2 Innovation-led growth in Piedmont, Italy: Trends, challenges and opportunities

This chapter analyses the main trends, challenges, and opportunities for innovation-led growth in Piedmont and compares it with other OECD regions. It illustrates the economic trends and the performance of Piedmont, including the latest figures on the effects of COVID-19, and how manufacturing remains a driver of productivity and growth. It then explores Piedmont's regional innovation performance, linking this with global trends and the potential effects of COVID-19, all of which could shape innovation and regional growth in the future.

In Brief

- Innovation is a key driver for regional competitiveness; however, Piedmont faces a series of structural and economic obstacles that hinder its regional innovation potential.
- Long-term development patterns have eroded Piedmont's economic base. Two severe recessions in 20 years and low economic performance weakened the regional job market, increasing cyclical and structural unemployment, and resulted in a strong pattern of job polarisation.
- Productivity growth will need to be fostered, especially among small and medium-sized enterprises (SMEs), which are facing the largest difficulties.
- Human capital and skills need to be reinforced. A low share of the labour force in Piedmont has a tertiary education. Moreover, a considerable amount of youth are unemployed, which is an obstacle for the region as it strives to reach its potential. Matching conditions between labour supply and demand need to be improved as well.
- Innovation can help the regional economic system reverse the productivity slowdown and promote firms and employment performance, including among SMEs.
- Piedmont has the potential to promote innovation-led growth, by enhancing the participation of SMEs in innovation production and diffusion while also taking steps to enhance entrepreneurial skills.
- While COVID-19 is challenging the regional economy, it is also providing opportunities to boost innovation and raise productivity, including through digitalisation and investment in infrastructure and skills.

Introduction

Regions and cities are facing some of the most challenging moments in recent times. Global trends, such as the health, economic and social impact of the COVID-19 pandemic, the globalisation of production and consumption, the 4th Industrial Revolution, climate change and demographic pressures (ageing and migration) are some of the most striking phenomena shaping the geography of development, with significant long-term and territorially-differentiated economic and social outcomes. These global phenomena have led to rising spatial inequalities and an economic landscape that is increasingly polarised along geographic fault lines. This is particularly noticeable in regions experiencing long-term economic decline or stagnation (OECD, 2019[1]), urban shrinkage, and that are at risk of being caught in a "middle-income trap", i.e. those whose economic output might not be able to grow further (Iammarino, Rodríguez-Pose and Storper, 2020[2]).

Regions with economies rooted in manufacturing, especially those specialised in traditional and low-tech manufacturing are particularly at risk of falling into a development trap and are often challenged by a process of industrial transition. Such regions suffer from increased competition fostered by globalisation, given their generally higher production costs compared to low-income regions. At the same time, they also have lower productivity and innovation levels than high-income regions, thus affecting investment levels. To help these regions avoid or exit such a trap, it is more advantageous to focus on building capacities and competitive advantage rather than on managing decline. 'Place-based' policy responses become

critical in such instances, as they promote a region's internal or inherent development assets, thereby making it easier for regions to seize the opportunities inherent in trade openness and economic integration.

A series of characteristics are common to regions in industrial transition, such as Piedmont, although these traits may be present to a greater or lesser extent in each place. These characteristics include lower than average per capita gross domestic product (GDP), annual GDP growth rates of less than 1%, rising unemployment rates and a lower than average percentage of the population with a tertiary education. They can be compounded by specific trends, such as an ageing population, sectoral restructuring, and industrial decline. To attenuate these characteristics and manage such trends, regions in industrial transition, including Piedmont, frequently rely on action in a number of policy areas including a focus on skills and jobs, making the most of the entrepreneurial fabric, and broadening innovation (OECD, 2019[3]).

Innovation plays a key role in fostering the regional economic potential and reversing poor performance dynamics. Productivity is the ultimate driver of regional competitiveness, and innovation, together with innovation diffusion, can boost productivity. However, innovation investments can be costly and their returns are uncertain, especially in regions specialising in more traditional activities.

This chapter analyses the economic features and development drivers of Piedmont in an international comparative perspective, focusing primarily on the OECD area[1]. The chapter describes Piedmont's regional performance, such as GDP and GDP per capita. In recent years, the level and nature of Piedmont's economic activity has been driven by a process of industrial transition. Compared to OECD regions overall, Piedmont's industry still plays a large role in the regional economy. However, manufacturing jobs in Piedmont are falling, especially in SMEs, and the region has lost a share of its competitive advantage, as measured by productivity, despite a recent, slight recovery. Within this context, innovation can contribute to reversing the region's weak productivity dynamics.

The chapter begins with a look at the main economic trends of Piedmont, with a specific emphasis on the growth rate of regional GDP and job market performance. Then, the chapter focuses on the sectorial trends, including in manufacturing, taking into account key indicators such as gross value added (GVA), productivity and employment. The chapter moves on to analyse the main trends in the region's innovation activity, including research and development (R&D) investments, patenting, collaboration in R&D activities and skills and employment. Then, a dedicated session illustrates how COVID-19 has affected the regional economy and discusses how the pandemic could affect future regional economic and innovation trends.

Piedmont: a wealthy region with low economic and labour performance

This section highlights the main features and trends characterising Piedmont's regional economy. OECD evidence shows that Piedmont has good economic development levels, yet it exhibits weak long-term growth patterns that erode its economic base. The region was severely hit by recessions in the last two decades. Low economic performance has resulted in a weakening of the regional job market, with rising cyclical and structural unemployment, as well as a strong pattern of job polarisation.

Structural and territorial features of the regional economy

Piedmont is an upper-mid income region, with a regional GDP per capita 17% higher than the OECD regional average (OECD, n.d.[4]) and 2% higher than the OECD average, overall in 2018 (OECD, 2021[5]). In the same year, Piedmont's GDP per capita reached EUR 31 445 (USD 46 075 in purchasing power parity), placing it 135th out of 387 OECD regions[2] and 12th out of 21 Italian regions. Piedmont's GDP per capita is comparable to Tuscany and Friuli-Venezia Giulia (Italy), Aragon (Spain), Lisbon (Portugal), Schleswig-Holstein (Germany), and North Middle Sweden (Sweden). In terms of total regional economic size, with 4.34 million inhabitants, more than 426 000 active firms and a regional GDP of approximately EUR 140 billion, Piedmont is in the top 20% of OECD regional economies. Piedmont's total regional GDP

is comparable to regions such as Provence-Alpes-Côte d'Azur (France), Berlin (Germany), North-Holland (the Netherlands), Warsaw (Poland), and Oklahoma (United States). The region exhibits a marked geographic polarisation, with a divide between Turin and the rest of the territory. The Functional Urban Area (FUA)[3] of Turin covers less than 7% of the region's geographic territory, but hosts 40% of the total regional population and 44% of its workers in business sectors (ISTAT[6]). The second largest FUA in Piedmont, Novara, is three times smaller than Turin in terms of surface area, but is more than 10 times smaller in terms of population and workers in business sectors (less than 4%). More than 43% of the region is mountainous, contributing to the spatial concentration of population in some parts of the region and to an urban-rural divide. Between 2012 and 2018, jobs in Piedmont's business sectors grew by 1% and employment in urban areas grew by 3%, yet employment fell by an average of 2% in non-urban areas (ISTAT[6]).

The region shows geographic imbalances when taking into account its administrative provinces[4], where GDP data are available. The province of Turin contributes 55% of the regional GDP, while the remaining 45% is distributed across the other seven provinces. Furthermore, the Piedmontese provinces are highly differentiated in terms of GDP per capita. While the GDP per capita of Turin and of Cuneo are considerably higher than the OECD average, and Novara and Alessandria show values in line with the OECD average, the other provinces show lower GDP per capita compared to the OECD average. Verbano-Cusio-Ossola and Asti, for instance, have a GDP per capita significantly below the OECD average (Table 2.1).

Table 2.1. Share of regional GDP and GDP per capita in Piedmont provinces (2017)

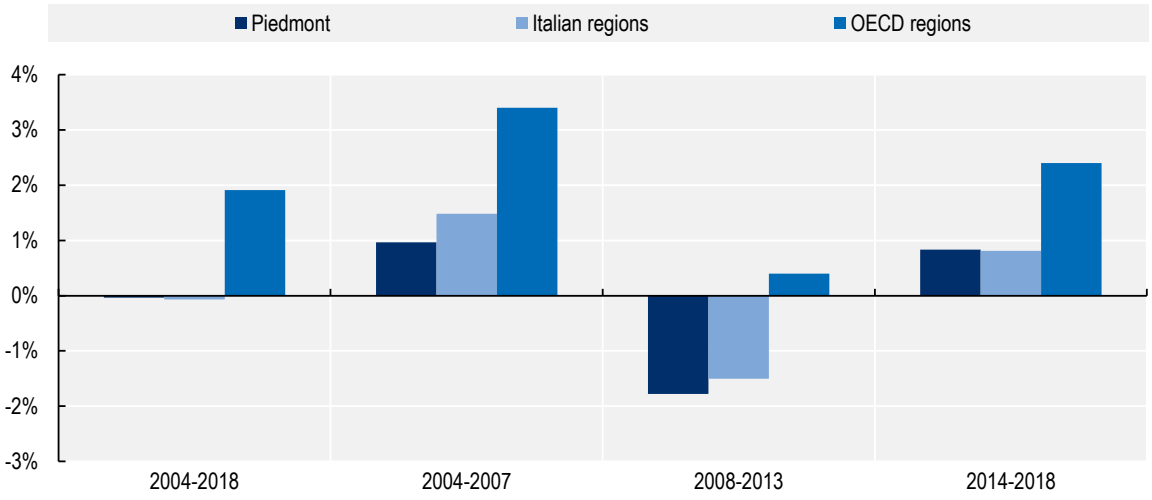
Province	Share of regional GDP	GDP per capita (USD)	GDP per capita (OECD=100)
Turin	55%	47 228	109
Vercelli	3%	39 419	91
Biella	4%	39 165	90
Verbano-Cusio-Ossola	3%	35 561	82
Novara	8%	42 907	99
Cuneo	14%	46 865	108
Asti	4%	36 895	85
Alessandria	9%	41 589	96
Piedmont	*100%*	*46 075*	*106*
Italy (National average)		*44 699*	*103*
OECD average		*43 518*	

Source: OECD elaboration from OECD Regional Statistics Database.

Economic trends

Piedmont shows weak long-term development trajectories and was severely hit by recessions. Despite its strong performance in terms of GDP levels, the Piedmont's performance in other areas is less stellar compared to other OECD regions. From 2004 to 2018, the regional growth rate of GDP in Piedmont, as well as in Italy, on average, was very close to zero, while the average GDP growth rate for OECD regions was almost 2%. Piedmont was particularly hurt by the Great Recession of 2007-2009, resulting from the financial crisis, and also by a second recessionary period that affected Italy between 2011 and 2014. Piedmont, on average, was more affected by both recessionary periods than the rest of Italy (Figure 2.1).

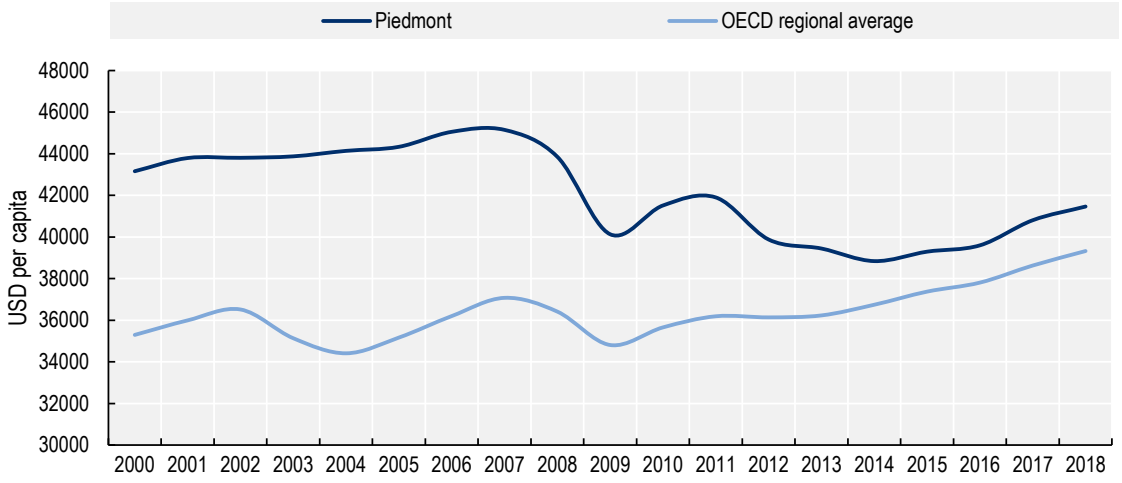
Figure 2.1. Annual growth rates of real GDP in Piedmont, Italian regional average, OECD regional average (2004-2018)



Note: Average annual growth rates, constant Purchasing Power Parity, base year 2015.
Source: OECD elaboration from OECD Regional Statistics Database.

Despite a recovery beginning in 2015, by 2018 the region's economy still had not bounced back to pre-crisis (2007) levels, and Piedmont's regional GDP increased at a slower pace than the OECD regional average. In 2007, GDP per capita in Piedmont was 26% higher (USD 8 000) than the OECD regional average. In 2015, however, GDP per capita in Piedmont was only 10% higher (less than USD 2 000) than the OECD regional average (Figure 2.2). Additionally, in 2019, the region entered into another recessionary phase, which primarily affected the manufacturing industry and resulted in a decline in industrial production (Bank of Italy, 2020[7]).

Figure 2.2. Gross Domestic Product per capita in Piedmont and OECD regional average (2000-2018)

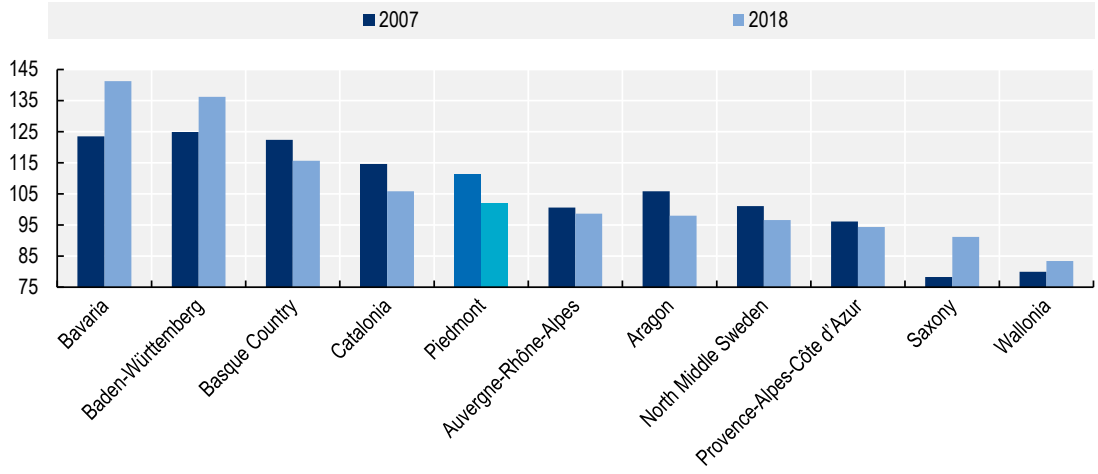


Note: USD, constant Purchasing Power Parity, base year 2015. The values of Piedmont and the OECD regional average refer to the left axis, the difference between Piedmont and the OECD regional average refers to the right axis.
Source: OECD elaboration from OECD Regional Statistics Database.

Patterns of decline are also evident when comparing Piedmont with a sample of OECD benchmark regions: Auvergne-Rhône-Alpes and Provence-Alpes-Côte d'Azur (France); Wallonia (Belgium); the Basque Country, Catalonia, Aragon, Valencia (Spain); North Middle Sweden (Sweden); Bavaria, Baden-

Württemberg and Saxony (Germany). In terms of GDP per capita, Piedmont ranks 5th among these 12 regions. However, in 2007 Piedmont's GDP per capita was 7% higher than the average of the benchmark regions (11% higher than the OECD average), while in 2018 the level was 1% below the average of the benchmark regions (2% higher than the OECD average). From 2007 to 2018, while some regions, such as the German regions[5] and Wallonia[6], increased their level of GDP per capita compared to OECD regions, Piedmont lost its share in a pattern similar to that seen in Catalonia, Aragon, and the Basque Country. As compared with benchmark regions, Piedmont experienced the largest loss of GDP per capita (Figure 2.3). The German regions (Baden-Württemberg, Bavaria, Saxony) and Wallonia are the only regions where GDP per capita increased. As the rest of the chapter will show, GDP levels and the dynamics of benchmark regions are generally coupled with higher labour market and innovation performance.

Figure 2.3. GDP per capita in selected OECD benchmark regions (2007-2018)



Note: OECD average=100
Source: OECD elaboration from OECD Regional Statistics Database and OECD Economic Outlook

The job market in Piedmont faces rising unemployment and polarisation

Piedmont's long-term, weak growth patterns and its slow recovery from two, back-to-back recessionary periods are reflected in its job market conditions. The labour force participation rate increased by 6% in Piedmont in the last years (from 67.8% in 2007 to 71.6% in 2019) and the employment rate also increased moderately (from 64.9% in 2007 to 66% in 2019). However, despite the rising participation rate, when compared to the OECD average, Piedmont's job market figures remain weak (

Table 2.2). Participation rates and employment rates are still below the OECD average, as well as those of the OECD benchmark regions (Box 2.1).[7] In addition, despite outperforming the Italian average, Piedmont also demonstrates markedly lower participation and employment rates when compared to Italy's benchmark regions – Bolzano-Bozen, Emilia-Romagna, Aosta Valley, Trento, Lombardia.[8]

Table 2.2. Job market indicators in Piedmont (2019)

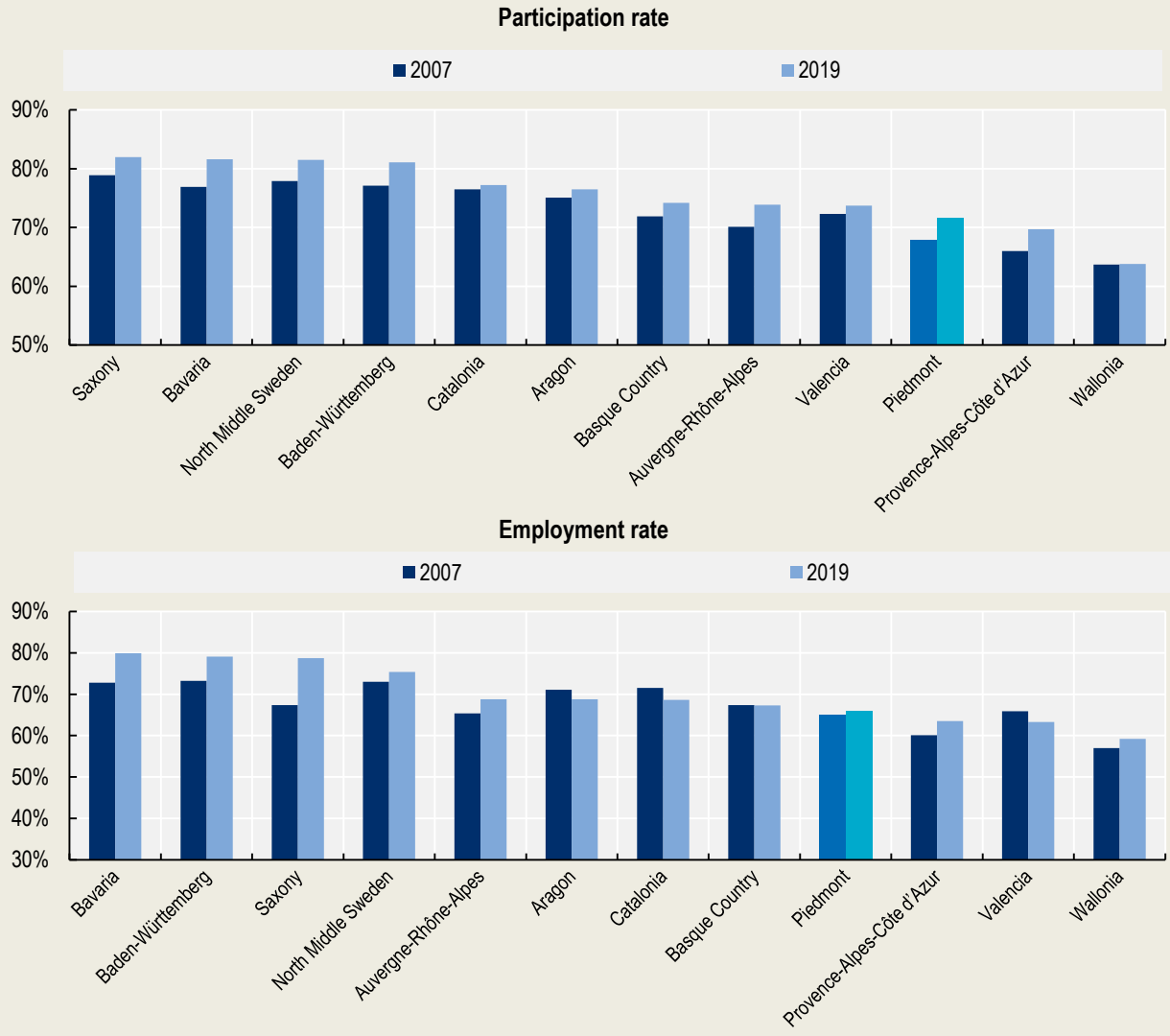
	Piedmont	Italy	OECD
Participation rate (% labour force over working age population 15-64 years old)	71.6%	65.7%	72.8%
Employment rate (% employment 15-64 over working age population 15-64 years old)	66%	59%	68.7%
Unemployment rate (total, % of labour force 15+)	7.6%	10%	5.4%
Long-term unemployment rate (% of long-term unemployed over total unemployed)	53.7%	57%	25.8%
Female unemployment	9.2%	11.1%	5.6%
Youth unemployment (% unemployment 15-24 over labour force 15-24)	26.8%	29.2%	11.7%
NEET (15-29 year-olds, % in same age group)	17%	23.7%	12.8%

Source: OECD elaboration from OECD Regional Statistics, OECD Employment Outlook Statistics, Italian Statistical Bureau.

Box 2.1. Participation and employment rate in OECD benchmark regions

Low rates of labour force participation and employment are evident when comparing Piedmont with a series of OECD benchmark regions (Figure 2.4). The comparison shows that regions with better economic performance, such as the German regions and North Middle Sweden, are also those with higher participation and employment rates.

Figure 2.4. Participation and employment rates in OECD benchmark regions (2007-2019)

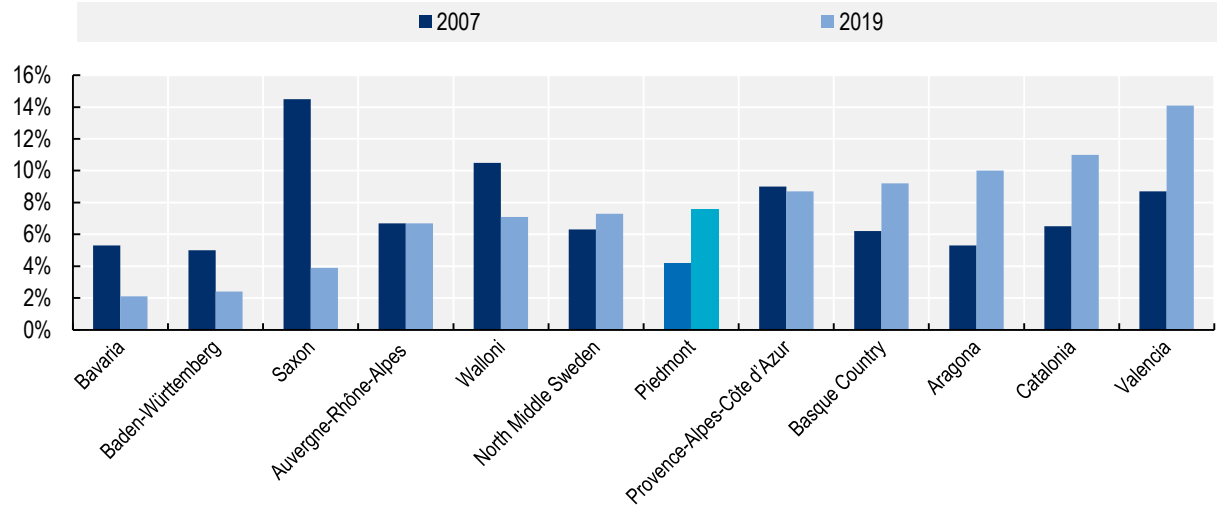


Source: OECD elaboration from OECD Regional Statistics Database.

The region's low regional economic performance contributes to rising unemployment levels. Piedmont's unemployment rate almost doubled between 2007 and 2018, rising from 4.2% to 8.2%, dropping slightly in 2019 to 7.6% (OECD, 2021[8]). Despite remaining below the OECD average until 2012, by 2019 the unemployment rate was 40% higher than the OECD average. Unemployment in Piedmont also shows a

considerable gender gap. While the unemployment rate for men is 6.3% (9.1% in Italy, 5.25% in the OECD area), the unemployment rate for women is 9.2%, against the OECD average of 5.6%. As for labour market participation and employment rates, in the 2007-2019 period Piedmont witnessed a rise in unemployment also compared with benchmark regions (Figure 2.5). While before the 2008-2009 recession Piedmont was in first place, having the lowest unemployment rate among benchmark regions, by 2019 it had fallen to 7th place out of 11. Country patterns clearly emerge from the comparison among benchmark regions, linking unemployment with general national economic performance. German regions outperform the others, which has been associated with strong economic performance and active policies that match labour supply with labour demand (IZA, Germany/IZA, Germany, 2019[9]).

Figure 2.5. Unemployment rates in OECD benchmark regions (2007-2019)

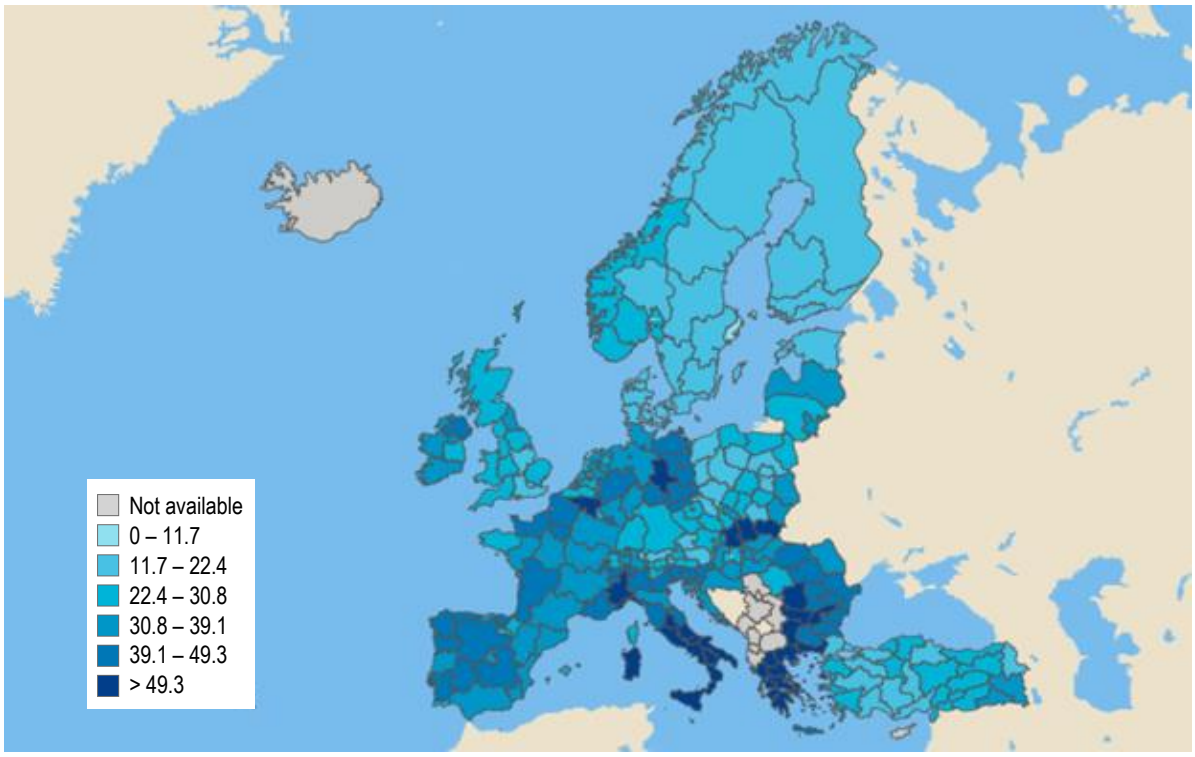


Source: OECD elaboration from OECD Regional Statistics Database.

Long-term unemployment highlights structural weakness in Piedmont. Long-term unemployment (i.e. people who have been unemployed for one year or more), represents the structural part of unemployment and indicates low labour market efficiency. It is a large threat for regions due to the harmful impact on regional economies. For instance, long-term unemployment, even if tackled by policies, often has persistent effects and can lead to economic stagnation or decline (OECD, 2020[10]). Hence, regions should actively work from both the supply side (skills and employability) and the demand side (support to firms), as well as in improving public employment services to prevent workers from falling into long-term unemployment. Long-term unemployment also has high potential risks. For instance, it is often coupled with mental and material stress for those affected and their relatives, and it produces a loss of human and social capital. It often affects already disadvantaged groups, such as youth and women, as well as low-skilled people. In 2019, long-term unemployment in Piedmont was almost 54% of the total unemployment, meaning that more than half of the job seekers in Piedmont have been unemployed for one year or more. The OECD average (based on national data) was around 26%. This puts Piedmont in the top 15% of OECD regions in terms of long-term unemployment. In a national comparison, Piedmont ranks 8th out of 21 Italian regions with respect to long-term unemployment levels, with values similar to those in southern Italy. The phenomenon is particularly marked in the provinces of Alessandria (59.5%), Asti (58.7%), and Novara (57.2%). The high share of long-term unemployment is also evident when comparing with other OECD regions (Figure 2.6).

Figure 2.6. Long-term unemployment in OECD European regions

% share of long-term unemployment over total unemployment (2019)



Source: OECD elaboration from OECD Regional Statistics Database

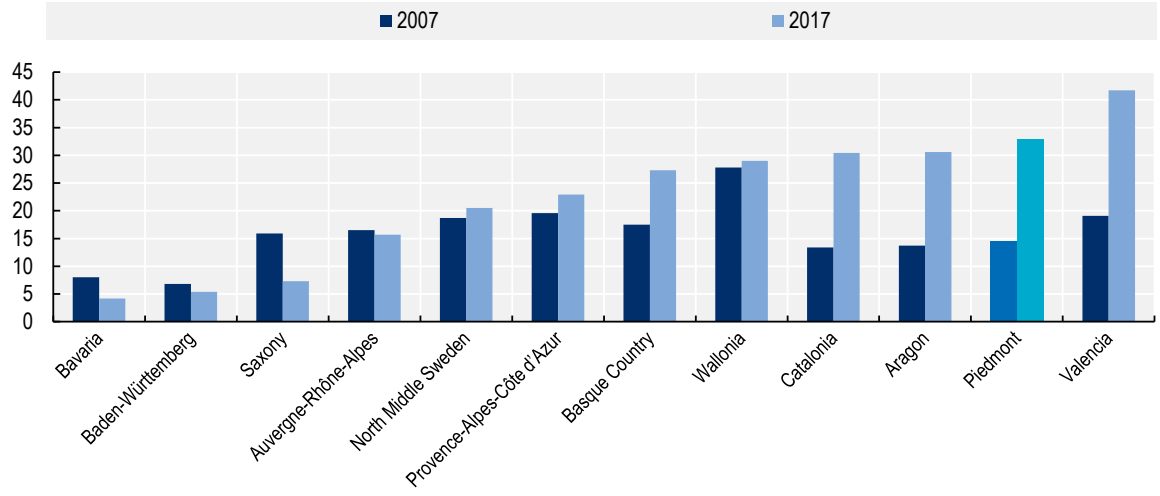
Piedmont exhibits the highest share of long-term unemployment compared to the benchmark regions. The share of long-term unemployment in the best performing benchmark region, North Middle Sweden, is 18%. Baden-Württemberg and Bavaria have respectively 24.3% and 28.2%. The Spanish regions of Catalonia, Basque Country, Aragon and Valencia range from 36.2% and 40.3%. Provence-Alpes-Côte d'Azur has 42.5% and Auvergne-Rhône-Alpes shows 32%. Saxony (with the second largest German share of long term unemployment) and Wallonia (with the highest value in the BENELUX area) show values comparable to those of Piedmont: respectively 49% and 49.6%.

Youth are particularly affected by the job market trends. Youth unemployment and the share of youth that are neither in employment nor in education or training (NEET), have significant social and economic consequences, at the individual level, and the aggregate regional level. Young people disengaged from work and education or training are at risk of social exclusion, and they represent a loss of economic opportunities for the regional economy. In Piedmont, youth unemployment reaches almost 27% (Figure 2.7). This value, slightly above the Italian national average, contrasts significantly with an average of less than 12% in the OECD area (OECD, 2020[10]). Additionally, around 17% of Piedmont's youth are NEET, approximately 4% higher than the OECD average (Figure 2.8). Recent estimates released by the Italian Statistical Bureau updated the share of NEET in Piedmont at 20% in 2020 (Italian Statistical Bureau, 2021[11]). A high level of early leavers from education and training[9] also characterises Piedmont (Figure 2.9). Even if the rate of early leavers has improved over the period 2000-2018, there was a remarkable increase in the period 2016-2018 (passing from 10.2 to 13.6). In addition to rising youth unemployment and inactivity among the youth population, which is common to many Italian regions (Marino, F.; Nunziata, L., 2017[12]), Piedmont faces relatively low participation rates in higher education. The share of the labour force with a tertiary education is in the bottom 10% of OECD regions, despite the

presence of three universities in the region and an enrolment rate that is slightly higher than the national average.[10] This calls into question the absorptive capacity of the regional productive system. The combination of youth unemployment, NEET, early school leavers and the low share of labour force with a tertiary education is a driver of long-run stagnation and productivity. It calls for active investment in human capital and skills, as well as improving the matching conditions between labour supply and demand, especially for youth already in or about to enter the labour force.

Figure 2.7. Youth unemployment rate in benchmark regions

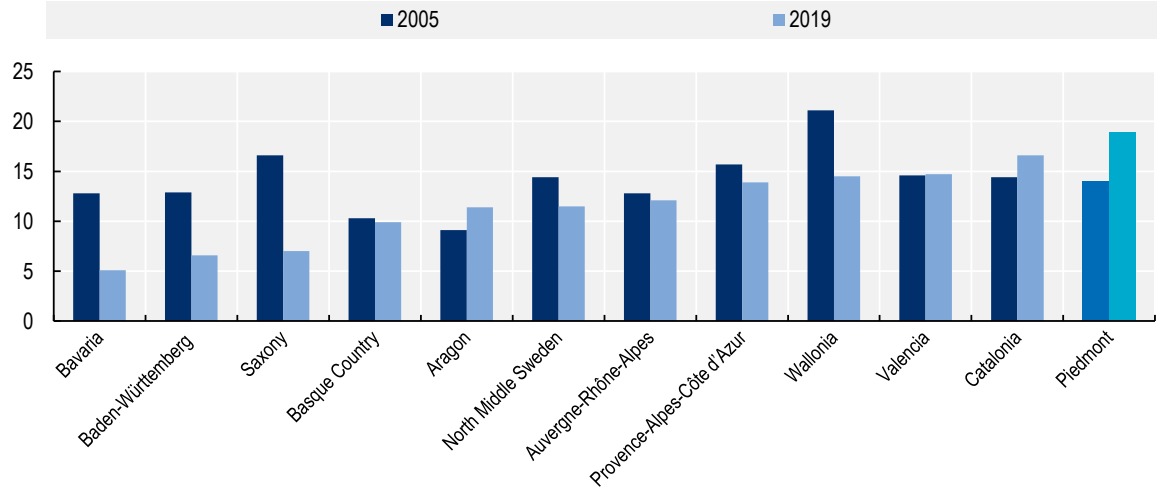
% share of unemployed over the labour force aged 18 to 24



Source: OECD elaboration from OECD Regional Statistics Database.

Figure 2.8. Youth not in employment, education or training

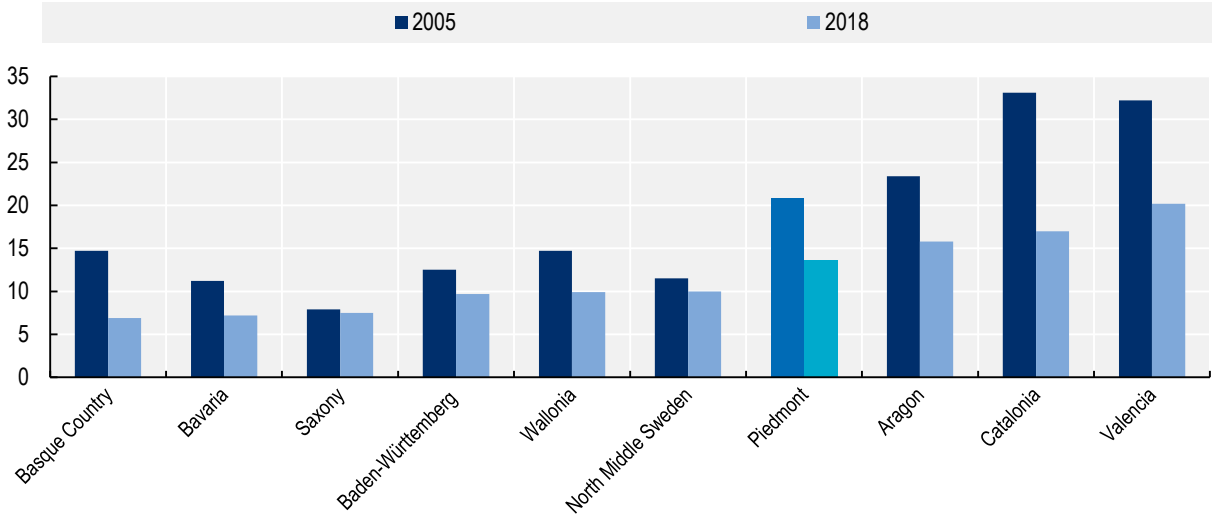
% share of NEET over total population aged 18-24



Source: OECD elaboration from OECD Regional Statistics Database.

Figure 2.9. Early leavers from education and training

% share over the total population aged 18 to 24



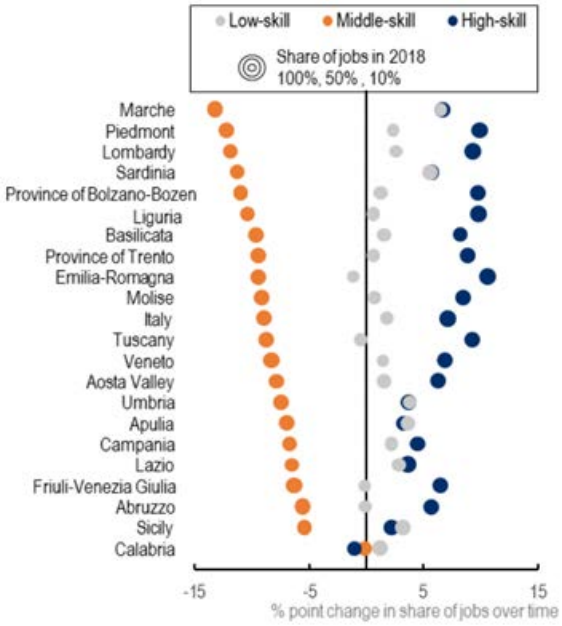
Source: OECD elaboration from OECD Regional Statistics Database

Job polarisation characterises regions in industrial transition. Job polarisation is the decline of the share of middle-skill jobs over total employment.[11] The phenomenon is mainly driven by a structural shift from manufacturing to service industries, and/or by technological change within industries (which affect the demand of jobs). Both aspects may cause employment growth in high-skill occupations (e.g. managers, human resources administrators, IT specialists, etc.) as well as in low-skill service occupations (e.g. sales assistants, logistics operators, etc.). Hence, the phenomenon is strongly interconnected with the dynamics of the industrial sectors that characterise the regional economies. It characterises many economic sectors, yet for middle-skill jobs the highest drops are in manufacturing, such as pulp and paper, textiles, transport manufacturing, and machinery (OECD, 2017[13]).[12] Thus, regions in industrial transition, such as Piedmont (as well as North Middle Sweden and Wallonia, for example) are particularly affected because of a series of interconnected factors. First, their industries were largely based on middle-skill jobs. Second, manufacturing reduced its presence, and services rose (with higher demand for both low- and high-skill jobs). Third, automation in manufacturing progressively substituted jobs consisting of routine tasks previously performed by middle-skill workers. Fourth, offshoring and fragmentation of value chains have further decreased demand for middle-skill jobs (Goos, Manning and Salomons, 2014[14]). The decline of middle-skill employment raises concerns, including its net effects in terms of total employment and wages, since such a decline may result in either a rise or fall of employment (and wages). In addition, it affects the wage distribution, with possible rising inequalities between high and low wages. Furthermore, workers who held middle-skills jobs may either transition to higher- or lower-paid occupations, as well as to underemployment or unemployment. Innovation can affect job polarisation. Hence, while promoting innovation and innovation diffusion, policies should also consider the capacity to generate jobs, the quality of the jobs generated, and whether the workforce is being prepared for the jobs of the future.

Job polarisation is strongly evident in Piedmont, pointing to a long-term trend of job polarisation. Between 1994 and 1996 in the OECD area, 42% of jobs were estimated to require middle-skills to be performed. This dropped to 31% in the 2016-2018 period (OECD, 2020[10]). The Italian job market was not spared by this phenomenon (Basso, 2020[15]), as the share of medium-skilled jobs in Italy dropped from 43% in 1995 to 32% in 2019 (OECD, 2020[10]). While Piedmont's economy is still based on intermediate professions requiring middle-skills, among Italian regions, Piedmont exhibits one of the most striking figures in terms

of job polarisation among Italian regions. In 2000, middle-skill jobs accounted for almost half of the regional employment, while in 2018 the share of middle-skill jobs was 37%. Hence, the share of middle-skill jobs dropped by more than 12%, representing the second largest drop among Italian regions, after Marche, which is another region whose economy is strongly based on (traditional) manufacturing (Figure 2.10).[13]

Figure 2.10. Job polarisation in Italian regions, 2000-2018

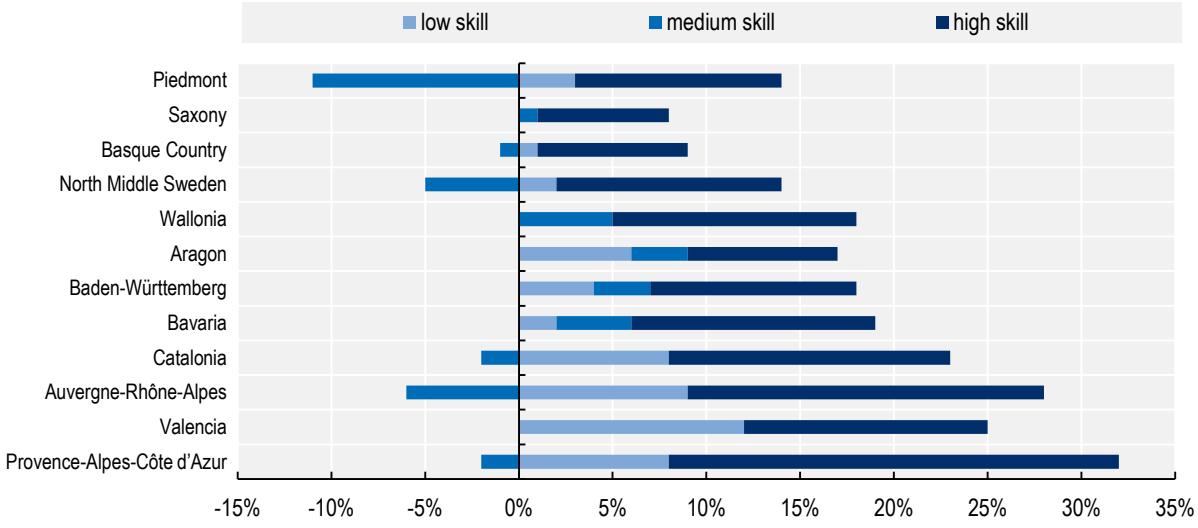


Source: (OECD, 2020[16])

Piedmont is more affected by job polarisation and a shift in labour demand from middle-skill to high-skill occupations than the benchmark regions. On average, the benchmark regions show patterns where high-skill workers provided the highest contribution to total growth in employment. In some regions, medium-skill workers diminished (e.g. Auvergne-Rhone Alpes, Provence-Alpes-Côte d'Azur, the Basque Country, Catalonia, and North Middle Sweden), in others they continued to increase although more slowly than high-skill workers (e.g. in Aragon, Baden-Wurttemberg, Bavaria, Saxony and Wallonia). Piedmont shows the lowest aggregate job growth performance and also the largest gap between growth in high skill workers and decline of medium-skill workers (Figure 2.11). This causes concerns regarding the capacity to absorb medium-skill workers, and also on the possible widening in income gaps within the wage distribution. Targeted actions to monitor the job markets and address policy responses are required, with particular attention to the transition from middle-skill jobs to better- or worse-paid jobs.

Figure 2.11. Job polarisation in selected benchmark regions, 2000-2018

Contribution to total growth by low-skill, medium-skill and high-skill workers



Note: Regions are ordered by the overall growth rate (from bottom to top)
Source: (OECD, 2020[16])

In absolute terms, more than 192 000 medium-skilled jobs were lost between 2000 and 2018. Of the middle-skill jobs lost in Italy, 1.5 out of 10 were in Piedmont. The drop in middle-skill jobs has been offset mainly by the growth of high-skill jobs, which accounted for 29% of regional jobs in 2000. This share increased to 39% in 2018: in absolute terms, the labour market added almost 200 000 high-skilled jobs in that period (Table 2.3). On the one hand, the concurrent drop of middle-skill jobs and the growth of high-skill jobs might indicate a gradual shift towards a knowledge- and innovation- based economy in Piedmont. On the other hand, it might be characterised by asymmetric effects among firms and workers, with unclear net effects in terms of firm performance, innovation and employment.

Table 2.3. Low-skill, middle-skill and high-skill jobs in Piedmont and Italy, 2000-2018

	Share (2018)		Growth rate (2000-2018)		Contribution to total job growth (2000-2018)		Absolute variation (2000-2018)	
	Piedmont	Italy	Piedmont	Italy	Piedmont	Italy	Piedmont	Italy
Low-skill	23.9%	26.5%	15%	18%	3%	4%	55 765	937 936
Middle-skill	37.1%	35.3%	-22%	-12%	-11%	-5%	-192 177	-1 153 147
High-skill	39.0%	38.3%	39%	35%	11%	11%	199 036	2 296 117
Total	*100.0%*	*100.0%*	*4%*	*10%*	*4%*	*10%*	*62 625*	*2 080 906*

Source: OECD elaboration from (OECD, 2020[16])

Industry remains a strong regional asset, but it is losing jobs

Piedmont is one of the most industrialised regions in the OECD. Around one-fifth of its jobs are in industrial sectors. This is 6% higher than the OECD regional average (Table 2.4)[14]. Services account for 61% of total jobs, against the OECD average of 66%. Within services, public services (e.g. public administration, education, and health) are less present in Piedmont than in other OECD regions, on average. At the same time, there is a higher presence of professional, scientific, technical, administration and support service

activities. Piedmont also shows a remarkable specialisation in Information and Communication Technology (ICT) activities – 3.1% of regional jobs, against the OECD regional average of 2% – meaning that Piedmont's specialisation is almost 60% higher than the OECD regional average. This indicates that, despite the long-term pattern of decline, manufacturing is still a strong asset for Piedmont, and it can underpin regional development strategies and actions. Moreover, its specialisation in ICT activities could potentially have substantial multiplicative effects for the regional economy and jobs.

Table 2.4. Employment shares by sector (2016)

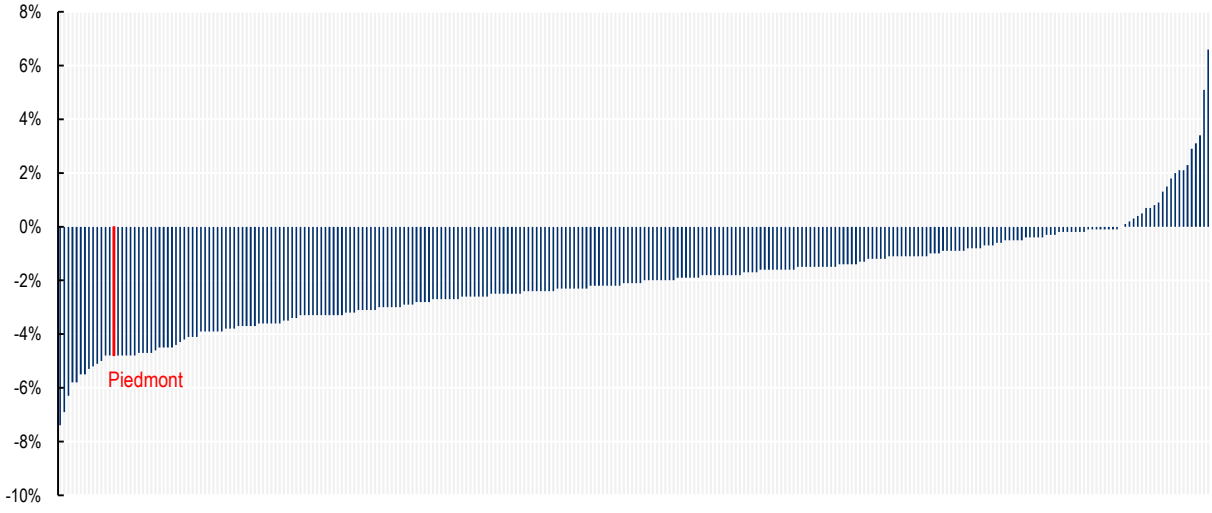
% shares over regional employment and Regional Specialization Index

	Piedmont	OECD Regional average	Piedmont Regional Specialization index (OECD regional average=100)*
Agriculture, forestry and fishing	2.4%	6.5%	36
Industry	21.1%	14.2%	149
Construction	6.1%	6.8%	89
Distributive trade, repairs, transport, accommodation, food serv. activities	23.9%	25.7%	93
Financial and insurance activities	3.0%	2.5%	122
Information and communication	3.1%	2.0%	159
Professional, scientific, technological activities, admin., support service activities	12.4%	9.9%	126
Public administration, compulsory social security, education, human health	17.5%	24.4%	71
Real estate activities	0.7%	1.5%	48
Other services	9.8%	6.4%	153

Note: *Regional Specialisation Index: values higher than 100 indicate that Piedmont is more specialised in the activity, as compared to the OECD regional average.
Source: OECD elaboration from OECD Regional Statistics Database.

The loss of manufacturing jobs is much more marked in Piedmont than in other OECD regions. Between 2004 and 2018, Piedmont's manufacturing sector shed 16% of its jobs (more than 73 400 jobs). Despite this, total employment in the region grew by 3.3% (72 000 jobs) in the same period, with the decline in manufacturing jobs offset by growth in business services. The decline in the share of manufacturing sector jobs is a common trend among OECD regions. Only 8% of OECD regions show an increase in their share of manufacturing as a percentage of total employment, and they are mostly located in the Czech Republic, Germany and Mexico. However, when compared to other OECD regions, Piedmont is experiencing one of the highest rates of decline in the share of manufacturing over total employment, which is similar to other industrial regions such as Lombardy (Italy), West Midlands (United Kingdom), Flanders (Belgium), and Aragon (Spain). Regions with the poorest performance include the Spanish regions of Catalonia, the Basque Country, La Rioja and Valencia, together with Budapest (Hungary). The highest regional growth rates are found in Mexico (Aguas Calientes, Baja California Sur, Chihuahua, Coahuila), the Czech Republic (Central Bohemian Region, Northwest), and Germany (Saxony, Saxony-Ahnalt, Thuringia) (Figure 2.12).

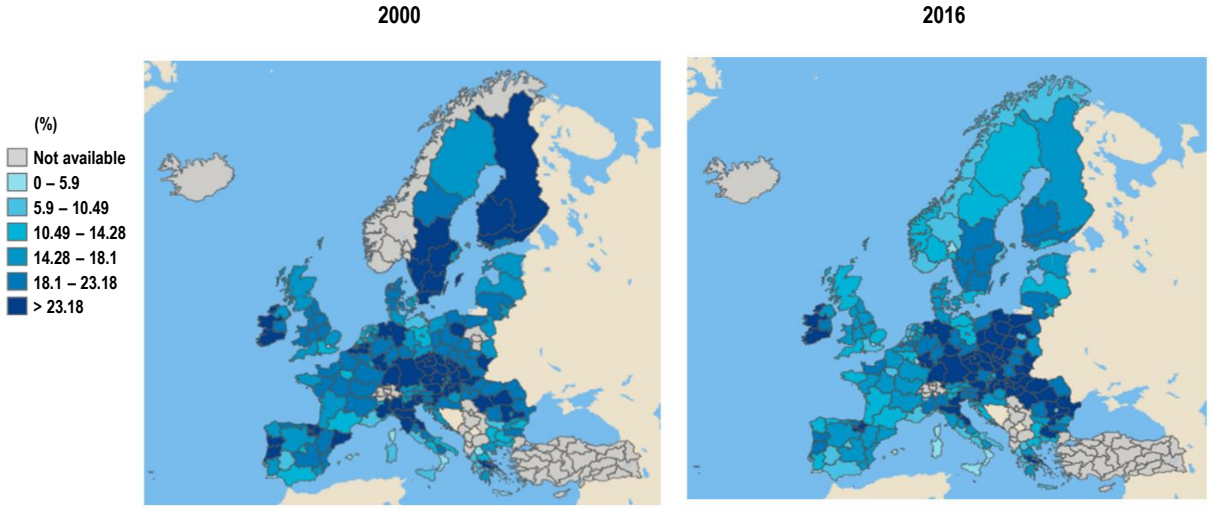
Figure 2.12. Change in the share of manufacturing sector over total employment in OECD regions (2004-2017)



Source: OECD elaboration from OECD Regional Statistics Database.

Gross value added follows the same trends. The decline in the share of value-added in manufacturing is uneven across regions in European OECD countries (Figure 2.13). Some regions, such as those in Italy, Spain, France, and the Nordic countries show significant drops, while regions in Central and Eastern Europe maintain a higher share. The link between manufacturing and economic success depends on the innovative capacity of manufacturing and its multiplicative effects in terms of demand for advanced services and high-skill employment (Iammarino, Rodriguez-Pose and Storper, 2017[17]). This is reflected in the strong role of manufacturing in many high-income regions, especially in Germany.

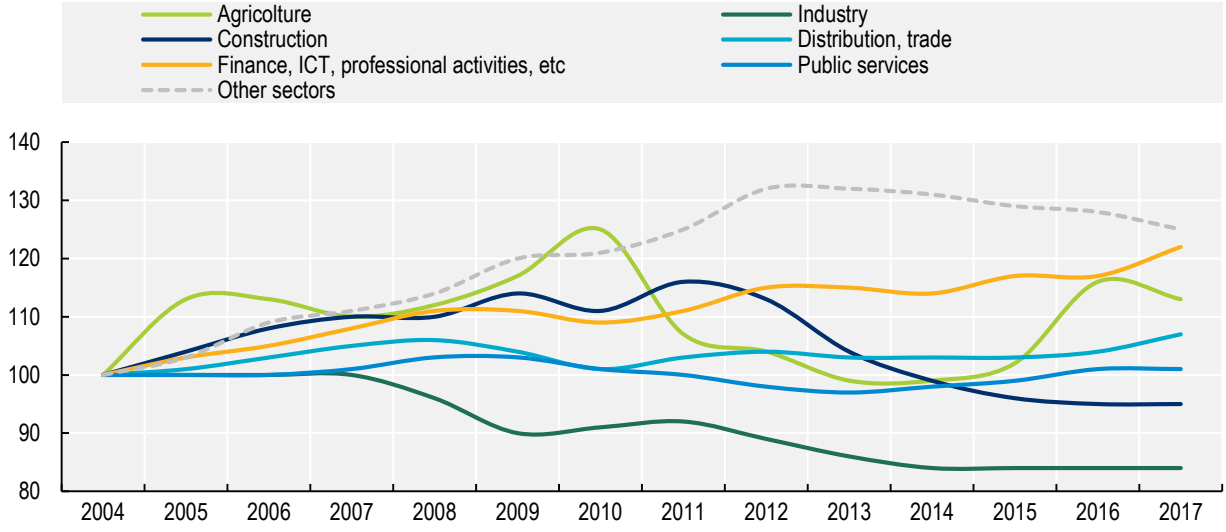
Figure 2.13. Share of Gross Value Added in manufacturing in European OECD regions (2000, 2016)



Source: OECD elaboration from OECD Regional Statistics Database

Regional employment is favouring services in Piedmont. The evolution of Piedmont's regional economy appears to be slightly favouring the service sector (Figure 2.14). From 2004 to 2017, services attracted nearly 140 000 workers. Meanwhile, industry showed the weakest performance, indicated by continuous job losses in the same years, with a particularly strong drop in the 2008-2010 period. From 2004 to 2017, industry decreased by about 74 000 workers, considerably reducing the overall regional employment, which grew by 60 500 units. Yet, not all service industries increased their employment. Between 2004-2017, positive dynamics characterised consumer services (distributive trade, repairs, transport, accommodation, food service activities), finance, ICT and other professional activities. "Other sectors", which mainly comprises the arts, entertainment and recreation, repair, membership organisation and domestic works, showed considerable growth as well, although driven by activities characterised by low productivity, such as personal services. In general, the shift to services can negatively affect productivity, and thus wages, especially in less knowledge-intensive services, such as personal services (Sorbe, Gal and Millot, 2018[18]). The rise in low productive services in Piedmont calls into question its potential to activate multiplicative effects for the regional economy. Conversely, the rise of employment in finance, ICT, professional, scientific and technical activities provides a good base for the innovation environment.

Figure 2.14. Employment in economic sectors in Piedmont (2004-2017)

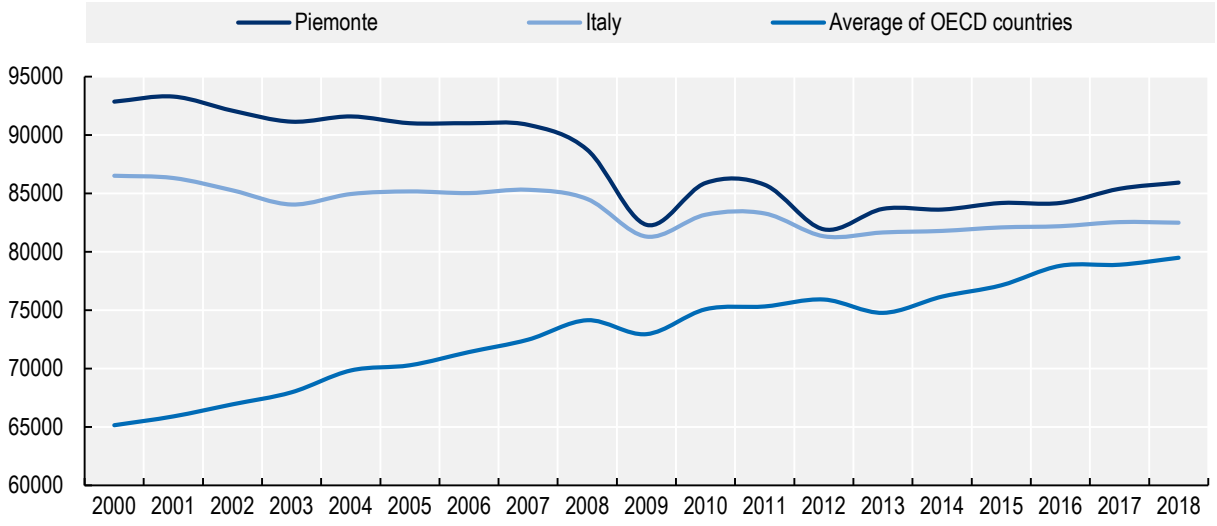


Note: Variations expressed in index numbers (2004=100)
Source: OECD elaboration from OECD Regional Statistics Database

Productivity is decreasing in Piedmont. Labour productivity represents one of the most relevant drivers for economic growth, and thus income and well-being. The drop in manufacturing's contribution to economic output in Piedmont is also reflected in decreasing aggregate productivity within the region, as expressed by GVA per worker. Despite the fact that Piedmont's productivity performance is above Italian values and the OECD (national) average, aggregate productivity dropped from around USD 90 000 in the early 2000s to around USD 85 000 in 2018, with the lowest points seen during the recessionary periods of 2008-2009 and 2011-2012. Conversely, throughout this period, productivity steadily increased in the OECD area (Figure 2.15). Given the differential in productivity between industry and services, the decline in the share of industrial activities played a key role in the slowdown of productivity in Piedmont, which in turn may hinder investment and innovation. Conversely, stagnation in productivity in Piedmont can be the outcome of low creation, diffusion or adoption of innovation in the regional economy.

Figure 2.15. Labour productivity in Piedmont, Italy and OECD countries

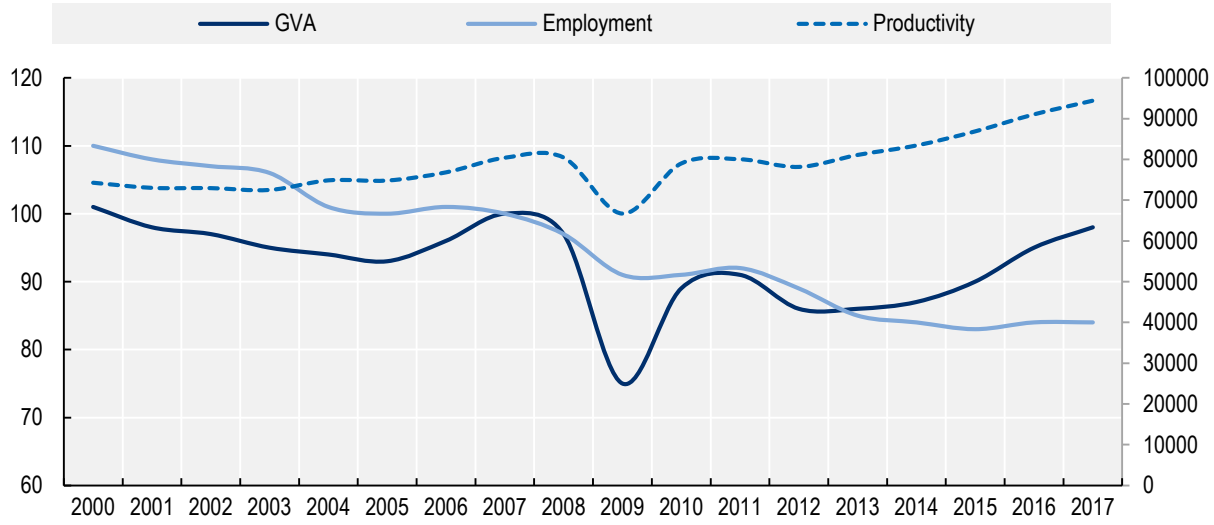
GVA per worker, constant Purchasing Power Parity (PPP)



Note: GVA is expressed in index numbers in USD per worker (constant PPP), base year 2015
Source: OECD elaboration from OECD Regional Statistics Database.

Employment is falling in Piedmont's manufacturing sector. Beginning in 2013, Piedmont's manufacturing sector picked up in terms of production and value added. However, productivity in the sector grew at the expense of employment, which continued to decline (Figure 2.16). From 2013 to 2018, the number of firms in manufacturing also dropped by about 2 500 firms. Since 2011, manufacturing firm deaths have exceeded firm creation. The de-coupling of economic outcomes (GVA and productivity) and employment can be attributed to at least two factors: first, to the re-organisation of business activities by firms and their value chains (e.g. outsourcing); second, to the region's dualist industrial structure (Delponte and Zenker, 2019[19]), namely large and leading global companies operating side-by-side with smaller firms. Among the latter, 40% of the SMEs in manufacturing are suppliers, hence they depend on (often large) clients.[15] This may have resulted in fragmented business activities and a degradation of pre-existing supply chains reliant on the supply and demand relationships between small and large firms. For instance, sometimes local suppliers have been replaced by suppliers from other regions or from abroad, weakening local supply chains (OECD, 2020[20]).

Figure 2.16. Dynamics of Real Gross Value Added, employment and productivity in manufacturing in Piedmont (2000-2017)

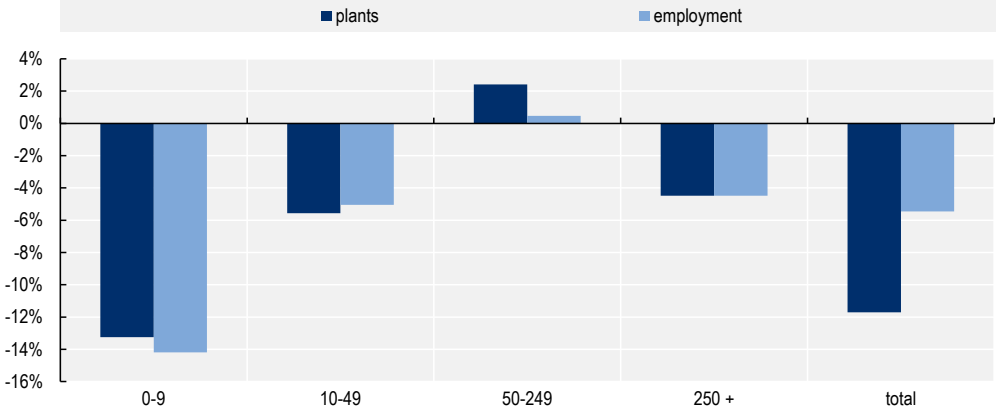


Note: GVA and employment dynamics (left axis) are expressed in index numbers (2007=100), productivity (right axis) is expressed in USD per worker (constant Purchasing Power Parity, base year 2015).
Source: OECD elaboration from OECD Regional Statistics Database

SMEs show the most marked decline and the region shows a low presence of start-ups. The dualism and fragmentation characterising the region's manufacturing industry is reflected in the fact that the decline in employment within the manufacturing sector affects SMEs more than larger companies. From 2012 to 2018, manufacturing plants with less than 250 employees dropped by 12% and their employment levels dropped by almost 6%. Smaller firms saw higher drops in employment. For instance, the number of firms with less than 10 workers fell by more than 13.2% (4 100 firms) and 14.2% (11 600 workers), respectively (Figure 2.17).

Figure 2.17. Growth rates in plants and employment in manufacturing in Piedmont (2012-2018)

% growth rates by plant size



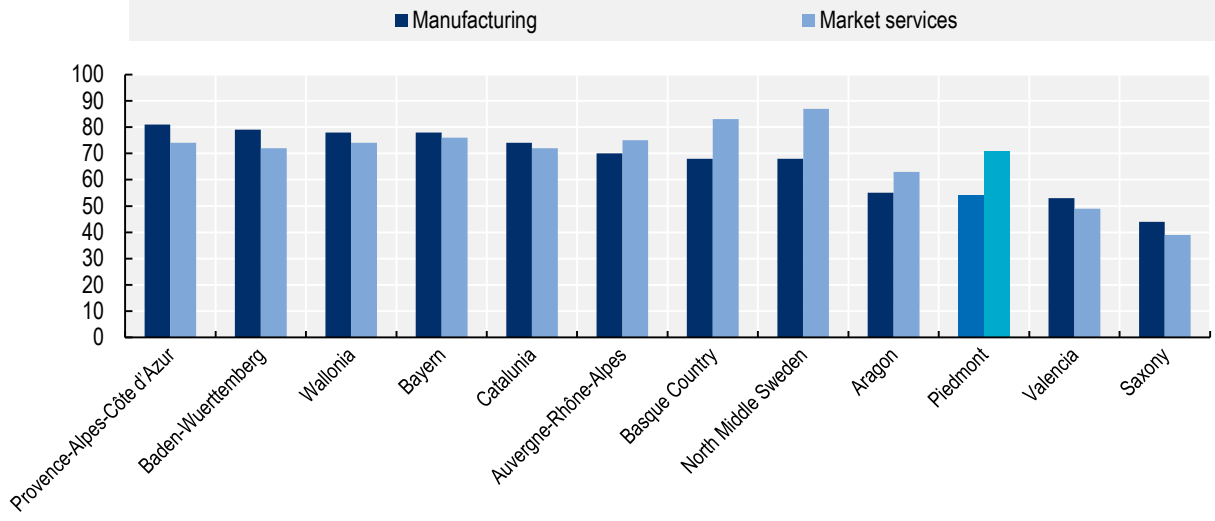
Note: 1 (0-9 employees), 2 (10-49 employees), 3 (50-249 employees), 4 (250 employees and higher), 5 (total).
Source: OECD own elaboration from Italian Statistical Bureau.

It should be noted that Piedmont has a considerably high number of SMEs within an OECD comparison, ranking just below the 70th percentile of OECD regions in terms of firms and employment. Yet it also shows a relatively low start-up rate, below the 25th percentile in terms of the share of start-up presence and employment in 2017 (OECD, 2021[21]).

Productivity poses a challenge for manufacturing in Piedmont. Aggregate regional productivity in the long run is falling in Piedmont. Additionally, the competitiveness of Piedmont in terms of productivity shows a gap between manufacturing and services. While Piedmont is in the top 30% of OECD regions in terms of productivity in market services, it is in the top 50% of OECD regions in terms of productivity in manufacturing. All benchmark regions, except Valencia and Saxony, show higher productivity in manufacturing (Figure 2.18). Additionally, Piedmont shows a more pronounced imbalance between the productivity levels of manufacturing and market services. Productivity grew in Piedmont in 2004-2017, but at a slower pace than most of the benchmark regions, where, on average, higher levels of productivity are associated with the highest growth rates. The economic crises of the last two decades, and particularly the 2008-2009 recession, shaped the manufacturing industry's productivity growth patterns in Piedmont, which dropped in 2008-2009 and 2011-2012 (Figure 2.19). This was also the case in most of the benchmark regions. While some regions recovered completely from the recessionary periods (e.g. Bavaria and Catalonia), Piedmont – despite a recovery in productivity in recent years – has not caught up to pre-2008 productivity growth. This is shown by Figure 2.19, where the dashed line illustrates the hypothetical growth rate of productivity if Piedmont would have had the same growth rates it experienced before the 2008-2009 recession. By comparing the hypothetical growth pattern with the actual growth it is possible to see that, while Piedmont productivity recovered from the recessionary period, it did not reach the previous growth pattern. The same holds for Saxony, for instance. Piedmont's lower productivity growth rates are also associated with higher loss in employment compared to the benchmark regions – where only Bavaria, Baden-Wurttemberg and Saxony have shown a positive employment change in manufacturing.

Figure 2.18. Productivity in benchmark regions (2017)

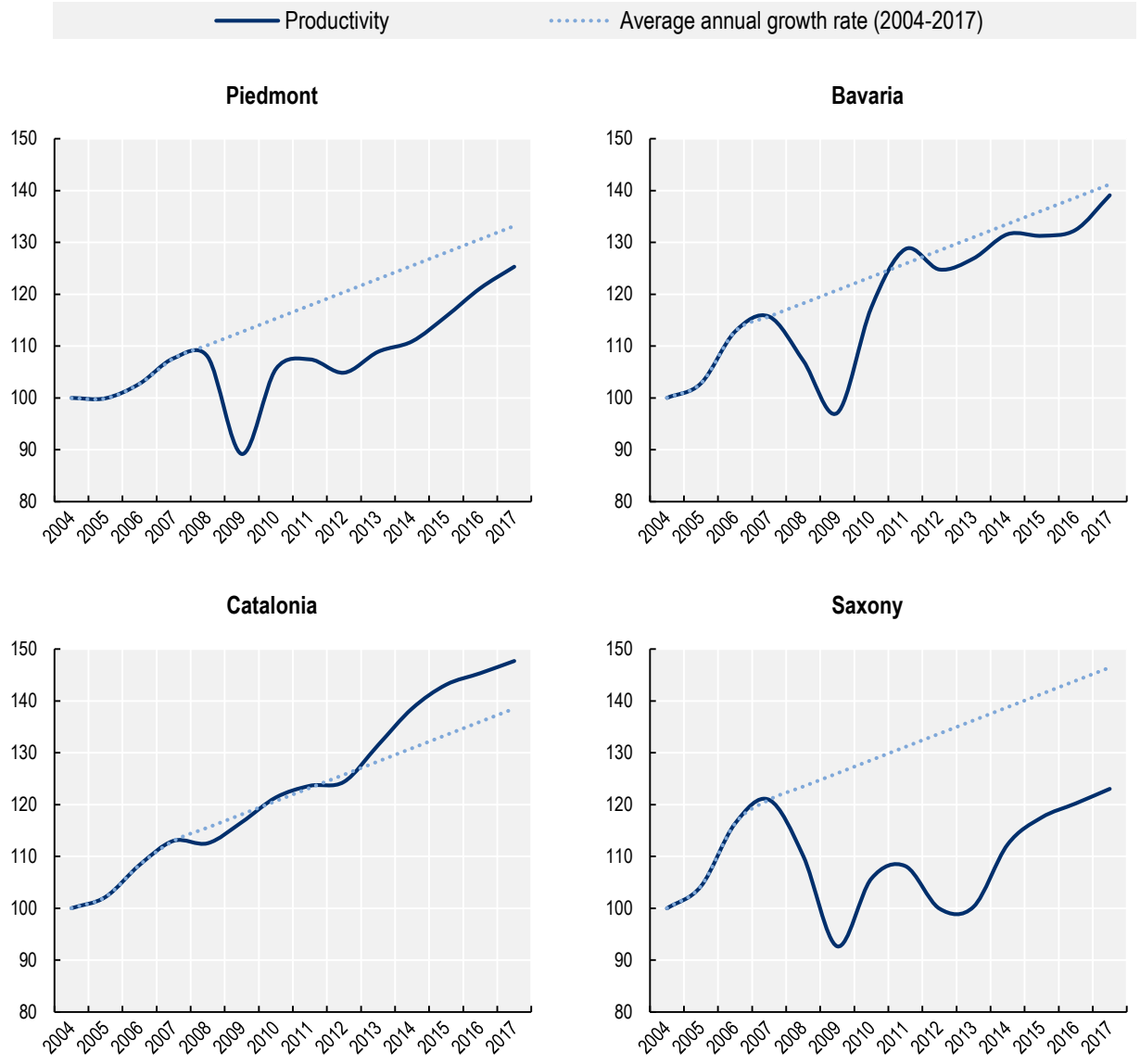
OECD percentiles in manufacturing and market services



Source: OECD elaboration from OECD Regional Database

Figure 2.19. Productivity patterns in selected benchmark regions (2004-2017)

Index numbers (2004=100)



Note: The dashed line simulates the productivity up to 2017 based on the average yearly growth rate of the period 2004-2017.
Source: OECD elaboration from OECD Regional Database.

Box 2.2. The automotive supply chain in Piedmont

Despite the general process of de-industrialisation in Piedmont, the automotive industry maintains a central place in the regional economy. The automotive supply chain in Piedmont is composed of 737 active firms, out of a total of about 2 200 in the Italian supply chain. This has a turnover of EUR 18 585 billion (38% of the national turnover), employs 60 311 workers (37% of the national workers), and generates 33% of Italian exports in the automotive components industry (Coccimiglio and Giardina, 2020[22]).

Table 2.5. The automotive supply chain in Piedmont

Firms, turnover and workers (2019)

	Firms	Turnover (EUR million)	Workers
Sub-contractors	198	1 380	6 733
Sub-contractors (machining)	96	734	2 180
Specialists	231	7 563	22 124
Specialists (aftermarket)	84	653	1 965
Engineering & design	86	4 777	4 609
Systems engineers and modelers	41	8 230	22 532
Total	736	18 585	60 311

Source: Observatory of the Italian Automotive Supply Chain (Coccimiglio and Giardina, 2020[22]).

The historical presence of the FIAT Group has led — and still leads — the strong presence of the automotive supply chain in the region. However, firms have also found other customers besides Stellantis (the current name of the former FIAT group). While almost 80% of Piedmont's firms have trade relationships with FIAT, it is the main customer of less than 50% of these firms. Many of those other customers are abroad: 30% of their revenues are exports. Still, FIAT generates an average of approximately 40% of revenues for such firms.

The regional automotive supply chain is characterised by high levels of innovation activities. More than three out of ten firms have more than one employee and invest a considerable share of their turnover in R&D activities. However, they also identify significant obstacles to innovation – the most important one being excessive costs. This is followed by the uncertainty and the instability of demand for innovative products and/or services, and by the lack of skilled workers.

Source: (Coccimiglio and Giardina, 2020[22])

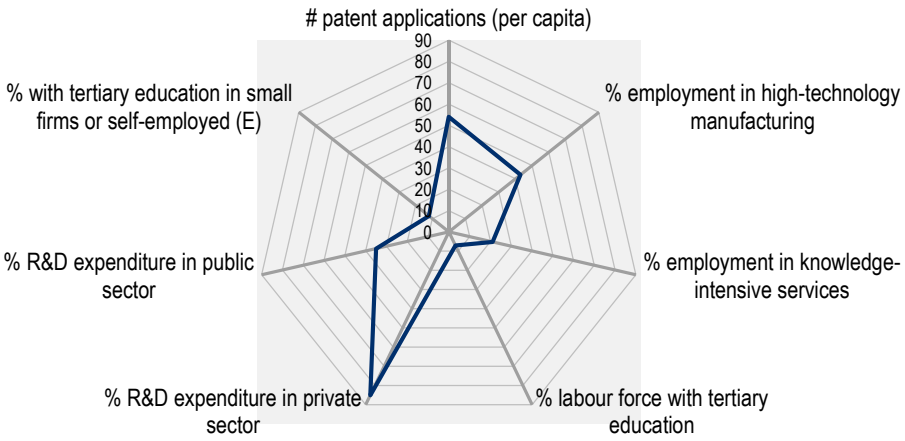
Innovation can contribute to reversing economic decline

Facts and figures on the regional economy and the labour market show the danger of long-term economic decline. To attenuate the impact and manage the trends, regions in industrial transition, including Piedmont, frequently rely on action in a number of policy areas including a focus on skills and jobs, making the most of the entrepreneurial fabric, and broadening innovation (OECD, 2019[3]). Innovation plays a key role, since it allows for greater firm competitiveness, with positive effects in terms of entrepreneurship and employment. SMEs would particularly benefit from a broadening and diffusion of innovation. The 2021 EU innovation scoreboard defines Piedmont as a moderate innovator+ (Hollanders and Es-Sadki, 2021[23]),

meaning that, while showing positive trends in some aspects related to innovation (e.g. private investments in R&D), there are also some drawbacks, related for instance to human capital and cooperation. This section reviews the main indicators of Piedmont's innovation environment and compares these with the OECD area and the benchmark regions.

At a glance, Piedmont shows considerable innovation potential, but lags behind in many aspects. As already explored, Piedmont – and in particular Piedmontese manufacturing – faces strong productivity and labour market challenges. Yet, despite the declining performance of both GDP and the labour market**,** parts of Piedmont's productive system are competitive, and the region shows considerable innovation potential, as well as room for improvement in some key dimensions. This is highlighted in Figure 2.20, which summarises the relative position of Piedmont versus OECD regions, with reference to some key innovation indicators available.

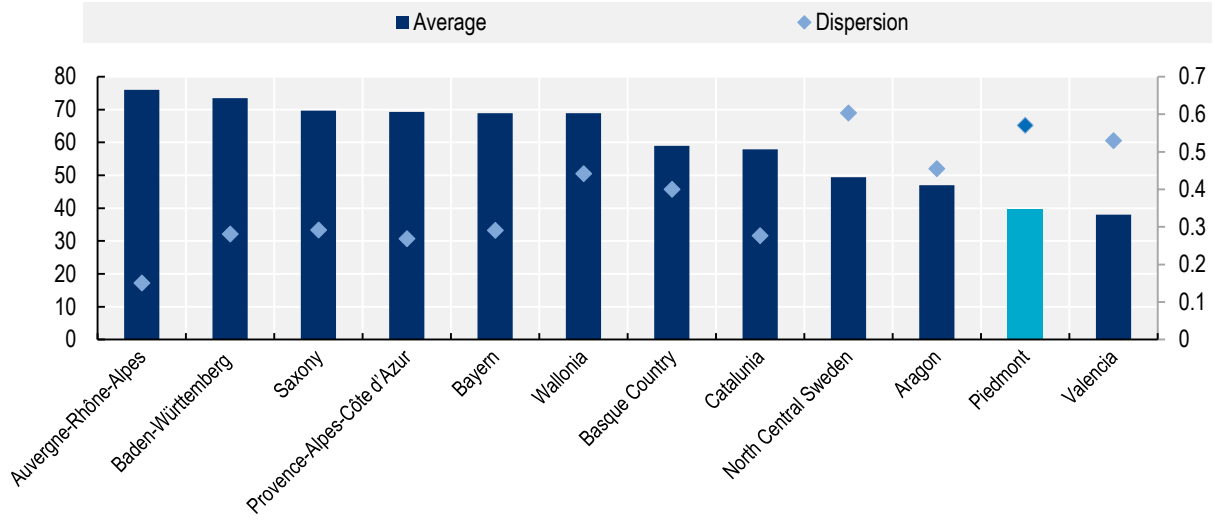
Figure 2.20. Indicators of regional innovation, Piedmont in comparison to OECD regions (2017)



Note: Each number scores the rank-position of Piedmont compared to OECD regions (100 represents the best performing region).
Source: OECD elaboration from OECD Regional Statistics Database and OECD Regions in Transition Database.

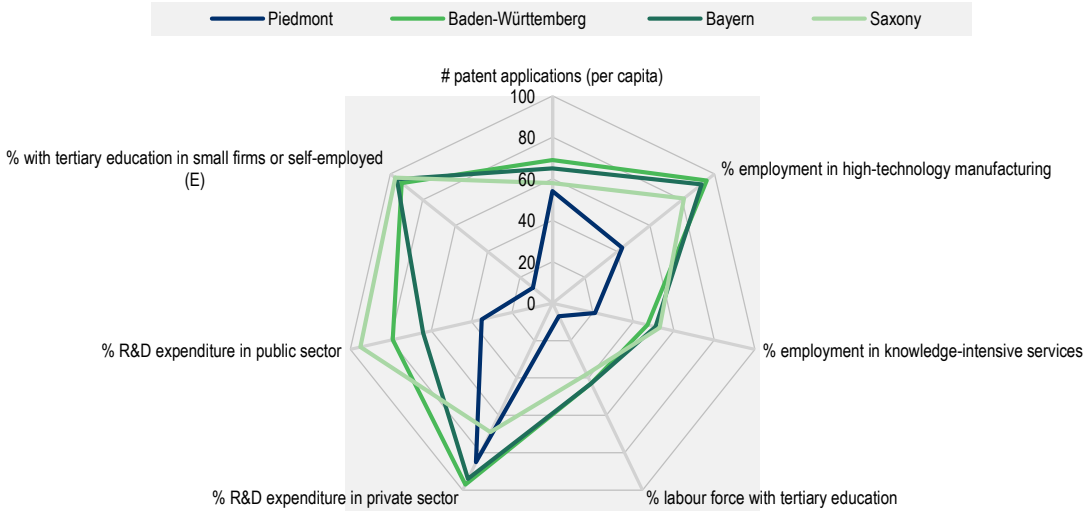
Regional innovation involves several dimensions and indicators, which are interlinked and should be tackled as a whole, with a systemic perspective. In comparison with the benchmark regions, Piedmont shows, on average, a lower value of innovation, computed by the average of all indicators featured in Figure 2.21, and a greater degree of dispersion among the innovation indicators. This means that that Piedmont shows both high dispersion levels and low innovation values (Figure 2.21). By contrast, regions with the highest scores in terms of aggregate innovation show lower dispersion (e.g. Auvergne-Rhône-Alpes, Baden-Württemberg, Saxony), meaning that there is not a large variation among the values scored by different indicators. Figure 2.22 compares Piedmont with the German benchmark regions that show lower dispersion and also higher innovation indicator scores. Innovation indicators are frequently interlinked and should be seen as a system, both when assessing innovation and when implementing policy. For example, R&D investment should also consider the effects on employment or patents.

Figure 2.21. Average values and dispersion of innovation indicators in benchmark regions



Note: Dispersion was computed by means of the coefficient of variation (ratio between average value and standard deviation) of each region. Average values on the left axis, dispersion values on the right axis.
Source: OECD elaboration from OECD Regional Statistics Database and OECD Regions in Transition Database.

Figure 2.22. Innovation scores in Piedmont and German regions (2017)



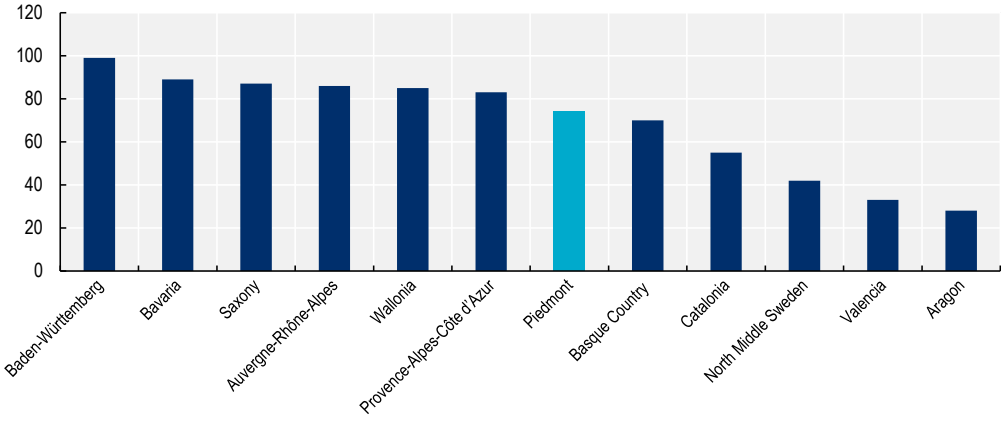
Note: Each number scores the rank-position of the region compared to the OECD regions (100 represents the best performing region).
Source: OECD elaboration from OECD Regional Statistics Database and OECD Regions in Transition Database.

R&D investments are largely led by the private sector in Piedmont. Piedmont is in the top 25% of OECD regions in terms of total R&D investment as a share of GDP. Yet, the region has a lower share than many of the benchmark regions, and with German, French and Belgian regions in particular (Figure 2.23). R&D investments are made by the public and the private sector. Piedmont performs particularly well with respect to private investment in R&D (Figure 2.24), which, in 2018, accounted for 2.2% of regional GDP, and 80% of total investment in R&D in the region. In this aspect, Piedmont is in the top 15% of OECD regions. In absolute terms, Piedmont's businesses spend roughly USD 3 billion every year on R&D. It is the third

highest value in Italy, preceded by Lombardy and Emilia-Romagna, and it is comparable to the performance of regions such as Rhineland-Palatinate (Germany), Madrid and Catalonia (Spain). The share of R&D investment increased from 1.6% to 2.2% between 2004 and 2018, bringing it close to the OECD (aggregate) average of 2.3%. The good performance of the business sector is also reflected by the R&D Personnel Employed by the Business Sector Rate (in % of total employment): Piedmont has the second highest share in Italy (1.99% of total employment in business sector), after Emilia-Romagna (2.49%).

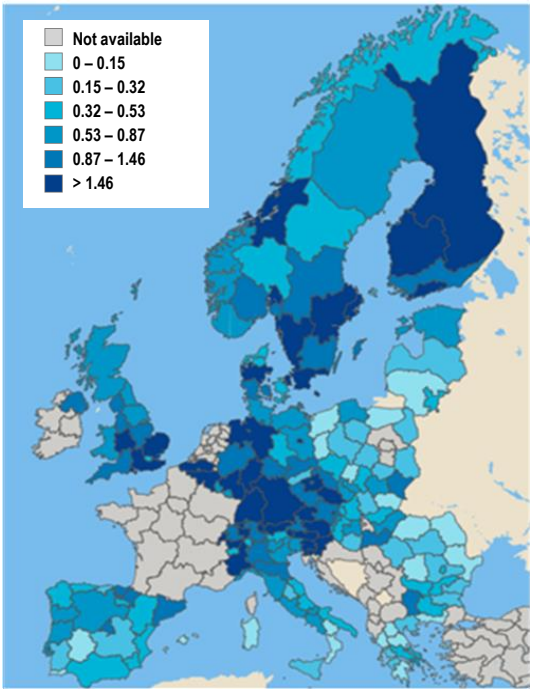
Figure 2.23. R&D expenditures (all economy) as share of the GDP in benchmark regions

OECD regional percentiles



Source: OECD Regional Statistics Database

Figure 2.24. R&D expenditure by the private sector as a % of GDP in selected OECD regions (2017)

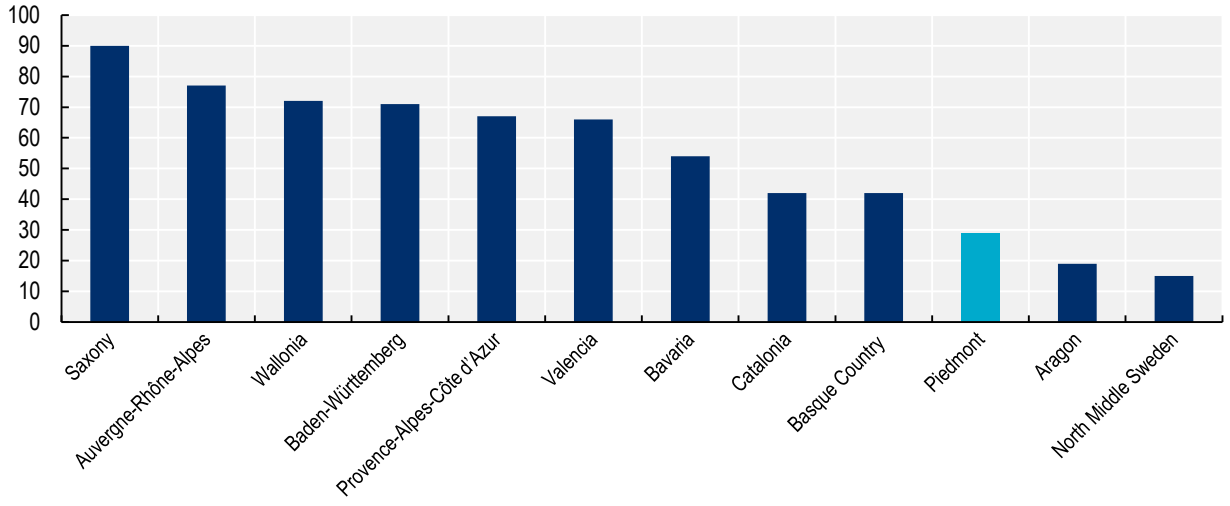


Source: OECD Regional Statistics Database

Meanwhile, there is room for improvement in R&D investment and employment by the public sector in Piedmont. Piedmont stands in the bottom 40% of OECD regions in terms of R&D investment as a share of GDP made by the government (0.08%) and in the bottom 30% OECD regions in terms of R&D investment as a share of GDP made by universities and other higher education institutions (0.28%). For instance, Saxony has an R&D share by universities and other higher education institutions that is 2.7 times higher than that of Piedmont (Figure 2.25).

Figure 2.25. R&D investment by universities and other education institutions as a % of GDP

OECD regional percentiles

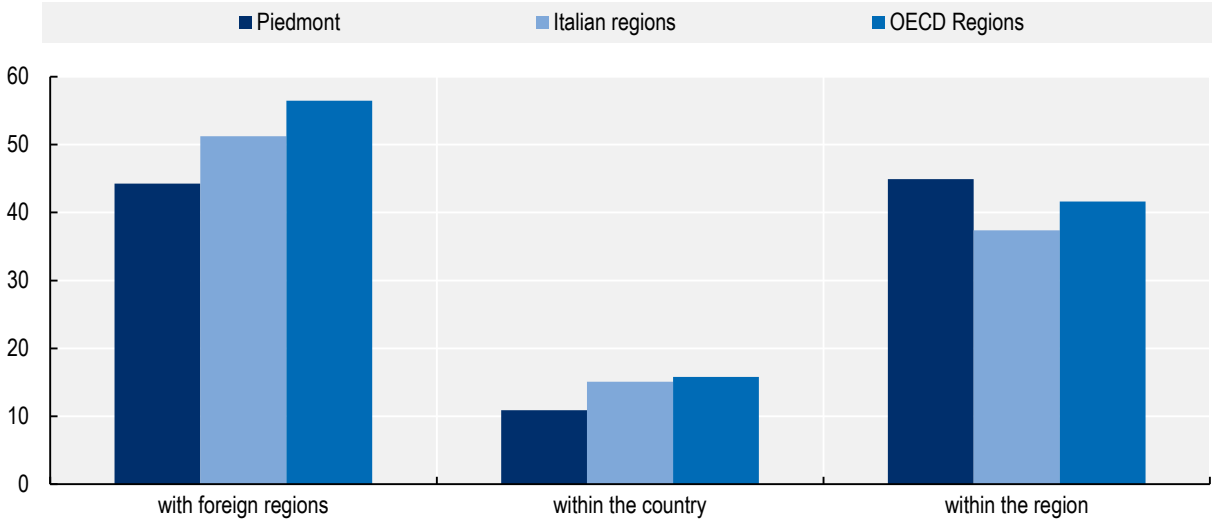


Source: OECD Regional Statistics Database

Patent applications are increasing. R&D investments, in particular those made by the business sector, seem to pay off in terms of output, as measured in patent applications per capita. While the regional value is still below the OECD regional average, it is increasing over time and Piedmont is in the top 54% of OECD regions. In terms of patent applications per capita (under the Patent Cooperation Treaty PCT – The International Patent System)[16], Piedmont showed 85 applications per million inhabitants in 2015, comparable to what was seen in Trento (Italy), Provence-Alpes-Côte d'Azur (France), Catalonia (Spain), British Columbia and Quebec (Canada). Most of applications come from the business sector (89%), while university and other governmental institutions are much lower (respectively 1.4% and 1.7% of all applications).

Data on patent applications show a considerable amount of collaboration in R&D. From 2011 to 2015, Piedmont's share of PCT co-patent applications was 70.2%, compared to the Italian regional average of 67.9% and OECD regional average of 73.8% (Figure 2.26). When compared to the OECD regions, Piedmont shows a high share of co-patenting within the region (almost 45% of all co-patenting applications). This is not matched by cross-border or international co-patenting cooperation. Among OECD regions, cross-border co-patenting averages 56.5%, while in Piedmont it is the case in only 44.3% of co-patent applications. This may be explained both by the presence of many large, international and leading firms in Piedmont not perceiving a need to co-patent across borders, as well as by the archipelago of small firms that may find it difficult to access international collaboration.

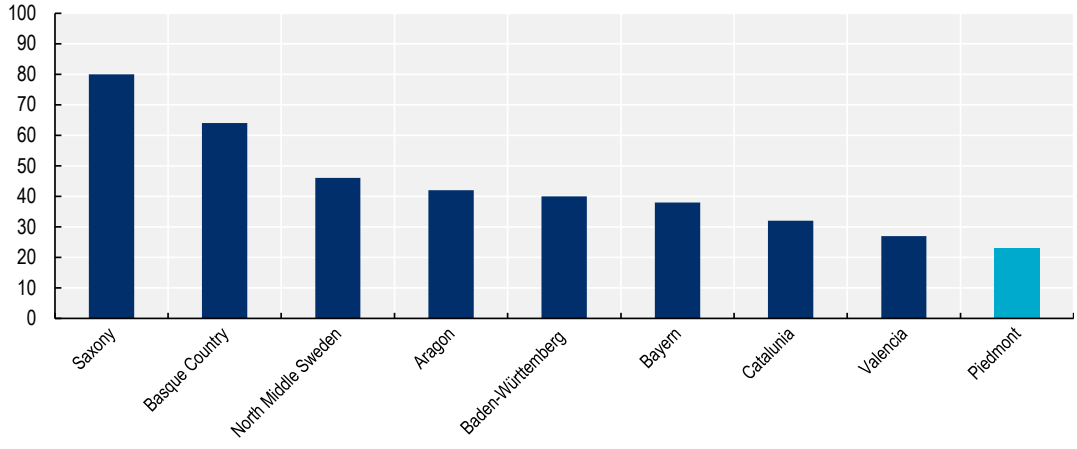
Figure 2.26. Shares of co-patenting with foreign regions, within the country, within the region



Note: Average values for the period 2011-2015.
Source: OECD elaboration on OECD Regional Statistics Database.

SMEs face more difficulties in collaborating in innovation. Just the 17% of Piedmontese SMEs are collaborating in innovation. This represents the lowest figure among benchmark regions and corroborates the hypothesis of difficulties for smaller firms to access innovation. This calls for action targeted at fostering shared innovation among SMEs (Figure 2.27).[17]

Figure 2.27. SMEs collaborating in innovation in benchmark regions, OECD percentiles (2017)



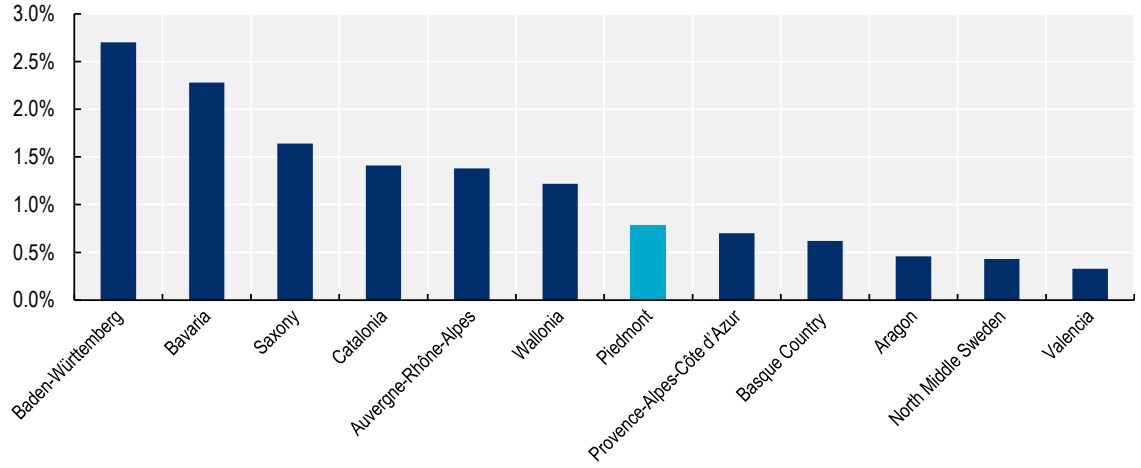
Source: OECD elaboration from Regional Innovation Scoreboard

Major challenges for innovation in Piedmont are related to the employment of high-skilled workers, particularly those with tertiary education (Figure 2.20). The share of Piedmont's labour force with tertiary education (International Standard Classification of Education – 5 to 8) is low, placing the region in the bottom 10% of OECD regions. The low employment of skilled labour is also linked to the sectoral structure of the region. Piedmont specialises in some sectors that demand high-skill work (such as professional services, ICT, finance), but it is less oriented towards high-tech and knowledge-intensive activities than

other the OECD regions: it is in the bottom 21% of OECD regions in the share of employment in knowledge-intensive services, and it is in the bottom 43% of employment in high-technology manufacturing. The comparison with benchmark regions (Figure 2.28, Figure 2.29) confirms the weakness of Piedmont. Additionally, the share of R&D personnel employed by higher education institutes is 0.45% of total employment, as measured by the Higher Education Sector Rate. The share of government sector employment is even lower (0.8%).

Figure 2.28. Employment shares in hi-tech manufacturing, benchmark regions

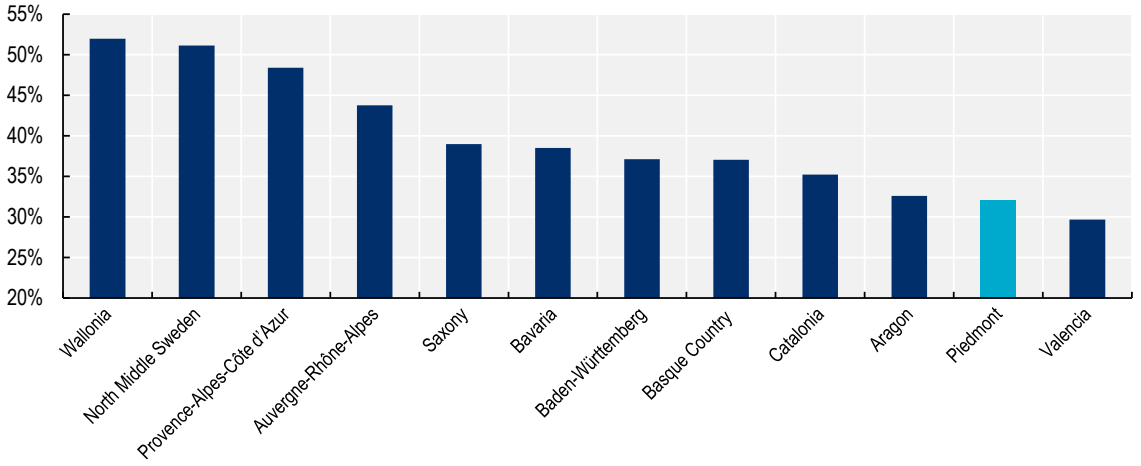
% employment shares



Source: OECD elaboration on OECD Regional Innovation Diffusion Database.

Figure 2.29. Employment shares in Knowledge-Intensive Business Sectors, benchmark regions

% employment shares



Source: OECD elaboration on OECD Regional Innovation Diffusion Database.

Taken together, the various innovation indicators explored (i.e. expenditure, personnel, patents, demand for skills) highlight an innovation potential that needs to be enhanced and promoted. Innovation performed by the business sector is strong. However, it can be very concentrated in few, and generally large,

companies, leaving a large share of smaller companies behind. This calls for actions aimed at fostering innovation-led development and will likely require further investment in R&D and skills. It would be important to do so in such a way as to maximise the returns of R&D and technology adoption by promoting high-tech and high-skilled sectors, and broadening innovation diffusion across sectors and regional value chains, with a particular focus on SMEs. The promotion of innovation should also consider how the results of R&D investments can translate into increasing demand for labour. This is particularly necessary given the risks linked with job automation and the structural changes that can be associated with a transition to greener industry in terms of R&D, innovation and skill-profiles needed.

COVID-19 is magnifying Piedmont's existing economic trends

The COVID-19 pandemic has caused an unprecedented health, economic and social crisis in a world that was already grappling with significant megatrends, such as deep changes in technology, automation, global value chains, urbanisation and demographic change. The aggregate GDP of the OECD area decreased by 4.8% in 2020 (from 2019 levels) as a result of measures taken by countries to combat the COVID-19 pandemic. While an economic recovery of 5.3% is expected in 2021 and 3.8% in 2022 among OECD countries, 2022 output is projected to be below pre-pandemic forecasts in many countries, raising the risk of long-lasting or even permanent impact (OECD, 2021[24]). Moreover, the impact is highly differentiated across territories (OECD, 2020[25]). The intensity of the pandemic, the containment measures implemented to slow its spread and the sectoral composition of the economy magnified the effects on national and regional economies.

The economic effects of COVID-19 have been asymmetric not only across territories, but also across sectors and firms (OECD, 2020[25]). The sectors that are more exposed to international demand and value chains have suffered the most from the supply and demand shocks that hit the global economy (Box 2.3). Likewise, some sectors, such as tourism, transport, retail and food service activities, have been affected more by the measures taken to contain the virus. The economic impact is affecting large businesses and SMEs. Yet, compared to larger companies, SMEs are more vulnerable to the impact, face higher risks, and are less resilient (OECD, 2020[26]). SMEs that are able to continue their activities are likely to be more vulnerable to social distancing measures than larger firms (e.g. ease in switching to teleworking, adapting working spaces, etc.).

Box 2.3. How the economic crisis arising from the COVID-19 pandemic affects firms

The economic effects of the COVID-19 pandemic are hurting firms on the aggregate supply and the demand sides.

On the supply side, firms have experienced a reduction in the supply of labour due to COVID-19 containment measures. This particularly affected the sectors less amenable to remote working, such as manufacturing. Additionally, international supply chains were interrupted, leading to shortages of raw materials, parts and intermediate goods, especially from areas most severely affected by COVID-19 cases and containment measures.

On the demand side, the drop in demand (arising from a suspension of activities because of containment measures and general uncertainty) and in revenue affects the ability of firms to function, and/or causes severe liquidity shortages. Consumers experience income loss and heightened uncertainty, which in turn reduces spending and consumption. These effects are self-reinforcing because workers are laid off and firms are not able to pay salaries. Reduced demand will in turn affect the supply side, with negative multiplicative effects.

Finally, the uncertainty and volatility that is associated with the novel coronavirus may continue to affect financial markets and risks further reducing confidence and credit.

Source: (OECD, 2020[26])

COVID-19 has affected Italy more than many other European countries, particularly in the early months of the pandemic (early March 2020). The economic effects of the pandemic and the very stringent lockdown measures were magnified by the country's openness to trade and its specialisation in sectors heavily affected by the pandemic, such as tourism. Italian GDP is estimated to have fallen by 8.9% in 2020, and a slow recovery is forecasted for 2021 (+4.1%) and 2022 and (+4%) (OECD, 2021[27]). The unemployment rate is also forecasted to increase from 9.4% in 2020, to 11% in 2021, and 10.9% in 2022 (OECD, 2021[24]).

Piedmont has been one of the most affected regions in the OECD. The suspension of economic activities undertaken by the Italian government to contain the COVID-19 virus is estimated to have affected 29.1% of total employment in the region, a larger share than the average of OECD regions (27.8%) (OECD, 2020[16]). GDP in Piedmont is projected to fall by 8% in 2020 (Conte et al., 2020[28]). The regional economy's high trade-openness had been one of the most relevant drivers of the fall of GDP: exports, (accounting for 35% of regional GDP) have been estimated to drop by 12.2% in 2020 (IRES Piemonte, 2021[29]; OECD, 2021[30]). In Italy and in Piedmont, almost all sectors reduced their output in 2020, with the exception of ICT. The impact of the pandemic is compounded by the fact that it hit at a moment when Piedmont's economy was weakening (Bank of Italy, 2020, p. 5[7]). This increases the likelihood that the economic costs will affect the regional economy in the coming years. As reported by *Istituto di Ricerche Economico Sociali del Piemonte* (IRES Piemonte) (2021[29]), GDP is recovering in 2021 (+5%) and the 2022-2024 outlook is for a slow recovery (+2.7 yearly average growth rate of GDP). However, this expected growth rate will not be sufficient to compensate for the region's economic losses in 2020 (Table 2.6).

Table 2.6. Piedmont growth prospects

Average yearly growth rates

	2000-2007	2008-2014	2015-2018	2019	2020	2021	2022-2024
GDP	1.0	-1.8	1.6	-0.2	-9.4	5.0	2.7
Household consumption	0.9	-0.9	1.6	0.3	-12.1	4.1	3.7
Public consumption	1.9	-0.7	0.3	-1.1	0.7	3.2	-0.6
Investments	0.3	-32	3.3	2.3	-10.8	12.5	6.8

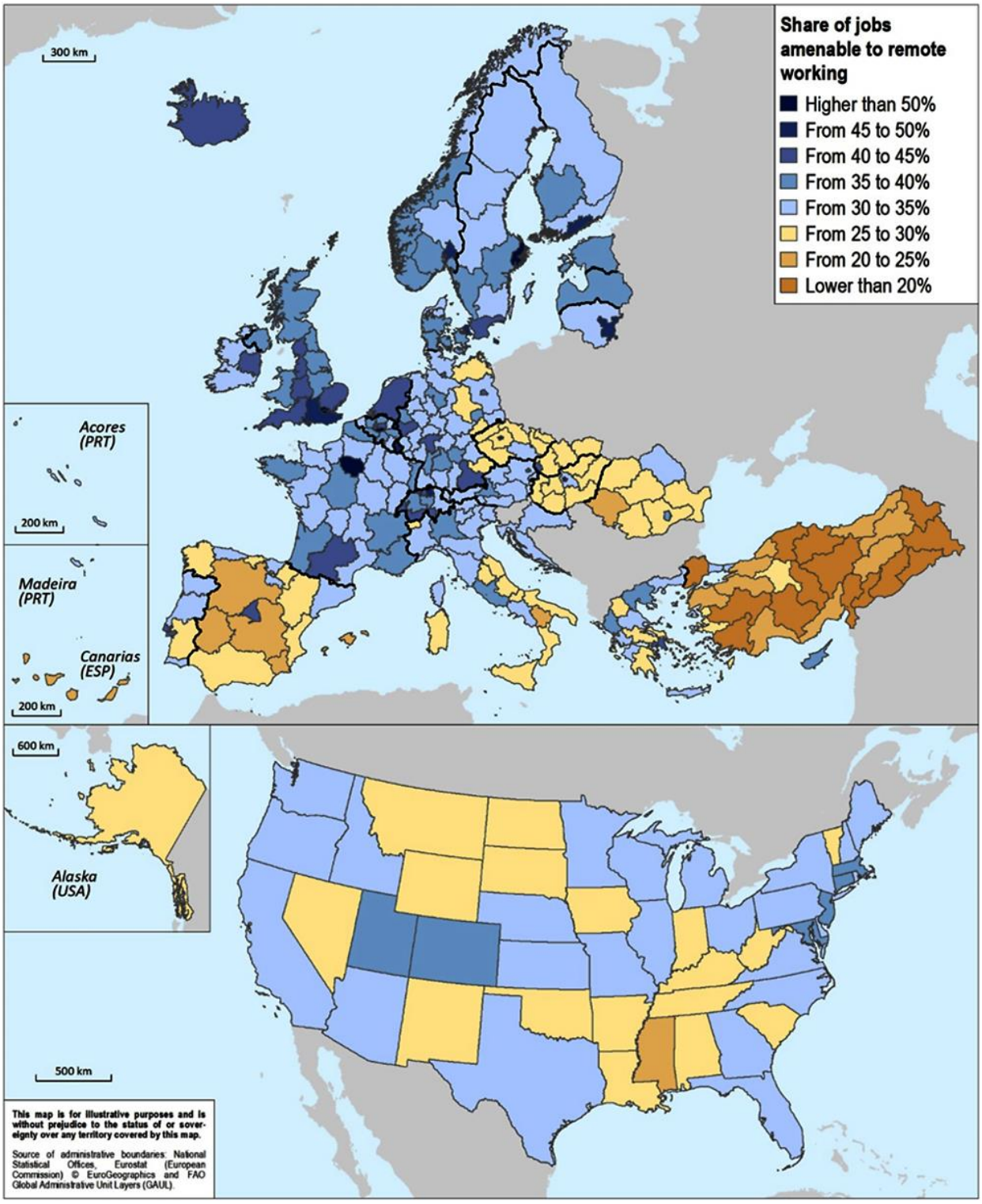
Source: (IRES Piemonte, 2020[31])

The ability to unlock investments in the region will be crucial to effective innovation-led development in Piedmont, and COVID-19 is challenging this ability. The vulnerabilities of the regional economic structure, and in particular those associated with having a high percentage of SMEs forming the backbone of a region's business environment, risk being accentuated in Piedmont as a result of COVID-19. First, two-thirds of workers are employed in firms with less than 50 employees. Small manufacturing firms, in particular, had already shown long-term patterns of employment reduction. Second, SMEs are generally more vulnerable to shocks (like the drop in the aggregate demand due to COVID-19) than large firms, particularly in terms of their dependence on debt for financing their activities. The COVID-19 economic shock can cause a shortage of liquidity and insolvency to SMEs, which in turn increases the death rate of firms (Kalemli-Ozcan et al., 2020[32]).

The pandemic shows how crucial digitalisation is for people, firms and institutions to access services and markets. The ability to telework often supported business continuity during the 2020 COVID-19 containment measures, for many in Piedmont and around the world. At the aggregate level, the increase of jobs easily performed remotely reduces job losses. The higher the capacity for remote working, the smaller the lockdown costs, the lower the vulnerability of firms in the short run, the higher their resilience in the medium and long run. In Piedmont, 32.1% of jobs were estimated to be adaptable to remote working based on the tasks required and whether they could be performed remotely (OECD, 2020[33]). This is in line with the OECD average of 31.47% (Figure 2.30). The provision of fast digital infrastructure is a key enabling factor. Piedmont lags behind, being in the bottom 33% OECD regions in terms of share of population with broadband access, whereas, for instance, all German regions stand in the top 25% (OECD, 2021[34]).

Figure 2.30. Share of jobs amenable to remote working in selected OECD and European countries

Percent values, 2018, NUTS-1 or NUTS-2 (TL2) regions

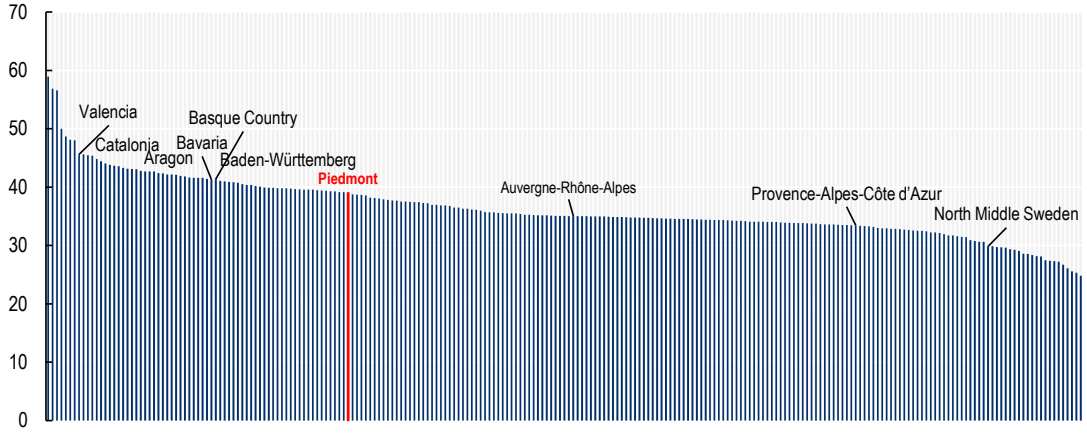


Source: (OECD, 2020[35]).

The economic sectors most affected by containment measures face the highest risk in the short-term. The capacity for remote working, and its relative costs, are highly differentiated among sectors and firms. Some sectors, for instance those involving direct contact, travelling, physical presence, etc. were more likely to be suspended to contain the diffusion of the virus. The OECD estimates that in Piedmont around 29% of jobs were at risk from containment measures, putting it in the top 50% of regions (OECD, 2020[16]). SMEs may face greater difficulties and higher costs when adapting to digitalisation needs for remote working, e-commerce and other digitalised business activities. The digital divide between "champion" firms and lagging enterprises may increase, and could be further exacerbated by inequalities in access to digital infrastructure and services among urban areas and rural and inner areas. Additionally, teleworking capacity varies across workers: high-skill workers are able to switch to remote working more fluidly, while low-skill workers are generally employed in jobs that cannot be performed by telework, and can face higher health, economic and social impact consequences as a result of the virus.

The combination of COVID-19 and technological change is magnifying the risks of tension in the job market in terms of quantity and quality of jobs, and will likely magnify the polarisation of firms and jobs. The automation of industrial processes and jobs was already challenging regions in industrial transition such as Piedmont, with new jobs generated by automation, for example, and old jobs destroyed, thus changing the profile of skills demanded. The COVID-19 pandemic is accelerating this and could result in a poorer job market structure for regions already affected by job polarisation, unemployment and skill mismatch (OECD, 2020[16]). Negative forces might dampen labour force participation and employment levels, as well as further accentuate any mismatch between the supply of and demand for work, employability of youth, and re-employment (reskilling) of the workforce. Within the OECD area, there are a few regions that face relatively low risks from both COVID-19 and automation, located mostly in Belgium, Canada, and the Netherlands, and the Scandinavian countries. There is a cluster of regions, mainly in Eastern Europe, France, part of Germany, Greece and southern Italy that face relatively low risks of job losses from COVID-19 and high risks of automation, while other regions, mainly in Australia, the UK, and the US that face high risks from COVID-19 and low risks from automation. Finally, some regions, mainly in northern Italy, southern Germany, and Spain, are facing relatively high levels of risk from both COVID-19 and automation. Piedmont shows a considerable amount of combined risk: within a regional comparison, Piedmont ranks in the top 30% regions in terms of combined risks of automation of works and COVID-19 (Figure 2.31). Among benchmark regions, those with higher industrial shares (e.g. the German regions) as well as those that are service-oriented (e.g. the Spanish regions) face higher risks, while areas with a more diversified structure show a lower combined risk.

Figure 2.31. Combined risk from automation of jobs and COVID-19 in OECD regions



Source: Authors own elaboration from OECD estimates (OECD, 2020[16])

The COVID-19 crisis also offers some opportunities for Piedmont's economy. Improved physical and digital accessibility to services can contribute to the regional resilience of firms and to citizens' well-being. The expansion of teleworking, e-commerce and other digital-related changes in firms has been a driver of higher productivity and market expansion. Additionally, innovation in public services, fostered by the crisis, represents another important aspect. For instance, COVID-19 accelerated the digitalisation of public administration and public services delivery (OECD, 2020[36]). These innovations might also enhance Piedmont's rich environment of ICT and high-tech firms.

A second opportunity is embedded in the transition towards a greener and circular economy. While a higher demand for "greener" products may bring potential risks, for example to the region's traditional automotive industry, demand favouring electric vehicles, and green business investments are likely to continue to grow. This could activate a regional value chain that already shows considerable potential (OECD, 2020[37]), and offer strong prospects for job creation.

In order to boost the potential and activate regional value chains and jobs, it will be crucial to invest in the new skills associated with a green transition. This will be necessary in the context of existing jobs that require reskilling so they may evolve, and new jobs that attract youth just entering the workforce, as well as workers previously in carbon-intensive sectors. Skill gaps are particularly noticeable in "green" sectors such as renewable energy, energy and resource efficiency, renovation of buildings, construction, environmental services and manufacturing (OECD, 2020[33]). Regional-level investment in skills (soft infrastructure) can generate a win-win outcome in technological transition (job losses in traditional manufacturing) and the low-carbon transition (job gains in the green sectors). Being a region in industrial transition, Piedmont had already started to experience what other regions are experiencing now with automation and digitalisation-related job changes. This gives the region a competitive advantage in managing the regional challenges and changes associated with the COVID-19 crisis. Piedmont can also learn from the experience of other regions in industrial transition.

The economic and technological changes arising from COVID-19 are also affecting territorial attractiveness. The deceleration of globalisation processes and the shifts (and disruptions) in global value chains may change where firms chose to locate. Local supply chains may be favoured over global supply chains. Within this context, the availability of local public goods (e.g. digital and physical infrastructure), and effective and quality institutions (e.g. schools and universities), which are the building blocks of innovation ecosystems, can represent a strategic asset for investment and firm attraction.

Changing geographic preferences associated with the COVID-19 pandemic could also mitigate geographic concentration and the urban-rural divide that affects Piedmont and the related economic and demographic imbalances (e.g. population decline and ageing in rural and mountainous areas). The rise of teleworking and digital access offer more households the chance to choose where they live – if in large urban areas, smaller communities, or rural areas with natural amenities and more affordable housing. Small cities and rural areas are potentially very attractive in a post-pandemic "new normal" scenario. This may activate virtuous circles for a balanced territorial development within the region. Investment in the drivers of territorial attractiveness such as digital connectivity and public service provision is key to optimising this opportunity.

Conclusion

The industrial specialisation that shapes the region has allowed Piedmont to reach high levels of economic output and income. At the same time, it can represent a driver for long-term stagnation and erosion of regional competitiveness, as shown by the slowdown in productivity growth. The reduction of the weight of manufacturing in the regional economy has affected activities and value chains that characterised the regional productive system. Now Piedmont risks being caught in a middle-income development trap, stuck between rising competition both from low-income regions (because of higher production costs in

'traditional' activities) and from high-income regions, which can more easily attract investments in more innovative activities. Worsening job market figures, with rising general and youth unemployment, reinforce the concerns surrounding Piedmont's economic health. Within this framework, innovation can be a tool to foster regional competitiveness in terms of its firms as well as its workers. Piedmont shows a high potential for innovation-led growth, as demonstrated by the investments made by the private sector. Yet it will need to ensure that smaller firms are able to access innovation production, collaboration and diffusion, and that the public can increase the type of resources that drive innovation, or the elements that contribute to it (e.g. education and skills training).

The ability to further unlock public and private sector investment in innovation will be crucial to effective innovation-led development in Piedmont, especially in light of the COVID-19 framework, which has affected Piedmont and Italy more than other countries. The pandemic has shown the extent to which investment in digitalisation and innovation is important for firms and people. This gives the region the opportunity to re-think its place-based assets, in order to better scale-up its economic system and boost firm productivity, increase the region's attractiveness for investments and promote high-quality job creation.

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Notes

[1] Economic data for the OECD regions are drawn from several sources. For reasons of data availability, when possible the comparison is made with the average of the OECD area as a whole. In other cases, the comparison is made with the average of the OECD regions.

[2] The Territorial Level 2 (TL2) regions represent the first administrative tier of subnational government. For Italy, this definition corresponds to the *Regioni* and the *Provincia Autonoma di Trento* and *Provincia Autonomia di Bolzano/Bozen*, which have the same legislative powers as regions. For further details, please see https://www.oecd.org/regional/regional-statistics/territorial-grid.pdf.

[3] The Functional Urban Area of Turin comprises the city of Turin and the 87 municipalities in its commuting zone. For the definition and description of FUAs, as well as the list of municipalities included in each FUA, please refer to https://www.oecd.org/regional/regional-statistics/functional-urban-areas.htm.

[4] OECD LAU (Local Administrative Unit) level 3.

[5] GDP per capita in Bavaria was 24% higher than the OECD average in 2007 and 41% higher than the OECD average in 2018. GDP per capita in Baden-Württemberg was 25% higher than the OECD average

in 2007 and 36% higher in 2018. GDP per capita in Saxony was 22% below the OECD average in 2007 and 9% below the OECD average in 2018.

[6] GDP per capita in Wallonia was 20% below the OECD average in 2007 and 17% in 2018.

[7] Within the OECD area, the highest values in terms of participation and employment rates are found in Japan, Iceland, Netherlands, New Zealand, Sweden, and Switzerland.

[8] The following indicates the values of the participation rates and employment rates in the top performing Italian regions: Bolzano-Bozen (76.3%, 74.1%), Emilia-Romagna (74.6%, 70.4%), Aosta Valley (73.2%, 68.3%), Lombardia (72.5%, 68.4%),Trento (72.2%, 68.5%)

[9] Early leavers from education and training refers to a person aged 18 to 24 who has completed at most lower secondary education and is not involved in further education or training.

[10] Among secondary school students, 52.4% enrolled at a university in Piedmont versus the national average of 50.3% in 2016 (Source: Italian Statistical Bureau).

[11] Middle-skill jobs are defined as occupations in the middle of the occupation-wage distribution (OECD, 2020[10]). Skill-levels are defined by using the International Standard Classification of Occupations (ISCO) used by the OECD. Accordingly, occupations are distinguished as high-skill (or high-occupation), middle-skill (or middle-occupation) and low-skill (or low-occupation) based on by their average wage, regardless of the formal education, training, or labour market experience they require (OECD, 2017[13]). The median middle-skill workers is a person without a tertiary degree and likely to work in manufacturing.

[12] In 1995-2015 in the OECD area, the share of middle-skill jobs in transport manufacturing dropped by 9.5%, while the share of high-skilled jobs increased by 9% (OECD, 2017[13]).

[13] High-skill jobs include jobs classified under the ISCO-88 major groups: 1 (legislators, senior officials, and managers); 2 (professionals); and 3 (technicians and associate professionals). Middle-skill occupations include jobs classified under the ISCO-88 major groups 4 (clerks); 6 (skilled agricultural workers); 7 (craft and related trade workers); and 8 (plant and machine operators and assemblers). Low-skill occupations include jobs classified under the ISCO-88 major groups 5 (service workers and shop and market sales workers); and 9 (elementary occupations) (OECD, 2020[16]).

[14] For a full comparison with the OECD regions, data refer to year 2016.

[15] Source: OECD elaboration from Italian Statistical Bureau permanent census of industry

[16] Data collected from the OECD REGPAT Database, which presents patent data that have been linked to regions according to the addresses of the applicants and inventors. For more information on the database, see: www.oecd.org/dataoecd/22/19/40794372.pdf.

[17] No data are available for the French and Belgian regions.