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An insight into
the innovative start-up
landscape of Friuli-Venezia
Giulia: A tale of two sub-
regions?

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An insight into the innovative start-up landscape of Friuli-Venezia Giulia

A tale of two sub-regions?

This paper offers an in-depth analysis of the characteristics of innovative start-up firms in Friuli-Venezia Giulia, an autonomous region situated at the extreme North East of the Italian territory, bordering with Austria and Slovenia. This work is part of a series of thematic papers on sub-national 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. Friuli-Venezia Giulia hosts a polycentric, mainly urban start-up landscape, with a low prevalence of female and young founders. Its historical sub-regions of Friuli and Venezia Giulia present remarkable differences under several perspectives, including the industrial composition of their start-ups, the spread of emerging technologies among them and their propensity to use national incentives. Firm dynamism, notably high-growth and exit trends, constitutes another major focus of this work, which concludes with a set of evidence-based recommendations for policy-makers.

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Executive summary

This document offers an in-depth analysis of the characteristics of innovative start-up firms in Friuli-Venezia Giulia, an autonomous region in the Northeast of Italy. It is part of a series of thematic papers on sub-national 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 Italian local authorities enjoy particularly extensive delegated powers in terms of law-making, spending, and tax raising. Friuli-Venezia Giulia (“FVG”) is one of them. Situated at the extreme north-east

of the Italian territory, bordering Austria and Slovenia, this region of 1.2 million has traditionally been Italy's "gateway" to the Balkan peninsula. Friuli-Venezia Giulia is comparatively wealthy in the Italian context, with middle-to-high employment rates and GDP per capita, and a very equal wealth distribution. Regional spending in research and development is substantial, with a strong contribution from both the private and the public sector.

Compared to its small size, Friuli-Venezia Giulia has a large population of innovative start-ups. At the beginning of 2020, 231 firms were registered as beneficiaries of Italy's start-up policy, making up almost 5% of all young limited companies in the area. This is the third highest such ratio in Italy, close to double of the national average. A closer look shows particularly high density in the areas of Trieste (6.8%) and around Pordenone (5.1%), in Friuli, which are both the result of a steady and sustained pace in new registration under way since 2013, the year of introduction of the Start-up Act. Nonetheless, particularly in Trieste the net growth of registered start-ups has stagnated, with firms leaving the policy being now roughly equal to those that enter it.

Innovative start-ups are spread throughout Friuli-Venezia Giulia. There is at least one registered firm per each of 18 *Unioni Territoriali Intercomunali* ("UTI"), a second-level administrative division unique of this region – meaning that there are innovative firms also in fairly rural and remote areas. However, according to a pattern seen all over Italy, start-ups are primarily found in main urban agglomerations. Friuli-Venezia Giulia's landscape is markedly polycentric, with the areas of Trieste, Udine, and Pordenone hosting comparable amounts of firms. An interesting finding is that there is a measurable start-up density in municipalities that are cultural centres for the region's Slovene-speaking minority: this seems to rule out an adverse effect of language diversity on policy transfer, which was observed in this working paper series for the German-speaking community in South Tyrol.

Friuli-Venezia Giulia's start-up landscape is also characterised by a very marked under-representation of women and youth. The rate of female participation (10%), in particular, is very low in the Italian context. Innovative start-ups owned or managed by people under 35 years of age are also less common than at the national level, albeit in a less pronounced way. Just 1.2% of all registered firm have a majority of both women and young people among shareholders, suggesting that the gender gap in entrepreneurship is stark and begins at an early age. A demographic in which Friuli-Venezia Giulia instead stands out is foreign citizens: 6.9% of innovative start-ups are run by non-Italians. This density is particularly high in Trieste (12.5%), whose border location and ties with the Balkans and Central Europe may constitute an important attractiveness factor.

Adoption of specific policy instruments of the Italian Start-up Act shows acute divergence between the two sub-regions that make up Friuli-Venezia Giulia. This is particularly true for access to the SME Guarantee Fund, a facility to support start-ups' access to credit. Data show how innovative firms in Friuli have exceptionally high access rates, with over 35% of start-ups in Udine and Pordenone having obtained guaranteed loans. Conversely, start-ups in Trieste and its surroundings have comparatively low access rates, which makes them more similar to areas in Central and Southern Italy where the use of this measure is not widespread. Friuli and Venezia Giulia are less far apart in terms of the adoption of online incorporation, with usage rates around 35% in Udine and Trieste. In spite of quite good performance of the local Chambers of Commerce in processing registrations fast, this ratio is slightly under the national average (36.3%) – but it has grown rapidly between 2018 and 2019.

As the Italian Start-up Act is aimed at companies in the early stage of their life cycle, an overwhelming majority of innovative start-ups in Friuli-Venezia Giulia, like anywhere else in the country, are micro-SMEs in terms of turnover size. At the end of 2018 (last available year), the average registered start-up had a turnover of EUR 155 000 and a median of just EUR 35 656, values in line with the national average. However, a glance to "former start-ups", i.e. firms that were once registered as beneficiaries but have now "graduated" from the innovative start-up status, shows a comparatively high share of firms with a turnover above EUR 2 million, meaning that they are no longer considered micro-SMEs according to the EU

definition. Indeed, high-turnover start-ups are relatively more common in Friuli-Venezia Giulia than in the rest of Italy, particularly per effect of better performance of the firms registered in the first years of existence of the support scheme (2013-2014): 10% of all innovative start-ups in this group had a sales volume of over EUR 1 million in 2018. Another feature of this region is the very low propensity of businesses to cease operations: while in most of Italy “unviable” start-ups that have recorded low and stagnating sales for at least three years in a row are very likely to stop operations, this has not really happened yet in Friuli-Venezia Giulia.

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. The analysis shows how Friuli-Venezia Giulia is a laggard in this respect, with significantly fewer firms likely to adopt these technologies as part of their business model. This is particularly pronounced in Friuli, whose start-up landscape is dominated by manufacturing firms. Again, Trieste – which has relatively more start-ups in “pure ICT” economic sectors – differentiates from the rest of the region, with a share of AI start-ups higher than the national average and comparable to prominent start-up hubs such as Torino, Bologna, or Trento.

Our analysis traced a balanced profile of Friuli-Venezia Giulia’s start-up landscape, highlighting a number of strengths – remarkable density of innovative firms, comparatively good growth indicators, widespread access to the SME Guarantee Fund in Friuli, attractiveness towards foreign entrepreneurs in Trieste – but also several areas in which the local ecosystem seems far from full potential. In response, the OECD Trento Centre outlined a first range of evidence-based policy recommendations to the advantage of local policy makers.

First, local policy makers could acknowledge that innovative start-ups in Friuli and those in the Trieste area have in general sharply different characteristics: Friuli is dominated by manufacturing start-ups, while the area of Trieste is more digital-oriented. This has clear practical implications: for example, capital-intensive firms in Friuli are more prone to obtain guaranteed loans, while in Trieste and Gorizia there is a clear funding gap that should be tackled. Trieste highly international ecosystem could also prove a good breeding ground to pilot programmes to attract foreign talents and entrepreneurs. On the other hand, the low uptake of emerging digital technologies observed at regional level is particularly pronounced in Friuli: firms in the area should be put in the conditions to access funding deployed via EU strategies for digitising industry, and support services offered by Digital Innovation Hubs.

Other recommendations include the design of programmes for fostering the entrepreneurial engagement of women and youth, which is particularly low in this territory: it is suggested to prioritise the participation of graduate and doctoral students, by introducing stipend schemes that give financial security and encourage experimentation. Some final recommendations, reiterated also in other papers of this series, are primarily targeted to the national legislator, which could work towards putting in place a true “scale-up strategy” capable to identify early and support effectively firms with a high potential for growth, beyond size and age constraints set forth by the Start-up Act.

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 (BMW, 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, estimate 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.

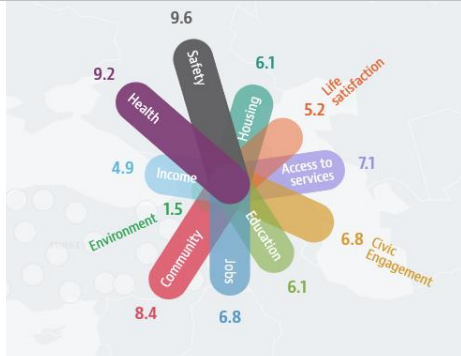
There are two main reasons why studying the local dimension of the Italian Start-up Act is interesting for researchers. The first is purely observational: all data available show wide variation across regions under most metrics. Trends in registrations and exits, spatial distribution, propensity to use 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. Friuli-Venezia Giulia basic demographic and economic statistics

Territory and demographics		Ranking in Italy (out of 21 regions)	Year and source
Size (km ²)	7 932.48	16 th	2019
Population	1 215 220	15 th	2019 (ISTAT)
Population density	153.2 h/km ²		2019
Share of mountainous territory (>600m)	42.5% of municipalities		2019 (ISTAT)
Economy			
GDP (EUR million)	37 010.4 (2018)	12 th	2018 (OECD)
GDP per capita (EUR 2005, constant prices)	30 452	11 th	2018 (OECD)
Gini index (disposable income)	0.261	2 nd lowest	2013 (OECD)
Employment			
Employment rate (15-64 years)	66.6%	8 th	2019 (OECD)
Men	74.6%	6 th	2019 (OECD)
Women	58.6%	9 th	2019 (OECD)
Youth (25-34)	73.0%	8 ^d	2019 (ISTAT)
Skills and innovation			
Total tertiary education (ISCED2011 levels 5 to 8), 25-64	21.1%	7 th	2018 (ISTAT)
R&D expenditures (% GDP)	1.57%	4 th	2016 (OECD)
From business	0.85%	above nat. average (0.83%)	2016 (OECD)
From government	0.27%*		*2015 (OECD)
From higher education institutions	0.40%*		*2015 (OECD)
Regional well-being			

Located in far north-eastern Italy, adjoining Austria and the Balkan peninsula, Friuli-Venezia Giulia is a small, densely populated autonomous region – meaning that local government have devolved legislative and fiscal power. It is traditionally divided in two areas with distinct history and culture: Friuli (western part, largest towns Udine and Pordenone), which is equally divided between an Alpine area and an extensive plain in the south, and Venezia Giulia, an eponym that used to refer to Italian-speaking areas in the northern Balkans today part of Croatia and Slovenia. After the Second World War, its administrative boundaries include the city of Trieste (~200 000 residents, regional capital) and its immediate surroundings on the Adriatic Sea and the Karst (“Carso” in Italian) plateau.

Friuli-Venezia Giulia is a comparatively wealthy region. Although its GDP per capita is not particularly high, it enjoys a very equal wealth distribution and fairly high employment rates among all demographic groups. A high share of its working population has attained a university degree, and the share of R&D expenditures over GDP is remarkable in the Italian context. Similarly to another autonomous territory in Northeast Italy, Trentino, the public sector makes an important contribution to research and innovation expenditures, both directly and through higher education institutions.

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](https://www.mise.gov.it/index.php/it/impresa/competitivita-e-nuove-imprese/start-up-innovative/relazione-annuale-e-rapporti-periodici)

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 Friuli-Venezia Giulia: how the policy has taken root

Start-up registration trends: policy transfer has been (generally) effective

As of 6 January 2020, Friuli-Venezia Giulia was home to 231 registered innovative start-ups. It was ranked 12th out of Italy's 21 regions, ahead of more populous regions such as Liguria, Sardinia, and Abruzzo. In relative terms, Friuli-Venezia Giulia hosts about 2.1% of all Italian start-ups, which is in line with the weight of its human population in the country (1.2 million people over about 60 million).

Friuli-Venezia Giulia's performance is more impressive in terms of 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). Quarterly reports issued by MISE show that, as of Q4 2019, almost 5% (4.95%) of new firms with such characteristics were registered as innovative start-ups. This ratio is close to double the equivalent ratio to the whole of Italy, which is 2.98%, and is lower only to that recorded in two smaller territories, the Aosta Valley (5.1%) and, very far at the top, the *provincia autonoma* of Trento (7.45%) (MISE, 2020^[36]).

In this working paper series, we have considered the number and the density of start-up registered a first indicator of effectiveness of policy transfer. This phrase indicates the mechanisms that allow policies designed by central administrations to catch on at the local level. 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 indicator allowed to highlight the exceptional performance of Trentino, the territory that introduced this working paper series. By using the same metrics, Friuli-Venezia Giulia positions at a lower level than Trentino, but it is still a case of excellent policy diffusion – arguably, the "second-best" in Italy.

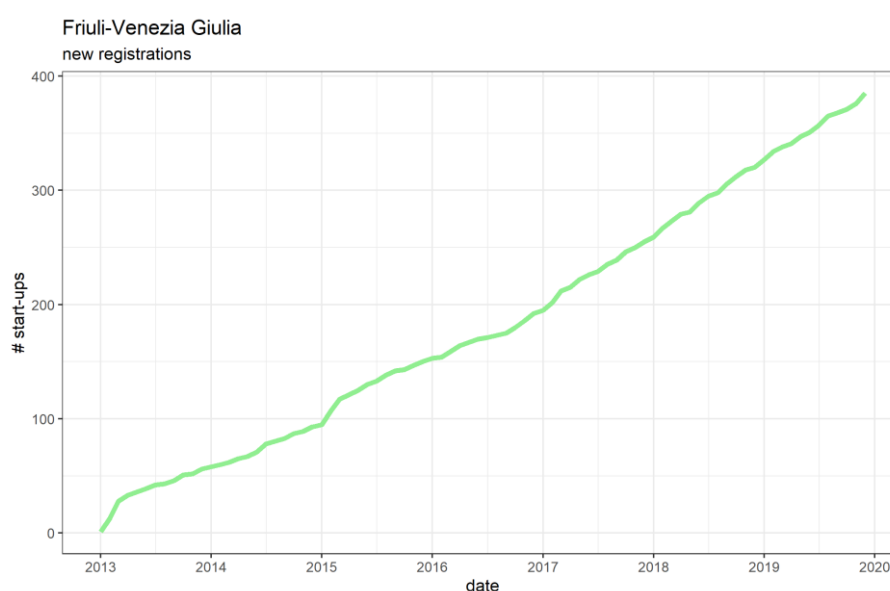
Figure 2.1 shows the trend of gross start-up registration, i.e. the cumulative number of firms that have registered into the policy month by month. The chart shows an early "jump" in registration in Q1 2013, very soon after policy introduction, which suggests that information about the policy spread rapidly. A second jump in early 2015 is roughly coincident with a major regulatory update (decree-law 3/2015). The pace of registrations per month has followed a constant pace since early 2017, with about five new start-ups added to the registry region-wide every month (Table 2.1, first column).

As stressed in Section 1.3, the innovative start-up status is subject to temporal, dimensional, and innovation-specific constraints. While 385 firms in Friuli-Venezia Giulia were registered as innovative start-ups for some time between 2013 and 2020, 154 are no longer listed as beneficiaries as of 2020, due to dissolution, voluntary cancellation, 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.

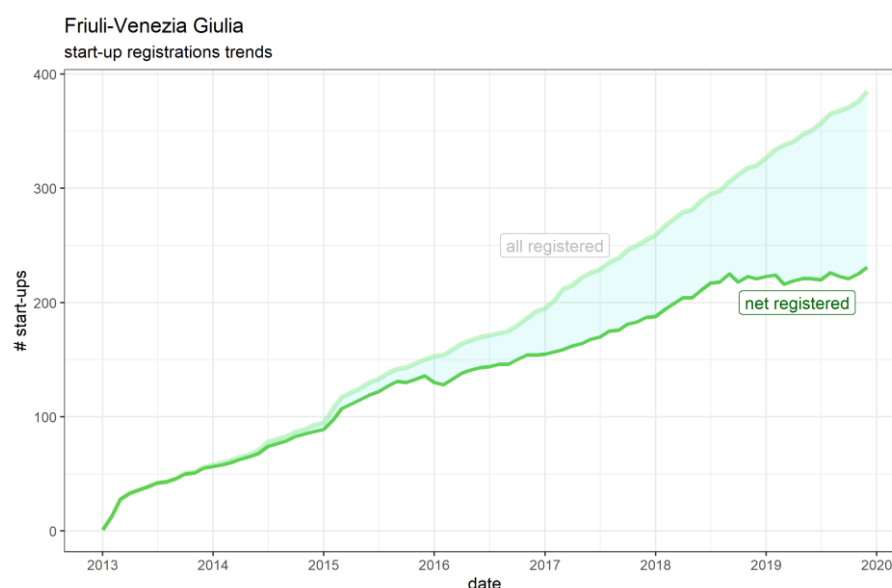
Gross and net registration curves are shown in Figure 2.2. The two slopes start to depart in 2016, when the oldest firms in the sample had started to lose their start-up status, and diverge drastically from 2018 onwards. Indeed, Friuli-Venezia Giulia shows clearly the expected stabilisation” pattern: the net number of registration as of January 2020 is essentially the same recorded in Q3 2018, and has been overall constant over the last year and a half. As shown in Table 2.1, the number of new monthly registrations, albeit still sustained, no longer significantly exceeds exits from the registry (last column). This is opposed to what seen in Trentino, where net start-up numbers have kept growing markedly also in 2019.

Figure 2.1. Cumulative new innovative start-up registrations in Friuli-Venezia Giulia (monthly trends, 2013-2020)



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

Figure 2.2. Cumulative new innovative start-up registrations in Friuli-Venezia Giulia (monthly trends, 2013-2020)



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

Table 2.1. Average number of monthly start-up registrations in Friuli-Venezia Giulia, breakdown by year

Year of registration	Start-ups registered per month (average)	Start-ups de-registered per month (average)	Net start-up registrations per month (average)
2013	4.67	1	4
2014	3.7	1.25	3.5
2015	4.75	2	3.5
2016	3.5	3.4	0.3
2017	5.25	3	2.6
2018	5.42	2.8	2.6
2019	5.42	5	0.64

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

The autonomous Region of Friuli-Venezia Giulia is traditionally divided into four provinces: Udine and Pordenone (the “Friuli”), which are more extensive but not very population dense, and Gorizia and the regional capital Trieste (the “Venezia Giulia”), which have very small territorial extension but a sizeable population. Albeit provinces have no longer any administrative significance in this region,¹ they are still a useful statistical unit to observe territorial differential, including in policy transfer dynamics.

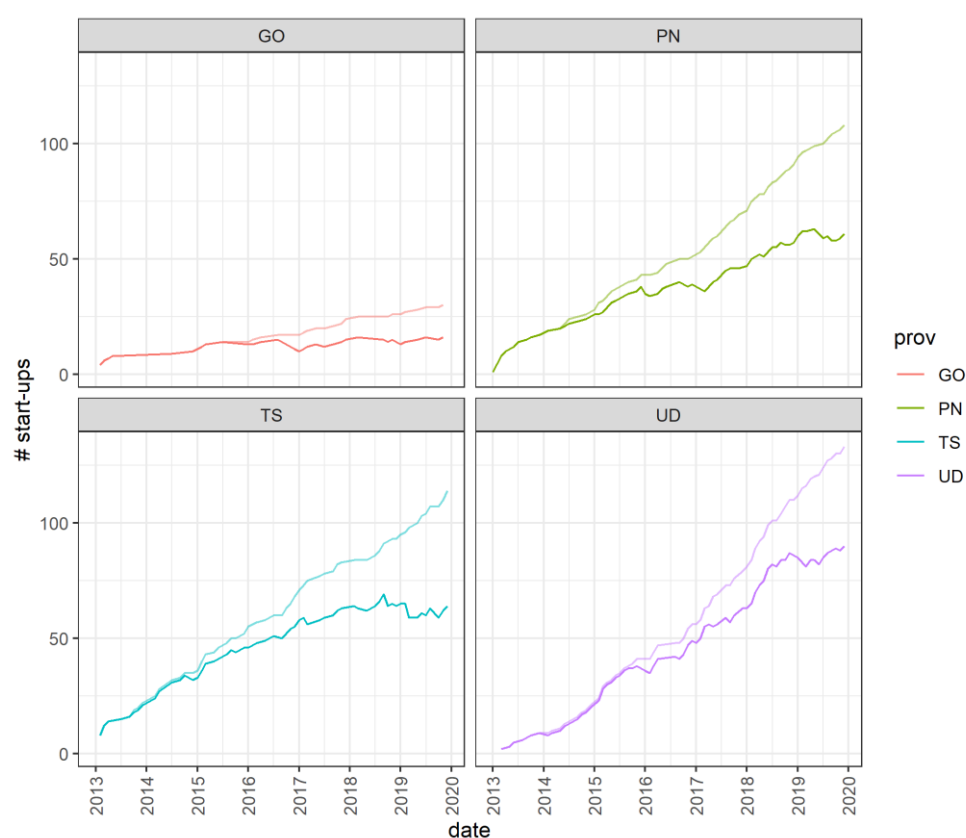
Figure 2.3 clearly shows how start-up registration trends, both net and gross, have been significantly different across Friuli-Venezia Giulia. Trieste’s curve follows a distinctive path: it used to have many start-ups early on after policy introduction, but have since lost its edge. Net start-up numbers peaked in 2017 already, and are now stabilising around 60. Even if this number may appear small compared to other Italian major cities, it is a very remarkable share if weighted for the number of limited companies actually existing in the area. MISE data shows that start-up density in Trieste is very high: it once rivalled Trento as the province with most innovative start-ups over all limited companies, and is still ranked second in all of Italy (6.77%). This may suggest that in Trieste, a mostly urbanised territory with an unusually low prevalence of

limited companies,² the policy may have really made a difference in spurring new entrepreneurship. The comparison with next-door Gorizia is stark: this province has about half of the inhabitants of Trieste, but less than one quarter of its start-ups, and does not show any sign of catching up.

Over time, the two provinces with a larger entrepreneurial presence, Pordenone and Udine, have outstripped Trieste and now host a significantly higher number of start-ups. It is visible how the trend has been somewhat different between the two, with Pordenone being a much earlier adopter of the initiative. Pordenone also has one of the highest density ratios in Italy (5.1%), which again testifies good policy transfer dynamics. Udine has been a later adopter, but its pace of new registrations is currently the most intense in the region, and is the only province where the number of net registrations per month is still consistently positive as of 2020.

Data suggests then that awareness and interest about this policy framework was originally concentrated around the cities of Trieste and Pordenone, later spreading to the rest of the region. It is still not possible to tell positively whether Trieste's originally outstanding performance is gradually aligning to the fundamentals of its local economy, or if there has been a decrease in interest towards the innovative start-up policy. For this reason, it is crucial that authorities carry out analyses aimed at estimating the number of entrepreneurial initiatives that are potentially eligible for the start-up status but that never registered, and how this population has evolved in size over time. Chapter 5 provides a blueprint to policy-makers, while Box 2.1 summarises an early attempt to estimate the size of the unregistered population.

Figure 2.3. Cumulative net and gross innovative start-up registrations in the four historical provinces of Friuli-Venezia Giulia (monthly trends, 2013-2020)



Note: The darker line indicates net registrations, the shaded line gross registrations. GO: Gorizia, PN: Pordenone, TS: Trieste, UD: Udine.
Source: OECD Trento Centre elaboration on Italian Business Registry data.

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^[37]) 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 Section 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^[38]).

Territorial distribution: a polycentric landscape

A common thread of the territorial distribution of innovative start-ups in Italy is their high propensity to agglomerate around major cities. Most often, a majority of start-ups are located in the provincial capital and in its immediate vicinities, while peripheral and rural areas have very few if no firms registered. Friuli-Venezia Giulia broadly follows the pattern of high urban density, but its start-up landscape looks remarkably polycentric, and is more reflective of actual population distribution than in most other Italian regions.

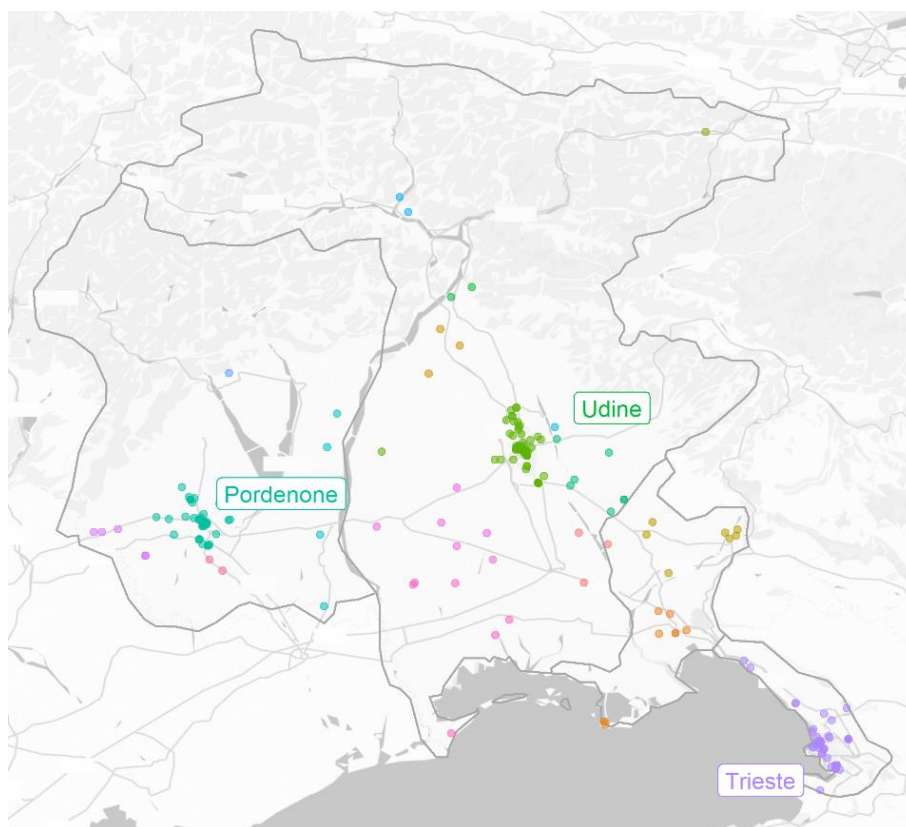
As clearly visible from the map in Figure 2.4, Friuli-Venezia Giulia's start-up distribution is characterised by three hubs of roughly equal size: Trieste, Udine, and Pordenone. The three cities are however of fairly different size, with Trieste having over twice the number of inhabitants of Udine and over four times those of Pordenone. As a result, Trieste is an unusual case of regional capital in which the share of start-ups over the total number of registered firms in the region is not very disproportionate compared to its human inhabitants: it hosts 25% of Friuli-Venezia Giulia's start-ups, and around 20% of its population (Table 2.2).³ However, this figure should be put into context. As we have seen in the previous section, Trieste has an unusually low prevalence of limited companies, implying that its density of innovative start-up is higher than suggested by the above ratio.

Table 2.2 shows that the municipalities of Trieste, Udine and Pordenone combined are home to about two-thirds of Friuli-Venezia Giulia's start-ups. The remaining third is scattered across 49 municipalities, only

one of which has more than three registered firms – Tavagnacco, a suburb of Udine. It is important to stress that 70% of Friuli-Venezia Giulia's population lives outside the three main centres mentioned, confirming that start-ups are mainly a urban phenomenon.

Nonetheless, registered innovative start-ups exist in all parts of this region, suggesting that this policy is not unknown also in more peripheral areas. Friuli-Venezia Giulia features a unique level of second-level administration in Italy called *Unioni Territoriali Intercomunali*⁴ ("inter-municipal territorial unions", UTI), which are much smaller than traditional *province* and capture groups of municipalities that are coherent in terms of geographical landscape and economic structure. There are 18 UTIs, all of which hosted at least one registered start-up as of 2020. This includes also the very low-population and rural UTIs located in the Dolomites and in Val Canale (one start-up each). However, a distribution by UTI further stresses how dominant the three main hubs of Trieste, Udine and Pordenone are: when their suburbs are also considered, their weight over all start-ups in the regions reaches 75%. A detailed breakdown of innovative start-up distribution by UTI is given in Annex 2.

Figure 2.4. Location of the head offices of innovative start-ups in Friuli-Venezia Giulia (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 colours indicate location in the second-level administrative unit UTI: a key and breakdown is provided in Annex 2.

Source: OECD Trento Centre elaboration on Italian Business Registry data. The map is created in R with the [ggmap package](#).

Table 2.2. Distribution of start-ups and population by municipality in Friuli-Venezia Giulia

Municipality or class	Start-ups	% FVG start-ups	Municipalities with start-ups	Municipality in class	Population (2019)	% FVG population
Trieste	58	25.1%	1	1	204 267	16.8%
Udine	48	20.8%	1	1	99 377	8.2%
Pordenone	43	18.6%	1	1	51 367	4.2%
10 000-50 000 residents	37	16.0%	16*	20	310 769	25.6%
5 000-10 000 residents	26	11.3%	16**	39	271 680	22.4%
1 000-5 000 residents	17	7.4%	15***	101	246 411	20.3%
Fewer than 1 000 residents	2	0.9%	2****	52	31 349	2.6%
Total	231	100.0%	52	215	1 215 220	100.0%

Note: * Tavagnacco (8), Gorizia (4), Cordenons, Sacile, Monfalcone (3), Tolmezzo, Ronchi dei Legionari, Porcia, Azzano Decimo, Gemona del Friuli (2), Maniago, Spilimbergo, Fontanafredda, Muggia, Codroipo, San Vito al Tagliamento (1); ** Grado, San Giovanni al Natisone (3), Rivignano Teor, Buja, Cormons, Duino-Aurisina, Brugnera, Pasian di Prato (2), Lignano Sabbiadoro, Basiliano, Povoletto, Majano, Remanzacco, Gradisca d'Isonzo, Staranzano, San Giorgio di Nogaro (1); *** Sgonico, Buttrio (2), Bertiolo, Tarvisio, San Giorgio della Richinvelda, Trivignano Udinese, Aiello del Friuli, Pocenja, Cordovado, Carlino, Pradamano, Castions di Strada, Talmassons, Premariacco, Mortegliano (1); **** Chiopris-Viscone, Monrupino (1).

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

This analysis has shown that start-ups are uncommon in small municipalities. 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.

Even if Friuli-Venezia Giulia is partly mountainous and is located close to very rural areas, it is highly urbanised, and its population distribution demonstrate it. 85% of Friuli-Venezia Giulia’s inhabitants live either in main service hubs or in “outlying” municipalities in their immediate vicinities. The latter category is particularly important in this region, as almost half of the population lives there. Meanwhile, the share of the population living in inner areas is limited, and even in that case very few municipalities can be truly defined “remote”, meaning that service hubs are normally accessible in less than half an hour via public or private transport.

As a result, the distribution of innovative start-ups in Friuli-Venezia Giulia is quite similar to the national one. About 70% of all start-ups are located in hubs, and 26.4% in surrounding outlying areas; a remainder is in inner areas. Compared to the actual population distribution, hubs are overrepresented and outlying municipalities underrepresented, repeating a trend common to all of Italy, but this is much less pronounced than, for instance, in South Tyrol (cfr. Corbetta 2020, forthcoming).

Table 2.3. Distribution of registered start-ups across central and inner areas (ACT categories, January 2020)

Region	Central areas			Inner areas		
	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-Bozen	71.7%		18.5%	5.4%	4.3%	
Toscana	69.0%	5.0%	21.5%	3.8%	0.7%	
Friuli-Venezia Giulia	68.8% (8th highest)		26.4% (4th highest)	4.8% (7th lowest)		
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%		34.5%	14.9%	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.

A final aspect that it is worth examining is language diversity. Friuli-Venezia Giulia hosts a sizeable Slovene speaking community, particularly in border areas and around Trieste. More specifically, Slovene is co-official in 31 municipalities, including Trieste, whose outer neighbourhoods are home to a substantial Slovene community. However, there is consensus on the fact that just a minority of the 350 000 inhabitants of these municipalities speak a Slavic dialect as mother tongue: lack of up-to-date information on language shares makes it difficult to identify unambiguously the areas where these languages are in the widest use. It is therefore not possible to identify systematically a correlation between the presence of Slovenes and start-up density, as it was done in this paper series with the German-speaking community in South Tyrol (Section 2.3).

Simple descriptive statistics however suggest that there are no fewer start-ups in language minority areas. About one third of municipalities where Slovene is co-official host at least one registered firm; even if Trieste is excluded, there are still 14 start-ups registered in these areas. Among these there are three small towns where the share of Slavic speakers is reputed to be very high: Sgonico (*Zgonik*, 2 start-ups), Monrupino (*Repentabor*, 1 start-up), and Duino Aurisina (*Devin Nabrežina*, 2 start-ups).⁵

Friuli-Venezia Giulia's missing entrepreneurs

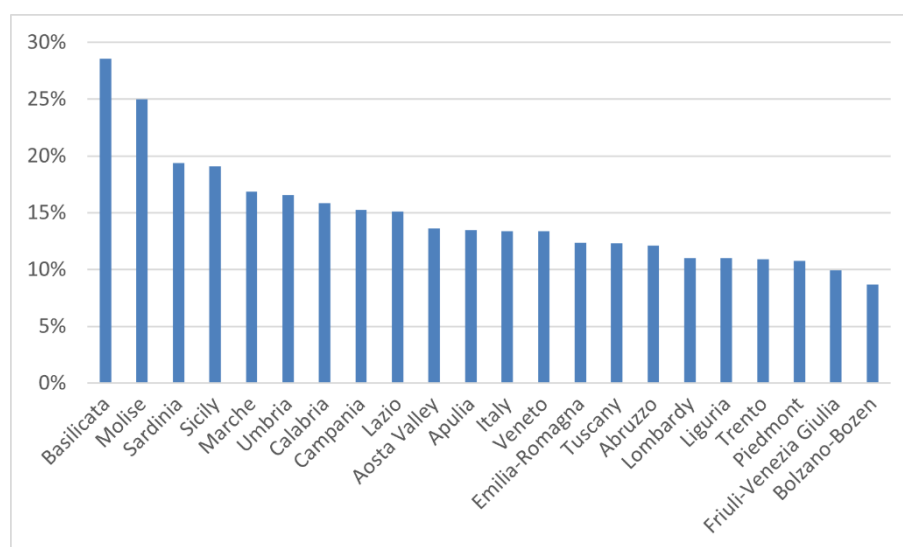
Women and youth participation is low...

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.⁶ 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.

Friuli-Venezia Giulia's start-up landscape is characterised by a very marked under-representation of women and youth in entrepreneurship. The rate of female participation, in particular, is very low in the Italian context. Friuli-Venezia Giulia is one of the only two Italian regions where start-ups owned or managed by women represent less than 10% of all beneficiary firm (9.96%); the only other that fares even worse is another area in the Italian North East, South Tyrol. Friuli-Venezia Giulia's ratio is below national average by about 3.5 percentage points, and is very far from the rates recorded in the best-performing regions – which are all located in the South of Italy (Figure 2.5).

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



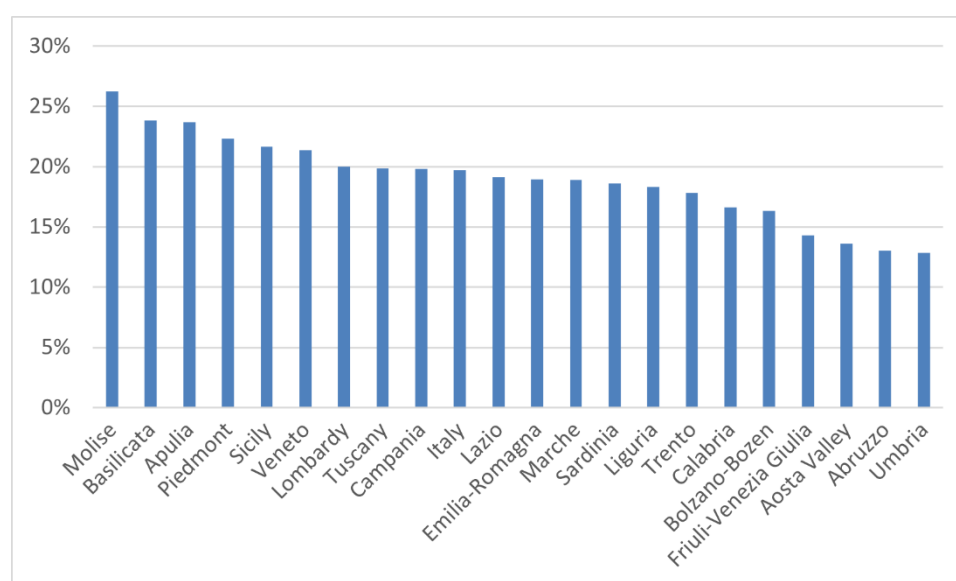
Source: OECD Trento Centre elaboration on Italian Business Registry data.

Trends are very similar when majority-youth start-ups are concerned. Less than 15% of innovative firms in Friuli-Venezia Giulia are primarily owned by people under 35 years of age (14.3%): this is the fourth-lowest ratio in the country, about five percentage points below national levels (19.7%). Friuli-Venezia Giulia's performance is quite poor also compared to other regions in the North, which in most cases still lag Southern regions with higher youth majority rates (Figure 2.6).

There is evidence that gender and youth disparities in business are intertwined: young women have a much lower entrepreneurial propensity than their male peers and never manage to fill up this gap over time (OECD/European Union, 2019, p. 92^[13]). A look at the intersection between these two categories of start-

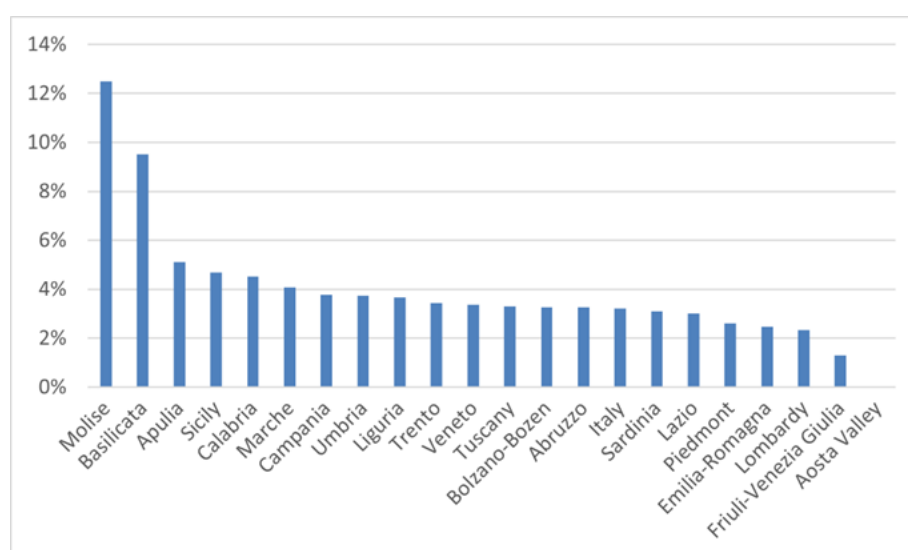
ups – firms that are both female majority and youth majority⁷ – gives interesting insights: in the case of Friuli-Venezia Giulia, it highlights a dearth of start-ups belonging to both these categories that is more severe than in any other region with a comparable start-up population. Just 1.2% of Friuli-Venezia Giulia's start-ups are majority-female and majority-youth: only Valle d'Aosta is ranked lower. The national average is an alarmingly low 3.2%: with the exception of a few Southern areas, most regions are clustered around that value, suggesting that under-representation of young women in entrepreneurship is a phenomenon prevalent throughout the country (Figure 2.7). However, Friuli-Venezia Giulia's woes appear to be particularly severe in this respect, pointing to the need for action by policy-makers.

Figure 2.6. Ratio of majority-youth (under-35 years old) registered start-ups by Italian region and autonomous province (January 2020)



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

Figure 2.7. Ratio of majority female and majority-youth (under-35 years old) registered start-ups by Italian region and autonomous province (January 2020)



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

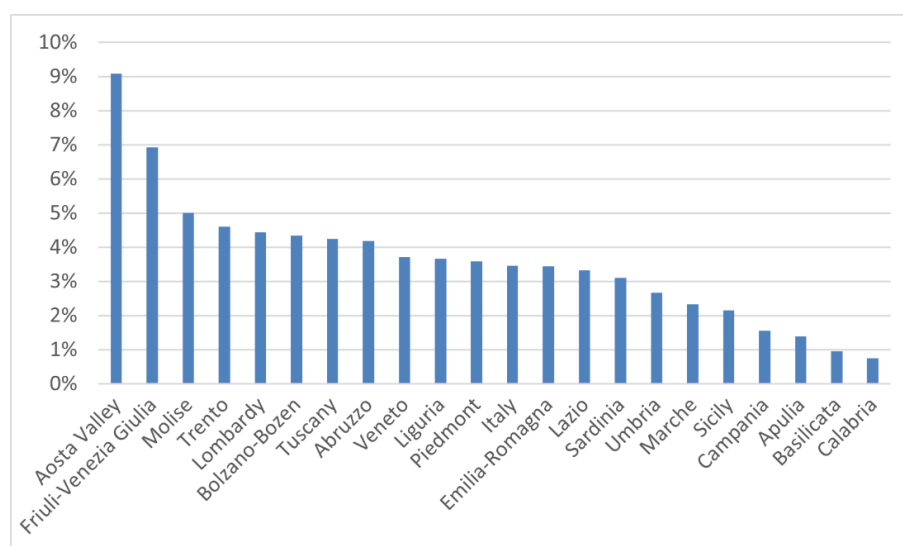
To sum up, northern regions like Friuli-Venezia Giulia tend to perform worse in terms of representation of women and young people among start-up founders. This finding runs opposite to general labour market trends. While not exceptionally high, Friuli-Venezia Giulia has above average rates of employment among females (58.6%, 9th highest in Italy) and youth (73% in the 25-34 age group). 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 figures strongly suggest that the rates 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 as disadvantaged groups find it easier to get permanent, well-paid dependent employment, and are therefore less likely to opt for risky entrepreneurial ventures.

...but there are many more foreign entrepreneurs than average

One demographic in which Friuli-Venezia Giulia performs noticeably better than average is the representation of entrepreneurs born outside of Italy. In 6.9% of all registered start-ups in the region, citizens of a country other than Italy (EU or non-EU) own a majority of shares: the ratio is double the equivalent for the whole of Italy (3.5%) and second only to another border region, the Aosta Valley – which has a much smaller start-up population and is thus less representative (Figure 2.8). Under this metric, Southern regions normally perform significantly worse than the ones in the North, suggesting that location and economic conditions play a relevant role.

Figure 2.8. Ratio of registered start-ups owned by non-Italian citizens, shares by Italian region and autonomous province (January 2020)



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

The share of start-ups founded and owned by non-Italian citizens is particularly high in Trieste (12.5%), which strongly suggests an effect of its status as a border region with strong historical and economic ties to surrounding areas. Foreign start-ups are also common in Pordenone (8.2%).

The density of foreign-owned start-ups in Friuli-Venezia Giulia, which is much higher than that observed in other regions, is a promising sign that deserves further attention, as it may constitute a prominent factor of territorial attractiveness. Given to its proximity and infrastructural connection to the Western Balkans, including countries that are not part of the European Single Market, Friuli-Venezia Giulia could try to solidify a position as a gateway to the Italian and Western European markets. The final Chapter of this paper includes specific recommendations in this direction. Moreover, 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]).

Uptake of flagship policy instruments

SME Guarantee Fund

As evidenced by the OECD evaluation, 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. In Friuli-Venezia Giulia, 28.1% of innovative start-ups registered currently or in the past have obtained a subsidised loan.¹⁰ This is the fourth highest access rate to this instrument among Italian regions, only behind the *province autonome* of Trento and Bolzano, and Aosta Valley. More specifically, the instrument has facilitated 243 operations towards 103 firms, which have received on average EUR 416 955 each. This amount is comparatively large – the fourth highest in Italy; however, this is just a fraction of the total 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). Another distinctive feature of Friuli-Venezia Giulia is that start-ups tend to receive funding over multiple operations: on average, beneficiaries have received 2.2 guaranteed loans each, more than in any other Italian region, against a national average of 1.7.

Table 2.4. 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-Bozen	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%

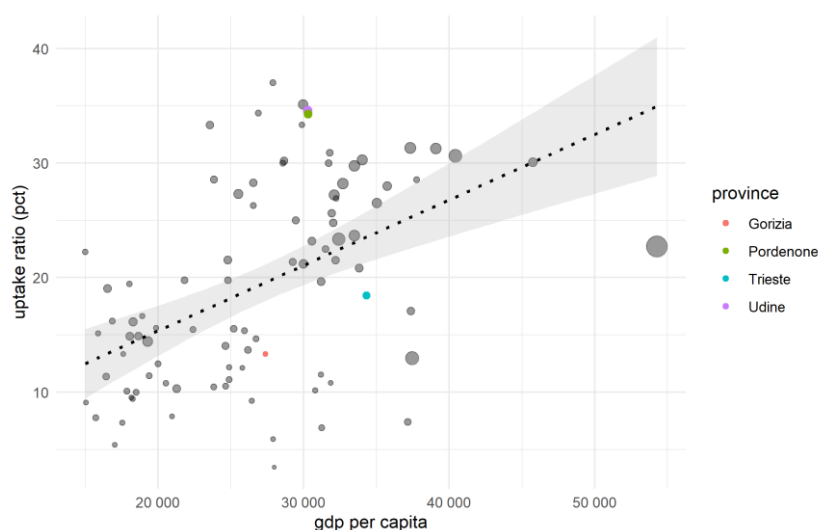
Note: The list considers operations authorised by the SME Guarantee Fund before 1 January 2020, and their status as of 31 March 2020 (as most lending agreements take a few weeks to be finalised after the public guarantee is obtained).

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

Uptake rates vary significantly across the region: it can be roughly said that start-ups in Friuli access this instrument much more than in Venezia Giulia. The differences are particularly stark if compared with the rest of the country. Innovative start-ups in the historical province of Udine has a 34.6% access rate, while Pordenone stops just below with 34.3%. In absolute terms, these are the fourth and the sixth highest uptake rates across Italy's 105 *province*, meaning that this area is at the very top in Italy for this metric. For Trieste and Gorizia, the situation is very different, as in either *province* accession rates are below the national average. While Trieste is in a middling position (18.4%), Gorizia is a low performer (13.3%). Both ratios are particularly unimpressive if compared with other provinces in Northern Italy, as the bottom part of the table is almost exclusively occupied by regions in the Centre (Tuscany in particular) and the South.

Part of geographical differences between loan access rates is explained by local economic fundamentals. Figure 2.9 evidences the existence of a mild but statistically significant correlation between provincial GDP per capita and accession rates. However, whilst the four historical provinces of Friuli-Venezia Giulia have relatively similar incomes, their outcomes are quite far apart. Trieste has higher GDP than Udine and Pordenone, but it underperforms its predicted values (diagonal slope in the figure) quite significantly, whereas the two Friulian provinces are almost outliers – i.e. extreme over-performers.

Figure 2.9. 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.

For a more accurate assessment on how background condition influence access rates to the instrument, we develop an OLS regression model with three controlling variables at the provincial level: GDP per capita, number of start-ups registered, and average turnover of innovative start-ups in 2019 (see Chapter 3). All three have a statistically significant effect: higher GDP and turnover are correlated with higher uptake, while the number of registered start-ups has a small negative impact – that is, *ceteris paribus*, a more populated province will have slightly lower uptake (

Table 2.4).

Over- and under-performance in uptake can now be intended in terms of how much actual values deviate from those predicted from the model. This approach confirms in even starker terms the first impression: Udine and Pordenone are marked over-performers, while the results of Trieste and Gorizia are far from optimal. Specifically, Udine outperforms its predicted value by almost 14 percentage points, as opposed with Pordenone whose observed uptake beats the model by “just” 8.6 points. Instead, Gorizia and Trieste are below predicted values respectively by 5.9 and 6.3 percentage points.

Table 2.5. Relationship between rate of innovative start-ups accessing guaranteed loans and GDP per capita, number of registered start-ups, and average turnover of start-ups, 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	-2.3162	3.2355	-0.7159	0.4757
GDP per capita 2017	0.0006	0.0001	5.0032	0.0000***
N. registered startups	-0.0072	0.0029	-2.5081	0.0138**
Average turnover	0.00004	0.0000	4.6497	0.0000***
Observations	103			
R-squared	0.36			
Adjusted R-squared	0.34			
Residual standard error	7.83			
F-statistic	9.517			
* p<0.1, ** p<0.05, *** p<0.01				

Note: Provincial GDP per capita data is for 2017, average turnover data is for the tax year 2018. The R-squared value implies that the controlling variables explain around 34% 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.

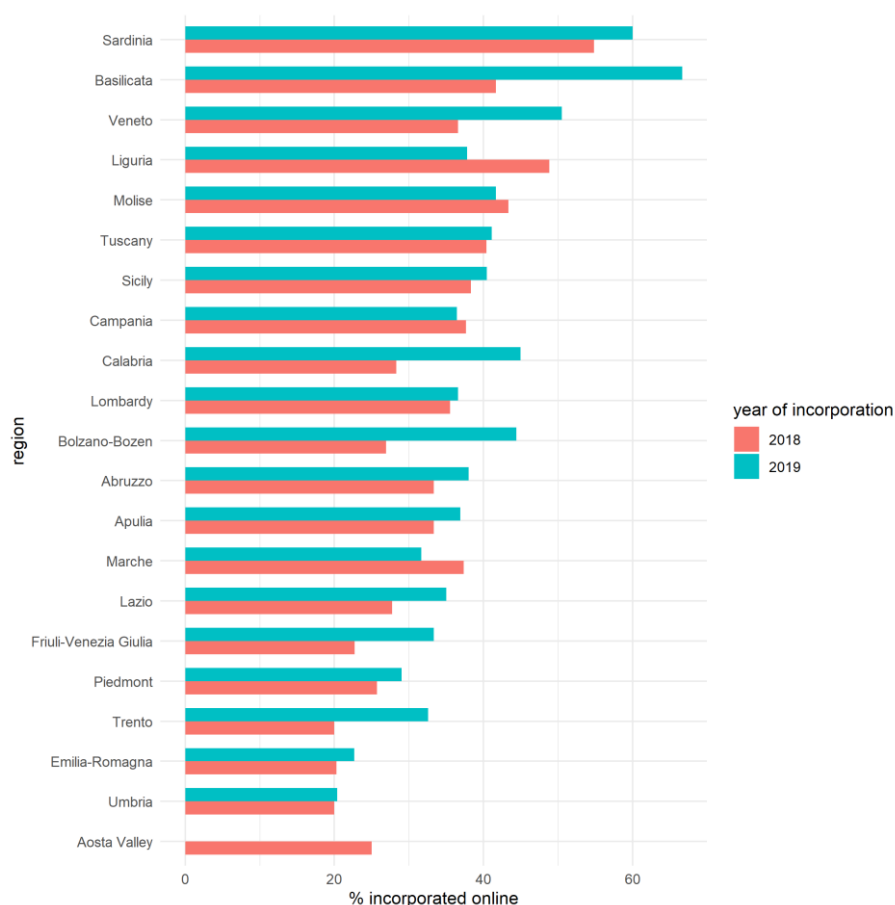
Even if this multivariate model has still limited explanatory value, capturing about one third of all variation in outcomes, it gives clear indication on the fact that the difference in uptake between Friuli and Venezia Giulia are not owing to macroeconomic condition or to better economic performance of local start-ups. On the one hand, there might be some specific credit drag in the Trieste and Gorizia sub-region which deserve a close inspection. On the other hand, the excellent results of Udine and Pordenone may be revealing of the type of start-ups based in the area, or even of “unwanted” excessive reliance on credit finance. Many start-ups prefer to raise funds exclusively via other channels that are alternative to debt, such as venture capital, which are normally seen as more indicated for high-risk, high-reward business activities.¹¹ In this respect, earlier studies (Giraud, 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 Friuli-Venezia Giulia have made a rather 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 (2016: 118) 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.¹²

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, including Friuli-Venezia Giulia. In 2019, just 33.3% of firms in the regions had become incorporated by using the new procedure, a ratio three percentage points under the national level (36.3%). Nonetheless, uptake of this measure is increasing nationwide, including in Friuli-Venezia Giulia, in which this modality used to be even less prevalent. In 2018, just 22.7% of firms incorporated in the year had exploited this channel, one of the lowest rates in the country (Figure 2.10).

Figure 2.10. 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.

Unlike for the SME Guarantee Fund, the adoption of this measure has been uniformly low across the region. Adoption rates are around 35% in Udine and Trieste, and lower in Pordenone (25%). While Udine had similar uptake in 2018 already, in Trieste and Pordenone the rate has markedly increased in the last year from very low levels.

A possible reason why adoption of online incorporation is low could be excessively long times by local Chambers of Commerce in processing applications. However, this does not really seem to be the case of Friuli-Venezia Giulia: in Udine, the average duration of incorporation procedure was just two days in 2019. An alternative explanation for low uptake in Friuli-Venezia Giulia 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^[39]), confirming the important advisory role of professional networks (OECD, 2011^[40]).

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.¹³ 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 early July 2020,¹⁴ 81.8% of registered start-ups in Friuli-Venezia Giulia 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 (72.7%).¹⁵ However, start-ups in other territories, such as South Tyrol, boast a virtually universal adoption rate (95.7%). 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.

Regional variation within Friuli-Venezia Giulia suggests again that the role of the local Chambers of Commerce matters in ensuring participation in this initiative. While Pordenone (87.1%) and Udine (85.8%) boast high adoption rates, Trieste (70.9%) and Gorizia (70.6%) lag somewhat behind. The resemblance between uptake in Friuli and in Venezia Giulia is most certainly not random, as in Friuli-Venezia Giulia there are just two Chambers of Commerce: one covering Udine and Pordenone, the other Trieste and Gorizia.

Notes

¹ Please refer to Section 2.2. for more details

² According to Chambers of Commerce data, in Trieste there are less than 1 000 young limited companies on the records.

³ For reference, 85% of all innovative start-ups in Lazio are located in Rome, 71% of those in Liguria are in Genoa, and 65% of South Tyrol's in Bolzano-Bozen.

⁴ <https://lexview-int.regione.fvg.it/FontiNormative/xml/xmllex.aspx?anno=2014&legge=26>

⁵ At the 1971 ISTAT census, the last one to indicate shares for language communities, Sgonico and Monrupino had an overwhelming majority of Slovene speakers, while Duino-Aurisina had only a small Italian majority.

⁶ The ratio is calculated as (percentage of share capital held by women + percentage of leading positions held by women)/2 > 50%.

⁷ Please note that this should not be read as “start-ups founded by a majority of young women”, as individual-level data are unavailable to this study. The figures only represent the intersection between start-ups with a female majority and start-ups with a youth majority, and there is no way to tell if the women that make up the majority are also all under 35 years of age. This means that the shares presented here are to

be intended as an approximation (per excess) of the actual share of young women owning Italian innovative start-ups.

⁸ ISTAT. Tasso di occupazione: Dati regionali (2019). 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 The value refers to operations approved by the SME Guarantee fund before 31 December 2019, which had been finalised before 31 March 2020. All 385 start-ups formerly and currently registered are taken into account: however, only loans obtained when the firm held innovative start-up status are considered.

¹¹ For an extensive literature review on the issue, see Menon et al. 2018, pp. 52-53.

¹² For an overview of the registration process, check the guide published by InfoCamere [Italian]: <http://startup.infocamere.it/atst/guidaCostitutivo>. Last access: 20/05/2020

¹³ <http://startup.registroimprese.it/isin/home>. The platform can be browsed in Italian and English.

¹⁴ Data obtained from startup.registroimprese.it on 8 July 2020. The platform is updated in real time, meaning that adoption shares may shift at any time.

¹⁵ Residual non-compliance may be partly dependent on the COVID-19 crisis, which has impacted administrative procedure and enforcement as well as having disrupted innovative start-up activities.

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 Friuli-Venezia Giulia 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 comprehend 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 Friuli-Venezia Giulia placed on the market goods or services for about EUR 155 000. This value can be considered average in a comparative perspective: it positions at 11th place among Italy's 21 regions and *province autonome*, and is close (albeit slightly below) the national average of EUR 173 200. Half of Friuli-Venezia Giulia's start-ups recorded a turnover of less than EUR 36 655. This indicates, as expected, that most local start-ups are very small firms which have not yet accessed the market, or have done so only in a marginal way; indeed, a significant share of start-ups (12.7%) reported a turnover value of exactly zero. However, this median value is actually comparatively high: it is above the national average (EUR 33 809) and the 7th largest overall (Table 3.1).

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

Turnover values	Friuli-Venezia Giulia	Ranking by region (out of 21)	Italy
Start-ups	231	12	10 901
Share of start-ups with valid turnover in 2018	71.9%	5	64.0%
Mean*	154 570	11	173 199
Median*	36 656	7	33 809
Share with turnover = 0*	12.6%	8	13.8%
95 th percentile*	505 712.5	7	777 866

Note: * valid values only.

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

Within the registered start-up population, the only value that is significantly lower than that recorded nationwide is the 95th percentile: just 5% of current beneficiaries have a turnover above EUR 500 000. However, an analysis of the current population is not ideal to observe “peak values”, as high-performing start-ups are required to leave the registry as soon as their sales volume crosses the EUR 5 million threshold set forth by the law. Moreover, firms that have survived the start-up phase and are now over five years of age will normally be larger in size than their younger peers. It is therefore useful to give a look also at the formerly registered population, whose central tendency and peaks are shown in Table 3.2. Data shows how 3.9% of firms in this group had a sales volume above EUR 2 million in 2018, which implies a comparatively high density of firms that have graduated from the micro-SME status: this share is over twice the national average.

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

	Friuli-Venezia Giulia		Italy	
	Former	Current	Former	Current
Registered				
Mean*	561 590	154 570	646 029	173 199
Median*	148 708	36 656	131 036	33 809
95 th percentile 2018*	2 058 990	505 712.5	2 444 663	777 866
Share of non-micro SMEs* ³	3.9%	0.4%	1.7%	0.7%
Highest value 2018	14 388 207	3 409 335	168 133 941	7 798 006 ⁴

Note: * valid values only.

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 considers 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^[39]) 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 Friuli-Venezia Giulia and Italy (January 2020)

Employment values	FVG	Italy
Share of firms with more than one employee	42.9%	40.1%
Mean*	2.7	3.5
Median*	2	2
95 th percentile	6.4	11
Max	20	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 Friuli-Venezia Giulia's innovative start-ups is compared to beneficiaries in Italy 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 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. 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. 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: their economic performance is tracked for a three years period (2016 to 2018).

As seen in Section 2.1, in 2013 and 2014 the diffusion of Italy’s start-up policy was meaningful only in a few territories, such as the area of Trieste and Pordenone: it is from 2015 that policy adoption has started growing at a sustained rate across the country. As a result, the second cohort is larger than the first: in Friuli-Venezia Giulia there are 93 firms registered in 2013 and 2014, and 99 registered in 2015 and 2016. At the national level, the difference is much more pronounced: the first cohort includes 3 188 start-ups, the second 4 528.

It must also be noted that most of the measures that make up the Italian Start-up Act came into force gradually over time (MISE, 2017^[41]), with some key measures not being fully accessible until 2015 or 2016. 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 how Friuli-Venezia Giulia’s “early adopter” and “second wave” innovative start-ups distribute 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),⁵ for those that were about to close shop (winding up),⁶ and those for which the turnover values are missing and no inferences could be made (NA).

In this region, the first cohort of start-ups has had slightly better economic outcomes than average. On the one hand, the share of beneficiaries with high turnover levels is quite large: even before accounting for missing values, almost 10% of start-ups registered in 2013 and 2014 declared a sales volume above EUR 1 million in 2018. This is two percentage points more than Italy-wide, with the share of missing values being roughly the same. On the other hand, the number of shutdown start-ups is below national levels by almost 10 percentage point. A look at the sub-regional level shows divergent local patterns, evidencing how start-up outcomes vary in not negligible way between Friuli and Venezia Giulia. There are more high-turnover start-ups in Friuli, but shutdown rates are also noticeably higher there than in Venezia Giulia – although still somewhat below the national level. Start-ups in Trieste and Gorizia are generally smaller, but apparently highly resilient, as just one firm in this cohort had ceased operations by 2019.

These observed patterns partly subside in the 2015-2016 cohort. “Second wave” start-ups in Friuli Venezia Giulia show similar shares to Italy at both in terms of both shutdowns and high-turnover firms. However, there are fewer missing values, which suggest that the share of high-growth start-ups is actually somewhat larger than in the rest of Italy. As we will see further on (Figure 3.1 and Figure 3.2), missing values mostly conceal firms with low turnover or close to zero turnover values.

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

Friuli-Venezia Giulia	Class 2014	Class 2015	Class 2016	Class 2017	Class 2018
Shutdown	0.0%	1.1%	3.2%	5.4%	8.6%
Winding up	1.1%	0.0%	2.2%	1.1%	0.0%
Below EUR 50 000	44.1%	38.7%	24.7%	24.7%	24.7%
EUR 50 000-500 000	41.9%	45.2%	47.3%	44.1%	29.0%
EUR 500 000-1 million	1.1%	4.3%	6.5%	8.6%	7.5%
EUR 1 million-5 million	5.4%	5.4%	5.4%	5.4%	8.6%
EUR above 5 million	0.0%	0.0%	1.1%	1.1%	1.1%
NA	6.5%	5.4%	9.7%	9.7%	20.4%
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 Friuli-Venezia Giulia and Italy, shares of start-ups by turnover class over time – second wave (2016-2018)

Friuli-Venezia Giulia	Class 2016	Class 2017	Class 2018
Shutdown	2.0%	5.1%	8.1%
Winding up	1.0%	1.0%	0.8%
Below EUR 50 000	48.5%	41.4%	30.3%
EUR 50 000-500 000	33.3%	36.4%	39.4%
EUR 500 000-1 million	3.0%	8.1%	5.1%
EUR 1 million-5 million	3.0%	2.0%	5.1%
EUR above 5 million	1.0%	1.0%	1.0%
NA	8.1%	5.1%	11.1%
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.

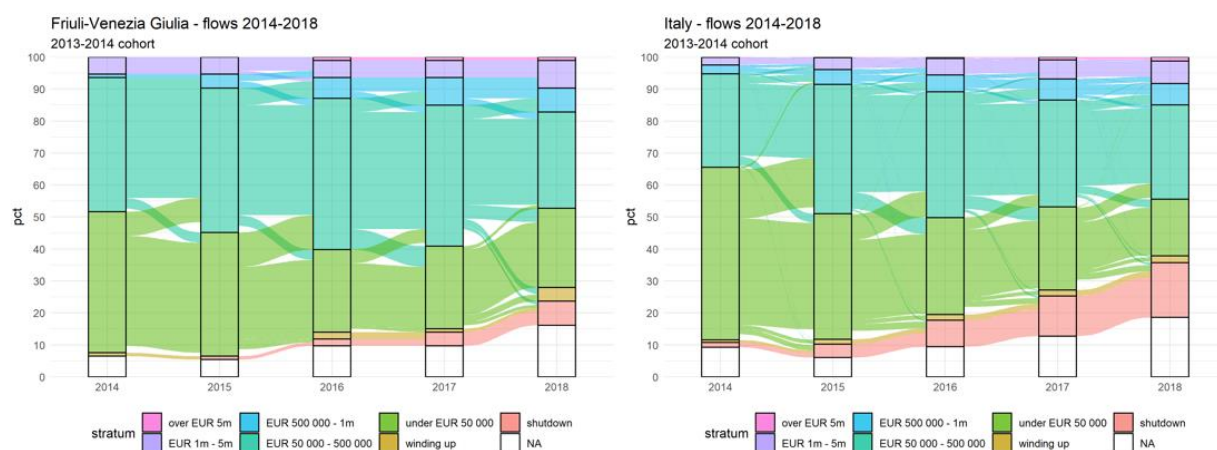
Dynamic analysis

Both in Friuli-Venezia Giulia and in Italy, the higher turnover groups become increasingly more populated as the years go by. In either cohort, about half of all start-ups record a turnover below EUR 50 000 in their first year; and most other do not exceed EUR 500 000. Over time, the first class in particular shrinks significantly. An interesting divergence in Friuli-Venezia Giulia is that the smallest turnover group remains quite sizeable in both cohorts, which might be explained by a lower propensity of these firms to shut down, rather than Friuli-Venezia Giulia's start-ups having a lower growth rate.

Such 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. As evidenced already, early adopters in Friuli-Venezia Giulia behave somewhat differently than in the rest of the country, with a higher share of either very small and very large start-ups compensating a lower number of shutdowns. Indeed, it is visible how in Italy most firms that close had recorded a turnover under EUR 50 000 in the previous year. This flow is almost invisible in Friuli-Venezia Giulia for the first cohort, meaning that most low turnover firms have survived until the end of the time series.

A more concerning finding, which is also observed at the national level, is that firms that do not grow since their first or second year of registration become increasingly less likely to scale to higher turnover levels later. If a firm stays in the two lower turnover classes after one year of registration, it will scale above the EUR 500 000 threshold in just 20% of all cases; if they remain in the same classes also the next year, they will grow meaningfully only in very rare situations. Moreover, albeit the sample is very small, it is worth noting that a slim majority of “millionaire” start-ups in Friuli-Venezia Giulia have held this status since their first year of registration: this trend is also seen elsewhere in Italy, even if to a smaller scale. Albeit there is no trace of a purely deterministic relationship, this finding strongly suggests that firms with high growth potential will tend to demonstrate it early after becoming registered. The empirical evidence may be related to a key finding of the OECD evaluation, which showed that most of the causal effect of the facilitations of the Italian Start-up Act on economic outcomes is strongest in the first and second year after policy entry (Menon et al., 2018, p. 30_[27]).

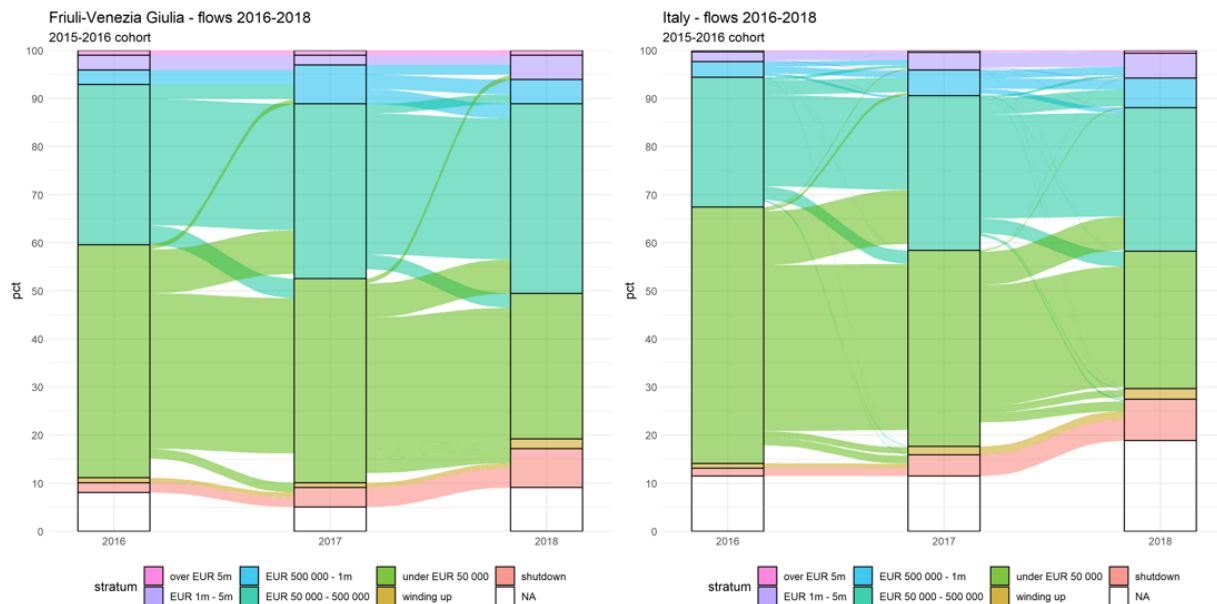
Figure 3.1. Flows between turnover categories of innovative start-ups in Friuli-Venezia Giulia (left) and in Italy (right), early adopters (registered 2014-2018)



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 Friuli-Venezia Giulia (left) and in Italy (right), second wave start-ups (registered 2016-2018)



Note: Created in R with the ggalluvial package.

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

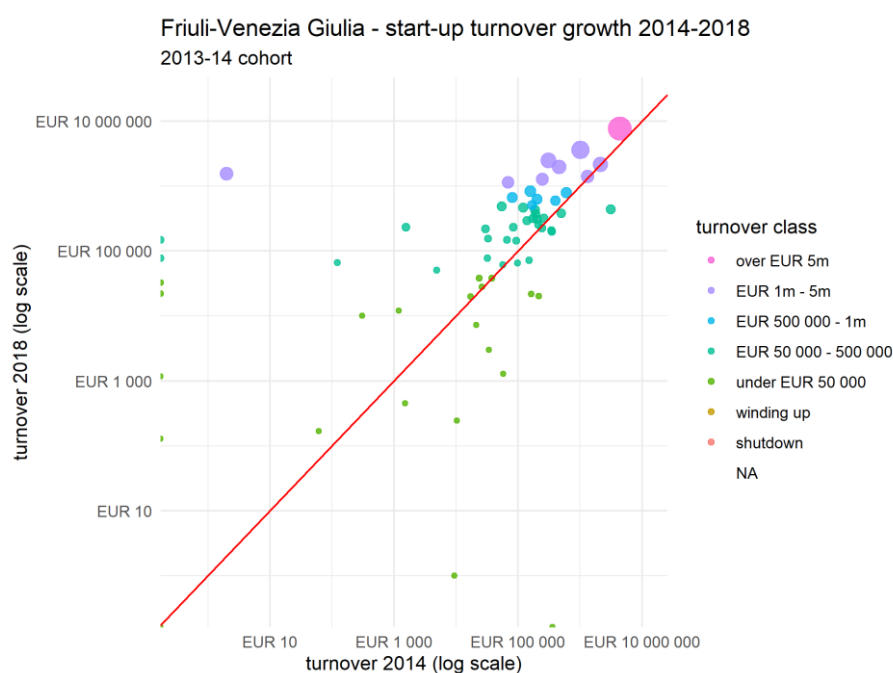
Focus on individual growth trajectories

The relatively small population of start-ups in each cohort 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 Friuli-Venezia Giulia have indeed grown since the first year in the policy: a vast 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.

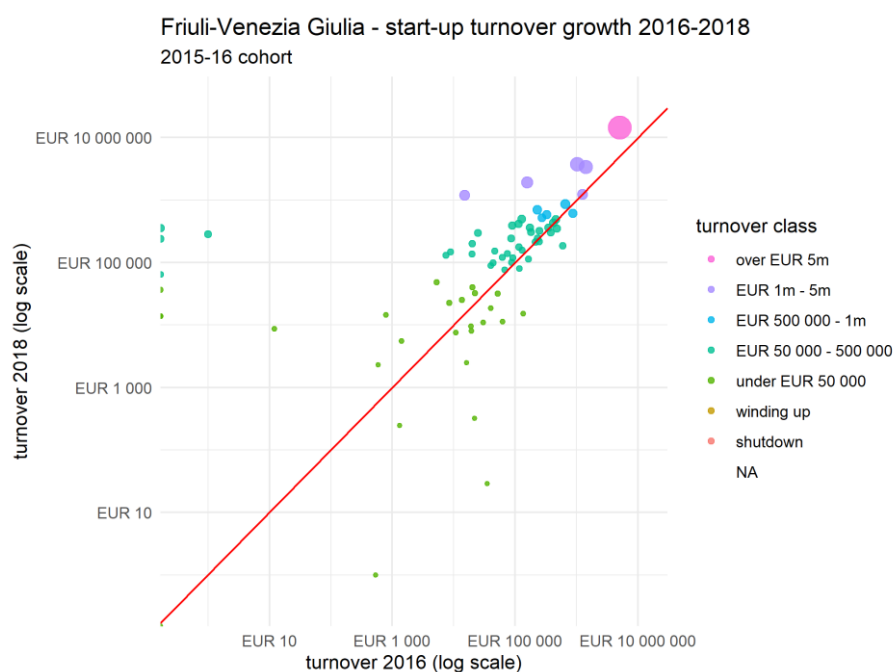
The graphs thus support the observation that high-performing start-ups tend to be on the market since their early steps. In just a handful of cases – exactly five in each cohort – a firm with a turnover functionally equal to zero in its first year (less than EUR 10 000) has passed the EUR 100 000 mark as of 2018. The number of points positioned to the right line or to the bottom mostly cover firms that had low turnover in their first year already: in Friuli-Venezia Giulia there is a non-insignificant amount of them, particularly in the second cohort (about a dozen, that is over 10% of all firms). Together with the evidence presented in the previous paragraphs, this strongly suggests that, unlike in most of Italy, start-ups in Friuli-Venezia Giulia have a low propensity to shut down even if they shrink or stagnate.

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



Note: The x and y axes are logarithmic (log10). Twenty-nine 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 Friuli-Venezia Giulia, second wave (2015-16)



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

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 To determine this share, only turnover values are considered.

⁴ 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.

⁵ 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.

⁶ 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 1.3), 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 is also a sizeable share of manufacturing start-ups (17.3%), which are primarily classified as producers of “machinery” and “electronic equipment”. Few registered 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.

Friuli-Venezia Giulia has a distinctive sectorial distribution in the Italian context. The most remarkable feature is a much higher density of manufacturing start-ups: over one quarter of registered firms as of early 2020 (26.4%) have a NACE code relating to manufacturing, exactly 10 p.p. more than the share observed nationwide. Indeed, all the NACE codes that are most distinctive of Friuli-Venezia Giulia relate to manufacturing: the relative number of firms classified as “Manufacture of machinery (generic)” (6.1%) and “Manufacture of electrical equipment” (3%) double Italy’s corresponding shares. Conversely, while still dominant, ICT start-ups are significantly less common than in the rest of Italy (42.9%, 4.6 percentage points below national levels), although the density of firms with a specific “Computer programming” code is not that divergent from national levels (34.6%, -0.9 p.p.). Service and consulting firms are also somewhat under-represented. Other classes, such as retail and agriculture, have only a residual role (Table 4.1).

As pointed out multiple times in this work, the two sub-regions of Friuli and Venezia Giulia have fairly different economic structures and outcomes. This is evident in the sectorial distribution of registered start-ups. As shown in Table 4.2, the higher density of manufacturing start-ups is essentially due to Udine and Pordenone’s contribution only. Indeed, Pordenone is a rare case of a territory where there are more

manufacturing firms than ICT firms in the local start-up registry. Trieste and Gorizia show a much more “conventional” sectorial distribution, with ICT start-ups representing exactly half of all registered firms.

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

	FVG		Italy	
J 62 – Computer programming	80	34.6%	3 883	35.6%
J – Other ICT	19	8.2%	1 287	11.8%
M 72 – Scientific research and development	32	13.9%	1 512	13.9%
M – Other services	14	6.1%	481	4.4%
C 26 – Manufacture of computers	9	3.9%	307	2.8%
C 27 – Manufacture of electrical equipment	7	3.0%	169	1.6%
C 28 – Manufacture of machinery (generic)	14	6.1%	340	3.1%
C – Other manufacturing	31	13.4%	1 866	14.0%
G – Wholesale and retail trade	4	1.7%	370	3.4%
A – Agriculture and fisheries	3	1.3%	79	0.7%
Other	18	7.8%	947	8.7%
	231	100.0%	10 901	100.0%

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

Table 4.2. Distribution of innovative start-ups by economic activity (NACE), Friuli and Venezia Giulia (January 2020)

Sector (NACE 1-digit category)	Friuli (Udine and Pordenone)	Venezia Giulia (Gorizia and Trieste)
J – Information and communication	39.1%	50.0%
C – Manufacturing	32.5%	15.0%
M – Professional, scientific and technical activities	17.2%	25.0%
F – Construction	2.0%	2.5%
G – Wholesale and retail trade	2.0%	2.5%
P – Education	2.0%	0.0%
A – Agriculture and fisheries	1.3%	1.3%
K – Financial and insurance activities	1.3%	0.0%
N – Administrative and support service activities	1.3%	3.8%
D – Electricity, gas, etc.	0.7%	0.0%
Q – Human health and social work activities	0.7%	0.0%
E – Water supply, waste management, etc.	0.0%	1.3%

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

While this distribution gives important insight on the structure of Friuli-Venezia Giulia’s start-up 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, Friuli-Venezia Giulia hosts 237 registered start-ups, six 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.

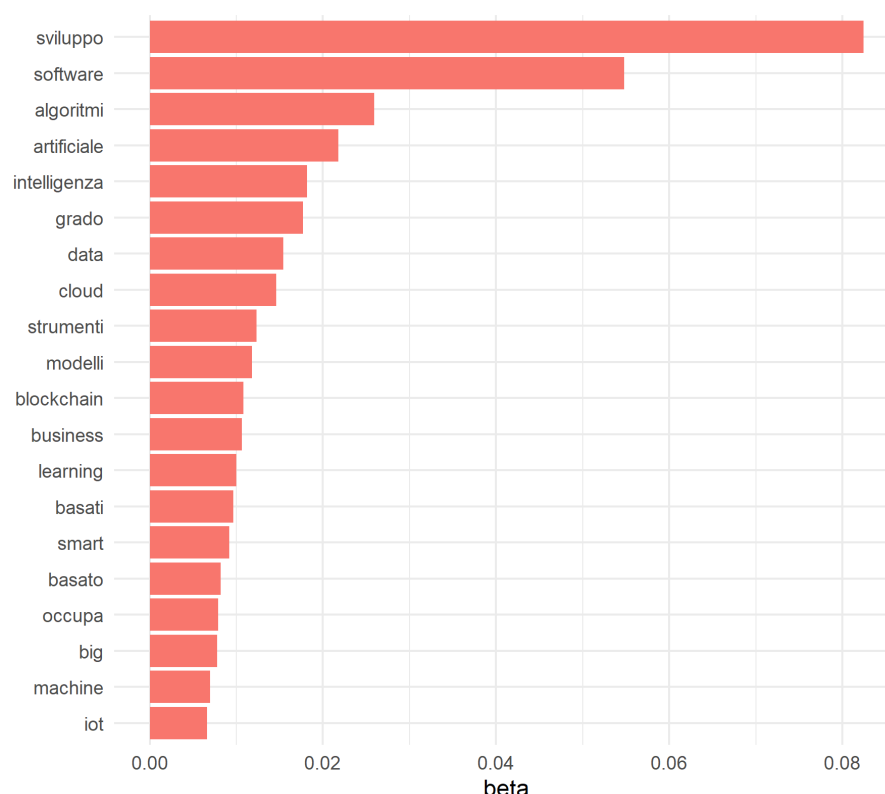
The power of topic models is that they make it possible to *discover* the main themes underlying a corpus of texts without any prior information being fed to them. In this work, this is achieved thanks to a probabilistic algorithm, Latent Dirichlet Allocation, or LDA (Blei, Ng and Jordan, 2003^[42]). 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%, leaves out a few firms that have a very detailed and comprehensive

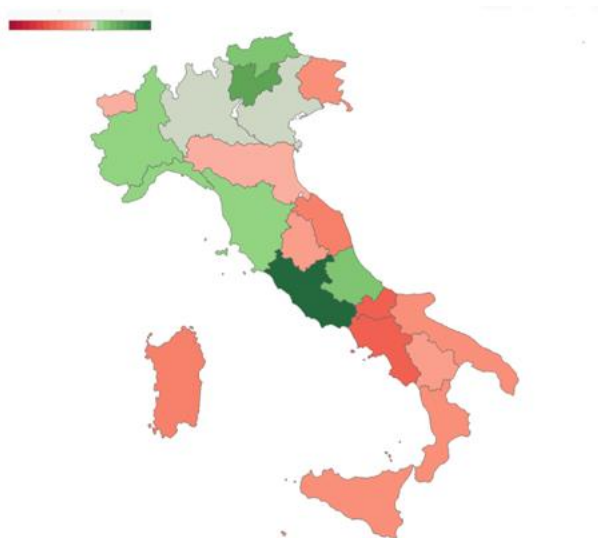
activity description – and which thus includes more words that relate to other topics with a higher probability.

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%.

Our analysis shows that innovative start-ups in Friuli-Venezia Giulia are not prominent adopter of emerging digital technologies. As of April 2020, 17 firms had a *gamma* score for emerging digital technologies higher than the 0.107 threshold, which is equivalent to 7.2% of all firms enrolled in the start-up registry at the same date. As this number is below 10%, this category of start-ups is by definition under-represented compared to nationwide levels. The ratio exhibited by Friuli-Venezia Giulia is the sixth lowest (16th) among all Italian regions, over 10 percentage points below national leader Lazio (17.4%) and by some margin the lowest in all Northern Italy (Figure 4.2).

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

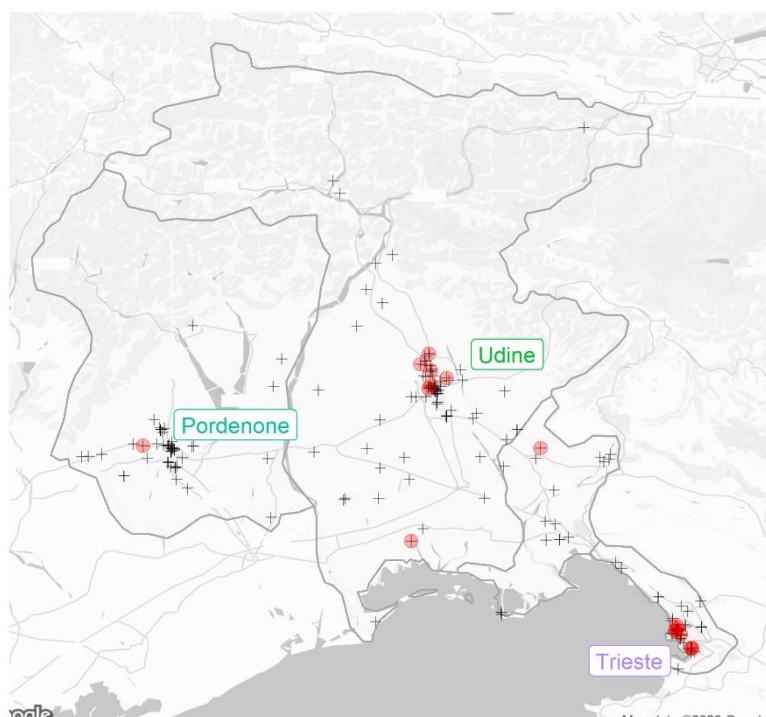


Note: Red shades indicate regions with a share of emerging technology start-ups below 10%. Green shades indicate values above 10%. The darker the shade, the furthest the value is from 10% in either direction.

Source: OECD Trento Centre elaborations on Business Registry data.

Not all of Friuli-Venezia Giulia exhibits low density ratios: Trieste has a 12.5% share, which is comparable to that observed in prominent start-up hubs such as Torino, Bologna, and Trento. The main reason for the region’s under-performance is a dearth of start-ups of this type in Friuli: according to our model, Udine has seven “AI-intensive” start-ups (7.5% ratio) and Pordenone just one (1.6%). Moreover, as it is clear from the map in Figure 4.3, this type of start-ups is almost exclusively found in major urban centres: in this case, the two main cities of the region, Trieste and Udine.

Figure 4.3. Location innovative start-ups in Friuli-Venezia Giulia that adopt emerging digital technologies (April 2020)



Note: Darker hues indicate that multiple start-ups have their office at that location, and that thus there is higher density in that area.

Red dots indicate start-ups adopting artificial intelligence and other emerging digital technologies (gamma score > 0.107). Black crosses indicate other start-ups-

Source: OECD Trento Centre elaboration on Italian Business Registry data. The map is created in R with the [ggmap package](#).

Friuli-Venezia Giulia's low numbers (in Friuli in particular) are partly explained by the relatively low percentage of ICT firms included in the registry: as seen in Section 4.1, Friuli's distinctive trait is a high representation of manufacturing start-ups, which are less likely to adopt such technologies – albeit it is possible to observe, in Friuli and across the country, a handful of “Industry 4.0” start-ups with relatively high *gamma* scores.⁶ However, a closer inspection shows that not even ICT start-ups are extremely innovative in this sense. Region-wide, 12.7% of registered start-ups with the corresponding NACE code (“J” class) are classified as adopters, below the national average of 14.1%. Trieste (17.9%) and Udine (16.7%) position relatively well, but still far from front-runner territories like Trento (20.5%) or Rome (22.3%).

To sum up, our approach suggests that Friuli-Venezia Giulia is a late adopter in terms of emerging digital technologies such as artificial intelligence or cloud computing – or, more specifically, that these technologies are rarely sufficiently important in start-ups' business models to be mentioned explicitly in their company documentation. Even if this approach has obvious limitations, it indicates a potential weakness of the local start-up landscape.

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 Friuli. However,

unlike activity description, there are still differences in adoption rates across the country, making comparison between and within regions 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 [last access: 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> [last access: 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 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>

⁶ Three registered start-ups in Friuli-Venezia Giulia have a *gamma* score for AI, cloud and other emerging technologies above 0.107. Although this small number has hardly statistical significant, it is interesting to observe that it is equivalent to a 4.6% share, identical to the national rate (86 out of 1 850)

5. Main takeaways and policy recommendations

A tale of two sub-regions?

This paper has highlighted Friuli-Venezia Giulia as one of the territories in Italy where the national strategy to support innovative start-ups has taken root the most: start-up density is remarkable and policy adoption has been sustained since the early years of introduction of the initiative in most of the region. However, this work has identified several features in which the local start-up landscape is far from uniform: these seem all to correspond to the traditional geographical boundary between Friuli and Venezia Giulia.

The two areas have sharply different strengths. Start-ups in Friuli are much more likely to be manufacturing enterprises, to obtain bank loans backed by a state guarantee, and their net numbers are growing at a more sustained rate. In Trieste (and Gorizia) there is a prevalence of ICT firms, which translates into a higher rate of adopters of advanced digital technologies such as artificial intelligence – whereas their numbers are extremely low in Friuli. The area of Trieste is also highly attractive for non-Italian entrepreneurs, with a share of foreign start-up founders larger than in any other major Italian city. However, innovative start-ups in Trieste have low access rates to guaranteed loans and an unwanted propensity to stagnate – i.e. low-growth firms never wind up. Finally, Trieste used to have an extremely high start-up density – rivalling Trento as the city with most innovative young firms over all limited companies – but has gradually lost its edge: the net number of registered start-ups has peaked very early (in 2017) and has since remained roughly constant. There are also signs that the Chamber of Commerce of Trieste and Gorizia is slightly less efficient than its equivalent in Pordenone and Udine.

Local policy-makers should then acknowledge that there are two distinct start-up landscapes in the same region, facing different challenges and having diverging needs. Friuli appears an excellent breeding ground for capital-intensive manufacturing enterprises, also because of good credit conditions. Trieste may be more oriented towards an “intangible-based” economy, with more digital start-ups and laboratory research resulting from the excellent network of research centres and higher education institutions based there. Both forms of entrepreneurship are arguably better suited for financing through patient capital and equity funding, rather than debt. There are also clear signs that the area of Trieste has inherently a significant potential for talent attraction, in particular from the Western Balkans.

The advice to local administration and ecosystem players is therefore to prefer the sub-regional level in designing future supporting policies. The priority to unleash Friuli’s potential is clear: encouraging uptake of digital solutions, thereby increasing the competitive edge of this territory in high-tech manufacturing. The area of Trieste requires a different, multifaceted approach. Empirical evidence points to a lack of growth capital, which might be tackled through specific programmes. Moreover, trials with initiatives to encourage the retention of non-Italian researchers and the relocation of entrepreneurial initiatives in the area seem an extremely good fit for this city. These should be prepared with a more accurate mapping of the cityscape than that performed in this paper, possibly performed at the level of individual entrepreneurs, and with the

ambition to identify also innovations with high market potential that have not yet turned into a formal entrepreneurial endeavour.

Measuring residual gaps in policy transfer

As said, the number of registered start-ups in Friuli-Venezia Giulia is high compared to the actual business population. This, and the observation that the territorial distribution of innovative firms is more spread and equal than in most of Italy, leads to the conclusion that awareness about the policy framework is high and well spread.

Our analysis cannot however determine whether this high density means that there are indeed many more innovative companies in Friuli-Venezia Giulia 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.

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.

More diversity in start-up entrepreneurship is needed. What can be done?

Arguably the most concerning finding emerging in this report is the very strong under-representation of women and youth among start-up entrepreneurs. Less than 10% of innovative start-ups registered in Friuli-Venezia Giulia 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 feature is not unique Friuli-Venezia Giulia: in all of the Italian north-east similar trends are on show, reaching their *zenith* in the *provincia autonoma* of Bolzano-Bozen. High-income, high-employment areas tend to have (proportionally) fewer start-ups founded by young people and women than regions that are perceived as more peripheral, and that certainly have worse economic outcomes in general, such as the heavily rural Southern regions of Basilicata and Molise.

This counterintuitive trend gives rise to two interpretations. The first is that public policy matters greatly in determining the 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 reports further elaborate on this, highlighting how even start-ups that obtain loans tend to get less funding than their peers in the North. The second is a suggestion that "risky" innovative entrepreneurship is less palatable for traditionally under-represented groups insofar there are other job market opportunities. As a consequence, even in wealthy areas with high education levels, gender and age inequalities not only persist, but may be even amplified in certain fields like the digital economy (cfr. OECD-EU 2018, "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. The OECD evaluation of the Start-up Act highlighted how student entrepreneurship in Italy is not widespread as in other comparable countries. In addition, our paper evidenced that the dearth of women entrepreneurs is particularly severe among the youngest age group, with Friuli-Venezia Giulia scoring particularly low under this metric.

Young people and women of all ages suffer from a lack of starting capital, which makes the entrepreneurial choice less palatable to begin with. Schemes targeted to these groups should therefore be oriented towards ensuring financial security to graduate students and researchers that devote part of their time to develop an entrepreneurial project. The EXIST stipend scheme in Germany (BMW, 2020b^[43]), which offers time limited monthly support to student entrepreneurs, with special provisions for those that have parenting responsibilities, 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.

Prioritise support to start-ups that grow...

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. how many investments were 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^[37]). 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.

The Start-up Act offers more extensive support in terms of debt financing, particularly through the SME Guarantee Fund. As shown in the report, Friuli-Venezia Giulia has a very high 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^[44]). Public policy attempts to attract more VC 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^[45]), 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 VC 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 VC 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.¹ 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): companies that have potential for growth tend strongly to demonstrate it since their early years after policy entry.

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^[46]).

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.

... and that operate in high-impact sectors, like artificial intelligence

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). According to this approach, in Friuli-Venezia Giulia the uptake of these technologies has been mediocre, particularly in the parts of the region where there is low intensity of ICT businesses.

Acknowledging the existence of a gap in adoption of advanced digital technologies, both in “pure digital” firm and in blended hardware-software start-ups, is extremely important at this stage. Artificial intelligence, digitised manufacturing and cloud computing are attracting growing interest from policy-makers, particularly in Europe, and investment in these areas is certainly going to increase in the coming years. 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^[47]). 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.²

Besides artificial intelligence, 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.

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 or 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.³

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. Another reason for this, 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; in the case of Friuli-Venezia Giulia, there is very wide variation within the same region. As it is difficult for national legislators to observe these specificities through a single lens, and to keep track to all support measures that are introduced at the local level by public bodies and ecosystem players, decentralised data collection and processing may really help policy-makers, entrepreneurs and investors get an accurate picture of the strength, weaknesses and opportunities of urban and regional ecosystems.

Box 5.1. Policy recommendations

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

- Draw up diversified strategies for start-ups between the Friuli sub-region, whose businesses are more oriented towards manufacturing, and the area of Trieste, which are more oriented towards “intangible” research and digital technologies. Give a prominent focus to the funding gap issue, which appears to be particularly severe for credit financing in the Venezia Giulia sub-region.
- In the context of the above, survey local ecosystem players to understand why start-up creation has somewhat slowed down in Trieste in the last three years. Assess whether policy transfer issues have emerged (e.g. if promotional activities have been downsized, and why).
- Encourage the uptake of emerging digital technologies among local start-ups, particularly in Friuli. Exploit funding and infrastructure arising from EU initiatives in the field of artificial intelligence: ensure wide and affordable access to high quality consulting services (via “Digital Innovation Hubs”) and testing facilities.
- Explicitly position Friuli-Venezia Giulia as a gateway to the Italian market for entrepreneurs in Central Europe and in the Western Balkans. Work with ecosystem players in target countries to disseminate information about start-up incentives, preferably in the local languages. Pilot attraction programmes in Trieste, which already has a multi-national start-up ecosystem, and learn from best practices already put in place by local players.
- 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 measures to encourage entrepreneurship among young women, as evidence shows that the gender gap is particularly severe for this group in Friuli-Venezia Giulia. Assess whether local government action (or lack thereof) creates adverse incentives to business creation.

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 Friuli-Venezia Giulia or in partnership with the central government:

- Launch a proper “scale-up strategy” alongside the Start-up Act, aiming at building a brand that is as recognised in the ecosystem as the original Act. Any scheme aimed at high-potential enterprises should put a prominent focus on the provision of patient capital.
- Launch a monitoring exercise to uncover eligible start-ups that have not registered into the national policy, exploiting the network of knowledge and support actors in place. Give priority to firms operating in highly innovative, high-impact sectors.
- 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).

- Ensure that the digital infrastructure – high-speed and high-capacity broadband, digital public administration services – is widespread and of high quality.
- Develop “early warning” mechanisms to identify start-ups that grow fast, and that develop innovations that are technologically solid, market-ready, and have disruption potential.
- 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 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.

² For more information, refer to the website of the *Piano Strategico Banda Ultralarga*, <https://bandaultralarga.italia.it>.

³ 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.

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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.

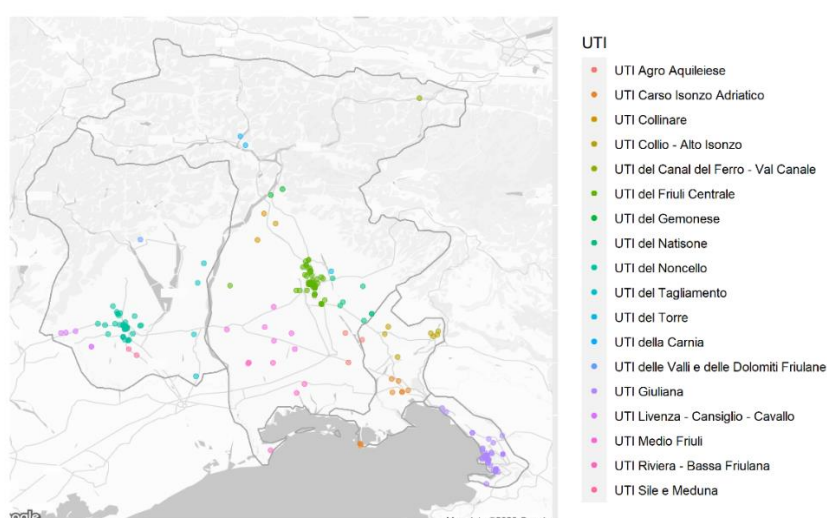
- Dedicated digital and free-of-charge procedure for incorporation: based on a web platform, it reduces red tape and costs (savings of about EUR 2 000 per incorporation) and simplifies subsequent adjustments to the deed of incorporation.
- Exemption from payment of annual fees to the Chamber of Commerce 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.

Annex B. Distribution of innovative start-ups in Friuli-Venezia Giulia by UTI

Figure B.1. Location of the head offices of innovative start-ups in Friuli-Venezia Giulia, distribution by Unione Territoriale Intercomunale (UTI) (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.

Source: OECD Trento Centre elaboration on Italian Business Registry data. The map is created in R with the [ggmap package](#).

Table B.1. Distribution of innovative start-ups in Friuli-Venezia Giulia by Unione Territoriale Intercomunale (UTI) (January 2020)

UTI	# innovative start-ups	% start-ups	inhabitants	% inhabitants
UTI Giuliana	64	27.7%	234 493	19.3%
UTI del Friuli Centrale	59	25.5%	172 135	14.2%
UTI del Noncello	49	21.2%	116 200	9.6%
UTI Carso Isonzo Adriatico	9	3.9%	73 404	6.0%
UTI Collio - Alto Isonzo	7	3.0%	65 999	5.4%
UTI del Natisone	7	3.0%	50 707	4.2%
UTI Medio Friuli	6	2.6%	50 986	4.2%
UTI Riviera - Bassa Friulana	6	2.6%	52 509	4.3%
UTI Livenza – Consiglio – Cavallo	5	2.2%	50 474	4.2%
UTI del Tagliamento	4	1.7%	57 527	4.7%
UTI Agro Aquileiese	3	1.3%	57 294	4.7%
UTI Collinare	3	1.3%	50 127	4.1%
UTI del Gemonese	2	0.9%	19 165	1.6%
UTI della Carnia	2	0.9%	37 552	3.1%
UTI Sile e Meduna	2	0.9%	52 380	4.3%
UTI del Canal del Ferro - Val Canale	1	0.4%	10 230	0.8%
UTI del Torre	1	0.4%	28 086	2.3%
UTI delle Valli e delle Dolomiti Friulane	1	0.4%	35 952	3.0%

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