OECD Local Economic and Employment Development (LEED) Papers

An insight into the innovative start-up landscape of Trentino

Is it time for the “Start-up Valley” to scale up?

This paper offers an in-depth analysis of the characteristics of innovative start-up firms in Trentino, a high-income mountainous area in the North East of Italy. This work is part of a series of thematic papers on regional start-up landscapes in Italy, produced by the OECD Trento Centre for Local Development. Following the 2018 OECD Evaluation of the Italian Start-up Act, which embraced a national perspective, it represents a first attempt to analyse the impact of this policy at the local level. Among Italian regions, Trentino boasts the highest density of registered innovative start-ups over all young firms established locally. However, innovative start-ups spread unevenly throughout this territory, concentrating in urban areas. Female and young founders are less prevalent than in Italy at large. Firm dynamism, in particular high-growth and exit trends, the uptake of emerging technologies among local start-ups as well as their propensity to use national incentives are other key areas of this work, which concludes with a set of evidence-based recommendations for policy makers.

JEL codes: D22, L26, M13, O38, R12
Keywords: start-up, innovation, entrepreneurship, policy adoption, local development, firm dynamism, artificial intelligence

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Executive summary

This work offers an in-depth analysis of the characteristics of innovative start-up firms in Trentino, a high-income mountainous area in the North East of Italy. It is part of a paper series focusing on regional start-up landscapes in Italy, produced by the OECD Trento Centre for Local Development.

Extensive empirical evidence shows that young firms are a key driver to job creation and productivity. As shown during the COVID-19 pandemic, innovative start-ups can also contribute to societal well-being by offering new solutions to urgent needs, and by facilitating the shift to digital-based work and consumption. Start-ups may also contribute more broadly to social inclusion: however, women and young people are under-represented among founders, revealing deep-seated societal and cultural disparities.

Traditionally, policy makers have followed two alternative paths to start-up support: a "selective" approach, targeted at companies assumed to grow the most, and a "nonselective" one, creating an enabling environment for all innovative firms that facilitates entry and exit, and smoothens risk. While identifying high-growth firms fully *a priori* is challenging, there is an economic argument for supporting start-ups in general in times of crisis, as losses in firm creation and growth have long-term effects on employment.

Italy opted for a mixed approach. In the Italian legislation, "innovative start-ups" are defined as the beneficiaries of a specific scheme launched by the national government in 2012, the Italian Start-up Act. Its peculiarity is the provision of a legal definition of innovative start-ups, which entitles eligible firms to benefit from an extensive package of support measures, including online incorporation, subsidised loans, and incentives to equity investors. Earlier OECD work reveals how firms benefiting from this scheme have a better economic performance than other eligible entities that do not join the policy, or do so at a later stage. This makes the issue of policy transfer – the mechanisms that allow policies designed by central administrations to catch on at the local level – particularly salient, given that the policy works on self-selection: eligible companies must file an application to qualify as an innovative start-up, and there is evidence that a substantial share of them never do so.

Another distinctive feature of the Italian Start-up Act is its open data policy: a vast range of micro-data on beneficiary firms is freely available online, and a structured monitoring system is in place. These datasets represent the main statistical source used for the purposes of the present work.

There are two main reasons of interest for studying the local dimension of Italy's start-up policy: the wide variation observed across Italian regions under most metrics of firm performance, and the significant law-making and spending powers devolved to regional authorities in the field of SME and innovation policy. In such a decentralised setup, regional authorities have significant discretionary powers to complement national policies and adapt them to local conditions.

Some local governments enjoy particularly extensive delegated powers. An example is the *provincia autonoma* of Trento (Trentino), a high-income territory with some of the best economic and employment statistics in Italy, as well as high R&D spending, mostly public driven.

Compared to other Italian regions, innovative start-ups in Trentino stand out in several ways. First, there is an unusually high density of beneficiary firms: the ratio between registered innovative firms and all young

limited companies (7.45%) is by far the highest in the country (the equivalent for all of Italy is 3%). This is the effect of a steady and sustained pace in new registrations under way ever since the Start-up Act entered into force, and hints at effective policy transfer.

Despite their relatively high density, innovative start-ups spread unevenly throughout Trentino, and their spatial distribution does not reflect population patterns. While most residents in this region live in small, often peripheral municipalities, registered start-ups are concentrated in main population hubs. However, while in most of Italy start-ups are prevalent only in the regional capital and settlements of comparable size, in Trentino there is at least one major secondary cluster in peri-urban areas. An ancient industrial district, Rovereto is a case of successful reconversion driven by the action of the public sector.

The population of entrepreneurs is also not representative of overall demographics in other ways. Female founders are rare: just 10.9% of innovative start-ups registered in Trentino are primarily owned or run by women – one of the lowest ratios in Italy. Start-ups owned by under-35s are also less prevalent than in Italy at large. Trentino displays very high female and youth employment levels overall; conversely, the regions with the highest women- and young-led start-ups are in southern Italy, which has much higher unemployment and lower labour force participation. This negative correlation suggests that under-represented groups have even fewer incentives to embark on risky entrepreneurial ventures when more opportunities in the "conventional" job market are available.

Focusing on the uptake of flagship policy instruments for innovative start-ups, Trentino's performance is mixed. Over 30% of registered firms have obtained bank loans backed by a public guarantee facility, which is more than 10 percentage points above the national average. However, access to credit is strongly influenced by underlying macro-economic conditions: after controlling for GDP per capita and other variables, Trentino's uptake performance is less remarkable, and inferior to most surrounding areas. Trentino's start-ups are also less likely to be incorporated online than in most other Italian regions.

As the Italian Start-up Act targets firms in their early stage of development, an overwhelming majority of innovative start-ups in Trentino, like anywhere else in Italy, are micro-SMEs in terms of turnover size. However, start-ups are somewhat larger in Trentino than in the rest of the country: this lies primarily with a higher share of "medium-sized" start-ups, rather than with the presence of few firms with exceptionally high turnover values. In fact, high-growth firms are not particularly common, compared to the rest of Italy. Conversely, firm shutdowns used to be more frequent in Trentino than in the rest of Italy, particularly for the "oldest cohort" of start-ups – i.e. firms that joined the policy in 2013 and 2014. A glance at year-by-year flows shows that most start-ups grow since registration, even if patterns are uneven. In particular, high-turnover start-ups tend to show good economic outcomes already in their first or second year after registration; firms that have not entered the market by then are unlikely to scale later on, and make up most of late years' shutdowns. These two trends may both be signs of a healthy ecosystem that supports sustainable business models and "rejects" non-viable ones.

Finally, an exploratory text analysis of company documentation, based on machine learning techniques (Latent Dirichlet Allocation method for topic modelling), estimated the share of registered start-ups adopting emerging digital technologies, such as artificial intelligence (AI), cloud computing, and big data analytics. This exercise uncovered another strength of the local landscape: innovative start-ups in Trentino seem very likely to employ such technologies in their business models, almost rivalling Rome – Italy's most prominent hub in the field – when accounting for different macro-sectorial patterns. Specifically, digital-based start-ups have a high rate of adoption, suggesting that they tend to be more innovative than average.

Despite many encouraging performance indicators, the analysis showed several areas in which Trentino's start-up landscape may not have fulfilled its full potential yet. In response to that, the OECD Trento Centre outlined a first range of evidence-based policy recommendations to the advantage of local policy makers.

Trentino is encouraged to foster the entrepreneurial engagement of women and youth, particularly among graduate and doctoral students – also exploiting its high-quality research environment. More focus could

also be put on championing the scaling-up of firms, given its low share of high-growth start-ups. A specific recommendation in this sense is to develop “early warning” systems that help identify and support promising start-ups early in their life cycle. Funding and support services are also crucial. Trentino’s start-ups are well positioned to benefit from the increasing attention given by policy makers to AI and digitised manufacturing, and could be put in the position to effectively exploit the substantial resources earmarked by the EU to develop testing facilities and Digital Innovation Hubs.

1. Introduction

How young and innovative firms contribute to job creation, productivity and inclusiveness

Enabling start-ups to enter the market and grow is a policy priority across OECD member countries. There is empirical evidence that a thriving landscape of young firms, particularly if technologically innovative, is beneficial for economies and societies.

In all OECD countries, young firms – defined as firms that are five years of age or younger – have a positive impact on job creation. Even if, on average, they account for about 20% of total employment, they create almost half of all new jobs, meaning that they have a disproportionate effect on aggregate employment. The entry of new firms has in itself a measurable impact on job levels, together with the growth of young incumbents, particularly those that are less than three years old. This is remarkable because just a tiny proportion of start-ups grow significantly after entry: between 2% and 9%, according to the OECD DynEmp dataset used by the OECD (Criscuolo, Gal and Menon, 2014, p. 32[1]). Even if there is wide cross-country variation, start-ups are subject to "up-or-out" dynamics, meaning that high average rates of growth coexist with low survival rates. Nonetheless, the number of jobs created outweighs those destroyed through bankruptcies and downsizing, while for older firms the net contribution to employment is often slightly negative.

There are also signs that dynamism of young entrants is a driver of aggregate productivity growth (Tushman and Anderson, 1986[2]): through a "creative destruction" process, labour and capital are reallocated away from sluggish inefficient firms to growing highly productivity firms, raising overall aggregate productivity. Where said "up-or-out" dynamics are particularly strong, the exceptional productivity growth of a few high-potential firms more than compensates for the majority of start-ups that stagnate (Haltiwanger, Lane and Spletzer, 1999[3]; Calvino, Criscuolo and Menon, 2016[4]). A case in point are the United States, where the role of new firms explains almost half of all productivity growth in the last three decades (Klenow and Li, 2020[5]).

Above and beyond private market benefits of entrepreneurship, *innovative* start-ups can play a disproportionately important role in meeting broader social objectives. As also highlighted in recent reports (OECD, 2020a[6]), the COVID-19 pandemic brought to the fore the critical role that start-ups play for the economy. On the one hand, the forced closure of workplaces, schools and places of leisure has catalysed advancements in digital technology as much as dramatically increased its uptake. This opened new market opportunities for digital-based young firms, which may be possibly long-term if the shock results in persistent societal changes. On the other hand, public authorities, such as the European Commission,[1] have resorted to start-ups to develop innovative solutions meeting urgent problems. These include increasing the availability of medical supplies (Reuters, 2020[7]), developing symptom assessment tools, and support health and well-being during the lockdown (Sifted, 2020[8]).

Young firms may also contribute to social inclusion. For instance, there is evidence that innovative entrepreneurship fosters social mobility in the United States (Aghion et al., 2015, pp. 21-22[9]), while minority communities, particularly those of South-East Asian origin, have played increasingly important

roles in American science and technology sectors (Stuen, Mobarak and Maskus, 2012, pp. 1143-1176[10]). Indeed, all major start-up hubs, in the US as well as in Europe, are characterised by a high share of entrepreneurs coming from abroad (MISE, 2020a[11]). Nonetheless, patterns in start-up entrepreneurship also reflect societal inequalities, and there are signs that they may even amplify them if no correctives are made. (Aghion et al.[9]), for instance, also identify a significant correlation between innovation performance and higher top income inequality. At the same time, there is extensive empirical evidence that women and youth are strongly under-represented among the self-employed population, and even more so in entrepreneurship with high-growth, income generation (Piacentini, 2013[12]) and sustainability prospects. A joint OECD-EU work on "Missing Entrepreneurs" in the European Union (OECD/European Union, 2019[13]) showed that this gap is persistent, has become more prominent after the Great Recession, and is only slightly narrowing due to a decrease in self-employment among middle-aged men.

Digital-based business models may hold potential for making entrepreneurship more inclusive. As they entail fewer costs to access the market and reach new customers, they are more suitable for entrepreneurs with less financial resources. However, this potential is still largely untapped, as women and youth are greatly under-represented among digital entrepreneurs as well. In 2018, women accounted for only 15.6% of digital start-ups in the EU, with no signs of progress over time. Even if programmes to support female and youth start-ups exist – albeit there is a perception that this channel is somewhat underexplored (OECD, 2016, pp. 111-129[14]) – there are factors of disadvantage that are complex to tackle. These include a systematically lower confidence among these groups in their own ability to launch an entrepreneurial venture successfully as well as a more difficult access to strategic resources and funding.

How policy can support start-up entrepreneurship: two alternative approaches

Policy makers may follow two different approaches in supporting start-up entrepreneurship. The first advocates for concentrating support only on the subset of firms that have "[high] growth potential" (Shane, 2009[15]), which, as seen above, are those that generate most economic benefits. The key assumption of this "selective" approach is that growth can be reliably predicted based on observable characteristics of firms, which can be thereby unambiguously identified. However, econometrics studies have indicated that such explanatory variables at firm and entrepreneur levels are largely overshadowed by randomness (Geroski, 2002[16]; Coad, 2009[17]; McKelvie and Wiklund, 2010[18]). There is also an objective difficulty in obtaining sufficiently detailed data on "ex ante" characteristics of founders from existing sources – although the growing accumulation of data in the digital age, and development of machine learning techniques, may help making progress in the coming future.

A second, "nonselective" approach eschews prior assumptions of growth potential. Enterprises with desired characteristics, such as technology-intensive business models, should be encouraged by allowing "experimentation", streamlining the regulatory context applying to them, incentivising entry – e.g. by simplified incorporation rules and corporate governance – and making company exit via dissolution or bankruptcy less burdensome. The drive towards experimentation also gives a rationale for smoothening risk on the financial supply side, for instance by providing public guarantees to credit institutions and fiscal incentives to capital investors.

Another argument to endorse large-scale support to young firms is the consequences they suffer in times of economic downturn, such as that brought by the COVID-19 pandemic. New entrants are highly susceptible to liquidity shocks, as they find it more difficult to access traditional funding, and their relationships with suppliers and customers are not yet well established. Even after accounting for massive short-term job losses, the experience of the Great Recession shows that such shocks have a permanent effect of the number of firms created, which in turn results of lower employment levels in the long run (up to -0.5% after 14 years). Indeed, to shield the economy from long-term damage, during the pandemic all OECD countries launched a variety of schemes to support SMEs (OECD, 2020b[19]), and some, such as

France (Bpifrance, 2020[20]), Germany (BMWi, 2020a[21]), the United Kingdom, (UK Government, 2020[22]) and Italy (MISE, 2020b[23]), have also introduced measures specifically targeted at start-ups.

The Italian Start-up Act: a definition of innovative start-ups and support measures

Among OECD countries, Italy has followed a distinctive course to support young innovative enterprises. The country's strategy for "innovative start-ups" (*start-up innovative*) is a mix of the two approaches described in the previous paragraph, as it creates a special playing field for companies with pre-defined characteristics, conferring them a set of facilitations, exemptions, and funding opportunities that are tailored to allow experimentation and smoothen risk.

The "Italian Start-up Act" was introduced in late 2012, as part of the actions undertaken by the Italian government to stimulate economic recovery in the aftermath of the financial crisis. Its main body, articles 25 to 32 of decree-law 179/2012, introduces a broad set of special regulations and incentives aimed at promoting "*sustainable growth, technological development, innovative entrepreneurship and youth employment*", and thereby contributing to "*a new entrepreneurial culture […], social mobility and the attraction of foreign talents, innovative firms and capital to Italy*" (Gazzetta Ufficiale, 2012[24]) (art. 25, par. 1, the "preamble" of the Act).

This set of regulations is applicable to firms that meet a list of eligibility criteria, which define "innovative start-ups" as a specific type of firms under Italian law. These are limited liability companies established for less than five years, reporting an annual turnover lower than EUR 5 million, and not publicly listed. Their incorporation should not be the result of a branch split or merger from a previous company, and they should not have distributed profits. In addition, eligible firms must have an objects clause ("*oggetto sociale*") explicitly related to innovation, and should fulfil at least one of the following requirements: R&D expenditure ratio higher than 15%; at least one third or two thirds of staff holding a PhD or a Master's degree respectively; ownership of legal rights for a patent or a software (art. 25, par. 2). Remarkably, the definition does not provide for any sector-related constraint – it is well possible to have registered start-ups in tourism, farming, or retail trade, provided that they meet the innovation-related requirements mentioned above.

The Italian Ministry of Economic Development ("MISE"), the *chef-de-file* in national policy-making on the matter, advertises the support measures in the package as "*benefiting all stages of start-ups' lifecycle, from birth to maturity*" (MISE, 2019a[25]). They include, among other things, a digital and free procedure for incorporation, several exemptions from duties, fees and corporate governance requirements, tax breaks for seed- and early-stage investments, a public guarantee facility for access to credit, and simplified bankruptcy regulations (Annex A provides an overview of the Italian Start-up Act's main support measures).

The requirements imply that a firm can hold innovative start-up status until it is five years old, or its turnover exceeds EUR 5 million. For companies that no longer meet one of these conditions, but that still retain a character of technological innovation, the government introduced in 2015 (decree-law 3/2015) a "Tier-2" support scheme for so-called "innovative SMEs" (*PMI innovative*). This regime offers many of the support measures applicable to start-ups, within limits mostly set by European Union rules on state aid. Its dimensional constraints are coterminous with the European definition of SME, and there are no age limits. The definition is thus intended to capture high-growth innovative "scale-ups", together with older small- and mid-caps that introduced high-tech aspects in their business model (MISE, 2019b[26]).

A distinctive feature of the Italian regulatory framework is self-selection. Eligible firms do not benefit from the policies automatically: legal benefits apply only after they register in a "special directory" (*sezione speciale*) of the Italian Business Registry. The registry is managed by the Italian Chambers of Commerce (*Camere di Commercio*), public law bodies that act as an interface between firms and the state for most

administrative matters. It is worth noting that Chambers of Commerce are decentralised players, traditionally organised at the level of each *provincia* (Italy's second-level local authority)[2] and that they also have consulting and promotional duties, as well as merely bureaucratic functions. This, together with their responsibilities in keeping the registry tidy – i.e. by checking whether registered start-ups comply with legal requirements – makes Chambers of Commerce key players in implementation and dissemination of the Italian Start-up Act.

Registration as start-up is voluntary: this obviously implies that nascent and existing companies must be well informed about the policy in order to benefit from it. Linkages with other players of the innovation ecosystem (e.g. start-up incubators and accelerators, investment funds and technology transfer institutions) may increase the likelihood to receive such information. Prior analysis, summarised later in this work, estimated that many eligible firms – potentially, as many as those currently registered – are not aware of the policy framework: this was typically a major issue for "mature" SMEs incorporated before the Italian Start-up Act entered into force, and in general for those enterprises that have fewer formal connections with players in the Italian start-up ecosystem. As a consequence, the number of *registered* innovative start-ups may not capture the full extent of the potentially eligible population.

The Italian scheme is salient for international policy research for a number of reasons. Arguably, the most remarkable is its attempt to introduce a legal definition of innovative start-up based on objective firm characteristics. This solution is uncommon in other OECD countries, but can be generalised nonetheless, as it is based on publicly available company information. Business characteristics used to define eligible firms, such as age, company form, and financial data, are widely available through public as well as commercial datasets: this potentially allows to identify a firm population comparable to Italian innovative start-ups in any other country where the same information is available. Moreover, there is evidence that the policy enjoys high name recognition in Italy (Menon et al., 2018, pp. 72-74[27]), which supports the thesis that registered firms are an acceptable approximation of the local landscape of innovative entrepreneurship.

As outlined in the next section, the policy monitoring system generates a wealth of statistical evidence of many dimensions of firm development and performance. As a result, a growing corpus of policy analysis literature has emerged (Biancalani, Czarnitzki and Riccaboni, 2020[28]; Del Bosco et al., 2019[29]; Giraudo, Giudici and Grilli, 2019[30]; Finaldi, 2018[31]; Demartini, 2018[32]; Scattoni et al., 2019[33]).This includes an evaluation exercise performed by the OECD (Menon et al., 2018[27]), which evidenced a significant causal effect of exposure to the policy framework on several economic outcomes. Its main findings are summarised in Box 1.1.

Box 1.1. The evaluation of the Italian Start-up Act (OECD 2018)

In September 2018, the OECD published a comprehensive evaluation of the Italian "Start-up Act", intended as a set of 19 complementary, "eclectic" policy instruments tied to a legal definition of "innovative start-up" firms.

The key section of the study, a counterfactual analysis based on detailed balance sheet, patent, and bank credit data at firm level, estimates the causal effect of the policy on its beneficiaries. Although preliminary, its findings are that beneficiary firms increase revenues, value added and assets by about 10-15% percent relative to similar start-ups that did not benefit from it. Enrolled firms are also more likely to receive loans at a lower interest rate, and have a higher probability to receive venture capital funding, although the latter nexus is not necessarily causal.

This evidence is regarded as positive, also in the light of the relatively modest cost of the initiative (estimated at approximately EUR 30 million for the 2013-2016 period). The policy seems to have had

also other “side” effects, such as an increase in interest for the concept of “start-up” in Italy from 2012 onwards (Menon et al., 2018, pp. 73-75[27]).

However, since the policy has been introduced, Italy has not seen an increase in the amount of venture capital investments, especially in comparison with other major EU economies. Although the Italian Start-up Act includes few incentives specifically targeted to this form of finance – and almost exclusively for small-size investments – this may cast doubt over the long-term potential and attractiveness of the Italian start-up ecosystem.

The authors warn that the effects of the Italian Start-up Act depend on the health of the entrepreneurial environment as a whole, as bottlenecks that are detrimental for all businesses can be particularly harmful for start-ups. Contract enforcement, bankruptcy and insolvency laws, education and skills, and digital infrastructure are all mentioned as areas in which Italy needs improvement in order to promote start-up competitiveness. Specific policy recommendations feature calls to amend the current objects clause requirement, and introducing provisions targeted to very high-growth firms, researchers, and to tackle the gender gap (Menon et al., 2018, pp. 87-88[27]).

Data sources

The provision by law of a specific legal definition of innovative start-up – and, relatedly, the creation of dedicated directories within the national Business Registry – is one of the most distinctive features of the Italian Start-up Act. By express provision of the law, micro-data on innovative start-ups are accessible to anyone online, free of charge, and there are no restrictions to their processing and re-publication. InfoCamere, the IT firm of the Italian Chambers of Commerce running the Business Registry backend, updates datasets once a week, allowing continuous public monitoring.[3]

The Business Registry data available for each of the registered innovative start-ups include, among others, the following items: company name, legal type, geographical location (municipality, province and region), date of incorporation and access to policy, NACE code, size class in terms of turnover, employees and share capital, share of women, young and foreigners among shareholders, and company website.

This paper will use a “historicised” version of this database, which includes all start-ups currently and formerly registered as of the first week of 2020. It also integrates it with parallel monitoring systems on policy measures, such as access to guaranteed loans via the public Guarantee Fund for SMEs, and customary demographic and business performance sources.[4] Our work is also indebted to the periodic monitoring reports published by MISE on a quarterly basis, which cover business demographics as well as performance of individual policy measures.[5] Indeed, the final clauses of the Start-up Act commit the Ministry to running a monitoring and evaluation system, which culminates in a yearly report to Parliament signed by the Minister.[6]

Italian innovative start-ups are also interesting for researchers because of large availability of high-definition text data on their economic activity. As of 2019, innovative start-ups are required by law to fill out and update a public “company profile” on a dedicated platform (startup.registroimprese.it), as a precondition to retain their innovative start-up status every year. By doing so, the legislator aims to put corporate data to a better use, increasing company visibility vis-à-vis customers, business partners and investors, both nationally and internationally – profiles may be filled in both Italian and English.

Profiles are largely composed of blocks of free text, although partly guided. Entrepreneurs are encouraged to provide a short description of their business activity, and explain what makes it technologically innovative. They may include a list of team members and an indication of their age and qualifications (in compliance with the EU GDPR), specify the stage of development reached, and their market of interest.

The profile also provides for a "self-tagging" system aimed at identification of specific sectorial subgroups that may not emerge from traditional economic activity classifications, such as NACE (see Chapter 4).

Why is the regional level relevant in Italy?

Even though MISE's official reports regularly offer basic regional and other sub-national breakdown of trends in start-up demographics, firm performance and uptake of support measures, this working paper series represents a first attempt to provide an in-depth analysis of the effect of Italy's policy framework for innovative start-ups in a set of selected Italian regions.

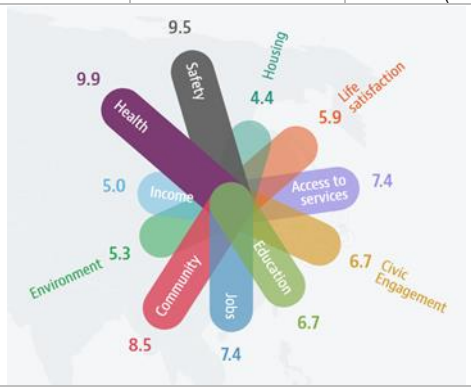
There are two main reasons why studying the local dimension of the Italian Start-up Act is interesting for researchers. The first is purely observational: all data available show wide variation across regions under most metrics. Trends in registrations and exits, spatial distribution, propensity to use specific legal benefits, share of traditionally underrepresented groups, and ultimately firm performance, are all highly uneven. Indeed, Italy is historically a case of a country where framework conditions for entrepreneurship vary greatly, being divided between a richer north, which has better employment statistics, higher business density, and a more efficient public administration, and a poorer south, where the role of public employment (and funding) is relatively more important (OECD, 2018[34]). These framework conditions have a direct impact on the entrepreneurial attitude of the local population and of the performance of new and small businesses at the local level (OECD, 2016, p. 93[14]), and similar trends can be observed also in the context of the Italian Start-up Act – although, as it will be shown in this working paper series, not always in obvious ways.

The second reason lies in Italy's devolved local governance, which confers significant policy-making powers – including the enactment of legislation in the field of economic development and SMEs, and some tax raising powers – to first-level sub-national units. Moreover, five regions (Valle d'Aosta, Friuli-Venezia Giulia, Trentino-Alto Adige/Südtirol, Sardinia and Sicily) are designated by the Italian Constitution as "autonomous", meaning that they have even more extensive delegated powers. These vary from case to case, disciplined by *ad hoc* autonomy statutes: for instance, Trentino-Alto Adige/Südtirol further delegates its powers to its constituent *province*, Trento (also known as "Trentino") and Bolzano-Bozen (in English often "South Tyrol")[7], which are thus named *province autonome* ("autonomous provinces").

This devolved setup means that, when transferring and applying national legislation, regional authorities have significant discretionary powers to design additive policy instruments, in order to broaden the impact of these measures, or even supplement them to fill gaps and fix perceived flaws.[8] During the COVID-19 pandemic, for instance, regional authorities have complemented support action of the national government towards SMEs in several ways, such as smoothening access to finance, streamlining bureaucratic procedures, support to temporarily unemployed workers and teleworkers, and subsidised finance schemes (OECD, 2020c[35]).

Besides law-making and spending powers, devolved authorities play a part in enhancing accessibility and dissemination of information, by involving public (e.g. development agencies), private-public (e.g. Chambers of Commerce), and private intermediaries (e.g. local accountants) in policy transfer. It is therefore essential for policy makers to have an accurate and nuanced picture of the landscape of beneficiaries of national initiatives in their territories, so that regional measures in the field can be designed in a synergic way, avoiding overlaps and duplications.

Table 1.1. Trentino basic demographic and economic statistics

Territory and demographics		Ranking in Italy (out of 21 regions)	Year and source
Size (km²)	6 206.86		2019
Population	541 098		2019 (ISTAT)
Population density	87.18 h/km2		2019
Share of mountainous territory (>600m)	100% of municipalities		2019 (ISTAT)
Economy			
GDP (EUR million)	19 993.2 (2018)	18th	2018 (OECD)
GDP per capita (EUR 2005, constant prices)	36 990	4th	2018 (OECD)
Gini index (disposable income)	0.282	6th lowest	2013 (OECD)
Employment			
Employment rate (15-64 years)	68.5%	3rd	2019 (OECD)
Men	74.9%	5th	2019 (OECD)
Women	61.7%	4th	2019 (OECD)
Youth (25-34)	76.3%	3rd	2019 (ISTAT)
Skills and innovation			
Total tertiary education (ISCED2011 levels 5 to 8), 25-64	21.3%	5th	2018 (ISTAT)
R&D expenditures (% GDP)	1.56%	5th	2016 (OECD)
From business	0.59%		2016 (OECD)
From government	0.42%		2015 (OECD)
From higher education institutions	0.46%		2015 (OECD)
Regional well-being			

Located in north-eastern Italy, Trentino is a fully mountainous province with relatively low population density. Compared to other Italian regions, Trentino has high GDP per capita and a remarkably equal distribution of wealth. It nears the top under all employment metrics, and its population is one of the most educated in the country. The share of R&D expenditures over GDP is also high in the Italian context, with an unusually strong contribution by the public sector. Trentino ranks high among most parameters of regional well-being, with excellent digital infrastructure, support networks, and health.

Source: OECD Trento Centre elaboration on a plurality of ISTAT (Italian national institute for statistics) and OECD sources.

Notes

[1] See the European Research area “corona platform”, which aggregates information about special calls, also launched by national government, to tackle the COVID 19 crisis. URL: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/covid-19 [accessed 25 June 2020]

[2] Following efficiency and cost-saving measures, many Chambers of Commerce (primarily in small-sized provinces) have merged in the 2010s. As of 2020, there are 82 *Camere*, down from the original 105 (roughly one for *each provincia* and *città metropolitana*).

[3] The most recent version of the weekly dataset on registered innovative start-ups can be downloaded at the following URL: http://startup.registroimprese.it/isin/report?2&fileId=startup.zip (.csv format).

[4] Eurostat, ISTAT (Italian National Institute for Statistics), Italian Ministry of Economy and Finance.

[5] Repository of MISE periodic reports: “Relazione annuale e rapporti periodici”, mise.gov.it: https://www.mise.gov.it/index.php/it/impresa/competitivita-e-nuove-imprese/start-up-innovative/relazione-annuale-e-rapporti-periodici [accessed 25 June 2020]

[6] Editions of the Annual report have been published for 2014, 2015, 2016 and 2017.

[7] This territory, which is statutorily trilingual (German and Ladin are spoken alongside Italian), is officially known in Italian as “Alto Adige”.

[8] For instance, the Italian Start-up Act provides for little direct funding options – and no outright grants – nor there are major sector-specific initiatives arranged at the national level.

2. The Italian Start-up Act in Trentino: how the policy has taken root

Start-up registration trends: Trentino stands out in Italy

Trentino is home to a comparatively high number of firms registered as "innovative start-ups" under Italian law. Over the last years, government reports, business analysts (Cerved, 2016[36]) and mainstream media (Trentino, 2020[37]) have consistently pinpointed this phenomenon, some even describing Trentino as a "Silicon Valley" in the making. Local government itself has toyed with this good reputation in its official communication strategy, naming its publicly-funded acceleration programme "Trentino Startup Valley".[1]

As of 6 January 2020, Trentino hosts 174 registered innovative start-ups. It ranks 13th in Italy out of Italy's 106 provinces,[2] ahead of several major urban areas such as Genoa, Florence, Catania or Venice. Notably, the start-up population is almost twice as large as in neighbouring South Tyrol. While the latter hosts just 92 start-ups, it is broadly the same size as Trentino in terms of residents (approximately half a million each) and has, in fact, a larger business population overall.

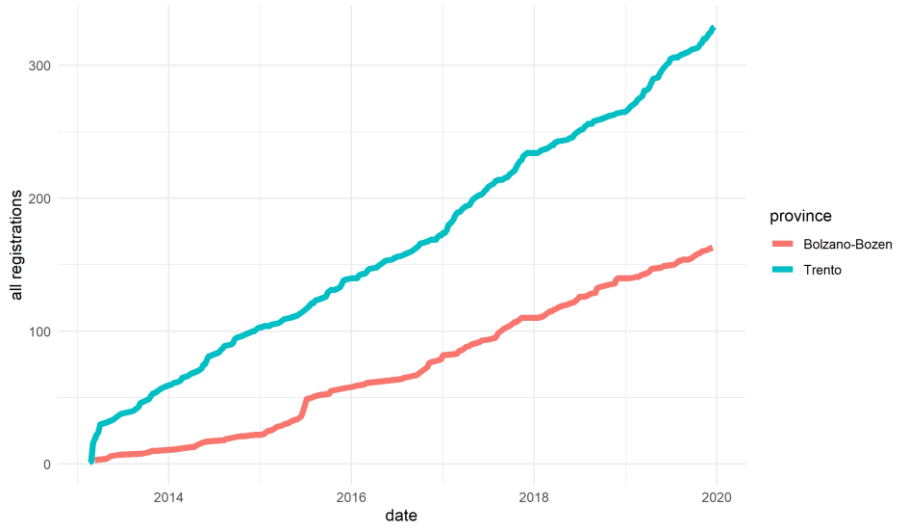
Quarterly reports issued by MISE show that Trentino has an unusually high innovative start-up density, intended as the ratio between registered firms and total "comparable" limited companies (less than five years old, fewer than EUR 5 million in annual turnover). As of Q4 2019, 7.45% of young firms in Trentino were registered innovative start-ups, by far the highest share among Italian provinces. For reference, the equivalent ratio for Italy as a whole is 2.98%, and only Trieste – which has a much smaller firm population – rises even above 6% (MISE, 2020c[38]).

Perhaps most striking is the comparison with neighbouring *provincia autonoma* Bolzano-Bozen. Considering Trentino-Alto Adige/Südtirol[3] as a whole, it still boasts the highest density across Italian regions (5.25%). However, the contribution of Trentino is much more prominent. The ratio for South Tyrol is 3.37%, which is slightly higher than the national average but less than half the equivalent for Trentino. In other words, while over half (54%) of all young limited companies in Trentino-Alto Adige/Südtirol are in Bolzano-Bozen, the province hosts just one third (34.6%) of its registered innovative start-ups.

Data suggests that Trentino is, above all, a stand-out case of effective policy transfer. With this phrase we indicate the mechanisms that allow policies designed by central administrations to catch on at the local level. An analysis of registration trends by months gives clear hints in this respect, and seeing these trends in parallel with Bolzano-Bozen – which is close to the national average – is particularly useful.

Looking at "gross" start-up registrations, i.e. the cumulative number of start-ups that have registered month by month, it is immediately clear that the difference between Trento and Bolzano-Bozen is in timing, as well as in pace. Policy transfer in Trentino has been much faster, with a spike in registrations already in spring 2013, just months after the launch of the initiative. For South Tyrol, a similar acceleration can only be seen from 2015 onwards. Since that head start, Trentino's numbers have kept growing at a sustained pace, with 3.9 new innovative start-ups per month on average, while Bolzano-Bozen adds on average 1.9 new beneficiaries per month (Figure 2.1).

Figure 2.1. Cumulative new innovative start-up registrations in Trentino and South Tyrol (monthly trends, 2013-2020)



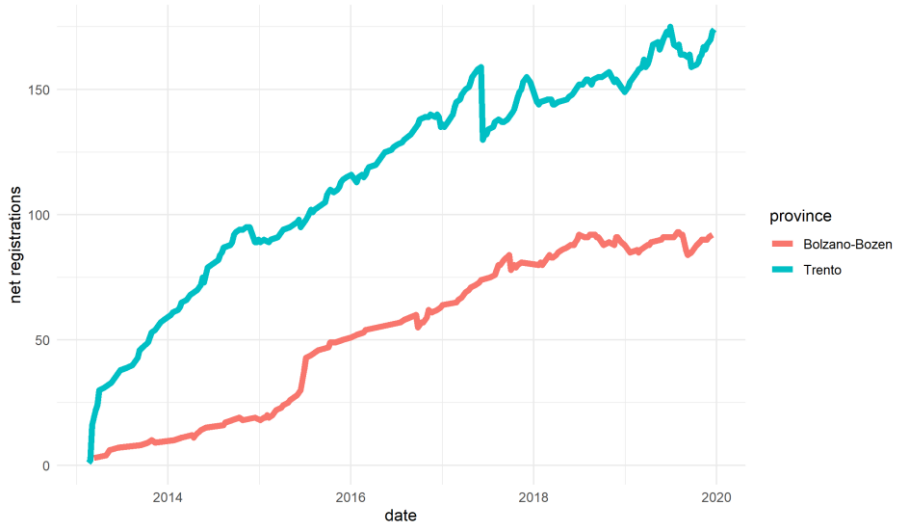
Source: OECD Trento Centre elaboration on Italian Business Registry data.

As stressed in Chapter 1, innovative start-up status is subject to temporal, dimensional, and innovation-specific constraints. While 329 firms in Trentino were registered as innovative start-ups for some time between 2013 and 2020, 155 are no longer listed as beneficiaries at the reference date, due to dissolution or loss of eligibility requirements. The latter case, in particular, applies to all firms that obtained their "special status" in 2013 and 2014, as the ones that are still in operations are more than five years old by now.

It is therefore useful to look at net registration trends, i.e. the number of firms that entered the registry minus those that left it in the same month. If the pace of new registrations is stable – or grows slowly – over time, we should expect the total number of registered start-ups to "stabilise", with the number of firms leaving the registry roughly equalling new entrants over the long term. A related advantage is that this trend is less influenced by "spikes" in registrations, as these are going to be absorbed over the long term with the expiry of the legal status: Trentino, with his high number of registrations in the early months of 2013, is a case in point.

Figure 2.2 shows again a fundamental difference between Trentino and South Tyrol. While in Bolzano-Bozen, as expected, the total number of registered start-ups has been broadly stable since mid-2018, in Trentino it has kept growing, even if at a slower rate. This is all the more remarkable as we note that Trento had many more registered start-ups than Bolzano in the first two years of the policy already.

Figure 2.2. Cumulative net innovative start-up registrations in Trentino and South Tyrol (2013-2020)



Source: OECD Trento Centre elaboration on Italian Business Registry data.

Trentino has therefore a record of a territory where Italy's initiative for innovative young firms has benefited from effective policy transfer. As it is based on self-selection, the policy is particularly vulnerable to information asymmetries and requires high awareness in the entrepreneurial ecosystem to succeed. This alone makes Trentino an important case study for national and regional policy makers.

Studies have indeed shown how policy transfer issues have an important effect on the reach of this initiative, with the ratio of eligible companies being estimated as several times higher than that of firms that actually become registered (Box 2.1). The issue is far from being limited to South Tyrol, where peculiar local dynamics could also be at play (e.g. the language divide).[4]

Box 2.1. Bottlenecks in policy transfer, a long-standing issue of the Italian Start-up Act

The 2016 edition of MISE's Annual Report to Parliament on the Italian Start-up Act (MISE, 2016[39]) offered evidence that many young firms across the country were not benefiting from the national policy for innovative start-ups because they were unaware of it.

InfoCamere, the IT firm in charge of the Italian Business Registry, had carried out an analysis aimed at measuring the amount of "missing" innovative start-ups, i.e. firms that, in spite of being formally eligible, had not entered into policy up to then. The query targeted the general "non-start-up" section of the Business Registry (containing all Italian limited companies but innovative start-ups, innovative SMEs, as well as other minor firm groups), by applying a filter based on some of the main requirements set forth by the law (e.g. being a limited company, ownership of a patent etc.).

On 7 March 2016, the analysis found in the "non-start-up" section of the Business Registry 4 969 "missing" innovative start-ups, almost equal to the number of firms registered at the time (5 145 firms as of 31 December 2015).

It should be noted that the estimate was conservative, as the filter applied to track the innovative character of firms (i.e. the ownership of a patent or software) derives from the most stringent requirement among the three alternatives set forth by the law. In fact, the Business Registry does not allow a structural query based on R&D or qualified workforce ratios – whose selection by firms during self-assessment (see par 1.2) for a concise description of the procedure for entry into policy) is far more common than the ownership of intellectual property rights.

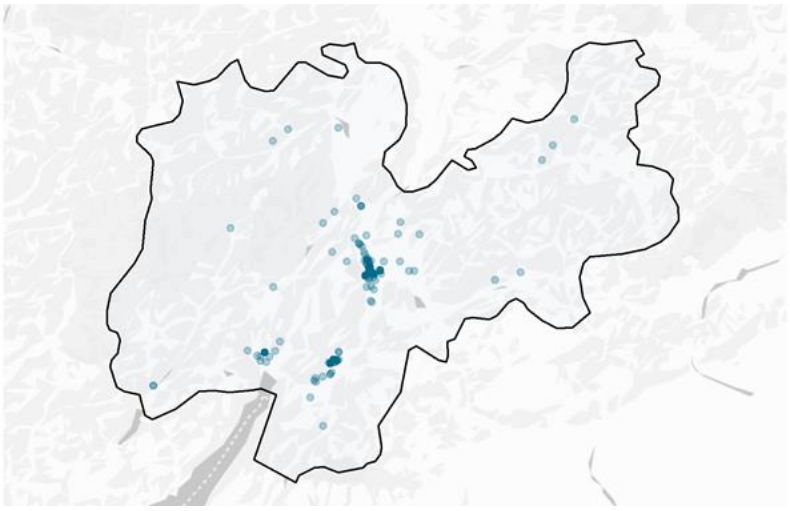
Local policy makers should consider the matter carefully, as this is far from a mere administrative or public communication issue. The presence of innovative start-ups is increasingly seen as a key indicator of the propensity for innovation of regional entrepreneurial ecosystems – in turn one of the core determinants of productivity. For instance, the number of innovative start-ups is part of the basket of indicators used by Il Sole 24 Ore, Italy's main financial newspaper, to draw up the business climate section of its renowned annual ranking on the quality of life in Italian cities (Il Sole 24 Ore, 2020[40]).

Start-up distribution does not reflect population patterns

As in the rest Italy, most innovative start-ups in Trentino are located in its main urban centres. As of January 2020, 79 out of the 174 registered start-ups have their legal office in the provincial capital, Trento. The concentration ratio, 45.4%, is in line with the national average (44%).

Trentino is home of a second major hub, Rovereto. This small town (40 000 residents in 2019) is an exceptional case: 47 registered start-ups (27% of the provincial total) are based there, making it one of the most prominent poles in "provincial Italy" as a whole.[5] A third cluster can be spotted on the shores of the Garda lake, with 14 innovative start-ups (8%) incorporated in Riva del Garda (17 500 residents). The remaining 35 start-ups (20%) are scattered across 24 municipalities (Figure 2.1).

Figure 2.3. Location of the head offices of innovative start-ups in Trentino (January 2020)



Note: Darker hues indicate that multiple start-ups have their office at that location, and thus there is higher density in that area. The three visible clusters are Trento (centre), Rovereto (south-east), and Riva del Garda (south-west).
Source: OECD Trento Centre elaboration on Italian Business Registry data. The map is created in R with the ggmap package.

A brief insight into the demography of Trentino will help put data on start-ups' distribution in context. Trentino's 541 098 inhabitants (ISTAT, 2019) live scattered across 162 municipalities, the vast majority of which have less than 5 000 permanent residents. Over 40% of Trentino's population is concentrated in these small settlements, with an additional 18.5% in municipalities with a population between 5 000 and 10 000. Trento itself is the only *comune* with over 100 000 inhabitants, and hosts slightly more than a fifth of the provincial population (21.9%).

The distribution of registered start-ups diverges greatly from these patterns. The 155 smallest municipalities in Trentino have about the same number of innovative firms (15) as Riva del Garda (14), which in itself is a relatively small community. Replicating findings seen all around Italy, just two start-ups are based in the tiniest class of *comuni*, which are normally also the most rural and remote (Table 2.1).

Table 2.1. Distribution of start-ups and population by municipality in Trentino

Municipality or class	Start-ups	% Trentino start-ups	Municipalities with start-ups	Municipality in class	Population (2019)	% Trentino population
Trento	79	45.4	1	1	118 288	22.1
Rovereto	47	27.0	1	1	39 972	7.5
Riva del Garda	14	8.0	1	1	17 505	3.3
10 000-50 000 residents	5	2.9	2*	2	39 299	7.4
5 000-10 000 residents	14	8.0	8**	15	100 126	18.7
1 000-5 000 residents	13	7.5	13***	84	178 457	33.4
Fewer than 1 000 residents	2	1.1	2****	69	40 802	7.6
Totals	174	100.0	28	173	534 449	100.0

Note: * Arco (3 innovative start-ups), Pergine Valsugana (2); ** Mezzolombardo (4), Mori (3), Lavis (2), Ala, Baselga di Pinè, Borgo Valsugana, Cles, Vallelaghi (1) *** Albiano, Andalo, Brentonico, Cembra Lisignago, Civezzano, Comano Terme, Dimaro Folgarida, Malè, Moena, Predazzo, Scurelle, Storo, Ziano di Fiemme (all 1); **** Cavedago, Giustino (1).
Source: OECD Trento Centre elaboration on Italian Business Registry and ISTAT data.

There is therefore a clear imbalance between the distribution of the population in Trentino – which is heavily located in small and micro-municipalities – and of registered start-ups. However, the magnitude of local units is obviously not a proxy of their distance from main population centres, as small municipalities could be close or well connected to major urban areas, or being attractive for innovative start-ups for other reasons (e.g. lower rental costs). To shed light on this aspect, it is useful to adopt a more refined measure of "remoteness", such as that introduced in 2014 by Italy's "National Strategy for Inner Areas" (*aree interne*). Responsibility for implementation lies with a central Agency for Territorial Cohesion (*Agenzia per la coesione territoriale*, "ACT").

In this classification, "inner area" does not necessarily equate "rural area", but it is a function of how close a municipality is to key Service Provision Centres. A municipality (or cluster of municipalities) is identified as such a centre if it hosts schools of every educational grade, major hospitals, and well-connected train stations. According to this definition, the mountainous but highly developed regions in the Italian North East will tend to be less peripheral than the infrastructure-deprived South. Nonetheless, a slim majority (52%) of Trentino's population live in an *area interna*, against a national average of 22%.

Despite not being fully representative of its population patterns, data shows that Trentino has a rather high number of start-ups located in peripheral areas: 20%, over double the national average. Under a more granular classification, which divides central and inner areas in three subgroups each, Trentino differs more significantly by Italy at large, and also from neighbouring territories. In Trentino, the lowest band in central areas, so-called "outlying" municipalities (in the original Italian, "*Cintura*", meaning "belt"), is much more represented than in the rest of Italy. This is essentially thanks to Rovereto, which falls into this category. Reflecting this, Trentino is one of the few areas in Italy in which only a minority of start-ups is located in major "urban hubs": that is, 45.4% of start-ups located in the *comune* of Trento (Table 2.2).

Table 2.2. Distribution of registered start-ups across central and inner areas (ACT categories), January 2020

	Central areas			Inner areas		
Region	**A. Hubs**	**B. Inter-municipal hub**	**C. Outlying area**	**D. Intermediate area**	**E. Peripheral area**	**F. Ultra-peripheral area**
Lazio	91.0%		3.3%	5.0%	0.7%	
Liguria	82.7%	8.4%	7.9%	1.0%		
Lombardy	79.5%	2.9%	15.7%	1.5%	0.3%	<0.1%
Piemonte	78.3%	1.8%	16.6%	2.8%	0.5%	
Emilia-Romagna	71.8%	1.2%	22.5%	3.4%	1.1%	
Bolzano	71.7%		18.5%	5.4%	4.3%	
Toscana	69.0%	5.0%	21.5%	3.8%	0.7%	
Friuli-Venezia Giulia	68.8%		26.4%	4.8%		
Umbria	63.1%	3.7%	18.7%	13.4%	1.1%	
Sardinia	62.0%		10.9%	4.7%	11.6%	10.9%
Campania	60.3%	5.9%	23.5%	7.7%	2.2%	
Basilicata	60.0%		3.8%	6.7%	19.0%	10.5%
Sicilia	59.6%	3.1%	14.6%	13.8%	7.8%	1.0%
Veneto	59.1%	1.0%	29.2%	9.8%	0.9%	
Abruzzo	57.7%	4.7%	20.9%	13.0%	3.3%	0.5%
Puglia	56.4%	3.0%	22.3%	13.7%	4.2%	0.5%
Marche	54.4%	8.1%	25.0%	10.8%	1.7%	
Calabria	50.6%	0.8%	23.4%	16.6%	7.2%	1.5%
Trento	**45.4% (3rd lowest in IT)**		**34.5% (highest in IT)**	**14.9% (4th highest)**	**4.6%**	**0.6%**
Molise	45.0%		16.3%	26.3%	12.5%	
Valle d'Aosta	27.3%		31.8%	36.4%	4.5%	
ITALIA	70.8%	2.6%	18.0%	6.2%	2.0%	0.4%

Source: OECD Trento Centre elaboration on Italian Business Registry and Agenzia per la Coesione Territoriale data.

The deviation of Trentino from national trends is almost entirely explained by high density of innovative start-ups in just two small municipalities, Rovereto and Riva del Garda. Rovereto in particular hosts a number of prominent ecosystem players that influence start-up localisation and registration. Two of the seven Business Innovation Centres in Trentino, promoted by the local public development agency Trentino Sviluppo, are located in this town: Progetto Manifattura and Polo Meccatronica.[6] Out of the 47 registered start-ups in Rovereto, a majority (29) share the address for their head office with one of these two centres. The share is even higher when formerly registered firms are considered (55 out of 87).

These bodies offer spaces and support services to fledgling and developing firms in areas such as clean-tech (Progetto Manifattura) and digitised manufacturing (Polo Meccatronica), a natural fit for the legal definition of innovative start-up. The two centres enjoy vast facilities (90 000 and 100 000 square meters, respectively), remnants of manufacturing heritage dating to the 19th and the early 20th century, and host also the offices of private and public-private initiatives, such as venture accelerator Industrio and "open innovation" laboratory Witlab.

Riva del Garda is a prominent tourist destination situated close to the border with Lombardy. Its sectorial patterns are very different from those in Rovereto, as almost all registered firms there are software makers. It is likely, looking at head office addresses, that several of these start-ups have been created by the same private actor – a web agency based in the municipality.

Trentino's "missing entrepreneurs": women and youth participation is still too low

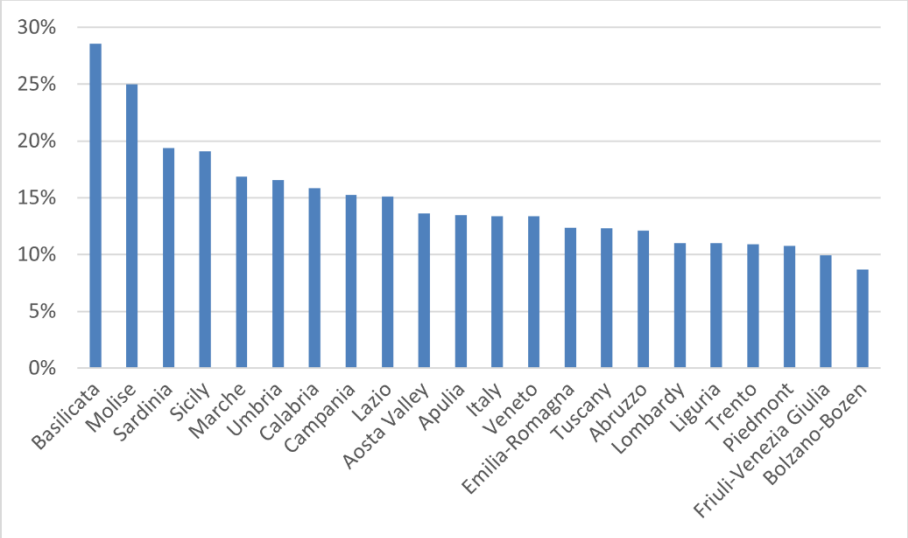
Datasets from the Italian Chambers of Commerce allow us to measure the share of innovative start-ups led prevalently by women, young people, and non-Italian citizens. Women-led innovative start-ups are here defined as all companies in which women's share in the ownership and governance of society is, overall, the majority.[7] Same rules apply to foreigners and youth, which are defined as individuals that are under 35 years of age.

As shown in OECD's "Missing Entrepreneurs 2019" report (OECD/European Union, 2019[13]), firms led prevalently by women, young and foreigners are under-represented in most member countries of the Organisation – for instance, young women are only 60% as likely as young men to be self-employed.

Trentino is no exception, particularly when it comes to female entrepreneurship. Just 10.9% of innovative start-ups registered in Trentino are primarily owned or run by women. This ratio is lower than the national average (13.4%) and is one of the lowest in Italy (18th out of 21 regions). The bottom places are all taken by territories in the richer North, with South Tyrol sitting at the last spot (8.7%) (Figure 2.4).

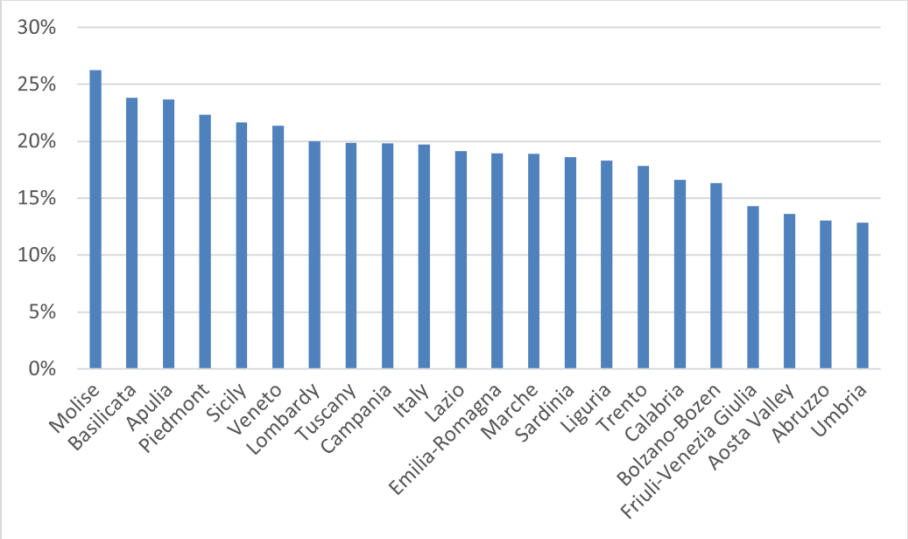
Innovative start-ups owned by under-35s are also less prevalent in Trentino than in Italy at large. 17.8% of innovative firms are predominantly managed by people of this age group, compared to a national share of 19.7% (Figure 2.5).

Figure 2.4. Ratio of majority-female registered start-ups by Italian region and autonomous province (January 2020)



Source: OECD Trento Centre elaboration on Italian Business Registry data.

Figure 2.5. Ratio of majority-youth (under-35) registered innovative start-ups by Italian region and autonomous province (January 2020)



Source: OECD Trento Centre elaboration on Italian Business Registry data.

Conversely, Trentino ranks near the top (4th) in terms of the number of foreign-owned innovative start-ups (4.6% vs 3.5% nationally), a feature in common with border regions such as Valle d'Aosta and Friuli-Venezia Giulia. This is a promising sign, as research focusing on the European Union shows that self-employed immigrants born outside the EU or in another EU member state are respectively as likely or just slightly less likely as self-employed born in the reporting EU country to have employees (OECD/European Union, 2019, p. 167[13]).

The ratio of innovative firms run by youth and women is particularly low compared to regions in the South of the country. This finding runs opposite to general labour market trends. In 2019, Trentino boasted very high rates of labour force participation among women (62.1% employment rate) and under-29s (42%). The same applies in an amplified fashion in South Tyrol, whose rates of innovative start-ups participation among women and youth are worse than in Trentino, although it has easily the highest female and youth workforce participation rates in Italy. Conversely, in the Southern regions that have relatively more women and young people among start-up founders, often less than 30% of women and not even 20% of under-29s are in work.[8]

These numbers strongly suggest that the numbers of female and youth-owned start-ups are influenced by a wider availability in the South of targeted public support schemes which offer more favourable conditions to underrepresented groups:[9] an effect of national and European cohesion policies, as well as of most acute hardship faced by Southern innovative firms in raising funds via market channels, which make public funding even more desirable. It is also possible to assume that in the South there is a component of "necessity-driven entrepreneurship", which is less prominent in the North and in rich Trentino in particular as disadvantaged groups find it easier to get permanent, well-paid dependent employment, and are therefore less likely to opt for a risky entrepreneurial venture.

Uptake of flagship policy instruments: there is still room for improvement

There is evidence that in Trentino the awareness of the national policy framework at the local level is high (effective policy transfer). However, this is not necessarily true for policy uptake. Indeed, Trentino still

shows room for improvement when it comes to the actual adoption of specific policy instruments brought about by national legislation.

SME Guarantee Fund

As evidenced by the OECD evaluation (Menon et al., 2018[27]), access to the Public Guarantee Fund for SMEs ("FGPMI", *Fondo di Garanzia per le piccole e medie imprese*) is a key determinant for growth in beneficiaries of the Italian start-up policy, and has also a positive impact on value added, labour productivity, and propensity to patent. Compared to other firms, innovative start-ups benefit from lower interest rates and receive more funding (by around 14 percentage points). However, data shows that only a minority (20.5%) of registered firms actually obtain a subsidised loan.

The Italian North East is a partial exception, with uptake rates higher than in the rest of the country. As of January 2020, 31.3% of all registered start-ups in Trentino had obtained a guaranteed loan via this scheme: this is the highest share in Italy across all regions and *province autonome*, over 10 percentage points higher than the national average. Only neighbouring South Tyrol also crosses the 30% mark (Table 2.3). Compared with other provinces, Trento positions 10th, generally outperformed just by areas with much smaller start-up populations.

Overall, 103 innovative firms in Trento obtained on average approximately EUR 326 000 each through this scheme, normally over two distinct operations (the average is 1.7). This is just a fraction of the total amount that the guarantee can potentially cover (EUR 2.5 million in guarantees covering up to 80% of the sum loaned out, i.e. about EUR 3.1 million per start-up).

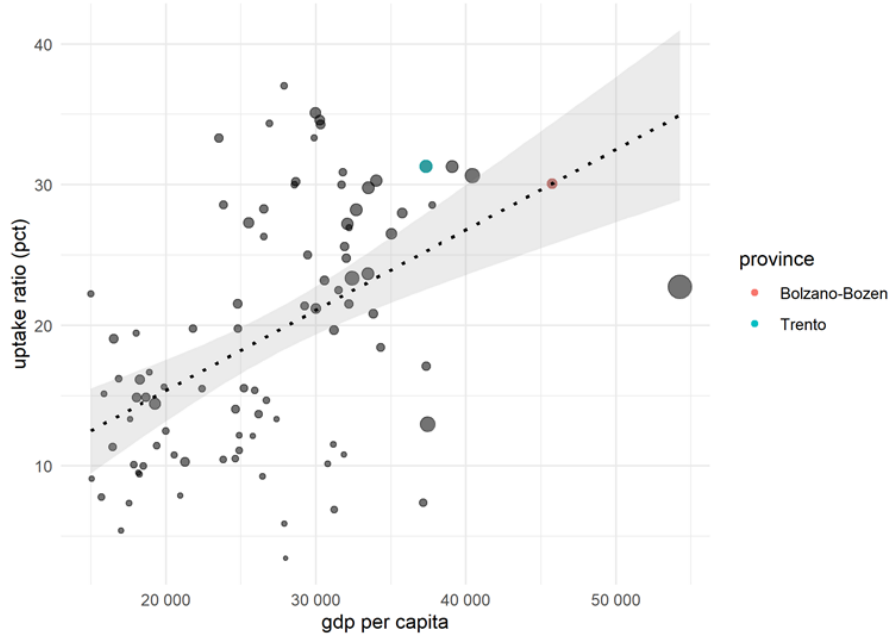
Table 2.3. Share of access to state-guaranteed bank loans among innovative start-ups in Italian regions and autonomous provinces (January 2020)

Region	No. beneficiaries	No. registered	Ratio
Trento	103	329	31.3%
Bolzano	49	163	30.1%
Valle d'Aosta	10	35	28.6%
Friuli-Venezia Giulia	108	385	28.1%
Liguria	81	289	28.0%
Emilia-Romagna	487	1 740	28.0%
Umbria	81	293	27.6%
Veneto	352	1 446	24.3%
Lombardy	965	4 063	23.8%
Piemonte	231	991	23.3%
ITALY	3 394	16 551	20.5%
Abruzzo	70	344	20.3%
Marche	130	639	20.3%
Campania	173	1 131	15.3%
Sicily	105	719	14.6%
Lazio	225	1 693	13.3%
Sardinia	39	297	13.1%
Molise	12	97	12.4%
Puglia	72	673	10.7%
Basilicata	15	147	10.2%
Calabria	28	333	8.4%
Toscana	58	744	7.8%

Note: The list considers operations authorised by the SME Guarantee Fund before 1 January 2020, and their status as of 31 March 2020 (as most lending agreements take a few weeks to be finalised after the public guarantee is obtained).
Source: OECD Trento Centre elaboration on Italian Business Registry data.

However, it would be misleading not to look to this high uptake into context. Indeed, as shown in Figure 2.6, the rate of innovative start-ups accessing guaranteed loans has a strong positive correlation with GDP per capita in that territory, plus a weaker (but still significant at 10% level) negative correlation with the number of start-ups registered – meaning that, all things equal, more "populated" provinces will tend to see lower adoption rates.

Figure 2.6. Rate of innovative start-ups that have accessed state-guaranteed bank loans at the provincial level, and correlation with GDP per capita (January 2020)



Note: GDP per capita data are for 2017. Only provinces with at least 20 registered start-ups are shown. The size of each point indicates the number of start-ups registered in each province.
Source: OECD Trento Centre elaboration on Italian Business Registry and Eurostat data.

After constructing a multiple regression model (Table 2.4), which "levels the field" controlling for background conditions, over- and under-performance in uptake can now be intended in terms of how much actual values deviate from those predicted from the model. In this respect, Trento ranks 26th among Italian provinces, overperforming expected values by 4.3 points. However, this ratio is lower than that seen in other areas in the surroundings of Trentino, such as Udine in Friuli-Venezia Giulia, Brescia and Bergamo in Lombardy, and Verona in Veneto. This is nonetheless a better performance than neighbouring South Tyrol, which actually slightly underperforms its predicted values.

Table 2.4. Relationship between rate of innovative start-ups accessing guaranteed loans and GDP per capita, number of registered start-ups, taxable income, provincial level (OLS regression model)

	Dependent variable			
	Ratio of start-ups beneficiaries of state-guaranteed loans (FGPMI), provincial level			
	Estimate	std.error	statistic	p.value
Constant	6.509	7.629	0.853	0.396
Taxable income per capita 2017	0.0005	0.001	-0.717	0.475
GDP per capita 2017	0.001	0.000	3.155	0.002***
N. registered startups	-0.006	0.003	-1.981	0.05*
Observations	103			
R-squared	0.224			
Adjusted R-squared	0.200			
Residual standard error	8.615			
F-statistic	9.517			
				* p<0.1, ** p<0.05, *** p<0.01

Note: Provincial GDP per capita and taxable income data are for 2017. The R-squared value implies that the controlling variables explain around 20% of the variation in beneficiary start-ups.
Source: OECD Trento Centre elaboration on Italian Business Registry, Eurostat, and Italian Ministry of Economic and Finance data.

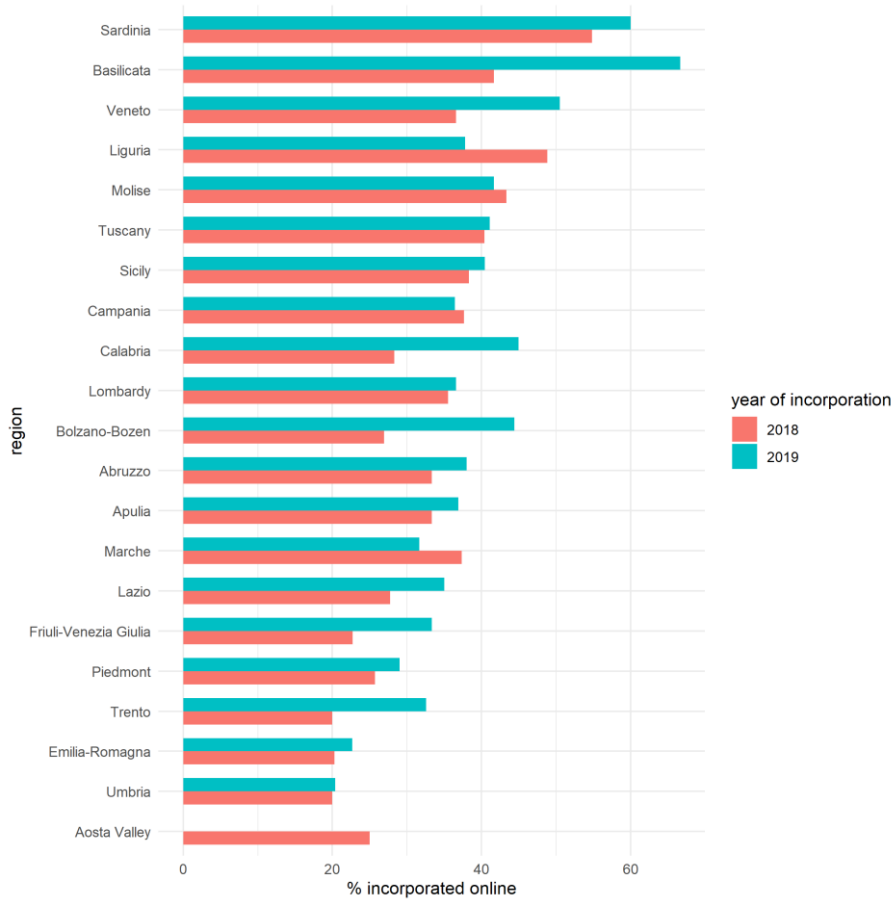
With reference to the Guarantee Fund, policy makers should also get a better understanding on why, even in the territories with the best uptake rates, normally less than a third of registered firms actually benefit from this instrument. It could also be the case that many start-ups prefer to raise funds exclusively via other channels that are alternative to debt, such as venture capital. In this respect, earlier studies (Giraudo, Giudici and Grilli, 2019[30]) evidenced that companies that raise capital from institutional investors are less inclined to apply for guaranteed loans.

Online incorporation

Start-ups in Trentino have made more limited use of another flagship policy, a digital-based procedure for incorporation introduced in 2016. The measure exempts innovative start-ups from incorporating the company by notarial deed, resulting in lower administrative and consultancy fees. Costs incurred for incorporation constitute a (perceived) major obstacle to firm creation by new entrants: a sample survey conducted by MISE (MISE, 2016, p. 118[39]) estimates that they amount to EUR 2 000 on average per new start-up. Conversely, online incorporation implies only limited registration fees (~ EUR 250), and the Chambers of Commerce offers free-of-charge assistance at every step of the process.[10]

As an alternative, it is still possible to incorporate start-ups offline through a notarised public deed, the only procedure admitted by law in the past. Indeed, this method is still prevalent across most of Italy, with the propensity to adopt online incorporation varying greatly across regions. In this respect, Trentino features among "old schoolers": just 32.6% of start-ups incorporated in 2019 used the online procedure, approximately four percentage points less than the national average (36.3%). The year before, just 20% of new start-ups had exploited this channel, one of the lowest rates in the country (Figure 2.7).

Figure 2.7. Ratio of innovative start-ups incorporated online over total registered firms incorporated in the year (2018, 2019)



Source: OECD Trento Centre elaboration on Italian Business Registry data.

One plausible reason why the uptake of this measure in Trentino is low could be a high degree of entrepreneurs' trust in local legal professionals, included notaries. The first and to date only "census" survey of innovative start-ups, performed by MISE in early 2016, evidenced how accountants and other tax and law consultants played a major part in disseminating information on benefits and rights connected to innovative start-up status (ISTAT, MISE, 2018[41]), confirming the important advisory role of professional networks (OECD, 2011[42]).

Online showcase startup.registroimprese.it

From 2019, the law requires innovative start-ups to complete a public "company profile", on a national platform administered by the Chambers of Commerce.[11] In addition to open access administrative data drawn by default from the Business Registry, start-ups must add specifics on their innovative potential, the stage of development of their product or service, the key skills of their team members, and more.

As of May 2020, 81.8% of registered start-ups in Trentino had filled their profile. This compares favourably at the national level, since just seven start-ups in ten had done the same by that date (70.1%). However, start-ups in South Tyrol boast a virtually universal adoption rate (95.6%). Anecdotal evidence suggests that the uptake of this specific measure is to some extent a function of dynamism by the local Chamber of Commerce in raising awareness on new procedures and opportunities involving start-ups: this confirms

the importance that intermediate actors, being they institutions or consultants, have in promoting transfer and uptake of the Italy's start-up policy.

Notes

[1] For more information about this initiative, URL: https://trentinostartupvalley.it/ [accessed on 29 June 2020]

[2] Historical "province", which are a conventional statistical unit for large area statistics in Italy, albeit they have often no longer administrative significance. We use the subdivision adopted by Italian Chambers of Commerce, which does not differentiate between *province autonome*, *province* and *città metropolitane*, nor takes into account most recent administrative developments (since the mid-2000s, in some regions provinces have been redesigned or replaced by lower-level large area units).

[3] As per Article 116 (par. 1-2) of Italy's Constitution, Trentino and South Tyrol jointly form the *regione autonoma* of Trentino-Alto Adige/Südtirol (TAA/S). However, uniquely in Italy, the *Statuto d'Autonomia* of TAA/S (1972) delegates most of the legislative powers usually attributed to regions to the two *province autonome* of Trento and Bolzano-Bozen. This asymmetric status (a second-level unit with the powers proper of a first-level division) is also acknowledged by more recent amendments to the national Constitution.

[4] The paper on the start-up landscape of South Tyrol, which is part of the same series of thematic reports as the present document, provides insights on the matter.

[5] Specifically, Rovereto has the largest number of innovative start-ups among all municipalities in Italy that are not regional or provincial capitals. The only similar example is a university town in Calabria, Rende (province of Cosenza, 36 000 residents), which hosts 42 registered start-ups.

[6] For more information about Trentino's start-up incubators, URL: https://trentinosviluppo.it/it/Principale/Diventa_imprenditore/Incubazione_(BIC)/Incubazione_(BIC).aspx

[7] The ratio is calculated as (percentage of share capital held by women + percentage of leading positions held by women)/2 > 50%.

[8] ISTAT website, section on unemployment data, URL: https://www.istat.it/it/archivio/disoccupati

[9] Some of these schemes are run by national agencies, such as Smart&Start Italia. This initiative is targeted exclusively to innovative start-ups, which can be funded through zero-rate loans between EUR 150 000 and 1.5 million. Start-ups based in the South of Italy can get up to 20% of the amount as a non-repayable grant. Other major initiatives targeted to start-ups in the South – not necessarily innovative – include "Resto al Sud", a EUR 1.25 billion scheme of micro-funding (up to EUR 50 000 per entrepreneur), part guarantees and part outright grant, primarily aimed to young entrepreneurs based in Southern Italy or willing to relocate there.

[10] For an overview of the registration process, check the guide published by InfoCamere [Italian]: http://startup.infocamere.it/atst/guidaCostitutivo [accessed on 20 May 2020]

[11] URL: http://startup.registroimprese.it/isin/home. The platform can be browsed in Italian and English.

3. Growth trends of innovative start-ups

Italy's Start-up Act is designed to support tech firms in the earliest stage of their life cycle. As outlined in the introduction, beneficiaries are always less than five years old, and legal facilitations will cease to apply as soon as their sales cross EUR 5 million per year. It should therefore not be surprising that the overwhelming majority of registered innovative start-ups can be classified as "micro-SMEs", which in European legislation identifies firms that have a yearly turnover under EUR 2 million, and less than 10 employees.[1]

The most recent data for turnover, which cover the 2018 fiscal year,[2] show that 99.3% of innovative start-ups registered as of 1 January 2020 at national level either qualified as micro-SMEs, or had not filed accounts in 2018 (the average registered start-up is just 736 days old). In other words, just 71 start-ups out of 10 901 registered firms had a turnover above EUR 2 million for that year.

This section will first provide a snapshot of how start-ups in Trentino were distributed in terms of turnover, and how they compared to the national average at the onset of 2020. Another key measure of firm size, employment, presents specific challenges for innovative start-ups, which are elaborated in Box 3.1.

An analysis of dynamics will follow, in order to grasp growth trends of beneficiaries, even after the start-up phase. The perspective will be broadened in terms of both time – looking at turnover shifts/variations over several years – and population, by including companies that have been innovative start-ups in the past but that are no longer registered at the reference date. Crucially, the latter encompass both top-performing firms (i.e. whose turnover exceeded EUR 5 million) and those that have since shut down, enabling a preliminary analysis of scaling-up and exit rates.

Descriptive statistics: a snapshot as of January 2020

In 2018, the average innovative start-up in Trentino placed on the market goods or services for slightly more than EUR 200 000. This value, which refers to 69.5% of firms registered at the beginning of 2020,[3] is comparatively high in the Italian context, being the third-highest across Italy's regions and autonomous provinces.

Even if registered innovative start-ups are small enterprises by rule, there is nonetheless a remarkable spread within the population, shown by the divergence between mean and median values. Half of Trentino's start-ups recorded a turnover of less than EUR 63 842, and 7.4% had a sales volume equal to zero. However, both of these figures compare positively with the national average: the median turnover value for Italy is almost half of that seen in Trentino, and the share of zero-turnover start-ups is almost double at national level (Table 3.1).

Table 3.1. Turnover of registered innovative start-ups in Trentino, summary statistics and comparison with Italy at large (2018 fiscal year, EUR)

	Trentino	Ranking by province (out of 106)	Ranking by region (out of 21)	Italy
Start-ups	174	13	16	10 901
Share of start-ups with valid turnover in 2018	69.5%	41	7	64.0%
Mean	204 282	20	3	173 199
Median	63 842	13	1	33 809
Share with turnover = 0 (valid values only)	7.4%	22	3	13.8%
95th percentile	772 788	33	7	777 866

Source: OECD Trento Centre elaboration on Italian Business Registry Data (financial statements 2018).

The data above indicates that registered start-ups in Trentino are somewhat larger than in the rest of Italy. However, this seems to be due to better performance overall of currently registered firms, rather than a broader share of very-high-performing companies. This is visible in the current population already (the 95th percentile is in line with the national average), and it is confirmed even when considering those companies that are no longer registered as start-up. Extending the analysis to formerly registered firms allows to grasp otherwise not visible "peak values" (i.e. former start-ups that exceeded EUR 5 million in turnover), together with firms that no longer have an age compatible with innovative start-up status (they are more than five years old) but that still in most cases have turnover levels comparable with those of registered firms – i.e. they are micro-SMEs.

Indeed, formerly registered start-ups in Trentino do not exhibit exceptionally high turnover values. The 95th percentile is decidedly smaller than at the national level, and the share of SMEs with over EUR 2 million in turnover is also somewhat smaller than average. Moreover, contrary to what seen for registered firms, mean and median turnover are also lower than in Italy at large (Table 3.2).

Table 3.2. Turnover of innovative start-ups in Trentino, key peak values for currently and formerly registered firms, comparison with the rest of Italy (2018 fiscal year, EUR)

	Trento		Italy	
Registered	*Former*	*Current*	*Former*	*Current*
Mean	533 307	204 282	646 029	173 199
Median	122 195	63 842	131 036	33 809
95th percentile 2018	1 589 820	772 788	2 444 663	777 866
Share of non-micro SMEs[4]	1.5%	0.6%	1.7%	0.7%
Highest value 2018	10 174 919	4 556 275	168 133 941	7 798 006[5]

Source: OECD Trento Centre elaboration on Italian Business Registry Data (financial statements 2018).

Box 3.1. Innovative start-ups' employment conundrum

A comprehensive analysis of growth trends should also take into account employment generated by beneficiary firms. Unfortunately, available Business Registry data do not allow a precise analysis in this respect.

The size of the labour force of Italian innovative start-ups is not well known. Data from INPS, the national social security authority, only takes into account individuals hired on a dependent contract. Table 3.3 shows key statistics about the distribution of such employees. As of 1 January 2020, MISE and InfoCamere reported a total of 14 324 employees among Italian innovative start-ups. A majority of registered firms did not report any.

This number is widely seen as an underestimation. Most of the labour force of start-ups, especially in their early stage, does not appear in the books as employees, but as shareholders. Their number is known and regularly published by MISE and InfoCamere, which state in their reporting that start-ups "involve" around 65 000 individuals. However, there is no information to tell what percentage of shareholders are actually involved in daily operations of the company, as opposed to mere investors.

Furthermore, neither employee nor shareholder data grasp another important side of start-up workforce: consultants, freelancers, and workers in the gig economy – which, given the high density of software development firms and online platforms, arguably play a major part. The only study carried out on this aspect to date (ISTAT, MISE, 2018, p. 33[41]) evidenced how about 25% of all innovative start-ups employ interim staff; in this group, one third of firms do not have any permanent personnel.

Table 3.3. Distribution of employees of registered innovative start-ups in Trentino and Italy (January 2020)

Employment values	Trento	Italy
Share of firms with more than one employee	45.4%	40.1%
Mean*	3.2	3.5
Median*	2	2
95th percentile	8.1	11
Max	47	234

Note: *Only companies with at least one employee are considered.
Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Visualising growth trends over time: a cohort-based analysis

The present section examines the annual variations of start-ups' turnover values since registration. The behaviour of Trentino's start-ups is compared to Italy's registered firms as a whole. The analysis takes into account all innovative start-ups ever registered, and allows to capture growth trends even after losing this particular legal status: firms in each cohort may or may not have left the special directory during the observation period, and some will have ceased operations by the end of the reference period.

Our methodological approach is to break down the start-up population into two distinctive cohorts, based on the year they joined the policy. "Early adopters" include firms that joined the policy shortly after its inception, i.e. they registered as innovative start-ups in 2013 and 2014. Normally a small population across Italy, it is unusually significant in Trento (see Section 2.1). Although start-up population varies sharply in different regions, this choice allows to obtain subsamples of acceptable size across most of Italy, facilitating transferability of the same methodology.[6]

For these firms, the analysis of turnover trends extends over a period of five years, from 2014 to 2018. The "second wave" comprises firms that registered in 2015 and 2016. These were the years where the national policy spread markedly across the country. These firms are followed across a period of three years (2016-2018).

Moreover, it must be noted that most of the measures that make up the Italian Start-up Act came into force gradually over time (MISE, 2017[43]), with some key measures not being fully accessible until 2015 or 2016.[7] The potential impact of the policy on survival and growth rates is thus expected to be all the more significant the more recent the date of entry.

In the following, turnover trends are visualised in increasing detail. In the first part, descriptive tables will show changes in the relative weight of turnover classes across the years. Secondly, a dynamic analysis visualises year-by-year flows across these classes. Finally, a two-way plot presents variation in turnover values between the first (x-axis) and the end year (y-axis) of the observation period for each start-up in the cohort.

Size of turnover classes

Table 3.4 and Table 3.5 show respectively how Trentino's "early adopter" and "second wave" innovative start-ups distribute, in each year between 2014 and 2018, across five turnover classes, ranging from start-ups with very low yearly turnover values (under EUR 50 000 per year) to the few that cross the EUR 5 million mark. Specific classes are displayed for start-ups no longer in operations (shutdowns),[8] for those that were about to close shop (winding up),[9] and those for which the turnover values are missing and no inferences could be made (NA).

Trento diverges most prominently from the rest of Italy per effect of a comparatively high rate of exits in the first turnover cohort. Over a quarter of firms registered in 2013 and 2014 were no longer operational in 2018, against a national share of 18.2%. Uniquely in Italy, 12% of start-ups in this cohort had already closed shop by the end of their first year of registration. Over time, however, exit rates decrease sharply: just 8.5% of innovative start-ups in the second cohort had shut down by 2018, which is broadly in line with the national three-year mortality rate (8.9%).

A common trend in the two cohorts, in Trentino and all over Italy, is the constant increase in size of the higher turnover groups over time. This becomes particularly salient after the second year after policy entry, as already evidenced in the OECD evaluation (Menon et al., 2018, p. 30[27]). In Trentino, just 4.2% (first cohort) and 6.8% (second cohort) of start-ups had a sales volume above EUR 500 000 in their first year, whereas by the third year (for second wave start-ups) or the fourth (for early adopters) the relative ratio approaches 15%. This is actually more than in the rest of Italy, especially for the youngest cohort – although Trentino has fewer missing values than the Italian average. Later years also see the appearance of a small group of "millionaire" start-ups (turnover above EUR 1 million per year), representing 7% of firms in the older group, and 5.6% in the younger. However, in each cohort high-turnover firms are about as common in Trentino as in the rest of Italy, confirming that the density of high-growth innovative start-ups in this area is not particularly high.

However, firms reporting slow growth trends constitute the relatively largest share across all observed cohorts, both in Trentino and at the national level. More than 20% of start-ups in each cohort had a sales volume below EUR 50 000 in 2018; compared to the rest of Italy, Trentino has a somewhat higher share of firms with a turnover above EUR 50 000, which could be intended as an absolute "minimum viability" threshold for market validation. Nonetheless, a vast majority of active firms in both cohorts did not exceed EUR 500 000: this should lead local policy makers to reflect on how to ensure that sustained growth affects a wider segment of the start-up population.

Table 3.4. Turnover growth of innovative start-ups in Trentino and Italy, shares of start-ups by turnover class over time – early adopters (2014-2018)

Trentino	Class 2014	Class 2015	Class 2016	Class 2017	Class 2018
Shutdown	11.7%	13.6%	17.5%	22.3%	26.2%
Winding up	1.0%	1.0%	0.0%	1.0%	0.0%
Below EUR 50 000	43.7%	29.1%	29.1%	24.3%	19.4%
EUR 50 000-500 000	33.0%	43.7%	34.0%	29.1%	25.2%
EUR 500 000-1 million	5.8%	4.9%	6.8%	10.7%	6.8%
EUR 1 million-5 million	1.0%	3.9%	4.9%	3.9%	5.8%
EUR above 5 million	0.0%	0.0%	0.0%	0.0%	1.0%
NA	3.9%	3.9%	7.8%	8.7%	15.5%
Italy	**Class 2014**	**Class 2015**	**Class 2016**	**Class 2017**	**Class 2018**
Shutdown	1.5%	4.3%	8.6%	13.2%	18.2%
Winding up	0.8%	1.5%	1.7%	1.9%	0.0%
Below EUR 50 000	54.0%	39.2%	30.2%	25.8%	17.4%
EUR 50 000-500 000	29.1%	40.5%	39.2%	33.2%	29.2%
EUR 500 000-1 million	2.8%	4.6%	5.2%	6.5%	6.6%
EUR 1 million-5 million	2.4%	3.7%	5.2%	5.9%	6.8%
EUR above 5 million	0.1%	0.2%	0.4%	0.8%	1.2%
NA	9.3%	6.0%	9.4%	12.7%	20.6%

Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Table 3.5. Turnover growth of innovative start-ups in Trentino and Italy, shares of start-ups by turnover class over time – second wave (2016-2018)

Trentino	Class 2016	Class 2017	Class 2018
Shutdown	1.4%	2.8%	8.5%
Winding up	0.0%	0.0%	0.0%
Below EUR 50 000	45.1%	32.4%	21.1%
EUR 50 000-500 000	35.2%	39.4%	40.8%
EUR 500 000-1 million	2.8%	9.9%	8.5%
EUR 1 million-5 million	1.4%	2.8%	4.2%
EUR above 5 million	0.0%	0.0%	1.4%
NA	14.1%	12.7%	15.5%
Italy	**Class 2016**	**Class 2017**	**Class 2018**
Shutdown	1.7%	4.6%	8.9%
Winding up	1.0%	1.7%	0.0%
Below EUR 50 000	53.3%	40.7%	28.5%
EUR 50 000-500 000	27.0%	32.1%	29.8%
EUR 500 000-1 million	3.2%	5.3%	6.1%
EUR 1 million-5 million	2.0%	3.7%	5.1%
EUR above 5 million	0.3%	0.4%	0.6%
NA	11.5%	11.5%	21.0%

Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Dynamic analysis

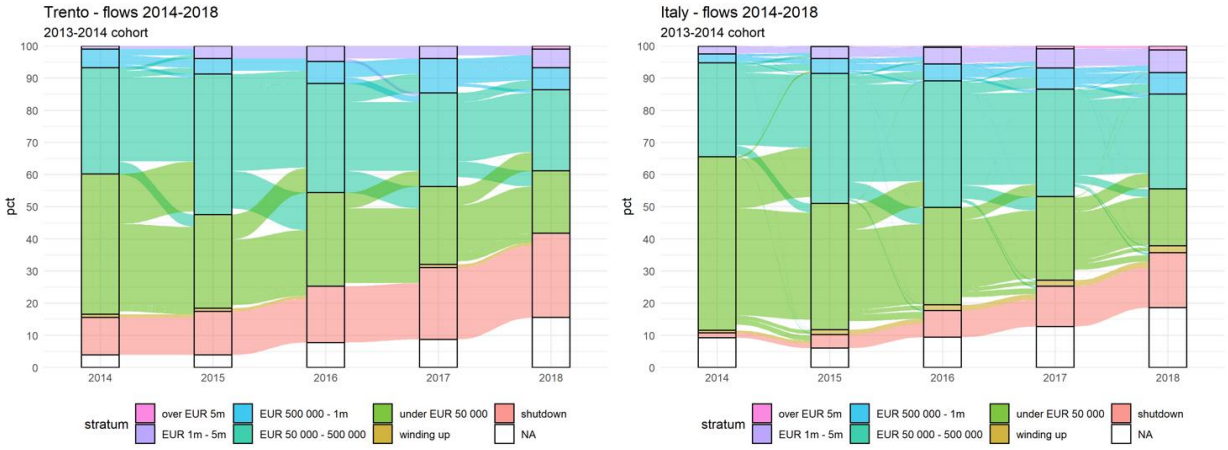
The descriptive analysis above hints at movement between the classes over time. It is intuitive, for instance, how the two smallest turnover classes – and the smallest in particular – are gradually shrinking due to an increasing number of shutdowns and higher turnover values.

The flows between turnover classes can be visualised through an alluvial diagram (also known as a "Sankey chart"). Figure 3.1 and Figure 3.2 give dynamism to data in the table above, showing the extent to which companies in each class have transitioned to another class in the following year.

Graphs show that a fair share of start-ups in both cohorts are actually rather stationary year-by-year, particularly those with a turnover between EUR 50 000 and 500 000. The graphs show clearly that this class is proportionally more populated in Trento than in the rest of Italy, especially for the younger cohort, and that this trend has been persistent since the first year after entry. In Trentino, 44% of start-ups registered in 2013 and 2014 were still classified in the same group in 2018, a value very similar to the national average (43.6%). For the second wave of start-ups the equivalent share is 64% in Trentino and 54% at the national level.

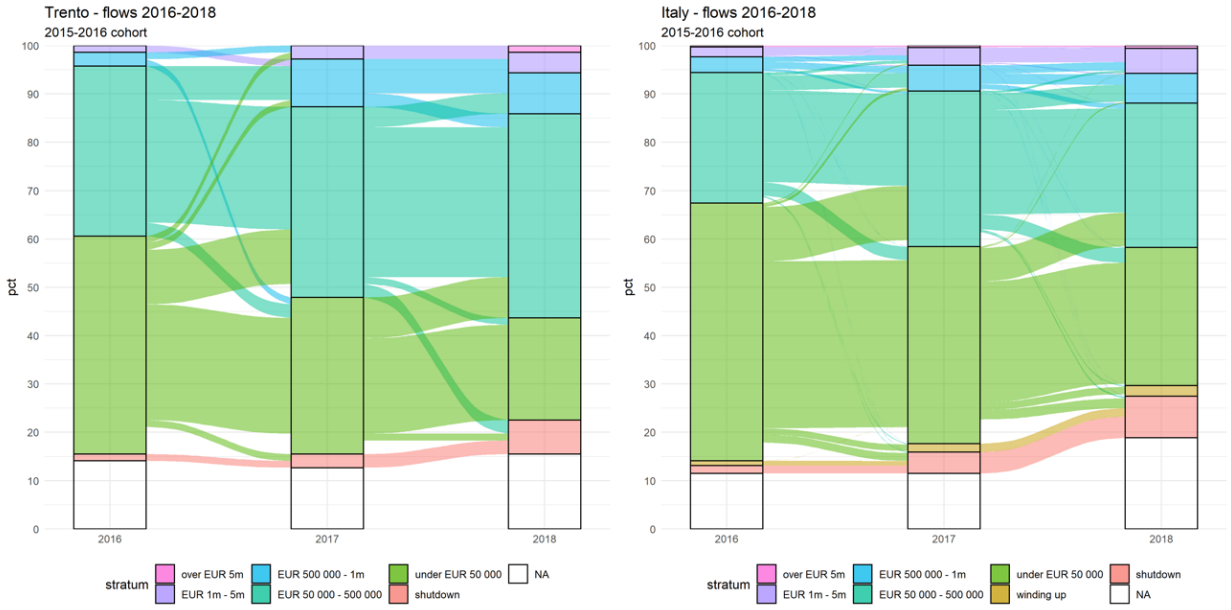
Nonetheless, a few discernible "movements" can be pinpointed. First, mobility from lower to higher classes exceed that going the other way around. In Trentino, it becomes increasingly rare for start-ups that have high sales in their first years to fall down to lower levels. Conversely, firms that remain at low turnover levels in their second and third year are very unlikely to "scale" later in their life. In Trentino, just 6% of "early adopter" firms that had a turnover below EUR 50 000 in their first year crossed the EUR 500 000 threshold by the end of the observation period; conversely, this group of firms makes up almost the entirety of late years shutdowns. Similar trends all around the country suggest that the overwhelming majority of beneficiary start-ups that ceased their activity had never found validation on the market.

Figure 3.1. Flows between turnover categories of innovative start-ups in Trentino (left) and in Italy (right), early adopters (registered 2014-18)



Note: Created in R with the ggalluvial package.
Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Figure 3.2. Flows between turnover categories of innovative start-ups in Trentino (left) and in Italy (right), second wave start-ups (registered 2016-18)



Note: Created in R with the ggalluvial package.
Source: OECD Trento Centre elaboration on Italian Business Registry Data.

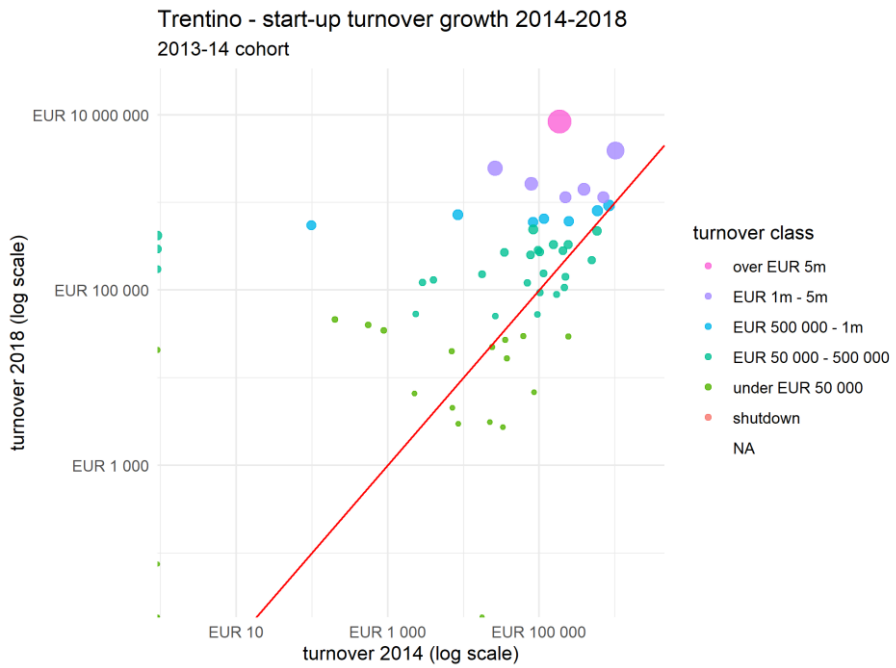
Focus on individual growth trajectories

The relatively small population of start-ups in each cohort in Trentino allows to find ways to glance at the growth trajectory followed by every firm in the sample. This can be done by means of a bivariate scatterplot, turning turnover values into coordinates and showing each start-up as a point on a grid.

Figure 3.3 and Figure 3.4 intuitively show that most innovative start-ups in Trentino have indeed grown since the first year in the policy: a majority of points position to the left of the diagonal line that indicates a stationary state – i.e. identical turnover values at the beginning and the end of the observation period. It also shows that most high-performing start-ups recorded measurable sales from their first year of registration, which is testified by their relative proximity to the diagonal line.

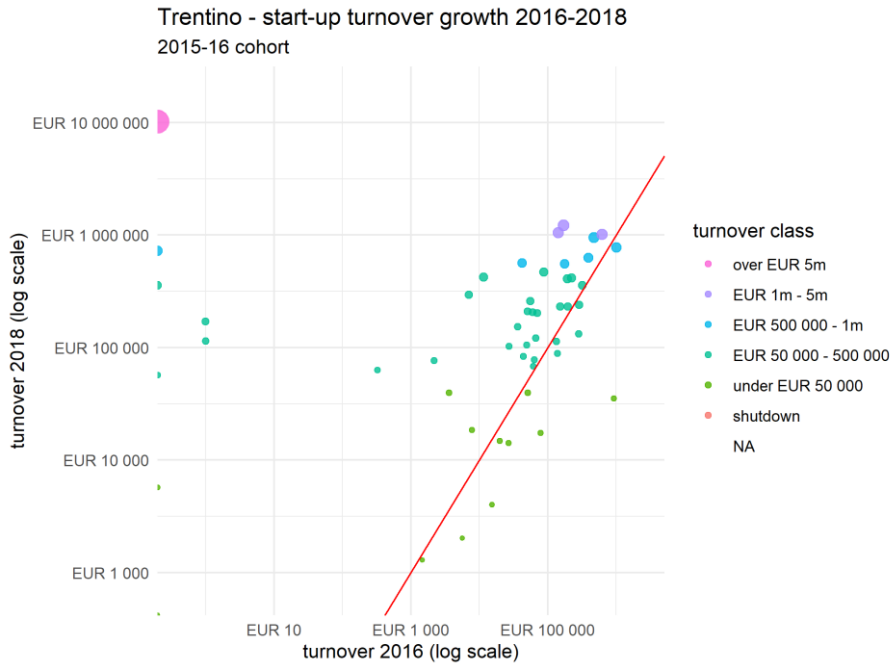
The graphs thus support the observation that high-performing start-ups tend to be on the market since their early steps. There are however notable exceptions, which can be isolated on the left side of the plot: a handful of start-ups that had close to zero turnover in their first year recording high values at the end. Indeed, the highest-performing firm in the whole sample recorded no sales in 2016. It appears at the top left of Figure 3.4.

Figure 3.3. Individual growth trajectories of start-ups in Trentino, early adopters (2014-2018)



Note: The x and y axes are logarithmic (log10). Forty-four shutdown firms with no turnover value in 2018 are not shown.
Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Figure 3.4. Individual growth trajectories of start-ups in Trentino, second wave (2016-2018)



Note: The x and y axes are logarithmic (log10). Twenty shutdown firms with no turnover value in 2018 are not shown.
Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Discussion of findings

The growth trends of Trentino's start-ups during and after the period of public support were analysed in the previous paragraphs.

Data shows that currently registered innovative start-ups in Trentino have overall a somewhat better economic performance compared to the rest of the Italy: mean and median values are among the highest across all Italian regions. This, in particular, is driven primarily by higher-than-average turnover values among small start-ups, rather than the presence of a larger share of top-performing firms. Across each "cohort" – defined by year of formal registration as innovative start-up – firms with a turnover between EUR 50 000 and EUR 500 000 are more common in Trentino than in the rest of Italy, and there are relatively fewer start-ups with an annual turnover equal to zero.

However, just 0.6% of Trentino's innovative start-ups have outgrown the micro-SME status as defined by European legislation, a ratio that rises to just 1.5% for companies no longer registered as start-ups (which are typically older and larger in size). Peak values, such as the 95th percentile in the turnover distribution, are also in line or slightly lower than national trends, showing that Trentino does not have a particular density of high-growth firms.

Data also hints at effective market validation dynamics among innovative start-ups in Trentino. A larger share of firms tends to show significant turnover values since their early years in the special registry, and keep growing also after legal benefits are discontinued. Conversely, firms that do not grow display a high propensity to close shop soon in their life, and firms registered before 2014 in particular. Both trends may be signs of a healthy ecosystem that supports sustainable business models and "punishes" non-viable ones.

Notes

[1] Small and medium-sized enterprises (SMEs) are defined in the EU recommendation 2003/361, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32003H0361&locale=en.

[2] Yearly accounts in Italy cover the 1 January-31 December 2018 period, with limited exceptions.

[3] Normally, missing turnover data are due to the fact the firm did not file their financial statements on that year, either because it did not exist yet or because it was exempted from doing so (e.g. because it started to do business very close to the end of the fiscal year). However, there is a significant share of unexplained missing values: as shown in Section 3.2, this amounts on average to about 10% of all start-ups registered in a given year.

[4] Turnover values only.

[5] In rare circumstances, a start-up can be still registered in the special directory even if it has passed the EUR 5 million threshold: for instance, when it is transitioning to “innovative SME” status or when the administrative process for removal is yet to be completed.

[6] For Trento, the “early adopters” cohort (2013-14) includes 103 start-ups (Italy: 3188). Uncommonly, the “second wave” cohort (2015-16) in Trento is smaller, with 71 start-ups (Italy: 4528).

[7] The preferential track to the SME Guarantee Fund was enabled in late 2013, and the Smart&Start Italia subsidised finance programme was extended to all of Italy in 2015. Online incorporation entered into force in mid-2016, while tax incentives for equity investors are accessible at the current rate (30%) only since 2017.

[8] Normally shutdown firms do not file statements of account in the year when they cease their activity. In the few instances they do, the value is discounted.

[9] This category identifies the start-ups that have not submitted a statement of account in that year, and that have formally ceased business in the following year.

4. Breakdown by economic sector: "traditional" areas and emerging technologies

"Traditional" NACE classification of start-ups (and its shortcomings)

The definition of innovative start-up adopted in Italy does not entail any explicit sectorial limitation.[1] Provided that the firm introduces a component of "technological innovation" in its business model, as stated by its objects clause and ascertained by the fulfilment of measurable innovation requirements (see Section 1.2), it can be admitted into the start-up registry regardless of its economic sector.

According to the Statistical Classification of Economic Activities in the European Community, commonly referred to as NACE, almost half of all firms registered as of 1 January 2020 (47.4%) operate in information technology. In particular, 35.6% are classified as "Computer programming", a broad class that, amongst other, includes the app economy. A second very common category in the tertiary sector is "Scientific research and development" (13.9%) in fields such as biotechnologies, natural sciences, engineering.

There also a sizeable share of manufacturing start-ups (17.3%), which are primarily classified as producers of "machinery" and "electronic equipment". Few start-ups are classified as retail (3.8%), and the agricultural sector is almost non-existent (0.7%). The latter might not be a sign of scarce adoption of innovative technologies in farming, but rather of incompatibility between facilitation regimes. Agri-businesses in Italy may benefit for a special tax regime – so-called "cadastral-based" – only if they are incorporated as partnerships ("*società di persone*") and not as limited companies, which is a requirement to obtain innovative start-up status.[2] Conversations with stakeholders confirm that companies with a large land estate see the limited company form as overly costly from a fiscal standpoint, even factoring in incentives awarded to innovative start-ups.

In Trentino, the NACE distribution highlights a few sectorial peculiarities. Two sectors are particularly overrepresented compared to the national average: research and development, with 22% – eight percentage points above average – and manufacturing as a whole, with 24% – seven percentage points more than at national level. ICT start-ups are however still dominant, and about as common as nationwide (46.4%). There are also a few NACE codes that are under-represented, which seem to refer primarily to "low-tech" consulting activities. Finally, even in this highly rural territory, there is just one registered start-up classified as "agriculture", and wholesale retail is entirely absent (Table 4.1).

Table 4.1. Distribution of innovative start-ups by economic activity (NACE) (January 2020)

	Trento		Italy	
J 62 – Computer programming	64	37.6%	3 883	35.6%
J – Other ICT	17	10.0%	1 287	11.8%
M 72 – Scientific research and development	38	22.4%	1 512	13.9%
M – Other services	10	5.9%	481	4.4%
C 26 – Manufacture of computers	8	4.7%	307	2.8%
C 27 – Manufacture of electrical equipment	7	4.1%	169	1.6%
C – Other manufacturing	25	14.7%	1 866	17.1%
G – Wholesale and retail trade	0	0.0%	370	3.4%
A – Agriculture and fisheries	1	0.6%	79	0.7%
Other	4	2.4%	947	8.7%
Total	174	100.0%	10 901	100.0%

Source: OECD Trento Centre elaboration on Italian Business Registry Data.

While this distribution gives a first impression of the structure of Trentino's population, it does little to clarify in which ways registered start-ups are indeed innovative. Many NACE codes are arguably too broad – e.g. "computer programming" – and/or devoid of key content – "research and development", "manufacture of machinery and equipment" – to provide useful information on start-up business models. The very app economy mentioned above can involve a highly diversified range of sectors, spanning from car sharing and food delivery to cryptocurrencies and influencer marketing, just to mention a few, but all are likely to be classified within the same NACE code. There are also credible concerns that the sectorial spread may be partly influenced by random chance, with for instance hybrid software-hardware IT start-ups being alternatively classified as "manufacturing" or "software development", depending on how statutes of incorporation were drafted.

Identifying start-ups that adopt emerging digital technologies: a topic modelling approach

Rationale and data

A systematic understanding of the field in which innovative start-ups operate require methods that supplement or replace NACE codes. This is particularly necessary to keep track of new technology and investment trends, and to assess the performance of public policies aimed at "frontier" domains.

The Italian policy maker has up to now relied on encouraging public "self-identification" from the side of entrepreneurs. These, upon registration of their innovative start-up, are required to fill out a public profile on the startup.registroimprese.it platform (see Section 1.3), including by indicating up to three tags to describe their specific activity and therefore signal their belonging to a specific sectorial or technological subgroup. Each firm can freely choose these tags, which often bear no resemblance to traditional classifications and are influenced by the marketing proposition of the start-up. In this way, a company focussing on "machine learning" technology will be able to distinguish itself from others whose NACE code falls under the broader "software development" category.

Specific sectorial information may also be retrieved through standard administrative documentation normally produced by all firms (regardless of their innovative start-up status). Every Italian firm, in its act of incorporation, has a long description of the economic activities it intends to pursue – an "*oggetto sociale*", "objects clause". This goes along with a shorter description for operational and auditing purposes called "*descrizione attività*", literally "activity description", which is easier to change (being not part of the statute) and never longer than 200 characters. In a legal opinion, MISE clarified that the activity description is a useful tool to ascertain the "innovation component" of the business, as per the legal definition of start-up.[3]

For this reason, it is likely that this text will describe in detail the type of innovation introduced, "strategically" using sector-specific keywords. This last feature makes this source particularly suited for a text analysis exercise.

Our study focuses thus on the 11 173 firms registered as of early April 2020, the closest date for which the activity description is available for the entire sample. Territorial and sectorial distributions are largely comparable to that shown before in this paper, which refer to the population as of January 2020. In the dataset used for this section, Trentino hosts 184 registered start-ups, 10 more than three months earlier.

Methodology: topic modelling

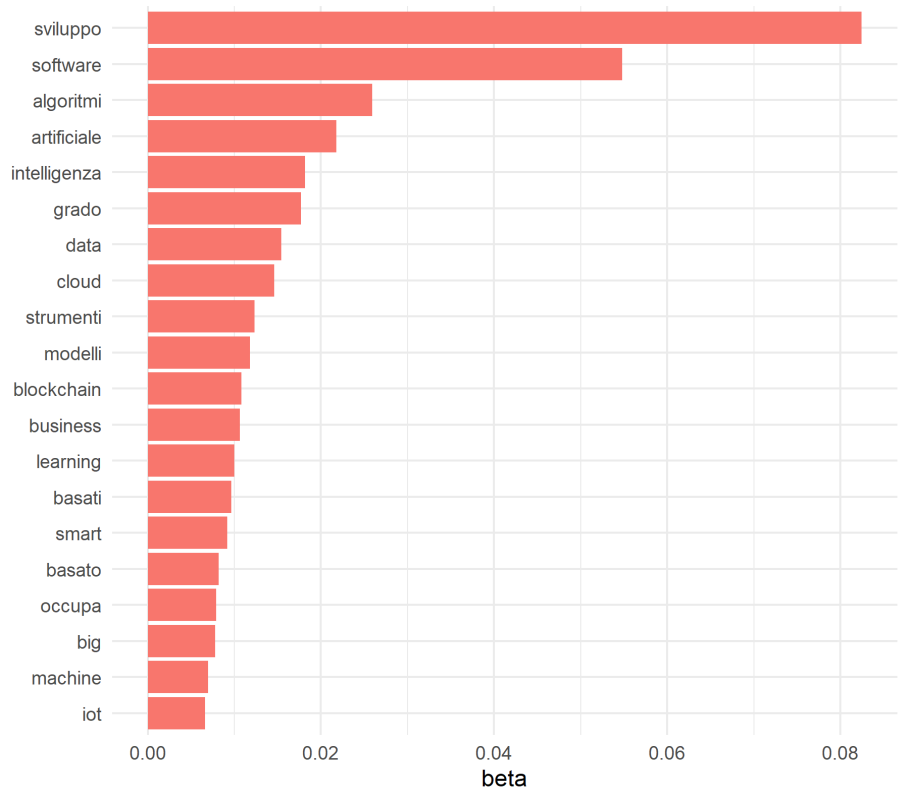
Topic modelling is a form of unsupervised machine learning. It is normally used in natural language processing to cluster together similar documents, part of a wider corpus. The innovative start-up directory can thus be understood as a corpus of documents, which in this case are the activity descriptions of each registered start-ups.

The power of topic models is that they make it possible to *discover* the main themes underlying a corpus of texts without any prior information being fed to them. In this work, this is achieved thanks to a probabilistic algorithm, Latent Dirichlet Allocation, or LDA (Blei, Ng and Jordan, 2003[44]). LDA uses the frequencies with which words appear in each document to make inferences about unobserved topics that "gave rise" to the use of those words, or in other terms estimates the probabilities that (a) each word and (b) each document are composed of each topic. Resulting probability scores are called *beta*, for words, and *gamma*, for documents. They add up to 1.0 within each word or document when all topics are considered, which facilitates their understanding as compositional percentages.[4]

LDA is appealing because, while computationally complex,[5] it is easy to exploit: to fit the model, the researcher must only decide in advance the number of topics to look for ("k-value"). This choice is arbitrary, and a "right" number can only be found through an iterative process: that is, trying several values, and checking every time which words have the highest *beta* score within each topic.

For this paper, we ran an LDA model based on a k-value of 12. The parameter is sufficient to generate a category in which the five most distinctive words, ranked by *beta* score, are *software*, *algoritmi* ("algorithms"), *artificiale* ("artificial"), *intelligenza* ("intelligence"), *data*. This topic also exhibits high *beta* scores for words like *cloud*, *modelli* ("models"), *blockchain*, *learning*, *big*, *machine*, and *iot*, meaning that it does not encapsulate just artificial intelligence, but emerging digital technologies at large (Figure 4.1).

Figure 4.1. Top-10 words by *beta* score in the "emerging digital technologies" topic (LDA topic model, k-value = 12), innovative start-ups population (6 April 2020)



Source: OECD Trento Centre elaboration on Italian Business Registry Data.

Moving from words to documents, i.e. from *beta* to *gamma* scores, we observe that the values generated at company level for the emerging digital technologies topic are in a range between 0.286 (maximum) and 0.057 (minimum). The majority of firms have a *gamma* value between 0.06 and 0.07, meaning that their "content" in terms of emerging digital technologies is very likely marginal or non-existent. The firms with the highest *gamma* values are specifically – and beyond any doubt – artificial intelligence start-ups. However, a simple look-up for the words "*intelligenza artificiale*" shows that firms using them may have also somewhat lower *gamma* scores: these become increasingly uncommon after passing the 95th highest percentile (0.121), and very uncommon only for scores under 0.10, which is close to the 90th percentile – more precisely, 10% of innovative start-ups have a *gamma* score higher than 0.107.

This last specification thus captures almost all companies for which keywords from the desired semantic field (artificial intelligence, big data, references to computational models etc.) are actually present. Using a higher threshold, such as top 5%, actually leaves out a few firms that have very detailed and comprehensive activity description – and which thus includes more words that relate to other topics with a higher probability.

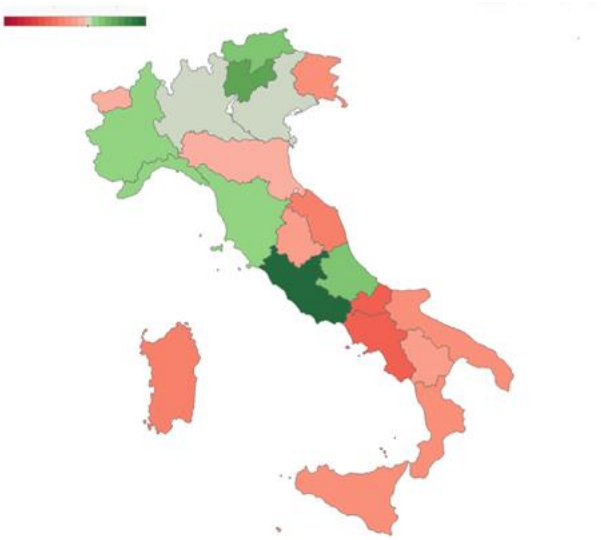
Results

In short, the LDA machine-learning algorithm identified a topic specifically relating to emerging digital technologies, and assigned *gamma* scores to each registered start-up based on the likelihood of related words to appear in their activity description. We now define territories as having a high density of "emerging

technology" start-ups when the share of firms registered in that area with a *gamma* score higher than 0.107 is above 10%.

In Trentino, 25 firms have a *gamma* score for emerging digital technologies higher than the 0.107 threshold, which is 13.6% of all firms registered as of April 2020. When the *provincia autonoma* of Trento is considered on equal footing with regions, Trentino shows the second highest rate in the country, only behind Lazio (Figure 4.2). If Trentino-Alto Adige is accounted as a whole unit, it retains the second position as well and with a very similar share (12.9%), since South Tyrol exhibits a density above national levels as well (11.4%).

Figure 4.2. Share of registered start-ups adopting emerging digital technologies (top-10 gamma percentile) by region and autonomous province (April 2020)



Note: Red shades indicate regions with a share of emerging technology start-ups below 10%. Green shades indicate values above 10%. The darker the shade, the furthest the value is from 10% in either direction.
Source: OECD Trento Centre elaborations on Business Registry data.

If we compare it with other *province*, Trento is in eighteenth position, outstripped primarily by areas with small start-up populations. Taking only into account substantial poles – 50 registered start-ups or over – Trentino places fifth, with a rate only marginally inferior to Treviso and Modena (which have start-up populations comparable to Trento) and only substantially below Pescara and Rome.

Rome (18.3%) is by far the largest pole in Italy for innovative start-ups in emerging digital technologies. This is primarily a function of the extremely high concentration of ICT young firms: 60.4% of registered start-ups in Rome have the corresponding NACE codes ("J" class). For Trento, as earlier said, the equivalent share is 47.8%, close to national average. Both in Rome and in Trento, the share of start-ups that our model classifies as "emerging digital technologies" over all ICT start-ups is above 20%: this is significantly higher than the Italy-wide value (14%). However, Trento partly closes the gap with Rome thanks to firms that, under NACE, are classified as "manufacturing": even though the sample is very small, these firms seem to be much more likely to have an explicit "digitised" component than in the rest of the country (12% against 5%).

To sum up, our exploratory analysis suggests that Trentino hosts a substantial number of innovative firms whose business model exploits emerging digital technologies such as artificial intelligence, cloud and advanced computational techniques for big data. Its density is broadly comparable to that in Rome – Italy's focal point in the field – in spite of a very different macro-sectorial NACE distribution.

This analysis could be made more accurate by running a topic model on less concise, more descriptive text data. Company profiles on startup.registroimprese.it seem ideal, for a number of reasons. First, they have a business rather than administrative purpose, and are therefore more likely to be filled out by entrepreneurs or employees that have a clear grasp of the innovative features of their company, compared to accountants or notaries usually in charge of drafting objects clauses upon incorporation. Second, as evidenced in Section 2.5, they are available for a large majority of firms, particularly in Trentino and South Tyrol. However, unlike activity description, there are still differences in adoption rates across the country, making cross-regional comparison more complex. Moreover, the tagging system may be taken as a useful guide for implementing forms of supervised machine learning, that are likely to yield even more granular information on specific technology trends.

Notes

[1] The preparatory white paper for the Italian Start-up Act, "*Restart, Italia!*" (MISE, 2012) spells out the rationale behind this choice: "*Intuitively, we can all recognise a startup. We can all recognise an enterprise that has been established recently, one whose goal is to develop, produce and market certain goods or services that are the result of research, or one which uses a high rate of innovation in its activity. We also know that startups do not pertain just to the digital world, but are established across all sectors, including more traditional ones.*" (p. 10). URL: https://www.mise.gov.it/images/stories/documenti/startup_eng_rev.pdf [accessed on 8 June 2020]

[2] The requirements to access the "cadastre-based" special income tax regime is explained by Italy's Revenue Agency at the following URL (in Italian): https://www.agenziaentrate.gov.it/portale/web/guest/schede/agevolazioni/opzione-per-determinazione-del-reddito-su-base-catastale/scheda-info-opzione-determinazione-reddito-base-catastale [accessed on 8 June 2020]

[3] Circular issued by MISE on 14 February 2017 (p. 4-5). URL: https://www.mise.gov.it/images/stories/normativa/Circolare-startup-e-PMI-innovative-14-02-2017.pdf [accessed on 5 June 2020]

[4] This explanation is adapted from Catalinac, Amy (2016), "*From Pork to Policy: The Rise of Programmatic Campaigning in Japanese Elections*". The Journal of Politics, Vol 78, No. 1.

[5] For the specifics, see Blei et al. 2003 or, for beginners to the topic, this guide: "*Intuitive Guide to Latent Dirichlet Allocation*". URL: https://towardsdatascience.com/light-on-math-machine-learning-intuitive-guide-to-latent-dirichlet-allocation-437c81220158

5. Main takeaways and policy recommendations

Trentino: a model case of policy transfer?

As documented in this work, there are several signs that Italy's national strategy for innovative start-up has enjoyed effective policy transfer. First and foremost, the number of beneficiary firms is unusually large: the ratio between registered start-ups and all new limited company, 7.45%, is by any measure the highest among all Italian jurisdictions – the equivalent ratio for all of Italy is 3%. This is the effect of an organic trend, that is a steady and sustained pace in new registrations that has been observed ever since 2013, when the special policy framework entered into force.

The high density of start-ups in Trentino is certainly also a function of its human, financial and institutional environment. Trentino is wealthy, has a dynamic economy also reflected by its high employment levels, a highly educated population and high spending in research and development, particularly from local government and higher education institutions. Some other areas in Italy have similar characteristics to Trentino; the number of registered start-ups is nonetheless proportionally lower. There is, in particular, an apparently good counterfactual in South Tyrol. Besides geography and shared history, these two territories have a similar degree of fiscal and legislative autonomy, including extensive competencies in industrial policy. There are however also key differences, most notably the linguistic makeshift of South Tyrol – the only region in Italy where Italian is not the majority language.

South Tyrol's ratio of registered start-ups over all new limited companies is in line with the national average (3.4%), and thus much lower than in Trentino. The reasons for this divergence are not obvious, but a few intriguing hypotheses can be made. Two of them point to policy transfer issues. There might be a specific effect of the language barrier, meaning that in German-speaking areas there are proportionally fewer registered firms than in Italian-majority ones.[1] Another factor may be a difference in strategy between these two jurisdictions. In spite of its high degree of autonomy from the central state, in Trentino the nationally defined concept of "innovative start-up" has clearly become *embedded* in local policy communication, as well as policy practice. Since 2012, Trentino has sought to promote its pre-existing cluster of research institutions and advanced manufacturing firms as a "Start-up Valley", and has since developed several local measures targeted to firms holding innovative start-up status according to the nationally-defined notion. In South Tyrol, this has happened to a smaller extent and to a different timeframe (cfr. dedicated paper).

In spite of its high start-up density, in Trentino the distribution of innovative firms does not reflect population patterns, as these are mostly found in the main urban agglomerations of the province. This distribution is seen all over Italy, with start-ups being normally found in the main service provision centres of each territory. However, Trentino's distribution is still distinctive in the sense that there is at least one major cluster in a more peripheral area. The density of start-ups in the town of Rovereto is unparalleled among other peri-urban areas at the national level, and is the result of concentration of major ecosystem players in its territory, which are either publicly-owned or hosted in public facilities. In this sense, Rovereto appears to be a successful case of reconversion and diversification of earlier manufacturing heritage towards high-

potential, highly innovative sectors. Other territories, especially those facing challenges of de-scaling, unemployment, and depletion of physical and human capital (i.e. underutilisation of spaces and people's skills) might look with interest to Trentino's approach, which seems particularly indicated for areas that have once pursued a strategy of rural development through planned industrialisation.

It is plausible that the high number of beneficiaries of the Italian Start-up Act in Trentino is influenced by public policy. It is however not sure whether high density means that there are indeed many more innovative companies in Trentino than in the rest of Italy, or if there is simply a higher propensity for eligible firms to register voluntarily as an innovative start-up. This question can be positively resolved only by performing more accurate estimates of the unregistered start-up population. The exercise is highly relevant for national and local administration alike: its execution and follow-up would benefit greatly for the two operating in a synergic way.

It is possible, as done by MISE in 2016, to obtain rough estimates of the number and the distribution of unregistered start-ups by filtering firms in the Business Registry based on legal eligibility criteria: age, turnover, ownership of patents or software. There is also the option to experiment with text analysis techniques. It is possible, as a first step, to measure the proximity of activity descriptions and object clauses of unregistered firms with those of innovative start-ups. However, policy makers might want to prioritise a measurement of the size of the unregistered population that have the strongest innovation component, or that operate in target sectors – e.g. those identified by local Smart Specialisation Strategies. This objective can be achieved through usage of machine learning techniques, both supervised (i.e. guided by pre-defined keywords) and unsupervised. For instance, it is possible to replicate a similar approach to that followed in Chapter 4 to identify start-ups adopting emerging digital technologies, running the same algorithm on the entire business population.

An overarching "hunt" for unregistered start-ups based on potential compliance with national criteria can be performed at a centralised level, with cooperation of the data owners – Italian Chambers of Commerce and their IT in-house firm InfoCamere. Regional development bodies could however play a part in many ways: firstly, thanks to their proximity, they could take care of outreach activities towards unregistered start-ups with characteristics that make them suitable and desirable for public support. Trentino looks like a good terrain for piloting this approach: its small firm population makes outreach more feasible and less costly, and an extensive support network that is used to deal with and advise innovative start-ups is already in place.

Furthermore, many potential registered start-ups on the territory may not appear in the Business Registry, as they are not yet corporatised – e.g. do economic activity under the guise of a sole proprietorship or under freelance accounts – or are incorporated in other countries. The latter typology entails more complex considerations, such as the need to offer favourable, trustworthy conditions for foreign investors that may otherwise "lure" promising firms out of their area of origin. For the first one, the local level is again ideal for an outreach strategy. Local development agencies could target nascent innovative entrepreneurs for which the commitment of setting up a limited company could be excessive even when factoring in incentives for innovative start-ups. This is the case of student entrepreneurs who have few resources and appetite for formalisation, as they are more concerned with securing a stable income first – another area where public policy may play a part. To make identification of such potential start-up entrepreneurs systematic, agencies should work together with educational institutions – from vocational training upwards – and devise solutions to make talent "visible" and measurable, for instance via periodic, targeted calls and challenges.

High-growth start-ups: is more work needed?

An area in which Trentino does not stand out in the Italian context is the number of high-growth start-ups – or more specifically, of firms that reach high turnover levels. Even though beneficiary firms in Trentino tend to be larger than in most other Italian regions, they are normally micro-SMEs with a sales volume that

can generate only limited spill-overs in terms of employment and investment. Few beneficiary firms exceed the EUR 2 million turnover threshold that identifies micro-SMEs, and only a handful cross the EUR 10 million mark.

Several measures of the Italian Start-up Act aim to facilitate the flow of funding towards start-ups. These are however geared towards micro-funding and particularly seed capital, confirming that this policy is mostly conceived to support firms in their very early stages.

This report has not analysed patterns in access to incentives to risk capital investment. This data, which is collected through yearly tax returns, is not publicly available, although MISE has released breakdowns by regions and type of beneficiary firm (now outdated). The Ministry of Economy and Finance also releases every year aggregate data from the point of view of the investor (i.e. on the amount of investments made, the number of individual investors, and the total tax benefit received). This information does not allow to draw much inference, except that the investments covered by the tax benefits are in most cases of very small size (MISE, 2016, pp. 111-117[39]). A feature of this incentive is that, since 2015, there is no independence restriction: tax relief can also be claimed by founders themselves when injecting new capital in a firm they already own, fully or in part. It is likely that the small investments supported via this instrument are often recapitalisation through own funds rather than third-party money: this would make this incentive more of an instrument to support day-by-day operations rather than an incentive to risk-taking and growth. Small investment may also be the result of liberalisation of equity crowdfunding, which has known a significant expansion in Italy from 2017 onwards.[2]

The Start-up Act offers more extensive support in terms of debt financing, particularly through the SME Guarantee Fund. As shown in the report, Trentino has the highest rate of access to the instrument in Italy, with about one registered start-up in three having obtained a guaranteed loan. This is significant as it is not obvious that innovative start-ups would want to resort to debt in their early stages, as they may perceive that this type of finance does not suit their development path – and, given a substantial risk of insolvency, it is personally much riskier for upstarting entrepreneurs. As the OECD warned in the conclusions of its 2018 evaluation of the Italian Start-up Act (Menon et al., 2018, p. 52[27]), backed by extensive empirical evidence, debt is a suboptimal form of funding for high-growth innovative start-ups, and no targeted strategy should rely exclusively on it.

Italy has a small venture capital market, which has seen some growth in the last years of the 2010s – albeit not on the same scale of European partners (Dealroom, 2019[45]). Public policy attempts to attract more venture capital investments towards Italian firms have up to now been unsuccessful; the new National Innovation Fund ("*Fondo Nazionale Innovazione*") was formally set up only in January 2020 (CDP, 2020[46]), and it is not possible to express any judgment on its effects.

The OECD evaluation of the Start-up Act stressed that the small size of the Italian venture capital market may be down to a reputational issue, resulting from long-standing structural inefficiencies such as a slow, cumbersome civil justice system, which makes contract enforcement difficult. The Italian start-up ecosystem, and the significant benefits that its constituents enjoy, is hence not well known to foreign venture capital investors, and businesses that require substantial capital injections to grow fast are often tempted to relocate in markets perceived as more favourable, such as the United Kingdom or the United States.

It is therefore clear that Italy needs a scale-up strategy that works alongside the Start-up Act. Even if legislation already provides for a "Tier 2" support scheme for *PMI innovative*, this seems as well not yet sufficient for the necessities of high-growth firms, as it simply extends some of the incentives enjoyed by start-ups to older and larger firms.[3] This work provides evidence that the main issue for a public policy that supports scale-ups is not extending support beyond typical start-up age (in Italian legislation, five years after incorporation). In Trentino, most firms that have a meaningful growth potential start showing substantial turnover values since their first or second year of activity. This suggests that many high-growth firms can be identified when they are still young.

The pace of turnover growth in early years can be used by local policy makers as an instrument to identify firms that "aim big". As a first step towards an organic scale-up strategy, we encourage local ecosystem players to develop early warning systems for innovations that have potential for success on the market. This can be done also via qualitative measures of innovation and disruption potential, such as those developed by the European Commission in its Innovation Radar qualitative survey on research projects, particularly in the digital field (De Prato, Nepelski and Piroli, 2015[47]).

Promising firms may then become eligible for more advanced forms of mission-oriented support that encourage ambitious investment, experimentation and opening to international markets. Such schemes must have a prominent component of provision of patient capital, also (but not exclusively) via direct participation to share capital. Resources for these scale-up schemes may be diverted from existing measures based on zero-interest loans and deferred payments, which are less likely to select the most innovative project as they are to offer an additional credit line to the entrepreneurs that already have the best resources, and that can for instance obtain more easily loans on the general credit market. As shown in the report, this is primarily dependent on endogenous firm characteristics, but there is a strong influence of other factors, a positive correlation with GDP per capita in particular. Such an approach would help making the general policy strategy more place-conscious, acknowledging that, in countries with large regional disparities, underlying macroeconomic conditions influence the likelihood to access market-based instruments even after public intervention.

Finally, it must be highlighted how, especially when implemented at local level, this strategy can also be used as territorial branding, improving the visibility of regions and cities and initiating a virtuous cycle of attraction of talents and enterprises based elsewhere. Up to now, Trentino's communication strategy of stressing the high density of innovative companies has been mildly successful in Italy; there are currently no visible sign of it having had an international reach, as the share of foreign start-up founders – comparatively high but not exceptional – may suggest. As a well-connected area with high standard of living, equally close to Continental and Southern Europe, Trentino has several cards to play for positioning itself as an attractive place of relocation for promising start-up entrepreneurs.

Start-ups in high-impact sectors: how to find and support them

Start-up entrepreneurship is not only desirable because it creates growth and employment. Innovative solutions may be conducive to social advancement and tackle urgent needs arising in emergency situations. This was brought to the fore spectacularly by the Covid-19 crisis. On the one hand, the forced closure of workplaces, schools and places of leisure has catalysed advancements in digital technology as much as dramatically increased its uptake. On the other hand, as also highlighted by recent OECD work, public authorities have resorted to start-ups to develop innovative solutions meeting urgent problems, such as increasing availability of medical supplies, developing symptom assessment tools, and support health and well-being during lockdown.

A strategy to support start-up ecosystems cannot have a singular focus on the potential for economic growth of firms: it must also assess their potential to introduce innovations that meet social challenges, in the short as well as in the long term. Systematic ways to measure "social impact" as well as "disruption potential" of firms are however not easy to develop, and thus not readily available to policy makers.

The substantial wealth of data generated by the Italian Start-up Act's monitoring system can alleviate this issue. This paper has proposed a method, based on machine learning techniques, to identify the firms that make use of emerging digital technologies in their business models (artificial intelligence, big data modelling, cloud computing). Trentino, in particular, has emerged as one of the territories in Italy with the highest density of such firms.

It is important for territories to have an understanding of the existing landscape of firms working with these technologies. Artificial intelligence, digitised manufacturing and cloud computing are attracting growing interest from policy makers, and increasingly so in Europe. The development of better infrastructure and skills and research capacity, as well as a focus in retain industrial data close to their source, is an explicit objective of many European governments and of the 2020 Industrial Strategy of the European Commission (European Commission, 2020[48]). One of the most discussed topics is the uptake of artificial intelligence solutions in small enterprises, which is expected to be promoted via a network of Digital Innovation Hubs all over the European Union during the 2021-2027 programming period. Other strategies, such as the "Ultra-broadband plan" of the Italian Government, aim to improve basic connectivity infrastructure by bringing high-speed broadband internet to 100% of Italy's productive units, following a "fibre-to-the-factory" approach.[4]

The same text-based approach can be replicated also to identify other recurring "topics" in start-up activity, such as platform-based digital start-ups, or firms that put ecological sustainability at their core – keywords like "resource efficiency" tend to appear regularly in their activity description. The main limitation of this approach is that it is based on declaration of intents, rather than on outcome: activity descriptions of start-ups tell that a company intends to work with a certain technology, but nothing is known about progress and results. Text data obtained via the startup.registroimprese.it platform, which is more detailed and must be updated once a year by express provision of the law, could offer a more accurate starting set.

The use of text analysis approaches is recommended to national and local policy makers to obtain a more nuanced portrait of the local start-up landscape: it is particularly useful for observing clusters of similar firms that do not arise as the direct result of public policy – e.g. highly innovative firms that are not located in science and technology parks, or supported by recognised incubators and accelerators. However, the promising solutions are unlikely to be identified by algorithms – or, in other words, they most likely require a case-by-case approach. We reiterate the recommendation for ecosystem builders to introduce early warning systems that track high potential innovations at the level of individual firms (or cluster of firms), as well as forms of financial support that allow experimentation, long term planning and ambitious investment.

Diversity in start-up entrepreneurship: what can Trentino do better?

The least positive finding about Trentino's start-up landscape that emerges in the report is the representation of women and youth. Just 10.9% of innovative start-ups registered in Trentino are primarily owned or run by women, a ratio significantly below national levels, and start-ups owned by under-35s are also less prevalent than in Italy at large. This finding is striking as Trentino exhibits very high female and youth employment levels overall; conversely, in the regions where a higher share of start-ups is majority female, only a minority of women are in the workforce, and a similar consideration can be made for youth-majority start-ups, albeit in a less pronounced way.

This counterintuitive trend suggests that public policy matters greatly in determining representation of disadvantaged groups. Southern Italian regions, which are low income and thus receive more funds via European and national cohesion policy, have more leeway to introduce programmes aimed at funding start-ups set up by underrepresented groups, which are even more appealing in areas where credit markets are more constrained. As briefly shown in this work, start-ups in the South have much lower access rates to guaranteed loans; MISE's reporting further elaborate on this, highlighting how even start-ups that obtain loans tend to get less funding than their peers in the North.

Conversely, these findings suggest that, when no supplementary incentives are introduced, "risky" innovative entrepreneurship is less palatable for these groups insofar there are other job market opportunities, resulting in a higher number of "missing entrepreneurs". Even in wealthy areas with high education levels, gender and age inequalities persist; as evidenced by the OECD Missing Entrepreneurs

work, they are even amplified in certain fields like the digital economy (cfr. “Can digital technology help level the entrepreneurship playing field?” section).

Such structural inequalities do not have a quick fix and require deep cultural changes. The Missing Entrepreneurs literature outlines priority areas for intervention such as welfare institutions, access to finance, upskilling and strengthening entrepreneurial culture. A practical first step to pursue at the local level first is to focus on subsets and intersections of these population whose involvement in innovative entrepreneurship is particularly desirable: young STEM graduate students, researchers and practitioners, with particular attention given to young women in these fields.

Young people and women of all ages suffer from a lack of starting capital, which makes the entrepreneurial choice less palatable to begin with. Moreover, the OECD evaluation of the Start-up Act highlighted how student entrepreneurship in Italy is not widespread as in other comparable countries. These are all arguments for introducing targeted schemes that offer financial security to graduate students and researchers that devote part of their time to develop an entrepreneurial project. The EXIST stipend scheme in Germany, which offers time limited monthly support to student entrepreneurs, with special provisions for those that have parenting responsibilities (BMWi, 2020b[49]), may offer a useful framework. These schemes may also include mentoring and advisory services that aim at bridging more subtle, cultural-related gaps, such as lack of confidence and misconceptions about the entrepreneurial choice.

Data availability: closing information gaps and promoting evaluation culture

The Italian Start-up Act is an attractive policy to study thanks to wide availability of data about beneficiary firms and uptake of policy instruments. This is a consequence of its form – it is a registry-based initiative where beneficiaries are strictly identified – but also of explicit policy decisions taken by policy makers, which have committed themselves to making most administrative data accessible to anyone, and to setting up a monitoring and evaluation system. However, gaps in data availability persist, limiting the effectiveness and accuracy of analysis in areas that are very important for the development and effectiveness of the strategy.

A first key deficiency is employment data, which is currently available in an inadequate form. Fledgling start-ups are unlikely to generate much subordinate employment, as in early stages they might be composed exclusively by teams of entrepreneurs with one of more leaders and multiple minority shareholders. All of them may (or may not) perform work activities in the firm, on a permanent or part-time basis. There are currently no instruments to measure the size of this population, and the same applies to those firms that employ consultants, contractors, or gig economy workers in general. This information can be collected in two ways: surveys or amendments to company documentation. Both have been tested – the latter via the introduction, in 2019, of a specific field in the startup.registroimprese.it platform – but in neither case the indication of the number of employees is mandatory.

The second gap refers to data on venture capital operations. This is a recurrent, unresolved issue in start-up policy analysis, as systematic collection of detailed information on funding rounds is often impossible. Several public sector actors attempt to do so based on monitoring of specialised press and/or start-ups’ and investors’ own communications. This gives a partial view of the market, and accordingly estimates of its size vary widely. A particularly severe issue, especially for a policy framework that is geared towards micro-SMEs in a very early stage, is that this data normally does not include seed funding, which is less formalised and rarely comes from “institutional” investors.

The Italian Start-up Act potentially has a built-in tool to measure small size operations: data on the use of tax incentives for investments in SMEs. However, these are highly sensitive tax data that are not normally available to research, and have never been published by MISE in a detailed way – presumably for privacy issues and because this would require clearance by the tax authorities. Albeit themselves incomplete these

data could shed light on how start-ups finance themselves in their early stages, particularly when they do not access traditional credit markets, by choice or else.[5]

The alternative, as for employment data, is to obtain this information directly from entrepreneurs, providing for additional transparency obligations. However, the collection and publication of such data is burdensome for entrepreneurs, which advise against it being carried out in an authoritative way at centralised level. There is therefore an argument for moving this process at the local level, through ecosystem players. Trentino, again, is well placed for this task, thanks to its extensive network of public players with a "pulse" of the situation and that are in contact with registered start-ups all over their territory. If this effort is successful, Trentino could be a first breeding ground for performing analysis that is very important for start-up policy evaluation, even beyond Italy's boundaries: labour productivity, impact of seed and later stage equity funding, and differences in growth path and innovation potential between firms that finance themselves primarily through venture capital as opposed to debt.

There are arguments for promoting a decentralised approach to policy evaluation. As this paper series has highlighted, firms that are supported through the same national framework actually look remarkably different across Italy, with diverging sectorial patterns and economic outcomes. It is difficult for national legislators to observe these specificities through a single lens. Moreover, the role of regional support schemes is also non-trivial, and could serve as an inspiration for developments nationwide.

Box 5.1. Policy recommendations

Based on the empirical evidence analysed throughout this report, the government of Trentino could take into account the following policy recommendations aimed at strengthening its innovative start-up landscape. The actions listed both address existing weaknesses and call for better exploitation of structural strengths:

- Develop a local "scale-up strategy" to stimulate growth and investment of locally based firms. Any such scheme should rely on "early warning" techniques to identify high-potential, high-impact innovations, and put a prominent focus on the provision of patient capital, making equity finance a credible alternative to debt.
- Launch a monitoring exercise to uncover eligible start-ups that have not registered into the national policy, using both Business Registry data and local networks. Due to the extensive community of support actors in place, Trentino is very well suited for this exercise. In this way, a broader share of eligible firms will benefit from the support measures offered by the Italian Start-up Act, which is likely to improve their economic performance.
- Follow up monitoring with outreach activities at the local level towards unregistered start-ups, targeting firms whose innovations are technologically solid, market-ready, and have disruption potential.
- Introduce "soft" measures to incentivise the attraction and creation of start-ups in rural areas, starting from places where suitable infrastructure and skills are available – e.g. former industrial districts, satellite university poles.
- Adopt measures to involve "missing entrepreneurs", starting from priority demographics such as STEM graduates and researchers. Programmes should focus on guaranteeing financial security of perspective entrepreneurs, e.g. by providing a monthly stipend, and on improving confidence and awareness about the entrepreneurial choice. Consider introducing additional incentives for women, among STEM graduates and researchers, as evidence shows that the gender gap starts already at an early age.
- Continue the effective work done in integrating the "start-up" brand into local industrial policy and communication, and do the same with a "scale-up" strategy whenever that is in place. Build

upon existing ecosystem strengths, such as high start-up density and the presence of a strong innovation network, and encourage the reconversion into more innovative, digitised, and sustainable business models wherever possible.

- Foster cooperation between innovative start-ups and traditional businesses through challenge prizes, hackathons or other corporate matching solutions, as open innovation can increase the competitiveness of the local industrial base.
- Leverage national instruments for the attraction of foreign innovative entrepreneurs, such as the start-up visa programme, and ensure human capital retention, including of foreign talents with entrepreneurial potential who chose to study in Trentino. The Italian law provides for simplified procedures for the conversion of residence permits for non-EU students who decide to stay in the country to start up an innovative business.

In addition to the above, the following recommendations embrace a national perspective, as they respond to issues that are common throughout Italy. These actions could be implemented locally, either directly on the initiative of the government of Trentino or in partnership with the central government:

- Ensure that the digital infrastructure – high-speed and high-capacity broadband, digital public administration services – is widespread and of high quality.
- Ensure wide and affordable access to high quality consulting services and testing facilities (including high-performance computing). Work with local ecosystem players to exploit effectively the European Digital Innovation Hubs scheme for the adoption of advanced digital technologies by SMEs, and encourage information sharing with equivalent bodies elsewhere in the European Union.
- Ideate tools to make entrepreneurial innovative projects in embryonic state emerge, and for high-skilled talents to experiment with entrepreneurial projects (e.g. innovation challenges, calls for young entrepreneurs).
- Improve the collection of data about employment in innovative start-ups, in order to enable accurate analysis of labour productivity, job creation and skills.
- Map significant venture capital rounds received by local start-ups, and work with the national tax authorities to improve exploitation of tax data on incentives to equity investment, which enshrine a wealth of information on seed and early-stage funding.

Notes

[1] The forthcoming OECD paper "*An insight into the innovative start-up landscape in South Tyrol*" presents econometric evidence supporting this thesis.

[2] The Polytechnic University of Milan hosts an observatory of main figures and trends in equity crowdfunding. As all operations must take place publicly on authorised portals, the mapping is pervasive and up to date. URL: http://www.osservatoriocrowdinvesting.it/webportal/docdownload?codice=508

[3] However, the fact that several well-known scale-ups are included in this registry suggests that it could serve as a first stepping stone for a scale-up strategy. A crucial development in this respect was the

extension of incentives to risk capital investments also to innovative SMEs, which became operational only in 2018 after complex negotiations with the European Commission.

[4] For more information, refer to the website of the *Piano Strategico Banda Ultralarga*, https://bandaultralarga.italia.it/ .

[5] However, this should not lead to the assumption that every small-scale operation towards start-ups is facilitated by fiscal incentives, as the investor must be aware of this option and an Italian taxpayer.

References

Aghion, P. et al. (2015), *Innovation and Top Income Inequality*, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w21247. [9]

Biancalani, F., D. Czarnitzki and M. Riccaboni (2020), "The Italian Startup Act: A Microeconometric Program Evaluation", *SSRN Electronic Journal*, http://dx.doi.org/10.2139/ssrn.3543937. [28]

Blei, D., A. Ng and M. Jordan (2003), "Latent Dirichlet Allocation", *Journal of Machine Learning Research*, Vol. 3, pp. 993-1022, https://dl.acm.org/doi/pdf/10.5555/944919.944937 (accessed on 21 July 2020). [44]

BMWi (2020a), *Customised support for new businesses affected by the coronavirus crisis*, https://www.bmwi.de/Redaktion/EN/Pressemitteilungen/2020/20200401-customised-support-for-new-businesses-affected-by-the-coronavirus-crisis.html (accessed on 29 June 2020). [21]

BMWi (2020b), *EXIST Business Start-up Grant*, https://www.exist.de/EN/Programme/EXIST-Business-Startup-Grant/content.html (accessed on 30 June 2020). [49]

Bpifrance (2020), *Coronavirus: 4 milliards d'euros pour soutenir les startups | Bpifrance servir l'avenir*, https://www.bpifrance.fr/A-la-une/Actualites/Coronavirus-4-milliards-d-euros-pour-soutenir-les-startups-49193 (accessed on 8 July 2020). [20]

Calvino, F., C. Criscuolo and C. Menon (2016), "No Country for Young Firms?: Start-up Dynamics and National Policies", *OECD Science, Technology and Industry Policy Papers*, No. 29, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jm22p40c8mw-en. [4]

CDP (2020), *Nasce CDP Venture Capital SGR-Fondo Nazionale Innovazione*, https://cdp.it/resources/cms/documents/CS_VENTURE_21gen20.pdf (accessed on 30 June 2020). [46]

Cerved (2016), *Rapporto Cerved PMI 2016*, https://know.cerved.com/wp-content/uploads/2017/10/Rapporto-Cerved-PMI-2016.compressed.pdf (accessed on 21 July 2020). [36]

Coad, A. (2009), *The Growth of Firms*, Edward Elgar Publishing, http://dx.doi.org/10.4337/9781848449107. [17]

Criscuolo, C., P. Gal and C. Menon (2014), "The Dynamics of Employment Growth: New Evidence from 18 Countries", *OECD Science, Technology and Industry Policy Papers*, No. 14, OECD Publishing, Paris, https://dx.doi.org/10.1787/5jz417hj6hg6-en. [1]

De Prato, G., D. Nepelski and G. Piroli (2015), *Innovation Radar: Identifying Innovations and Innovators with High Potential in ICT FP7, CIP & H2020 projects*, http://dx.doi.org/10.2791/61591. [47]

Dealroom (2019), *2018 full year report – Annual European Venture Capital Report*, https://blog.dealroom.co/wp-content/uploads/2019/02/Dealroom-2018-vFINAL.pdf (accessed on 3 July 2020). [45]

Del Bosco, B. et al. (2019), "Innovative startup creation: the effect of local factors and demographic characteristics of entrepreneurs", *International Entrepreneurship and Management Journal*, http://dx.doi.org/10.1007/s11365-019-00618-0. [29]

Demartini, P. (2018), "Innovative Female-Led Startups. Do Women in Business Underperform?", *Administrative Sciences*, Vol. 8/4, p. 70, http://dx.doi.org/10.3390/admsci8040070. [32]

European Commission (2020), *An SME Strategy for a sustainable and digital Europe*, https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf (accessed on 30 June 2020). [48]

Finaldi, R. (2018), "When Too Much Is Too Little: Evaluating the Italian Startup Act", *The Journal of Private Equity*, http://dx.doi.org/10.3905/jpe.2018.1.071. [31]

Gazzetta Ufficiale (2012), *Decreto Legge 179/2012*, https://www.gazzettaufficiale.it/atto/serie_generale/caricaDettaglioAtto/originario?atto.dataPubblicazioneGazzetta=2012-12-18&atto.codiceRedazionale=12A13277 (accessed on 29 June 2020). [24]

Geroski, P. (2002), "The growth of firms in theory and in practice", *CEPR Discussion Papers*, https://ideas.repec.org/p/cpr/ceprdp/2092.html (accessed on 29 June 2020). [16]

Giraudo, E., G. Giudici and L. Grilli (2019), "Entrepreneurship policy and the financing of young innovative companies: Evidence from the Italian Startup Act", *Research Policy*, Vol. 48/9, p. 103801, http://dx.doi.org/10.1016/j.respol.2019.05.010. [30]

Haltiwanger, J., J. Lane and J. Spletzer (1999), "Productivity Differences Across Employers: The Roles of Employer Size, Age, and Human Capital", *American Economic Review*, Vol. 89/2, pp. 94-98, http://dx.doi.org/10.1257/aer.89.2.94. [3]

Il Sole 24 Ore (2020), *Qualità della vita 2019: la classifica delle città italiane dove si vive meglio. Milano la migliore | Il Sole 24 ORE*, https://lab24.ilsole24ore.com/qualita-della-vita-2019/classifiche-complete.php (accessed on 3 July 2020). [40]

ISTAT, MISE (2018), *Startup Survey 2016. La prima indagine sulle neoimprese innovative in Italia*, https://www.istat.it/it/files//2018/02/Rapporto-Startup.pdf (accessed on 30 June 2020). [41]

Klenow, P. and H. Li (2020), *Innovative Growth Accounting*, National Bureau of Economic Research, Cambridge, MA, http://dx.doi.org/10.3386/w27015. [5]

McKelvie, A. and J. Wiklund (2010), "Advancing Firm Growth Research: A Focus on Growth Mode Instead of Growth Rate", *Entrepreneurship Theory and Practice*, Vol. 34/2, pp. 261-288, http://dx.doi.org/10.1111/j.1540-6520.2010.00375.x. [18]

Menon, C. et al. (2018), "The evaluation of the Italian "Start-up Act"", *OECD Science, Technology and Industry Policy Papers*, No. 54, OECD Publishing, Paris, https://dx.doi.org/10.1787/02ab0eb7-en. [27]

MISE (2017), *Annual Report to Parliament on the implementation of legislation in support of innovative startups and SMEs*, https://www.mise.gov.it/images/stories/documenti/Annual_Report_to_Parliament_Italian_Start up_Act_2017_-_full_text.pdf (accessed on 18 February 2020). [43]

MISE (2016), *Annual Report to Parliament on the implementation of legislation in support of innovative startups and SMEs (2016)*, https://www.mise.gov.it/images/stories/documenti/italian_startup_act_annual_report_to_parlia ment_2016.pdf (accessed on 3 July 2020). [39]

MISE (2020b), *DL "Rilancio": gli interventi a favore delle startup e PMI innovative*, https://www.mise.gov.it/images/stories/documenti/Misure_DL_Rilancio_-_startup_e_PMI_innovative.pdf (accessed on 21 July 2020). [23]

MISE (2020a), *Italia Startup Visa Report*, https://www.mise.gov.it/images/stories/documenti/Rapporto_ISV_Survey_ENG.PDF (accessed on 21 July 2020). [11]

MISE (2019b), *Italy's policy framework to support innovative SMEs: Executive summary*, https://www.mise.gov.it/images/stories/documenti/Executive%20summary%20innovative%20 SMEs%2007_2019.pdf (accessed on 29 June 2020). [26]

MISE (2019a), *Italy's policy framework to support innovative startups: Executive summary*, https://www.mise.gov.it/images/stories/documenti/Executive%20summary%20ISA%2007_20 19.pdf (accessed on 2 July 2020). [25]

MISE (2020c), *Report con dati strutturali. Startup innovative 4° trimestre 2019*, https://www.mise.gov.it/images/stories/documenti/4_trimestre_2019-rep-startup-stats.pdf (accessed on 30 June 2020). [38]

OECD (2018), *OECD Regions and Cities at a Glance 2018*, OECD Publishing, Paris, https://dx.doi.org/10.1787/reg_cit_glance-2018-en. [34]

OECD (2016), *Job Creation and Local Economic Development 2016*, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264261976-en. [14]

OECD (2011), *Intellectual Assets and Innovation: The SME Dimension*, OECD Studies on SMEs and Entrepreneurship, OECD Publishing, Paris, https://dx.doi.org/10.1787/9789264118263-en. [42]

OECD (2020b), *Coronavirus (COVID-19): SME policy responses*, http://www.oecd.org/coronavirus/policy-responses/coronavirus-covid-19-sme-policy-responses-04440101/ (accessed on 2 July 2020). [19]

OECD (2020c), *Italian regional SME policy responses*, https://www.oecd.org/cfe/leed/COVID-19-Italian-regions-SME-policy-responses.pdf (accessed on 29 June 2020). [35]

OECD (2020a), *Start-ups in the time of COVID-19: Facing the challenges, seizing the opportunities*, OECD Publishing, Paris, http://www.oecd.org/coronavirus/policy-responses/start-ups-in-the-time-of-covid-19-facing-the-challenges-seizing-the-opportunities-87219267/ (accessed on 29 June 2020). [6]

OECD/European Union (2019), *The Missing Entrepreneurs 2019: Policies for Inclusive Entrepreneurship*, OECD Publishing, Paris, https://dx.doi.org/10.1787/3ed84801-en. [13]

Piacentini, M. (2013), "Women Entrepreneurs in the OECD: Key Evidence and Policy Challenges"*, OECD Social, Employment and Migration Working Papers*, No. 147, OECD Publishing, Paris, https://dx.doi.org/10.1787/5k43bvtkmb8v-en. [12]

Reuters (2020), *Italian start-up 3D prints valves to help coronavirus patients* -, Reuters, https://www.reuters.com/article/us-health-coronavirus-italy-valves/italian-start-up-3d-prints-valves-to-help-coronavirus-patients-idUSKBN2133D2 (accessed on 29 June 2020). [7]

Scattoni, P. et al. (2019), *Innovative startup localization determinants and origin: A Rome city case study*, http://www.makerfairerome.eu/it/ (accessed on 29 June 2020). [33]

Shane, S. (2009), "Why encouraging more people to become entrepreneurs is bad public policy", *Small Business Economics*, Vol. 33/2, pp. 141-149, http://dx.doi.org/10.1007/s11187-009-9215-5. [15]

Sifted (2020), *How startups are supporting Europe's coronavirus efforts*, Sifted, https://sifted.eu/articles/startup-initiatives-coronavirus/ (accessed on 29 June 2020). [8]

Stuen, E., A. Mobarak and K. Maskus (2012), "Skilled Immigration and Innovation: Evidence from Enrolment Fluctuations in us Doctoral Programmes", *The Economic Journal*, Vol. 122/565, pp. 1143-1176, http://dx.doi.org/10.1111/j.1468-0297.2012.02543.x. [10]

Trentino (2020), *«La Silicon Valley? È a Trento»*, https://www.giornaletrentino.it/cronaca/trento/la-silicon-valley-%C3%A8-a-trento-1.905675 (accessed on 21 July 2020). [37]

Tushman, M. and P. Anderson (1986), "Technological Discontinuities and Organizational Environments", *Administrative Science Quarterly*, Vol. 31/3, p. 439, http://dx.doi.org/10.2307/2392832. [2]

UK Government (2020), *Apply for the coronavirus Future Fund*, https://www.gov.uk/guidance/future-fund (accessed on 29 June 2020). [22]

Annex A. The Italian Start-up Act's policy instruments

The following incentives and policy instruments apply to innovative start-ups from their entry in the special section of the Business Register, and for a maximum of five years from their date of incorporation.

- Dedicated digital and free-of-charge procedure for incorporation: based on a web platform, it reduces red tape and costs (savings of about EUR 2 000 per incorporation) and simplifies subsequent adjustments to the deed of incorporation.
- Exemption from payment of annual fees to the Chamber of Commerce and other fees (e.g. stamp duty) otherwise due when depositing an act (e.g. annual balance sheet) at the business registry.
- Flexible corporate management: permits participants to create categories of shares with specific rights, carry out financial operations on their own shares and offer shares to the public.
- Extension of terms for covering losses: in the event of financial losses, participants receive a one-year extension to reduce capital, as otherwise required by Italian company law.
- Exemption from regulations on dummy companies: start-ups are not subject to regulation regarding non-operational companies and businesses reporting systematic losses.
- Exemption from the duty to affix the compliance visa for compensation of VAT credit, for credit up to EUR 50 000 (for other companies, the cap amounts to EUR 5 000).
- Tailor-made labour laws: start-ups are allowed to hire employees through fixed term contracts for any duration and can be renewed an indefinite number of times for 36 months. After that, the contract can be renewed once more for a maximum duration of 12 months. Standard regulations on rate of fixed-term employees over open-ended employees do not apply, i.e. start-ups can hire as many fixed-term employees as they want.
- Remuneration through stock options and work for equity schemes: participants (start-ups) can offer additional remuneration to collaborators, employees and even external service providers through stock options and work equity schemes. These participative financial instruments do not concur to determine the taxable labour income, i.e. people who get a stock option do not pay taxes on this type of income.
- Tax incentives to corporate and private investors who invest in start-ups: for individuals a deduction of income amounting to 30% of the amount invested, with maximum limit on the size of the deductible of one million euros. Legal entities receive fiscal deduction on taxable income equal to 30%, with maximum limit of EUR 1.8 million.
- Possibility to raise and collect capital through equity crowdfunding platforms. Italy was the first country worldwide to introduce ad hoc regulations on equity crowdfunding in 2013 followed by France and Germany in 2014, USA and UK in 2015.
- Fast-track simplified and free access for innovative start-ups to SME Guarantee Fund: this State Fund enables access to credit through guarantees on bank loans (in the measure of 80% of the total loan). The amount covered by the public guarantee is up to EUR 2.5 million. Unlike other companies, start-ups can obtain the guarantee without costs. Fast-track refers to the fact that their files are given priority over those concerning other companies. Unlike other companies, the SME

Guarantee Fund does not evaluate any balance sheet or business plan submitted by the concerned start-up, i.e. the guarantee is provided automatically, based on the “merit of credit” evaluation carried out by the lending bank.

- Service and support for start-ups looking to access foreign markets from the Italian Trade Agency: start-ups receive a 30% discount on standard fees applied to services such as targeted advice on legal, business and/or fiscal activities. Free-of-charge participation of selected start-ups in international events is also provided.
- Italia Start-up Visa programme: fast-track, web-based procedure for obtaining self-employment visas to Italy. It is addressed to non-EU citizens who intend to establish an innovative start-up in Italy. In addition, non-EU citizens who already reside in Italy, e.g. for study, and intend to prolong their stay in Italy with the purpose of establishing an innovative start-up, are allowed to convert their residence permit to a self-employment type through a similar fast-track, web-based procedure (“Italia Start-up Hub” programme).
- Fast fail bankruptcy procedure: participants are exempt from normal bankruptcy processes, preliminary closure agreements, and forced liquidation if the start-up becomes over-indebted.