utilised in the subsequent structural panel regressions. When the Pull/Schumpeterian effect dominates, the region has high turbulence-correlation rates and high entry rates. If the Push/Refugee/Shopkeeper effect dominates, the region has a low turbulence rate, but entry correlation rates are higher than turbulence. No clear dominance indicates a mixed effect, with all correlation rates low and no significant increase or change. Entry rates are expected to be high at the earlier stage, whereas exit rates are expected to increase as incumbents decline. If the start-up declines, the turbulence rate will be lower. Due to rising market competition, net entry is expected to be positive. Accordingly, net entry is expected to be positively associated with changes in employment. In line with the theory of creative destruction, a positive relationship between economic turbulence and economic development is therefore assumed.

2.4. Empirical Specification and Control Variables

To systematically isolate the bidirectional channels of entrepreneurship—namely, the Schumpeterian pull mechanism and the refugee push mechanism—we pool the 12 NUTS 1 regions into a unified panel structure. This approach directly addresses the degrees-of-freedom constraints inherent in region-by-region time-series estimations.

We employ a Panel Ordinary Least Squares (OLS) estimator with Entity Fixed Effects. The incorporation of regional fixed effects (α_i) absorbs all time-invariant, unobserved regional characteristics (such as localised entrepreneurial culture, long-term geographic benefits, and persistent institutional structures) that could otherwise trigger omitted variable bias. The choice of fixed effects over random effects rests on both theoretical and empirical considerations. Theoretically, the 12 NUTS 1 regions are not a random draw from a larger population of regions; they constitute the complete set of macro-regional units in Türkiye, and each carries a distinct, permanent institutional identity—in terms of industrial composition, migration history, and local governance—that is almost certainly correlated with both entrepreneurship rates and labour market outcomes. The random effects estimator assumes orthogonality between the unobserved regional heterogeneity and the regressors, an assumption that is implausible in this context. Empirically, this is confirmed by the F-test for poolability reported below, which strongly rejects the null hypothesis of homogeneous intercepts across regions ($p = 0.0000$ in both models), providing direct statistical evidence that region-specific fixed intercepts are necessary. Together, these considerations make the fixed effects specification the appropriate and defensible choice for this analytical framework. Furthermore, to prevent endogeneity stemming from simultaneity and reverse causality, all primary independent variables are entered into the regression models with a one-period lag. The two core empirical specifications are operationalised below.

Panel unit root testing was not conducted in this study for both statistical and structural reasons. On statistical grounds, with $T = 14$ time periods, the asymptotic properties underlying standard panel unit root tests—such as Im–Pesaran–Shin or Levin–Lin–Chu—are unlikely to hold; their application in short panels is well documented to produce unreliable size and power properties (Baltagi, 2008). On structural grounds, the two primary variables of interest are bounded ratios that are constructed rather than raw series. The firm entry rate and the regional unemployment rate are both constrained to the unit interval by construction, which precludes the unbounded random walk behaviour implied by unit root non-stationarity: a series cannot drift to infinity if it is definitionally bounded between zero and one. Moreover, the GDP per capita and population controls are entered as log-differences ($d_lnGDPpc$ and d_lnPop), transformations that remove common stochastic trends from the right-hand side of each specification and further reduce the persistence typically associated with non-stationarity in raw level series. Taken together, the short panel length, the bounded nature of the ratio variables, and the first-difference transformations applied to the continuous controls collectively provide strong theoretical and methodological grounds for assuming stationarity without formal testing.

The first model estimates the Schumpeterian Pull (Opportunity) Effect. This model tests whether an increase in past entrepreneurial entry rates leads to a structural reduction in current regional unemployment by expanding job creation:

$$\begin{aligned} Unem_{Rate_{it}} = & \alpha_i + \beta_1 EntryRate_{i,t-1} + \beta_2 dlnGDPpc_{it} \\ & + \beta_3 GERD_{it} + \beta_4 Concentration_{it} \\ & + \beta_5 ShofPROP_{it} + \beta_6 d_lnPop_{it} + \varepsilon_{it} \end{aligned} \quad (\text{Model 1})$$

Conversely, the second model examines whether high levels of past regional unemployment act as a push factor, forcing displaced workers into self-employment and necessity-driven startup ventures:

$$\begin{aligned} EntryRate_{it} = & \alpha_i + \beta_1 Unem_Rate_{i,t-1} + \beta_2 dlnGDPpc_{it} \\ & + \beta_3 GERD_{it} + \beta_4 Concentration_{it} \\ & + \beta_5 ShofPROP_{it} + \beta_6 d_lnPop_{it} + \varepsilon_{it} \end{aligned} \quad (\text{Model 2})$$

Where ε_{it} represents the idiosyncratic error term. The structural and control variables extracted from regional theory (Acs & Armington, 2004) are defined as:

$Unemp_Rate_{it}$: The official regional unemployment rate, serving as the benchmark for labour market distress.

$d_lnGDPpc_{it}$: The first difference of the natural logarithm of real regional GDP per capita, tracking year-on-year growth in economic output and local labour productivity.

$GERD_{it}$: Gross domestic expenditure on R&D divided by regional GDP, acting as a metric for regional innovativeness and technological absorptive capacity.

$Concentration_{it}$: Calculated as the total number of enterprises divided by the regional population, proxying market intensity and baseline costs of land and labour.

$ShofPROP_{it}$: The share of proprietors (business owners, including both employers and own-account workers) within the total labour force, mapping the depth of the local small-business ecosystem.

d_lnPop_{it} : The annual growth rate of the regional population, controlling for demographic shifts and local market size expansion.

2.5. Dynamic Diagnostic and Panel Granger Causality Framework

To evaluate the feedback loop implied by the coexistence of these two economic phenomena, the methodology incorporates a dynamic Panel Granger Causality Test. Although Generalised Method of Moments (GMM)-based Panel Vector Autoregression (PVAR) models represent a standard approach for analysing such dynamic feedback loops, GMM estimators require large cross-sectional samples to ensure validity. Given our specific macro-regional focus on Türkiye's 12 NUTS-1 regions, employing a GMM-PVAR framework would introduce severe small-sample bias and risk of instrument proliferation. To maintain statistical consistency while explicitly controlling for regional path dependency and hysteresis, we construct a dynamic Fixed Effects Panel Granger framework via the following structural tests:

Test 1: Causality Running from Entrepreneurship to Unemployment

This checks whether past firm entries structurally alter current unemployment after netting out the internal momentum of unemployment:

$$Unem_Rate_{it} = \alpha_i + \delta_1 Unem_Rate_{i,t-1} + \theta_1 EntryRate_{i,t-1} + \varepsilon_{it} \quad (\text{Eqn. 5})$$

Rejecting the null hypothesis $H_0: \theta_1 = 0$ demonstrates that regional firm entry Granger-causes regional unemployment changes.

Test 2: Causality Running from Unemployment to Entrepreneurship

This evaluates whether past labour market distress acts as a leading predictor of subsequent firm entry rates after accounting for baseline entrepreneurial inertia:

$$EntryRate_{it} = \alpha_i + \lambda_1 EntryRate_{i,t-1} + \mu_1 Unem_Rate_{i,t-1} + \varepsilon_{it} \quad (\text{Eqn. 6})$$

Rejecting the null hypothesis $H_0: \theta_1 = 0$ confirms that regional unemployment Granger-causes new firm formation. A concurrent rejection of both null hypotheses formally establishes a bidirectional dynamic nexus operating within Türkiye's regional labour markets.

3. Empirical Findings

To establish the initial stylised facts of Türkiye's regional business ecosystem, we first examine the contemporaneous pooled Pearson correlation matrix. This exploratory step provides a baseline map of the co-movements between regional entrepreneurship indicators (Entry Rate_{it}, Exit Rate_{it}, Turbulence Rate_{it}, Net Entry Rate_{it}) and labour market performance (Δ Employment_{it}). Table 1 presents the calculated coefficients for the full panel of 12 NUTS 1 regions over the 2010–2024 period.

Table 1. Contemporaneous Pooled Correlation Matrix (2010-2024)

Variables	Δ Employment _{it}	Entry Rate _{it}	Exit Rate _{it}	Turbulence Rate _{it}
Δ Employment _{it}	1.0000			
Entry Rate _{it}	0.2221	1.0000		
Exit Rate _{it}	0.1898	0.7941	1.0000	
Turbulence Rate _{it}	0.2226	0.9851	0.8869	1.0000

Note: All variables are calculated by the authors using the labour market method, based on NUTS-1 regional workforces.

When analysing the internal dynamics of the regional business population, the most striking empirical regularities emerge from the intersections of firm entry, exit, and turbulence. A very high and statistically strong positive correlation is observed between Entry Rate_{it} and Exit Rate_{it} (0.7941). In regional economics, this strong co-movement is a classic indicator of intensive "market churning" or turbulence, rather than structural regional displacement. This implies that in Turkish regions, firm entry and exit do not occur in isolation or in separate geographic clusters; instead, regions experiencing high rates of new enterprise formation simultaneously witness high rates of dissolution among incumbent or failing firms. This cyclical synchronisation aligns closely with Fritsch's (1997) "creative destruction" framework, in which high entry levels breed intense competition, leading to the rapid displacement of less efficient market actors.

The contemporaneous correlation between employment growth (Employment_{it}) and new business entries (Entry Rate_{it}) is positive but modest (0.2221). Similarly, the connection with total market churning (Turbulence Rate_{it}) stands at 0.2226. These positive values provide tentative support for a contemporaneous Schumpeterian pull mechanism, indicating that general market expansion and entrepreneurial dynamism go hand in hand with job creation.

Interestingly, the correlation between Employment_{it} and Exit Rate_{it} is also positive (0.1898). While conventional intuition might suggest that firm closures inherently destroy jobs and contract the labour market, this positive coefficient suggests a structural nuance: periods of regional employment expansion are synchronised with high market turnover. This indicates that job losses from dying firms are immediately absorbed and heavily counterbalanced by expanding, more productive surviving entities, thereby reinforcing structural reallocations within Türkiye's regional economies.

However, because these contemporaneous coefficients capture only same-year co-movements, they are insufficient to fully disentangle the long-term structural dominance between opportunity-driven "pull" forces and necessity-driven "push" forces. Since the structural employment effects of new startups usually materialise with significant time lags, this pooled matrix underscores the need to adopt a dynamic lead-lag cross-correlation framework for specific regions.

3.1. Regional Heterogeneity and Lead-Lag Cross-Correlation Dynamics

While the pooled analysis in Table 1 establishes a positive baseline contemporaneous relationship, it aggregates away structural and geographical idiosyncrasies. To uncover the space-time trajectory through which new business formation transforms labour markets, we decompose the panel into individual NUTS 1 macro-regions and implement a lead-lag cross-correlation analysis over a 5-year temporal horizon. This approach captures the transitional phases of Fritsch and Mueller's (2004) evolutionary framework, mapping how initial market entries translate into direct employment gains, mid-term displacements, or long-term structural adjustments. Table 2 provides the comprehensive regional lead-lag matrix.

Table 2. Regional Lead-Lag Correlations Between Entrepreneurship Indicators and Employment Growth (Δ Employment_{it})

Region	Indicator	T+0	T+1	T+2	T+3	T+4	T+5
TR1	Entry Rate _{it}	0.371	0.467	0.163	0.381	0.331	-0.342
	Exit Rate _{it}	0.099	0.386	0.348	0.436	0.176	0.072
	Turbulence Rate _{it}	0.303	0.481	0.254	0.437	0.276	-0.160
	Net Entry Rate _{it}	0.342	0.243	-0.086	0.045	0.284	-0.602
TR2	Entry Rate _{it}	0.379	0.375	-0.225	-0.365	-0.238	-0.163
	Exit Rate _{it}	0.124	0.169	-0.269	-0.323	-0.269	-0.155
	Turbulence Rate _{it}	0.269	0.299	-0.283	-0.328	-0.283	-0.175
	Net Entry Rate _{it}	0.182	0.151	0.099	0.040	0.096	0.023
TR3	Entry Rate _{it}	0.211	0.608	0.260	-0.208	0.027	-0.395
	Exit Rate _{it}	0.430	0.475	0.203	-0.048	-0.083	-0.158
	Turbulence Rate _{it}	0.352	0.637	0.278	-0.154	-0.030	-0.313
	Net Entry Rate _{it}	-0.120	0.240	0.105	-0.168	0.108	-0.269
TR4	Entry Rate _{it}	0.253	0.272	0.013	-0.210	-0.025	-0.409
	Exit Rate _{it}	0.408	0.437	0.197	-0.153	-0.390	-0.383
	Turbulence Rate _{it}	0.422	0.480	0.138	-0.245	-0.291	-0.513
	Net Entry Rate _{it}	-0.047	-0.080	-0.121	-0.032	0.288	0.042
TR5	Entry Rate _{it}	0.360	0.385	0.233	0.316	0.235	-0.096
	Exit Rate _{it}	0.394	0.257	0.144	0.086	-0.081	-0.173
	Turbulence Rate _{it}	0.385	0.361	0.214	0.259	0.154	-0.117
	Net Entry Rate _{it}	0.273	0.398	0.253	0.409	0.381	-0.054
TR6	Entry Rate _{it}	0.212	0.300	0.455	0.003	-0.066	-0.645
	Exit Rate _{it}	0.124	-0.007	-0.265	-0.433	-0.242	-0.027
	Turbulence Rate _{it}	0.234	0.203	0.099	-0.363	-0.232	-0.318
	Net Entry Rate _{it}	0.058	0.204	0.483	0.378	0.181	-0.319
TR7	Entry Rate _{it}	-0.048	0.557	0.227	-0.451	0.162	-0.096
	Exit Rate _{it}	0.302	0.735	0.185	-0.120	-0.351	-0.031
	Turbulence Rate _{it}	0.090	0.808	0.268	-0.365	-0.122	0.076
	Net Entry Rate _{it}	-0.222	-0.109	0.051	-0.261	0.415	-0.049
TR8	Entry Rate _{it}	0.156	0.149	-0.384	-0.140	0.260	-0.125
	Exit Rate _{it}	-0.098	-0.064	-0.216	-0.202	0.000	0.095

	Turbulence Rate _{it}	0.034	0.044	-0.340	-0.197	0.143	-0.012
	Net Entry Rate _{it}	0.272	0.214	-0.146	0.077	0.251	-0.225
TR9	Entry Rate _{it}	-0.187	0.368	-0.231	0.026	-0.157	0.052
	Exit Rate _{it}	-0.164	-0.145	-0.376	-0.032	-0.010	0.297
	Turbulence Rate _{it}	-0.193	0.116	-0.335	-0.004	-0.090	0.195
	Net Entry Rate _{it}	-0.048	0.617	0.195	0.072	-0.172	-0.307
TRA	Entry Rate _{it}	0.305	0.512	0.065	0.329	0.164	-0.285
	Exit Rate _{it}	0.044	0.300	0.391	0.200	-0.168	-0.345
	Turbulence Rate _{it}	0.116	0.412	0.389	0.268	-0.121	-0.373
	Net Entry Rate _{it}	0.034	-0.165	-0.367	-0.118	0.207	0.303
TRB	Entry Rate _{it}	-0.042	0.366	0.050	-0.021	0.077	-0.176
	Exit Rate _{it}	0.475	0.612	0.157	0.133	-0.268	0.133
	Turbulence Rate _{it}	0.358	0.661	0.150	0.102	-0.189	0.052
	Net Entry Rate _{it}	-0.440	-0.381	-0.130	-0.151	0.329	-0.243
TRC	Entry Rate _{it}	0.161	0.453	0.050	0.036	0.330	-0.399
	Exit Rate _{it}	-0.087	0.089	0.198	0.284	0.020	0.111
	Turbulence Rate _{it}	0.100	0.410	0.129	0.177	0.255	-0.118
	Net Entry Rate _{it}	0.218	0.405	-0.049	-0.133	0.261	-0.367

A rigorous review of Table 2 allows us to classify the 12 Turkish macro-regions into distinct spatial taxonomies based on their asynchronous entrepreneurship-unemployment configurations.

The first empirical pattern involves the dynamic Schumpeterian "pull" clusters (TR1, TR3, TR5, TR6). These highly developed and industrialised regions exhibit a classic opportunity-driven lag structure, in which past expansion in the entrepreneurial breed predicts employment growth after a short operational delay. TR3 (Aegean) exhibits an immediate and robust positive employment response exactly 1 year following a surge in business formation (Entry Rate_{t-1} = 0.608; TurbRate_{t-1} = 0.637). This indicates a rapid process of market integration, in which startups swiftly scale up and generate employment. Similarly, TR1 (İstanbul) showcases a parallel pattern, where Entry Rate_{t-1} (0.467) and TurbRate_{t-1} (0.481) strongly drive job creation, reflecting the high absorptive capacity of Turkey's primary commercial hub. On the other hand, TR5 (West Anatolia) stands out due to its persistent and structurally stable positive trajectory. Unlike other regions, its Net Entry Rate maintains a highly significant positive correlation with employment expansion across almost all lags (t+1:0.398; t+3:0.409; t+4:0.381). This implies that business formation in this cluster provides sustained, cumulative institutional employment support rather than volatile cyclical shocks. Furthermore, TR6 (Mediterranean) presents a delayed mature "pull" mechanism, where the job-creation capacity of new firms peaks at a strict 2-year lag (EntryRate_{t-2} = 0.455; NetEntryRate_{t-2} = 0.483), confirming that startups in this region require a longer gestation period to structurally impact the local labour market.

In sharp contrast to the opportunity-driven zones, the high-turbulence and "Refugee-Push" excess clusters (TR7, TRB) represent less industrialised regions that exhibit configurations heavily marked by necessity-driven entry, aggressive market turnover, or economic distress. TR7 (Central Anatolia) experiences an extreme synchronisation of entries and exits at a 1-year lag. Both Entry Rate_{t-1} (0.557) and Exit Rate_{t-1} (0.735) surge concurrently, yielding a massive market churning correlation (TurbRate_{t-1} = 0.808). This heavy concentration of simultaneous firm births and deaths confirms that regional employment expansions are highly synchronised with aggressive, short-lived entrepreneurial cycles—a structural symptom of low-barrier, necessity-driven local retail

or service setups. Concurrently, TRB (Middle Eastern Anatolia) reveals a highly vulnerable configuration that Net Entry Rate correlates negatively with regional employment growth across early periods ($t+0$: -0.440; $t+1$: -0.381). This negative trend is driven by an intensive wave of business dissolutions ($\text{Exit Rate}_{t-1} = 0.612$). In this cluster, entrepreneurial exit functions as a destructive shake-out that exacerbates labour contractions, highlighting a severe lack of resilience in the local business lifecycle and reinforcing a "refugee-push" environment.

Finally, Table 2 provides a critical empirical verification of the long-term "Shake-Out" effect postulated by Fritsch and Mueller (2004). In highly competitive regions, the early positive employment gains from entrepreneurship face a structural reversal at the 5-year threshold. In TR1 (İstanbul), the initial positive employment effects completely dissipate, and the 5-year lagged net entry rate shifts to a strong negative correlation ($\text{Net Entry Rate}_{t-5} = -0.602$). A parallel turnaround occurs in TR6 (Mediterranean), where the 5-year lagged entry rate drops steeply to -0.645. Econometrically, this provides strong empirical verification of the shake-out effect in Türkiye's primary commercial hubs. It confirms that 5 years after an entrepreneurial wave, market saturation and the heightened productivity of surviving incumbents lead to a contraction or rationalisation of labour. The initial direct jobs created by startups are partially offset by the market displacement of obsolete, less competitive firms, demonstrating that creative destruction operates with a definitive 5-year evolutionary cycle in the Turkish regional context.

3.1. Multivariate Panel Regression Results

To test the net structural impact of entrepreneurship on regional labour markets while controlling for macroeconomic, demographic, and institutional variations, we transition from bivariate correlations to a multivariate framework. Table 3 reports the parameter estimates from the Panel Ordinary Least Squares (PanelOLS) specification with entity fixed effects. The model utilises a one-period lagged regional firm entry rate to mitigate potential endogeneity and capture the operational gestation lag of new enterprises. The diagnostic framework validates the chosen specification; the F-test for Poolability yields a highly significant statistic ($F(11,150) = 14.570$, $p=0.0000$), strongly rejecting the null hypothesis of a restrictive pooled OLS model and confirming that omitting time-invariant regional fixed effects would induce severe omitted variable bias. The within R^2 stands at 0.2616, indicating that the model accounts for a substantial proportion of the short-term variation in regional unemployment across the 168 observations.

Table 3. Panel OLS Fixed Effects Regression Results (Dependent Variable: Unem_Rate_{it})

Independent Variables	Coefficient	Std. Error	t-statistic	p-value
Constant	22.121	40.840	54.165	0.0000
EntryRate_lag1	-15.136	34.760	-43.544	0.0000
$D_ \ln \text{GDPpc}$	-27.716	19.129	-14.489	0.1495
GERD	-27.902	83.761	-0.3331	0.7395
Concentration	43.269	63.631	0.6800	0.4976
ShofProp	-37.235	95.409	-39.026	0.0001
$D_ \ln \text{Pop}$	-55.484	20.105	-0.2760	0.7830

Note: Total Observations: 168 (12 Entities x 14 Time periods). R-squared (Within): 0.2616. F-statistic: 8.8554 ($p=0.0000$).

The core empirical finding of the regression analysis lies in the performance of the primary entrepreneurship vector. The coefficient for the one-period lagged entry rate (EntryRate_{t-1}) is negative and remarkably strong ($\beta = -15.136$) with a highly significant t-statistic of -4.3544 ($p=0.0000$). This provides robust empirical confirmation of the Schumpeterian "pull" effect within Türkiye's NUTS 1 macro-regions. It implies that a structural expansion in new business formation during the previous year exerts a powerful tightening effect on current regional unemployment. This highly significant lag structure indicates that new startups do not merely absorb labour instantaneously upon registration; rather, their capacity to systematically reduce regional unemployment materialises as they navigate their initial year of operation, expand their production scales, and actively hire from the local labour pool.

Beyond the direct shock of new entries, the model reveals that the structural composition of the regional business ecosystem plays a critical role in mitigating labour market distress. The variable ShofPROP (Share of Proprietors), which serves as a proxy for the structural density of self-employment and localised small business ownership, displays a highly significant negative coefficient ($\beta = -37.235$, $t = -3.9026$, $p=0.0001$). This suggests that regions characterised by a higher structural baseline of local proprietors possess a resilient socio-economic buffer that inherently keeps unemployment lower. This structural density fosters an entrepreneurial climate that stabilises regional labour demand, confirming that a sustained entrepreneurial culture is just as critical for regional employment as cyclical spikes in new firm entries.

In contrast to the highly significant impacts of firm entry and proprietorship structures, the broader economic and demographic control variables do not exhibit statistically significant short-term effects in this fixed-effects specification. Per capita income growth ($d_lnGDPpc$) shows the expected negative sign ($\beta = -2.7716$, $p = 0.1495$) but remains statistically insignificant, indicating that aggregate demand fluctuations are secondary to structural business turnover in explaining regional unemployment variance. Similarly, regional R&D intensity (GERD), market concentration (Concentration), and population growth (d_lnPop) display high p -values, proving statistically inert in the short run. Collectively, these results demonstrate that within the Turkish administrative framework, localised entrepreneurial vitality and small-business density serve as the primary structural levers driving labour market performance, offering far greater explanatory power than aggregate regional macroeconomic controls.

To fully map the dynamic feedback loop within Türkiye's regional labour markets and evaluate whether business formation is driven by opportunity or economic distress, we reverse the causal structure in our second specification. Model II estimates the structural determinants of gross firm creation by treating the regional firm entry rate (EntryRate) as the dependent variable, which is driven by one-period-lagged unemployment ($Unem_Rate_{t-1}$) and a vector of socioeconomic control variables. Table 4 reports the parameter estimates from these fixed effects specification. The F-test for Poolability yields an exceptionally large and highly significant statistic ($F(11.150) = 66.610$, $p=0.0000$), providing overwhelming econometric justification for the integration of entity fixed effects and confirming that unobserved regional institutional frameworks exert a powerful, permanent influence on baseline entrepreneurship rates.

Table 4. Panel OLS Fixed Effects Regression Results (Dependent Variable (Entry Rate))

Independent Variables	Coefficient	Std. Error	t-statistic	p-value
Constant	0.0023	0.0010	0.0291	0.0291
Unemp_Rate_lag1	49.840	18.540	26.884	0.0080
D_lnGDPpc	0.0016	0.0004	38.489	0.0002
GERD	-0.0682	0.0201	-33.878	0.0009
Concentration	0.0204	0.0157	12.818	0.2109
ShofProp	0.0002	0.0024	0.0871	0.9307
D_lnPop	0.0003	0.0050	0.0597	0.9525

Note: Total Observations: 168 (12 Entities x 14 Time periods). R-squared (Within): 0.1830. F-statistic: 5.5998 ($p=0.0000$).

The empirical estimation reveals a compelling econometric dualism, characterised by the simultaneous statistical significance of both necessity-driven and opportunity-driven entrepreneurial forces. The coefficient for lagged regional unemployment ($Unem_Rate_{t-1}$) is positive and highly significant ($\beta=4.984$, $t=2.6884$, $p=0.0080$). This finding provides robust empirical validation for the "refugee-push" hypothesis within the Turkish regional context. It implies that an escalation in labour market distress pushes displaced workers out of wage employment and into necessity-driven entrepreneurship due to a lack of viable alternative income streams. Crucially, however, the model simultaneously yields a positive and highly significant coefficient for per capita income growth ($d_lnGDPpc$) ($\beta=0.0016$, $t=3.8489$, $p=0.0002$), which captures a powerful Schumpeterian "pull" mechanism. This dual significance indicates that Türkiye's macroeconomic panel is not homogeneous; rather, opportunity-driven business formations fuelled by regional income growth co-exist with distress-driven entrepreneurial reactions triggered by unemployment shocks. This global panel synthesis perfectly explains the stark regional variations previously uncovered in our lead-lag taxonomy in Section 4.2.

Another striking finding in Model II is the performance of regional research and development intensity (GERD), which exhibits a highly significant negative coefficient ($\beta = -0.0682$, $t=-3.3878$, $p=0.0009$). While conventional assumptions might associate R&D expenditure with a higher volume of technological startups, in regional economics, this negative relationship typically reflects a structural barrier to entry. High R&D intensity signals a shift toward a knowledge-intensive industrial regime dominated by large, capital-intensive incumbents. These consolidated corporate structures elevate the minimum efficient scale of operation, effectively discouraging or blocking gross firm entries by small independent actors who lack the capital to compete. Consequently, gross entry rates contract as a region matures technologically, shifting the entrepreneurship profile away from high-volume, low-barrier market churning and toward a more consolidated industrial ecosystem.

Finally, the remaining structural and demographic indicators—market concentration (Concentration), baseline proprietor density (ShofPROP), and regional population growth (d_lnPop)—fail to display any statistically significant impact on gross firm entry rates, as evidenced by their high p -values. The insignificance of these control vectors reinforces the conclusion that regional firm creation in Türkiye is primarily modulated by a direct, sensitive balancing act between macroeconomic growth incentives and localised labour market

contractions. Having established the structural parameters for both the employment-to-entrepreneurship and entrepreneurship-to-employment channels, the analysis can now transition to a formal Panel Granger Causality framework to mathematically confirm the definitive directional dominance within this macroeconomic feedback loop.

3.3. Panel Granger Causality Analysis

To complement the static parameters of the multivariate regressions and establish the directional primacy within the entrepreneurship-unemployment nexus, we implement a formal Panel Granger Causality framework. This dynamic testing procedure assesses whether past trajectories of new business formation provide incremental predictive power over current regional unemployment fluctuations, beyond what is already captured by lagged unemployment values. We estimate a dynamic fixed-effects specification in which the regional unemployment rate ($Unem_Rate_t$) is regressed on its first-order autoregressive lag and the one-period-lagged entry rate ($EntryRate_{t-1}$). Table 5 presents the empirical outcomes of this primary causal direction. The model demonstrates high explanatory performance, with the within R^2 jumping to 0.5729, driven by the structural absorption of autoregressive inertia. The F-test for Poolability remains highly significant ($F(11,154) = 3.1377, p = 0.0008$), confirming that individual regional heterogeneities continue to condition the causal dynamics.

Table 5. Panel Granger Causality Estimation Test 1 (Dependent Variable: $Unemp_Rate$)

Independent Variables	Coefficient	Std. Error	t-statistic	p-value
Constant	6.4569	1.0041	6.4307	0.000
$Unemp_Rate_Lag1$	0.6807	0.0548	12.427	0.000
$Entry_Rate_Lag1$	-10.67	2.2956	-4.650	0.000

Note: Total Observations: 168. R-squared (Within): 0.5729. F-statistic: 103.28 ($p = 0.0000$)

The empirical results from Test 1 deliver definitive confirmation of a directional causal vector running from regional entrepreneurship to labour market adjustments. First, the autoregressive parameter $Unemp_Rate_{t-1}$ is highly significant and positive ($\beta = 0.6807, t = 12.427, p = 0.0000$), pointing to a substantial degree of structural hysteresis and persistence within Turkish regional labour markets. This implies that current unemployment is strongly anchored in its immediate historical baseline.

Crucially, even after capturing this heavy autoregressive inertia, the lagged entrepreneurial vector ($EntryRate_lag1$) retains a powerful and statistically overwhelming negative impact on unemployment. The coefficient stands at $\beta = -10.67$ with an extreme t-statistic of -4.6500 ($p = 0.0000$). Econometrically, this allows us to reject the null hypothesis of no Granger causality. It provides rigorous mathematical verification that expansions in gross firm entry rates Granger-cause a systematic structural contraction in regional unemployment over a 1-year temporal horizon. This finding establishes that the Schumpeterian transmission mechanism observed in Model I is not an artefact of contemporaneous economic shocks or cyclical correlation; rather, it is a genuine predictive and causal driver that structurally transforms the capacity of regional labour markets to absorb idle human capital.

Table 6. Panel Granger Causality Estimation Test 2 (Dependent Variable: $Entry_Rate$)

Independent Variables	Coefficient	Std. Error	t-statistic	p-value
Constant	0.0008	0.0003	2.6791	0.011
$Entry_Rate_Lag1$	0.5211	0.0690	7.5465	0.000
$Unemp_Rate_Lag1$	6.9880	1.6470	4.2414	0.000

Note: Total Observations: 168. R-squared (Within): 0.2965.

F-statistic: 32.450 ($p = 0.0000$) F-test for Poolability: 4.5129 ($p = 0.0000$)

To evaluate the potential for a bidirectional feedback loop, Test 2 reverses the causal order by regressing the current firm entry rate ($EntryRate_t$) on its own historical trajectory and the one-period-lagged regional unemployment rate ($Unem_Rate_{t-1}$). As documented in Table 6, the autoregressive coefficient $EntryRate_{t-1}$ exhibits high structural momentum and statistical significance ($\beta = 0.5211, t = 7.5465, p = 0.0000$). This confirms that regional firm creation is subject to powerful path-dependent patterns; regions with established entrepreneurial infrastructure and high baseline market-entry paths continue to generate clusters of new business cohorts in successive periods, irrespective of temporary economic shifts.

Crucially, the causality vector running from past labour market distress to current entrepreneurial action is verified with overwhelming empirical strength. The parameter estimate for $Unem_Rate_lag1$ is positive and highly significant ($\beta = 6.988$) with a robust t-statistic of 4.2414 ($p = 0.0000$). Econometrically, this allows us to confidently reject the null hypothesis of no Granger causality in the reverse direction. This dynamic verification confirms that an escalation in regional unemployment systematically Granger-causes an increase in gross firm entry rates over

a 1-year horizon. When synthesised with the findings from Model II, this result provides definitive, non-spurious support for the dynamic "refugee-push" mechanism across the aggregate Turkish panel. High unemployment acts as a structural push factor, leaving displaced workers with low opportunity costs and compelling them to enter the business ecosystem through necessity-driven entrepreneurship.

Taken together, the simultaneous validation of Test 1 and Test 2 establishes a complex bidirectional feedback loop within Türkiye's regional economies. The entrepreneurship-unemployment nexus does not operate as a unidirectional causal stream; instead, it constitutes an evolutionary, self-reinforcing macroeconomic cycle. On one side of the loop, a wave of new business entries serves as a proactive engine of job creation, structurally driving down regional unemployment at a 1-year lag (the Schumpeterian channel). On the flip side, when regions face systemic labour contractions, the resulting surge in unemployment serves as a reactive mechanism that forces individuals into self-employment and the formation of new micro-firms (the refugee-push channel). This empirical duality indicates that policy frameworks cannot treat regional entrepreneurship as a homogeneous aggregate. Instead, interventions must distinguish between proactive, growth-oriented entries that structurally reduce unemployment and reactive, distress-driven entries that serve primarily as temporary socioeconomic safety nets.

4. Conclusion

This study provides a comprehensive, multi-dimensional empirical evaluation of the dynamic relationship between entrepreneurship and labour market adjustments across Türkiye's NUTS 1 macro-regions. By transitioning from localized exploratory time-space cross-correlations to multivariate fixed-effects configurations and formal Panel Granger Causality testing, the analysis successfully maps the structural mechanics of the regional business ecosystem. The empirical architecture rejects a linear, unidirectional interpretation of regional development. Instead, it establishes the definitive presence of a complex, bidirectional feedback loop where proactive market forces and reactive socioeconomic adaptations operate simultaneously within a self-reinforcing evolutionary cycle.

The primary contribution of this research lies in the simultaneous validation and contextualization of the Schumpeterian "pull" and the "refugee-push" mechanisms. On one side of the macroeconomic loop, the analysis confirms that expansions in regional firm entry rates Granger-cause a systematic structural contraction in local unemployment over a 1-year operational horizon. This finding validates the proactive capacity of entrepreneurship to serve as a vital engine of job creation.

However, this Schumpeterian process is not a static expansion; the long-term cross-correlations capture a definitive "shake-out" phase at the 5-year threshold in advanced industrial clusters such as İstanbul and the Aegean. This structural reversal mathematically confirms that after the initial employment shock, market rationalisation and competitive displacement eliminate marginal entrants, shifting the long-term value of entrepreneurship from quantitative job aggregation to qualitative structural modernisation. On the reverse side of the loop, the study confirms that regional labour market distress acts as a powerful structural push factor. Elevated unemployment surges Granger-cause an increase in gross firm creation, as displaced wage earners enter the business ecosystem through necessity-driven self-employment to mitigate severe income loss.

Furthermore, the model uncovers a critical regional anomaly regarding the role of technological maturity. The highly significant negative parameter for regional research and development intensity (GERD) on gross entry rates reveals a powerful structural barrier to entry within Türkiye's knowledge-intensive zones. High R&D expenditures, concentrated within capital-intensive regimes, elevate the minimum efficient scale of production and allow dominant corporate incumbents to foreclose markets against small, independent actors. This shifting dynamic reconfigures the regional entrepreneurial profile away from high-volume market churning toward consolidated corporate supply networks. Additionally, the structural resilience provided by a high baseline density of local proprietors (ShofPROP) underscores the importance of fostering a permanent, culturally embedded small-business infrastructure to stabilise regional labour demand during macroeconomic contractions.

Ultimately, these findings indicate that regional development strategies in Türkiye can no longer rely on generic, "one-size-fits-all" entrepreneurial promotion schemes. Policymakers must adopt place-based, asymmetric frameworks that distinguish between growth-oriented, high-scaling business entries and fragile, distress-driven necessity setups. While advanced clusters require targeted equity financing and post-gestation incubator networks to navigate the inevitable shake-out phase, less-developed regions plagued by high market turbulence require structural investments that generate stable wage employment, thereby relieving the distress that fuels volatile churning regimes. Future research could productively expand upon this framework by utilising finer, localised sub-regional datasets (NUTS 2 or NUTS 3) as data availability matures, and by integrating explicit spatial econometrics (such as Spatial Autoregressive or Spatial Error Models) to mathematically isolate the cross-border geographical spillovers and spatial dependency structures that connect Türkiye's evolving regional labour markets.

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Araştırmacıların Çıkar Çatışması Beyanı (Declaration of Researcher’s Conflict of Interest)

Bu çalışmada herhangi bir potansiyel çıkar çatışması bulunmamaktadır. (There is no potential conflicts of interest in this study.)

Araştırma ve Yayın Etiği Beyanı (Declaration of Research and Publication Ethics)

Etik kurul izni ve/veya yasal/özel izin alınmasına gerek olmayan bu çalışmada araştırma ve yayın etiğine uyulmuştur. (This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.)

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Entrepreneurship and Creative Destruction in Turkish Regions

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Extended Abstract

This study investigates the structural relationship between regional entrepreneurial activity and labour market dynamics in Türkiye, emphasising its implications for sustainable development and regionally differentiated policy design. Using panel data from 12 NUTS Level 1 regions over the period 2010–2024, the analysis explores how firm creation and unemployment interact over time. In distinguishing between opportunity-driven entrepreneurship, associated with Schumpeterian growth processes, and necessity-driven entrepreneurship arising from labour market constraints, firm entry rates are measured through a labour-market-based approach. The empirical strategy combines fixed-effects panel regressions with Panel Granger causality testing, enabling a detailed assessment of both the direction and timing of these interactions.

The findings challenge a simple dichotomy between “pull” and “push” explanations of entrepreneurship. While new firm formation contributes to reductions in regional unemployment, this effect is neither immediate nor uniformly strong across all regions. Instead, the employment benefits of new business creation tend to emerge with a lag of approximately one year and are most evident in relatively advanced regions. As a result, entrepreneurship functions as a limited but meaningful mechanism for job creation at the aggregate level. In contrast, the reverse relationship is considerably more pronounced. Rising unemployment consistently predicts increases in firm entry rates across nearly all regions, indicating that necessity-driven entrepreneurship constitutes a dominant and persistent dynamic within the Turkish context.

By moving beyond descriptive correlations to a multivariate and causality-based framework, the study demonstrates that entrepreneurship and unemployment are linked through a bidirectional and evolving feedback loop. Rather than operating through a linear trajectory, regional development unfolds through the interplay of proactive market expansion and reactive socio-economic adjustment. This dual mechanism confirms that both opportunity- and necessity-driven processes coexist and reinforce one another within regional economies.

Further insights emerge when examining the temporal dimension of entrepreneurial outcomes. Although increases in firm entry initially stimulate employment growth, longer-term patterns reveal a “shake-out” effect, particularly in more industrialised regions such as İstanbul and the Aegean. Approximately five years after entry surges, competitive pressures and market consolidation eliminate less productive firms. This transition suggests that the long-run contribution of entrepreneurship lies less in expanding job numbers and more in promoting structural efficiency and qualitative transformation within the economy.

The study also identifies important structural determinants shaping regional entrepreneurial dynamics. Notably, higher levels of research and development (R&D) intensity are associated with lower rates of new firm entry. This finding points to the existence of significant barriers to entry in knowledge-intensive regions, where capital requirements and technological thresholds favour established firms and constrain smaller entrants. Consequently, entrepreneurial ecosystems in such areas tend to shift toward more concentrated and corporatized forms. In contrast, regions characterised by a strong base of small proprietors exhibit greater resilience, as this embedded entrepreneurial culture helps stabilise employment during periods of economic downturn.

Overall, the results underscore the limitations of uniform, nationwide approaches to entrepreneurship policy. Instead, they highlight the importance of context-sensitive, place-based strategies that account for regional heterogeneity. In more developed regions, policy efforts should focus on supporting innovative firms through targeted financing and post-entry support mechanisms to navigate market consolidation phases. Conversely, in less-developed regions, where necessity-driven entrepreneurship is more prevalent, priority should be given to creating stable wage employment opportunities to reduce the volatility associated with survival-driven business formation.

Future research could build on this framework by employing more fine-grained sub-regional data and incorporating spatial econometric techniques to capture interregional spillovers and dependencies. Such extensions would further enhance understanding of how regional labour markets and entrepreneurial ecosystems evolve in an interconnected economic landscape.