



# The Geography of Firm Dynamics: Measuring Business Demography for Regional Development





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## *Foreword*

Business creation is a vital source of innovation, economic growth and employment creation. Policy makers around the world are increasingly trying to promote policies that foster local entrepreneurship and more innovation-based industries. Empirical evidence has highlighted the importance of the creation of new businesses, which mostly consist of small and medium enterprises (SMEs), for local employment growth and productivity growth. Among SMEs, new or young businesses in particular contribute to local employment. Understanding the scale, heterogeneity and determinants of business creations is therefore conducive to designing entrepreneurship-enhancing policies.

Across the OECD, business demography measuring the birth, death and survival of firms is of a highly localised and context-dependent nature. This report presents a first conclusive approach to capture the subnational dimension of business dynamics. Based on a novel comprehensive database on regional business demography across OECD countries, this report analyses the variation in and the importance of entrepreneurial activities for regional development. While differences in business dynamics across regions are inevitable, certain factors within the control of policy makers can encourage and stimulate new business creations and resulting employment. Having reliable and robust business demography statistics can help understand how to promote job creation in all places.

Regions across the OECD show different economic structures as well as different socio-economic trajectories. This is reflected, for example, by the clear divide observed between urban and rural places in terms of productivity growth during the last couple of decades. Thanks to the novel database developed on regional business demography, this report analyses whether these regional disparities also extend to business dynamism and therefore to the degree of reallocation of input and output from less productive towards more productive businesses.

*The Geography of Firm Dynamics* contributes to the ever more important questions of regional development and employment growth. Entrepreneurship is an important factor boosting innovation and making enterprises more efficient while also generating new employment in regions. Through *The Geography of Firm Dynamics*, the OECD provides an overview and a starting point for national and local policy makers to design strategies that are tailored to the specific characteristics of each region and thus raise prosperity.

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## *Table of contents*

<b>Executive summary</b> .....	<b>9</b>
<b>Chapter 1. The case for regional business demography</b> .....	<b>13</b>
Introduction: Why regional business demography.....	14
What this report offers.....	14
Note.....	18
References.....	18
<b>Chapter 2. Measuring business demography at the level of regions: Methods and challenges</b> .....	<b>21</b>
International comparisons of business demography data: An overview.....	22
Methodological challenges posed by a regional approach.....	26
Development of business demography indicators.....	29
Highlights and methodological considerations.....	30
Notes.....	32
References.....	33
<b>Chapter 3. Regional dynamics from an enterprise approach</b> .....	<b>35</b>
Introduction.....	36
Data sources and indicators.....	36
The geographical dimension of business demography.....	37
Regional characteristics and entrepreneurial activity.....	58
The way forward: Measuring employment in business.....	68
Notes.....	69
References.....	70
Annex 3.A1. Enterprise data sources.....	73
<b>Chapter 4. Regional business employment dynamics</b> .....	<b>75</b>
Introduction.....	76
Employment trends in new firms.....	77
Measuring businesses at the regional level: Establishments vs. enterprises.....	80
Trends in regional employment in establishments.....	89
The role of new establishments for regional employment creation.....	94
Employment growth in small and medium-sized establishments.....	97
Regional environment and employment growth in incumbent firms.....	98
Concluding remarks.....	103
Notes.....	104
References.....	106
Annex 4.A1. Establishment data sources.....	108
Annex 4.A2. Notes on regional data coverage.....	110
Annex 4.A3. Harmonisation of datasets.....	111
Annex 4.A4. Regional characteristics associated with employment growth.....	113

<b>Chapter 5. Measuring regional business employment dynamics from micro-aggregation of administrative data</b> .....	115
Introduction.....	116
DynEmp: Methodology and challenges.....	117
The DynEmp Regional programme ( <i>dynemp_reg</i> ).....	121
Data description: Sources and coverage.....	122
Preliminary evidence from four countries.....	123
Conclusions and next steps.....	138
Notes.....	138
References.....	141
Annex 5.A1. Measurement challenges and implemented solutions.....	143
Annex 5.A2. Contributors to the DynEmp regional data collection.....	150

## Tables

Table 2.1. The issue of location in the national data sources.....	28
Table 3.1. Data sources and available breakdowns by country.....	38
Table 3.2. Available indicators by country.....	39
Table 3.3. Regional classification and typology.....	47
Table 3.4. Typology of regions with respect to productivity.....	51
Table 4.1. Data sources, units and level of regional breakdown.....	83
Table 4.2. Coverage of available data on establishments.....	84
Table 4.3. Determinants of employment growth in incumbent firms.....	102
Table 4.A3.1. Sectoral classes.....	112
Table 4.A3.2. Employment size classes.....	112
Table 4.A4.1. Determinants of regional employment growth, 2010-14.....	113
Table 5.1. DynEmp Regional questionnaire synopsis.....	120
Table 5.2. Output databases by aggregation level.....	122
Table 5.3. Underlying micro-data sources and available output levels.....	122
Table 5.4. TL2 regions and metropolitan areas by country.....	123
Table 5.5. Share of employment in young units and regional characteristics.....	131
Table 5.6. Share of employment in young units and regional innovation.....	132
Table 5.A1.1. Average employment growth of young units and regional characteristics.....	146
Table 5.A1.2. Relative net job creation by entering units and regional characteristics.....	147
Table 5.A1.3. Post-entry growth and survival of entrants and regional characteristics.....	148
Table 5.A2.1. Contributors table.....	150

## Figures

Figure 3.1. Net business population growth, within-country dispersion by year.....	40
Figure 3.2. Regional business birth rates across the OECD.....	41
Figure 3.3. Dispersion in business birth rates by country.....	42
Figure 3.4. Dispersion in business death rates by country.....	42
Figure 3.5. Share of employer firms by country.....	43
Figure 3.6. Ratio of birth rates for all firms and employer firms, TL3 regions.....	44
Figure 3.7. Self-employment vs. non-employer firms.....	45
Figure 3.8. Within-country dispersion: Birth rates for all firms and employer firms.....	46
Figure 3.9. Business births and deaths by urban-rural regional typology.....	47
Figure 3.10. Business birth shares by sector and type of region.....	48



Figure 3.11.	Relative weight of business births by type of region .....	49
Figure 3.12.	Average size of new employer firms by type of region .....	50
Figure 3.13.	Relationship of average size of existing employer firms and regional employer firm birth rate .....	51
Figure 3.14.	Relative weight of business births by degree of productivity .....	51
Figure 3.15.	Birth rates, all firms, TL2 regions, 2014.....	53
Figure 3.16.	Comparison: Per capita firm births and firm births relative to incumbent firms .....	54
Figure 3.17.	Business births and deaths per worker by type of region.....	54
Figure 3.18.	Within-country dispersion in business survival rates, by firm class .....	56
Figure 3.19.	Business survival rates by urban-rural regional typology .....	57
Figure 3.20.	Business survival rates by degree of productivity.....	57
Figure 3.21.	Concentration of employment in three largest firms and firm births, TL3, 2014.....	59
Figure 3.22.	Sectoral regulation and firm dynamics, TL2 regions, 2008-14.....	61
Figure 3.23.	Perception of corruption and local governance (Gallup), TL2 regions.....	62
Figure 3.24.	Local governance and firm birth rates, TL2 regions .....	62
Figure 3.25.	Average interest rate spread between loans charged to SMEs and to large enterprises, 2015 .....	63
Figure 3.26.	Credit supply restrictions and business demography .....	64
Figure 3.27.	The discontinuity in the allocation of funds for entrepreneurship and SMEs.....	65
Figure 3.28.	Enterprise births: R&D and employment in knowledge-intense services.....	67
Figure 3.29.	Enterprise births and the education of the labour force.....	67
Figure 4.1.	Employment creation rate by enterprise births, TL3, 2014 (or latest available year) .....	77
Figure 4.2.	Employment creation by type of region, 2011-14 (or last three available years).....	78
Figure 4.3.	Employment creation by type of region and sector, 2014 (or latest available year) .....	79
Figure 4.4.	Firm-level effects of Cohesion Policy across regions with low and high business dynamics .....	81
Figure 4.5.	Gini coefficients based on establishment and enterprise counts per capita.....	86
Figure 4.6.	Headquarter bias, selected EU countries.....	88
Figure 4.7.	Headquarter bias of capital regions in employment.....	89
Figure 4.8.	Birth rates of establishments and enterprises in French TL3 regions, selected sectors.....	90
Figure 4.9.	Annual employment growth across OECD regions, 2010-14.....	91
Figure 4.10.	Employment creation across TL2 regions, annual average change, 2010-14 .....	92
Figure 4.11.	Employment change – mostly metropolitan vs. non-metropolitan regions.....	93
Figure 4.12.	Employment change by regional productivity .....	93
Figure 4.13.	Employment creation rate by births, 2014 (or latest available year).....	95
Figure 4.14.	Net employment creation rates by new establishments, 2014 (or latest available year) .....	96
Figure 4.15.	Change in the number of small and medium-sized establishments, 2010-14 .....	97
Figure 4.16.	Employment in SMEs and its regional growth relative to overall employment, 2010-14 .....	98
Figure 5.1.	Regional employment shares by plant size (small and medium units) .....	124
Figure 5.2.	Within-country variation in small and medium units' employment growth .....	126
Figure 5.3.	Within-country variation in small and medium units' turnover growth.....	126
Figure 5.4.	Employment growth in small and medium units, young vs. old.....	127

Figure 5.5.	Employment growth in small and medium units, young vs. old/diverging, keeping pace and frontier regions .....	128
Figure 5.6.	Share of young units and average employment growth .....	129
Figure 5.7.	Relative net job creation in TL2 regions by group .....	133
Figure 5.8.	Relative net job creation in metropolitan areas by group .....	135
Figure 5.9.	Relative net job creation in metropolitan areas – <i>de novo</i> vs. <i>de alio</i> entry.....	136

## Boxes

Box 3.1.	Definition of unit of analysis and demographic events.....	37
Box 3.2.	Financing small and medium enterprises and entrepreneurs: Evidence from the OECD Scoreboard .....	63
Box 3.3.	EU funds and entrepreneurship: Evidence from a large transfer to European regions.....	65
Box 4.1.	Definitions.....	81
Box 4.2.	Differences in birth rates: Establishments and enterprises in France.....	90
Box 4.3.	Empirical specification for firm-level regressions .....	99
Box 5.1.	The Dynemp methodology and the data collected .....	118

## Executive summary

New businesses are not only vital for the creation of employment but also for the development of new ideas that simplify work and production processes and increase productivity. Consequently, business dynamics contribute to regional development and prosperity. Yet, the local reality across the OECD presents a picture of large regional disparities which needs to be understood. While some regions experience a high degree of business births and deaths, other regions only observe low levels of changes in their business population.

So far, the lack of a consistent and comprehensive database for OECD regions has been a major impediment for assessing differences in entrepreneurship across places. This report contributes to fill that void. It enables policy makers to compare business demography between different OECD regions and also highlights various place-specific factors that are more successful in stimulating the creation and development of businesses. Regions showing higher levels of entrepreneurship have on average better local governance, spend more on R&D activities, and have a more educated local workforce. Similarly, regions have on average higher firm creation when they have business-friendly regulations (ease of doing business) and a higher quality of governance (i.e. low levels of corruption). Financing constraints of firms appear to be related to higher rates of business deaths and lower rates of new business creation, while additional resources via EU Cohesion Funds can increase both the births and deaths of businesses.

Measuring business demography poses a number of empirical challenges that can be even more pressing at the subnational level. To analyse business dynamics comprehensively across regions, detailed information on demographic events (births, deaths and survival) and the accompanying effects on employment is required. In an ideal situation, robust and comparable statistics on business dynamics should allow firm cohorts to be followed over time, the location of those firms and related plants to be retained together with size, sectoral composition and the number of employees.

The enterprise approach for business demography statistics ensures the widest coverage across OECD countries and an already strong consistency in methods and definitions, on which further harmonisation should be built. Such an approach is best suited to study the creation and continuation of new businesses. On the other hand, the establishment approach offers the advantage of more precise location information on regional employment, but at the expense of a narrower country coverage and lower harmonisation achieved across countries. Given the conceptual and practical distinction between enterprise and establishment indicators, this project has collected both available sets of statistics and provided a comparison between the two. The indicators and methodological considerations developed through this work will help address a set of policy-relevant questions that relate to entrepreneurship and to the distribution of employment opportunities.

## Key findings

- **New firms constitute, on average, 10% of all firms across OECD regions, demonstrating that business dynamics in the form of firm births are considerable in the OECD.** However, both within as well as across countries, regions differ considerably in business dynamics. At the top end of the range, business birth rates can reach up to 25%, whereas regions with the lowest business creation rates only recorded birth rates of around 5%. These dynamics are partially driven by non-employer firms for which birth rates are larger than for employer firms (on average 9%).
- **Urban regions show the largest levels of business dynamics, both in terms of business creation and destruction rates, which is particularly pronounced for mostly urban regions at the frontier of national productivity.** They account for 24% more business births, among all types of firms, than would be expected given their share of active firms.
- **Using enterprise-level data to monitor employment growth from business creation can be susceptible to a headquarter bias, a deviation from a region's actual share of national employment of, on average, 1.4 percentage points.** Capital-city regions tend to concentrate headquarters of large firms. On average they control 7 percentage points more employment than is located in their region.
- **New firms and small and medium enterprises (SMEs) contribute significantly to regional employment growth and can be stimulated by the right set of regional conditions pertaining to local governance, financing availability and education.** Based on data on employer enterprises, new businesses can create up to 8% new employment in regions, though regions across the OECD differ substantially in this regard. Similarly, in a subset of four countries, regional employment growth in small and medium-sized plants between 2010 and 2014 ranged from 30% to a loss of 27%. Regions with on average smaller existing firms also record higher firm birth rates. For those reasons, tailored policies that facilitate and encourage entrepreneurship can boost regional development and employment.
- **Ad hoc analysis on micro-data is a possible alternative way to build comparable and robust evidence on the dynamics of businesses and related employment.** By means of consistently performed micro-aggregation of business registers data in the context of Costa Rica, Finland, France and Sweden, young plants are shown to disproportionately contribute to regional net creation and employment growth. After controlling for firm-level characteristics, population density appears to significantly enhance both entrepreneurial activities and post-entry employment growth.

## Way forward

One main lesson emerging from this report is that robust and internationally comparable regional business demography indicators require further harmonisation efforts across countries on the capacity to distinguish employer-only enterprises from those of non-employer ones and to enhance the capacity to track enterprises and their establishments in order to better assess the geographical dimension of employment creation.

**Future efforts should be concentrated on extending and refining enterprise demography data.** The high degree of harmonisation already achieved at the enterprise level will make it possible, in the short to medium term, to build a database of regional business demography encompassing all OECD countries, with the objective of extending the coverage as much as possible to detailed geographies (i.e. small administrative TL3 regions such as departments in France), and of distinguishing employer from non-employer enterprises also for the countries where such distinction is still not possible.



## *Chapter 1.*

### **The case for regional business demography**

*This chapter provides the context and rationale for measuring business demography at the regional level. It explains why place is important to assess business dynamics and highlights the most important methodological and empirical challenges in building internationally comparable evidence on the dynamics of businesses and of its related employment across regions. Finally, it synthesises what the report offers and how it can be used by experts and policy makers.*

## Introduction: Why regional business demography

Over the course of the past three decades, most OECD countries have experienced a dramatic change in the sectoral composition of their economies. In many countries, industrial production is shifting further away from traditional manufacturing and towards more innovation-led businesses, a phenomenon in part linked to the emergence of global value chains (De Backer and Miroudot, 2013). As a result, policy makers concerned with sustaining economic development and employment growth are progressively relying less on large-scale industrial complexes and leaning more towards sustaining local entrepreneurship (Chatterji, Glaeser and Kerr, 2013). The policy attention reserved to small and medium enterprises (SMEs) in this context stems from the expectation that new enterprises will generate growth by fostering employment and productivity (Birch, 1979, 1981; Romer, 1986). Indeed, empirical evidence seems to indicate that young and small firms contribute substantially to employment growth (Neumark, Wall and Zhang, 2011; Haltiwanger, Jarmin and Miranda, 2013; Criscuolo, Gal and Menon, 2014).

However, national statistics on business demography often mask a substantial heterogeneity in the distribution of entrepreneurship within OECD countries. Some regions attract a disproportionate share of new businesses and of the related employment growth (OECD, 2014). Economic theory typically attributes the heterogeneous spatial distribution of entrepreneurial activity to differences in entry costs, input factors or talent across regions (Glaeser, Kerr and Ponzetto, 2010; Guiso and Schivardi, 2011; Lucas, 1978). Clusters may also emerge and prosper due to social and cultural factors with a strong local component (Marshall, 1922; Becattini, 1990). The uneven distribution of economic activity across space is enhanced by the agglomeration dynamics associated with productive clusters. The presence of incumbent firms acts as a catalyst for new entrepreneurs and is associated with higher rates of firm survival and with cross-industry positive spillovers (Delgado, Porter and Stern, 2010; 2014). This agglomeration tendency can be partially explained by the capacity of existing clusters to lower the entry costs, provide access to better intermediate inputs and enlarge the pool of workers with similar skills (Delgado, Porter and Stern, 2010, 2014; Overman and Puga, 2010).

Agglomeration tendencies may lead to the emergence of a core-periphery pattern between regions (Krugman, 1991), which acts in the opposite direction of inter-regional convergence. In particular, the effects of entrepreneurship on employment can be mediated by a substantial regional component since business quality can differ endogenously across regions and because of inter-regional spillovers (Fritsch and Mueller, 2004; Fritsch, 2008). Analysing entrepreneurial dynamics at the subnational level is therefore of paramount importance in order to help policy makers design policies that are tailored to local circumstances and better fits to sustain long-term growth.

## What this report offers

The contribution of this report is threefold. First, it provides data on business demography (active firms, births, deaths and survival rates) for a large set of OECD regions in a time span generally covering on average the years 2007-14. When available, employment indicators related to business demography (employment in active firms, in births, deaths and survivals) are also collected. Second, it provides a methodological discussion on how to overcome the major challenges emerging for measuring business demography at the subnational level and from an international perspective. The first and probably most important challenge is the distinction between employer and non-employer business



demography statistics. The possibility to distinguish employer firms (those with at least one employee) from the set of all firms allows a much stronger comparability of actual business dynamics, as it mitigates the bias emerging from institutional, taxation and regulatory differences across countries. Third, the report presents evidence on business dynamics and related employment dynamics across OECD regions, identifying facts and recent trends that can be useful for experts and policy makers to better understand how to improve regional development and foster the quality of the business environment.

This chapter describes the main steps and the results of the measurement of business demography across OECD regions. Such measurement led to the development of an *OECD Regional Business Demography Database*, a cross-country harmonised data source covering indicators of firm activity at the subnational level which spans across the regions of 27 OECD countries. This database is a relevant contribution to the OECD data collection. While business demography indicators are available at different levels of geographical detail for most OECD member countries, a cross-country harmonised database on business demography covering the OECD at the subnational level was missing.

A second contribution of this project is towards the development of a comparable methodology to measure business activity at the subnational level. Chapter 2 of this report starts by briefly recapping the methodological work commenced in 2006 by the OECD-Eurostat Entrepreneurship Indicators programme which resulted in the *Manual on Business Demography Statistics* (OECD/Eurostat, 2007), concerned with developing a benchmark for the measurement of business demography indicators at the national level. This manual now forms the methodological framework of reference for the collection of business demography indicators for OECD member countries.<sup>1</sup>

However, the harmonisation of business demography statistics at the subnational level poses an additional set of methodological issues. Chapter 2 discusses especially the distinction between indicators based on the location of the company's headquarters (firms) and indicators based on the physical location of production units (plants). The choice of how to assign productive units to regions is crucial, since it has the potential to drastically affect the interpretation of indicators, particularly in the context of regional statistics (Ahmad, 2008).

Given the conceptual and practical distinction between enterprise and establishment indicators, this project has collected both sets of statistics. This report presents an analysis of both enterprise- and establishment-based indicators, as well as a comparison between the two. An enterprise approach enables a more sound measurement of real firm dynamics in the sense that it allows firm births and deaths to be correctly and consistently measured instead of being confounded with additional plants of already existing businesses. In addition, regional business demography statistics at the enterprise level have already reached a substantial level of international comparability. Therefore, future data collection to measure regional business demography will be more appropriate at the enterprise level, preferably allowing the distinction between employer and non-employer enterprises and at a sufficiently detailed geographical scale, such as that of OECD TL3 regions (*cf.* Box 3.3).

Chapter 3 describes indicators based on the enterprise approach, available for public use. This database has the widest coverage, including most OECD countries that collect statistics at the subnational level. It also offers rich spatial information as data on TL3 regions has been collected for the vast majority of countries. Furthermore, enterprise-level data benefits from a high degree of methodological consistency across countries thanks to the fact that firm-level regional statistics follow, in most cases, the guidelines outlined for national indicators.

Enterprise-level indicators are especially useful for measuring firm dynamics, such as business birth, death and survival rates. The analysis of enterprise indicators delineates some clear regional disparities within OECD countries, in particular with respect to the role of cities. Urban areas tend to host more business births, even in comparison to their population size and density. Furthermore, they host larger and more knowledge-intensive firms. Urban areas are dynamic environments, where businesses find conditions to exist, but also face more competition, especially in large or capital cities. Cities are subject to economies of agglomeration but also to forces of creative destruction.

Enterprise-level indicators are essential for measuring regional disparities in entrepreneurial opportunity. However, they can be a source of bias when used to assess the location of the employment generated by existing firms. Large, multi-plant firms (which tend to have headquarters in cities) may operate a substantial amount of plants (and employ workers) outside of the region where the headquarters are located. If all workers employed in multi-plant firms are attributed to the headquarters' regions (as is the case with enterprise-level indicators), the real geographical distribution of employment presents a "headquarter bias", which may in some cases be severe.

Therefore, Chapter 4 of this report, which discusses employment dynamics across OECD regions, also presents establishment-level indicators. These indicators focus on measuring the business life of local production units (plants). In establishment-level indicators, regions correspond to the actual physical location of the production unit, and of its workers, rather than the location of the firms' headquarters.

Establishment-level indicators are also based on the harmonisation of regional aggregated data developed by national statistical offices (NSOs) (see Annex 4.A3 in Chapter 4). However, since a majority of NSOs measure business demography only at the level of enterprises, these indicators are available only for a subset of OECD countries. Furthermore, establishment-level indicators are not harmonised across countries, since each NSO applies definitions of establishment-related demographic events, which are not consistent. Most of these inconsistencies are documented in Chapter 4. Besides the issue of cross-country comparability, establishment-level demography indicators will overstate the share of new firms and capture more than merely the impact of firm births, since a new establishment can be an expansion of an existing firm. Despite these limitations, establishment-level indicators offer a valuable perspective to look at the actual geographical distribution of production units across the territory.

Since employment generation is the *raison d'être* of many SME-oriented policies (industrial policy in general), indicators of employment creation through business dynamics prove crucial from the standpoint of regional development policy, as will be illustrated in this report. For this reason, Chapter 4 is largely dedicated to the analysis of employment creation as well as the comparison between enterprise- and establishment-level indicators. This comparison shows that enterprise-level indicators (presented in Chapter 3) show a higher spatial concentration of employment than establishment-level ones. This is because firms and plants are unequally distributed across regions, but firms tend to be much more concentrated than plants. Therefore, the real geographical distribution of workers across regions, while highly unequal in general, is often more homogenous than enterprise-level indicators would otherwise suggest.

One lesson emerging from Chapter 4 is that current regional indicators of business demography often overestimate the concentration of workers in cities, particularly capital cities. This finding has some interesting policy implications. The first is to suggest that firms created in cities can, and do, generate income and employment far from the city

itself, which helps reduce inter-regional disparities. On the other hand, these indicators stress another dimension of regional inequality, which has to do with economic control. Legal control (ownership) is concentrated in cities (capitals, in particular), with respect to the actual physical location of production and workers. Cities are the places hosting the organisation, management and control over a substantial fraction of the production factors and of workers in other regions. This phenomenon might, in fact, constitute a particular form of inter-regional inequality, along the lines of political economy. In several respects, this type of inter-regional relationship might be connected to the disparities in skills, tasks and working conditions existing across regions for the same firm, similarly to what proposed by De La Roca and Puga (2017).

Given the findings emerging from the comparison between establishment and enterprise indicators, future methodological work should focus on the development of a common method for the production and collection of business demography statistics at the enterprise level, along the lines of the OECD/Eurostat (2007) effort. Additionally, a consistent measurement across all countries of firm dynamics along the distinction of employer and non-employer firms would signify an important progress. This methodological framework might be useful also to encourage the NSOs that have yet to do so, to develop regional indicators of business demography at a sufficiently detailed geographical scale, which are better suited to analyse the place-based characteristics that can promote a stronger and healthier environment for all businesses.

Finally, this report also presents the results emerging from the Regional Dynemp Project, which was initially developed to compare the performance of businesses over time and their capacity to create employment across OECD countries at the national level (Criscuolo, Gal and Menon, 2015). Chapter 5 presents the results of the extensions of Dynemp at the regional and metropolitan level for a subset of OECD countries. The produced indicators make it possible to analyse employment growth, with detail on plant age, size and two-digit sector, although at the moment only covering a limited number of countries. The main methodological improvement of Regional Dynemp with respect to other indicators presented in this report is the possibility to follow plants' post-entry performance, thanks to a routine that aggregates business register data to produce transition matrixes that allow the performance of groups of plants to be followed over time. Contrary to Chapter 3 and to the main database presented in this report at the enterprise level, Chapter 5 considers plant entries and exits instead of births and deaths, a difference that will be explained in further detail in the following chapter as well as in the Annex 5.A1. Results from Chapter 5 highlight how small, young plants are the largest contributors to employment creation and growth, confirming the results emerging from the previous national analysis (Criscuolo, Gall and Menon, 2014), even though these figures are by definition higher than they would be for small, young firms. Furthermore, regional characteristics, such as the degree of productivity and agglomeration dynamics, have positive implications for entrepreneurial outcomes and post-entry employment growth.

The indicators and methodological considerations developed through this work will help address a set of policy-relevant questions that relate to entrepreneurship and to the distribution of employment opportunities. The promotion of SMEs is rapidly becoming a pillar of growth-friendly policies.

This work highlights relevant spatial disparities in the distribution of entrepreneurial activity and business performance. Regions differ in their capacity to attract and retain business and employment; in turn, the heterogeneous distribution of firms and workers has vital implications for the development of regions. Dynamics of agglomeration, of the

heterogeneous distribution of employment opportunities and innovation across space not only have implications for regional development, but for the long-term growth trajectory of countries. These inequalities matter for regional development, and a coherent policy-making trajectory for regions requires taking these disparities into account.

## Note

1. As a result of this work, national-level business demography statistics have been harmonised across OECD countries. The data resulting from this project are presented annually (since 2011) in the OECD publication *Entrepreneurship at a Glance*.

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## *Chapter 2.*

### **Measuring business demography at the level of regions: Methods and challenges**

*This chapter presents an assessment of the methodological challenges associated with the development of a regional business demography database encompassing a large number of OECD countries. The chapter also presents a roadmap for future methodological and statistical work necessary to improve our understanding of entrepreneurship and the geography of employment in OECD regions.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## International comparisons of business demography data: An overview

The national statistical offices (NSOs) of OECD countries generally rely on business registers to compile business demography indicators. Business registers originate from administrative sources, such as tax records or a compulsory register of legal entities operating in a certain territory. In this sense, business registers present the advantage over surveys of offering a complete source of information about the population of firms operating in a given country, since their coverage is universal or semi-universal.

The various definitions used to compile indicators may substantially differ across countries. In order to maximise international comparability, Eurostat and the OECD have provided member countries with the methodological guidelines to be used for the production of business demography statistics at the national level (see OECD/Eurostat, 2007). As a result of the compliance with these methodological notes, national databases have been harmonized *ex ante* and are now available at: [https://stats.oecd.org/Index.aspx?DataSetCode=SDBS\\_BDI](https://stats.oecd.org/Index.aspx?DataSetCode=SDBS_BDI).

With the aim of developing a regional business demography database, this section provides a recap of the general methodological issues that may arise from the cross-country comparison of business demography data at the national level – as outlined by Ahmad (2008) and OECD/Eurostat (2007) – and flags some general methodological issues that may arise when comparing regional business demography indicators, which may not benefit from the same degree of standardisation as national indicators.

### *Definition of a business statistical unit*

What constitutes a business? The interpretation of business demography indicators strongly depends on the definition of the business statistical unit, which can differ across countries along several dimensions, as indicated below.

- **Enterprises and establishments:** According to OECD/Eurostat (2007: 12), an enterprise (or firm) is defined as the “smallest combination of legal units [...] producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations”. Local units, on the other hand, are “enterprises or parts thereof (e.g. a workshop, factory, warehouse, office, mine or depot) situated in a geographically identified place. At or from this place economic activity is carried out for which – save for certain exceptions – one or more persons work (even if only part-time) for one and the same enterprise” (OECD/Eurostat, 2007: 86). An enterprise may exercise control over multiple establishments, which in turn may operate across different economic sectors or spread through different geographical areas. On the other hand, a coherent definition of establishment (local unit that is not an enterprise) is missing from the international guidelines. Establishments may be defined as those local production units that belong to the same legal entity as the enterprise but are physically separate from their headquarters. However, even defining what constitutes a “different” geographical area is not trivial, since this definition hinges on the regional unit each NSO considers when developing indicators. The same local unit could be considered as a part of the headquarters in a country that collects indicators at the TL2 level, and a separate production unit in a country that instead collects indicators at a lower level of geographical aggregation.<sup>1</sup> In other words, while enterprise-level indicators are largely comparable across



OECD countries, establishment-based ones are not. The *Eurostat-OECD Manual* recommends that countries use the enterprise as the business statistical unit of choice, when compiling statistics at the national level.

- **Value thresholds for inclusion in the registers:** NSOs may use production value or a distinction in the legal form to discriminate among firms that should be recorded in statistical business registers and indicators, and those that do not form part of the data-collection exercise. For example Belgium only records enterprises subject to value-added tax; Iceland only limited liability enterprises; Mexico only enterprises up to 100 employees; and New Zealand only enterprises that are “economically relevant”. The treatment of these phenomena and the very definitions of what constitutes a business may sometime differ across business registers within the same country. For example, in the United States, the Census COS defines as active any establishment with a positive payroll at any time of the year, while the Bureau of Labor Statistics considers a business unit active only if it has a payroll of USD 1 500 in any one quarter (or at least one employee for 20 or more weeks).<sup>2</sup>
- **Employment thresholds for inclusion in the registers:** From the point of view of regional analysis, a particularly important decision regards the inclusion of non-employer firms (self-employed entrepreneurs) in the business demography indicators. Self-employment may originate from different business cycle dynamics with respect to employer firms, such as differences in the tax regimes or the lack of alternative job opportunities. Some NSOs (such as the US Census) exclude self-employed entrepreneurs from the business demography statistics altogether. This is also the approach taken by the *OECD Structural and Demographic Business Statistics database*, which reports national indicators based on employer-only figures. Eurostat provides two separate datasets in its regional business demography database, one for employer and the other for non-employer firms. The possibility to distinguish between these two categories of businesses will be crucial for the cross-country comparability of regional indicators.
- **Selection of sectors of economic activity:** Business registers can differ in scope. Some economic sectors, such as agriculture or private households, are excluded from certain business registers (for example the US Census) and included in others (such as in the US Bureau of Labour Statistics). The Eurostat-OECD guidelines, on the other hand, recommend the exclusion of ISIC Rev. 4 Sections A, O, T and U, for the purpose of calculating indicators. This implies the exclusion of sectors such as agriculture, public administration and households. When harmonising indicators across countries, it is necessary to ensure consistency in the definition of the business population in order to build indicators upon an equivalent sectoral scope. A further issue regards the comparability across the sectoral classification systems. While European countries provide indicators based on NACE Rev. 2 classification, other OECD countries use different classification systems to define sectors of economic activity. These classification systems differ in the level of detail they provide. While the comparability between NACE Rev. 2 and ISIC Rev. 4, for example, is close to optimal (see correspondence tables)<sup>3</sup>, in other cases the comparability at the two-digit level might be limited (for example in the case of NAICS to NACE2).<sup>4</sup>

- **How to define employment:** Employment levels can be measured by headcount or full-time equivalent. This distinction is important because it might affect the inclusion of firms in the registers, depending on the employment thresholds. Moreover, it clearly affects the measurement of the employment itself, whether generated or destroyed by entrepreneurial activity. According to OECD-Eurostat guidelines, the full-time equivalent definition is more precise, since the headcount definition may overestimate the volume of work produced, for example, by part-time employment (OECD/Eurostat, 2007: 41). On the other hand, the full-time equivalent definition is not available in all countries and therefore the headcount definition maximises the availability of data.

The production of the enterprise-level indicators, presented in Chapter 3, highlights how these definitions are largely harmonised across countries. Most countries included in the *OECD Regional Business Demography Database* follow the OECD/Eurostat (2007) guidelines very closely in the development of regional statistics. The differences in the definitions of sectors and firm size classes have been *ex post* harmonised in the production of the indicators and whenever differences remain they have been clearly flagged as such in the database. Also, for establishment-level indicators, the definition of sectors and size classes are largely harmonised across countries (see notes to Chapter 4 for details). It is important to highlight that for establishment-level indicators, the size class corresponds to the size of the establishment itself, rather than the size of the parent firm.

### ***Business demography indicators: Definition of demographic events***

Business demography data in EU member states benefits from a large degree of comparability, following the adoption of the regulation on business registers for statistical purposes (No. 2186/93). Definitions are therefore largely consistent across this set of economies. The same does not necessarily hold for non-European OECD countries, where birth, death, entry, exit and survival can be defined in different ways in the various business registers.

This section reports the methodological guidelines to record the main demographic events that can affect firms, as defined in the OECD/Eurostat (2007) framework. These are:

- **Births and entries:** The definition of birth is strongly related, in a first instance, to the definition of business. In particular, it is necessary to clarify how each non-European register deals with the distinction between entries and births. While births can be defined as business creations *ex nihilo* (Ahmad, 2008), entries refer to the appearance in the registers of enterprises that were already active in previous periods, but in different forms (perhaps due to de-activations, change of legal form or spin-offs). These events should, in principle, be excluded from the birth statistics (OECD/Eurostat, 2007: 36), but it is necessary to verify that the NSOs maintain this approach when compiling regional-level statistics. Similarly, it is crucial to observe how the NSOs treat the phenomenon of entry by growth, which may arise when a firm surpasses the turnover/employment threshold to be included in the register. This is particularly relevant when dealing with the distinction between an employer and non-employer business: a self-employed entrepreneur may expand the business and enter the population of employer enterprises. In these cases, the resulting employer enterprise should be treated as a birth according to the *Eurostat-OECD Manual* (p.26). However, in situations where the treatment of these demographic events is not consistent across countries, the use of rates might

mitigate the problem (OECD/Eurostat, 2007: 12). This is because entry (and exit) rates are calculated as the ratio of entries to the total business population active in a given region. Therefore comparisons of entries (and exits) rates across countries that use different definitions of demographic events are less problematic than the same comparisons in levels, because bias works in the same direction in both the numerator and the denominator. Practically, the production of regional enterprise-level indicators highlighted that the definition of enterprise births is largely consistent across OECD countries which follow the OECD-Eurostat guidelines. While a clear definition of establishment births is missing from these guidelines, the common practice across countries presented in Chapter 4 is to define establishment births as the time the current production unit started business at its current location (establishment was not active in year  $t-1$ , but active in year  $t$ ).

- **Death:** This typology of demographic event relates to the dissolution of the firm's legal entity. Symmetrically to births, its definition in the case of a firm's closure is likely to be relatively straightforward and comparable across OECD countries. On the other hand, this demographic event is also related to exits: changes in legal forms of the firm (mergers/break-ups/split-offs), restructuring within enterprises, change of ownership, take-overs, joint ventures and reactivations. As in the case of births, these events should, in principle, be excluded from birth/death statistics (OECD/Eurostat, 2007: 52). Overall, definitions of business deaths are consistent across countries, both in terms of enterprise and of establishment indicators.
- **Survival:** An enterprise is generally considered to have survived if it was present in the business register in previous time periods and is still active in the current one. The OECD/Eurostat (2007: 45) framework defines as survivors as “An enterprise born in year  $xx$  or having survived to year  $xx$  from a previous year is considered to have survived in year  $xx+1$  if it is active in terms of turnover and/or employment in any part of year  $xx+1$  (= survival without changes)”. This definition is largely consistent across countries, both for establishment and enterprise indicators. On the other hand, survival is less easily defined in case of changes in the form of the legal entity constituting the business, such as in the case of mergers/break-ups/split-offs, restructuring within enterprises, change of ownership, take-overs or joint ventures. The OECD/Eurostat (2007: 45) Manual recommends the inclusion of business units in the survival statistics as long as “[...] their activity has been taken over by a new legal unit set up specifically to take over the factors of production of that enterprise”, even if the legal units have ceased to be active. Chapter 14 of the Eurostat (2010) *Business Registers: Recommendation Manual* defines three additional continuity rules, in addition to the continuity of production factors. These are the continuity of control, of economic activity and of location. Typically, when at least two of these criteria are met, the enterprise is considered to have survived, rather than being a birth (OECD/Eurostat, 2007: 26). Most OECD countries report following precisely the Manual's guidelines in the production of indicators of firm and establishment survival.
- **Reactivation:** This relates to businesses being dormant for a number of consecutive years, then recommencing activity. The OECD/Eurostat (2007) Manual provides precise indications on how to consider this phenomenon. For example, the reactivation of an enterprise should not enter the birth statistics if the enterprise has been dormant for less than two years (OECD/Eurostat, 2007: 36).

- **Growth:** Growth of an enterprise can be defined according to the change in employment or turnover in each given time period with respect to the previous period. The definition of a high-growth enterprise, however, might differ both in terms of thresholds and in terms of the time span upon which the measure is calculated. The OECD-Eurostat guidelines define as high-growth those enterprises in which employment or turnover experienced an average annualised growth greater than 20% per annum, over a three-year period. Gazelles are defined as those high-growth enterprises that are up to five years old (OECD/Eurostat, 2007: 63). On the other hand, Eurostat's regional database defines high growth as those enterprises with average annualised growth in number of employees greater than 10% per year over a three-year period ( $t-3$  to  $t$ ) and having at least ten employees in the beginning of the growth ( $t-3$ ). Practically, these indicators are rarely available in the *Regional Business Demography Database*, as non-European OECD countries rarely collect such indicators or the definitions are not comparable across countries.

If a firm moves regions within the same country, the demographic events have to be assigned to regions according to clear rules. The birth of the firm will be assigned to the region where it was first created. The death of the firm is assigned to the region where it was last active before it died. The survival rate is assigned analogously. For instance, a firm created in region  $X$  at time  $t$ , which then moves to region  $Y$  after five years and dies there after another three years should be assigned as follows:

- birth in region  $X$
- death in region  $Y$
- three-year survival in region  $X$ .

### Methodological challenges posed by a regional approach

The collection and harmonisation of regional business demography statistics presents a different set of challenges with respect to the national indicators. This section describes the main issues arising with the construction of indicators at the subnational level and the possible solutions.

#### *Enterprises, establishments and the headquarter bias*

The main methodological issue arising from the compilation of regional business demography statistics pertains to the location of economic activity. Specifically, regional statistics can be collected considering the enterprises (firms) as the statistical unit of choice; or rather, they can be compiled considering establishments (plants) as units (see the section on financing constraints for the relative definitions).

While this distinction does not pose particular problems in the analysis of national-level indicators, it has the potential to substantially affect the interpretation of regional data. This is due to the misallocation of figures to the region of the headquarters rather than to the region of location of the economic activity, which is a particularly concerning issue with respect to employment indicators.<sup>5</sup> For example, if an existing firm with headquarters in region  $A$  opens a new establishment in region  $B$ , it is likely to create new jobs in the process. Whenever the statistical unit of choice is the enterprise, the new jobs will result as headquarter growth rather than as growth of employment in region  $B$ .

When computing the national employment statistics, no useful information will be lost. However, this misattribution can significantly affect the analysis of the regional employment distribution, due to a “headquarter bias”. It is likely that at least a fraction of the establishments (and related jobs) will not be physically located in the same region as the headquarters. An incorrect attribution of even a fraction of these jobs, given the overall magnitude of the workforce associated with multi-plant firms, has the potential of introducing a significant bias in the analysis of the regional distribution of employment. In fact, employment indicators based on the enterprise approach do not reflect regional employment, but rather the employment controlled by firms with headquarters in a given region.

### ***The issue of location across different data sources: A comparison***

Eurostat and the various NSOs have different approaches with respect to the issue of assigning location to establishments when computing regional indicators. These choices are largely dependent upon data availability.

### ***Overview of the national data sources and of the relative methodological approaches***

Table 2.1 presents an assessment of how the issue of location is treated across national data sources. For Chile, Greece, Sweden and Turkey, regional-level information on business demography statistics is not available on public data sources, or it was not possible to access sufficient metadata on the methodology used to develop business indicators to satisfy the harmonisation requirements (Iceland). Among the NSOs that collect business demography statistics at the subnational level, the vast majority collect indicators based on enterprises and 13 collect them both at the enterprise and at the establishment level (Table 2.1, Columns 1 and 2).

On the other hand, Japan, Mexico and New Zealand collect indicators at the level of establishments; for these countries it is not possible to develop indicators at the level of enterprises.

### ***Enterprise approach***

Eurostat’s *Regional Business Demography Database* maintains the enterprise as the statistical business unit of choice, and in this sense is also consistent with the national methodological framework defined in the previous subsection. This choice is in part driven by data availability, but it is also the result of a trade-off between employment and firm indicators. While the employment indicators included in Eurostat’s database cannot be used to determine employment in a given region (as they only express the number of workers controlled by firms registered in it), they are optimal to evaluate entrepreneurial dynamics (such as start-up rates). The analysis of entrepreneurship at a regional level requires firm-level data.

### ***Possible solutions to the measurement issue***

The headquarter bias can hamper the interpretation of employment indicators. A solution to this problem is to distribute employment according to the region of activity of the local unit (establishment) rather than legal ownership of the firm (headquarters). This procedure would require shifting the focus from enterprises to establishments, and building business demography indicators accordingly. Constructing indicators at the level of establishments is, however, not possible for those OECD countries for which regional

business demography data are based on enterprise-level data. Furthermore, establishment-level data suffer from lower cross-country harmonisation and comparability. Finally, they also have the drawback of limited information on the nature of new establishments, i.e. whether they belong to existing enterprises or constitute new enterprises. For this reason, and based on the data availability outlined in Table 2.1, this project has developed a main regional database based on the enterprise approach, which maximises coverage by encompassing the 27 OECD countries that collect regional business demography data and at the same time provide indicators based on the enterprise approach (Table 2.1).

Table 2.1. **The issue of location in the national data sources**

Country	Availability of data on enterprise location	Availability of employment indicators at the enterprise level	Availability of data on establishment location	Availability of employment indicators at establishment level
Australia	Yes	No	No	No
Austria	Yes	Yes	Partial	Partial
Belgium	Yes	No	Partial	Partial
Canada	Yes	Yes	Partial	No
Czech Republic	Yes	Yes	No	No
Denmark	Yes	Yes	Partial	Partial
Estonia	Yes	Yes	Partial	Partial
Finland	Yes	Yes	Partial	Partial
France	Yes	Yes	Yes	Partial
Germany	Partial	No	Partial	No
Greece	No	Yes	Partial	Partial
Hungary	Yes	Yes	Partial	Partial
Ireland	Partial	Partial	Partial	Partial
Israel	Yes	No	Partial	No
Italy	Yes	Yes	Partial	Partial
Japan	No	No	Yes	Yes
Korea	Yes	No	Partial	Partial
Latvia	Yes	No	Partial	Partial
Luxembourg	Yes	No	Partial	Partial
Mexico	No	No	Yes	Yes
Netherlands	Yes	Yes	Partial	Partial
New Zealand	No	No	Yes	Yes
Norway	Yes	Yes	Partial	No
Poland	Yes	Yes	Partial	Partial
Portugal	Yes	Yes	Partial	Partial
Slovak Republic	Yes	Yes	Partial	Partial
Slovenia	Yes	Yes	Partial	Partial
Spain	Yes	Yes	Partial	No
Sweden	No	No	Partial	Partial
Switzerland	Yes	Yes	Partial	Partial
United Kingdom	Yes	No	Partial	No
United States	Partial	Partial	Yes	Yes
Number of countries with data availability	27	19	30	24
Number of countries with full data availability	23	16	5	4

Note: Availability is defined as “partial” if data refer to active firms only, but not to births and deaths.

In addition, the project has also gathered a second data source, for the subset of OECD countries that develop regional indicators based on the establishment approach. The availability of these indicators is more limited in scope, but allows a more precise analysis of the spatial distribution of employment in firms. While employment indicators based on the establishment approach portray a precise picture of the spatial distribution of the workforce across regions, the indicators based on the enterprise approach can be best interpreted as the number of workers controlled by a certain region, rather than the number of workers effectively operating in it. When it comes to employment demography indicators, however, enterprise-level data are more reliable due to greater cross-country consistency and the other limitation of establishment data listed above. Nonetheless, the comparison between the two sets of employment indicators (based on the establishment vs. enterprise approach) is interesting in itself, informing regarding the relative concentration of business ownership across regions.

## Development of business demography indicators

This section describes some methodological choices made in developing the regional indicators presented in Chapters 3 and 4.

### *Choice of indicators and relative breakdowns*

The two databases provide the following set of indicators across countries:

1. total active population (number of enterprises/establishments)
2. births (number of enterprises/establishments)
3. deaths (number of enterprises/establishments)
4. survivors at one or three years (number of enterprises/establishments)
5. employment levels in births/deaths/survivors (enterprises and establishments)
6. number of high-growth firms (enterprises and establishments).

The definitions of these demographic events largely follow the methodology outlined in the OECD/Eurostat Manual (2007). However, the comparability of establishment and enterprise indicators across countries is defined on a case-by-case basis, and is outlined in Chapter 4.

This choice of indicators was based on their relatively high frequency across the different national data sources. Still, coverage is imperfect and most countries lack one or more of these indicators. The indicators will also be detailed according to the following classifications:

- **Spatial scale:** The database details the regional indicators up to the TL3 level (NUTS3 in the Eurostat classification) or TL2 otherwise.
- **Time dimension:** The time dimension of reference is the year. Enterprises are considered active, for example, if they were active at any point in a given year. The time series will reflect the availability of data provided by the national data sources.

Whenever possible, the indicators are also made available according to the following breakdowns:



- **Breakdown by size class:** The firms (or establishments) are classified into three size classes according to the number of employees in the firm (or in the establishment). To maximise coverage, the enterprise-level database provides three size classes: category “0”, or non-employer firms; micro-enterprise (1-9); and larger firms (10+). This classification is directly available for the majority of countries, albeit it is not necessarily available for all indicators. The establishment-level database provides these three size classes and breaks down the category 10+ into different size classes, whenever possible.
- **Breakdown by sector:** Regional indicators have also been compiled by sector of economic activity. Most NSOs already offer this breakdown at the level of regions. The sectoral classification used in the original data sources has been harmonised in order to make it comparable to the ISIC Rev. 4 one-digit classification. The one-digit classification maximises coverage, albeit it presents some minor issues since at times the correspondence tables offer limited guidance at this level of aggregation. Whenever these issues are present, they are clearly flagged within the database.

#### *Additional methodological notes*

**How to deal with firms that move between regions:** Firms can experience demographic events in different regions throughout their lifespan and different countries may deal differently with the issue of relocation of a certain business activity. According to the Eurostat *Business Registers: Recommendations Manual*, continuity of location is only one of the criteria to define continuity of businesses in addition to economic activity and control (Chapter 14). Typically, the change of location only results in a birth in the target region (and a corresponding death in the region of origin) if the firm changes simultaneously location and sector of economic activity, or all three continuity factors at once (OECD/Eurostat, 2007: 26). In other cases (when a firm changes location but not sector, or when it changes only location and legal form), the switch between regions should only result in a growth in the statistics of the active business population of that region, and a removal in the region of origin, but not figure in the birth and death statistics. The countries included in the database follow OECD-Eurostat guidelines, and as such the issue of relocation should be taken into account accordingly.

**Confidentiality issues:** There are potential confidentiality issues at the subnational level. However, this dataset will only provide aggregate data, and not disseminate the micro-data at the basis of the regional averages. However, at times some breakdowns of the indicators (according to sector and size class) were omitted in the original sources, due to confidentiality issues. In these cases, the database reflects the composition of the original sources.

### **Highlights and methodological considerations**

This report emphasises the importance of the regional dimension for the analysis of entrepreneurship. Entrepreneurial capacity, survival probability and the creation of jobs are all functions of local characteristics, and may in turn result in divergent growth paths for regions within the same country.

This section highlights some methodological considerations that emerge from the analysis of entrepreneurship at the subnational level. These considerations stress the need to expand the coverage of existing business demography statistics, along several dimensions.



These methodological notes outline a roadmap for future work on the development and analysis of business demography statistics for OECD countries.

***TL2 dimension is sometimes inadequate to capture the extent of agglomeration economies***

Business activity and entrepreneurship do not distribute uniformly across the national territory. Cities tend to attract the largest share of business births, in both relative and absolute terms (Chapter 3), and all countries display a very large concentration of firms across the first two or three urban centres (Chapter 4). The degree of geographic concentration is even higher when observing the distribution of firms across urban regions: capital cities tend to aggregate the largest share of firms in many countries (Chapter 4). Agglomeration economies are also crucial for post-entry growth (Chapter 5).

Due to the role of productive clusters and agglomeration for entrepreneurship, it is important to capture business demography statistics at the lowest level of geographical aggregation possible. Ideally it would be optimal to measure business dynamics at the level of micro-regions (TL3), which would allow a characterisation of small entrepreneurial clusters. Most importantly, this dimension permits to better distinguish cities *per se* from the areas surrounding them. Such distinction is often impossible when using statistics at the level of large regions (TL2).

TL2 regions, or large regions, often cluster together areas that are very vast, and where local economies differ substantially even within the region itself. The most obvious examples are the cases of Australian and US states or Canadian provinces, all of which correspond to the OECD TL2 classification of large regions. These are vast territories, which include both cities and rural areas and very different economies within each state/province. It is likely that the economies of Los Angeles and Dallas have more in common with each other than they have with rural areas in California and Texas, respectively.

However, the development of this database highlights that in many cases enterprise-level regional statistics are only available for TL2 regions: this is particularly the case for non-European OECD countries. Looking forward, a welcome development would be for all countries to converge towards the production of business demography statistics based on TL3 regions.

***Enterprise-based indicators is a robust option for assessing the employment generated by new businesses***

Chapter 3 highlights how indicators based on the location of firms, rather than on local production units, can produce biased employment statistics. The concentration of enterprises is much higher, in many countries, than the concentration of production plants. The typical case is one in which the capital city of a country gathers a vast number of firms' headquarters, but then operates plants in different regions. Measuring employment on the basis of enterprise-level indicators leads to a misattribution of employment across regions (Chapter 4).

The analysis of employment in business could therefore be complemented by establishment-level indicators. At the moment, these indicators are only partially available for 15 countries and even fewer countries in terms of detailed demography information (see Chapter 4). Moreover, the lack of international guidelines on how to produce these indicators greatly hampers the cross-country comparability of establishment-based business demography statistics.

A harmonisation of micro-data sources at the regional level across countries would allow the identification of the precise location not only of enterprises, but also of their establishments. This would increase the precision of any comparative analysis on the employment dynamics associated with business demography. Due to the limitations of establishment-level data, the enterprise demography indicators are the most reliable source and offer the promising approach to analyse employment creation in regions.

### ***Enterprise-level statistics remain crucial to measure entrepreneurship***

Enterprise-level indicators also remain the benchmark for studying the life and development of new firms over time. A new establishment might not necessarily suggest a new presence on the market, but perhaps the opening of a new plant of an existing firm, which might suggest market concentration, rather than competition.

The current state of collection of enterprise-level indicators, however, has room for improvement. In particular, it would be crucial for countries to develop indicators that allow to exclude non-employer firms from other firm statistics. This is because the dynamics of non-employer firms are very different from those that are born with employees: self-employment may be the result of differences in taxation or economic incentives across countries. As a result, the solo-firm cannot necessarily be included under the umbrella of “entrepreneurial venture”. The distinction between employer and non-employer firms is, however, not possible for all countries in the database (see Chapter 3 for details), which somewhat reduces the capability to measure the dynamics of entrepreneurship.<sup>6</sup>

Other improvements with respect to enterprise-based data collection regard the coverage of indicators. It would be particularly interesting to study the expansion and shrinkage of firms over time. Even if access to confidential micro-data able to measure such developments cannot be made available to the general public at low levels of geographic detail, these statistics could be compiled by the NSOs and provided as aggregate figures together with other business demography indicators. Indicators of firm expansion and contraction would help towards a better understanding of which firms are successful, and where they are located.

## **Notes**

1. Regions are classified by the OECD into two territorial levels that reflect the administrative organisation of countries. The OECD’s large regions (TL2) represent the first administrative tier of subnational government, such as the Ontario region in Canada. Small OECD (TL3) regions are contained within a TL2 region. For example, the TL2 region of Aquitaine in France encompasses five TL3 regions: Dordogne, Gironde, Landes, Lot-et-Garonne and the Pyrénées-Atlantiques. In most cases, TL3 regions correspond to administrative regions, with the exception of Australia, Canada, Germany and the United States.
2. <https://www.amstat.org/sections/srms/proceedings/y2005/Files/JSM2005-000327.pdf>.
3. Correspondence tables: <http://unstats.un.org/unsd/cr/registry/regso.asp?Ci=70>.

4. NAICS to NACE2:  
[http://ec.europa.eu/eurostat/ramon/miscellaneous/index.cfm?TargetUrl=DSP\\_NACE\\_2\\_US\\_NAICS\\_2007](http://ec.europa.eu/eurostat/ramon/miscellaneous/index.cfm?TargetUrl=DSP_NACE_2_US_NAICS_2007).
5. This misattribution may also arise in the context of particular indicators of business dynamics (for example, when analysing turnover).
6. A firm that is set up without employees at the time of its birth constitutes a non-employer firm birth.

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- Ahmad, N. (2008), “A proposed framework for business demography statistics”, in *Measuring Entrepreneurship*, Springer US, pp. 113-174.
- Eurostat (2010), *Business Registers: Recommendations Manual*, Eurostat Methodologies and Working Papers, Publications Office of the European Union, Luxembourg, <http://dx.doi.org/10.2785/39851>.
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## ***Chapter 3.***

### **Regional dynamics from an enterprise approach**

*This chapter describes the composition of a new database designed to compare business demography statistics at the subnational level. The database offers unprecedentedly rich subnational information across countries, covering 27 OECD countries in total, out of which 21 include data at the TL3 regional level. The chapter analyses the geographical distribution of business activity (entry, exit and survival rates) and presents evidence on how entrepreneurial activity differs across types of regions. The chapter also analyses how the geographic and institutional characteristics of regions are associated to firm creation and survival over time.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## Introduction

Analysing entrepreneurial dynamics at the subnational level can help design policy to enable all regions to contribute fully to national economic growth and foster economic cohesion. However, while business demography statistics are available at different geographic levels within most OECD countries, a cross-country comparable source at the regional level was missing.

This chapter presents a new set of regional indicators designed to measure business demography across OECD regions. The statistics presented throughout this chapter are based on a definition of business that revolves around the concept of firm, or enterprise, rather than on the local unit of production (plant or establishment).<sup>1</sup> Throughout the chapter, the geographical location of production units corresponds to the region where the firms' headquarters are located (or the local unit with the largest number of employees).

This firm-level database has the advantage of providing a correct measure of regional firm dynamics (births, deaths, survival) and, at the same time, maximising cross-sectional coverage and cross-country comparability. Plant-level regional data are not available in a vast number of OECD countries and are also less harmonised across countries.

This chapter will focus mainly on indicators of business activity. Chapter 4 will extend the analysis presented in this chapter by discussing, in detail, the impact of firm dynamics on regional employment creation.

## Data sources and indicators

The indicators presented in this chapter have been developed through the harmonisation of a variety of data sources. For many countries, the sources are the regional business demography statistics developed by national statistical offices (NSOs; described in Table 3.1). These data sources have been harmonised and combined with data contained in Eurostat's regional business demography database. The combined database spans across 26 OECD countries and 752 TL2 or TL3 regions. The indicators included in the enterprise-level database have yearly frequency. Table 3.1 provides a list of countries in the database, the relative data sources, as well as the level of geographic detail and time coverage available for each country included in the database.

The time frame generally covers the years between 2007 and 2014, albeit some countries provide a longer/shorter time series. A breakdown of these indicators is also available according to the sector of economic activity of the firm (NACE Rev. 2 one-digit). Some NSOs use different sectoral classifications in the original data sources: these differences have been harmonised *ex post* with the use of correspondence tables between international classifications.<sup>2</sup> Furthermore, a size class breakdown is also available. It distinguishes between non-employer firms (category 0), micro-firms (those with one to nine employees) and larger firms with ten or more employees.<sup>3</sup>

The indicators include the number of active firms, births, deaths and the number of three-year survivors. The definitions of these demographic events follow the standard international guidelines on the development of business demography statistics (OECD/Eurostat, 2007). The database also includes some indicators of employment in business (persons employed in active firms, as well as persons employed in firms that experience a birth, a death or survive).

This chapter will mostly focus on firm dynamics, rather than on employment created by businesses. A lengthy discussion of the geography of employment in relation to business demography will be the main subject of Chapter 4. Table 3.2 provides a list of the indicators included in the database and of their availability by country.

### Box 3.1. Definition of unit of analysis and demographic events

**Enterprise/firm:** Smallest combination of legal units producing goods and services which benefits from a certain degree of autonomy in decision making.

**Enterprise birth:** Creation of a combination of production factors with the restriction that no other enterprise is involved in the event. Excludes entries in the business population due to reactivations, mergers, break-ups, split-offs and restructuring.

**Enterprise death:** Dissolution of a combination of production factors with the restriction that no other enterprises are involved in the event. Excludes exits from the population due to mergers, take-overs, break-ups and restructuring of a set of enterprises.

**Enterprise survival (three years):** An enterprise born in year  $t-3$  is considered to have survived to year  $t$  if it is still active (in terms of employment or turnover) in any part of year  $t$ .

**Persons employed:** Total number of persons who work in the observation unit (inclusive of working proprietors, partners working regularly in the unit and unpaid family workers), as well as persons who work outside the unit who belong to it and are paid by it (e.g. sales representatives, delivery personnel, repair and maintenance teams).

**Employees:** Persons who work for a firm receiving compensation in the form of wages, salaries, fees, gratuities, piecework pay or remuneration in-kind. Employees are also included in the number of persons employed.

**Employer enterprise:** An enterprise having a positive number of employees in any part of the year.

**Non-employer enterprise:** An enterprise having no employees in any part of the year. The enterprise can have a positive number of persons employed (working proprietors, partners working regularly).

Sources: OECD/Eurostat (2007), *Eurostat-OECD Manual on Business Demography Statistics*, <http://dx.doi.org/10.1787/9789264041882-en>; Eurostat Glossary of Statistical Terms, [http://ec.europa.eu/eurostat/statistics-explained/index.php/Business\\_demography\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Business_demography_statistics).

## The geographical dimension of business demography

### *Entrepreneurial activity is unevenly distributed within countries*

Business creation, death and survival differ substantially across countries (OECD, 2016a). The large cross-country variation in entry rates and innovation is complemented by agglomeration dynamics, clusters of production and, generally, by an uneven distribution of firms within countries. These differences can be in part related to the fixed characteristics of local areas, such as geography or availability of natural resources, which in turn affect population and services' density and are crucial in determining the location of businesses. At the same time, policy-variant institutional factors like the availability and quality of the transportation network, the educational attainment of the population, the availability of finance, as well as the quality of local governments and institutions are known to differ widely across regions (OECD, 2016b). These differences

may have visible and long-lasting effects on business demography outcomes and in turn substantially affect job creation, income levels and regional development over time.

Table 3.1. **Data sources and available breakdowns by country**

Country	Spatial scale	Years	Sector breakdown	Size class breakdown	Non-employer separate	Source
Australia	TL2	2011-15	Yes	Yes	Yes	ABS
Austria	TL3	2008-13	Yes	Yes	Yes	Eurostat
Belgium	TL2	2008-15	Yes	Yes	Yes	Statistics Belgium
Canada	TL2	2010-14	Yes	Yes	No	Statistics Canada
Czech Republic	TL3	2008-13	Yes	Yes	Yes	Eurostat
Denmark	TL3	2007-14	Yes	Yes	Yes	Eurostat
Estonia	TL3	2004-14	Yes	Yes	Yes	Eurostat
Finland	TL3	2008-13	Yes	Yes	Yes	Eurostat.
France	TL3	2008-13	Yes	Yes	Yes	Eurostat
Germany	TL2	2006-13	Yes	Yes	No	Federal Statistical Office
Hungary	TL3	2008-13	Yes	Yes	Yes	Eurostat
Ireland	TL3	2008-14	Yes	Yes	No	StatBank Ireland
Israel	TL2	2011-14	Yes	Yes	Yes	CBS
Italy	TL3	2008-13	Yes	Yes	Yes	Eurostat
Korea	TL3	2006-14	Yes	No	No	KOSIS
Latvia	TL3	2007-14	Yes	Yes	No	Central Statistical Bureau
Luxembourg	TL3	2009-14	Yes	Yes	Yes	Statistics Luxembourg
Netherlands	TL3	2008-13	Yes	Yes	Yes	Eurostat
Norway	TL3	2001-15	Yes	Yes	Yes	Statistics Norway
Poland	TL3	2008-13	Yes	Yes	Yes	Eurostat
Portugal	TL3	2008-13	Yes	Yes	Yes	Eurostat
Slovak Republic	TL3	2008-13	Yes	Yes	Yes	Eurostat.
Slovenia	TL3	2008-13	Yes	Yes	Yes	Eurostat
Spain	TL3	2008-13	Yes	Yes	Yes	Eurostat
Switzerland	TL3	2013-15	Yes	Yes	No	Federal Statistical Office
United Kingdom	TL3	2009-14	No	No	No	ONS
United States	TL2	2007-14	Yes	Yes	Yes	SUSB
Number of countries covered	27 at TL2; 21 at TL3		26	25	20	

The temporal dimension of the *Regional Business Demography Database* can be exploited to develop a simple baseline measure of the degree of geographical dispersion in business activity within countries: business population growth or regional-level growth rates in the number of active firms over a particular time span. Since the number of active firms is available for most regions and years in the database (Table 3.2), net business population growth maximises the cross-sectional and time coverage. This indicator confirms the substantial cross-country variation in the degree of entrepreneurial activity measured at the same point in time: between 2008 and 2011, during the crisis and recession, the United States experienced net business destruction on average, with the number of active firms shrinking yearly. At the same time in Germany, net business creation was overall null or sometimes even moderately positive.



Table 3.2. Available indicators by country

Country	Actives	Births	Deaths	Survivors (three years)	Employment indicators
Australia	✓	✓	✓	✓	..
Austria	✓	✓	✓	✓	✓
Belgium	✓	✓	✓	..	..
Canada	✓	✓	✓	✓	✓
Czech Republic	✓	✓	✓	✓	✓
Denmark	✓	✓	✓	✓	✓
Estonia	✓	✓	✓	✓	✓
Finland	✓	✓	✓	✓	✓
France	✓	✓	✓	✓	✓
Germany	✓	..	..	..	..
Hungary	✓	✓	✓	✓	✓
Ireland	✓	..	..	..	✓
Israel	✓	✓	✓	..	..
Italy	✓	✓	✓	✓	✓
Korea	✓	✓	✓	..	..
Latvia	✓	✓	✓	..	..
Luxembourg	✓	✓	✓	..	..
Netherlands	✓	✓	✓	✓	✓
Norway	✓	✓	..	✓	✓
Poland	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓	✓
Slovak Republic	✓	✓	✓	✓	✓
Slovenia	✓	✓	✓	✓	✓
Spain	✓	✓	✓	✓	✓
Switzerland	..	✓	..	..	✓
United Kingdom	✓	✓	✓	✓	..
United States	✓	..	..	..	✓
Number of countries covered	26	24	22	18	18

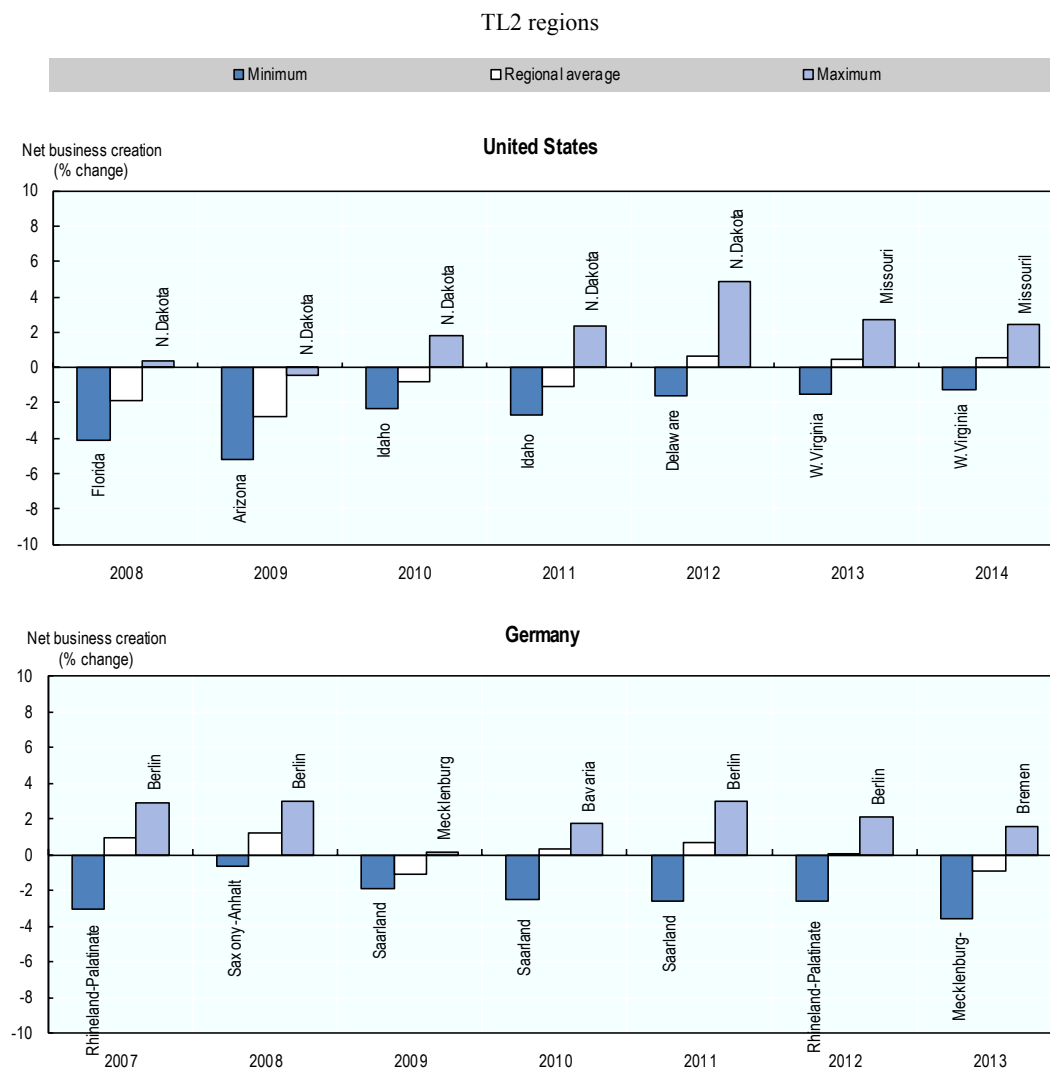
Note: ..: not available.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

The wide within-country dispersion in net business creation in any given year suggests that regions react differently to aggregate shocks (Figure 3.1). In fact, the variation in net business creation within countries often exceeds the differences observed across countries at the same point in time. The example of the United States around the 2008 crisis and the subsequent recession is very instructive. States that experienced higher than average growth rates in house prices ahead of the financial crisis (like Arizona and Florida<sup>4</sup>) experienced a much stronger reduction in the number of active businesses than the national average in 2008 (Figure 3.1). On the other hand, North Dakota (a region rich in natural resources, which experienced a boom in fracking over this time period) consistently outperformed the national average. In the case of Germany, the capital region of Berlin displays the highest net business creation rates over this time frame, while the industrial regions of Rhineland or Saarland display growth rates that sometimes negatively deviate by several percentage points from the national average.

Net business creation portrays the relative change a region's business count, which is a simple and useful indicator to understand the overall degree of geographical dispersion in business activity within a country. Nevertheless, it remains an incomplete measure of entrepreneurial dynamics since it cannot distinguish between entries and exits. A more precise way to measure entrepreneurship is to focus on dynamic indicators, such as business births, deaths and survivals.<sup>5</sup>

Figure 3.1. Net business population growth, within-country dispersion by year



Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

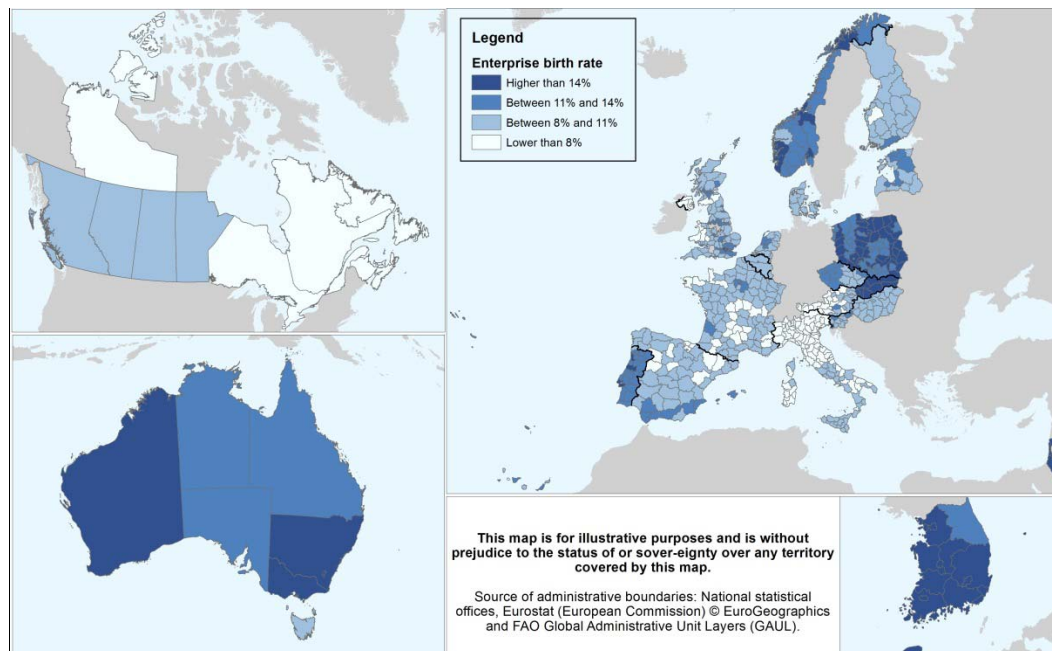
StatLink <http://dx.doi.org/10.1787/888933625585>

### *Within-country dispersion in business births and deaths*

Business birth rates, defined as new business openings in each given year as a fraction of active firms, can be considered a measure of entrepreneurial activity. This measure differs substantially within countries. While on average the proportion of newly created businesses as a share of active firms is around 10%, some TL3 regions display much higher/lower rates than the country average (Figure 3.2).

Figure 3.2. **Regional business birth rates across the OECD**

TL3 regions, 2014 (or last available year)



*Notes:* The figure presents business births as a proportion of total active firms in each region in the year 2014 (or last available year). All firms, including self-employed entrepreneurs, are included (total across sectors and size classes). Data are for TL2 regions in Austria, Belgium, Canada, Israel and the Netherlands.

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933625604>

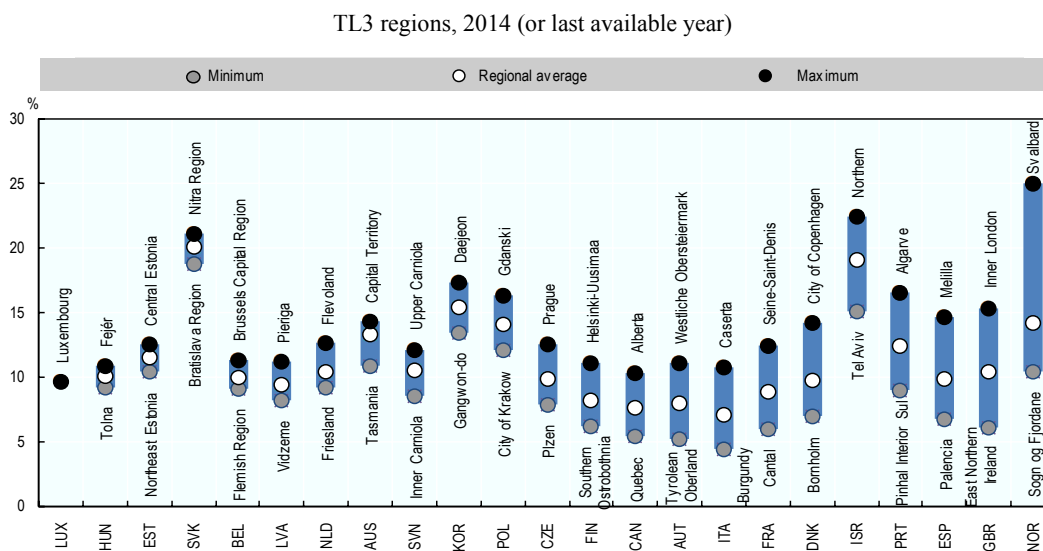
Whereas the within-country dispersion is sometimes very low, as in the case of many Eastern European countries, in London business birth rates, at 15% a year, are more than twice as high as those in East of Northern Ireland (Figure 3.3). Among the best performers in terms of business births, clear outliers are Israel and the Slovak Republic, where on average across each country 20% of active firms are composed by new entrants. Copenhagen and London are among the capital cities with highest birth rates in the sample, at around 15%.

The dynamism associated with higher than average entries is often accompanied by a high number of business closures. Business death rates exceed 10% per year in many countries. Average business exit figures by country are often comparable in magnitude to birth rates (Figure 3.4). This is also true for some outlier regions, like Copenhagen, where birth rates are relatively high, but so are death rates. The within-country distribution of business deaths has a strong regional component: some Northern regions in Italy (Sondrio) experience half the rate of business closures compared to their Southern counterparts (Caserta).

This descriptive evidence shows that urban regions (capital regions in particular) tend to be at the forefront when it comes to measuring business creation as well as destruction: this is the case of Brussels, London, Copenhagen, Vienna and Helsinki. This evidence may speak to the higher dynamism often associated with capital regions, where dynamics of specialisation and creative destruction may be leading the developments of the regional market (Duranton and Puga, 2001). On the other hand, these differences may also reflect

differences in sectoral composition of the business population operating in urban and capital regions.

Figure 3.3. Dispersion in business birth rates by country

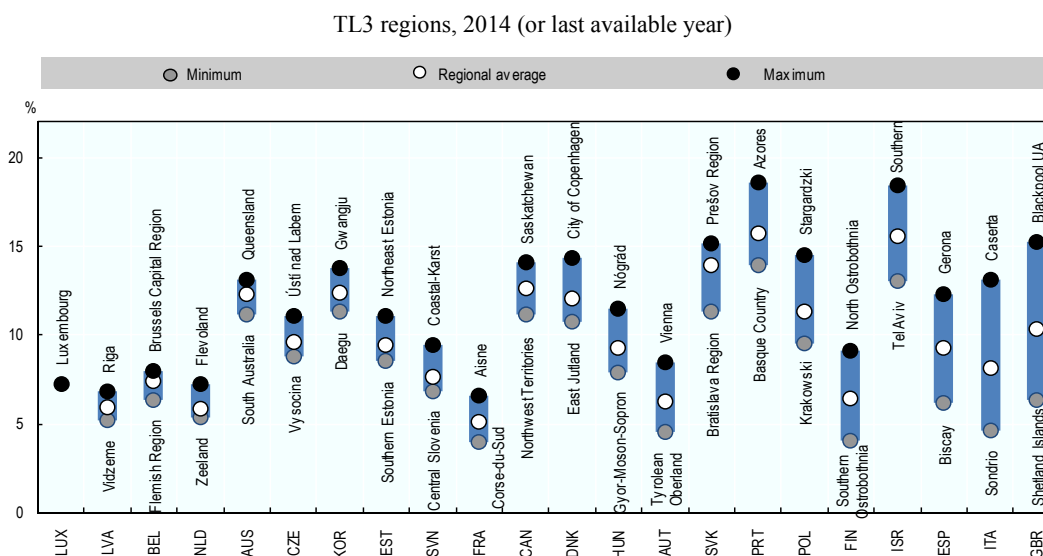


Notes: The figure refers to the total number of business births as a proportion of total active firms in the region in the year 2014 (or last available year). All firms, including self-employed entrepreneurs, are included (total across sectors and size classes). Canada and Latvia show figures for employer firms only. Data are for TL2 regions in Austria, Belgium, Canada, Israel and the Netherlands.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink <http://dx.doi.org/10.1787/888933625623>

Figure 3.4. Dispersion in business death rates by country



Notes: The figure refers to the total number of business closures as a proportion of total active firms in the region in the year 2014 (or last available year). All firms are included (total across sectors and size classes), except for in Canada and Latvia, which show figures for employer firms only. Data are for TL2 regions in Austria, Belgium, Canada, Israel and the Netherlands.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink <http://dx.doi.org/10.1787/888933625624>

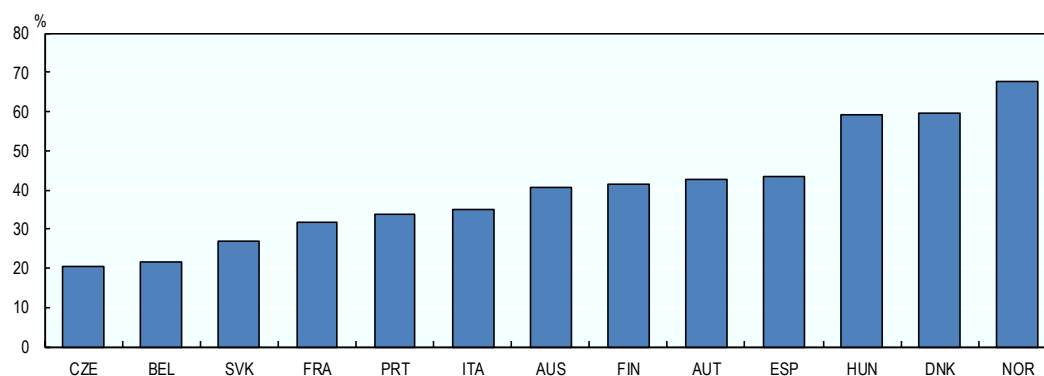
### *All firms or employer firms only? Cross-country comparability and coverage of indicators*

One question that arises when regional business demography is assessed across multiple countries is what type of firms should be considered. This question is particularly pertinent with regards to the size of a new firm, i.e. whether it is a non-employer firm (a firm with zero employees) or an employer firm.

Several OECD countries, especially outside Europe, do not provide a breakdown of regional business demography indicators by firm size class, so excluding the category of non-employer firms from the analysis would imply excluding a substantial part of the sample (see Table 3.1). However, the inclusion of non-employer firms may generate concerns related to the comparability of business demography indicators across countries, and at the same time substantially skew the indicators. Differences in legal definitions, tax regimes and thresholds for inclusion in business registers may lead similar firms to be included in the business registers of some countries but not in others.

While this is true of all firm categories, such differences are likely to disproportionately affect non-employer firms. This is due to the fact that differences in registration requirements (and tax regimes) applied to very small firms are likely to display a large cross-country variation, while the much higher consistency across countries is expected for larger employers. Evidence from the *Regional Business Demography Database* demonstrates that, in fact, the share of employer firms among all firms differs substantially by country (Figure 3.5). While in Belgium or the Czech Republic employer firms in business sectors account only for roughly 20% of all firms, around 70% of all firms in Norway are employer firms.

Figure 3.5. Share of employer firms by country



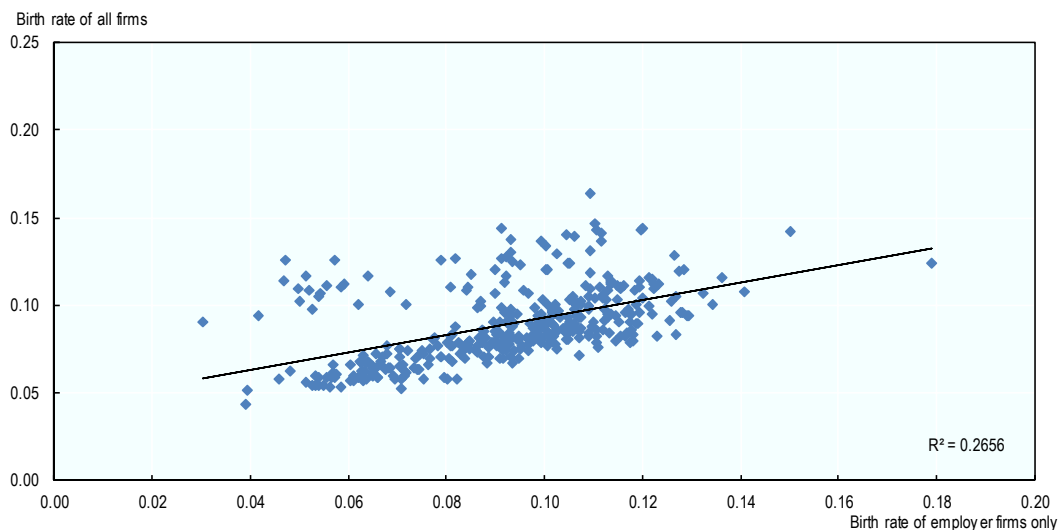
Note: The figure presents the proportion of employer firms of all firms by country across all sectors in 2014 (or last available year).

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933625661>

Regions not only differ in the relative importance that non-employer firms play, but also display significant variation in the relationship between dynamics of employer and non-employer firms (Figure 3.6). Births rates of employer firms and birth rates of all firms (including non-employer firms) are correlated across regions in the set of countries for which such a comparison is possible, but the correlation is fairly weak (Figure 3.6). As a consequence, conclusions drawn for birth rates of all firms are not necessarily correct for birth rates for employer firms.

Figure 3.6. Ratio of birth rates for all firms and employer firms, TL3 regions



Notes: The figure compares birth rates for all firms with birth rates for employer firms across OECD countries (for all sectors). Data are for TL3 regions in 2014 (or last available year). Hungary and Norway are excluded from the graph.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

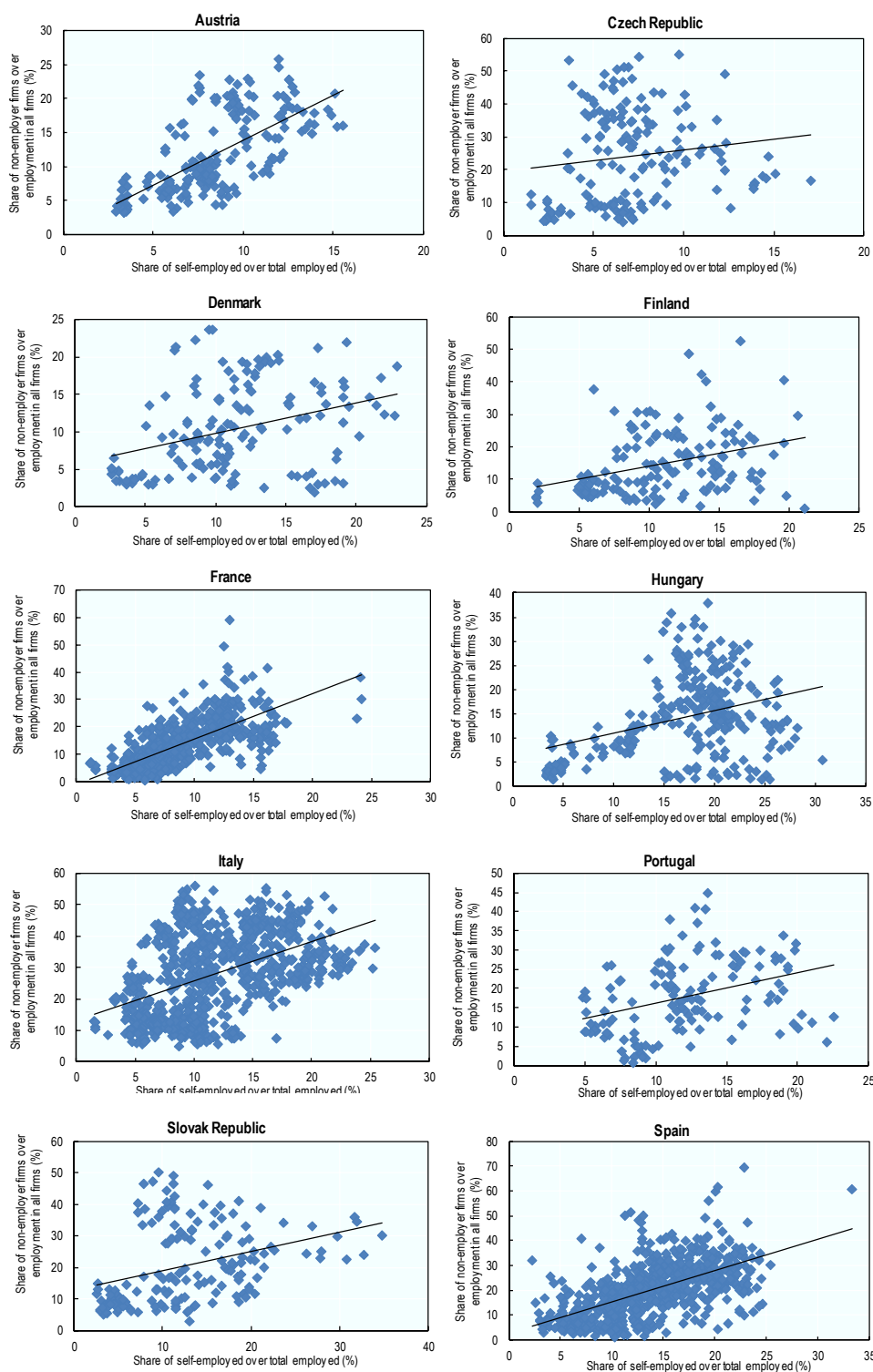
StatLink  <http://dx.doi.org/10.1787/888933625680>

Non-employer firms do not necessarily capture self-employment and the link between self-employment and non-employer firms varies across countries (Figure 3.7). If every non-employer firm truly consisted of a self-employed individual, then the ratio of non-employer firms to total employment in enterprises should correspond to the rate of self-employment. Such a comparison can be made by looking at labour force survey data for European countries and computing for each business sector in each region and year the share of self-employed labour force.

In almost all countries, non-employer firm statistics do not perfectly match the actual degree of self-employment, with an overall pairwise correlation of 0.36. However, across countries there are strong noticeable differences. Some of these differences might be attributable to the fact that NSOs use different thresholds and rules for including firms in their register. A great part of these differences are likely a product of different legal contexts and tax codes that cause differential incentives to set-up non-employer enterprises. As a consequence, one needs to be cautious in comparing business demography for non-employer firms across different countries and tax codes.

Across the OECD, the within-country range of dispersion of birth rates is in most cases similar when considering all firms and employer firms only, and the same region is often the respective country's minimum/maximum with respect to both measures (Figure 3.8). At the same time, both averages and the range of variation in the indicators are quite different for some countries. In general, birth rates measured for employer-only firms are lower than those measured including non-employers, with the notable exception of Hungary. Norway, for example, has a very low birth rate in terms of employer firms (3%) than when considering non-employers (15%). The large number of firms in the renting and operating own or leased real estate sector – about 8% of all firms in Norway, mostly non-employers – can partially explain the observed differences. The case is similar in Belgium, the Czech Republic and the Slovak Republic.

Figure 3.7. Self-employment vs. non-employer firms



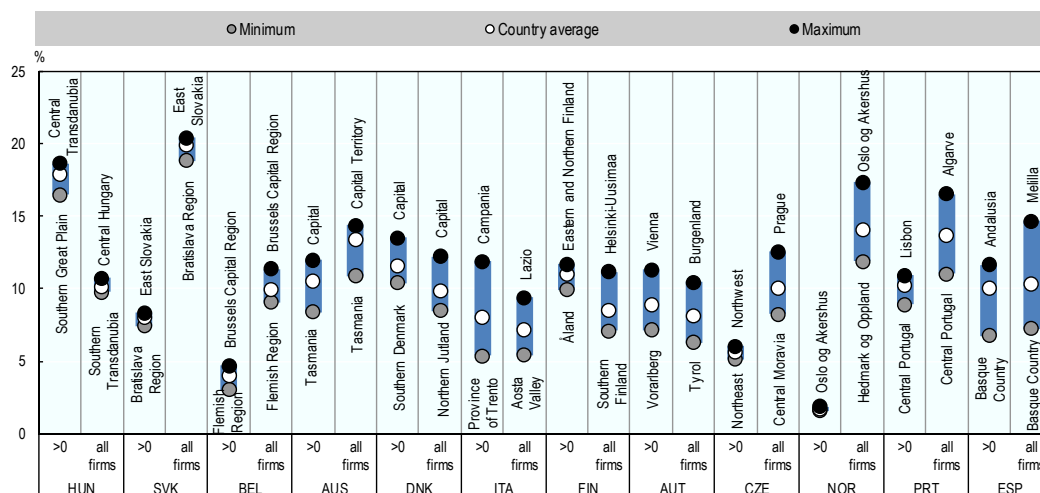
*Note:* The figures compare the share of self-employed over total employed and the share of non-employer firms over total employment in enterprises for each region, sector and year in ten European OECD countries.

*Sources:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>, and EU Labour Force Survey.

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Figure 3.8. **Within-country dispersion: Birth rates for all firms and employer firms**  
TL2 regions, 2014 (or last available year)



Note: The figure presents both the birth rates for all firms as well as employer firms in the region in the year 2014 (or last available year).

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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The findings in this section suggest that births of employer and non-employer firms capture different aspects of entrepreneurship. Furthermore, the relationship between these two measures varies across countries and regions. Currently, regional business demography data only allow distinguishing between employer and non-employer firms for a subset of countries. For the remainder of this chapter, we will therefore present results for all types of firms in order to ensure greater country coverage, especially for non-European countries. Another reason for including non-employer firms in the analysis is that they can become employer firms by growth. In fact, such entry by growth in a given year can be very significant in some countries compared to the number of new employer firms that were truly born in that same year (Eurostat, 2015). Where results for employer firms differ substantially from the results for all firms, those differences are explicitly stated.

### ***Business demography in urban and rural areas***

The large majority of new firms are born in cities, where the majority of firms are also active. Overall, about 50% of all active firms have headquarters in urban regions, while 34% are in intermediate regions and only 15% in rural areas (Figure 3.9). On average, 52% of new firm registrations take place in urban, TL3 regions (Figure 3.9).<sup>6</sup> This result most likely reflects the concentration of population and services in urban areas, which makes cities attractive to a majority of entrepreneurs. In a similar fashion, urban regions also account for the largest business death share: 51% compared to only 15% associated with rural regions (see Table 3.3 for a definition of urban and rural regions).

Since cities have a higher density of population and of firms, it can seem obvious that these regions will experience the majority of business entries and exits. Nevertheless, entry rates in urban areas are higher also when compared to their relative share of active business population (Figure 3.9). If the proportion of births were to be equivalent to the proportion of active firms across these regional typologies, birth and death shares in urban regions should be 2.2 percentage points lower.



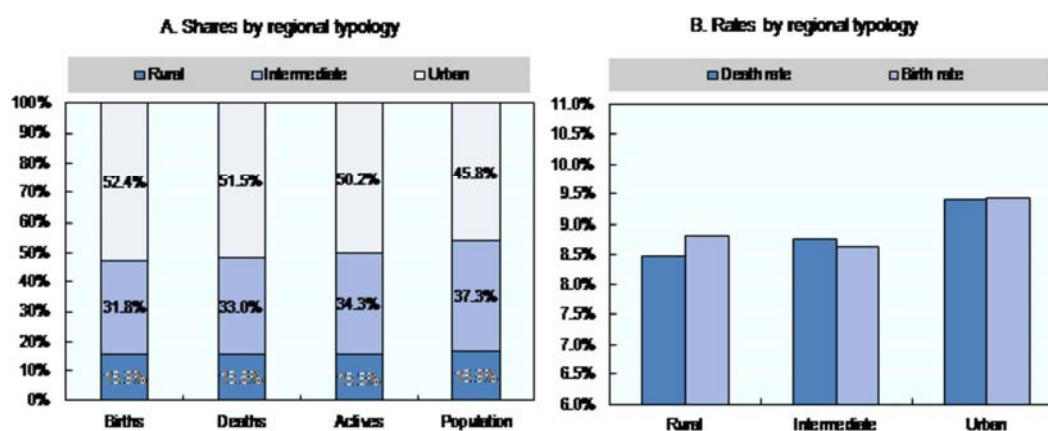
Table 3.3. Regional classification and typology

Regional classification TL2 and TL3	The 398 OECD large (TL2) regions represent the first administrative tier of subnational government, for example, the Ontario Province in Canada. The 2 241 OECD small (TL3) regions correspond to administrative regions, with the exception of Australia, Canada, and the United States. These TL3 regions are contained in a TL2 region, with the exception of the United States for which the Economic Areas cross the States' borders. All the regions are defined within national borders.
TL3 regional typology	TL3 regions have been classified as: predominantly urban (PU), intermediate (IN) and predominantly rural (PR) based on the percentage of regional population living in rural communities, combined with the existence of urban centres where at least one-quarter of the regional population reside. The terms urban, intermediate and rural are used to refer to these categories. An extended typology distinguishes between regions that are predominantly rural and close to a city, and predominantly rural regions that are remote. The distinction is based on the driving time to the nearest urban centre with at least 50 000 inhabitants for a certain share of the regional population. Due to lack of information on the road network, the predominantly rural regions (PR) in Australia, Chile and Korea have not been classified as remote or close to a city.
TL2 regional typology	TL2 regions have been classified as mostly metropolitan, mixed (metropolitan and non-metropolitan) or non-metropolitan, according to the percentage of residents living in functional urban areas (FUAs). Regions with more than 70% of their population living in an FUA, or some percentage of their population living in a large metropolitan area with more than 1.5 million inhabitants, are classified as mostly urban, those with less than 50% are classified as mostly rural.

Moreover, the higher dynamism associated with cities is confirmed when looking at a relative measure of entrepreneurship: business birth and death rates, defined as new firm creation and deaths as a proportion of the active business population in the same region and year. This indicator is capable of taking into account the scale effects, because the entries are scaled by the actual business population of a particular region, rather than as a share of the total in a country. Highly urbanised areas have a slightly higher entry rate than other types of regions: 9.5% per year, compared to 8.5% for rural and intermediate regions.

Figure 3.9. Business births and deaths by urban-rural regional typology

TL3 regions, 2014 (or last available year)



Notes: The left-hand panel displays the share of births and deaths in predominantly urban/rural/intermediate regions as a proportion of total births in a country/year. The right-hand panel displays the birth rates (births as a proportion of active firms in a region in the same year). Austria, Denmark, Estonia, Finland, France, Hungary, Italy, Korea, the Netherlands, Poland, Portugal, the Slovak Republic, Spain and the United Kingdom are included. Average across all firms.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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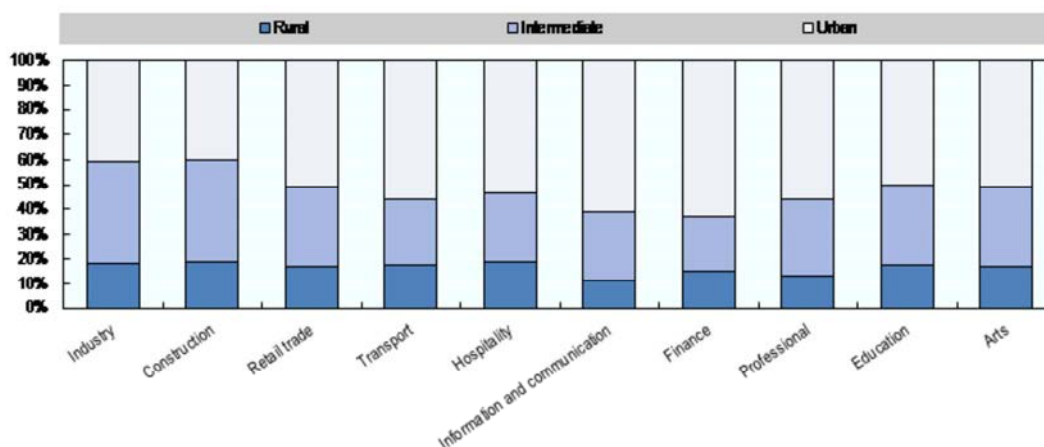
Death rates are also higher in cities (9.5% compared to roughly 8.5% in both rural and intermediate areas). Net churn (the average difference between births and deaths) is virtually zero in cities and instead remains positive in rural areas. This result distinguishes rural regions from other regional typologies, particularly intermediate ones, which seem to be facing net business destruction, with negative churn rates, in recent years (Figure 3.9).

The overall differences between rural, urban and intermediate areas may reflect in part the composition of business births in terms of sector and size class of the firm. Indeed, the sectoral composition in business births differs substantially between urban regions and other areas. For example, more than 60% of new business births in the financial sector as well as in information and communication activities take place in predominantly urban regions (Figure 3.10). This evidence most likely reflects the necessity of these firms to tap into a particular workforce, as well as the need to access networks and services.

On the other hand, intermediate regions host about 40% of births in industry (including manufacturing) and in the construction sector (Figure 3.10; the same pattern can be observed for employer firms only). These sectors often have high requirements in terms of physical space and are therefore sensitive to the cost of land; at the same time, they benefit from having access to large markets and to transportation networks (particularly for the tradable part). Therefore the choice of establishing business in intermediate areas probably reflects the fact that these regions combine a relatively easy access to cities with relatively lower costs. Rural regions instead account for a relatively large share (up to 20%) of new firms operating in the hospitality sector, which is possibly a reflection of the relevance of tourism in the regional economies.

Figure 3.10. **Business birth shares by sector and type of region**

TL3 regions, 2014 (or last available year)



*Notes:* The figure displays the composition of business birth and deaths rates by type of region and by sector of economic activity of the firm (share of births and deaths in a sector as a proportion of total births in a region). The figures by regional typology are computed as averages across countries: Austria, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Ireland, Italy, Korea, the Netherlands, Norway, Poland, Portugal and the Slovak Republic. 2014 or last available year. All size classes included.

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933625756>

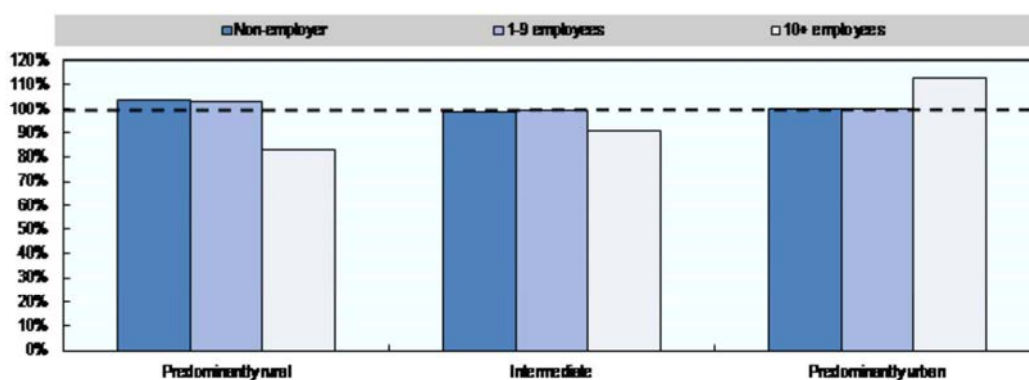
The geographical distribution of business births is quite heterogeneous when considering firms' size classes. A relative measure of the concentration of business entries across regional typologies can be developed by scaling each regions' birth share by size class

(births by region/all births in the same size class) for its share of business population in the same size class (actives by region/all active firms in the same size class). A uniform distribution of business entries by size class across regional typologies would require this ratio to be equal to one. However, this is not always the case (Figure 3.11).

While micro-firms (1-9 employees) are proportionally distributed in rural and intermediate regions, both intermediate and rural areas host a slightly larger than proportional share of the entries of non-employer firms (Figure 3.11). This evidence may reflect various factors, among which the lower employment possibilities affecting rural areas, particularly during the Great Recession. A lack of alternative job opportunities can be an important driver of self-employment (Vivarelli, 2013).

Figure 3.11. **Relative weight of business births by type of region**

TL3 regions, 2014 (or last available year)



*Notes:* Share of business births (births by size class and region/total births by size class) as a proportion of the share of active firms (actives by size class and region/total actives by size class). Averages across Austria, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Spain and the Slovak Republic.

*Source:* OECD (2017a), *Regional Business Demography* (database) <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933625775>

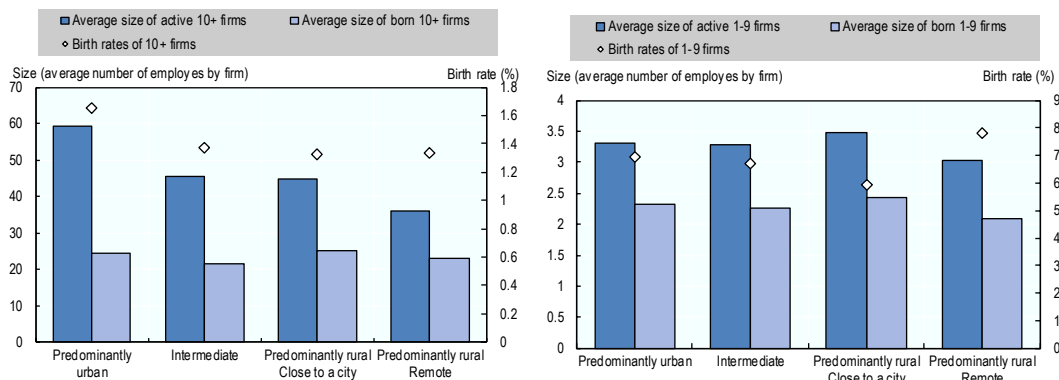
Cities, on the other hand, dominate the start-up rate among larger employer firms (those with more than ten employees on payroll). The more than proportional share of entries in the category 10+ pertaining to predominantly urban regions (13 percentage points higher than it would be expected given their share of active firms in the category 10+) strongly suggests that large employer firms prefer to establish headquarters in cities. This might be because of the access to better quality business-related services (legal and consultancy advice, for example) and to a wider pool of skilled workers (Overman and Puga, 2010). This result is also likely to reflect the sectoral composition of the business population in cities, which, operating mostly in services, might be less sensitive to real estate costs than larger employers operating, for example, in the manufacturing sector.

Although firms are on average significantly larger in urban regions, newborn firms are comparable in size across different types of regions (Figure 3.12). A typical active firm with at least 10 employees in predominantly urban regions has around 60 employees, where the average active firm in remote rural regions only consists of 35 employees. Nevertheless, newborn firms with at least 10 employees are of similar size, with 24 employees in urban and 23 employees in remote rural regions. In the smaller class size of 1-9 employees, rural regions that are close to a city have both, on average, the largest

active and newborn firms. Furthermore, birth rates in 10+ firms are larger in types of regions with on average larger firms. However, for 1-9 firms there is a decreasing pattern (higher average size leads to lower birth rates), even if the magnitude of this phenomena is limited.

Figure 3.12. Average size of new employer firms by type of region

TL3 regions, 2014 (or last available year)



Notes: Average size of active and newborn firms for firms with ten or more employees (left panel) or one to nine employees (right panel). Averages across Austria, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Spain and the Slovak Republic.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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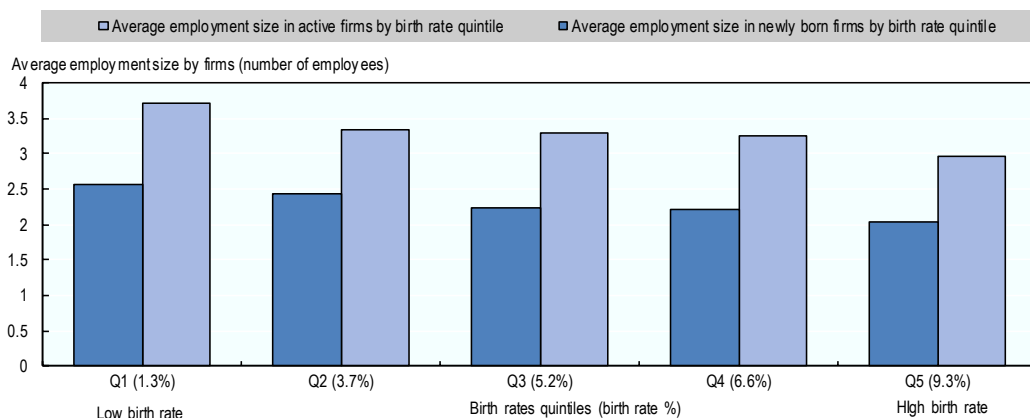
Across OECD regions, the average size of existing firms is negatively related to firm birth rates (Figure 3.13). Regions with, on average, smaller existing firms in terms of employment recorded the largest firm creation rates. In those regions, the newly created firms were also smaller than firms in the regions with larger existing firms and lower birth rates.

The agglomeration in entrepreneurial outcomes is even more evident when TL2 regions are further classified according to their position in the productivity frontier of their respective countries (Figure 3.14). Regions at the frontier are regions leading their country in terms of real gross domestic product (GDP) per worker (Table 3.4). Other regions are classified according to their productivity growth with respect to the frontier between 2000 and 2013, in particular, diverging regions are areas where productivity has been dropping more than 5 percentage points *vis-à-vis* the frontier (OECD, 2016c).

Regions at the top of their respective countries' productivity ranking (frontier regions) tend to correspond to mostly metropolitan areas, and often with capital cities (OECD, 2016c). These regions account for a disproportionate share of new business births in general, and in particular in the category of large employers: they host 40% more births in the category 10+ than it would be predictable given their share of active firms in the same size class. Frontier regions that are classified as mixed or non-metropolitan tend to host a lower than proportional share of entries, especially in the category of large employers.

Non-frontier regions (those that are keeping, catching-up or diverging) overall display a share of business births that is roughly proportional to their share of active firms. However, mixed and non-metropolitan non-frontier regions experience a lower than proportional share of entries among employer firms, once again confirming that cities are preferred by employers as the location of their headquarters, even in the category of micro-firms.

Figure 3.13. Relationship of average size of existing employer firms and regional employer firm birth rate  
TL3 regions, 2014 (or last available year)



Notes: Average size of active and newborn firms by quintiles of firm birth rates (along the regional distribution of firm birth rates). Averages across Austria, the Czech Republic, Denmark, Finland, France, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Spain, the Slovak Republic and Slovenia.

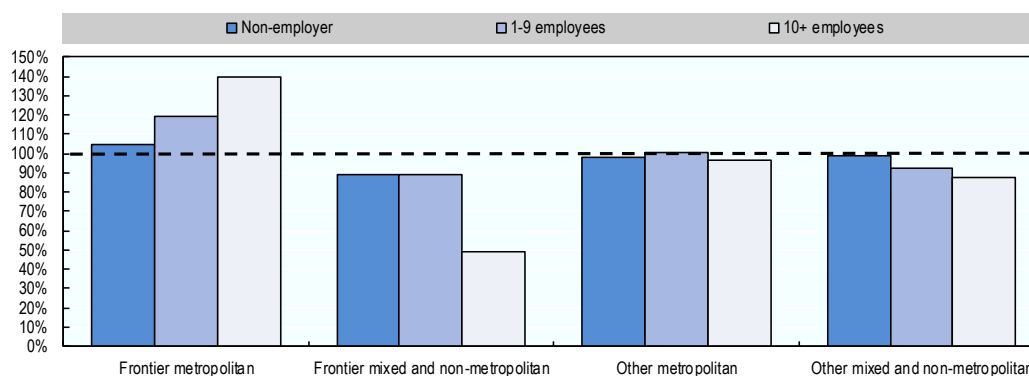
Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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Table 3.4. Typology of regions with respect to productivity

Frontier	is the region leading its country in terms of labour productivity, measured by the real gross domestic product per employee. In some countries the leading region accounts for a small percentage of the total workforce. Where this is the case, the frontier is the weighted average of regions with the highest labour productivity levels accounting for 10% of the country's total employment.
Catching up regions	is a classification of regions based on their labour productivity growth relative to the frontier. It is based on the growth in labour productivity between 2000 and 2013 (or closest year available).
Diverging regions	Regions where labour productivity grew/dropped by at least 5 percentage points more/less than in the frontier are classified as catching-up/diverging regions, with regions that are keeping pace falling within the $\pm 5$ percentage points band.
Keeping pace regions	

Figure 3.14. Relative weight of business births by degree of productivity  
TL2 regions, 2014 (or last available year)



Notes: Share of business births (births by size class and region/total births by size class) as a proportion of the share of active firms (actives by size class and region/total actives by size class). Averages across Austria, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Italy, the Netherlands, Norway, Poland, Portugal, Spain and the Slovak Republic. All sectors, 2014 or last available year.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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### ***Choosing a scaling factor for business demography indicators***

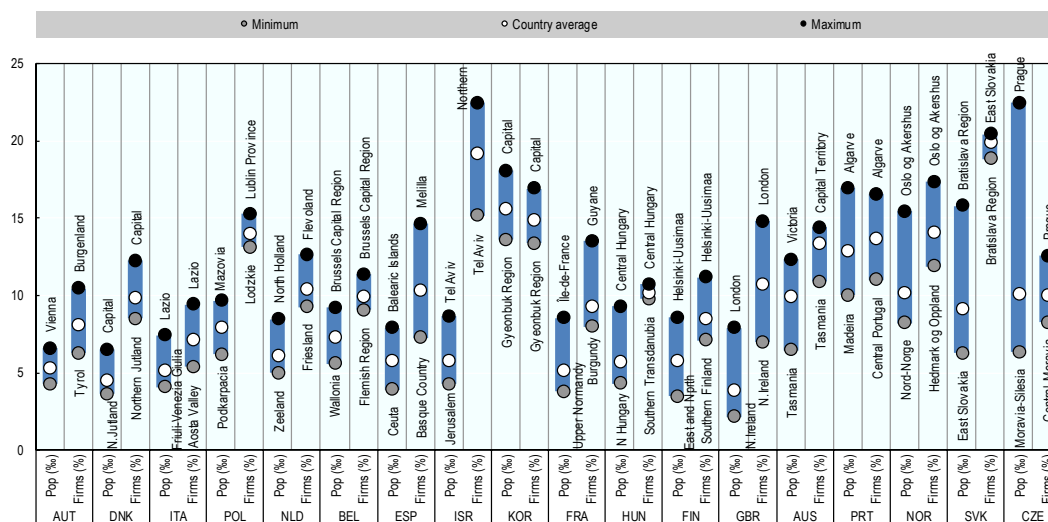
Indicators expressed in absolute terms (births, deaths) are not easily comparable across regions and countries due to scale effects. The choice of an appropriate denominator is therefore necessary in order to develop indicators that take into account the relative size of regional economies. Business birth rates throughout this chapter are expressed according to the relative size of the active business population in a given area, following the example of previous work (OECD, 2014a; 2016a). Another possible measure of entrepreneurship is the ratio of business births to the population resident in a given region. Business births expressed as a fraction of the population (rather than the business population) are, for example, used by the World Bank in compiling its Entrepreneurship Indicators. This indicator is intuitive, providing a measure of the share of population that started a business. Figure 3.15 shows, however, that the average within-country dispersion is similar between the two indicators, although not in all countries. Exceptions are the Czech Republic and the Slovak Republic, which display a much larger regional heterogeneity in the population-based indicator than in the firm-based one.

The population-based indicator tends to display lower values than the enterprise-based one, although averages are similar. In some cases this bias is severe, as in the case of Israel, for which birth rates drop from 20 to 5 percentage points, depending on the region, once population is taken as a scaling factor. Overall, these two indicators are not interchangeable, in that they measure different concepts: the population-based indicator captures the potential for entrepreneurship in a given population, while the firm-based indicator captures the dynamism of the regional economy. In other words, dividing by firms implies taking into account the pre-existing regional conditions that might affect entrepreneurship, which are likely to be better captured by the number of active firms than by the number of people. Using one indicator or the other depends on the purpose of the analysis. On one hand, the population-based indicator avoids biases in regions dominated by one large employer, for which an increase in one unit would result in a substantial change in the birth rates. On the other hand, the indicators based on the population of active firms might mitigate the understatement of progress of regions with a low-existing number of firms but a large population that record strong relative growth in firm creations. For such regions, population as a scaling factor could hide such progress.

The business demography indicators presented in this chapter consider different types of firms in terms of employment legal status, size (from zero to many employees) and sector. Differences in statistical conventions, taxation and legislation affect the count of business entries and exits and active firms, making cross-country comparisons difficult. Population-based indicators used by the World Bank consider only limited liability companies. In a situation of heterogeneous types of firms, the consequent bias in cross-country comparability can be alleviated when using active firms as a scaling factor (births/actives), as the heterogeneity is reflected in both the numerator and the denominator (see p.12 in OECD/Eurostat [2007]).

Furthermore, other indicators developed through the OECD *Regional Business Demography Database*, such as death and survival shares, become very counterintuitive if expressed as a proportion of the human population, rather than as a proportion of active firms. In order to establish a consistent standard across all indicators presented in this chapter, and in order to increase cross-country comparability, birth rates are therefore expressed as a proportion of the active business population (rather than the population) throughout the other sections of this chapter.

Figure 3.15. **Birth rates, all firms, TL2 regions, 2014**  
 Number of firm births in % of active firms and by 1000 population



Note: The figure refers to the total number of business births per capita or per active firm in the region in 2014 (or last available year). All firms, including self-employed entrepreneurs, are included (total across sectors and size classes) except for Canada, where non-employer firms are not included.

Sources: OECD (2017a), *Regional Business Demography* (database); OECD (2017b), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

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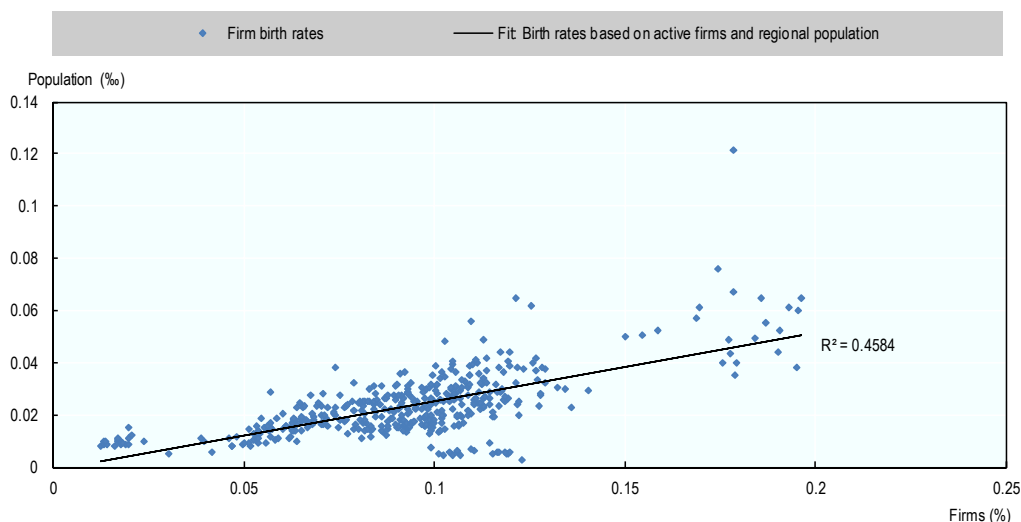
There is a clear relationship between the per capita firm births and the firm births per active firms (for employer firms) across OECD regions (Figure 3.16). At the same time, the two indicators seem to capture different aspects of entrepreneurship. The deviations of the trend line appear to be mostly driven by a few countries, such as Finland or Hungary, where most regions, compared to other countries, record more firm births relative to their firms than relative to their population. Even though the two concepts might capture different aspects of entrepreneurship, namely the propensity of the regional population to start a business and the relative dynamism of a region's business environment, they are closely related.

Regarding the choice of an appropriate scaling factor, previous studies have referred to the scaling of firm births by the number of incumbent firms as “ecological approach” and contrasted it to the so-called “labour market approach”, which scales firm births by the size of a region's workforce population (Audretsch and Fritsch, 1994). One potential concern about choosing the “ecological approach” is that it might overstate entrepreneurship in urban areas. Evidence from survey data of the adult population of 47 urban areas across 22 European countries suggests that urban areas are not necessarily more entrepreneurial than other areas if entrepreneurial activity is scaled by a region's workforce size (Bosma and Sternberg, 2014).

The reason why the relative entrepreneurial intensity in urban areas could differ depending on whether the ecological or labour market approach is chosen is the fact that establishments also differ between urban and non-urban areas. On average, establishment size tends to be larger in big urban areas than in non-urban ones. As a consequence, there are more employees per establishment that might start their own business and become themselves entrepreneurs.



Figure 3.16. Comparison: Per capita firm births and firm births relative to incumbent firms



Note: The figure compares the birth rate of employer firms as measured by: 1) the proportion of all active firms; and 2) the number of new firms per 1 000 inhabitants in the region in the year 2014 (or last available year).

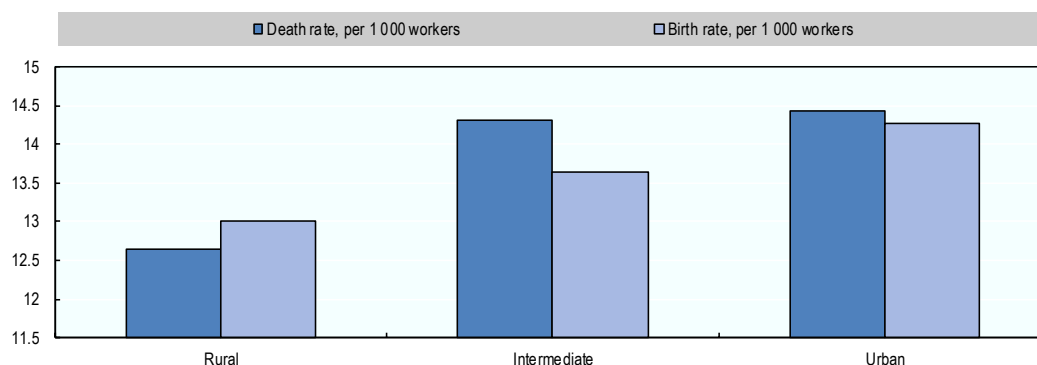
Sources: OECD (2017a), *Regional Business Demography* (database); OECD (2017b), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink <http://dx.doi.org/10.1787/888933625870>

Across the OECD, urban regions display higher levels of business dynamics than rural regions even if the firm births and deaths are standardised by a region's workforce size instead of the number of active enterprises (Figure 3.17). Although the exact rates have changed due to the different scaling factor, using the “labour market approach” confirms the findings of Figure 3.9 that urban regions are characterised by greater business dynamics. In 2014, urban regions recorded on average 14-14.5 firm births and deaths per 1 000 workers, while rural regions only experienced 12.5-13 firm births and deaths per 1 000 workers. Noticeably, the differences between urban and intermediate regions appear muted relative to the “ecological approach” (Figure 3.9).

Figure 3.17. Business births and deaths per worker by type of region

TL3 regions, 2014 (or last available year)



Notes: The figure displays the firm birth and death rates (births as a proportion of the number of employees in a region in the same year) by type of region. Average across all firms.

Sources: OECD (2017a), *Regional Business Demography* (database), OECD (2017b), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink <http://dx.doi.org/10.1787/888933625889>



Per capita indicators can be informative nonetheless. In particular, they can be used to assess the pervasiveness of entrepreneurship in the regional socio-economic environment. Across OECD regions, there is no clear pattern between the density of firms, measured by the per capita number of active employer enterprises, and business dynamics across regions. Regions with high or low firm density document neither more nor less firm births or churn (firm births minus firm deaths).

### ***Sustainability of entrepreneurship: Firm survival over time***

For entrepreneurship to be a vehicle for economic growth, firms need to be able to survive the hurdles posed by the early post-entry years, expand their activities and maintain employment over time. Therefore, understanding entrepreneurial dynamics requires observing what happens to businesses after their creation.

Close to one-half of newly created firms do not survive their first three years of activity, on average across regions (Figure 3.18). Survival rates are on average lower among employer firms than when considering the entire firm population, suggesting that non-employer firms face better chances of three-year survival, in this sample, compared to employer firms (Figure 3.18). The differences across countries are relevant: out of 100 firms born in Italy or Spain in 2011, on average only 50 were still active in 2014; in Austria the count goes up to 65. These differences are very likely to reflect the different macroeconomic circumstances faced by countries during this time frame.

Notwithstanding the country-level variation, regional differences in firm survival rates are sometimes larger than the differences across countries. For example, the best-performing region in Spain (the Basque Country) experienced the same survival rates in 2014 as the best-performing region in Austria (Vorarlberg). In the category of employer firms, the Basque Country, and even Northern Portugal, fare the same or even better in three-year survival rates than all regions in Austria.

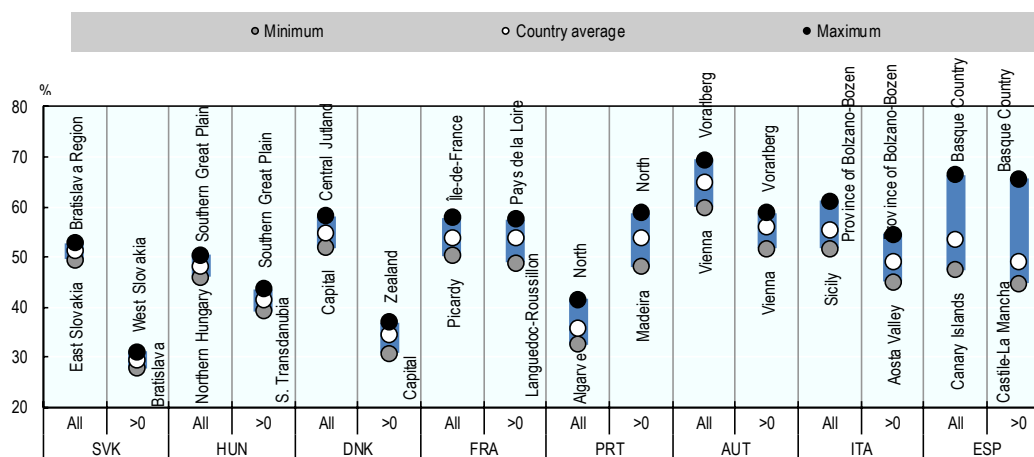
The ranking of countries according to the cross-regional difference between their best- and worst-performing region in terms of survival rates shows that while some countries are relatively homogenous within their boundaries (Hungary, the Slovak Republic), others (Italy, Spain) show a high degree of inter-regional dispersion (Figure 3.18). For example, out of 100 firms (including non-employers) created in Sicily in 2011, only 50 survived until 2014; in the Bolzano-Bozen Province, more than 60 did.

In most countries average survival rates among employer firms are similar, albeit slightly lower, than average survival rates calculated taking into account all firms (Figure 3.18). There are, however, some exceptions: in Denmark, employer firms face average three-year survival rates that are 20 percentage points lower than those faced by the whole sample of firms. This is also the case of the Slovak Republic. In Portugal, on the other hand, employers face survival rates 20 percentage points higher than the non-employers, possibly suggesting that much of the small-scale entrepreneurship occurring in Portugal during this time frame was indeed motivated by the worsening job opportunities that the country was facing at the time.

The capital regions of Bratislava, Copenhagen and Vienna have the lowest three-year survival among employer firms, confirming the higher dynamism associated with capital cities, which experience high death rates. The Aosta Valley has the lowest survival rates among the employer category in Italy, which is possibly a reflection of the relative importance of touristic facilities in this region, heavily hit by the recession between 2010 and 2013.

Figure 3.18. **Within-country dispersion in business survival rates, by firm class**

TL2 regions, 2014 (or last available year)



Notes: Survival rates measure the number of firms created in year  $t-3$  which are still active at time  $t$  (three-year survivors/births  $t-3$ ). 2014 or last available year. Countries are ranked according to the range of difference between regions in the survival rates of all firms.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink <http://dx.doi.org/10.1787/888933625908>

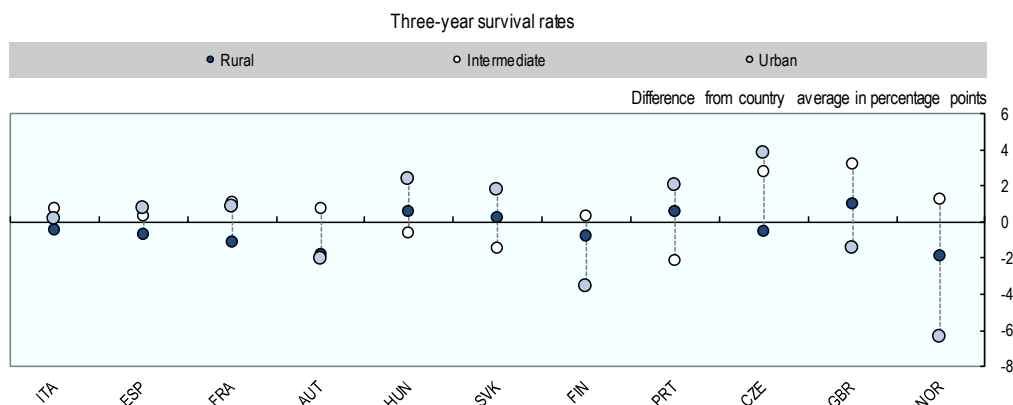
The North of Portugal, Central Hungary and the Basque Country are among the better performers in the respective countries, on the other hand. In Hungary, this effect is likely to reflect the location of Budapest, faring much better than other regions of the country despite the fact that, in absolute terms, survival rates in the country are among the lowest in the sample. Similarly, the case of the Iberian Peninsula stresses an important north-south divide, with survival rates in the Basque Country and the North of Portugal much higher than southern regions in the respective countries.

The urban-rural divide in business survival rates is not particularly marked, with a few exceptions (Figure 3.19). Predominantly urban regions fare significantly better than the country average in the Czech Republic, Hungary, Portugal and the Slovak Republic but in Austria, Finland, Norway and the United Kingdom, they are among the worst performers, with survival rates up to 7 percentage points lower than the country average. Intermediate regions, those mainly rural but close to a big city, have significantly higher than average survival rates in the Czech Republic and the United Kingdom, but fare relatively worse in Portugal. Rural regions stay very close to the country average in most cases, with the exceptions of Austria and Norway, where they experience survival rates that are 2 percentage points lower than the country average.

A country's most productive regions are not necessarily its best performers, in terms of business survival rates. In Austria, Denmark, Finland, Italy, Portugal and the United Kingdom, frontier regions display survival rates up to 4 percentage points lower than the respective countries' averages (Figure 3.20). This is likely to be a reflection of the higher dynamism associated with frontier regions, which not coincidentally tend also to correspond with capital cities. An exception is France, where frontier regions fare 4 percentage points better than the country average when it comes to business survival rates. Frontier regions also stand out in terms of survival rates in the Czech Republic, Hungary and the Slovak Republic.

Figure 3.19. Business survival rates by urban-rural regional typology

TL3 regions, 2014 (or last available year)



Notes: Survival rate measures the number of firms created in year  $t-3$  which are still active at time  $t$  (three-year survivors/births  $t-3$ ). The rates are expressed as the distance from the country average. All firms apart from Norway (employer firms only).

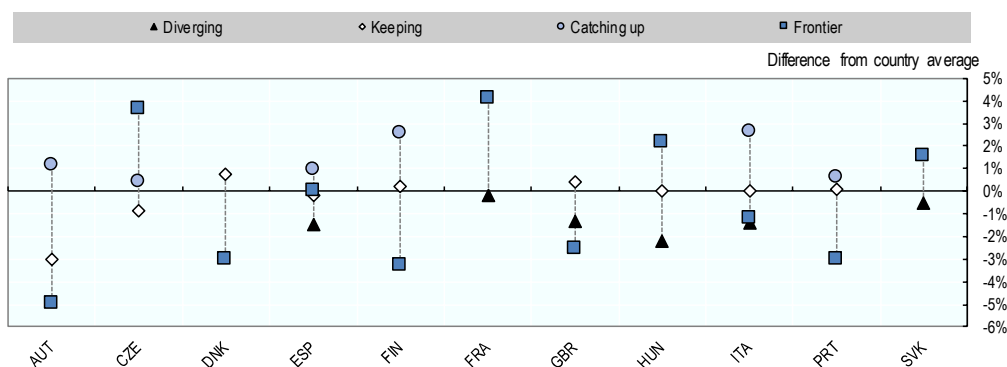
Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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On the other hand, countries where some regions are classified as diverging (where income and productivity per capita have been declining over time) consistently show that these areas have the lowest relative survival rates (Figure 3.20). Dynamism, or “creative destruction”, is unlikely to be the leading explanation for these regions’ relatively poor performance. In all likelihood, low business survival rates reflect a worsening of the regional economic fabric over time (OECD, 2016c).

Figure 3.20. Business survival rates by degree of productivity

TL2 regions, 2014 (or last available year)



Notes: Survival rate measures the number of firms created in year  $t-3$  which are still active at time  $t$  (three-year survivors/births  $t-3$ ). Average by productivity classification (OECD, 2016c). The rates are expressed in proportion to the country average. All firms.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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These descriptive statistics suggest that businesses in similar size classes operating at the same point in time across regions of the same country face a different probability of survival. Also, survival rates systematically depend upon regional characteristics, like rurality or the relative positioning of a region with respect to a country's productivity frontier. Clearly, there is a process of self-selection at play, as more productive businesses may decide to locate in regions offering better conditions. Moreover, these statistics are based on a regional aggregation and therefore they disregard important sources of unobserved heterogeneity in the composition of the business population. Nevertheless, the wide within-country variation suggests that the conditions for firms to thrive are not evenly distributed over space. This can hamper the extent of countries' economic development as those regions with low survival probabilities cannot reach their full potential. Lower survival probabilities inhibit job creation and economic growth in those regions as young firms, which are a major contributor to increases in employment, often do not survive to create further jobs. As a result, countries' overall economic development is diminished.

### **Regional characteristics and entrepreneurial activity**

The spatial concentration of firms is a function of many endogenous characteristics of regions, often intertwined with each other. Some of these characteristics are fixed, like geography; others are institutional and as such policy-variant and susceptible of change over time. Some of these factors, like access to services or the institutional framework, may affect the capacity of businesses to grow and thrive.

This section analyses the relationship between business demography indicators and some characteristics of the regions where businesses operate. In particular, the focus is on the concentration of regional employment in a few large firms, the regulatory framework, the role of the financial sector and education as well as research and development. This section also serves as an example of questions that could be explored using enterprise-level business demography indicators.

#### ***Regional dominance of a few large enterprises***

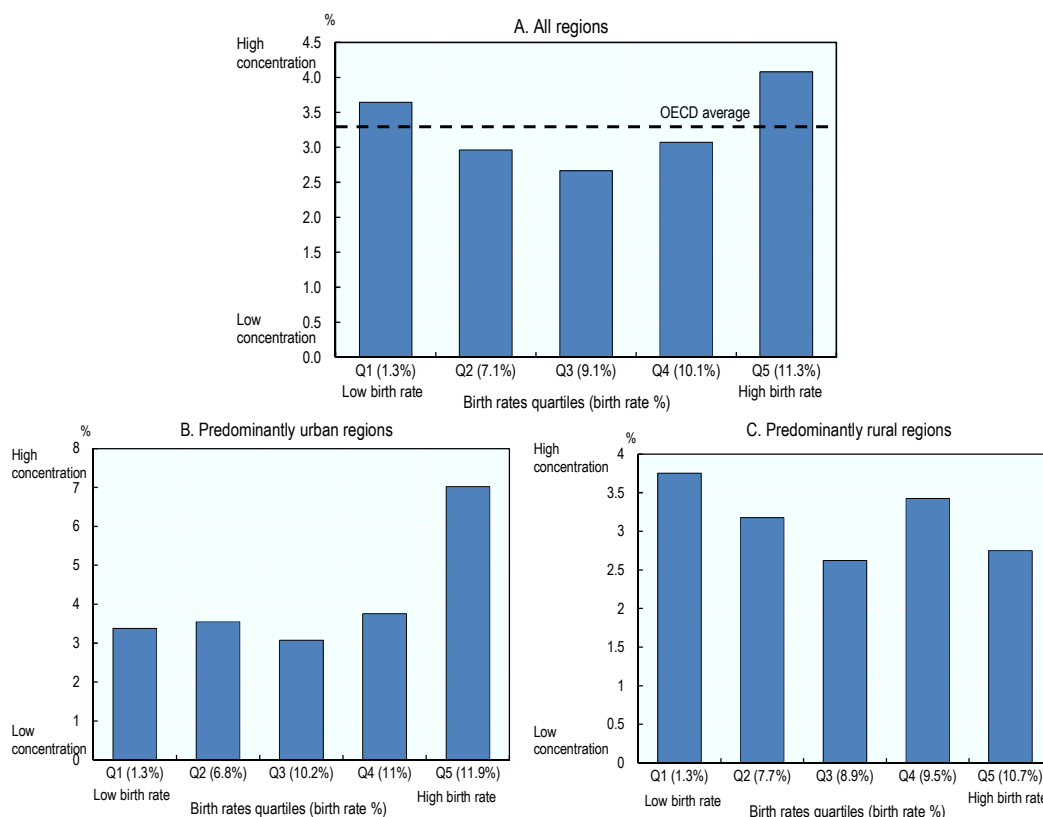
Possessing a business culture that encourages exchange of ideas and forays into entrepreneurial activities can be an important factor for establishing dynamic regional economies. In fact, entrepreneurship is often a by-product of knowledge spillovers and business interactions between different firms. Therefore, the regional economic environment is of fundamental importance.

In particular, the degree to which regional economies are dominated by a few large firms can affect entrepreneurship. On the one hand, a high concentration of business activities within a few firms can inhibit fostering a local spirit of entrepreneurship as fewer individuals are likely to have gained experience in starting or managing a business. On the other hand, large firms can be local "hotspots" of innovation and can thus generate positive externalities that could translate into more business creations.

Across OECD regions, the effect of employment concentration in a few large firms on business dynamics is ambiguous. Overall, regions with relatively large as well as a relatively low concentration of regional employment in the three largest regional employer firms record the largest firm birth rates (Figure 3.21, panel a). In contrast, regions with employment concentration that falls outside of the first and fifth quintile are less dynamic in terms of firm births.<sup>7</sup>

While high employment concentration is related to high enterprise birth rates in urban regions, in rural regions low employment concentration fares best in terms of new firm creations (Figure 3.21, panels b and c). Urban regions with highly concentrated employment have 10 percentage points higher business birth rates than urban regions with low employment concentration. On the other hand, in rural regions the least concentrated regions in terms of employment have a firm birth rate that is more than eight times as high as that of their peer regions with the largest employment concentration.

Figure 3.21. Concentration of employment in three largest firms and firm births, TL3, 2014



*Notes:* Concentration (y-axis) presents the employment share of the three largest firms in a region. The figures present the data for all regions, urban regions and rural regions, each partitioned into quintiles (x-axis) according to their enterprise births rates from low (left) to high (right). Data are provided for TL3 regions in Austria, Denmark, Finland, France, Hungary, Italy, Latvia, Norway, Portugal, the Slovak Republic and Spain.

*Sources:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en> and Orbis.

StatLink  <http://dx.doi.org/10.1787/888933625965>

These large discrepancies suggest that entrepreneurship in urban and rural regions is differently linked to the local business environment and cluster formation. Whereas in rural regions a more traditional cluster model still succeeds that is often characterised by small firms that innovate informally, in urban areas clusters dominated by a few champions thrive the most. One explanation could be that champion-driven clusters mean that those large firms are large enough and grow fast, which allows them to effectively innovate and connect with international markets. These champions can thus pull other, smaller firms in the cluster, creating a business environment that is dominated by a few large firms but also more dynamics (higher birth rates) at the same time.

### ***The role of institutions: Ease of doing business and firm dynamics***

An effective and transparent institutional and regulatory environment is key for entrepreneurship and business development, at all stages of the business cycle, including entry, investment, and expansion, transfer and exit (OECD, 2017a). The regulatory framework, taxation system, competition rules, as well as good governance, extent of corruption and the stability of institutions can directly affect the decision to become an entrepreneur, and as such they can have important consequences for regional development.

Red tape is also often cited as an important factor limiting entrepreneurial dynamism. Regulation can be good to enforce consumer protection and fair competition, but in some cases it can discourage entry and innovation, by imposing high fixed costs on entrepreneurs. Product market regulation, in particular, can affect producers by reducing competition, with important implications not only in the sectors that are directly affected by the legislation, but in all downstream sectors (Borules et al., 2013).

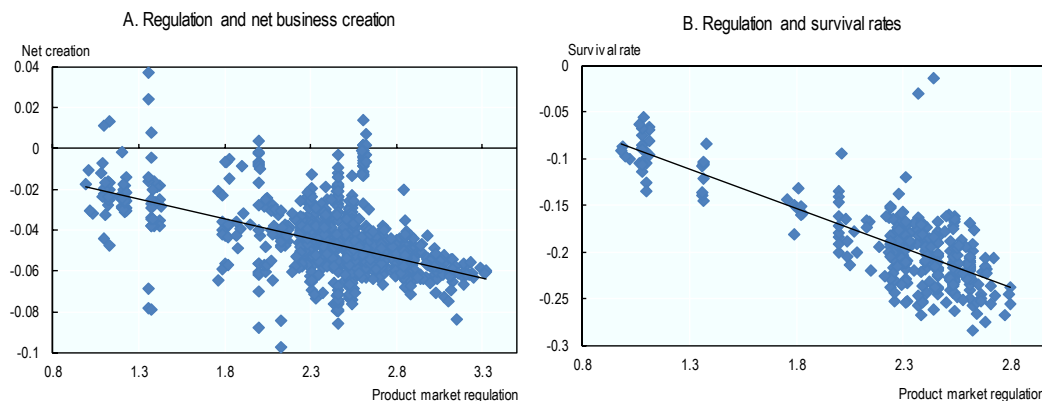
While product market regulation is often a nationwide phenomenon, its intensity can vary across the territory depending on the composition of the business population in a given region. If a change in product market regulation affects some industrial sectors more than others, a change in regulation at the national level will reflect differently upon regions in the same country, because of the *ex ante* sectoral composition of the business population in each region. This can have implications for business demography and for regional growth.

A time-varying country-level change in regulation affecting sectors can be derived from the OECD indicators of product market regulation (OECD, 2013). To derive a regionally time-varying measure of regulation intensity, one can interact the *ex ante* sectoral input-output composition of the firm environment in a given region (before the change in regulation begins) interacted with the time-varying measure in product market deregulation, which is country-/sector-/year-specific (OECD, 2013). As a result, this interaction captures subnational variation in the intensity of product market regulation.

Changes in product market regulation may affect downstream firms mainly through cost dynamics and reduced barriers to entry. Indeed, net firm creation during the period 2008-14 is a negative function of within-region change in product market regulation: higher regulation implies lower net business creation (Figure 3.22). Also, survival shares are negatively correlated with the degree of product market regulation (albeit this correlation is not statistically significant). This evidence, consistent with national-level findings (Borules et al., 2013), suggests that policies like product market regulation may also have regional implications and heterogeneous effects across the national territory.

Although the institutional and regulatory framework is largely driven by norms that are defined at the national or even supranational level, the implementation of norms and services available to entrepreneurs to comply with regulation can vary largely across regions. More broadly, the perception of the quality of government, trust in institutions and security can differ widely within the same country (OECD, 2014b; Charron, Lapuente and Dijkstra, 2012). From this point of view, subjective measures of the perception of the quality of local institutions can be as useful in understanding entrepreneurial activity as objective measures of institutional support to firms, like business taxation or financial incentives. Furthermore, the extent of corruption, good governance and the stability of institutions can directly affect the decision to become an entrepreneur, and as such they can have important consequences for regional development.

Figure 3.22. Sectoral regulation and firm dynamics, TL2 regions, 2008-14



*Notes:* Residual plots, OLS regression. The dependent variable in the left-hand side is net business creation in all firms (births minus deaths); in the right-hand side it is survival rates (number of firms created in year  $t-3$  which are still active at time  $t$ ). Country\*year fixed effects are included. Errors are clustered at the country level.

*Sources:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>; OECD (2013), *OECD Product Market Regulation Statistics* (database), <http://dx.doi.org/10.1787/pmr-data-en>.

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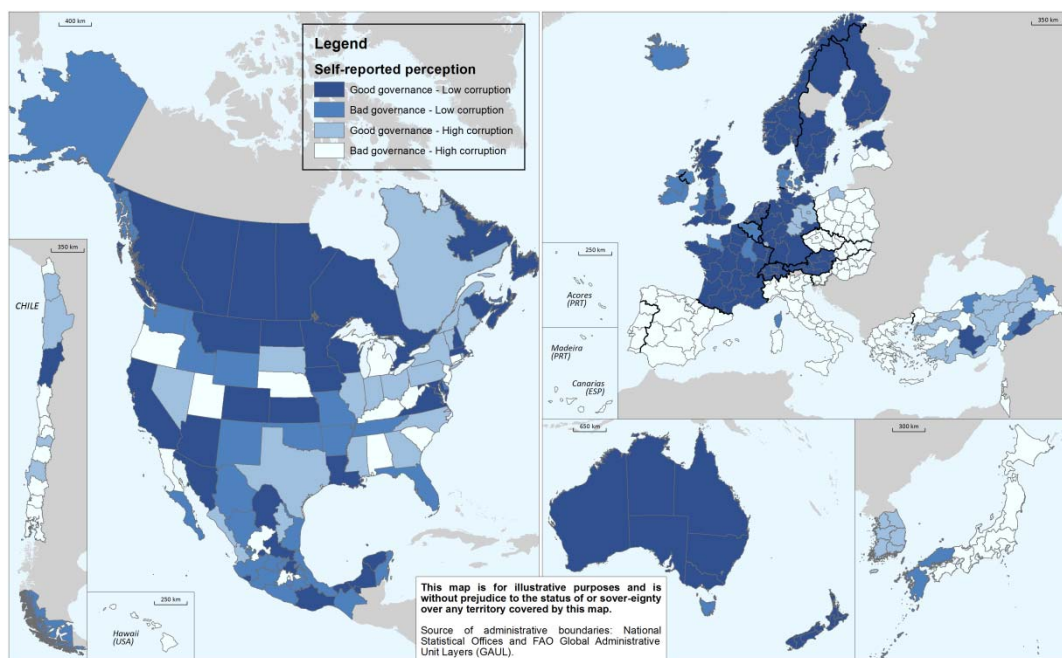
Across OECD regions, subjective perception indicators of business-friendly governance and low corruption provided by Gallup World Poll are strongly correlated (Figure 3.23). Regions where survey respondents perceive corruption to be low are also regions where respondents believe that the regional government supports entrepreneurship by making it easy to start a business. Most regions in Scandinavia, Australia, Canada, France, Germany or the Netherlands score highly on both measures. In contrast, many regions in eastern and southern Europe are perceived to have both high corruption and not to have a business-friendly government. Overall, the evidence suggests that citizens' perception of the quality of local governance is significantly related to the decision to start a business.

The regional variation in the percentage of respondents reporting that government makes it easy to start a business is positively and significantly correlated with the birth rates of firms, across all sectors and size classes (Figure 3.24). On the other hand, the perception of the extent of corruption in business is negatively and significantly correlated with firm entry rates, across all sectors and size classes (Figure 3.24). This evidence suggests that the quality of local, rather than national, policies may be an important driver of entrepreneurship, at the margin. Of particular importance might also be the local implementation of nationally shaped or determined policies.

### ***Financing constraints: A regional perspective***

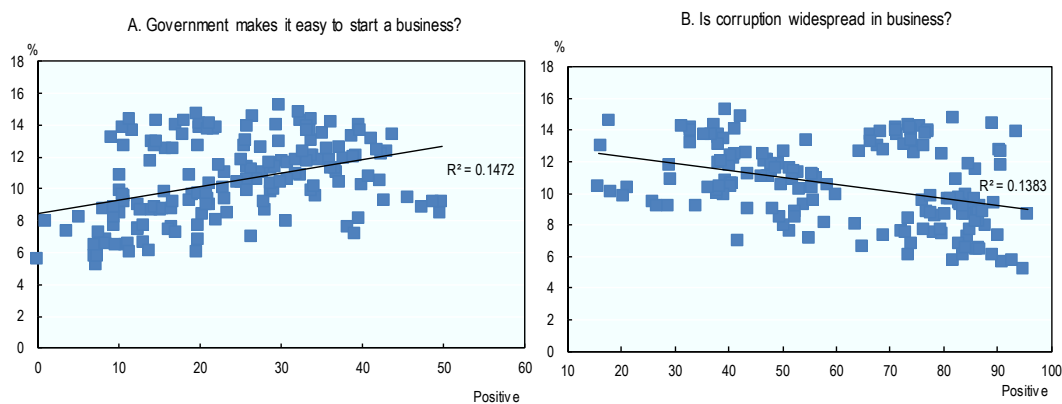
Small and medium enterprises (SMEs) typically rely heavily on bank debt for their external financing, as they have less access to market-based financing than large enterprises. Although financing conditions and SMEs' access to finance has generally improved in recent years, financing gaps persist, especially for young firms, start-ups, micro-enterprises and fast-growing innovative ventures. In addition, while there are signs of a recovery, progress has been uneven, with financing challenges much more pronounced in some countries than in others (Box 3.2).

Figure 3.23. Perception of corruption and local governance (Gallup), TL2 regions



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Figure 3.24. Local governance and firm birth rates, TL2 regions



*Notes:* Correlation between average birth rates in employer firms by region between 2008 and 2015 (or last available year) and regional-level responses to the Gallup World Poll pooled across seven waves of the survey (2008-15). The Gallup World Poll questions are: “Is corruption widespread within businesses located in (area), or not?” (yes=1, no=0); “Does the government make it easy or hard to start a business” (1=easy, 2=hard).

*Sources:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>; Gallup World Poll (2008-15).

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However, credit and banking also have an important regional dimension (Guiso, Sapienza, and Zingales, 2004; Deloof and La Rocca, 2015). Regional variation in credit supply, in particular, is an important predictor of change in employment in business (Greenstone, Mas and Hoai-Luu, 2014; Chodorow-Reich, 2014).

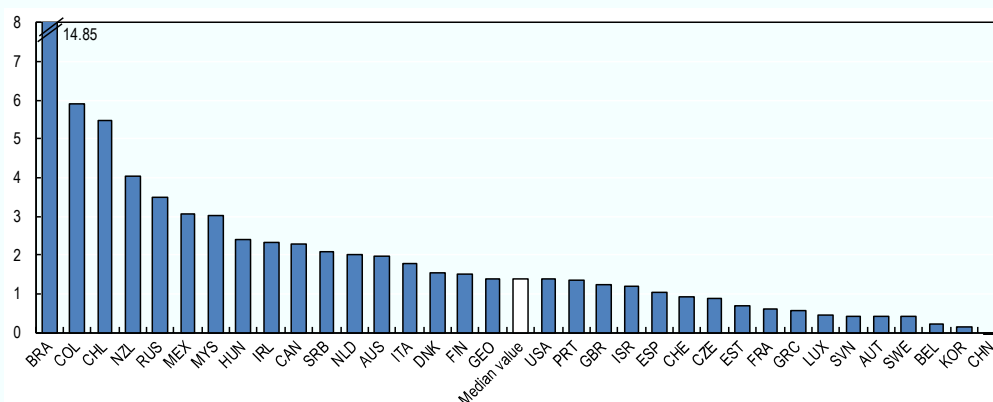


### Box 3.2. Financing small and medium enterprises and entrepreneurs: Evidence from the OECD Scoreboard

The annual OECD Scoreboard on Financing SMEs and Entrepreneurs monitors small and medium enterprises' (SMEs') and entrepreneurs' access to finance, based on data collected on debt, equity, asset-based finance and framework conditions, and includes information on policy initiatives in this area. It provides a comprehensive framework to assess the financing needs of SMEs and whether they are met. In addition, detailed profiles provide an overview of the state of play for every participating country.

The 2017 edition, comprising 39 countries, indicates that lending to SMEs increased moderately in the majority of economies in 2015, interest rates generally declined, and payment delays and bankruptcies are on a downward trend. Nonetheless, key indicators show a varied cross-country picture, reflecting variations in the ease of accessing external financing across participating countries. In particular, the spread between the average interest rate charged to SMEs and to large enterprises, which describes the tightness of the credit market and the costs of accessing straight debt for SMEs compared to large enterprises, ranges from 14.85 percentage points in Brazil to 0.16 percentage points in Korea.

Figure 3.25. Average interest rate spread between loans charged to SMEs and to large enterprises, 2015



Source: OECD (2016d), *Financing SMEs and Entrepreneurs 2017: An OECD Scoreboard*, [http://dx.doi.org/10.1787/fin\\_sme\\_ent-2016-en](http://dx.doi.org/10.1787/fin_sme_ent-2016-en).

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The regional dimension of credit constraints to firms is hard to measure, since a comparable cross-country source of information on credit to firms at the subnational level is not currently available. However, an approximation of the change in credit constraints across regions can be built from national-level time-varying indicators, by exploiting the regional variation in the *ex ante* composition of the business population interacted with national measures of the change in credit supply to different categories of firms over time.

Credit supply experienced a contraction in the immediate aftermath of the financial crisis and during the recession (OECD, 2016d). However, this restriction in credit displays a large degree of heterogeneity: small firms often witnessed their credit supply restricted more than larger firms (ECB, 2016).

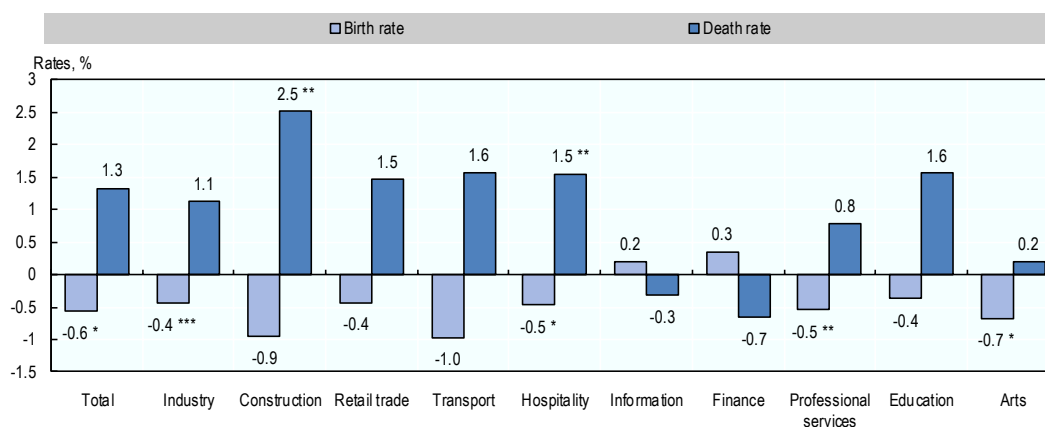
The differential in credit restriction to different categories of enterprises can be measured, at the national level, using the spread in interest rates applied to loans to small firms *vis-à-vis* loans to large firms over the period 2009-14 (OECD, 2016d). This

additional layer of within-country variation in lending practices over time (along the lines of firm size) can be interacted with the share of the firm typology (large vs. small) in each region, measured before the start of the survey. The interaction between the *ex ante* composition of the business population across regions (measured in 2008) and the time-varying shifts in credit provision to different categories of firms generates a time-varying regional measure of credit supply that can be used to understand to what extent lending decisions are associated to the lifecycle of firms.

The regional measure of restriction in credit supply is negatively and significantly correlated with birth rates and positively correlated with death rates across most sectors (Figure 3.26). The observation that credit restriction is correlated with net business closures at the regional level is consistent with the intuition that local credit conditions have a vital role in sustaining entrepreneurship, which is consistent with national-level results (OECD, 2016a).

Figure 3.26. **Credit supply restrictions and business demography**

TL2 regions, 2009-14



*Notes:* The figure shows the estimated coefficient of correlation between credit supply restrictions at the regional, net business creation and firm survival shares. OLS regression. The regional dimension is TL2 for Austria, Belgium, Denmark, Finland, France Hungary, Ireland, Italy, Portugal, the Slovak Republic, Slovenia, Spain and the United States. The time frame is 2009-14. Year fixed effects included, as well as fixed effects at the level of TL2 regions. Errors are clustered at the country level. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

*Sources:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>; OECD (2016d), *Financing SMEs and Entrepreneurs 2016: An OECD Scorecard*, [http://dx.doi.org/10.1787/fin\\_sme\\_ent-2016-en](http://dx.doi.org/10.1787/fin_sme_ent-2016-en).

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However, the role of credit is not equally distributed across sectors. The construction sector was directly affected by the housing market crash that took place during this period in many OECD countries. Construction firms might have suffered from a particularly strong contraction in credit following 2008, and indeed in this sector a 1 standard deviation increase in the regional credit measure correlates with an increase in business death rates worth about 2.5 percentage points, the largest across the sample. The second-largest and significant increase in death rates is in the hospitality sector. Birth rates are particularly affected in the industrial sector and in professional and technical services.

Professional and technical services also experience significantly negative business creation and survival rates in response to changes in lending practices. This possibly reflects the reliance of these services on bank lending, but also the cross-sectoral spillovers resulting

from their non-tradable nature: relying on local demand, they suffer from a deterioration of the credit conditions applied to other firms in the same region. Business demography in other sectors does not experience significant correlations with respect to the change in local credit conditions.

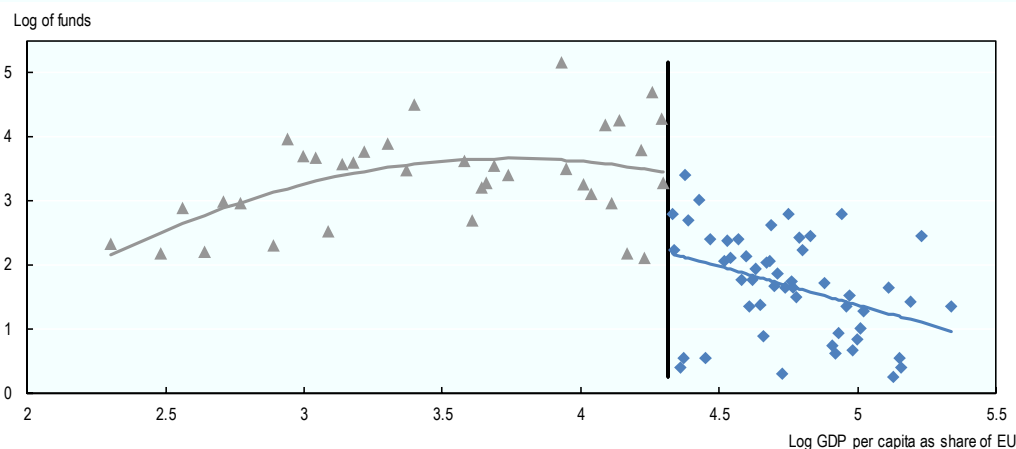
Further evidence on the relevance of the availability of sufficient financial means for entrepreneurship is presented in Box 3.3. EU funding for entrepreneurship strongly increases business dynamics across regions.

### Box 3.3. EU funds and entrepreneurship: Evidence from a large transfer to European regions

The European Union administers and distributes a large transfer to European regions in order to promote social and economic cohesion. European Regional Development Funds (ERDF) and the Cohesion Funds (CF) include a number of transfers with the specific objective of promoting entrepreneurship in the recipient regions. The magnitude of the funds that regions receive during each seven-year period depends on a set of criteria that are based on GDP per capita levels. Regions with a GDP per capita below 75% of the EU-27 average satisfy the EU's Objective 1, which qualifies them for decisively more funding.

This discrepancy in the allocation of funds between regions can be analysed to elicit the effect of funds with the objective of promoting entrepreneurship on business creation and destruction.<sup>1</sup> In the framework of a regression discontinuity design, this exogenous variation in the allocation of entrepreneurship funds across regions can be exploited. It compares business dynamics between regions that are similar in terms of GDP per capita but differ significantly in the magnitude of funds received.

Figure 3.27. The discontinuity in the allocation of funds for entrepreneurship and SMEs



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Overall, the EU funds received in 2007-13 significantly increased business dynamics. Regions that fell just below the Objective 1 criterion and thus received larger amounts of funds, recorded considerably more enterprise births as well as deaths than regions that had comparable GDP per capita levels but were slightly above the allocation rule of 75% of the EU average. The effects for self-employed firms are slightly lower than for employer firms. Considering all types of firms, a 1% increase in the amounts of funds received increases the birth and death rate of firms by 0.06%, whereas the respective birth rate of only employer firms would increase by 0.042% and the effect on death rates is insignificant. The net effect of the funds, the number of enterprise births minus enterprise deaths, is in both cases not significantly different from zero. As a consequence, funds do, on average, not cause an increase in the number of enterprises.

### Box 3.3. EU funds and entrepreneurship: Evidence from a large transfer to European regions (*continued*)

However, the effect of the EU funds on entrepreneurship and the number of firms in a region can be enhanced by the right set of institutions. Funds seem to be relatively more effective in net business creation in those regions with relatively lower levels of corruption. In less corrupt regions, the overall effect of EU funds on net business creations is significantly larger than in relatively more corrupt regions. Interestingly, the contribution of low corruption to funds' effectiveness on business birth rates and net business creation is considerably more pronounced for employer firms than merely self-employed firms.

1. The funds considered include the following categories: assistance to R&D, particularly in SMEs; advanced support services for firms and groups of firms; assistance to SMEs for the promotion of environmentally friendly products and production processes; investment in firms directly linked to research and innovation; other investment in firms; other measures to stimulate research and innovation and entrepreneurship; services and applications for SMEs (e-commerce, education); support for self-employment and business start-up.

*Source:* Diaz Ramirez, M., L. Kleine-Rueschkamp and P. Veneri (2017), "Does quality of governance affect the returns of policy for entrepreneurship?", Paper presented at the Congress of European Regional Science Association, August 2017.

### ***The importance of human capital: Education and R&D***

A vital factor for entrepreneurship is the locally available level of human capital. For many firms, one of the most important production inputs is labour. The availability of a wide local pool of adequately skilled workers may be a crucial source of agglomeration, reducing search costs of new firms (Overman and Puga, 2010). Human capital is a primary determinant of regional differences in economic development as it is paramount for firms' productivity (Gennaioli et al., 2013).

Additionally, the level of training and education of workers may produce positive spillover effects through knowledge-sharing (Fritsch and Aamoucke, 2013). This is particularly true for high-tech sectors that rely relatively more on workers with a tertiary education. As a consequence, differences in the regional supply of highly skilled workers can give rise to productivity differences (Moretti, 2004). For those reasons, the skills and education of workers are likely to also affect the choice and feasibility of creating a new business.

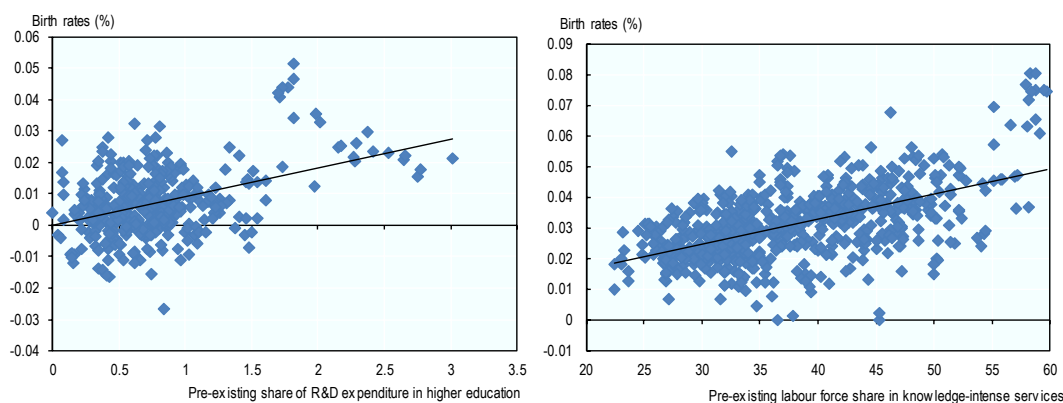
Furthermore, innovation and research are essential for entrepreneurship and (local) economic growth. The presence of universities and the level as well as quality of research activities contribute to the creation of new enterprises (Audretsch, Lehmann and Warning, 2005; Hausman, 2012). Pre-existing research activities and investments can provide the necessary innovation to stimulate entrepreneurship. Similarly, existing clusters of innovation-reliant business sectors might be conducive to the creation of new firms as entrepreneurs benefit both from knowledge spillovers as well as from the availability of an experienced and well-trained workforce (Chatterji, Glaeser and Kerr, 2013).

Information on workers' human capital, high-tech clusters and R&D is available from the *OECD Regional Database* and mostly covers TL2 regions.<sup>8</sup> In fact, measures for all three factors appear to be strong predictors of business entries across regions. The within-country/year variation in business rates is significantly and positively correlated with the share of R&D performed by the regional higher education sector and the share of the regional workforce employed in knowledge-intensive services (Figure 3.28).<sup>9</sup> Moreover, net

business creation rates are significantly higher in regions that had a more skilled labour force as measured by tertiary education (Figure 3.29).

Figure 3.28. **Enterprise births: R&D and employment in knowledge-intensive services**

TL2 regions, 2009-14

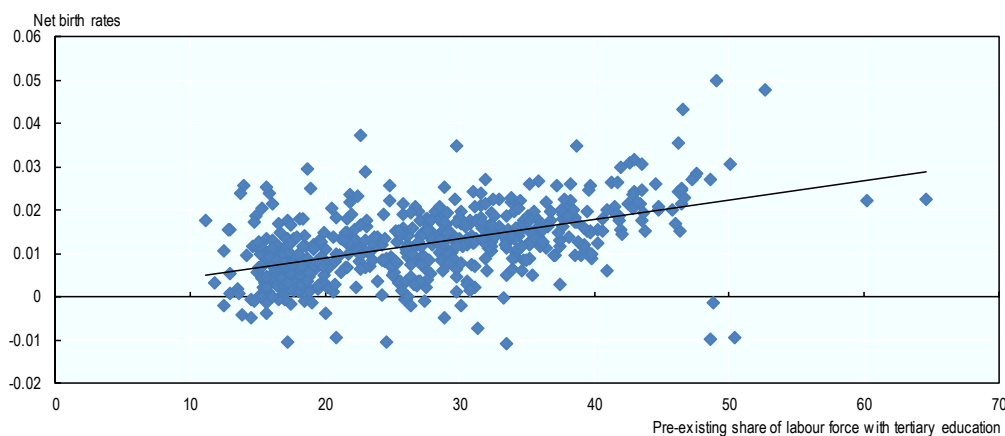


*Notes:* Residual plots, OLS regression. The dependent variable is business birth rate for all firms (births minus deaths). The explanatory variables are created from year  $t-1$ , i.e. the year before business creations are examined. Country\*year fixed effects are included, years 2008-14. Errors are clustered at the country level.

*Sources:* OECD (2017a), *Regional Business Demography* (database); OECD (2017b), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

Figure 3.29. **Enterprise births and the education of the labour force**

TL2 regions, 2009-14



*Notes:* Residual plots, OLS regression. The dependent variable is the regional net business creation rate for all firms (births minus deaths). The explanatory variable is created from year  $t-1$ , i.e. the year before business births and deaths are examined. Country\*year fixed effects are included, years 2008-14. Errors are clustered at the country level.

*Sources:* OECD (2017a), *Regional Business Demography* (database); OECD (2017b), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

These findings imply that, within countries, regions with a more educated labour force, greater university R&D intensity and a relatively stronger focus on innovative business sectors experience higher firm entry or net business creation rates.

## The way forward: Measuring employment in business

The policy attention reserved to entrepreneurship often stems from the intuition that new firms will generate economic growth and employment. In reality, businesses differ in their capacity to create employment. Young and small firms tend to be net contributors to employment creation, while in “bad times” a large part of employment losses stem from layoffs from old firms (Neumark, Wall and Zhang, 2011; Haltiwanger, Jarmin and Miranda, 2013; Criscuolo, Gal and Menon, 2014).

Moreover, firm creation and expansion have non-linear effects on job creation: the complexity of the relationship between firm entry and employment spans over time (Fritsch and Mueller, 2004) and across regions (Fritsch, 2008). Regional dynamics over time are visible first and foremost in the direct effects of entrepreneurship on employment levels: these can be defined as the immediate effect of new entrants on the number of jobs created.

The direct dimension of employment creation due to business entry can be heterogeneous across regions due to the endogenous and idiosyncratic spatial distribution of quality in new entrepreneurial ventures. In the medium term, new entrants may, however, have a negative effect on employment: due to competition and market selection, newcomers may displace incumbents, leading to a net decline in employment, a phenomenon that can be defined as crowding-out (Fritsch and Mueller, 2004). If new entrants destroy jobs initially, in the long term their net contribution to employment creation may once again be positive, due to supply-side effects: increased competition, higher innovation and an increase in product or process variety (Fritsch and Mueller, 2004). However, such indirect effect of business entries (which occur with a time lag) may also have a spatial component, in that employment creation and destruction may cross regional boundaries, due to knowledge and productivity spillovers, or migration (De La Roca and Puga, 2017; Fritsch, 2008).

Job creation and destruction are therefore phenomena of intrinsically local nature: for example, the same share of layoffs can have different effects on remote regions and on central areas, because workers in remote areas are more likely to remain unemployed following a layoff (Andersson et al., 2014). Clearly, the regional nature of employment creation and destruction has vital repercussions on the both local and national economies, and is therefore of the utmost policy relevance.

In order to fully grasp the regional dimension of differences in demography of business employment, precise information on the geographic location of enterprises and employment is valuable. At the subnational level, extending the coverage of employment demography statistics to TL3 regions in all countries would further increase the precision of the spatial representation and allow a more differentiated analysis and policy design. This report has made significant progress in this direction but for a few countries the current coverage only includes TL2 regions.

Business dynamics can differ among different types of firms, which might have consequences for employment creation or destruction across OECD regions. In particular, collecting data that allow distinguishing between employer and non-employer firms can be informative. First, it reveals potentially different contributions, both across regions or countries, of new employer and non-employer firms to regional employment creation. Second, it can facilitate empirical consistency and comparability across different countries and legislative systems, which might affect the nature and frequency of creations of non-employer firms.

In the medium term, the way forward to increase the quality and the international comparability of business demography statistics at the regional level would have to build on the employer statistics at the enterprise level. This would benefit from a relatively high harmonisation of methods and a relatively wider coverage.

At the same time, accurate information on the actual location of employment creation, in the form of data on new local units, rather than simply the main location of new firms, could further strengthen the analysis of regional employment creation by firm dynamics. For this reason, the following chapter develops and scrutinises different indicators on the location and intensity of subnational employment creation, based both on new enterprises as well as new establishments. This analysis can lead to a better understanding of where employment from entrepreneurship is located across the territory and better inform policies aimed at sustaining job creation and growth in the long run.

## Notes

1. Firms (or enterprises) are defined, according to OECD/Eurostat (2007) guidelines, as the “smallest combination of legal units [...] producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations”.
2. The remaining discrepancies, which mainly revolve around the inclusion or exclusion of particular categories of firms from the statistics, are clearly flagged as notes to the statistics in the database.
3. This distinction by size class is directly available for countries covered by Eurostat’s regional database, but not for many other countries for which the data collection relies on national sources. In these cases, the harmonisation has been carried out *ex post*, to make the figures comparable across countries. In a few cases some discrepancies remain (often related to the impossibility to pin down these exact three categories). These instances are reported in the database as missing values or, alternatively, the discrepancies are clearly flagged in the notes to the statistics.
4. For a descriptive analysis of the spatial heterogeneity in US house price growth over time see, for example Bogin, Doerner and Larson (2016).
5. Throughout the chapter and in the database, active firms as well as birth, death and survival are defined in accordance with the statistical guidelines set out in OECD/Eurostat (2007).
6. A predominantly urban (or urban) TL3 region is a region where the majority of the population lives in a city (OECD, 2016b).
7. Concentration of employment in the three largest firms in terms of regional employment is computed with Orbis data for 2014.
8. These are approximated by the share of a region’s labour force employed in knowledge-intensive sectors.
9. Knowledge-intensive services are classified by Eurostat: [http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Knowledge-intensive\\_services\\_\(KIS\)](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Knowledge-intensive_services_(KIS)).



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## *Annex 3.A1.*

### Enterprise data sources

<b>Australia</b>	Australian Bureau of Statistics (ABS) Database: Counts of Australian Businesses, including Entries and Exits (CABEEs): <a href="http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8165.0Main+Features1Jun%202011%20to%20Jun%202015?OpenDocument">www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8165.0Main+Features1Jun%202011%20to%20Jun%202015?OpenDocument</a> .
<b>Belgium</b>	Statistics Belgium – Directorate-General Statistics <a href="https://bestat.economie.fgov.be/bestat/index.xhtml">https://bestat.economie.fgov.be/bestat/index.xhtml</a> .  <a href="http://statbel.fgov.be/fr/statistiques/chiffres/economie/entreprises/vie_entreprises/evolution_emploi/#.WEViv_krK70">http://statbel.fgov.be/fr/statistiques/chiffres/economie/entreprises/vie_entreprises/evolution_emploi/#.WEViv_krK70</a> .
<b>Canada</b>	Statistics Canada Data: <a href="http://www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5290001&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=50&amp;tabMode=dataTable&amp;csid=">www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5290001&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=50&amp;tabMode=dataTable&amp;csid=</a> Metadata: <a href="http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&amp;SDDS=5157">www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&amp;SDDS=5157</a>
<b>Germany</b>	Federal Statistical Office - Company Register System (URS) <a href="https://www-genesis.destatis.de/genesis/online/logon?language=de&amp;sequenz=statistiken&amp;selectionname=521*">https://www-genesis.destatis.de/genesis/online/logon?language=de&amp;sequenz=statistiken&amp;selectionname=521*</a>
<b>Ireland</b>	Central Statistical Office – StatBank Ireland-Business Sector – Business Demography <a href="http://www.cso.ie/px/pxeirestat/database/eirestat/Business%20Demography/Business%20Demography_statbank.asp?sp=Business%20Demography&amp;Planguage=0">www.cso.ie/px/pxeirestat/database/eirestat/Business%20Demography/Business%20Demography_statbank.asp?sp=Business%20Demography&amp;Planguage=0</a> .
<b>Israel</b>	Central Bureau of Statistics-Business demography Data: <a href="http://www.cbs.gov.il/webpub/pub/text_page_eng.html?publ=63&amp;CYear=2014&amp;CMonth=1#100">www.cbs.gov.il/webpub/pub/text_page_eng.html?publ=63&amp;CYear=2014&amp;CMonth=1#100</a> .
<b>Korea</b>	Korean Statistical Information Service Data: <a href="http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETI_TLE&amp;parmTabId=M_01_01">http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETI_TLE&amp;parmTabId=M_01_01</a> .
<b>Latvia</b>	Central Statistical Bureau – Statistical Business Register Database Data: <a href="http://www.csb.gov.lv/en/statistikas-temas/termini/employer-enterprise-35891.html">www.csb.gov.lv/en/statistikas-temas/termini/employer-enterprise-35891.html</a> . Metadata: <a href="http://www.csb.gov.lv/en/statistikas-temas/statistical-business-register-database-30703.html">www.csb.gov.lv/en/statistikas-temas/statistical-business-register-database-30703.html</a> .
<b>Luxembourg</b>	Statistics Luxembourg-Demography and Structure of enterprises Data: <a href="http://www.statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF_Language=eng&amp;MainTheme=4&amp;FldrName=1">www.statistiques.public.lu/stat/ReportFolders/ReportFolder.aspx?IF_Language=eng&amp;MainTheme=4&amp;FldrName=1</a> .
<b>Norway</b>	The Central Register of Establishments and Enterprises Data: <a href="https://www.ssb.no/statistikkbanken/selecttable/hovedtabellHjem.asp?KortNavnWeb=foretak&amp;CMSSubjectArea=virksomheter-foretak-og-regnskap&amp;PLanguage=1&amp;checked=true">https://www.ssb.no/statistikkbanken/selecttable/hovedtabellHjem.asp?KortNavnWeb=foretak&amp;CMSSubjectArea=virksomheter-foretak-og-regnskap&amp;PLanguage=1&amp;checked=true</a> .

<b>Switzerland</b>	Office fédéral de la statistique (OFS) Data: <a href="https://www.bfs.admin.ch/bfs/fr/home/statistiques/catalogues-banques-donnees/donnees.html">https://www.bfs.admin.ch/bfs/fr/home/statistiques/catalogues-banques-donnees/donnees.html</a> .
<b>United Kingdom</b>	Office for National Statistics-Business Demography Data: <a href="https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/businessdemography/2014">https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/businessdemography/2014</a> .
<b>United States</b>	Statistics of US businesses (SUSB) Data: <a href="http://www.census.gov/programs-surveys/susb/data/tables.html">www.census.gov/programs-surveys/susb/data/tables.html</a> .
<b>All other European countries included in Table 3.1</b>	Eurostat <i>Regional Business Demography Database</i> Data: <a href="http://ec.europa.eu/eurostat/web/structural-business-statistics/entrepreneurship/business-demography">http://ec.europa.eu/eurostat/web/structural-business-statistics/entrepreneurship/business-demography</a> .

## **Chapter 4.**

### **Regional business employment dynamics**

*This chapter describes regional business dynamics and its related employment. It presents employment creation in new firms across OECD regions and explains the advantages and disadvantage of using establishment- – rather than enterprise- – level data to assess regional employment dynamics. It does so also by illustrating and quantifying the “headquarter bias” as well as discussing the overestimation of the impact of new firms when using establishment-level data. The chapter also examines the spatial distribution of employment dynamics across OECD regions and analyses discrepancies across different types of regions and sectors. This analysis is supplemented by an investigation of regional factors that are connected to regional employment growth in establishments. The chapter concludes by providing evidence on the contribution of small and medium-sized establishments to employment creation and the role of regional factors for employment growth in existing firms.*

## Introduction

Understanding the impact of business dynamics on employment across regions is crucial to design policies that effectively promote inclusive growth. The primary methodological concern of cross-country comparisons of regional data on business demography, the role of non-employer firms, is equally pressing for subnational employment creation indicators. In comparison to recording firm births and deaths, measuring the impact of business dynamics on employment at the subnational level requires considering further methodological challenges. When an enterprise located in a given region grows, the employment generated might be geographically located in another region if the enterprise has more than one establishment. While most new enterprises can be assumed to be single-establishment enterprises, some new enterprises can be comprised of various establishments.

As a consequence, common approaches of examining regional employment trends based on enterprise data can be subject to a bias if they fail to use information on local business units and focus instead the analysis on firms' headquarters. This chapter contributes to understanding the link between entrepreneurial dynamics and regional employment in several ways.

First, it presents recent trends in employment creation by new enterprises across OECD regions. This employment creation is also examined for different types of region. Furthermore, the description of regional employment growth is broken down by business sector.

Second, it shows the imprecision of enterprise data if the assumption that new firms are not exclusively present in one region does not hold. The bias that results from using business demography data at the enterprise instead of the establishment level is illustrated in the chapter. Since employment is of a local nature and enterprises can consist of multiples plants, assessing employment solely based on a firm's main location inevitably might not capture the full picture. This bias is not homogeneous across places; it tends to be stronger in capital regions, where the concentration of enterprises is very high and where relatively more firms set up their headquarters.

Third, trends in regional employment growth in businesses are presented. A particular focus is placed on the comparison between mostly metropolitan and non-metropolitan regions on the one hand. On the other hand, the classification of regions according to their productivity growth is used to assess potential differences in employment growth between economic frontier regions and those that converge or diverge in terms of economic growth. The chapter further assesses some drivers of the factors that might explain the differences in employment growth in the business sector across OECD regions.

Furthermore, the chapter shows the potentially vital role of new establishments and existing small to medium-sized establishments for regional employment growth. Changes in regional employment associated with newly created establishments are characterised by considerable regional heterogeneity; they can contribute up to 8% to regional employment. Similarly, small to medium-sized establishments, presented via the example of five OECD countries, differentially contribute to regional employment growth.

Finally, the chapter uses firm-level data to examine regional factors that are correlated to employment growth in existing firms. This complementary analysis based on microdata (Orbis) shows that regional characteristics such as gross domestic product (GDP) growth and the share of the labour force with a tertiary education are associated

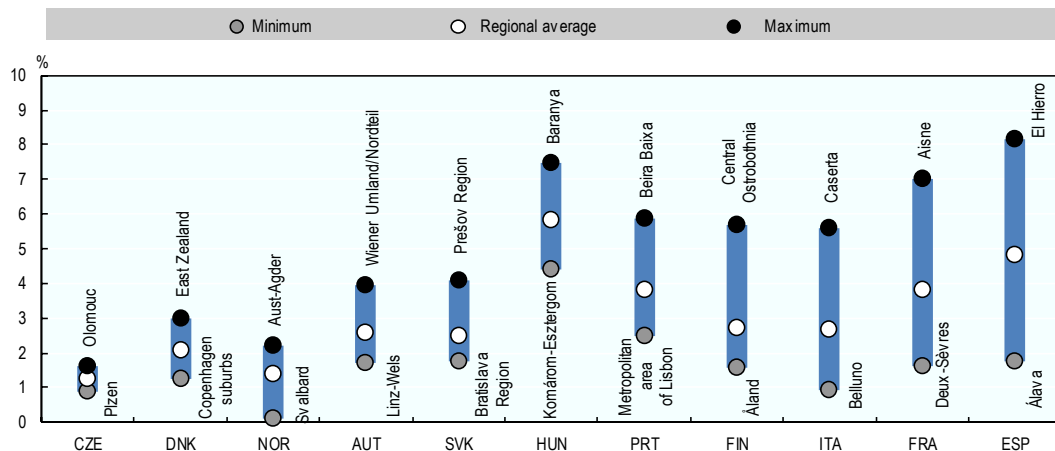
with larger employment growth in existing firms, even after controlling for individual firm information.

## Employment trends in new firms

The share of regional employment created by new employer firms is significant across the OECD, accounting for, on average, 3.3% of overall regional employment in active enterprises in 2014.<sup>1</sup> However, it displays large spatial heterogeneity. The share of newly created jobs by firm dynamics varies considerably both by country as well as across regions within the same country. Regions in Spain or Hungary gained on average 5% and 6% of employment through new firms, respectively, whereas not only the country average but the individual regional rates are below 2% for (almost) all regions in the Czech Republic and Norway (Figure 4.1). The OECD's *Regional Business Demography Database* also includes employment demography statistics on all types of firms, with a wider coverage of non-European OECD countries.

In some countries such as Finland, France, Italy or Spain, regional disparities in job creation in new firms is particularly large, with the top-performing region showing multiple times larger job creation than the respective bottom region. For example, the employment creation rate by new firms reached almost 6% in the Italian region Caserta while it fell below 1% in Belluno. Similarly, the range of employment creation in Spanish regions is defined by around 8.1% in El Hierro and 1.8% in Álava. In contrast, regions in the Czech Republic or Denmark are much more homogeneous in terms of the impact of new enterprises on regional employment. In Austria and Italy, the capital-city region or a neighbouring region experienced the largest rate of job creation; however, for most other countries this is not the case.

Figure 4.1. Employment creation rate by enterprise births, TL3, 2014 (or latest available year)



Notes: The figure presents the total number of employment created by firm births as a proportion of total employment in active firms in the region in the year 2014 (or last available year). Only employer firms are included (across all sectors).

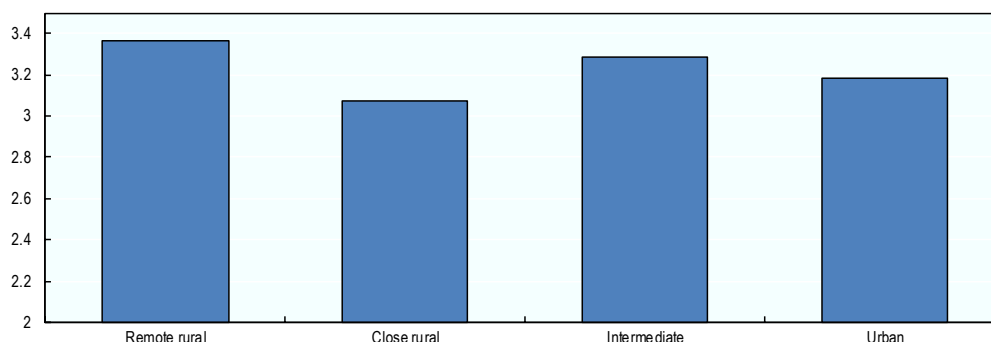
Sources: OECD (2017d), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933626136>

In fact, the heterogeneity of employment creation in employer firms along the urban-rural hierarchy is less pronounced than the heterogeneity of firm birth rates. Overall, all types of regions – remote rural, close rural, intermediate and urban – recorded

similar rates of employment creation between 2011 and 2014 of around 3.1-3.4% (Figure 4.2). The largest difference, between remote rural and close rural regions, is less than 0.3 percentage points. The differences are further reduced if the last five instead of the last three years are considered.

Figure 4.2. **Employment creation by type of region, 2011-14 (or last three available years)**



*Notes:* The figure displays the employment creation rates (employment created by firm births as a proportion of total employment in active firms in a region in the same year). Austria, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Italy, Latvia, Norway, Portugal, the Slovak Republic, Spain and Switzerland are included. Average across employer firms.

*Sources:* OECD (2017d), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933626155>

In terms of the sectoral composition of employment creation, there are, however, some striking differences between predominantly urban, intermediate and rural regions (Figure 4.3). For instance, the majority of employment in new enterprises in finance, professional services, transport as well as information and communication was created in predominantly urban regions. In information and communication, around 62% all newly created employment by firm births was located in urban regions, while only 11% were in rural regions. These findings mirror the sectoral composition of firm births documented in Chapter 3, as urban areas also accounted for comparably large shares of firm births in these sectors (see Figure 3.9). Noteworthy is that the share of employment in new firms is significantly greater in intermediate regions than the corresponding share of firm births in the same sector at the expense of rural regions, where the share of new employment is relatively lower compared to the share of firm births.

As long as new enterprises are only located in a single location, statistics on employment creation based on regional business demography are suitably represented by information on new enterprises. This chapter discusses and illustrates the problems that can arise if that assumption does not hold. In doing so, it also presents some of the potential consequences.

### ***Indirect employment effects through business dynamics***

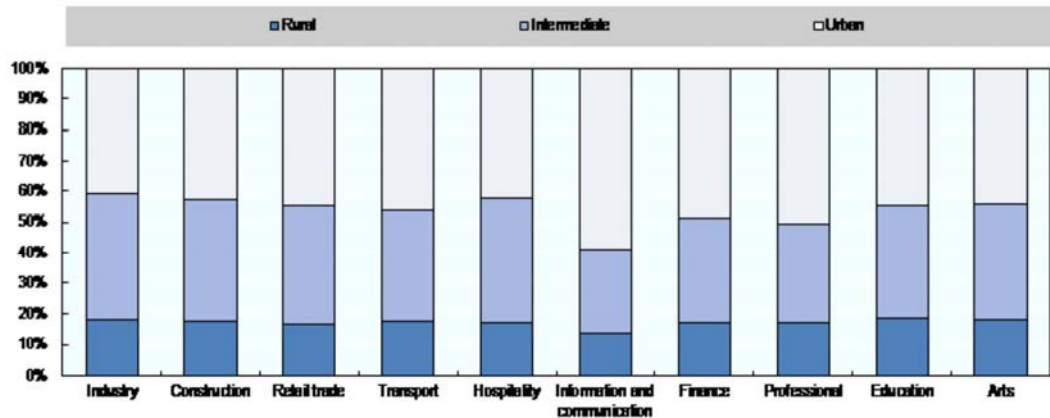
The employment impact of new enterprises might go beyond what can be measured by the newly created employment in those firms. Such measures capture the direct effects of firm births. Additionally, firm births or dynamics in general also have indirect effects.

More firm entries (and exits) in a region lead to a more competitive business environment, which can be associated with higher or lower economic growth (Fritsch, 2011). Higher competition may contribute to higher innovation efforts or the improvement of the quality of production processes and goods in both incumbent and new firms. If this holds



true, a larger number of firm births in a region, combined with a widened production in that region, may support regional growth. However, firm entry may force incumbent firms to exit the market, which may result in lower employment and economic growth in a region (Fritsch, 2011).

Figure 4.3. **Employment creation by type of region and sector, 2014 (or latest available year)**



*Notes:* The figure displays the composition of employment creation rates by type of region and by sector of economic activity of the firm (share of created employment by firm deaths in a sector as a proportion of total employment created by firm births in a region). The figures by regional typology are computed as averages across countries: Austria, the Czech Republic, Denmark, Finland, France, Hungary, Italy, Norway, Portugal, the Slovak Republic and Spain. 2014 or last available year. Only employer firms are included.

*Source:* OECD (2017d), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933626174>

This ambiguity motivates the question whether there is a link between regional business dynamics and employment growth in existing firms. In particular, such indirect effects can be examined by analysing the firm-level impact of the EU's Cohesion Policy funds. One could expect that in a competitive and therefore innovative business environment, firms that (are able to) remain in the market and receive Cohesion Policy co-funding may be able to grow to a larger extent than supported firms that are located in a region which shows less business dynamics.

As part of the EU's Cohesion Policy, the European Regional Development Fund (ERDF), the European Social Fund (ESF) and the Cohesion Fund (CF) co-fund projects that are selected by managing authorities in order to contribute to the target of a certain regional or national operational programme.<sup>2</sup> Recent research stresses the importance of understanding the micro-level effects of the co-funding on the beneficiaries' performance. Bachtrögler, Fratesi and Perucca (2017) find for a sample of eight countries that receiving co-funding affects the respective manufacturing firm's employment and value-added growth positively. Moreover, the authors find that the significance and size of the impact vary with the territorial conditions of the region in which the firms are located.

In order to test that hypothesis, the analysis below is focused on beneficiaries (firms) in the manufacturing sector that carry out projects as part of an operational programme, and therefore receive co-funding from the ERDF, the ESF or the CF. The period investigated is the multi-financial framework 2007-13 (as a cross-section) as for that period data on projects and beneficiaries are publicly available for the first time.<sup>3</sup> The estimation sample includes the Czech Republic, France, Italy, Portugal, the Slovak Republic and Spain. Using propensity score matching, similar firms within these countries are matched based

on observable firm and regional characteristics, which allows estimating average treatment effects on the (treated) firms' value added and employment growth. Given the methodological approach, only firms that were founded in 2007 or earlier (prior to the treatment) and have stayed in the market at least until 2014 are considered.

The country samples of manufacturing firms are split into two groups of NUTS-2 and NUTS-3 regions each. First, the national average of business dynamics (the number of firm entries and exits divided by the number of active firms in the region) in 2008 (for the Czech Republic and Portugal 2013) is used as a threshold dividing the countries' regions. Second, the national average birth rate (the number of firm entries relative to the number of active firms) in 2008 (2010 for the Czech Republic and Portugal) splits the country samples in a below-average and above-average group.<sup>4</sup>

Treatment effects on treated firms within the groups of regions with high dynamics (and birth rates) are higher than those for firms in regions with relatively low business dynamics in the same country (Figure 4.4). This result proves to be robust when considering only employer firms and considering the business demography variables and the location of firms on the NUTS-3 instead of the NUTS-2 level.<sup>5</sup>

Not all differences in the average effects of Cohesion Funds receipt on treated firms across regional groups are statistically significant. In France and Spain, supported manufacturing firms grow significantly more in employment and value added if they are located in a dynamic business environment within their country. In Italy, that only leads to their ability to significantly increase their value added more than treated firms in other NUTS-2 regions. However, taking firm birth rates into account, treated Italian manufacturing firms can also achieve significantly higher employment growth rates in regions with a higher number of new firms.

For NUTS-3 regions, results point in the same direction for value-added growth. However, another picture arises for the Cohesion Policy effects on employment growth: only in Italian and Portuguese NUTS-3 regions with relatively high birth rates (for dynamics, there is no statistically significant difference in average effects in any country) firms seem to be able to make better use of Cohesion Funds with regard to creating more jobs than treated firms in other regions.

Overall, firms that receive Cohesion Policy co-funding grow to a larger extent if they are located in a competitive and innovative business environment than supported firms in less dynamic regions. Consequently, indirect effects appear to augment the overall employment impact of firm dynamics.

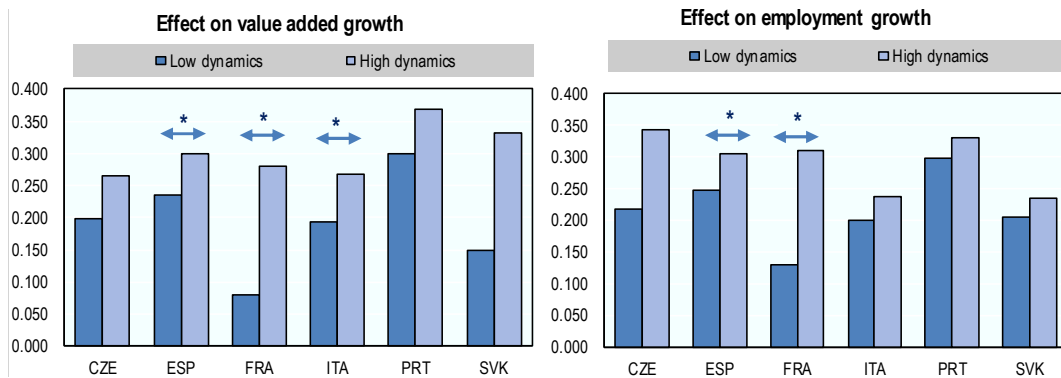
### **Measuring businesses at the regional level: Establishments vs. enterprises**

Enterprises can consist of a single or multiple local units, so-called establishments (see Box 4.1 for statistical definitions). In all countries, most enterprises have only one single establishment. However, there are numerous enterprises that exercise control over many establishments. These multi-plant firms comprise especially large and very large enterprises, which constitute around 0.5-1% of the total business population (OECD, 2017d). They can be marked by considerable degrees of geographic diversity and variety in the sectors in which the firm is active (as defined as NACE one-digit). In Portugal, for instance, only 2% of enterprises have been reported to have more than one local unit in 2016 (Statistics Portugal, 2016). However, those 2% of enterprises make up 27% of total employment in businesses.<sup>6</sup>

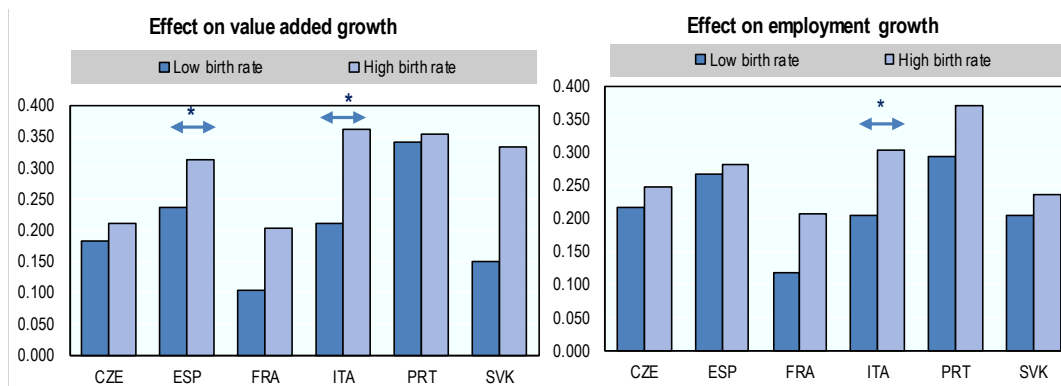
Figure 4.4. **Firm-level effects of Cohesion Policy across regions with low and high business dynamics**

Average treatment effects on the treated: Effects measured as log difference between post- and pre-treatment values of value added and employment

A. Business dynamics: Churn in firms



B. Business dynamics: Firm birth rates



Notes: \* A statistical significance (at the 10% or a lower level) of the mean differences. Apart from the effects estimated for Portugal, all average treatment effects (on the treated) are statistically significant (standard errors are bootstrapped with 500 replications).

Sources: Author's calculations based on data from Orbis business database (Bureau van Dijk); database of Cohesion Policy beneficiaries (Bachtrögl et al., 2017).

StatLink  <http://dx.doi.org/10.1787/888933626193>

#### Box 4.1. Definitions

An enterprise is the smallest combination of legal units that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations.

An establishment is an enterprise, or part of an enterprise, that is situated in a single location and in which only a single (non-ancillary) productive activity is carried out or in which the principal productive activity accounts for most of the value added.

Source: OECD Glossary of Statistical Terms, <https://stats.oecd.org/glossary/detail.asp?ID=3207>.

As a result of their geographically spread-out locations, accounting for the exact location of multi-establishment enterprises' units of production is important when looking at regional employment dynamics connected to business demography. In the case of labour, the associated employment can be assigned to an enterprise's headquarter (enterprise approach) or to its actual physical location where the units of production are used. This distinction produces different measures (Ahmad, 2008).

While the former approach would document the employment generated by a firm's entire organisation, it would ignore its regional dimension. In an extreme case, employment growth in an establishment could not be attributed to the corresponding region at all if the headquarters were located in a different region than the establishment. The establishment approach, on the other hand, reports employment at its actual location, making it more suitable to studying subnational employment dynamics. This context highlights the importance of the regional level as a complement to national data in order to understand regional composition and subnational trends of employment.

The use of establishment data to monitor the employment of new businesses has also important caveats. More specifically, it might overstate the actual employment creation of new business as new local establishments can consist of either truly new businesses or new plants of existing firms. What is more, new firms face different challenges than existing ones that establish new local units. Chapter 5 addresses this issue using the case of France and demonstrates that single-establishment firms are responsible for most of the employment creation and destruction due to firms' exits and entries, which alleviates the aforementioned concern.

In principle, there should be consistency between structural data for establishments and enterprises. In particular, the number of establishments should at least equal or be greater than the number of enterprises in a given region and at the country level, while regional employment in establishments summed up for the total country should correspond to the country's total employment in enterprises. In practice, discrepancies might be observed when data sources for establishments and enterprises rely on different data collection requirements (e.g. application of thresholds for the inclusion of units, for instance based on minimum employment or turnover).

As far as possible, the enterprise and establishment datasets used for the evidence provided in this chapter have been harmonised in order to allow a meaningful comparison. Detailed information on this harmonisation is given in Annex 4.A3.

### ***Data sources and availability at the establishment level***

In 17 countries, the respective national statistics offices (NSOs) publish structural and demographic business indicators by establishment at the regional level. These countries make up the core of a new OECD *Database on Establishment Statistics* at the regional level that is part of the *Regional Business Demography Database*. In addition, data on 13 European OECD countries from Eurostat's structural business statistics are included to integrate, at the TL2 level, information of active establishments and their associated employment. Table 4.1 provides information on data sources, the original denomination of the unit and coverage of territorial levels.

For the majority of the 30 countries in the database, data on the number of establishments as well as the number of employees in each region are available. Statistics on business demography across regions are only available for a subset of countries. Many NSOs neither report births or deaths of establishments at the regional level nor do they document job creation or destruction across regions resulting from changes in establishments.

Table 4.1. Data sources, units and level of regional breakdown

Country	Source	Source type	Statistical unit	Spatial scale
Austria	Statistics Austria	Census on local units of employment	Local unit	TL2
Belgium	Eurostat	Structural business statistics	Local unit	TL2
Canada	Statistics Canada	Business Register	Statistical location	TL2
Czech Republic	Eurostat	Structural business statistics	Local unit	TL2
Denmark	Statistics Denmark	Business Register (AMR-UN)	Local unit	TL3
Estonia	Eurostat	Structural business statistics	Local unit	TL2
Finland	Statistics Finland	Administrative data	Local unit	TL3
France	INSEE	Business Register (Sirene)	Local unit	TL3
Germany	Federal Statistical Office	Business Register	Local unit	TL2
Greece	Eurostat	Structural business statistics	Local unit	TL2
Hungary	Eurostat	Structural business statistics	Local unit	TL2
Ireland	Eurostat	Structural business statistics	Local unit	TL2
Italy	ISTAT	Business Register of local units	Local unit	TL2
Japan	Statistics Japan	Economic Census	Local unit	TL3
Korea	Statistics Korea (via KOSIS)	Census on Establishments	Local unit	TL3
Latvia	Eurostat	Structural business statistics	Local unit	TL2
Luxembourg	Eurostat	Structural business statistics	Local unit	TL1
Mexico	INEGI	Economic Census	Local unit	TL2
Netherlands	Eurostat	Structural business statistics	Local unit	TL2
New Zealand	Statistics New Zealand	New Zealand Longitudinal Business Frame (LBF) until 2015 and Business Register from 2016	Local unit	TL3
Norway	Statistics Norway	Central Coordinating Register of Legal Entities (ER) and Central Register of Establishments and Enterprises (CRE)	Local unit	TL3
Poland	Eurostat	Structural business statistics	Local unit	TL2
Portugal	Statistics Portugal	Integrated business accounts system	Local unit	TL2
Slovak Republic	Eurostat	Structural business statistics	Local unit	TL2
Slovenia	Eurostat	Structural business statistics	Local unit	TL2
Spain	INE	Central Business Directory	Local unit	TL3
Sweden	Eurostat	Structural business statistics	Local unit	TL2
Switzerland	Swiss Federal Statistical Office	Business Register	Local unit	TL3
United Kingdom	ONS	Business Register	Local unit	TL2
United States	US Census Bureau	Longitudinal Business Database (LBD) based on Census Bureau's Business Register (BR)	Local unit	TL2
Number of countries covered		1 at TL1; 20 at TL2; 9 at TL3		

In total, four countries report detailed regional business demography statistics at the establishment level. These are Japan, Mexico, New Zealand and the United States. France reports data on business demography for establishments but not for the associated employment. For the remaining countries, changes in the headcount of establishments and changes in the number of employees in establishments can be deduced from the data from different years, but an accurate decomposition of those changes into births or deaths of establishments (or employment creation or losses, respectively) is not possible.

The OECD database on establishments presents data in ISIC Rev. 4 classification. Whenever possible, detailed sectoral information was included in the database. Due to the relatively low number of countries for which sectoral variables are available, sectoral statistics are only presented for regional employment changes.

For all countries in the database, regional business statistics cover either ISIC Rev. 4 sectors B to N (or A to U).<sup>7</sup> For some countries, only the aggregated statistics for those sectors (B-N or A-U) is available, while other countries report data that allow a detailed decomposition into individual sectors. The coverage of economic activities by country and sector is presented in Table 4.2.

Similarly, data by detailed size class of employment, measured by the number of employees or persons employed, are only available for a number of countries. Finland uses full-time equivalents while all other countries measure headcounts, which typically provide higher estimates of employment due to the inclusion of part-time work.

Table 4.2 summarises information on data availability, notably as concerns breakdowns by sector and size, and coverage of non-employer establishments (i.e. establishments with zero employees). The time span ranges from almost 40 years for the United States (1977-2014) to only a 2-year period for Finland (2013-14).

Table 4.2. Coverage of available data on establishments

Country	Variable	Years	Size class breakdown	Economic sector breakdown	Sector coverage (ISIC Rev. 4)
Austria	Number of establishments	2011-14	No	No	05_99
	Number of persons employed	2011-14	No	No	05_99
Belgium	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Canada	Number of establishments	2016	Yes	Yes	01_99
Denmark	Number of establishments	2008-14	Yes	Yes	01_93
	Number of persons employed	2008-14	No	Yes	01_93
Estonia	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Finland	Number of establishments	2013-14	No	Yes	01_99
	Number of persons employed (employees converted to full-time equivalents)	2013-14	No	Yes	01_99
	Turnover	2013-14	No	Yes	01_99
France	Births	2008-14	Yes	Yes	05_96
	Number of establishments	2008-14	Yes	Yes	05_96
	Number of employees	2008-13	No	Yes	05_96
	Number of hours worked	2008-13	No	Yes	05_96
	Compensation of employees	2008-13	No	Yes	05_96
Germany	Number of establishments	2006-13	Yes	Yes	05_98
Greece	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Hungary	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Ireland	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Italy	Number of establishments	2012-14	Yes	Yes	05_96
	Number of persons employed	2012-14	Yes	Yes	05_96
Japan	Number of establishments	2009, 2014	No	No	01_96
	Number of persons employed	2009, 2014	No	No	01_96
	Births	2009, 2014	No	No	01_96
	Deaths	2009, 2014	No	No	01_96
	Number of persons employed in births	2009, 2014	No	No	01_96
	Number of persons employed in deaths	2009, 2014	No	No	01_96

Table 4.2. Coverage of available data on establishments (continued)

Country	Variable	Years	Size class breakdown	Economic sector breakdown	Sector coverage (ISIC Rev. 4)
Korea	Number of establishments	2006-14	Yes	Yes	01_96
	Number of employees	2006-14	Yes	Yes	01_96
Latvia	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Luxembourg	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Mexico	Number of establishments	2004, 2008-09, 2013-14	Yes (only for 2014)	Yes	01_99
	Number of persons employed	2004, 2008-09, 2013-14	Yes (only for 2014)	Yes	01_99
	Births	2009, 2014	Yes	Yes	01_99
	Number of persons employed in births	2009, 2014	Yes	Yes	01_99
Netherlands	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
New Zealand	Number of establishments	2000-16	No	Yes	01_99
	Number of employees	2000-16	No	Yes	01_99
	Births	2001-16	No	Yes	01_99
	Deaths	2001-16	No	Yes	01_99
	Number of employees in births	2001-16	No	Yes	01_99
	Number of employees in deaths	2001-16	No	Yes	01_99
Norway	Number of establishments	2009-17	Yes	Yes	01_99
Poland	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Portugal	Number of establishments	2010-14	No	Yes	01_99
	Number of persons employed	2010-14	No	Yes	01_99
Slovak Republic	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Slovenia	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Spain	Number of establishments	2009-15	Yes	Yes	05_96
Sweden	Number of establishments	2008-14	No	Yes	05_82, excl. 64-66
	Number of persons employed	2008-14	No	Yes	05_82, excl. 64-66
Switzerland	Number of establishments	2011-14	Yes	Yes	01_99
	Number of employees (as headcounts; also by gender)	2011-14	Yes	Yes	01_99
	Number of employees (as full-time equivalents)	2011-14	Yes	Yes	01_99
United Kingdom	Number of establishments	2016	Yes	Yes	01_99
United States	Number of establishments	1977-2014	Yes	No	05_99
	Number of employees	1977-2014	Yes	No	05_99
	Births	1977-2014	Yes	No	05_99
	Deaths	1977-2014	Yes	No	05_99
	Number of employees in births	1977-2014	Yes	No	05_99
	Number of employees in deaths	1977-2014	Yes	No	05_99
	Number of establishments surviving 1, 2, 3, 4 and 5 years	1994-2015	No	No	05_99
	Employees in establishments surviving 1, 2, 3, 4 and 5 years	1994-2015	No	No	05_99

### The headquarter bias

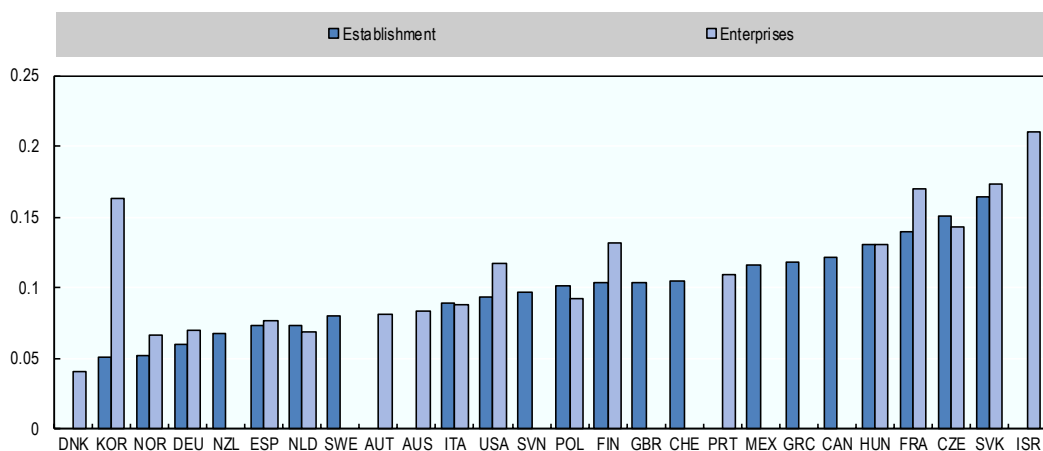
The salience of the distinction between statistics based on the enterprise or establishment approach depends on several factors. First, the overall degree of concentration of business activities within countries plays a role. Second, the relative importance of multi-establishment enterprises matters for the difference between the two sets of statistics, which especially affects statistics on regional employment. Finally, the geographic dispersion of establishments belonging to the same enterprise can drive a wedge between statistics based on the two different approaches.

The regional distribution of businesses varies considerably across countries. Firms might cluster for demographic reasons, such as population density. Furthermore, regional economic and political characteristics can both influence location decisions and affect business dynamics such as market entrance or exit. Factors such as local infrastructure, availability of adequately skilled labour, local research and development activities, or the size of the local economy, and therefore market, matter.

Figure 4.5 presents, for each OECD country in the database, Gini coefficients calculated for both the distribution of establishments and enterprises across regions.<sup>8</sup> To control for the fact that larger or more populous regions naturally tend to be the location of a greater number of local firms, the Gini coefficients are computed in terms of number of enterprises (establishments) per capita. The graph shows an uneven distribution of both establishments and enterprises across regions, with some countries showing large regional disparities.

Germany, the Netherlands, Norway and Spain appear to have the most equal territorial distribution of both establishments and enterprises. In comparison, the Czech Republic, France, Hungary and the Slovak Republic have a relatively less dispersed distribution of firms. Apart from a few exceptions, the regional concentration of establishments and enterprises seems to be fairly comparable. In Finland, France, Korea and the United States, however, enterprises are significantly more concentrated spatially than are establishments.

Figure 4.5. Gini coefficients based on establishment and enterprise counts per capita



Notes: The Gini coefficient ranges from 0 to 1. A coefficient equal to 0 can be interpreted as all TL2 regions having the same number of establishments (or enterprises) per capita, while a coefficient equal to 1 would reveal that all establishments (or enterprises) are located in only one TL2 region.

Sources: OECD (2017d), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

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The distinction between enterprise-level and establishment-level statistics is more relevant for regional employment than for the mere headcount of firms. The reasons for this are twofold. First, as mentioned above, multi-establishment enterprises, while few, account for the bulk or at least large shares of employment (e.g. almost 60% in the United States; Sadeghi, Talan and Clayton, 2016). Second, within each country many enterprise headquarters tend to be located in a small group of regions, which is normally composed of the capital region and large cities in the country's most prosperous regions. These regions are characterised by greater access to services, better transport infrastructure and potentially closer links to political and administrative processes. Consequently, employment in a multi-establishment enterprise might be reported in its headquarters region, although this could differ from the region(s) where part of the economic activity is performed or some of the actual employment is located.

Such a phenomenon of headquarter bias can be detected through a comparison of a region's national employment share based on enterprise data with its national share based on establishment data. By taking the difference between the two shares, it becomes apparent whether employment statistics do indeed differ. If there are no discrepancies between enterprise and establishment data, i.e. there is no differential regional attribution of employment for establishment and enterprise approach, then the proposed measure of the headquarter bias should be zero. Following the same logic, regions with positive (negative) values of the bias measure are regions where the enterprise data relatively overstate (understate) actual employment.

$$HQ\_Bias_{ic} = \frac{\text{Employment in Enterprises}_{ic}}{\text{Employment in Enterprises}_c} - \frac{\text{Employment in Establishments}_{ic}}{\text{Employment in Establishments}_c}$$

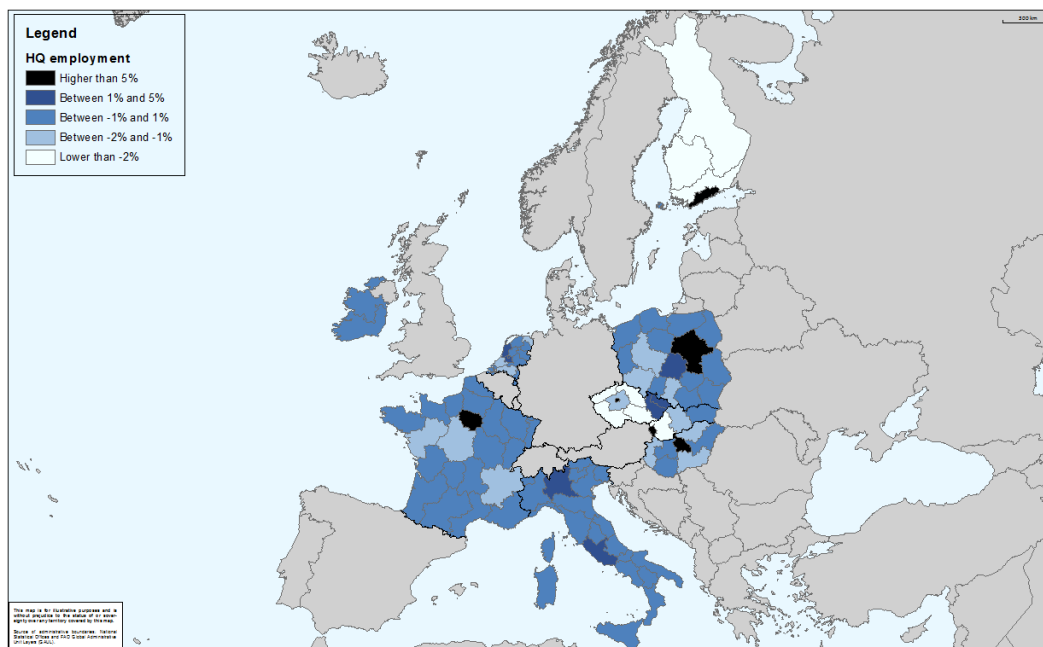
where  $HQ\_Bias_{ic}$  denotes the headquarter bias in region  $i$  in country  $c$ .

Figure 4.6 illustrates the headquarter bias graphically.<sup>9</sup> It confirms the existence of the headquarter bias across OECD regions. In many regions the bias is positive, indicating that enterprise-level statistics exaggerate the actual employment in those regions. Analogously, various regions display a significant negative measure, which implies that their regional employment would be downward biased if it were based on enterprise- instead of establishment-level data. The cases of Italy and especially France decisively capture the potentially enormous regional variation in the severity of the headquarter bias. In Italy, the capital region of Lazio and the country's economic centre, the region of Lombardy, have positive biases, whereas for the majority of Italy's remaining regions employment statistics would be downward biased if they were computed with enterprise data. In France, Île-de-France clearly stands out from the rest of the country in terms of the headquarter bias.

In terms of absolute values, the average regional headquarter bias corresponds to around 1 percentage point. Using enterprise-level data approximates the actual national employment share of any given region with a bias that amounts to 1.4 percentage points on average, i.e. a region were 5% of national employment is located would be estimated to have 6.4% or 3.6% of national employment. Depending on the number of regions and the level of concentration of economic activity, this bias can be much more severe in some countries and regions. On average, the maximum gap in each country is around 6.2%. The problem of the bias is likely to be even more accentuated if a lower regional tier is considered, because the challenge of correctly reporting employment in multi-establishment enterprises will be graver.

Figure 4.6. **Headquarter bias, selected EU countries**

Difference in regional weight in employment between establishments and enterprise data, 2014



Source: OECD (2017d), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933626231>

### ***Capital cities and the headquarter bias***

As mentioned above, the headquarter bias is best illustrated with the example of capital regions or the economically dominant regions in countries. Since many businesses have their headquarters based in those regions, the “headquarter bias” becomes particularly noticeable since at least some employment will be attributed to those regions even if the actual employment (in establishments) lies outside the capital region. Figure 4.7 demonstrates this fact by showing the difference in employment ratios in capital regions from the respective country average of that ratio.

In all (TL2) capital regions, the difference in the region’s national employment share between enterprise and establishment data is larger than the country average (which is centred at 0 by construction). In most cases, this difference is substantial. For instance, in the Czech Republic, Finland, France, Hungary, Poland and the Slovak Republic this capital headquarter bias surpasses more than 5%. In the Finnish and French capital regions, Helsinki-Uusimaa and Île-de-France, this figure rises to close to 12% and 11% respectively. Having business demography statistics (with related employment) at the establishment level would allow to correctly attribute employment to regions.

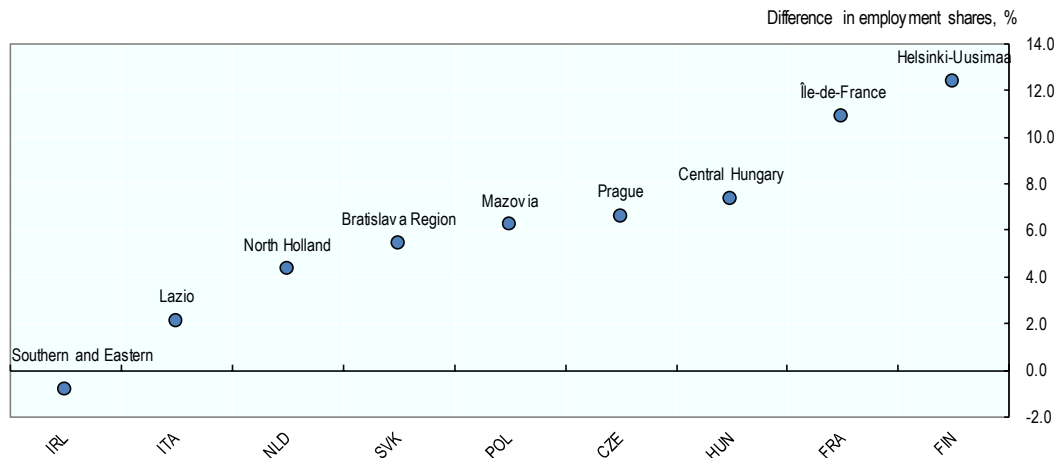
The only country where the employment bias is not more strongly pronounced in capital regions is Ireland, which can be explained by the fact that the country only consists of two TL2 regions. Excluding Ireland, the average headquarter bias in employment in capital regions is approximately 7%.

Overall, the striking example of capital regions provides evidence that employment statistics can differ substantially depending on whether they were collected based on the establishment or enterprise approach. The headquarter bias might be exacerbated for

capital regions or regions with extraordinary economic significance (e.g. Lombardy as Italy’s economic centre), though the former are in all countries but Ireland the region with the largest bias. Furthermore, the findings document that the degree to which capital cities amplify the headquarter bias in employment statistics can vary substantially across OECD countries, highlighting its considerable heterogeneity.

Figure 4.7. **Headquarter bias of capital regions in employment**

2014 (or latest available year)



*Notes:* Difference in capital regions’ national share of employment in enterprises to their national share of employment in establishments. Positive numbers indicate a relatively stronger bias in employment statistics based on enterprise data. The statistics are computed for TL2 regions. The figures are based on all business sectors, excluding education and arts (sectors B to N).

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink* <http://dx.doi.org/10.1787/888933626250>

Choosing the appropriate statistical unit is essential for investigating regional inequalities and informing suitable regional development policies. The aggregation of establishment activities that produces the employment variable at the parent enterprise level masks information on the real geographical distribution of employment. On the other hand, establishments are not necessarily an appropriate unit when assessing the impact of start-ups on employment creation, for which enterprise-level statistics are more suitable (Box 4.2).

## Trends in regional employment in establishments

To examine dynamics in regional employment in businesses at the exact location of employment, three requirements need to be satisfied: 1) establishment employment data must be available at the subnational level; 2) data must be observed for multiple years; and, for the sake of comparability 3) the data must be encompassing the same business sectors. The scope of this chapter’s analysis on establishments is constrained by the availability of data that satisfy those conditions.

For the 15 OECD countries for which suitable data are available, the most recent year coverage predominantly includes 2009-14. For that reason, the regional effects of the financial crisis can be described. The crisis had not only decisive repercussions, but also geographically very diverse adverse effects. The regional experience of employment changes has been far from uniform, with clear patterns observed between countries with

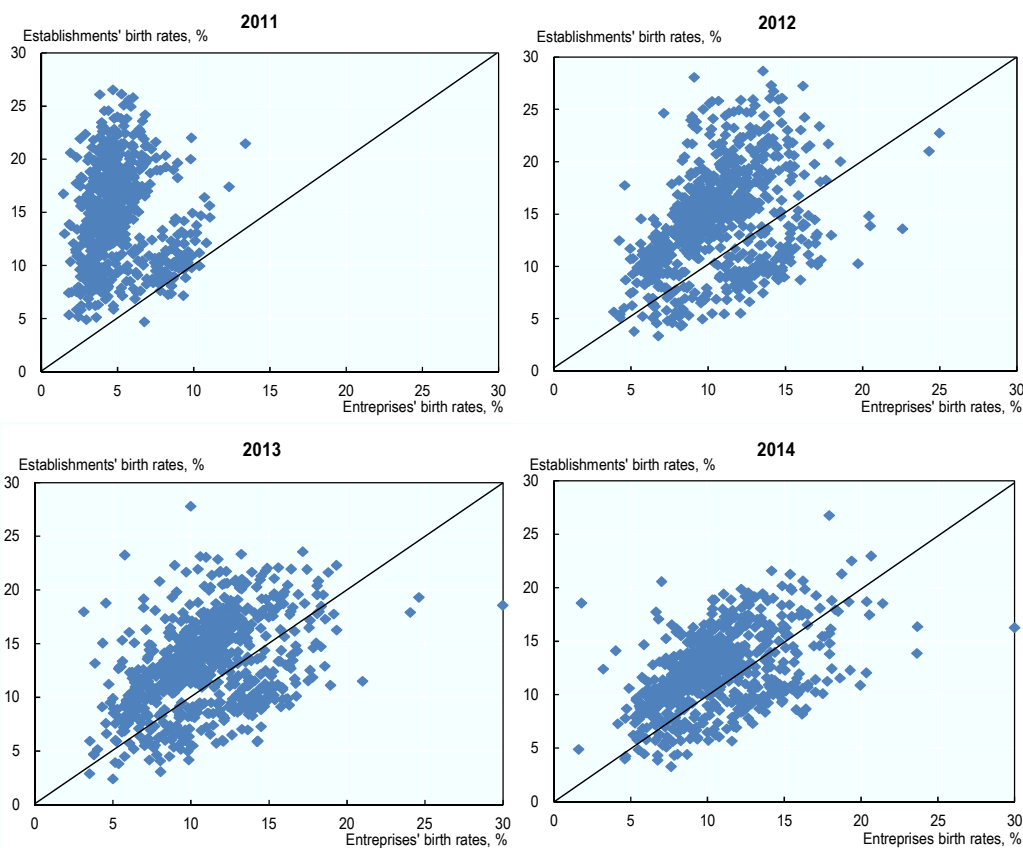
large heterogeneity in terms of employment growth, or in fact loss, across their regions (Figure 4.9).

#### Box 4.2. Differences in birth rates: Establishments and enterprises in France

The difference between enterprise and establishment creations becomes clearly visible in the case of France. Regional birth rates for establishments and employer enterprises in the same sectors differ strongly and deviate in many cases strikingly from the 45° line, which would be reached if enterprises and establishment birth rates were equivalent. This evidence demonstrates that enterprise and establishment creations may capture different economic decisions and concepts.

Additionally, the ratio between establishment and enterprise creations is not necessarily stable but may change over time or follow a cyclical pattern. For instance, in periods of uncertainty, countries may observe a reduction in births of enterprises, while establishment birth rates remain relatively high. In the case of France, enterprise creations in 2011 were fairly low compared to the creation of new establishments. The settlement of establishments might have been seen as a less risky option than the creation of new enterprises amid the economically critical time. Over time this pattern changed. While in 2012 establishment creations were still, relatively, more frequent than enterprise creations, in 2013 and 2014 a clear shift towards the creation of enterprises is notable.

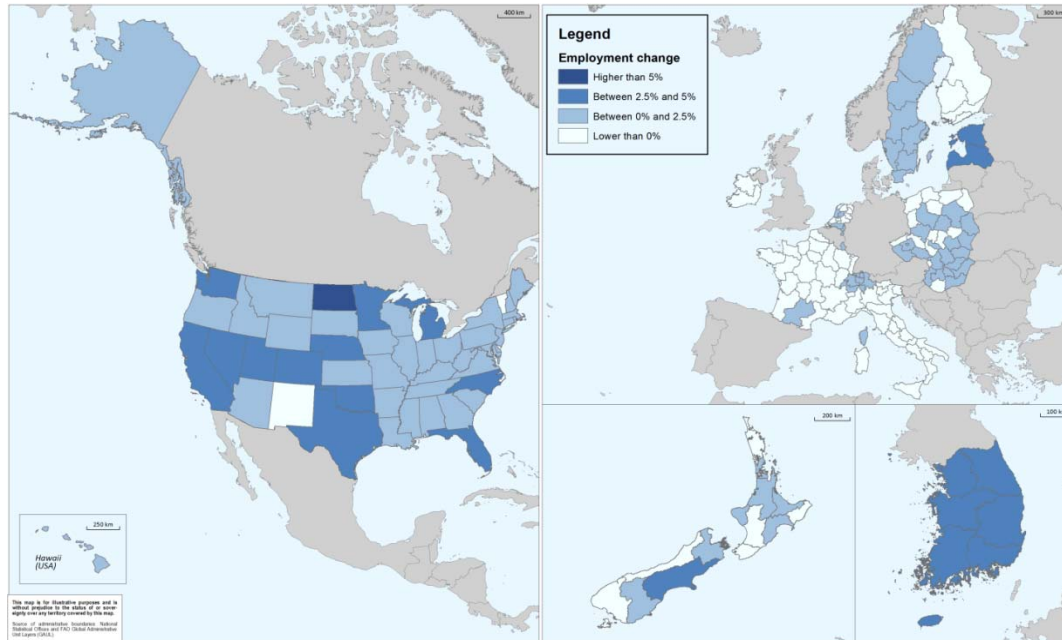
Figure 4.8. Birth rates of establishments and enterprises in French TL3 regions, selected sectors



Note: TL3 French regions for eight individual sectors B-E, F, G, H, I, J, M-N and R-S.

StatLink  <http://dx.doi.org/10.1787/888933626288>

Figure 4.9. Annual employment growth across OECD regions, 2010-14



Notes: The annual average change (CAGR) in employment is computed for 2010-14. Based on data availability, the following exceptions were made: Luxembourg and Switzerland (2011-14); France (2008-13); Italy (2012-14); Finland (2013-14); Ireland (2009-11).

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

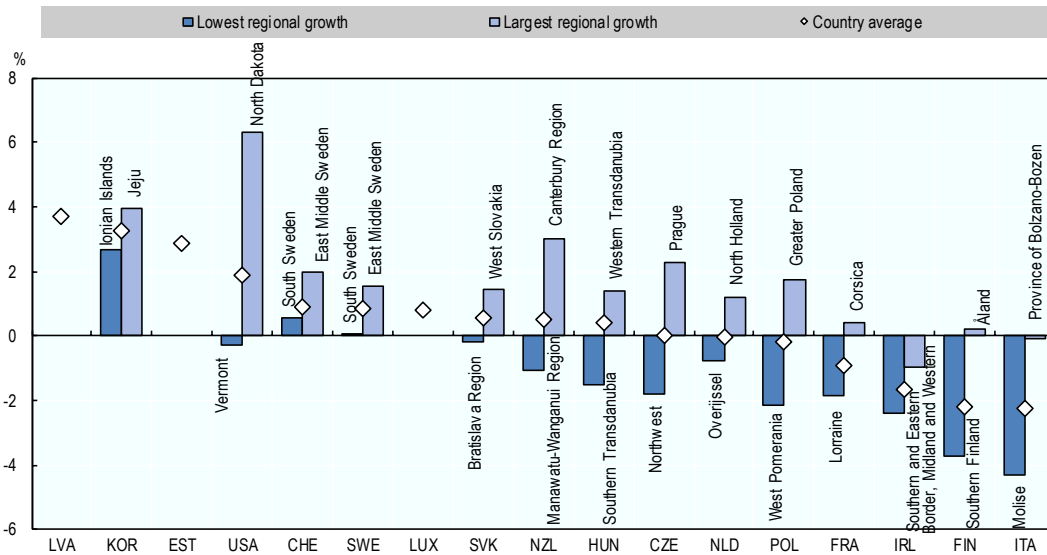
StatLink  <http://dx.doi.org/10.1787/888933626307>

In a few countries, namely Korea, Sweden, and Switzerland, all TL2 regions experienced employment growth. Korea, in particular, stands out with employment growth, measured in terms of annual average growth rates, surpassing 2.5% in the entire country but not exceeding 5% in any single region. In contrast, in the United States, most regions experienced positive but small employment growth rates, while in North Dakota employment grew on average around 6% per year.

Notwithstanding the cases of those countries, numerous OECD regions actually lost employment throughout the analysed period. For instance in France, Ireland, Italy and the Netherlands a majority or large proportion of regions had negative employment growth rates. National statistics can readily mask large differences across regions of the same country in the aftermath of the financial crisis.

Regional variation in annual business employment creation is considerable. Figure 4.10 takes a closer look at the respective regional country average as well as the best- and worst-performing regions in each country regarding employment creation. Apart from Korea and, to some extent, Switzerland, there are great regional differences in annual employment creation. In almost all countries, the regional leader in terms of business employment creation clearly outperformed the country average, and even more the worst-performing region.

The immediate aftermath of the financial crisis significantly affected regional employment in some OECD countries. Between roughly 2010 and 2014, regions in Finland, France, Ireland and Italy reported, on average, significant losses in employment. In many other countries, the average region only experienced muted employment growth of less than 1% per year.

Figure 4.10. **Employment creation across TL2 regions, annual average change, 2010-14**

Notes: The annual average change (CAGR) in employment is computed for 2010-14. Based on data availability, the following exceptions were made: Luxembourg and Switzerland (2011-14); France (2008-13); Italy (2012-14); Finland (2013-14); Ireland (2009-11).

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933626326>

To some degree, the employment change mirrors the more general economic development in OECD countries following the financial crisis. European countries were not only hit hard by the crisis, but their economies predominantly needed longer to start a meaningful recovery. This can be observed by the right-hand tail of the figure, which exclusively consists of European countries.

### ***Growth of employment in businesses – mostly metropolitan vs. non metropolitan regions***

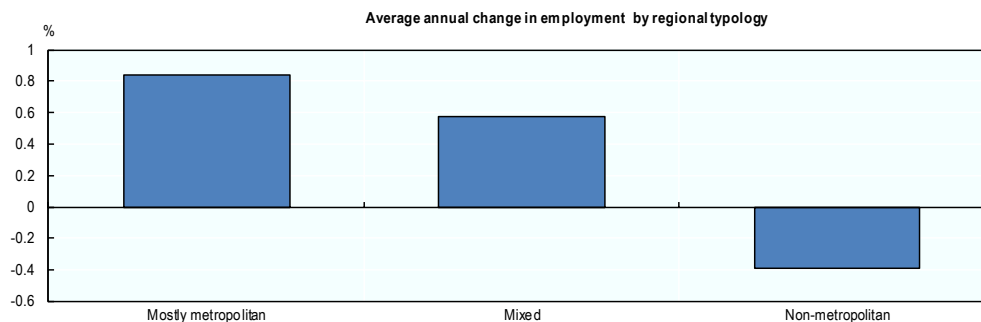
One dimension that has frequently been shown to be relevant in assessing regional economic trends is the typology of regions (OECD, 2016). Using the OECD typology of TL2 regions, the relevance of that categorisation for employment growth is assessable through a simple categorisation of regions based on the share of people living in functional urban areas (Table 3.3).

Mostly metropolitan regions experienced annual employment growth in excess of 0.8%, while non-metropolitan regions, on average, lost almost 0.4% of their employment base per year (Figure 4.11). In total, the annual difference in employment growth rates of approximately 1.2 percentage points over the course of four years demonstrates the vastly differential fates of employment in mostly metropolitan and non-metropolitan areas. Mixed regions recorded employment growth that was slightly lower than in mostly metropolitan regions, with an average growth rate of approximately 0.6%.

These different trends in employment growth were supported by simultaneous differences in the increase in the number of establishments. In mostly metropolitan regions, the count of establishments increased by around 1.5% per year, while the stock of establishments grew by 1.2% in mixed regions. In non-metropolitan regions on the

other hand, the number of establishments mildly fell over the same period (by 0.3%). This finding differs clearly from the recent trends of employment creation in new firms by type of region (Figure 4.2). Besides the fact that the figures assess TL2 and TL3 regions respectively, the contrast also points out that employment created by new establishments does not necessarily belong to a new enterprise, but can be caused by the expansion of an existing enterprise. Consequently, employment statistics on establishment demography data can overestimate the actual contribution of new firms on employment creation.

Figure 4.11. **Employment change – mostly metropolitan vs. non-metropolitan regions**

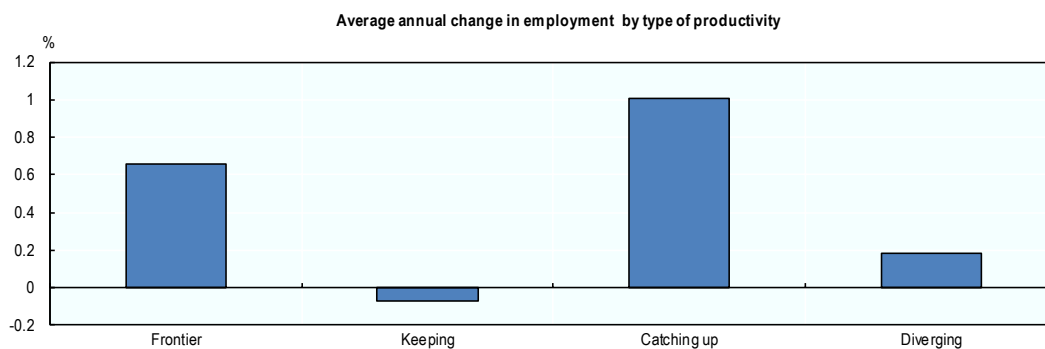


*Notes:* The annual average change (CAGR) in employment is computed for 2010-14. Based on data availability, the following exceptions were made: Luxembourg and Switzerland (2011-14); France (2008-13); Italy (2012-14); Finland (2013-14); Ireland (2009-11).

*StatLink*  <http://dx.doi.org/10.1787/888933626345>

Large regional disparities in employment growth rates are observed also when dividing regions according to their levels of regional productivity (measured by GDP per employee, classification reported in OECD [2016]). Overall, frontier regions, those among the highest 10% of regions regarding GDP per employee, and especially catching-up regions, clearly outpaced the remaining regions in terms of job creation. In the frontier regions, employment grew with an annual growth rate of more than 0.6% between 2010 and 2014 (Figure 4.12). Regions that are classified as catching-up, recording higher GDP per employee growth than the frontier regions, experienced the largest employment growth, with an average annual growth of 1.0% over the period of analysis.

Figure 4.12. **Employment change by regional productivity**



*Notes:* Countries included are the Czech Republic, Estonia, Finland, France, Hungary, Ireland, Italy, Korea, the Netherlands, New Zealand, Poland, the Slovak Republic, Sweden and the United States. The annual change (CAGR) is computed from multiple year changes, corresponding to 2010-14 for most countries.

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933626364>



In contrast to frontier and catching-up regions stand the experiences of diverging regions and those regions classified as keeping pace. Diverging regions barely recorded any employment creation at all, with a growth rate that was significantly below 0.2% annually. Regions classified as keeping pace even documented, on average, mild employment losses (0.5% annually).

Differences across regions in the growth of business employment can be connected to specific characteristics of the regions. Two sets of regional characteristics appear to be strongly correlated with regional employment growth: innovation and economic factors related to productivity and competitiveness. Using region-specific information, a simple OLS regression is run on a number of possible explanatory variables. To control for country-specific factors, country fixed effects are included (see Annex 4.A4).

Overall, regions with more innovative, more productive and high-tech oriented economies fared best with respect to employment creation across Europe. Innovation and research both within firms as well as in the regions generally appear to have mattered for employment creation. On the regional level, the number of scientific publications per capita and the number of high-tech inventors per capita were strongly correlated with employment growth. Similarly, the presence of innovative and collaborative small and medium enterprises (SMEs) and the proportion of knowledge workers among all employees were associated with higher employment creation.

The positive association between employment growth and human capital and innovation offers a potential explanation for the findings that urban regions record greater employment growth and employment creation through new firms (Figures 3.9 and 3.11). Large cities, and therefore urban regions, have a relative advantage in terms of the presence of university and research institutions or the average education of its workforce, which can induce more employment-increasing innovation (Acs, Bosma and Sternberg, 2011).

These results seem also to suggest that there are potential direct and indirect benefits to be reaped from efforts to encourage innovation, with knowledge spillovers to firms being one possible mechanism at work. Furthermore, employment growth was observed to be relatively higher in regions with higher levels of productivity and with a relatively stronger tradable sector, such as a higher relative export in high-tech manufacturing.

### **The role of new establishments for regional employment creation**

The importance of business demography (based on new establishments) for job creations has been documented by several studies. For instance, establishment births and deaths have been shown to account for almost 20% of job creation and destruction in the United States as observed by quarterly data for the years 1990-1995 (Spletzer, 2000).<sup>10</sup> Their importance rises considerably when job creation is measured at a lower frequency, because such an approach also captures some of the employment impact of establishment growth, which only materialises gradually and is therefore not immediately captured in the first quarter after a business is born.

Subnational data on establishment birth and death rates, and the employment associated to these events, are only available for a small subset of OECD countries, namely Japan, Mexico, New Zealand and the United States. For Mexico there is only information on establishment births so that employment dynamics caused by establishment deaths as well as the overall impact of establishment demographic developments on employment creation can be only examined in three countries.

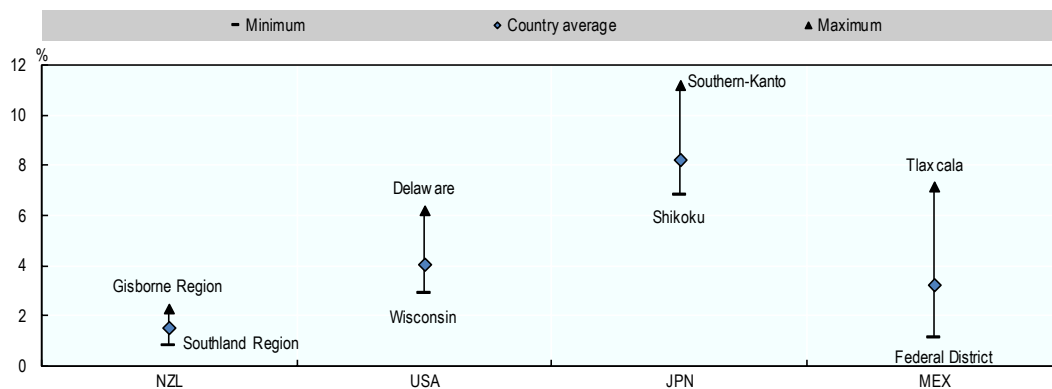


The impact of business demography at the regional level is examined along three measures: employment creation, employment destruction and net employment. The employment creation rate is measured as the share of a region's employment that was generated by new establishments over a defined period. Similarly, the employment destruction rate is defined as the number of jobs lost due to establishment deaths relative to the overall employment in the same region in the same year. Job net creation captures the net contribution of business demography, considering both firm deaths and births, to regional employment.

Newly founded establishments can account for large shares of created jobs in the four countries considered. For instance, new establishments in Japan created jobs equivalent to more than 8% of the regional employment total. At the same time, there is both considerable within-country as well as cross-country heterogeneity in the contribution of establishment births to employment creation.

In Mexico and the United States, the regions with the largest employment creation rates, Tlaxcala and Delaware, record job creation in excess of 5% of their respective entire employment (Figure 4.13). Employment creation in these two regions is twice as large as the respective national average. Similarly, the Japanese region with the largest share of newly created employment, Southern-Kanto, which includes among others Tokyo, registered an employment creation rate that is around 4.5 percentage points greater than in Shikoku, where job creation was the lowest. In contrast to the other three countries, employment creation by new establishments across regions in New Zealand was both modest and relatively homogenous.

Figure 4.13. **Employment creation rate by births, 2014 (or latest available year)**



*Note:* The statistics are based on all sectors (ISIC Rev. 4 categories A to U) as a breakdown to B to N would yield a loss of a further two countries.

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

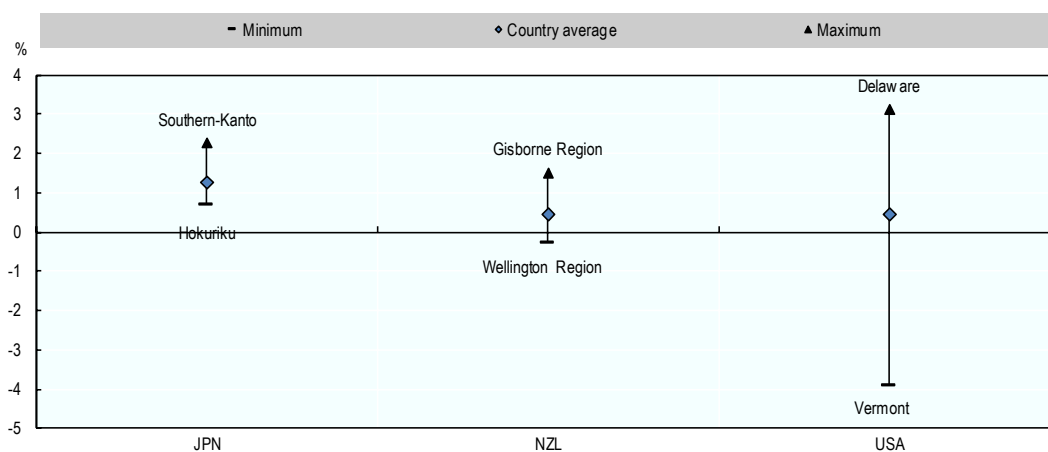
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Areas with large employment creation rates can be characterised by great employment dynamics more generally. Not only is the share of jobs created by newly founded establishments high in such regions, but the same holds true for the loss of employment by establishment deaths relative to overall employment. In Japan for instance, Southern-Kanto has both the largest employment creation and loss rates, while Shikoku records the lowest rates of employment created or lost by establishment dynamics.

Overall, regional employment loss and creation through establishment entries or exits seems to be correlated, though there may be exceptions. However, net employment rates could be examined to scrutinize this point further (Figure 4.14).

The cross-country differences in net employment creations are less pronounced than in either job creation or destruction, as evidenced by the more comparable country averages of regional net job creation rates. However, large regional disparities persist. While Vermont (United States) experienced employment destruction through the establishment births and deaths equivalent to 4% of its entire employment in 2014, net job creations amounted to more than 3% in Delaware (United States) and 2.2% in Southern-Kanto (Japan) in 2014.

Figure 4.14. Net employment creation rates by new establishments, 2014 (or latest available year)



Note: The statistics are based on all sectors (ISIC Rev. 4 categories A to U) as a breakdown to B to N would yield a loss of a further two countries.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933626402>

The findings point out two facts. First, the importance of new establishments on job creation is non-negligible. It can provide a vital source for employment growth in OECD regions. Second, the net effect of business demography is very diverse. As a result of establishment births and deaths, some regions experience a loss of employment, while in others jobs created by newly founded establishments clearly outnumbered jobs lost by the death of establishments.

The total effect of new firms on regional employment might constitute an even greater contribution to overall employment than that assessed in terms of jobs directly created with new firms. Indirect effects of new firms/start-ups on employment in existing, mature firms can arise through innovation spillovers and through a competition effect on existing firms. In the case of Germany, such indirect effects are estimated to be larger than the direct effect, accounting for 60% of new employment due to new firms between 1984 and 2002 (Fritsch and Noseleit, 2013).

## Employment growth in small and medium-sized establishments

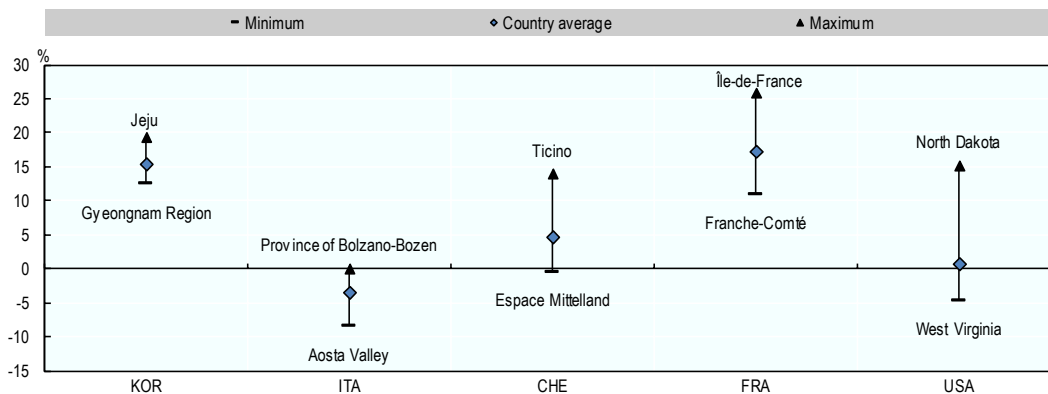
As discussed in Chapter 3, SMEs are often pivotal in creating jobs. Small and young firms contribute disproportionately to new employment (Neumark, Wall and Zhang, 2011). Therefore, SMEs are regularly the focus of attention in policy discussions about job creation.

The concept of small and medium-sized entities can also be applied to establishments, which might not always correspond to but certainly offer a good approximation of SMEs. In line with the most common definition of SMEs, small to medium-sized establishments in this report include establishments with less than 250 employees (OECD, 2010). They consist of micro (0-10 employees), small (10-49 employees) and medium-sized (50-249 employees) establishments. In general, SMEs make up the vast majority of all enterprises in the OECD (on average more than 99% in non-financial business sectors) and they are a major source of employment, as approximately 60% of all employment in the OECD is accounted for by SMEs (OECD, 2017b; 2017c).

Another appeal of SMEs is that they can be used as an approximation for the effect of business demography on employment. The vast majority, over 99% in 2014, of establishments and therefore also new establishments, fall into the small to medium-sized category of having less than 250 employees. For that reason, the change of the number of small to medium-sized establishments offers a reasonable measure for establishment dynamics in light of limited data availability on establishment demography.

In Figure 4.15, the regional variation in the change of the number of SMEs, as measured by establishments, between 2010 and 2014 is presented by country.<sup>11</sup> Korean and French regions saw, on average, a large increase in the number of SMEs. Average SME growth in American and Italian regions, on the other hand, was flat or even negative. In each of the countries presented in the figure, the leading region with regards to SME growth saw its number of SMEs grow markedly. In Île-de-France that growth was greater than 25%, while North Dakota, Ticino and Jeju all had SME growth rates between 15% and 20%. These figures include non-employer firms, which account for an important share of total business creation.

Figure 4.15. **Change in the number of small and medium-sized establishments, 2010-14**



*Note:* The statistics are based on all sectors (ISIC Rev. 4 categories A to U) as a breakdown to B to N would yield a loss of a further two countries.

*Source:* OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

*StatLink*  <http://dx.doi.org/10.1787/888933626421>

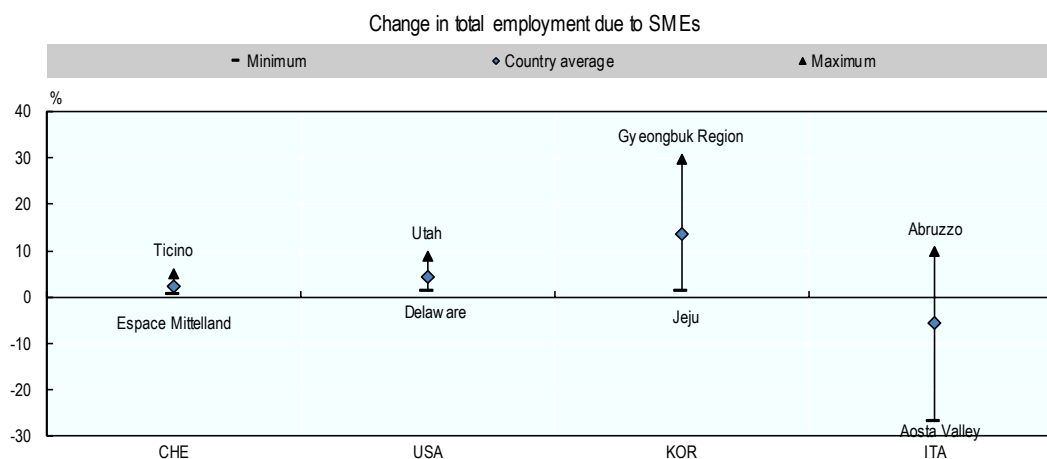
### ***Regional contribution of small to medium-sized establishments to change in employment***

Even though conditions that are conducive to entrepreneurship and SME creation are often associated with job creation, it is not absolutely clear how an increase in the number of SMEs affects employment, as the exact number of employees of each SME is unknown. To elicit the role of SMEs for regional employment, Figure 4.16 illustrates regional employment growth in small to medium-sized establishments relative to overall regional employment.

Across all countries and all types of regions employment changes can, to a very large extent, be attributed to SMEs. Across 17 OECD countries and Brazil, SMEs have been shown to account for 75% of gross job creation (Criscuolo, Gal and Menon, 2014).

In regions with very high employment growth, that growth was mostly driven by job creation through SMEs. Conversely, regions with low or even negative employment growth (e.g. Aosta Valley or Espace Mittelland) at the same time recorded sluggish or negative job creation in SMEs. This finding emphasises the crucial economic role SMEs might play for regions. They can be a powerful source of innovation and job creation and thus economic growth. Regions that lag behind economically or, more specifically, in terms of employment opportunities, can benefit from policies that augment the conditions for entrepreneurship and SMEs.

Figure 4.16. **Employment in SMEs and its regional growth relative to overall employment, 2010-14**



Note: The statistics are based on sectors B to N and capture the employment dynamics between 2010 and 2014.

Source: OECD (2017a), *Regional Business Demography* (database), <http://dx.doi.org/10.1787/region-data-en>.

StatLink  <http://dx.doi.org/10.1787/888933626269>

New establishments almost always, by default, fall into the SME category. At the same time the smaller and especially younger enterprises among SMEs are the ones that really drive SMEs' extraordinary importance for job creation (Lawless, 2014; Haltiwanger, Jarmin and Miranda, 2013).

### **Regional environment and employment growth in incumbent firms**

While regional employment growth as a result of business dynamics is considerable in many OECD regions, an even larger share of new jobs is created in existing firms.

Such employment growth is also highly heterogeneous, which begs the question: to what extent the location of a firm, i.e. regional factors, have an influence on its employment growth? While in theory it is acknowledged that location should be a relevant determinant of a firm's ability to create jobs, empirical research has mainly focused on firm-specific characteristics. To examine the role of the regional business environment, more than 2 million distinct firms from Bureau van Dijk's Orbis database in 19 European countries are matched to the region where they are located based on their postal codes.<sup>12</sup>

The sample covers the period 2008-14, with between 940 000 and 1.27 million observations for each year. Due to missing data the firms are unevenly distributed across countries with France, Italy, Poland, Sweden and Spain accounting for more than 80% of the firms in the sample. In the sample, the majority of firms are SMEs, firms with fewer than 250 employees, accounting for roughly 98% of observations in each year. Large firms in the sample, however, account for about 72% of total employment. These large firms have higher employment growth, on average, over the sample period. Among the SMEs, it is typically young firms that drive employment growth, in line with results in Chapter 5 and prior evidence (Criscuolo, Gal and Menon, 2014). The substantial heterogeneity between large firms and SMEs is therefore explicitly taken into account by allowing for different growth rates and a distinct effect of regional variables on SME employment growth.

In addition to firm-level characteristics such as size, age, productivity and sector of activity that have been found relevant for employment growth, the analysis controls for a set of regional characteristics, specifically whether the firm is located in a predominantly urban region at the TL3 level, real GDP per capita, real GDP growth, the unemployment rate at the TL2 and TL3 regional levels, and the educational attainment of the regional labour force at the TL2 level. The sample is also explicitly split between manufacturing firms and non-manufacturing firms, which, for the most part, produce services.

An important limitation of the Orbis database is that it is not a random sample, nor a registry of all businesses. While efforts have been made to create representative samples from the available database (Kalemli-Ozcan et al., 2015), the issue of firm births and deaths cannot easily be addressed. The results should therefore be taken as pertaining to incumbent firms. The estimations rely on multi-variate ordinary least squares regressions, accounting for a range of firm-level, regional and national characteristics, as well as country-industry and year fixed effects (Box 4.3).

#### Box 4.3. Empirical specification for firm-level regressions

Let  $emp_{c,r,j,i,t}$  denote firm-level employment in firm  $i$  operating in industry  $j$  in region  $r$  and country  $c$  in year  $t$ , the estimated model is:

$$\begin{aligned} \ln(emp_{c,r,j,i,t}) - \ln(emp_{c,r,j,i,t-1}) &= \alpha X_{c,r,j,i,t} + \beta Y_{c,t} + \delta Y_{c,r,t} \\ &+ \lambda SME_{c,r,j,i,t} + \theta SME_{c,r,j,i,t} Y_{c,r,t} + \gamma_t \\ &+ \gamma_{c,j} + u_{c,r,j,i,t} \end{aligned}$$

$X_{c,r,j,i,t}$  is a set of time-varying firm-specific variables including age (the difference between the year of observation and the year in which the firm was created) and the logarithm of the firm's multifactor productivity in year  $t-1$ .  $SME_{c,r,j,i,t}$  is a dummy variable equal to one if the firm is a small or medium enterprise, i.e. has strictly fewer than 250 employees, and zero otherwise.

$Y_{c,t}$  is a set of time-varying country-level variables, including the logarithm of real GDP per capita and the rate of real GDP growth.

### Box 4.3. Empirical specification for firm-level regressions (cont.)

$\mathbf{Y}_{c,r,t}$  is a set of time-varying regional variables, including the logarithm of real GDP per capita, the rate of real GDP growth, the unemployment rate (all at the TL2 or TL3 levels), and the share of the labour force with a tertiary education (at the TL2 level). It also includes a dummy variable equal to one if the firm is located in a predominantly urban region at the TL3 level.  $\mathbf{SME}_{c,r,j,i,t}$   $\mathbf{Y}_{c,r,t}$  is a set of interaction terms between the SME dummy and the regional variables to account for the potential heterogeneity with which the regional environment affects firms of different size categories. Finally,  $\boldsymbol{\gamma}_t$  are year fixed effects,  $\boldsymbol{\gamma}_{c,j}$  are country-industry fixed effects and  $\mathbf{u}_{c,r,j,i,t}$  is the error term.

Firm-level productivity (measured by multi-factor productivity) is one of the most important firm-level determinants for employment growth. Employment expands faster in more productive firms. A non-manufacturing firm with one standard deviation higher productivity has, on average, a 4 percentage points higher employment growth rate, equivalent to 13% of the standard deviation in employment growth (Columns 2, 4 and 5 in Table 4.3). In manufacturing, the effect is even larger, at around 5 percentage points (Columns 1, 3 and 5 in Table 4.3). Theoretically, the sign of the relationship between productivity and employment is ambiguous and the existence of a trade-off has been the subject of a long-standing debate (e.g. Gordon, 1995). Higher productivity (e.g. through technological progress) enables producing the same amount of output with fewer workers, thereby reducing labour demand. However, this might be offset by the fact that higher productivity reduces the cost of production, which leads to a higher demand for the products and for more workers until wages adjust upwards. Among incumbent firms this positive effect appears to dominate.

Older firms and SMEs are found to experience, on average, lower employment growth. This result likely hides substantial heterogeneity across SMEs as empirical results point to young SMEs as a significant source of employment and job growth (e.g. Criscuolo, Gal and Menon, 2014). The results for incumbent firms highlight that SMEs in the manufacturing sector actually do grow faster than large firms. The opposite is the case for non-manufacturing firms. There is substantial evidence that small firms face larger growth constraints and have more limited access to external finance, potentially explaining the lack of SME employment growth (e.g. Beck and Demircuc-Kunt, 2006) over the sample period 2008-14, which includes the aftermath of the 2007-08 global crisis and the euro area crisis that affected many of the countries that account for a significant percentage of the firms in the sample.

Employment grows more slowly in firms in richer countries, i.e. countries with higher GDP per capita. But, given a country's level of economic development, employment grows faster in firms located in the country's wealthier regions. As countries develop, the opportunities for catching up and rapid expansion diminish, leading to a slowdown in overall growth, including employment growth. The process of country-level growth can be accompanied by within-country convergence or divergence. Across the OECD, the trend was towards an increasing contribution of within-country inequality compared to the contribution of inequality across countries (OECD, 2016). In terms of employment, there seems to be a similar trend towards concentration, at least among incumbent firms, as those in wealthier TL2 regions attract more employment (Columns 1 and 2 in Table 4.3). For manufacturing firms, the positive impact is driven by large firms, but in the services

sector it is the growth of SMEs that is positively affected by the level of regional wealth (Columns 3 and 4).

Employment growth is not necessarily concentrated in the richest parts of a region. Employment in firms located in predominantly urban TL3 regions is growing more slowly than in other intermediate or predominantly rural regions. This effect is mainly due to large firms growing more slowly in the denser TL3 regions (Columns 1-6 in Table 4.3). Often rural regions in the proximity of cities are growing faster than the urban or even intermediate areas they are connected to (OECD, 2016). Since space is scarce, the cost of land is higher in larger cities. Locating in the vicinity can therefore yield a double-dividend of lower cost for land, but access to the labour and product markets in larger cities. This is in line with larger firms growing even slower than SMEs in predominantly urban areas (Columns 3 and 4 in Table 4.3). The result is also supported by considering regional per capita GDP at a smaller regional scale. At the TL3 level, the local per capita GDP has no statistically significant impact on employment growth, neither in manufacturing, nor in services nor for firms of different sizes (Columns 5 and 6 in Table 4.3).

Real GDP growth is positively and statistically significantly correlated with employment growth in incumbent firms, both at the country and at the regional level (Columns 1 and 2 in Table 4.3). A growing economy will naturally create higher labour demand. However, it is interesting that the regional dimension still matters after controlling for the national dimension. This indicates that local economic conditions matter beyond national conditions, especially for SMEs. For non-manufacturing firms this result highlights the importance of local links in (non-tradable) services. As economic conditions improve, demand for hospitality services, local retail opportunities, etc. grows. For SMEs in the manufacturing sector, the importance of local economic growth for job creation is more striking (Columns 3 and 5 in Table 4.3). It might indicate that SMEs in manufacturing depend relatively more than large firms on local markets to sell their products.

Labour market conditions, such as the supply and the type of workers available, can affect employment growth in firms. A common complaint is the lack of available – qualified – labour. On average, firms in regions with higher levels of human capital can be expected to experience faster employment growth (e.g. Shapiro, 2006). In line with this, the share of the regional labour force with tertiary education is positively correlated with employment growth, but the magnitude of the relationship is small. A 1 percentage point increase in the share of the regional labour force with tertiary education is, on average, associated with a 0.04 percentage point increase in employment growth in manufacturing and a 0.01 percentage point increase in non-manufacturing firms. The relationship is only significant in manufacturing (Columns 1 and 2 in Table 4.3). Differences arise between SMEs and larger firms and across sectors. For large non-manufacturing firms, a larger pool of tertiary educated workers in the wider (TL2) region is positively associated with employment growth, with an estimate of 0.1 percentage points (Column 4 in Table 4.3). However, this effect is not evident when considering the labour force at the local (TL3) scale (Column 6 in Table 4.3). For manufacturing firms, the results indicate the opposite. Employment growth in manufacturing SMEs benefits from a more educated workforce in the wider (TL2) region, while a larger percentage of educated workers in the local area (TL3) is associated with positive growth in larger manufacturing firms. Combined, the results highlight the complex nature of local labour market links. Commuting flows, especially those among the more educated, can easily cross administrative boundaries. A second indicator of labour market conditions is the local unemployment rate. It captures the “slack” in the local labour market, i.e. the pool of available workers a firm can tap into. This “slack” does not seem to benefit SMEs, but



where the estimates are statistically significant, they indicate that employment in large firms grows faster when unemployment rises, indicating that during downturns SMEs, at least on average, find it harder to expand (Columns 3 and 6 in Table 4.3).

Results based on firm-level microdata highlight the importance of the local environment in shaping the employment growth of incumbent firms. Employment grows more slowly in firms in wealthier countries. But, given a country's level of economic development, employment grows faster in firms located in the country's wealthier regions. However, employment growth is not necessarily concentrated in the wealthier urban parts of a region, as locating in the vicinity of urban areas offers advantages in terms of costs and access to markets and inputs. In addition, regional growth matters beyond national growth, which indicates that firms depend on the dynamism of their local markets. Finally, the results highlight the complex nature of local labour market links, as there is substantial heterogeneity across firm size categories and sectors in the link between local skill availability and employment growth. Other factors not explored here deserve further examination, such as the general policy environment, the regulatory burden facing businesses, the ease of doing business, corruption levels, and specialisation in some segments, such as high-tech manufacturing and R&D activities. The low R-squared in the regressions highlights that there is a substantial proportion of variation in the data that remains unexplained.

Table 4.3. **Determinants of employment growth in incumbent firms**

	(1)	(2)	(3)	(4)	(5)	(6)
	Manuf.	Non-man.	Manuf.	Non-man.	Manuf.	Non-man.
Age	-0.137*** (0.01)	-0.189*** (0.01)	-0.137*** (0.01)	-0.189*** (0.01)	-0.166*** (0.01)	-0.212*** (0.01)
ln(MFP)	4.860*** (0.25)	3.993*** (0.23)	4.866*** (0.25)	3.991*** (0.23)	5.292*** (0.26)	4.364*** (0.26)
SME	1.663*** (0.24)	-1.596*** (0.26)	28.74* (14.98)	-36.35** (15.46)	2.599 (13.61)	-13.61 (13.88)
ln(GDP per capita) (country)	-16.64*** (6.23)	-6.690 (7.55)	-16.62*** (6.24)	-6.679 (7.53)	-10.07 (6.77)	-3.348 (7.95)
Real GDP growth (country)	0.613*** (0.07)	0.446*** (0.06)	0.616*** (0.07)	0.445*** (0.06)	0.591*** (0.08)	0.432*** (0.07)
Predominantly urban (TL3) region	-0.450*** (0.08)	-0.350*** (0.07)	-1.040*** (0.23)	-0.952*** (0.25)	-0.673** (0.32)	-1.129*** (0.35)
SME*Predominantly urban (TL3) region			0.609*** (0.23)	0.608** (0.24)	0.349 (0.32)	0.727** (0.35)
ln(GDP per capita)	5.544*** (1.95)	4.571*** (1.21)	10.93*** (3.58)	-2.851 (3.39)	-2.453 (2.80)	-2.788 (2.89)
SME*ln(GDP per capita)			-5.660* (3.23)	7.556** (3.31)	0.237 (2.93)	2.475 (3.02)
Real GDP growth	0.094*** (0.03)	0.092*** (0.02)	-0.154** (0.07)	0.099* (0.06)	-0.030 (0.06)	0.100** (0.05)
SME*Real GDP growth			0.257*** (0.07)	-0.004 (0.06)	0.105* (0.06)	-0.031 (0.05)
Unemployment rate	-0.001 (0.02)	0.010 (0.01)	0.062*** (0.02)	0.015 (0.02)	0.010 (0.04)	0.148*** (0.05)
SME*Unemployment rate			-0.065*** (0.02)	0.003 (0.02)	0.0136 (0.04)	-0.133*** (0.05)
Share of labour force with tertiary education	0.035** (0.02)	0.013 (0.02)	-0.044 (0.04)	0.093* (0.05)	0.086*** (0.02)	0.009 (0.03)



Table 4.3. **Determinants of employment growth in incumbent firms** (*cont.*)

	(1)	(2)	(3)	(4)	(5)	(6)
	Manuf.	Non-man.	Manuf.	Non-man.	Manuf.	Non-man.
SME*Share of labour force with tertiary education			0.079** (0.04)	-0.080* (0.04)	-0.055** (0.02)	0.040 (0.03)
Observations	1 467 583	6 380 165	1 467 583	6 380 165	1 241 428	5 395 796
R-squared	0.035	0.024	0.035	0.024	0.037	0.026
Regional level	TL2	TL2	TL2	TL2	TL3	TL3

*Notes:* OLS regressions with firm-level year-on-year employment growth as dependent variable. The sample is split between manufacturing (Manuf.) and non-manufacturing (Non-manuf.) firms, the latter being mostly services sector firms. The sample covers the period 2008-14. Regional covariates are measured at the TL2 level in Columns 1-4 and at the TL3 level in Columns 5-6. Countries included are Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxemburg, Latvia, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom, when using TL2-level controls. Portugal and Slovenia are excluded in TL3-level regressions as data are not available. All regressions include year and country-industry dummies. Robust standard errors in parentheses. Regression constants are not reported. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

*Source:* Calculations based on Orbis; OECD (2017e), *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/region-data-en>.

## Concluding remarks

This chapter has presented an analysis of business employment at regional level across OECD countries. It has documented the spatial variation across OECD regions in terms of employment creation by new firms. Based on the comparison of employment and establishment-level data, it has unveiled and discussed the primary challenges in measuring employment at the subnational level. Furthermore, it has demonstrated the relevance of regional business demography for employment creation and employment losses. Entrepreneurship is often embodied by regions' dynamics in terms of its SME environment, the contribution of which to employment growth is documented.

Comparing employment statistics derived from different approaches, this chapter reveals a bias between enterprise-level and establishment-level measures. This so-called headquarter bias, which results from regional misattribution of employment for multi-establishment enterprises, tends to overstate or understate regions' actual contribution to regional employment dynamics. This bias is especially pronounced in capital regions, where many enterprise headquarters are located.

While the development of a regional establishment database, its comparison with enterprise data and the analysis discussed in this chapter constitute important contributions, there are clear areas for future work to enhance the policy debate on the regional employment effects of entrepreneurship. Foremost, data availability limits the range of the geographic and conceptual scope of future analyses. Co-ordinated efforts with NSOs could alleviate this problem. Expanding coverage of employment demography statistics for TL3 regions could significantly enhance any subnational analysis of employment dynamics.

The analysis demonstrates that new enterprises, new establishments and existing small to medium-sized establishments more generally can be important sources of job creation across OECD regions. According to the most recent available data, regions do, however, vary quite substantially in their ability to create jobs through firm dynamics or in existing small or medium-sized establishments. Precisely for that reason, policies that stimulate entrepreneurship can help regions that lag behind to catch up and eventually converge not only in terms of employment, but also in economic welfare as a whole.

Overall, this chapter made first strides forward towards the objective of collecting and analysing an internationally comparable dataset of business demography and employment at the enterprise and establishment level across OECD countries. In order to improve this dataset further and thus to enhance any assessment of regional employment dynamics, the sample of countries that provide precise employment demographics information at a detailed geographical level (TL3 regions) needs to be extended to more countries. In this regard, a closer collaboration with NSOs might be conducive to filling the current empirical gap.

For future work, further light on the links between enterprises and establishments could be shed. Understanding such links would elicit how conditions in one location could have spillover effects, e.g. in the case of potential crisis scenarios. Economic difficulties or bankruptcy in one location or sector (enterprise) could have adverse consequences for different locations (establishments) of the same firm that are themselves in good condition. Such linkages and domino effects are of particular interest for the study of regional employment creations or losses, an area of notable importance to economic policy.

Until recently, such linkages were difficult to measure and examine. However, the availability of new and richer data has alleviated this problem. The most promising path in this direction exploits firm-level micro data, as the previous section on employment growth in existing firms did. Those data allow tracking the same firms over time and might also establish linkages between enterprises and establishment (through ownership structure information) across regions. Another important advantage of such micro-data is that it, with a sufficiently long temporal coverage, makes it possible to not only estimate the short-term, direct effects of new firms on employment, but also the longer term, indirect effects (Fritsch, 2013).

The following chapter pursues such an analysis of micro-data based on the OECD DynEmp Regional project (OECD, 2017a). It thus contributes to this report by providing evidence on regional employment dynamics by directly micro-aggregating firm-level data at the regional level. Such an exercise complements this chapter's focus on regional employment patterns. In particular, it includes an analysis of establishment-level characteristics as well as regional factors as potential determinants for regional employment growth.

## Notes

1. This section considers only employment in employer firms. In other words, it excludes self-employment firms from the analysis.
2. On the one hand, in most member states, there are operational programmes prepared targeted at each NUTS-2 (or NUTS-1) region's development. On the other hand, there are operational programmes in the context of a specific thematic priority, like environment or energy.
3. Bachtrögler et al. (2017) present a database with over 2 million of projects co-funded by Cohesion Policy instruments by the ERDF, the ESF and the CF in the multi-financial framework 2007-13. The projects are carried out by over 1 million individual beneficiaries (firms and institutions) which are matched with the Orbis

business database in order to get more information on business characteristics and the beneficiaries' location.

4. Note that for the country sample split into groups of regions, we use enterprise data and consider all firms in the baseline results. As a robustness check, the indicators are calculated considering only firms with employees. Furthermore, results are robust to including regional fixed effects in the calculation of propensity scores.
5. Exceptions are the results for the Czech Republic and Portugal when only considering firms with employees, where the effect (coefficient) on value-added growth generated by treated firms in regions with higher dynamics appears to be lower than in less-dynamic regions.
6. Another example is the United States, where the proportion of multi-plant firms among the entire business population has been estimated to be around one-third while multi-establishment firms constitute around 57% of all employment (Sadeghi, Talan, Clayton, 2016).
7. Sectors B to N include industry, construction, retail trade, transport, hospitality, information and communication, finance, and professional services. Sectors A to U cover the entire economy.
8. For reasons of comparability and greatest possible coverage, all figures in this chapter are based on the same set of business sectors unless stated otherwise. Aiming at the greatest possible coverage, the statistics include establishments (enterprises) from all business sectors, excluding education and arts, which corresponds to ISIC Rev. 4 categories B to N.
9. The sample of countries is restricted by the requirement of having subnational employment statistics for the same business sectors for both the enterprise and establishment approach.
10. Using longitudinal establishment data for Germany, Brixy (2014) also provides evidence of the positive contribution of start-ups to regional employment creation.
11. Analogously to the change in regional employment shown in Figures 4.9 and 4.10, the change was computed, where possible, from 2010 to 2014. Where data limitations restricted this choice, the next closest set of years was selected. See note of Figure 4.10 for more details.
12. See Gal (2013) for a description of the Orbis data. The 19 countries covered are Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxemburg, Latvia, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## *Annex 4.A1.*

### Establishment data sources

<b>Austria</b>	<p>Statistics Austria          Data: <a href="http://www.statistik.at/web_en/statistics/Economy/enterprises/local_units_of_employment_from_census_2011/index.html">www.statistik.at/web_en/statistics/Economy/enterprises/local_units_of_employment_from_census_2011/index.html</a>.          Metadata: <a href="http://www.statistik.at/web_en/statistics/Economy/enterprises/local_units_of_employment_from_census_2011/index.html">www.statistik.at/web_en/statistics/Economy/enterprises/local_units_of_employment_from_census_2011/index.html</a>.</p>
<b>Canada</b>	<p>Statistics Canada          Data: <a href="http://www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5520006&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=31&amp;tabMode=dataTable&amp;csid=">www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5520006&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=31&amp;tabMode=dataTable&amp;csid=</a> and  <a href="http://www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5530006&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=31&amp;tabMode=dataTable&amp;csid=">http://www5.statcan.gc.ca/cansim/a26?lang=eng&amp;retrLang=eng&amp;id=5530006&amp;&amp;pattern=&amp;stByVal=1&amp;p1=1&amp;p2=31&amp;tabMode=dataTable&amp;csid=</a>          Metadata: <a href="http://www.statecan.gc.ca/daily-quotidien/170814/dq170814b-eng.htm">http://www.statecan.gc.ca/daily-quotidien/170814/dq170814b-eng.htm</a>.</p>
<b>Denmark</b>	<p>Statistics Denmark          Data: <a href="http://www.statbank.dk/10096">www.statbank.dk/10096</a>.          Metadata: <a href="http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/employment-in-businesses">www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/employment-in-businesses</a>.</p>
<b>Finland</b>	<p>Statistics Finland          Data: <a href="http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin_yri_alyr/?tablelist=true">http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin_yri_alyr/?tablelist=true</a>.          Metadata: <a href="http://www.stat.fi/til/alyr/index_en.html">www.stat.fi/til/alyr/index_en.html</a>.</p>
<b>France</b>	<p>INSEE          Data: <a href="https://www.insee.fr/fr/statistiques/2021271#consulter">https://www.insee.fr/fr/statistiques/2021271#consulter</a>.          Metadata: <a href="https://www.insee.fr/fr/statistiques/2021271#documentation">https://www.insee.fr/fr/statistiques/2021271#documentation</a>.</p>
<b>Germany</b>	<p>Federal Statistical Office          Data and metadata:  <a href="https://www-genesis.destatis.de/genesis/online/data;jsessionid=497C45668A6875451263FFCF281281CF.tomcat_GO_2_1?operation=abruftabelleAbrufen&amp;selectionname=52111-0004&amp;levelindex=1&amp;levelid=1493308751235&amp;index=97">https://www-genesis.destatis.de/genesis/online/data;jsessionid=497C45668A6875451263FFCF281281CF.tomcat_GO_2_1?operation=abruftabelleAbrufen&amp;selectionname=52111-0004&amp;levelindex=1&amp;levelid=1493308751235&amp;index=97</a>.</p>
<b>Italy</b>	<p>ISTAT          Data: <a href="http://dati-censimentoindustriaeservizi.istat.it/Index.aspx?lang=en">http://dati-censimentoindustriaeservizi.istat.it/Index.aspx?lang=en</a>.          Metadata: <a href="http://dati-censimentoindustriaeservizi.istat.it/Index.aspx?lang=en">http://dati-censimentoindustriaeservizi.istat.it/Index.aspx?lang=en</a>.</p>
<b>Japan</b>	<p>Statistics Japan          Data: <a href="http://www.stat.go.jp/english/data/e-census/">www.stat.go.jp/english/data/e-census/</a>.          Metadata:          2009 Census: <a href="http://www.stat.go.jp/english/data/e-census/2009/pdf/gaiyou_e.pdf">www.stat.go.jp/english/data/e-census/2009/pdf/gaiyou_e.pdf</a>.          2014 Census: <a href="http://www.stat.go.jp/english/data/e-census/2014/pdf/gaiyou_e.pdf">www.stat.go.jp/english/data/e-census/2014/pdf/gaiyou_e.pdf</a>.</p>
<b>Korea</b>	<p>Statistics Korea via Korean Statistical Information Service          Data: <a href="http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&amp;parentId=K#SubCont">http://kosis.kr/eng/statisticsList/statisticsList_01List.jsp?vwcd=MT_ETITLE&amp;parentId=K#SubCont</a>.          Metadata: <a href="http://kostat.go.kr/portal/eng/surveyOutline/3/3/index.static">http://kostat.go.kr/portal/eng/surveyOutline/3/3/index.static</a>.</p>

<b>Mexico</b>	INEGI Data: <a href="http://www3.inegi.org.mx/sistemas/tabuladosbasicos/tabdirecto.aspx?s=est&amp;c=33628">www3.inegi.org.mx/sistemas/tabuladosbasicos/tabdirecto.aspx?s=est&amp;c=33628</a> . Metadata: <a href="http://www.inegi.org.mx/inegi/contenidos/investigacion/experimentales/default.aspx">www.inegi.org.mx/inegi/contenidos/investigacion/experimentales/default.aspx</a> .
<b>New Zealand</b>	Statistics New Zealand Data and metadata: <a href="http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7601#">http://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7601#</a> .
<b>Norway</b>	Statistics Norway Data: <a href="https://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/bedrifter">https://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/bedrifter</a> . Metadata: <a href="https://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/bedrifter/aa/2017-01-20?fane=om#content">https://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/bedrifter/aa/2017-01-20?fane=om#content</a> .
<b>Portugal</b>	Statistics Portugal Data: <a href="https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0008597&amp;contexto=bd&amp;selTab=tab2">https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_indicadores&amp;indOcorrCod=0008597&amp;contexto=bd&amp;selTab=tab2</a> . Metadata: <a href="https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_cont_inst&amp;INST=6251013">https://www.ine.pt/xportal/xmain?xpid=INE&amp;xpgid=ine_cont_inst&amp;INST=6251013</a> .
<b>Spain</b>	INE Spain Data and metadata: <a href="http://www.ine.es/dynt3/inebase/en/index.htm?padre=51&amp;dh=1">www.ine.es/dynt3/inebase/en/index.htm?padre=51&amp;dh=1</a> .
<b>Switzerland</b>	Swiss Federal Statistical Office Data and metadata: <a href="https://www.pxweb.bfs.admin.ch/Selection.aspx?px_language=de&amp;px_db=px-x-0602010000_101&amp;px_tableid=px-x-0602010000_101\px-x-0602010000_101.px&amp;px_type=PX">https://www.pxweb.bfs.admin.ch/Selection.aspx?px_language=de&amp;px_db=px-x-0602010000_101&amp;px_tableid=px-x-0602010000_101\px-x-0602010000_101.px&amp;px_type=PX</a> .
<b>United Kingdom</b>	Office for National Statistics (ONS) Data and metadata: <a href="https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation">https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation</a> .
<b>United States</b>	US Census Bureau, Business Dynamics Stats, Business Employment Dynamics Data and metadata: <a href="https://www.census.gov/ces/dataproducts/bds/data.html">https://www.census.gov/ces/dataproducts/bds/data.html</a> .
<b>All other countries</b>	Belgium, the Czech Republic, Estonia, Greece, Hungary, Ireland, the Netherlands, Luxembourg, Latvia, Poland, the Slovak Republic, Slovenia, Sweden Eurostat Data and metadata: <a href="http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_r_nuts06_r2&amp;lang=en">http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=sbs_r_nuts06_r2&amp;lang=en</a> .

## *Annex 4.A2.*

### Notes on regional data coverage

In general, employment growth rates throughout this chapter are calculated for sectors B to N. Additionally, the time period over which those growth rates are computed is the same for all regions in each country.

However, there are a few exceptions to those rules. These exceptions are due to data availability and are listed below.

Sector coverage:

- Central Moravia (sectors F to N)
- Moravia-Silesia (sectors F to N)
- Mazovia (sectors F to N)
- West Pomerania (sectors F to N)
- Lodzkie (sectors F to N)
- Lubuzs (sectors F to N)
- Drenthe (sectors F to N, excluding J).

Temporal coverage:

- Upper Norrland (2013-14 instead of 2010-14)
- Stockholm (2011-14 instead of 2010-14).



## *Annex 4.A3.*

### Harmonisation of datasets

The establishment data have been collected for 36 countries, in 17 directly from the national statistical offices' (NSOs) websites and 19 were added from the Eurostat site (table sbs\_r\_nuts06\_r2). Over these, five countries have indicators related to demographic birth/death events (France, Japan, Mexico, New Zealand and the United States), and in this sample, only France, Mexico and the United States have data disaggregated by sector and size classes. Establishment data have been harmonised *ex post* to be compared with enterprise data with the same levels of sectorial breakdown and size classes, but the comparability of the demographic events *per se* relies on the definitions applied in the country which follows the international recommendations.

#### Comparability of the demographic indicators

For **France**, the notion of creation of an establishment is consistent with the harmonised European definition of a company birth, and corresponds to the implementation of new means of production. For **Mexican** data, it was determined to consider as death and subsequently to register as a birth those establishments that were affected by two of the following three situations: change in economic activity; change of owner or company name; change of physical location. The establishments that presented only one of the three changes mentioned above were considered within the level of survival. In **New Zealand**, births and deaths follow the international definitions and do not include entries/exit due to reactivations, mergers, break-ups, split-offs or other restructuring of a group of businesses linked by ownership or control. Births also exclude entries into a population resulting from changes to characteristics of existing businesses, which is largely based on, and fully consistent with, the Eurostat definition of enterprise births. To be considered a birth (death) in the business demography population, the geographic units existed at neither time  $t-1$  ( $t$ ) year nor time  $t-2$  years ( $t+1$  year). For the **United States**, birth year is defined as the year an establishment first reports positive employment in the *Longitudinal Business Database*, and excludes events from breakouts or consolidations in multi-unit firms. In the case of **Japan**, the data are less harmonised with international recommendations, and therefore should be taken with caution: the start-up date refers to: 1) the time the establishment concerned started its business at the present location, in other words, an establishment that has been transferred to another place may be included in some cases in births and deaths data; 2) those establishments present as of the date of the 2014 survey that were not identified in the 2012 Economic Census for Business Activity, and as such, births and deaths do not refer directly to annual data, and deviate from the international definition, mainly for what concerns the establishments which have been created and disappeared within the observed period. As a proxy, the Japanese values for birth and deaths have been divided by two.

#### Harmonisation of the sectorial and size classes breakdown

The data collected from NSOs were detailed at a 4-digit level of the ISIC Rev. 4 for Switzerland; at mainly a 2-digit level for Finland, Norway and Spain; and mainly at groups of 2-digits for the other countries. Special efforts have been made to organise the establishment data with the same breakdown as for enterprises' business demography

(presented in Table 4.A3.1) and produce the sector to B-N excluding K (financial and insurance activities) aggregate to have a major coverage of the economy that can be compared across countries and across datasets.

Table 4.A3.1. **Sectoral classes**

B-E	Industry (except construction)
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
L	Real estate activities
M-N	Professional, scientific and technical activities; administrative and support service activities

The employment size ranges can differ in some countries to the standard ranges 1-9, 10-19, 20-49, 50-249, 250+. To improve the usability of the dataset, size classes have been aligned in the five national size classes (as in Table 4.A3.2). The reference used for the employment ranges is generally based on the number of employees, and therefore excludes working proprietors, active business partners, unpaid family workers and home-workers, irrespective of whether or not they are on the payroll. The exceptions are Italy and the United Kingdom for which the reference is the number of employed persons.

Table 4.A3.2. **Employment size classes**

NSC	SC label	Exceptions
1	1-9	..
2	10-19	..
3	20-49	..
4	50-249	Canada (50-199); Denmark, Spain (50-99); France (50-199); Korea (50-299)
5	250+	Canada (200+); Denmark, Spain (100+); France (200+); Korea (300+)
6	Total	..
23	10-49	Switzerland

### *Annex 4.A4.*

## Regional characteristics associated with employment growth

For reasons of data availability, the analysis below is limited to European countries. For those countries, potential determinants of employment growth are more consistently available at the subnational level. The focus on European regions reduces the sample further, limiting the scope of the analysis to around 110 regions. Therefore, the findings should be seen as illustrating some correlational patterns rather than any causal relationship.

*Note:* The regressions are based on simple OLS estimation. In all cases country fixed effects were included.

Table 4.A4.1. **Determinants of regional employment growth, 2010-14**

Factor considered	Labour productivity (GDP per employee)	Innovative SMEs collaboration	Knowledge workers (% of employment)	Scientific publications	High-tech inventors	Exports medium-high/high (tech manuf.)
OLS coefficient (standard error)	0.0090941*** (0.0024695)	0.0109987* (0.005944)	0.0060408*** (0.0022907)	0.002943*** (0.0013896)	0.0050133** (0.0020006)	0.0038203* (0.0019465)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations (regions)	112	109	112	112	106	109

*Notes:* The table shows the estimated coefficient of correlation between the indicated factors and regional employment growth. OLS regression for the period 2010-14. Country fixed effects are included. \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.



## **Chapter 5.**

### **Measuring regional business employment dynamics from micro-aggregation of administrative data<sup>1</sup>**

*This chapter presents the OECD DynEmp Regional project, a distributed micro-data project aimed at analysing confidential administrative micro-data on employment dynamics at the level of TL2 regions and metropolitan areas. The chapter presents within-country differences in plant-level employment dynamics for the TL2 regions of Costa Rica, Finland, France and Sweden and the metropolitan areas of France and Sweden. The role of plant characteristics, such as age or size, and regional characteristics, in particular regional productivity, agglomeration economies, innovation and the rural-urban continuum, is also examined. The chapter finally discusses the methodological challenges and the solutions implemented in the first version of the dynemp\_reg routine, providing a detailed description of the inputs and outputs of the statistical programme and of the micro-aggregation procedure.*

## Introduction

Business employment dynamics are at the core of the creative destruction process, with important effects on resource reallocation and productivity growth. A growing body of evidence reveals significant differences in employment and business dynamics across countries and over time. These differences are particularly relevant when analysing the employment growth trajectories of start-ups and young firms, which importantly contribute to job creation (Criscuolo, Gal and Menon, 2014; Calvino, Criscuolo and Menon, 2015). Policy settings and structural factors have been found to be important drivers explaining cross-country differences in employment dynamics and heterogeneous performance of entering versus incumbent firms across countries (Calvino, Criscuolo and Menon, 2016; OECD, 2016a).

As of today, only a limited body of research is able to disentangle the regional and local specificities underlying economy-wide trends in business dynamics using comparative and representative data for a significant number of countries at a reasonable and unique level of detail. This chapter contributes to building new evidence in this area both by proposing a replicable methodology and new evidence at the regional (TL2) and metropolitan level for a set of four countries.

In particular, the *DynEmp Regional database* allows focusing separately on the business and employment dynamics of the manufacturing and non-financial business services sectors both in a cross-section and over time. This separate focus, combined with longitudinal information on employment, entry/exit, age and size classes, represents a unique characteristic of the data collected using the methodology proposed in this chapter.

As argued in other chapters of this report, analysing employment and business dynamics at regional and local level is particularly relevant for different reasons. Region-specific shocks may induce adjustment mechanisms that may be different from those related to economy-wide shocks. For instance, a shock in a particular region might be associated with higher migration in neighbouring regions (that are not necessarily in the same country) than a national shock would induce across countries (Decressin and Fatas, 1995). Symmetrically, regional characteristics may be associated with heterogeneous responses to economy-wide shocks. For instance, rural areas may have economic and employment dynamics that are different from urban or metropolitan areas, possibly due to agglomeration economies, spatial wage disparities and localised knowledge spillovers (see, among others, Rosenthal and Strange [2004]; Puga, 2010). Furthermore, more specialisation in the production of goods and services is likely to occur at the regional level, and this possibly influences employment dynamics and new business formation in a way that is not observable in economy-wide studies. Finally, the pronounced heterogeneity across firms, industries and regions can be addressed more appropriately by using micro-level analysis that provide detailed firm characteristics.

In this context, this chapter presents the OECD DynEmp Regional project, a new distributed micro-data project aimed at analysing confidential administrative micro-data on employment dynamics at the regional and local level by means of micro-aggregation. This chapter is part of a larger effort co-ordinated by the OECD Directorate for Science, Technology and Innovation to provide new evidence on employment dynamics, innovation activities and productivity across countries exploiting firm-level data.<sup>2</sup>

The aim of this chapter is to showcase the potential of the regionalisation of the DynEmp algorithm. In particular, it provides descriptive and econometric evidence based on the first wave of data collection, illustrating within-country employment dynamics in TL2 regions of Costa Rica, Finland, France and Sweden and metropolitan areas in France and Sweden.

This evidence highlights the heterogeneity in the employment distribution within countries and regions. It focuses on employment growth dynamics by plant characteristics (namely size and age), suggesting that young plants show a higher employment growth performance. It analyses the role of different groups of plants (entering, incumbents and exiting) and their relative contribution to net job creation in TL2 regions and metropolitan areas, suggesting that – for instance – in the Finnish non-financial market services sector, for every 100 jobs, in the average TL2 region about 1 new job is created by incumbents, about 3 by entrants and about 4 jobs are destroyed by exiting plants.

This chapter also provides some more formal analysis that investigates the role of young plants for regional employment growth and the regional characteristics associated with their location, suggesting that frontier regions, more innovative regions, and – especially in services – urban regions appear to have a higher share of employment in young units. In fact, agglomeration economies appear to be particularly relevant in non-financial market services.

Finally, this chapter discusses the methodological challenges together with the solutions proposed and implemented in the algorithm. In particular, the chapter provides details on the characteristics of the statistical programme, the required input data and outlines the output data produced.

As discussed in more detail below, the regional DynEmp algorithm is modular and flexible and could potentially be further extended in breadth to cover all broad sectors of the economy and in depth at lower levels of sectoral aggregation (e.g. at the level of 3- and 4-digit sectors) and/or at more detailed regional levels, were confidentiality not an issue. This is a unique feature that could be extremely valuable to investigate the evolution of regional disparities in business dynamism, the growth performance of young firms, etc., and their determinants both structural and policy-driven. Finally, the development of a comparable cross-country database of business dynamics across regions could be very useful in the evaluation of policies aimed at supporting entrepreneurship and employment growth in lagging regions.

This chapter is organised as follows. The next section describes the OECD DynEmp project, its aims and different phases, and focuses on the challenges and the proposed solutions to its regionalisation. The following section describes more in depth the OECD DynEmp Regional programme (*dynemp\_reg*), together with the characteristics of the input required and the output databases produced. The chapter then provides an overview of the preliminary version of the *DynEmp Regional database* and presents preliminary evidence based on the data collected. It also discusses the current challenges faced. The final section concludes and discusses the next steps of the DynEmp Regional project.

## **DynEmp: Methodology and challenges**

This section provides an overview of the OECD DynEmp project and its regional extension (DynEmp Regional), discussing the main methodological challenges faced and the solutions implemented.

### *The OECD DynEmp project*

The OECD DynEmp project is based on a distributed data collection exercise aimed at creating a harmonised cross-country micro-aggregated database on business employment dynamics from confidential micro-level sources at national level.<sup>3</sup> The primary sources of data are national business registers and for some countries, such as Brazil, social security records.

#### Box 5.1. The Dynemp methodology and the data collected

The DynEmp project is led by the OECD Directorate for Science, Technology and Innovation and supported by a network of national experts who run the common algorithm centrally developed by the OECD DynEmp team on the confidential micro-data to which they have access. The distributed micro-data approach involves developing a computer code by the OECD DynEmp team (the preferred statistical programme for this purpose is Stata by StataCorp LP) and then running this code in a decentralised manner by national experts from statistical agencies, academia, ministries or other public institutions who have access to the national micro-level data. The micro-aggregated data generated by the centrally designed but locally executed programme codes are then sent back for comparative cross-country analysis to the OECD. These data reduce confidentiality concerns as they aggregate information at a sufficiently high level, and achieve a high degree of harmonisation, as the definition of the extracted information is the same, ensured by the centrally written computer routine. The experts also implement country-specific disclosure procedures in order to ensure that confidentiality requirements are respected.

The first phase of the project was implemented in the first half of 2013 and was called DynEmp Express. This first phase was based on a simplified statistical routine which led to the collection of a database at the national level covering 18 countries (see Criscuolo, Gal and Menon [2014]). The second phase of the project, called DynEmp v.2, aimed at building a database which contains more detailed data on the within-sector contribution of start-ups and young firms to employment growth, in order to analyse the role played by national policies and framework conditions for employment growth (see, e.g. Calvino, Criscuolo and Menon [2015], [2016]). At the time of writing, 23 countries have been successfully included in the DynEmp v.2 database (Australia, Austria, Belgium, Brazil, Canada, Costa Rica, Denmark, Finland, France, Hungary, Italy, Japan, Luxembourg, the Netherlands, Norway, New Zealand, Portugal, South Africa, Spain, Sweden, Turkey, the United Kingdom and the United States). A new version of the DynEmp programme (dynemp3) is under development at the time of writing. Two parallel projects also led by the OECD Directorate for Science, Technology and Innovation, MultiProd and MicroBerd, have been also recently launched. While DynEmp focuses on employment dynamics, MultiProd is a distributed micro-data project aimed at analysing the dynamics of productivity and allocative efficiency across countries, and MicroBerd is aimed at investigating the heterogeneity and the policy drivers of business R&D investment exploiting cross-country harmonised micro-aggregated data mainly coming from national representative surveys and administrative tax records (for further details see [www.oecd.org/sti/ind/multiprod.htm](http://www.oecd.org/sti/ind/multiprod.htm) and [www.oecd.org/sti/rd-tax-stats.htm](http://www.oecd.org/sti/rd-tax-stats.htm)).

The advantages of using harmonised micro-aggregated data from business and establishment registers for the study of business and employment dynamics are manifold. First, micro-aggregating these data provides a unique picture on the universe of businesses or establishments, which is rarely provided by any other micro-data source. Second, the cross-country use of business registers allows separate identification of the different channels of employment growth, distinguishing between gross job creation and gross job destruction, and between the extensive (firm entry and exit) and the intensive (post-entry growth) margins of employment growth. Furthermore, the role of firm age and size can be examined separately and jointly. Finally, each of these elements can be compared across countries, sectors and over time.



The extension of the DynEmp methodology to the analysis of subnational employment and business dynamics at the plant level is the focus of the DynEmp Regional project presented in this chapter.

### ***DynEmp Regional: Methodological challenges and solutions***

The international comparison of employment dynamics at the regional and local levels involves a considerable number of methodological and conceptual challenges. An overview of these, together with the approaches taken by the DynEmp Regional project to face them, is discussed more in detail in this section and in Annex 5.A1, while in this section a brief overview is presented.

These challenges combine more general issues associated with the construction of internationally comparable employment and business dynamics indicators, building upon the experience developed at the OECD in the framework of the DynEmp project, with concerns specific to the local and regional analyses. These include the choice of the statistical unit of reference (firms vs. plants), measurement issues – such as the identification of entrants, the choice of the relevant employment variable, the measurement of location – and confidentiality challenges.

#### *Unit of analysis*

Analysing employment dynamics at the local level requires the availability of information on the location of economic activity. The statistical unit of reference at which the analysis is carried out is particularly important in this context.

A discussion on the challenges in the choice of the unit of analysis, and the bias induced when measuring location at the firm level and not at the plant level, is discussed in OECD (2016b).<sup>4</sup> Given these issues, in order to minimise the above described bias, the DynEmp Regional analysis is carried out at the plant level, exploiting the information available in the data on the plants' location.

In order to effectively design and implement the DynEmp Regional routine, the first step was to conduct a questionnaire to assess data availability. The questionnaire was sent to a considerable number of experts in OECD member and non-member countries that are part of the DynEmp and MultiProd networks. Relevant responses to this questionnaire, with particular reference to the availability of plant-level data with location information, are summarised in Table 5.1.

As is evident from the table, the scope of the analysis is limited to those countries for which suitable plant-level data including location information are available.

Out of 24 countries contacted, plant-level data suitable for the analysis of employment dynamics at the local level seem available for 12 countries. For the majority of these countries (7 out of 12), these data include information on the postal codes of plants, and for 3 additional countries – Brazil, France and Japan – postal code information can be retrieved by exploiting additional data sources or correspondence tables. The two remaining countries, Denmark and Spain, for which plant-level data for local employment analysis are available, report location information only at higher levels of aggregation (such as TL/NUTS regions).

Table 5.1. DynEmp Regional questionnaire synopsis

Country	Plant-level data	Location information	Postal code information
Australia	No	..	..
Austria	..	..	..
Belgium	No	..	..
Brazil	Yes	Yes	Possible merge
Canada	Yes	Yes	Yes
Costa Rica	Yes	Yes	Yes
Denmark	Yes	Yes	No
Finland	Yes	Yes	Yes
France	Yes	Yes	Possible merge
Germany	Yes	Yes	Yes
Hungary	No	..	..
Italy	..	..	..
Japan	Yes	Yes	Possible merge
Luxembourg	Partial	..	..
Netherlands	Partial	Yes	Yes
New Zealand	..	..	..
Norway	..	..	..
Portugal	..	..	..
South Africa	No	Partial	Partial
Spain	Yes	Yes	No
Sweden	Yes	Yes	Yes
Turkey	No	..	..
United Kingdom	Yes	Yes	Yes
United States	Yes	Yes	Yes

*Notes:* Responses are recorded at the time of writing this chapter. ..: not available.

*Source:* Authors' elaboration based on questionnaire responses provided by members of the DynEmp and MultiProd network.

### *Measurement challenges*

A number of measurement challenges need to be tackled when analysing employment and business dynamics across countries. An extensive discussion of some of the main issues in this context, including: 1) the definition of entry and exit; 2) the measurement of location by means of units' postal code; 3) the choice of the employment variable; 4) changes in the sectoral classifications over time, is presented in Annex 5.A1.

More general challenges associated with employment and business dynamics measurement in a cross-country perspective are also discussed in detail in Criscuolo, Gal and Menon (2014, 2015) in the context of the DynEmp project.

### *Confidentiality challenges*

An important challenge when working with highly representative administrative data is the confidentiality of these sources. In this framework, the *dynemp\_reg* programme implements a number of strategies to support national experts in participating countries to comply with the national confidentiality requirements.

Aggregation levels for the output databases are designed keeping in mind the trade-off existing between the levels of detail of the information collected and the extent to which this information can be further subjected to confidentiality blanking. In addition,

the *dynemp\_reg* programme directly deals with confidentiality when the blank option is specified, performing a simple blanking of cells below a given number of units. Participants to the project are then asked to check the data produced by the programme and to blank cells according to their national confidentiality rules.

Furthermore, all statistics concerning median values are calculated as the average of the five “central” units in the distribution of interest so that no information referring to an individual unit is disclosed. The number of central units can be increased at the request of those participants who may require stricter confidentiality thresholds.

Finally, an additional optional variable is provided to support participants in blanking related to dominance. In particular, if the option dominance is included, the programme also computes additional statistics on the share of employment or turnover accounted for by the biggest  $N$  unit in the cell, where  $N$  can be input by the user and is set to one by default.

### The DynEmp Regional programme (*dynemp\_reg*)

Building upon the discussion of the challenges to the regional extension of DynEmp carried out in the previous section, this section focuses more in detail on the DynEmp Regional routine.

The *DynEmp Regional database* is based on highly representative administrative sources with a longitudinal dimension. This is a unique feature of this data collection. In particular, the input data required to run the *dynemp\_reg* programme must be a longitudinal database and should include the universe of local units (establishments or plants) belonging to the sectors included in the data. In the input database, individual units need to be identified by a unique longitudinal local unit identifier (id) that has to be constant over time.

Only five variables are required to run the *dynemp\_reg* routine. They include a suitable unit employment variable; the calendar year to which the time-varying variables refer to, the birth year of the unit, the 3-digit sector identifying the main economic activity of the unit, following the ISIC Rev. 4 or NACE Rev. 2 classification, and the postal code of the local unit (see also the discussion in Annex 5.A1.).

The first version of the *dynemp\_reg* programme allows micro-aggregation of data along different dimensions. The combination of these dimensions defines a cell, which is the reference unit in a micro-aggregated setting. The aggregation levels considered in the output database are the following (see also Table 5.2 for a more schematic visualisation):

- Level 2: TL2 regions,<sup>5</sup> macro sector<sup>6</sup> (plus the total sector category), size classification and age classification
- Level 3: metropolitan areas, macro sector (plus the total sector category), size classification and age classification
- Level 5: metropolitan areas, units part of a multi-plant vs. single-plant firm, macro sector (plus the total sector category), size classification and age classification.

Regional levels of aggregation are classified following a methodology developed by the OECD Centre for Entrepreneurship, SMEs, Local Development and Tourism (see Annex 5.A1. for further details). The aggregation in *dynemp\_reg* is based on an external

correspondence table between postal codes and regional levels of aggregation (TL2 and metropolitan areas, conditional on their availability).

Table 5.2. **Output databases by aggregation level**

Level ref. number	Sector	Region	Metropolitan areas	Multi-plant vs. single plant firm	Group of units	Size	Age
2	7 macro sectors; all	Yes (TL2)	No	No	All	4 classes	2 classes
3	7 macro sectors; all	No	Yes	No	All	4 classes	2 classes
5 (optional)	7 macro sectors; all	No	Yes	Yes	All	4 classes	2 classes

Source: *DynEmp Regional database*, <http://www.oecd.org/sti/ind/dynemp.htm>.

Incumbents are classified into different age and size categories. The size classes considered in aggregation Levels 2, 3 and 5 are: 0-9; 10-49; 50-249; 250+; and 99 (missing).<sup>7</sup> The age classes considered in aggregation Levels 2, 3 and 5 are: 0-5; 6+; and 99 (missing). A discussion on the definition of entry and exit is carried out in Annex 5.A1. A considerable number of statistics are collected at these levels of aggregation, including average employment growth, total employment and gross job flow indicators.

## Data description: Sources and coverage

This section focuses on the description of the composition of the preliminary version of the *DynEmp Regional database*. It presents its coverage, main underlying micro-data sources and the available output databases at the time of writing.

As discussed above, data required to run the *dynemp\_reg* programme consist of the population (or highly representative) plant-level databases with information on the location of the plant.

Table 5.3 summarises the data sources for countries currently included in the *DynEmp Regional database*. It must be emphasised that the coverage is country-specific. The reader should bear this in mind when comparing descriptive results across countries.

Table 5.3. **Underlying micro-data sources and available output levels**

Country	Source(s)	Period	Geographical variable(s) used	Available output data
Costa Rica	Registro de variables económicas – REVEC	2005-15	Postal code	Level 2
Finland	Business Register on Establishments	2000-15	Postal code	Level 2
France	DADS; Fichier annuel de démographie d'entreprise (créations, transferts et stocks d'établissements)	2005-13	"Code commune" matched with postal code	Level 2, 3, 5
Sweden	RAMS	2000-15	Postal code	Level 2, 3

Note: Data for some countries are still preliminary.

Source: *DynEmp Regional database* (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

Table 5.4 summarises the number of TL2 regions and metropolitan areas by country, based on the preliminary version of the *DynEmp Regional database* available at the time of writing.

Table 5.4. TL2 regions and metropolitan areas by country

Country	Number of TL2 regions	Number of metropolitan areas
Costa Rica	6	..
Finland	5	..
France	22	15
Sweden	8	3

*Notes:* Data for some countries are still preliminary. Only TL2 regions or metropolitan areas with non-missing information are reported. TL2 regions for France exclude DOM and TOM (oversea territories), only the largest 15 metropolitan areas are considered.

*Source:* *DynEmp Regional database* (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

## Preliminary evidence from four countries

This section contextualises the analysis in the framework of recent OECD research and shows some preliminary evidence on employment and business dynamics at the regional and local level, based on the data available at the time of writing. It also discusses the challenges and limitations of the approach proposed.

Previous evidence from the *DynEmp* project (see Criscuolo, Gal and Menon [2014]; Calvino, Criscuolo and Menon [2015], [2016]; Blanchenay et al. [2017]) has documented significant heterogeneity across countries along different dimensions.

First, this evidence points to the crucial role of start-ups and young firms (rather than small firms in general) for job creation across a significant number of OECD and non-OECD countries. Second, policies and structural factors, especially in the field of access to finance, bankruptcy regulations and contract enforcement, are shown to have an important role in explaining these cross-country differences, and the heterogeneity in the performance of entering versus incumbent firms (Calvino, Criscuolo and Menon, 2016; see also Adalet McGowan, Andrews and Millot [2017] for evidence from different data sources). Finally, this evidence illustrates a steady decline in business dynamism across countries, which markedly accelerated during the crisis with later resilience that has been only partial.<sup>8</sup> Countries and sectors, however, show a fair degree of heterogeneity. For instance, the high-tech services sectors show a particularly pronounced decline in business dynamism (Blanchenay et al., 2017; see also OECD [2017]).

The granularity of the *DynEmp Regional database* allows focusing on within-country differences along some of the dimensions discussed above.

A number of figures and regression tables are presented and discussed below. Given the preliminary nature of the *DynEmp Regional database*, these figures and tables are to be interpreted with caution and should be seen as a first exploration of this source of cross-region cross-country information on regional and local employment dynamics, and not yet as an exhaustive analysis that fully exploits the potential of the *DynEmp Regional database*.

A considerable part of the analysis focuses on the dynamics of plants with less than 250 employees. This is consistent with the important role of young units (that are predominantly small) highlighted by recent OECD research and confirmed by the analysis below. This focus appears also interesting from a regional perspective. As a matter of example, in European countries small and medium enterprises (SMEs) and their competitiveness are a priority for the European Union's Cohesion Policy and part of the 11 Thematic Objectives for 2014-20 (see European Commission [2016]).<sup>9</sup> Finally, excluding cells associated with larger plants somehow reduces the potential issues introduced

by stringency and differences in confidentiality blanking rules across countries. See below for further discussion.

**Preliminary analysis at the TL2 level**

Figure 5.1 presents the within-region employment distribution, focusing on the share of 0-9, 10-49 and 50-249 plants with respect to all small and medium plants in the country-region, focusing separately on manufacturing and non-financial market services. The panels presented in Figure 5.1 allow a qualitative overview of the size distribution of plants within regions.

The share of medium sized units (with 50-259 employees) in the non-financial market services sector is significantly higher in the TL2 region where the capital city is located. The share of smaller units, instead, appears to some extent higher in more peripheral regions.

Still focusing on plants with less than 250 employees, Figure 5.2 shows the heterogeneity in average employment growth rates of incumbents, by size class across TL2 regions over the available years. A significant degree of both within-country and cross-country differences is evident. While it is not easy to determine a clear trend in Costa Rica, in Finland (and to some extent in the French manufacturing sector) the smallest plants appear to experience faster employment growth, both in manufacturing and in non-financial market services. Sweden seems to experience instead opposite dynamics, especially in the services sector.

**Figure 5.1. Regional employment shares by plant size (small and medium units)**

Significant regional variation in the employment weight of micro, small and medium-sized plants

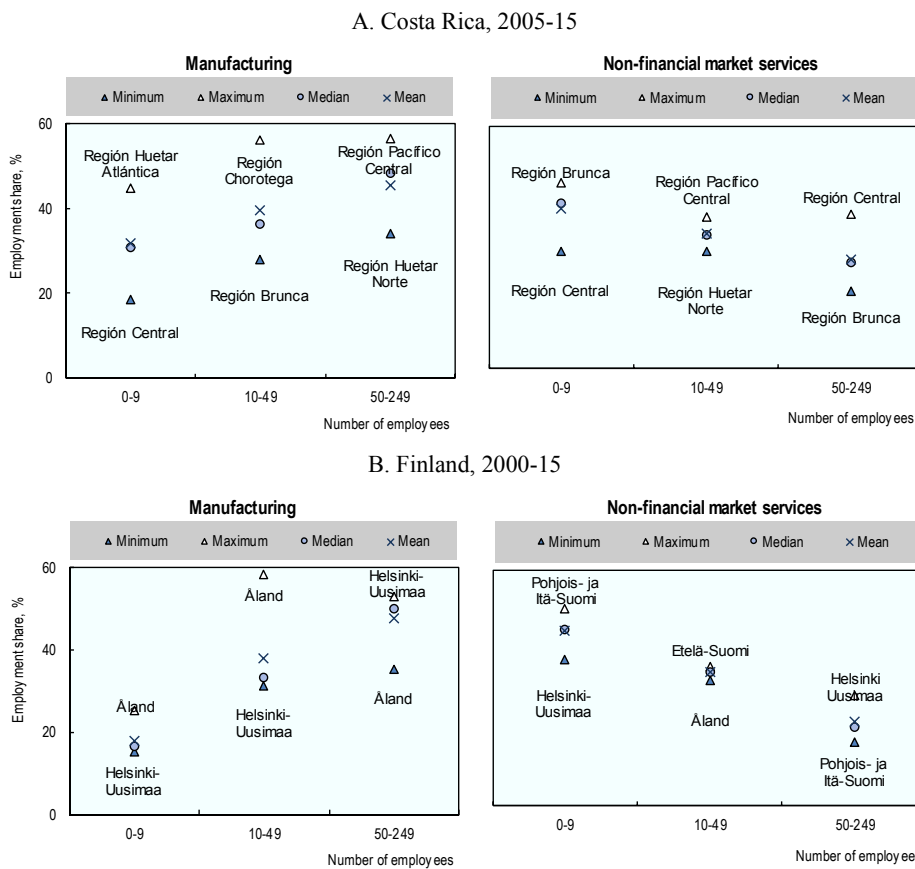
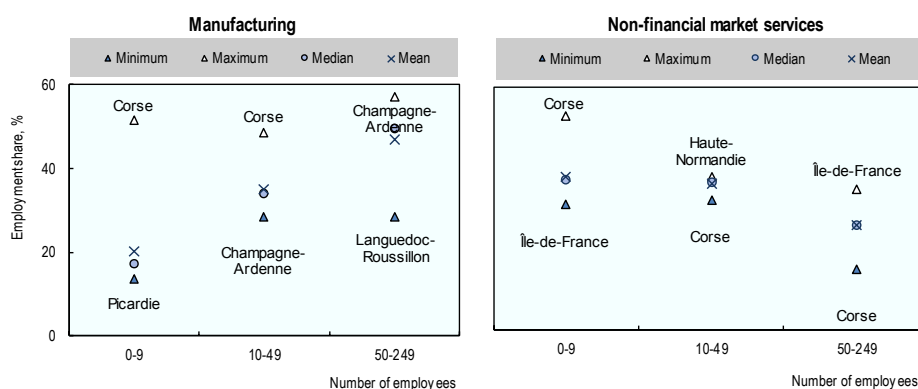


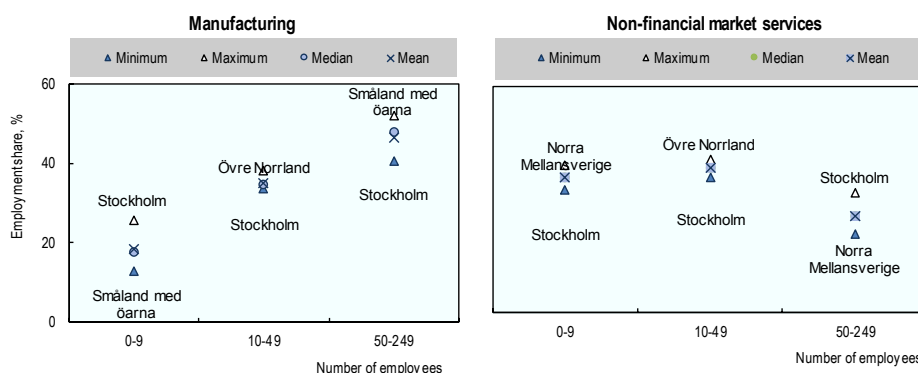
Figure 5.1. **Regional employment shares by plant size (small and medium units)** (*continued*)

Significant regional variation in the employment weight of micro, small and medium-sized plants

C. France, 2005-13



D. Sweden, 2000-15



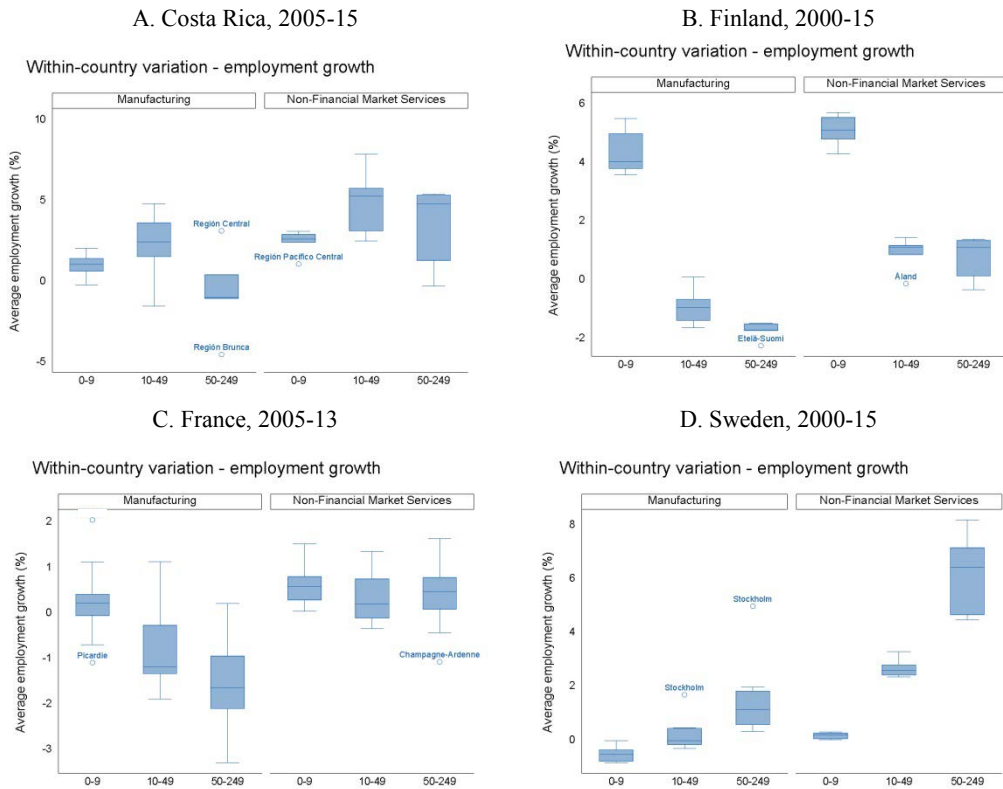
*Notes:* For each country, employment shares are calculated as employment in the macro sector, size class (0-9, 10-49, 50-249 employees), TL2 region over employment of all plants with less than 250 employees in the TL2 region, macro sector. Statistics are computed on average over available years. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

*Source:* DynEmp Regional database (accessed in April 2017).

StatLink  <http://dx.doi.org/10.1787/888933626440>

Additional analysis was carried out for Finland, where turnover growth is also available, and presented in Figure 5.3. Focusing on turnover, small units have a more limited growth performance in most TL2 regions, especially in the non-financial market services sector. Units in non-financial market services appear to have generally higher turnover growth rates when compared to plants in the manufacturing sector. This is particularly true for medium units (with 50-249 employees).

Figure 5.2. **Within-country variation in small and medium units' employment growth**



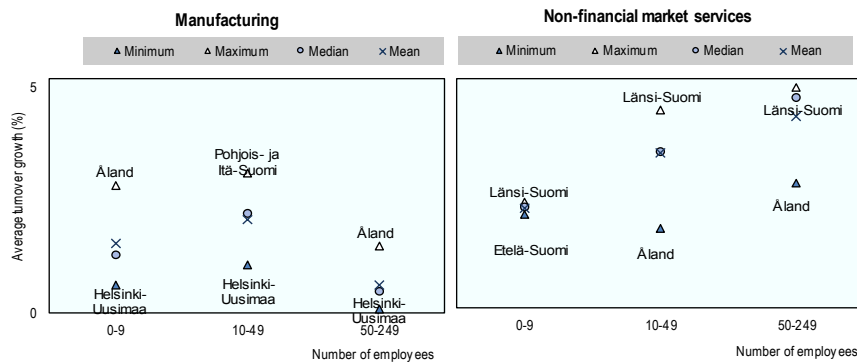
Notes: Average employment growth of incumbents in the country, macro sector, size class (0-9, 10-49, 50-249 employees), TL2 region. The box plot shows the within-country heterogeneity across TL2 regions. Statistics are computed on average over the available years. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

Source: DynEmp Regional database (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

StatLink <http://dx.doi.org/10.1787/888933626459>

Figure 5.3. **Within-country variation in small and medium units' turnover growth**

Finland, 2000-15



Notes: Average turnover growth of incumbents in the country, macro sector, size class (0-9, 10-49, 50-249 employees), TL2 region. Statistics are computed on average over available years (see Table 5.3 for detailed coverage). Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

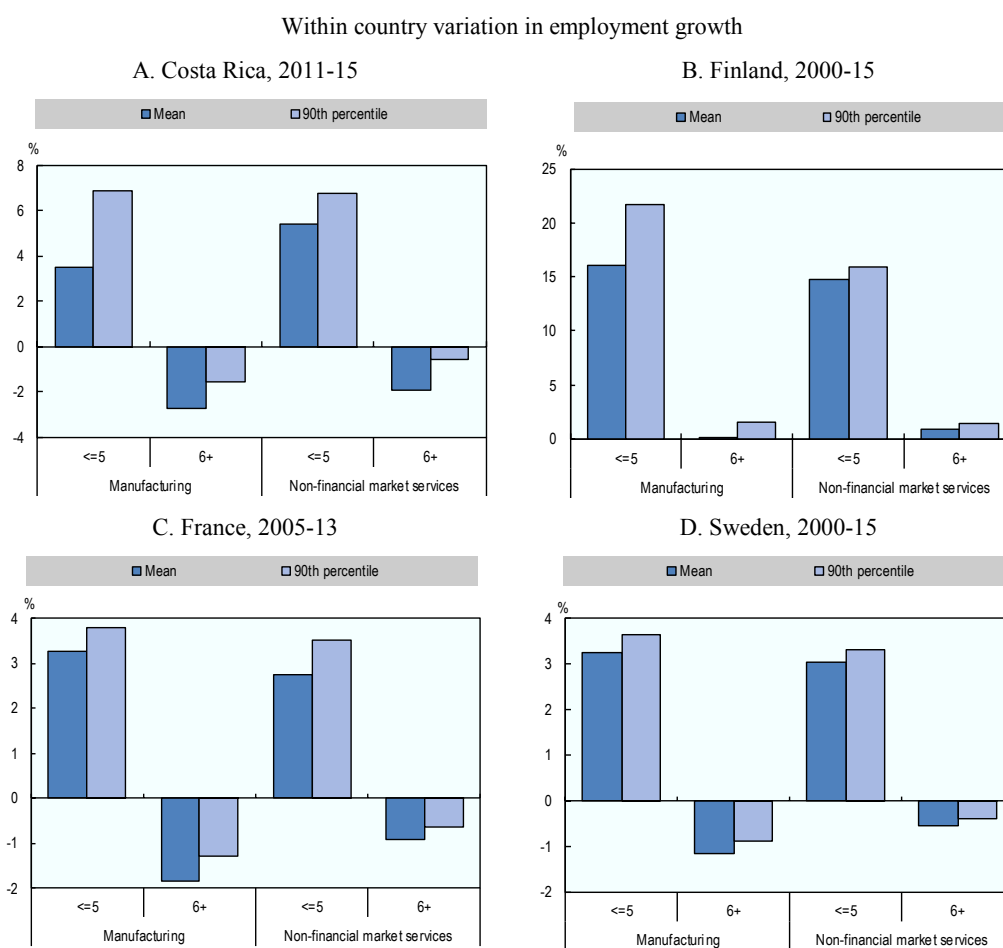
Source: DynEmp Regional database (accessed in April 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

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Figure 5.4 disentangles instead the different employment growth performances of young (five years old or less) versus older small and medium incumbent plants, across TL2 regions. Statistics are reported for the average TL2 region in the country-macro sector and for the TL2 region at the 90th percentile in terms of employment growth performance. The figure confirms that, in all countries and macro sectors considered, younger small-medium plants grew faster than older ones, consistently with previous evidence from the DynEmp project at the national level (see Criscuolo, Gal and Menon [2014]). Focusing on the difference between the average TL2 region and the region at the 90th percentile of the employment growth distribution allows a visualisation of within-country differences in employment growth profiles of incumbents. Within-country differences between the mean and the 90th percentile are evident, especially in Costa Rica. Furthermore, older small-medium plants in Finland seem to experience a positive (despite very limited) employment growth, while this is not the case for Costa Rica, France or Sweden.

Figure 5.4. **Employment growth in small and medium units, young vs. old**



*Notes:* Average employment growth of incumbents in the country, macro sector, age class (five years old or less; six years old or more), TL2 region. Statistics are reported for the average TL2 region in the country-macro sector and for the TL2 region at the 90th percentile. They are computed on average over available years. Complete information on unit age in Costa Rica is available starting from 2011. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

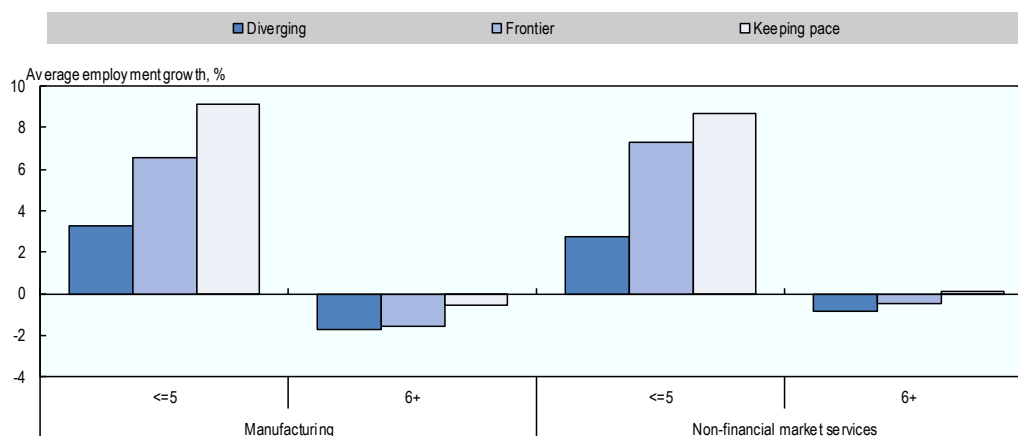
*Source:* DynEmp Regional database (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

StatLink <http://dx.doi.org/10.1787/888933626497>

The evidence that young firms grow faster on average is confirmed when performing a more formal exercise, regressing cell-level average employment growth on age class, size class, macro sector, country, TL2 region and year dummies.<sup>10</sup> This exercise shows that older units (six years old or more) experience a significantly lower employment growth (about 6% less) with respect to younger plants, conditional on other cell and region characteristics. However, since this simple framework does not allow inferring any causal relation, this should just be interpreted as a robust association.<sup>11</sup>

Figure 5.5 extends the analysis on the employment growth patterns of small and medium units separately focusing on frontier, keeping pace and diverging regions.<sup>12</sup> In the figure, the bars refer to the average region in each age class, type of region, macro sector. For instance, the first bar focuses on the average employment growth of young small and medium units in diverging TL2 regions in the manufacturing sector, the second focuses on frontier regions, and the third on keeping pace regions. The bars plot averages across the TL2 regions in each group. Young small and medium incumbents (less than five years old) are again characterised by higher average employment growth with respect to their older counterparts. In both manufacturing and non-financial market services, keeping pace regions exhibit higher average employment growth, especially when focusing on young units.

Figure 5.5. **Employment growth in small and medium units, young vs. old/diverging, keeping pace and frontier regions**



*Notes:* Average employment growth of incumbents in the macro sector, age class (five years old or less; six years old or more), type of TL2 region (frontier, keeping pace and diverging). Average values across TL2 regions in the different types are reported. They are computed on average over available years (see Table 5.3 for detailed coverage). Costa Rica is excluded because the productivity classification is not available. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

*Source:* *DynEmp Regional database* (accessed in April 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

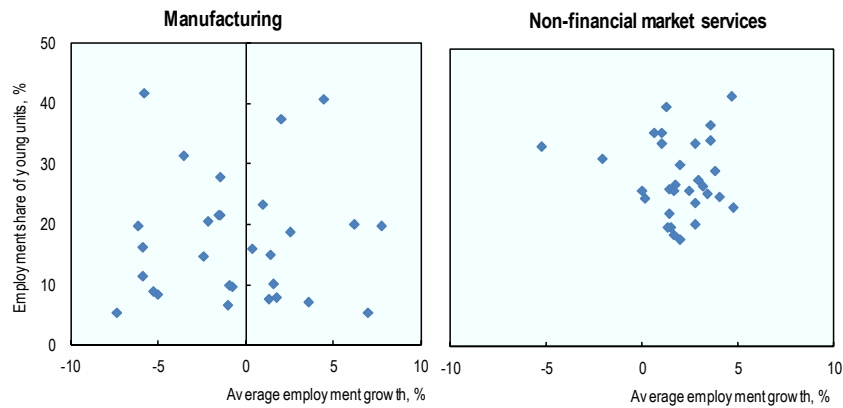
*StatLink*  <http://dx.doi.org/10.1787/888933626516>

Building upon the descriptive analysis presented so far, Figure 5.6 investigates the yearly correlation between the employment share of young (five years old or less) units and the overall average employment growth, across different TL2 regions by macro sector of activity (manufacturing and non-financial market services). Here the attention is no longer restricted to small and medium units, as was done in some of the analysis presented above. As shown in Figure 5.2, non-financial market services tend to have higher employment growth rates across TL2 regions in different countries. Furthermore,

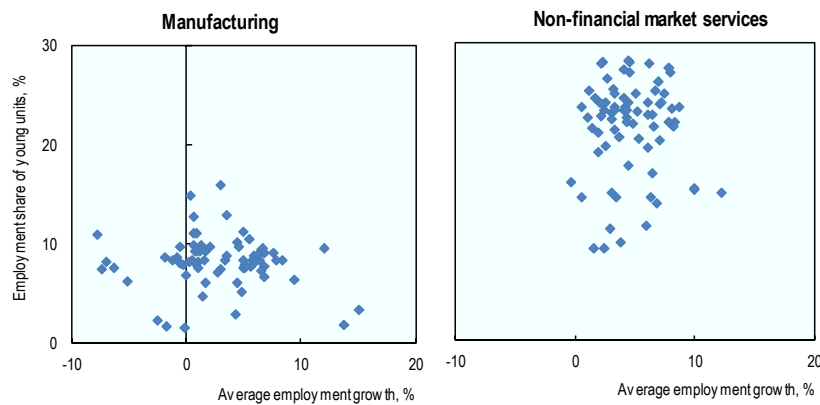
more evidently, they also tend to have higher shares of young units across regions. From this simple chart there appear significant differences in the share of young units between manufacturing and non-financial market services, but it is not straightforward to evince a clear relationship between share of young units and average employment growth within sectors.

Figure 5.6. Share of young units and average employment growth

A. Costa Rica, 2011-15



B. Finland, 2000-15



C. France, 2005-13

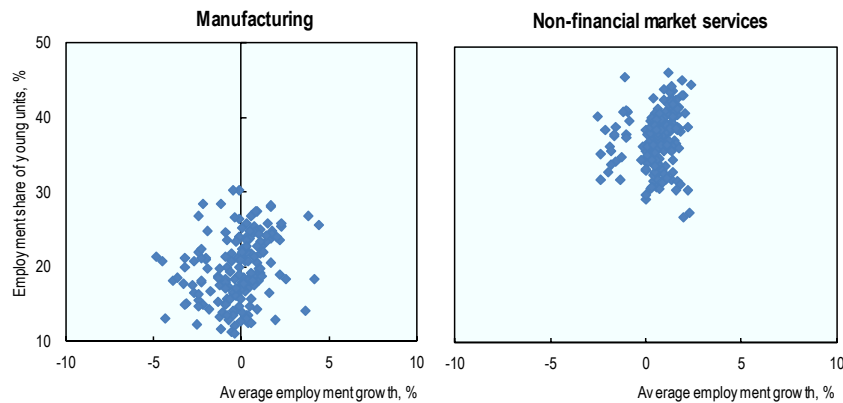
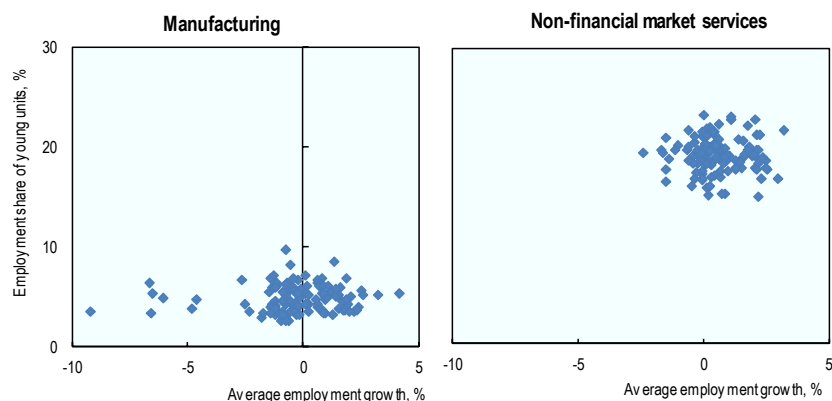


Figure 5.6. Share of young units and average employment growth (continued)

D. Sweden, 2000-15



Notes: Scatter plot illustrating the correlation of the employment share of young (five years old or less) units in the country, year, macro sector, TL2 region and the average employment growth of the country, year, macro sector, TL2 region. Complete information on unit age in Costa Rica is available starting from 2011. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

Source: *DynEmp Regional database* (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

StatLink  <http://dx.doi.org/10.1787/888933626535>

Further econometric analysis has been carried out in order to investigate this issue more in depth, with mixed results. In particular, when regressing the average employment growth rate of a given TL2 region-macro sector-year on the (employment) share of young units in the previous year (in the same region and macro sector) controlling for macroeconomic shocks (using year dummies) and unobserved regional characteristics (using TL2 fixed effects), a small positive and statistically significant coefficient (0.06) results from the analysis.<sup>13</sup> However, this correlation becomes statistically insignificant once the econometric model accounts for unobserved sectoral characteristics.<sup>14</sup>

Additional regression analysis was carried out to investigate the relationship between the share of employment in young units in a TL2 region and its characteristics. In particular, we looked at the relationship between the share of employment in young units and: 1) whether a region is mostly rural, mostly urban or intermediate; 2) whether a region is a frontier region, catching-up, diverging or keeping pace region; 3) both regional characteristics combined (see OECD [2016a] for additional details on these classifications).

Finally, we tried to proxy for the role of agglomeration economies for the development of an entrepreneurial economy, by including in these regressions two proxies for agglomeration. The first is population density and the second is “plant density”, i.e. number of plants per square meter in the TL2 region.

Therefore, the following model is estimated, separately looking at the share of employment in young units in the manufacturing and non-financial market services sectors:

$$y_{c,r,t} = char_{c,r} + agglomeration_{c,r,t} + year_t + country_c + \epsilon_{c,r,t}, \quad (1)$$

where  $y$  is the share of employment in young units;  $char$  indicates a set of regional characteristics dummies;  $country$  and  $year$  are a set of country and year dummies; the subscript  $c$  indicates country,  $r$  TL2 regions and  $t$  time;  $agglomeration$  is either the

logarithm of population density or of plant density,<sup>15</sup> which is added as a control after estimating the baseline models. Results are reported in Table 5.5 (Panel A focuses on manufacturing and Panel B on non-financial market services, reference categories are mostly rural regions and diverging regions).<sup>16</sup>

Table 5.5. Share of employment in young units and regional characteristics

A. Manufacturing sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intermediate	0.656 (0.454)		0.563 (0.507)	0.385 (0.545)	0.102 (0.579)			0.744 (0.557)	0.645 (0.589)
Mostly urban	1.323*** (0.418)		0.133 (0.517)	0.944* (0.500)	0.487 (0.569)			0.324 (0.552)	0.226 (0.578)
Frontier		3.322*** (0.669)	3.446*** (0.855)			3.426*** (0.695)	3.230*** (0.737)	3.691*** (0.856)	3.577*** (0.875)
Keeping pace		0.545 (0.378)	0.785* (0.454)			0.527 (0.390)	0.562 (0.394)	0.768* (0.455)	0.769* (0.458)
Log plant density				0.257 (0.210)		-0.0584 (0.154)		-0.197 (0.168)	
Log population density					0.462** (0.218)		0.0410 (0.161)		-0.0819 (0.189)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.840	0.850	0.851	0.841	0.842	0.850	0.850	0.851	0.851
B. Non-financial market services sector									
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Intermediate	2.994*** (0.364)		2.753*** (0.406)	2.013*** (0.473)	1.982*** (0.469)			2.363*** (0.507)	2.369*** (0.498)
Mostly urban	3.102*** (0.338)		1.817*** (0.406)	1.669*** (0.423)	1.576*** (0.420)			1.419*** (0.438)	1.378*** (0.438)
Frontier		3.929*** (0.512)	3.402*** (0.691)			1.814*** (0.563)	1.828*** (0.591)	2.694*** (0.750)	2.788*** (0.749)
Keeping pace		-0.643** (0.321)	0.264 (0.385)			-0.287 (0.333)	-0.258 (0.342)	0.322 (0.396)	0.338 (0.400)
Log plant density				0.795*** (0.166)		0.881*** (0.138)		0.383** (0.176)	
Log population density					0.844*** (0.178)		0.933*** (0.158)		0.385** (0.188)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.921	0.916	0.929	0.926	0.926	0.923	0.923	0.929	0.929

Notes: The reference categories are mostly rural regions and diverging regions. Data on regional characteristics are not available for Costa Rica, which is excluded from the estimation sample. All regressions include year and country dummies. Robust standard errors in parentheses. The tables do not report the regression constants. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Focusing on the results for the share of employment in young units, which should proxy for the presence of entrepreneurs in the region, and on the rural-urban gap, the estimates suggest that the share of employment in young units is significantly higher in the mostly urban TL2 regions, even if in the manufacturing sector this effect tends to disappear once the level of agglomeration in the region is accounted for. When focusing on the results based on the productivity classification, frontier regions appear to have a

higher share of employment of young units with respect to diverging regions, both in manufacturing and non-financial market services. When combining the two regional classifications, results appear stable for the non-financial market services sector, while only the regional productivity dummies remain significant in the manufacturing sector. Proxies for agglomeration (population density or plant density) are always positive and significant in non-financial market services.<sup>17</sup>

Additionally, we re-estimated equation (1) using as dependent variables the average employment growth rate of young units and the relative net job creation by entering units.<sup>18</sup> Results are reported in Annex 5.A1 (Tables A.1 and A.2) and provide qualitatively similar insights, slightly weaker when focusing on employment growth rates (in line with the descriptive evidence reported in Figure 5.5).

In a similar spirit, we focused on the relationship between regional innovation and employment in young units. Firstly, we estimated equation (1) replacing the regional characteristics dummies with a proxy of regional R&D intensity at TL2 level (total R&D expenditure over total employment in the region, persons aged 15-64). Results, reported in Table 5.6 (Panel A), suggest that high regional innovativeness, proxied by our R&D intensity indicator, is associated with a higher share of employment in young units.<sup>19</sup> Focusing on the manufacturing sector and changing the innovativeness proxy (using regional patent stock) produces similar results (Table 5.6, Panel B). However, when including both innovation indicators, only R&D intensity remains significant.

Table 5.6. **Share of employment in young units and regional innovation**

A. R&D in manufacturing and non-financial market services				
	(1)	(2)	(3)	(4)
	Manufacturing		Non-financial market services	
Log R&D intensity	0.159*** (0.0378)	0.161*** (0.0436)	0.146*** (0.00985)	0.142*** (0.0116)
Log population density		-0.00296 (0.0204)		0.00804 (0.00667)
Observations	273	273	273	273
R-squared	0.843	0.843	0.934	0.934
B. R&D and patents in manufacturing				
	(5)	(6)	(7)	(8)
	Manufacturing			
Log R&D intensity			0.147** (0.0664)	0.146** (0.0656)
Log patents	0.0756*** (0.0198)	0.0845*** (0.0273)	0.00392 (0.0306)	0.00553 (0.0344)
Log population density		-0.0202 (0.0214)		-0.00328 (0.0231)
Observations	347	347	272	272
R-squared	0.851	0.852	0.841	0.841

Notes: Dependent variables in log. Data on regional characteristics are not available for Costa Rica, which is excluded from the estimation sample. All regressions include year and country dummies. Robust standard errors in parentheses. The tables do not report the regression constants. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Secondly, we looked at whether a higher share of employment in young units at time  $t-1$  is somehow associated with a higher patent stock in the region, at time  $t$ . Preliminary

results from this type of exercise suggest the existence of a positive link between the stock of young units in a region and its innovation output.<sup>20</sup>

Further analysis oriented at corroborating these findings, which are at the moment simple associations with no causal interpretation, would be an interesting avenue for further research.

The granularity of the *DynEmp Regional database* was further exploited, disaggregating the data by groups of units (entering, incumbents and exiting). Along these lines, Figure 5.7 focuses on the relative net job creation by different groups of plants in TL2 regions. The measure represents net job creation in the TL2 region by the group of plants normalised by the total employment in the TL2 region, by macro sector of activity. Similarly to Figure 5.6 and to the regression analysis, this figure does not restrict anymore the focus on small and medium units.

The figure shows that, for instance, in the Finnish non-financial market services sector (Panel B), for every 100 jobs in the average TL2 region, about 1 new job is created by incumbents, about 3 by entrants and about 4 jobs are destroyed by exiting plants.

Figure 5.7. Relative net job creation in TL2 regions by group

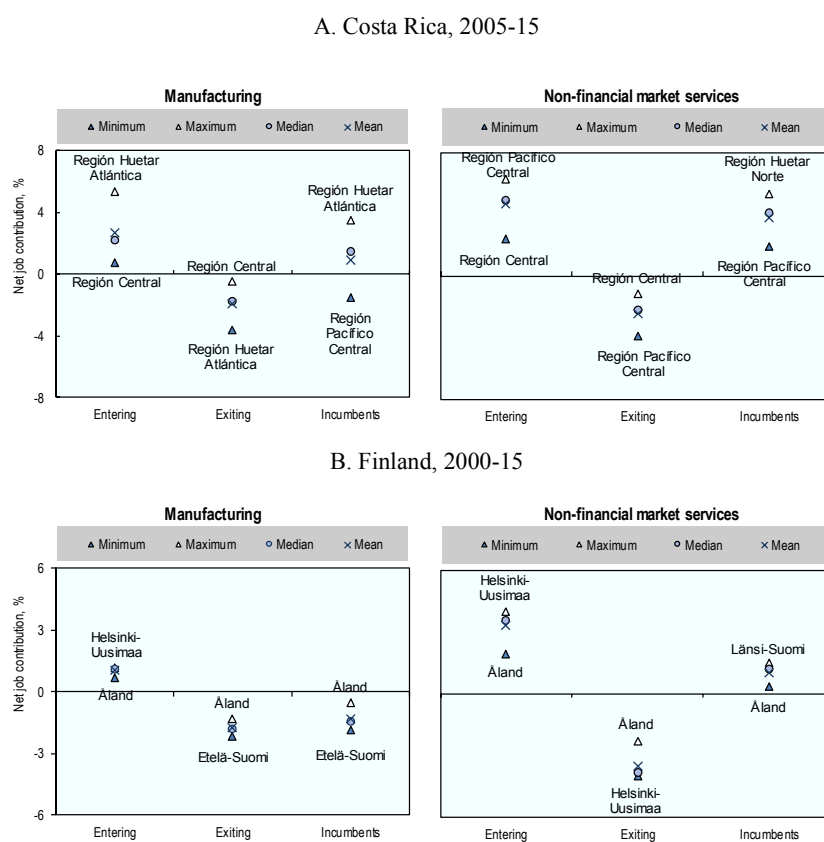
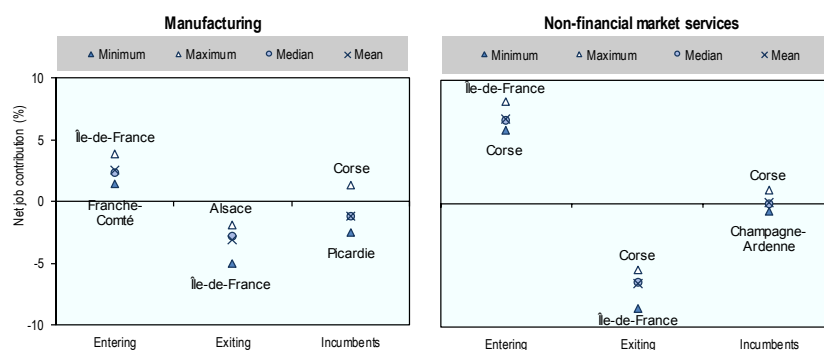
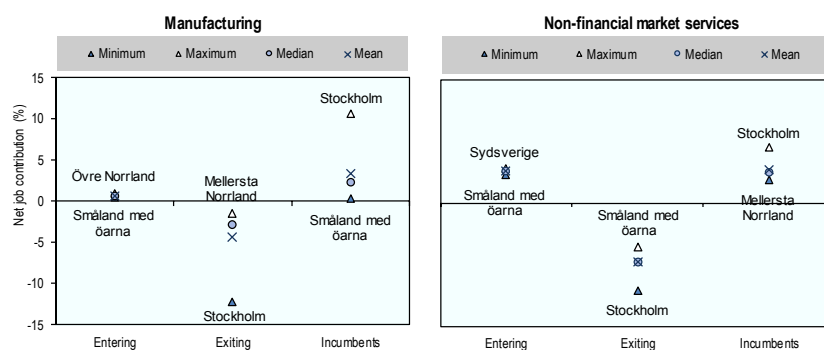


Figure 5.7. Relative net job creation in TL2 regions by group (*continued*)

C. France, 2005-13



D. Sweden, 2000-15



*Notes:* Relative net job creation is calculated as net job creation in the country, TL2 region, macro sector, group of plants (entering, incumbents and exiting) over average total employment (between time  $t$  and  $t-1$ ) in the country, macro sector, TL2 region. The mean, median, top and bottom TL2 regions are shown. Figures are computed on average over available years. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

*Source:* DynEmp Regional database (accessed in April 2017).

StatLink  <http://dx.doi.org/10.1787/888933626554>

Interestingly, looking at sectoral dynamics of the average TL2 regions, non-financial market services confirm to be more dynamic than the manufacturing sector in all countries under scrutiny. Furthermore, another interesting regularity appears to be the fact that – still looking at average regions – entering units, especially in non-financial business services, generally tend to outperform incumbents, more importantly in the TL2 regions of the capital city in Finland and France. This does not clearly occur in Sweden.<sup>21</sup>

Focusing on within-country sector figures, France seems to show more homogeneous dynamics, with more limited differences between the TL2 region at the top and at the bottom of the relative net job creation distribution in each given group of plants. Other countries, in particular Costa Rica and to a lesser extent incumbent and exiting units in the Swedish manufacturing sector, seem instead to exhibit more heterogeneous dynamics, which would be hidden looking at the average region only.

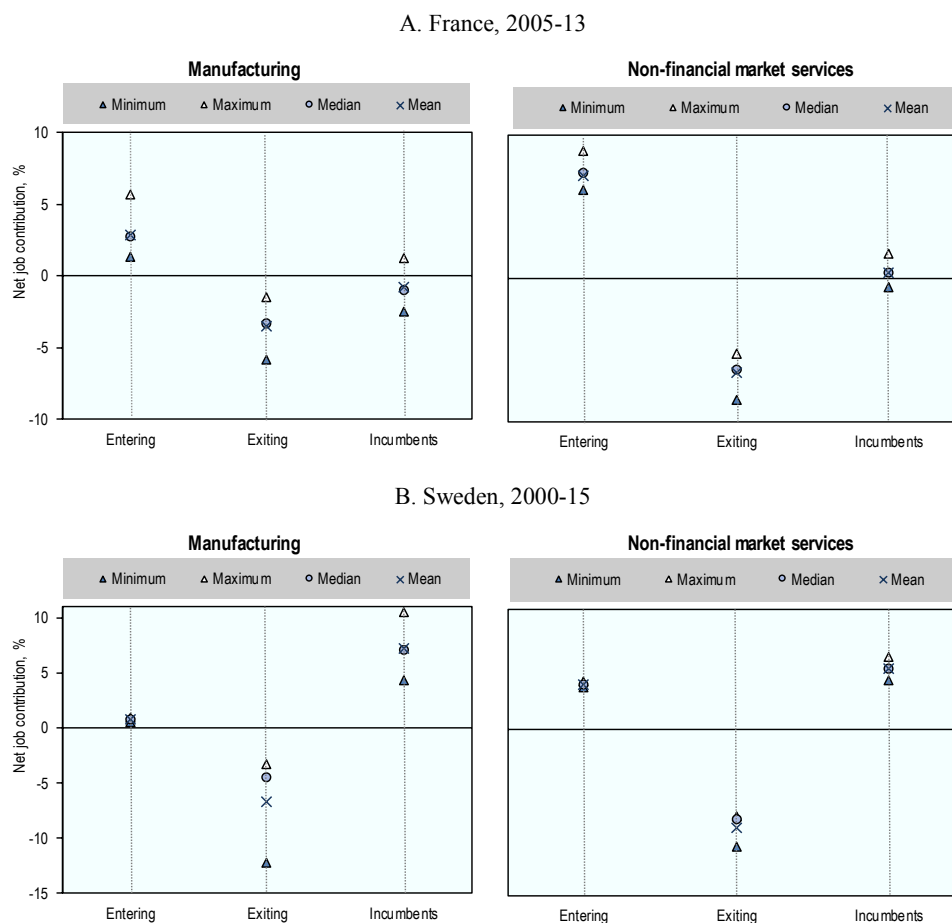


### Descriptive analysis for metropolitan areas

Whenever data availability allowed, we extended part of the previously presented analysis shifting the focus from TL2 regions to metropolitan areas. In particular, Figures 5.8 and 5.9 focus on the contribution to net job creation occurring at the level of metropolitan areas. This output database is available only for France and Sweden.

Similarly to Figure 5.7, Figure 5.8 focuses on the relative net job creation by different groups of plants (entering, incumbents and exiting) in metropolitan areas. The measure represents here net job creation in the metropolitan area by the group of plants normalised by the total employment in the metropolitan area, by macro sector of activity.

Figure 5.8. **Relative net job creation in metropolitan areas by group**



*Notes:* Relative net job creation is calculated as net job creation in the country, metropolitan area, macro sector, group of plants (entering, incumbents and exiting) over average total employment (between time  $t$  and  $t-1$ ) in the country, macro sector, metropolitan area. The mean, median, top and bottom metropolitan areas are shown. Figures are computed on average over available years. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

*Source:* DynEmp Regional database (accessed in February 2017), <http://www.oecd.org/sti/ind/dynemp.htm>.

StatLink  <http://dx.doi.org/10.1787/888933626573>

The figure shows that, for instance, in the Swedish manufacturing sector, for every 100 jobs, in the average metropolitan area about 7 new jobs are created by incumbents, less than 1 by entrants and about 7 jobs are destroyed by exiting plants. In the top

metropolitan area, instead, more than ten new jobs are added by incumbent plants in the manufacturing sector. Different dynamics seem evident when focusing on metropolitan areas in France, where entrants both in manufacturing and non-financial market services exhibit a relative net job creation higher than incumbent plants.

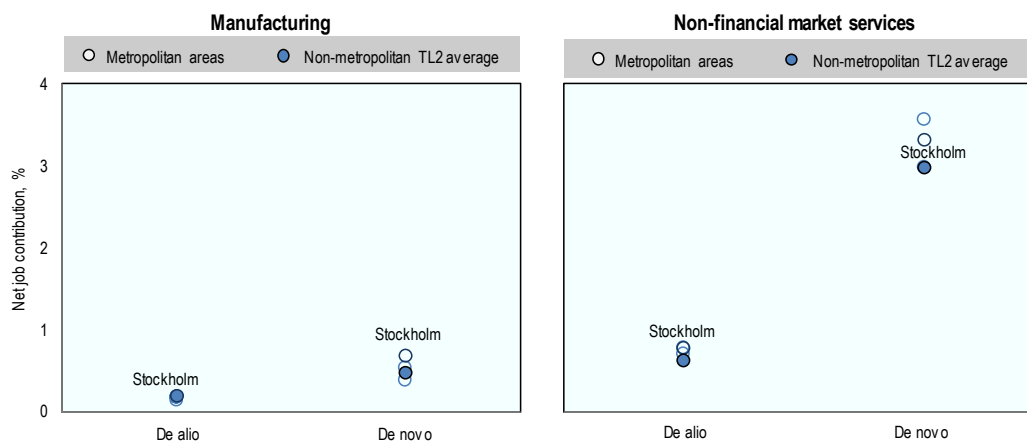
For France, additional unreported analysis has allowed to distinguish the relative net job creation by entering and exiting units separating plants part of a single-plant firm from those that are part of a multi-plant firm. Overall, on average, plants that are part of single-plant firms appear responsible for most of the dynamics observed in the overall figures, especially in the manufacturing sector. Additional analysis along these lines would be an interesting avenue for future research.

Finally, *de novo* entrants appear to contribute more significantly to net job creation in the metropolitan areas, especially in the non-financial market services sector.<sup>22</sup> This is reported in Figure 5.9, which focuses on the role of entering plants and further analyses their relative net job creation in metropolitan areas by disentangling *de novo* and *de alio* entrants in Sweden, where this further level of aggregation is available.

Comparing these figures to the same measures computed on “non-metropolitan” TL2 regions (see the figure note for details) illustrates that *de novo* entrants in non-financial market services have a higher relative contribution to net job creation in two out of three metropolitan areas. The magnitude of the differences seems less relevant in the manufacturing sector.

Figure 5.9. **Relative net job creation in metropolitan areas – *de novo* vs. *de alio* entry**

Sweden, 2000-15



*Notes:* Relative net job creation (reported in white) is calculated as net job creation in the country, metropolitan area, macro sector, group of plants (*de novo* vs. *de alio* entering units) over average total employment (between time  $t$  and  $t-1$ ) in the country, macro sector, metropolitan area. Relative average net job creation from TL2 regions that have less than 10% of zip codes associated with a metropolitan area (labelled “Non-metropolitan TL2s”) is reported in blue. Owing to methodological differences, figures may deviate from officially published national statistics. Data for some countries are still preliminary.

*Source:* *DynEmp Regional database* (accessed in February 2017), [www.oecd.org/sti/ind/dynemp.htm](http://www.oecd.org/sti/ind/dynemp.htm).

*StatLink*  <http://dx.doi.org/10.1787/888933626592>

### *Challenges and limitations*

Despite the considerable harmonisation efforts, a few challenges and limitations need to be taken into account when interpreting the preliminary findings of the DynEmp Regional project.

Despite the careful choice of the levels of aggregation at which the analysis was carried out, blanking still represents one caveat to consider when analysing the results. This can be particularly relevant for figures that do not restrict the attention to the smallest units in the economies under scrutiny (for instance, Figure 5.7). Furthermore, differences in blanking rules (due to primary or secondary disclosure) need to be further taken into consideration, particularly when comparing small cells across countries (notably those cells including the largest units, especially in scarcely populated sectors or regions).

As discussed in the section “The DynEmp Regional programme”, the identification of TL2 regions and metropolitan areas is based on a matching of microdata with an external correspondence table between zip codes and local levels of aggregation. Differences in the quality of such matching across countries need to be kept in mind as an additional caveat when carrying out cross-country analyses using the *DynEmp Regional database*.

From a more methodological perspective, the current structure of the DynEmp Regional programme does not allow taking self-employment into account. This could be an interesting direction for further development of future versions of the routine.

Finally, one of the challenges and important directions for further development is associated with the study of plant transition dynamics. In fact, longitudinal databases on employment dynamics can be used to study the regional employment growth performance of cohorts of plants over time (see for instance Calvino, Criscuolo and Menon [2015] for an example at national level). Due to time constraints, it was not possible to implement a module that computes such micro-aggregated statistics across different countries in the first version of the DynEmp Regional programme.

However, the module has been developed and implemented in one country. Some results for France are reported in Annex 5.A1 (Table 5.A1.3). These are aimed at showcasing the potential of this type of analysis. The results are based on a preliminary version of a transition database that follows cohorts of plants starting in pre-determined years (2001, 2004, 2007 and 2010) for three, five or seven years, conditional on data availability. Data are aggregated along different dimensions, including TL2 regions, macro sectors of activity, years, age classes, size classes at the beginning of each period and size classes at the end of each period.

A simple linear regression model was estimated, in order to investigate how survival (in terms of employment) and post-entry employment growth of entrants is associated with some regional characteristics (see Table 5.A1.3). Results suggest that entrants in mostly urban regions and, to a lesser extent, in mostly intermediate regions, tend to grow faster than entrants in mostly rural regions. However, no statistically significant effect of regional characteristics appears instead detectable when focusing on the survival shares of entrants.<sup>23</sup>

Additional refinements of the DynEmp Regional code, aimed at a cross-country implementation of this type of dynamic analyses, are left to future research.

## Conclusions and next steps

This chapter has presented the OECD DynEmp Regional project, a new distributed micro-data project aimed at analysing confidential administrative micro-data on employment dynamics at the regional and local level by means of micro-aggregation.

The results presented in this chapter have documented the heterogeneity in the employment distribution within countries and regions. They have confirmed that young plants contribute disproportionately to net job creation across regions and show on average a higher employment growth performance, as found in national-level analysis. The evidence reported in the chapter also highlights the importance of agglomeration economies for entrepreneurial efforts and post-entry employment growth in non-financial market services. The weight of entrepreneurial firms appear significantly higher in regions at the frontier, suggesting that on average these regions might be also more dynamic, reflecting a stronger creative destruction process.

At the time of writing, the DynEmp Regional project is still at its initial stages. A number of additional refinements might be carried out in the following versions of the code. These might include further customisation of the statistical routine to allow the participation of additional countries (such as, for instance, Denmark and Spain, whose microdata include only broader location information); possible addition of other indicators (possibly including a focus on concentration indices); possible additional refinements aimed at finalising the “Transition Matrix” code that would allow following cohorts of plants over time across countries, focusing on their employment and growth performance and the relation of this on contextual regional characteristics; possible methodological refinements in order to separately account for self-employment if and whenever possible.

Next steps entail matching the indicators of business dynamics at the regional and metropolitan level developed by the code to additional existing databases containing information on different relevant characteristics of TL2 and metropolitan areas, to refine the current analysis and to further understand the drivers of subnational business dynamics and employment growth.

## Notes

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2. As part of this strand of work, the OECD is leading three projects, DynEmp, MicroBerd and MultiProd, which rely on countries’ confidential micro-data to carry out comparable cross-country analysis on employment dynamics, investment in research and development (R&D), and productivity (see Box 5.1).

3. See <https://www.oecd.org/fr/sti/dynemp.htm> for additional information and details.
4. Analysing local employment dynamics at the firm level is likely to induce a bias, attributing employment of all the plants of a multi-plant firm to the location of the firm's headquarter. This bias depends on the proportion of multi-plant firms in a given economy, and on the distance of the plants that are part of these multi-plant firms from their headquarters.
5. The Territorial Level 2 consists of macro-regions. See the most updated territorial grids for OECD countries at: <http://stats.oecd.org/wbos/fileview2.aspx?IDFile=cebce94d-9474-4ffc-b72a-d731fbd75b9> for further details.
6. This corresponds to the STAN A7 classification in ISIC Rev. 4 (agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas, water and waste; construction; non-financial market services; non-market services).
7. Size is defined on the average of employment at time  $t-1$  and  $t$  for incumbents, on employment at time  $t-1$  for exitors, and on employment at time  $t$  for entrants.
8. Proxies of business dynamism include indicators of new business formation, job flows indicators, churning, etc. See Decker et al. (2016) for additional discussion, mainly focusing on the United States.
9. The SME definition is not identical to what result from our focus on plants with less than 250 employees, but a considerable degree of overlapping is expected. See OECD (2005) for further details.
10. Recall the definition of a cell provided in the section entitled "The DynEmp Regional programme". See Criscuolo, Gal and Menon (2014) for further discussion and analysis at the national level.
11. The regression table is omitted for brevity but available upon request.
12. See OECD (2016a) for additional details on this classification. The group of catching-up regions is excluded as it identifies only one small insular region in Finland (Åland).
13. Here the attention is no longer restricted to units with less than 250 employees.
14. Similar dynamics result when using the second lag of share of young units. Regression tables are not reported for brevity, but they are available upon request. This departs from unreported preliminary analysis that focuses on the relationship between average employment growth and share of young units at the country-industry-year level. This analysis suggests that this relationship remains positive and significant even once accounting for industry unobserved effects. Further exploration of these dynamics appears as a fruitful avenue for further research.
15. Note that population and plant density seem to essentially capture the same thing as they are very highly correlated, with a correlation coefficient above 0.6, and thus cannot be included together in the same regression model.
16. The group of catching-up regions is excluded from estimation as it identifies only one small insular region in Finland (Åland).
17. Unreported additional robustness exercises carried out for one country qualitatively confirm this role of agglomeration also when using a different range of proxies.
18. See the notes to Figure 5.7 for more details on the definition.

19. The results on R&D intensity also appear robust to the inclusion of TL2 regional dummies. Reverse causality issues are limited by the fact that the share of R&D is significantly higher in larger firms (see, for instance, OECD [2015]).
20. We included country and year fixed effects and focused on the manufacturing sector only. These results are preliminary and available upon request.
21. Replicating these figures using a common set of years for all countries (2013) provides qualitatively similar insights for average regions.
22. *De novo* entry corresponds to real economic entry, while *de alio* entry is entry due to a merger, an acquisition or a change in legal status.
23. The baseline category is mostly rural regions. Focusing on other covariates, the 2010 cohort of entrants appears to have experienced higher employment growth with respect to the 2007 one; the length of the time period over which units are observed is, unsurprisingly, negatively associated with survival and positively with growth; non-financial market services consistently appear more dynamic than the manufacturing sector (with higher growth and lower survival of entrants).

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## *Annex 5.A1.*

### Measurement challenges and implemented solutions

#### Measurement challenges and implemented solution

##### *Measurement of entry and exit*

Cross-country analyses of firm dynamics require a harmonised definition and comparable measures of firm entry and exit. This can be particularly challenging. This subsection discusses the approach taken in the DynEmp project, with a particular focus on the specific challenges associated with the use of plants as a unit of analysis.

In the *dynemp\_reg* programme, entrants are tagged by taking advantage of the birth year reported in the source database. Few corrections to this birth year are automatically implemented,<sup>1</sup> unless an option in the programme that forces the use of the exact source birth year is specified. If the data are left-censored and the user specifies this in the programme, the calculation of the age variable will take this into account, keeping the unit's age class missing until the plant becomes old enough to be tagged in a certain age class with certainty.

Two important challenges arising when defining entry are worth further discussion. The first one concerns whether a new plant is related to the entry of a new firm or is instead part of an existing multi-plant firm. In this respect, a procedure integrated in the *dynemp\_reg* routine allows distinguishing these two cases, whenever the optional firm identifier variable is specified. In particular, when this variable is specified, the output is further disaggregated, providing separate statistics for single plants or plants part of a multi-plant firm.<sup>2</sup> The second challenge is related to whether the registration of a new plant (and therefore its entry) corresponds to economic (*de novo*) entry or is rather related to other events such as a merger or an acquisition (*de alio* entry). The *dynemp\_reg* programme optionally allows the separate account of *de novo* and *de alio* entry, whenever the relevant information is available in the source data.

Consistently with the previous phases of the DynEmp project, the exit event is defined internally by the *dynemp\_reg* routine based on the last year in which the unit appears. In particular, the exit variable is equal to one in the year following the last time a unit appears in the data with positive employment.

Similarly to the case of entry, the *dynemp\_reg* programme optionally allows the separate account of units that exit due to a change in legal status whenever the relevant information is available in the source data.

##### *Measurement of location*

The analysis of employment and business dynamics at the local level requires the presence in the source data of a location variable. In order to choose the most appropriate location variable to use in the *dynemp\_reg* code, we took advantage of the preliminary questionnaire on data availability, described above.

The majority of countries for which data allow analysis at the plant level (7 out of 12) responded that information on the postal code of plants is available in their microeconomic database. Few countries have only information on city or municipality codes (such as Brazil

and Japan), while other countries have only more aggregated geographic information (such as Denmark and Spain).

The *dynemp\_reg* code therefore integrated a procedure to identify regional and geographical levels of aggregation (TL2 regions and metropolitan areas) starting from the postal code of units, based on an external correspondence table for each country. These correspondence tables have been developed by the OECD Centre for Entrepreneurship, SMEs, Local Development and Tourism.<sup>3</sup>

A few challenges need to be mentioned when developing a cross-country analysis that needs to deal with postal codes to identify plant location over time. These include the heterogeneity in postal code formats across countries; the possible change over time of the postal code for a given plant; possible reforms in the postal code systems.

The *dynemp\_reg* routine implements an automatic cleaning of the postal code variable, aiming at assigning a time invariant zip code to each plant. In particular, it creates a zip variable which takes the value of the most frequent (modal) zip code whenever such zip code changes over time or is missing, for a given plant. In case the mode is not available, the variable takes the zip code reported in the plant's latest available year. For reference, the automatically generated log file also reports the percentage of zip codes modified by the automatic cleaning procedure and the share of zip codes matched with the external correspondence table.

### ***Measurement of employment***

Measurement of employment across countries is a challenging task. In the first version of the *dynemp\_reg* code, the following recommendations are made to project participants.

Employment records should preferably be based on both headcounts and full-time equivalent if available, in two separate runs. The employment variable should measure employees, if available. If the available employment variable measures instead total employment, the programme should be run anyway but the DynEmp team should be informed about this. Employment can refer to either a yearly average or to a precise point in time (given that the focus is on longitudinal growth, this should not make a significant difference). The programme will run regardless of whether the employment variable is expressed as an integer or a decimal number. It is assumed that no additional rounding beyond that to unity is applied on the variable in the data.

Further refinements are planned for the subsequent versions of the *dynemp\_reg* programme, as discussed in the final section of this annex.

### ***Changes in industrial classification***

Another measurement challenge which applies when working with panel databases on business and employment dynamics concerns the changes in industrial classifications. In particular, a major change occurred between 2008 and 2009 in a significant number of countries due to the adoption of the new ISIC Rev. 4 (or NACE Rev. 2 in Europe) classification. In this context, many former industries were split into several parts, and others merged into a single industry.

For instance, the activities classified under the industry “Printing and publishing” (code 22) in ISIC 3.1 (NACE Rev. 1.1 in Europe) were split into five different 2-digit industries in ISIC Rev. 4 (NACE Rev. 2). Some of these industries are in manufacturing,

while some others are in services. As highlighted by the previous example, changes were not of the one-to-one type but n-to-m types. This applies to all levels of industry classification (i.e. 2-, 3- and 4-digit).

An additional challenge in this framework concerns the fact that units also change their activity from time to time, irrespective of changes in the classification system. However, it is typically more convenient to work with a constant industry identifier over time as this simplifies many types of analyses that make use of the industry dimension. For instance, a constant industry classification simplifies the definition of entry and exit as there is no need to follow which activity the unit enters or exits.

The *dynemp\_reg* programme, building upon the experience developed within the DynEmp and MultiProd projects, implements a probabilistic industry conversion system, which is described in detail by Criscuolo, Gal and Menon (2015) and in Berlingieri, Blanchenay and Criscuolo (2017). Its main rationale is to convert the input data according to the ISIC Rev. 4 classification before micro-aggregating them, taking advantage of probabilistic weights calculated in the years of overlapping industry classifications. Whenever overlapping years are not available, the routine takes advantage of an external correspondence table. Finally, in order to have a time-invariant industry code for each plant, the programme assigns to each unit its modal industry or its most recent industry code if the mode is not available.

## Definitions

The *dynemp\_reg* routine computes a few intermediate unit-level variables, which are subsequently used to calculate summary statistics at different aggregation levels in the final micro-aggregated dataset. The programme runs independently of whether the employment input data are expressed as an integer or a decimal number (it would round them up in the latter case).

The formula used to calculate the employment growth rate is presented in the following equation:

$$\gamma_{i,t} = \frac{L_{i,t} - L_{i,t-1}}{\frac{1}{2}(L_{i,t} + L_{i,t-1})}$$

Note that  $L_{i,t}$  stands for employment of unit  $i$  in year  $t$ . The formula is commonly used in the business dynamics literature as it has the advantage of not being biased by mean reversion dynamics (see Davis and Haltiwanger [1999], among others). The index is also scale neutral (i.e. it does not depend on the employment level at the beginning of the period) and is bounded between -2 and +2.

The unit's year of birth is the first year of activity of the unit and, as previously discussed, is needed to calculate the unit's age. If the data are left-censored and the user specifies this in the programme, the calculation of the age variable will take this into account.

In all output databases three different groups of plants can be identified: entering units, exiting units and incumbents.

In the *dynemp\_reg* programme, incumbents, entering units (entrants) and exiting units (exitors) are defined as follows. For each time interval ( $t-1$ ,  $t$ ), an entrant is a unit that is

not there in  $t-1$  but is there in  $t$ ; an exitor is a plant that is not there in  $t$  and is there in  $t-1$ .  
An incumbent is a unit that is there in  $t-1$  and  $t$ .

## Additional tables

Table 5.A1.1. Average employment growth of young units and regional characteristics

A. Manufacturing sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intermediate	-0.246 (0.266)		-0.170 (0.280)	-0.181 (0.307)	-0.149 (0.294)			-0.148 (0.322)	-0.134 (0.323)
Mostly urban	-0.591* (0.313)		-0.483* (0.266)	-0.500 (0.387)	-0.445 (0.360)			-0.460 (0.334)	-0.442 (0.347)
Frontier		-0.553 (0.447)	-0.161 (0.448)			-0.364 (0.565)	-0.259 (0.570)	-0.132 (0.563)	-0.104 (0.588)
Keeping pace		0.183 (0.408)	0.210 (0.452)			0.150 (0.428)	0.129 (0.432)	0.208 (0.458)	0.204 (0.466)
Log plant density				-0.0622 (0.155)		-0.106 (0.171)		-0.0234 (0.207)	
Log population density					-0.0812 (0.139)		-0.130 (0.160)		-0.0357 (0.202)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.820	0.820	0.821	0.821	0.821	0.820	0.820	0.821	0.821
B. Non-financial market services sector									
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Intermediate	0.0634 (0.143)		0.0605 (0.147)	-0.161 (0.170)	-0.0878 (0.165)			-0.122 (0.179)	-0.0288 (0.171)
Mostly urban	0.347** (0.152)		0.196 (0.151)	0.0190 (0.197)	0.119 (0.192)			0.00906 (0.188)	0.0940 (0.188)
Frontier		0.618*** (0.217)	0.455* (0.239)			0.221 (0.307)	0.387 (0.294)	0.122 (0.320)	0.312 (0.304)
Keeping pace		0.151 (0.199)	0.136 (0.212)			0.218 (0.208)	0.193 (0.206)	0.163 (0.217)	0.153 (0.217)
Log plant density				0.182*** (0.0694)		0.165** (0.0781)		0.180* (0.0980)	
Log population density					0.126* (0.0763)		0.103 (0.0828)		0.0898 (0.102)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.943	0.943	0.943	0.944	0.943	0.944	0.943	0.944	0.943

Notes: The reference categories are mostly rural regions and diverging regions. Data on regional characteristics are not available for Costa Rica, which is excluded from the estimation sample. All regressions include year and country dummies. Robust standard errors in parentheses. The tables do not report the regression constants. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 5.A1.2. **Relative net job creation by entering units and regional characteristics**

A. Manufacturing sector									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intermediate	0.147 (0.0948)		0.150 (0.105)	0.119 (0.117)	0.0815 (0.125)			0.197 (0.120)	0.192 (0.127)
Mostly urban	0.177** (0.0864)		-0.0205 (0.112)	0.138 (0.109)	0.0781 (0.126)			0.0290 (0.122)	0.0273 (0.129)
Frontier		0.527*** (0.146)	0.614*** (0.191)			0.566*** (0.152)	0.555*** (0.163)	0.677*** (0.192)	0.681*** (0.197)
Keeping pace		0.129 (0.0823)	0.206** (0.0985)			0.122 (0.0831)	0.124 (0.0834)	0.201** (0.0977)	0.197** (0.0979)
Log plant density				0.0265 (0.0473)		-0.0222 (0.0340)		-0.0510 (0.0406)	
Log population density					0.0549 (0.0488)		-0.0124 (0.0350)		-0.0420 (0.0455)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.651	0.663	0.666	0.651	0.652	0.663	0.663	0.667	0.666
B. Non-financial market services sector									
	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Intermediate	0.450*** (0.0982)		0.418*** (0.105)	0.195* (0.114)	0.198* (0.114)			0.227* (0.122)	0.239** (0.121)
Mostly urban	0.479*** (0.0882)		0.286*** (0.0992)	0.106 (0.102)	0.0986 (0.104)			0.0903 (0.104)	0.0809 (0.107)
Frontier		0.609*** (0.153)	0.519*** (0.188)			0.0561 (0.176)	0.101 (0.175)	0.170 (0.207)	0.231 (0.203)
Keeping pace		-0.0790 (0.115)	0.0566 (0.125)			0.0141 (0.116)	0.0141 (0.116)	0.0853 (0.126)	0.0915 (0.127)
Log plant density				0.207*** (0.0385)		0.230*** (0.0396)		0.188*** (0.0477)	
Log population density					0.210*** (0.0423)		0.225*** (0.0412)		0.180*** (0.0495)
Observations	356	356	356	356	356	356	356	356	356
R-squared	0.850	0.848	0.855	0.861	0.859	0.859	0.858	0.861	0.860

*Notes:* The reference categories are mostly rural regions and diverging regions. Data on regional characteristics are not available for Costa Rica, which is excluded from the estimation sample. All regressions include year and country dummies. Robust standard errors in parentheses. The tables do not report the regression constants. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table 5.A1.3. **Post-entry growth and survival of entrants and regional characteristics**

A. Post-entry employment growth	
	Post-entry employment growth
Year=2010 dummy	0.0485*** (0.0157)
J=5 dummy	0.0431*** (0.0141)
Non-financial market services	0.0349*** (0.0131)
Mostly intermediate dummy	0.0438*** (0.0159)
Mostly urban dummy	0.0618*** (0.0151)
Observations	132
R-squared	0.207
B. Survival share (in terms of employment)	
	Survival share (employment)
Year=2010 dummy	0.000490 (0.0139)
J=5 dummy	-0.123*** (0.0147)
Non-financial market services	-0.0725*** (0.0119)
Mostly intermediate dummy	-0.0189 (0.0154)
Mostly urban dummy	-0.0140 (0.0152)
Observations	132
R-squared	0.516

*Notes:* Dependent variables are: post-entry employment growth in Panel A; survival share of entrants (in terms of employment) in Panel B. The reference categories are year=2007 for the years dummies; manufacturing for the macro sector dummies; mostly urban regions for the regional characteristics dummies. Robust standard errors in parentheses. The tables do not report the regression constants. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## Notes

1. These corrections include replacing the birth year with the first year with positive employment when the birth year is within the observed period, or when the birth year is later than the first year of appearance with positive employment.
2. In the first version of *dynemp\_reg* this additional optional disaggregation level is available only for the metropolitan part of the output, in order to reduce possible issues related to residual confidentiality.
3. Further methodological details for metropolitan areas are available in OECD (2012) and for TL2 regions at: <http://stats.oecd.org/wbos/fileview2.aspx?IDFile=cebce94d-9474-4ffc-b72a-d731fbdb75b9>.

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## *Annex 5.A2.*

### **Contributors to the DynEmp regional data collection**

Table 5.A2.1 summarises the contributors to the DynEmp regional data collection. The table includes only countries for which data had been received at the time of writing. A more detailed version of the table, including all contributors to the DynEmp and MultiProd project, is available in OECD (2017).

Table 5.A2.1. **Contributors table**

Country	Contributor(s)	Institution(s)
Costa Rica	Alfonso Alfaro Ureña, David Bullon Patton, Arlina Gómez, Tayutic Mena, Francisco Monge	Banco Central de Costa Rica (BCCR) and COMEX
Finland	Mika Maliranta	Research Institute of the Finnish Economy (ETLA)
France	DynEmp team	OECD
Sweden	Fredrik Andersson	Statistics Sweden (SCB)

### *Reference*

OECD (2017), *Business Dynamics and Productivity*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264269231-en>.



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