

Vaud rhymes with grow

How a Swiss canton is punching above
its weight in the global economy

A study published by the Observatoire
BCV de l'économie vaudoise



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Executive Summary

The Canton of Vaud enjoys a vibrant economy that is one of the fastest-growing in Switzerland. Over the last two decades, the Canton has become an economic powerhouse with dynamic industries focused on niche markets and innovation.

This report looks at the current state of Vaud's economy, the transformation it has undergone to get to where it is today, and the strengths it can draw on to face the challenges ahead. The key findings of our report are as follows:

1. Vaud is one of the Swiss cantons that has seen the highest growth in GDP. Its real GDP expanded nearly 40% between 2000 and 2015, compared with 30% for Switzerland as a whole and 20% for the EU.
2. The Canton has experienced major structural shifts since the mid-19th century. In 1860 it was a primarily agricultural region, with some budding manufacturing industries like watchmaking, music-box making, and food production. But the number of farmers started to decline in the second half of the 19th century, and this decline has accelerated over the past 30 years – mainly due to increased competition when Switzerland opened up its borders to international trade.
3. Vaud's economy has more than recovered from a period of stagnation in the 1990s. Its construction industry in particular bounced back from a burst property bubble, and pharmaceuticals and other manufacturing industries like watchmaking and medical equipment have grown in what can be considered a "reindustrialization" of the Canton. In the services sector, business services including support functions, IT, and consulting have fared particularly well, as has the broader public sector including healthcare and education.
4. One recent development in Vaud's economy is the emergence of a raft of successful start-ups. The Canton's investments in innovation have paid off: Vaud now attracts just as much venture capital as Zurich, according to the latest Swiss Venture Capital Reports (2014 and 2016). Some CHF 173.3 million has flowed into the Canton in 2015, with approximately 70% going to medtech and biotech.
5. Vaud's economy is driven by services – a sector that has grown pretty much non-stop since 1985. It now makes up 77.0% of the Canton's jobs on a full-time equivalent (FTE) basis and roughly the same percentage of its GDP. Industries which have seen the fastest growth include business services, healthcare, and teaching.
6. The number of jobs in the Canton grew 33.1%, or 30.3% on an FTE basis, between 1985 and 2013. However, the increase was not linear: employment grew in the late 1980s but declined during a period of stagnation in the 1990s only to pick up again around 1998. The pace of job growth was especially rapid between 2005 and 2012. The percentage of jobs in the services sector rose while those in the agricultural and manufacturing sectors fell.

7. In manufacturing, the number of jobs decreased 9.4% in the 30 years between 1985 and 2013. However, this decline masks two contradictory trends: after contracting 26.5% between 1985 and 1998, employment rebounded 23.3% between 1998 and 2013. The recent upturn was driven mainly by a recovery in the construction industry along with expansion in pharma, medtech, watchmaking, the food industry, and some high-added-value niches.
8. Looking ahead, Vaud faces several challenges, not the least of which is a strong Swiss franc coupled with weakness in its main export market, the eurozone. The Canton's GDP growth already slowed in 2015 following the removal of the EUR/CHF floor rate. Other hurdles could come from laws being debated to reform the corporate tax system and introduce measures to curb immigration. A deterioration in Switzerland's relations with the EU would also be a detriment to Vaud's increasingly international economy.

Introduction

Would you expect a region that doesn't even grow coffee to create an entirely new way of packaging, selling, and preparing the beverage? Or a town of barely 100,000 people to house the global headquarters of the International Olympic Committee, along with dozens of other sports federations? Or a group of tiny villages nestled in the mountains to be where some of the world's most prestigious (and expensive) watches are made?

The Canton of Vaud punches above its weight.

This French-speaking region of Switzerland on the northern shore of Lake Geneva isn't very big, has few natural resources, and is home to only about 800,000 people – but has attained a global reputation for prosperity, innovation, and quality of life. Moreover, Vaud has been on a strong upward trend in recent decades, as an array of innovative companies, many in the tech and biotech sectors, have sprung up alongside the Canton's more traditional industries.

This has created a diverse, dynamic economic ecosystem that sets Vaud apart: the Swiss Canton, in the heart of “old” Europe, combines a strong sense of identity and an ingrained Swiss perfectionism with a broad openness to ideas and talent from other places. The result is a place where agriculture, industry, and high-tech innovation coexist, driving one of the most prosperous economies and attractive workplaces in Europe, and indeed the world.

The following pages explain how this came about.

It all starts with the cornerstone of Vaud's – and Switzerland's – enduring success: innovation. Switzerland is by many measures the world's most innovative country. It regularly comes out on top of worldwide rankings such as the Global Innovation Index and the WEF Global Competitiveness Report, generally far in front of its European neighbors and often ahead of the United States as well. On a per capita level, Switzerland is world number one in R&D spending and patents, and behind only Norway in Nobel Prizes.

These impressive rankings reflect Switzerland's longstanding need to focus on high-added-value niche markets to compete internationally. In a small country with few natural resources and little chance to generate large economies of scale, Swiss businesses have traditionally counted on know-how, not price, as their differentiator. Today, Switzerland invests some 3.0% of its GDP in R&D – well above the OECD average of 2.4%.

Within Switzerland, the Canton of Vaud stands out for its particularly diverse and vibrant economy and, increasingly, as the preeminent Swiss breeding ground for start-ups. The entire Canton is only roughly the size of Rhode Island in the US or Cornwall in the UK, but Vaud boasts six technology and innovation parks that churn out around 15 start-ups a year.

Many of these firms are spun off from ideas hatched at one of the elite institutions of higher learning scattered throughout Vaud. These schools, as well as several research centers specialized in tech and bio-tech, have seen strong growth in recent years, spearheaded by the Swiss Federal Institute of Technology Lausanne (EPFL), which has come into its own in the last three decades, emerging from the shadow of the older Zurich Polytechnic to become one of the world's great technology institutes. EPFL plays the same role in the Vaud economy that Stanford does in Silicon Valley, attracting and fostering talent and spinning off promising ideas and technology.

This dynamic knowledge economy has drawn investors, and Vaud now competes on equal terms with Zurich in terms of venture capital funding. (For more information on innovation in Vaud, see the case study on p. 13.)

Beyond tech start-ups and VC investors, the Vaud economy, like that of Switzerland as a whole, is a diverse mix. More traditional activities like services, construction, and manufacturing still play a major role, and small businesses account for more jobs than multinationals. This diversity has worked well for Switzerland, which has the 4th-highest nominal GDP per capita in the world and the 3rd-highest productivity in terms of GDP per hour worked. According to a 2015 world competitiveness study by IMD business school, the Swiss are more productive than the French (who rank 10th), the Americans (who rank 11th), and even the Germans (who rank 13th). And Swiss perfectionism is apparently not a myth, as Swiss workers topped the chart for worker motivation.

Switzerland may be an economic powerhouse, but Vaud's economy is pushing ahead even faster. The Canton's real GDP has grown nearly 40% since the turn of the century. That's a third higher than

the growth rate for Switzerland as a whole and double the rate of the European Union. Apart from a dip during a period of stagnation in the 1990s, when the Canton experienced a burst property bubble and structural change, the number of jobs in Vaud has grown steadily for the past 30 years.

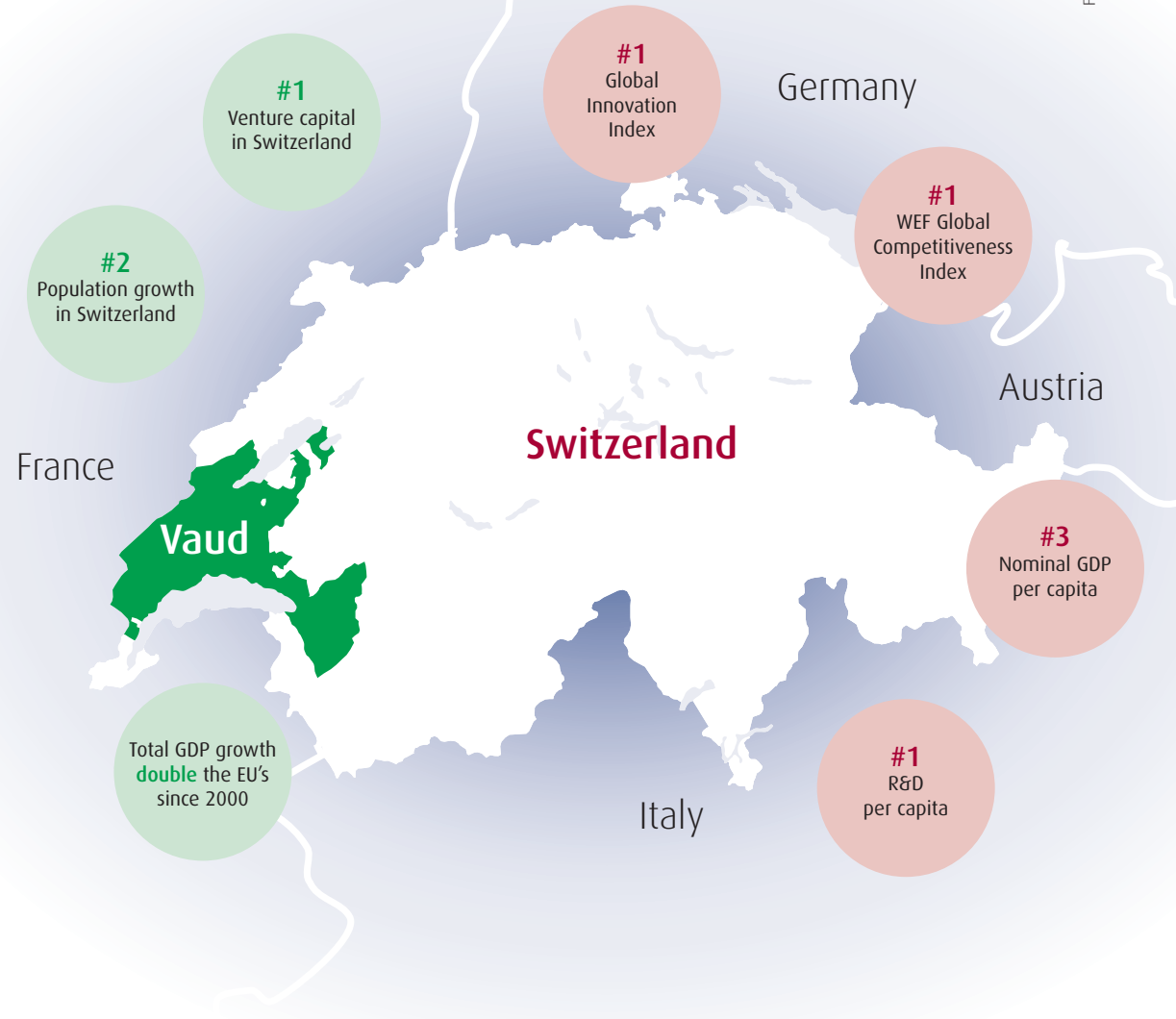
This dynamic local economy has spawned a number of companies that are known the world over, such as Nestlé and Bobst (see our case studies on pages 33 and 36). The Lausanne area has also become known as the "Silicon Valley of sports" in light of the numerous international sports organizations that are headquartered there, starting with the International Olympic Committee. (For more on sports organizations in Vaud, see our case study on p. 47.)

For all its success, however, Vaud will be facing some challenges going forward. Immigration has accompanied its economic expansion over the last 15 years, following bilateral agreements with the EU that gave its citizens the right to settle and work in Switzerland and helped Swiss companies find qualified workers in what has traditionally been one of Europe's tightest labor markets, with unemployment often at less than half of what it is in many neighboring countries. These agreements are now in question following a 2014 referendum in which Swiss voters approved caps on immigration; at the time of writing – more than two years after the vote – it is still not clear how the issue will be resolved.

The perennially strong Swiss franc is another challenge for the Vaud economy, which, like that of Switzerland as a whole, is largely driven by exports. A third challenge concerns longstanding fiscal policies in Switzerland that have come under attack from the EU and the OECD, triggering a reform of the country's corporate tax law. Vaud is one of the cantons for which corporate taxation for

Vaud and Switzerland: rankings

Fig. 1



Venture Capital in Switzerland by canton (2015)	Global Innovation Index (2015)	WEF Global Competitiveness Report (2015)	Per capita GDP (2014)
1. Vaud	1. Switzerland	1. Switzerland	1. Luxembourg
2. Zurich	2. UK	2. Singapore	2. Norway
3. Geneva	3. Sweden	3. USA	3. Switzerland
4. Lucerne	4. Netherlands	4. Germany	4. USA
5. Basel	5. USA	5. Netherlands	5. Ireland
6. Zug	12. Germany	6. Japan	11. Germany
7. Thurgau	19. Japan	10. UK	12. Canada
8. Schwyz	21. France	22. France	16. UK

Sources: Swiss Venture Capital Report, Swiss Federal Statistical Office, IMF, CREA, Global Innovation Index, World Economic Forum, OECD

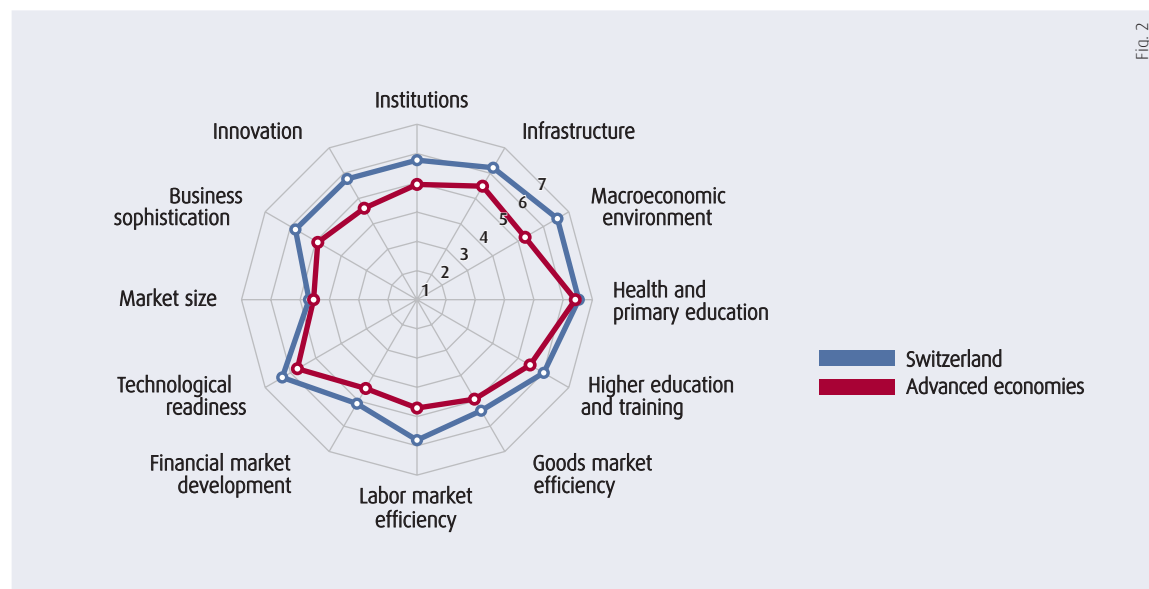
multinationals has become a hot-button issue, due to its attractive tax rate for multinationals and the large number of them that have set up headquarters in Vaud in recent years. The Canton wants to limit the increase in their tax burden, since it remains to be seen whether the quality of life on the shores of Lake Geneva will be enough to keep these firms in Vaud if their tax bill rises. And given that the special tax rates are bound to disappear, Vaud has chosen to substantially lower its standard corporate tax rate from around 22% to 13.79% (net) – closer to the 8%–11% range in which the special rates typically lie – if the reform is passed. A nationwide referendum will probably also be held on the corporate tax reform bill now that it has come out of parliament.

Despite these headwinds, the Canton of Vaud seems well positioned to remain a Swiss and European

success story in the coming decades. This can be attributed to a combination of Switzerland's unique corporate culture (i.e., high worker motivation, ingrained perfectionism, and consensus labor-management relations), an openness to outside influences and innovation that is somewhat greater than in other regions of Switzerland and Europe, and exceptionally good academic institutions with close ties to local businesses.

This study aims to shed light on the many factors that make Vaud's economy the growth engine that it is today. It represents a collaboration between the Observatoire BCV de l'Economie Vaudoise (an economic think-tank housed at Banque Cantonale Vaudoise), the CREA institute of applied economics (a branch of the HEC business school at the University of Lausanne), and the Vaud Chamber of Commerce and Industry (CVCI).

WEF Global Competitiveness Ranking: Switzerland #1



Unit: Score (1-7) on select criteria. Source: World Economic Forum, Global Competitiveness Report 2015-2016

The data we use come from several decades of statistics collected by the Swiss federal business survey and its replacement, the Swiss structural business statistics survey. These statistics break down employment by industry and give a good indication of employment trends over time. However, due to changes in survey methods and the official nomenclature for various industries, coupled with the drawbacks inherent to this type of data collection method, compiling the data was not a straightforward task. Nevertheless, we believe we have a fairly accurate representation of job trends between 1985 and 2013.

We also drew on other data sources, such as publications of Vaud GDP, which demonstrate recent trends in the agricultural, manufacturing & construction, and services sectors, and the Swiss federal census, which has been carried out every decade between 1860 and 2010 and annually since. The census data in particular illustrate how the Canton transformed from an agricultural region to a service-oriented one.

The first chapter of our report gives an overview of the Canton's strengths and the current state of its economy. The second looks back through history, with a focus on the structural shifts Vaud has gone through since the 19th century. Chapter 3 discusses the Canton's secondary sector, which encompasses manufacturing and construction, and describes Vaud's recent "reindustrialization." Chapter 4 turns to the services sector, with a discussion of the opportunities – and threats – Vaud faces. Finally, Chapter 5 looks at the challenges lying ahead for the Canton if it wants to remain one of Switzerland's and Europe's flagship economies.

1 One of Switzerland's most vibrant economies

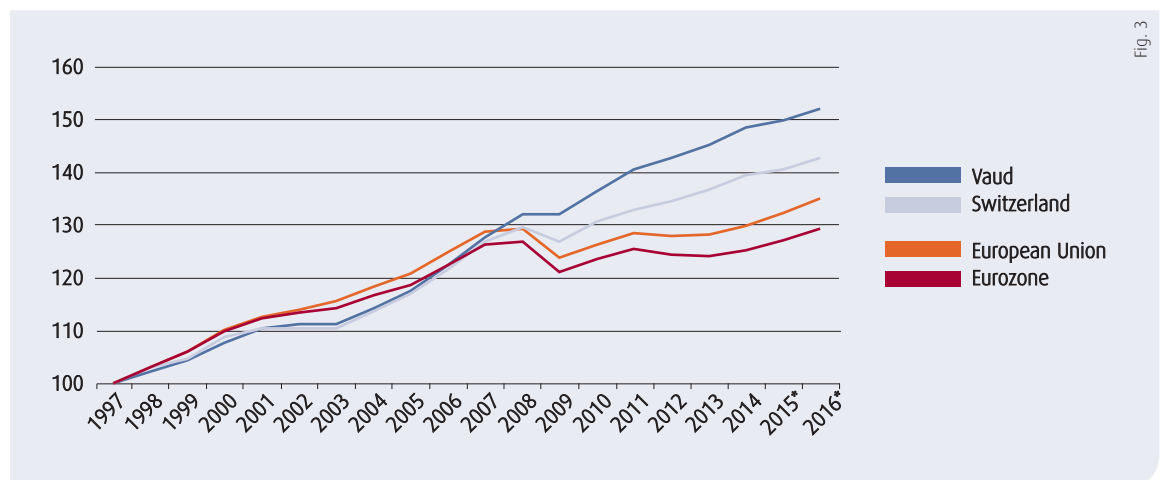
Vaud's economy is one of Switzerland's biggest and fastest-growing, thanks to its large services sector, diversified manufacturing base, and focus on niche markets. While the strong Swiss franc presents a challenge, the region has plenty of strengths to draw on.

BUSTLING TRADE

The Canton of Vaud bounced back from stagnation in the 1990s to post one of the fastest economic growth rates in Switzerland. Real GDP has expanded by some 40% since 2000 – higher than the 30% for the country as a whole and nearly twice the EU's 20%. While Vaud gross domestic product (GDP) calculations go back only to 1997, comparing Switzerland's and the European Union's (EU's) GDP growth since the 1960s shows that the Swiss economy expanded at a slower pace than the EU's from 1965 until the early 2000s, when the situation reversed.

That said, at the time of writing in early 2016, the Canton faces some serious headwinds. The global economy still hasn't fully recovered from the 2008 financial crisis and subsequent recession, and the eurozone is still struggling with anemic demand. The Swiss National Bank's (SNB's) decision to drop its EUR/CHF floor in January 2015 sent the Swiss franc sharply higher – and was a big blow to exporters. The SNB had introduced the EUR/CHF 1.20 currency floor in September 2011 to halt an appreciation in the franc. This measure proved effective in bolstering the country's economy, but early last year, when the European Central Bank (ECB) looked ready to

Relative GDP growth in Vaud, Switzerland, the EU, and the eurozone



Indices, base of 100 at 1997* = Estimate. Sources: Swiss Federal Statistical Office, SECO, European Commission, CREA

embark on a quantitative easing program to bolster the eurozone, the SNB abandoned the floor rate. The franc has since come down from the peaks reached just after the SNB's decision, but is still overvalued and shows no signs of easing quickly.

The strong franc has had a palpable impact on the Swiss and Vaud economies. GDP growth in both slowed to just under 1% in 2015, whereas it had been twice as high a year earlier. Exporters and firms competing with foreign goods (either imported or purchased abroad directly) have been the hardest hit. Last year, for the first time since 2004, the Swiss and Vaud economies grew more slowly than the EU's. The challenges facing Vaud in particular – which, in addition to the strong franc and weak eurozone economy, also include pending reforms to the corporate tax system and the implementation of the “against mass immigration” initiative – are discussed in more detail in Chapter 5.

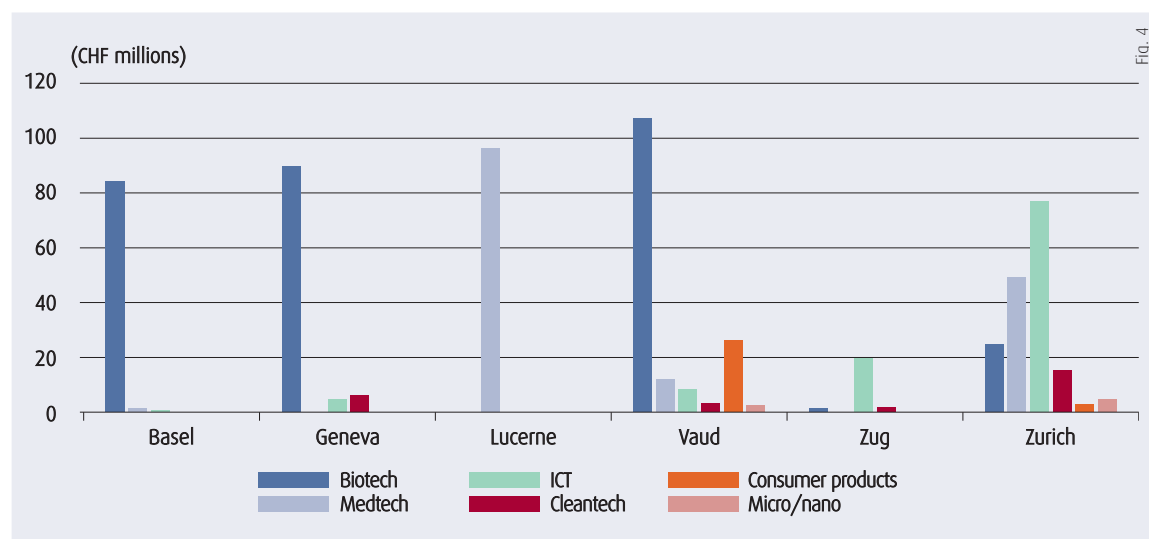
But since the onset of the global recession in 2008, Vaud's economy has proven that it can withstand concomitant shocks and remain buoyant, fuelled by robust domestic demand. That bodes well for the coming years as the Canton adjusts once again to a new macroeconomic landscape.

A LAND OF START-UPS

One of the Canton's key strengths is innovation. Even more so in recent years, as the Canton has invested in numerous technology parks and clusters to leverage synergies among research labs, universities, and start-ups. Vaud is home to the University of Lausanne (UNIL), the Swiss Federal Institute of Technology Lausanne (EPFL), the Vaud teaching hospital (CHUV), and many R&D centers.

The region has long been known for its advanced research capabilities and, more recently, its ability to spawn new businesses. For example, the rate of

Venture capital investments by industry and Swiss canton



Source: Swiss Venture Capital Report 2016

A HOTBED OF INNOVATION

The high-tech industry is brimming with rags-to-riches stories. Take Hewlett-Packard, founded in a garage in Silicon Valley, or Dell, launched from a dorm room at the University of Texas. But the United States doesn't have a monopoly on high-tech start-ups that are now big names – some of them were born in Vaud. Logitech, of mouse-and-keyboard fame, was created near Morges in 1981. Swissquote, Switzerland's biggest e-trading website, was set up in Gland by two EPFL engineers. And LeShop.ch, the country's first online supermarket, was created in Lausanne in 1997 – a bold move at a time when only 7% of the country had internet access.

Today Vaud is home to numerous start-ups, and their path from business idea to launch has become a lot easier over the years. The Canton has several technology parks and clusters to boost collaboration between research and industry and help get innovations to market; these include the EPFL Innovation Park (where Logitech now has its EMEA headquarters), the Biopôle biotech cluster, the Y-Parc technology park, the Technopôle greentech cluster, and the Swiss Welding Institute. Businesses in Vaud can also draw on the support of Innovaud, an organization that provides an array of services to help launch innovation projects.

Most Vaud start-ups operate in advanced fields, like biotech, pharma, medtech, diagnostics, nano-technology, and IT. There are plenty of promising candidates to eventually become leaders in their fields. They include:

- AC Immune, a biotech company founded in 2003 to develop treatments for neurodegenerative diseases like Alzheimer's, and which is currently planning an IPO on NASDAQ;
- Symetis, a maker of heart valve replacement devices founded in 2001. The firm had to cancel its IPO in the fall of 2015 due to sharp market volatility; it now plans to go public once it reaches breakeven, which should be by end-2016;

- Abionic, a nanotech firm founded in 2010 that aims to be the leader in allergy diagnostic systems. It, along with AC Immune and Symetis, is based at the EPFL Innovation Park;
- Sophia Genetics, a genetic data analysis firm founded in 2011 and spun off from EPFL in January 2015. It is now located just down the road in Saint Sulpice;
- Sensefly, a maker of next-generation drones that left EPFL in 2013 to set up shop in Cheseaux-sur-Lausanne;
- Netguardians, a cybersecurity business spun off from the Vaud School of Engineering and Management (HEIG-VD) and currently based at the Y-Parc tech cluster.

With so many engineering schools in such a small area, the region has become a hotbed of innovation – to the point where since 2014 Vaud has attracted just as much venture capital funding as the much larger Zurich Canton. Vaud has now earned a seat at the table with Europe's major innovation hubs, like London, Berlin, and Stockholm.

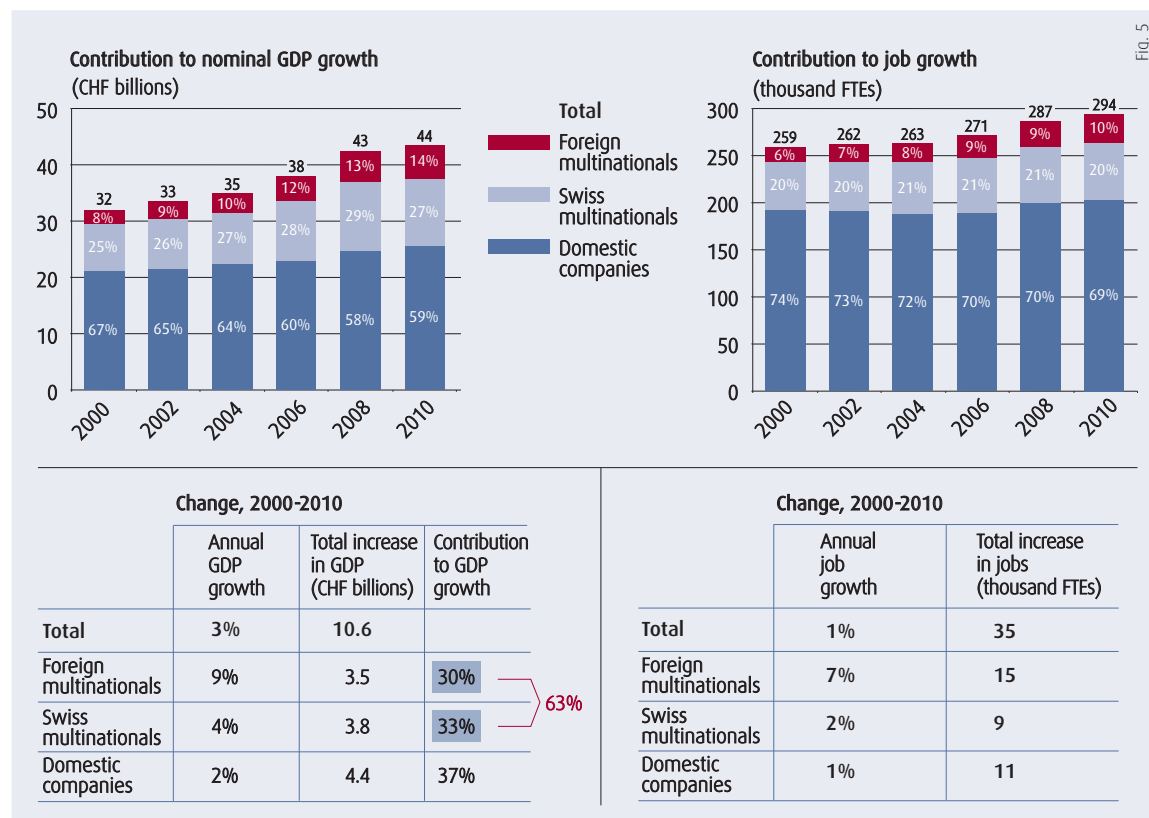
Of course, start-ups are not alone at the forefront of innovation. Established companies also have extensive R&D programs to develop the next breakthrough technologies. For instance, digital security leader Kudelski set up a cybersecurity division in 2012, Li-ion battery provider Leclanché teamed up with EPFL to develop a next-generation battery for storing solar power, biopharma company Debiopharm is funding a chair at EPFL to study signal transduction in oncogenesis and provides venture capital to numerous start-ups, and Nestlé opened a nutrition research center at EPFL. Multinationals and start-ups alike are leveraging the synergies of having top-tier universities right on their doorstep.

start-up creation at the EPFL picked up from just a handful in the 1980s to around 10 per year in the 1990s and some 15 per year since 2000. Today Vaud is one of the leading cantons for start-ups.

Vaud is also at the top of the Swiss tables for venture capital. According to the latest Swiss Venture Capital Reports (2014 and 2016), Vaud now stands head-to-head with Zurich in terms of venture capital investment, with CHF 173.3 million flowing into Vaud in 2015. Around 70% of those funds go to medtech and biotech firms; most of the rest is invested in IT, including healthcare applications.

Part of the reason why Vaud is able to attract such funding is because of the high quality of the new businesses launched within its borders. In 2015, Vaud entrepreneurs swept the top three spots in the “Top 100 Swiss Start-up Awards” sponsored by Institut für Jungunternehmen. First place went to L.E.S.S., which makes ultra-thin lighting systems; second place to Abionic, which supplies novel diagnostic tools; and third place to Flyability, which has developed a novel type of minidrone. Other well-known start-ups are Spinomix and AC Immune, both based at EPFL’s campus, and Xigen, based in the Biopôle biotech cluster just north of Lausanne.

Contribution of multinationals to Vaud economic growth



Sources: Swiss National Bank, Swiss Federal Statistical Office, BAK Basel Economics, Handelszeitung, ORBIS database, Boston Consulting Group

What's more, the region's budding entrepreneurs can now draw on the support of Innovaud, an organization set up in 2013 as a one-stop-shop with everything companies need to get innovation projects off the ground.

HEALTH VALLEY

In addition to spawning start-ups, Vaud is also known for its central role in the "health valley" that stretches across Western Switzerland. The Canton is home to several pharmaceutical and life sciences companies including Merck (ex-Serono), Ferring, GSK Consumer Healthcare (a joint venture between GlaxoSmithKline and Novartis), Medtronic, and Dentsply Maillefer. It also harbors numerous medical research centers such as the Swiss Institute for Experimental Cancer Research (ISREC), which since 2008 has been part of the EPFL; the EPFL's other life-science research institutes; a branch of the Ludwig Cancer Research center (at the University of Lausanne); and the CHUV teaching hospital. These establishments all form part of a broader healthcare industry spanning medical care, hospitals and clinics, research centers, and healthcare providers. This industry is one of the Canton's biggest employers, with 43,400 full-time equivalents (FTEs).

HOME TO MULTINATIONALS

Another large segment of Vaud's economy is made up of the many multinationals based in the Canton. Global firms from a variety of industries have chosen Vaud to set up headquarters. The reasons vary from its central location in the heart of Europe (with the Geneva International Airport right next door) to its highly skilled workforce, exceptional quality of life, and the political stability and sound legal system that Switzerland is known for.

Of course, taxes are another important factor that companies look at when considering where to set up shop. And corporate tax rates have become

a competitive battleground for countries around the world looking to attract foreign investment. In Switzerland, each canton is free to set special tax rates for companies that mainly do business outside the country, such as trading firms or multinationals headquartered in the canton. In Vaud, those special rates typically range from 8%–11%, instead of the 22% rate that applies to domestically focused companies. Vaud has also taken advantage of a federal law that lets cantons grant temporary tax relief to certain companies.

Vaud began to proactively seek foreign multinationals in the mid-1990s, as a way to help renew its economic base. An economic development agency for the Canton of Vaud (called DEV) was created, and the region was successful in attracting between 30 and 60 foreign firms per year. However in 2008 the pace slowed to around 30 per year, due partly to the removal of some of the temporary tax relief and partly to the global financial crisis. Multinationals became cautious about investing in Switzerland given the strong Swiss franc and uncertainty about the future of the special corporate tax rates. Those special rates had been under increasing pressure from the EU and the OECD since 2005, as they were seen as a form of unfair competition.

Another reason the pace of foreign investment slowed was that the Canton's policymakers no longer made attracting multinationals a strategic priority. The special corporate tax rates were also controversial locally, although the data show they had a net positive effect in boosting the local economy and improving the region's public finances. According to 2011 figures from the CREA institute of applied economics, 218 companies whose main business is overseas paid CHF 141 million in cantonal taxes and 306 million in federal taxes. That's in addition to an estimated CHF 170 million in income tax collected from the 9,200 employees

working for those companies. CREA also estimates that each of those employees created 1.7 additional jobs in the rest of the local economy.

Nevertheless, in response to criticism from the EU and OECD – and to prevent Switzerland from being exposed to at best additional red tape for its companies, at worst sanctions – the federal government proposed abolishing

the special corporate tax rates in a reform bill that is likely to be put to a national referendum. In order to limit the increase in the tax burden on companies currently taxed under the special rates, Vaud has chosen to substantially lower its standard corporate tax rate – from around 22% to 13.79% (net), close to the special rates – if the reform is passed.

Structure of Vaud economy by jobs and GDP

Industry	Total work-force	Total FTEs	Share of total FTEs (%)	Value added (million CHF)	Share of GDP (%)
Agricultural sector	13,177	9,071	2.7%	480.4	1.0%
Agriculture, forestry, and fishing	13,177	9,071	2.7%	480.4	1.0%
Secondary sector	73,364	68,164	20.3%	10,156.0	20.8%
Food, textiles, leather, wood, paper	11,907	10,603	3.2%	1,308.8	2.7%
Chemicals, pharma, rubber, glass, metalworking, etc.	11,631	10,927	3.2%	2,733.8	5.6%
Machines, instruments, watchmaking, etc.	18,005	17,008	5.1%	2,811.8	5.8%
Water and electricity production and distribution	3,877	3,563	1.1%	957.5	2.0%
Construction	27,944	26,063	7.7%	2,344.1	4.8%
Services sector	335,449	259,162	77.0%	38,183.7	78.2%
Wholesale, retail, repairs, etc.	56,089	45,796	13.6%	7,087.7	14.5%
Hotels and restaurants	20,128	15,626	4.6%	857.7	1.8%
Transportation, postal services, telecommunications, publication	23,227	19,894	5.9%	2,743.4	5.6%
Insurance and financial services	17,543	15,658	4.7%	3,584.1	7.3%
Real estate services, business services, etc.	79,271	62,837	18.7%	7,860.9	16.1%
Public administration, healthcare, education, sports, etc.	132,657	94,709	28.2%	12,069.1	24.7%
Other	6,534	4,643	1.4%	3,980.8	8.2%
Total	421,990	336,397	100.0%	48,820.1	100.0%

Fig. 6

Sources: Swiss Federal Statistical Office, SECO, CREA

A SERVICES-BASED ECONOMY

The services sector makes up 78.2% of Vaud's economy by value added and 77.0% by FTE jobs (based on 2013 data). Business services make up the biggest segment of this sector; they account for some 19.3% of the sector's employment (on an FTE basis). The exact definition of "business services" can vary, but typically includes rentals, leasing, facilities management, security, landscape planning, administrative and HR services, architecture, engineering, and legal and accounting services. The second-biggest services industry is retail, with 17.7% of FTE jobs, followed by healthcare (15.0%) and education (9.8%). Next comes financial services, banking, and insurance with 6.0%.

Vaud's secondary sector, which encompasses manufacturing and construction, is substantially smaller than just 30 years ago but still makes up 20.8% of its economy by value added and 20.3% by FTE jobs. Most activity in this sector is in construction, with 38.3% of FTE jobs, followed by machinery and precision instruments (including watch-making) with 20.0%, and chemicals and pharma with 9.2%.

Between 1997 and 2013, the sector's value added rose 40.9% and the number of FTE jobs grew 19.7%. Comparing this with the services sector, where FTE jobs grew a total of 36.8% and value added 48.5% over the same period, illustrates the higher productivity gains that have been achieved in manufacturing.

The agricultural sector – once the Canton's bread and butter – now accounts for 1.0% of the economy by value added and 2.7% by FTE jobs. This represents a major structural shift from 1860 when farming occupied half of the Canton's population. Nevertheless, Vaud remains the second-biggest canton for farming output and the biggest for crop production.

2 Shaping the Vaud economy, from 1860 to today

From a farming-based economy in 1860 to a land of start-ups today, Vaud has undergone some major transformations. And the lessons learned along the way are what laid the foundations for what is now one of Switzerland's most dynamic regions.

A CENTURY AND A HALF OF CHANGE

Vaud was traditionally an agricultural canton, with abundant crops, vineyards, and dairy farms. In 1860, 48% of the population worked in agriculture; for Switzerland as a whole the figure was 41%. Vaud was the second-largest canton in terms of the surface area used for crops and winegrowing, and third largest for livestock.

The Canton's industrial sector at the time was still underdeveloped. 29% of people worked in manufacturing, compared with 37% for the country as a whole. With some exceptions, Vaud was mostly outside of Switzerland's main manufacturing industries of the 19th century, which were textiles and associated machinery in the northern part of the country and watchmaking in the Jura region.

Switzerland's manufacturing base back then was already structurally different from those of other nations. Swiss producers had to struggle with challenges specific to their country: a relatively small amount of available land, scarce raw materials, and a topography and climate that made importing raw materials difficult. For instance, since coal was hard to transport across the mountains, water became the country's main source of energy, initially as hydrological power and later transformed into electricity.

Switzerland's small domestic market in the 19th century (as opposed to those of the United Kingdom and France) made mass production unprofitable. As a result, manufacturers began selling their goods abroad and focusing on high-added-value niche products, like ribbon in Basel and embroidery in Saint Gallen, to be competitive in foreign markets. That same strategy serves Swiss companies well even today, and is one of the reasons behind their lasting success.

Production sites in Switzerland were not as concentrated as they were in England and northern France, so artisans worked largely at home. One advantage Switzerland enjoyed was a well-trained workforce, especially in the Central Plateau region, and salaries that were fairly low for the mid-19th century.








RURAL EXODUS

Over the following decades, Vaud's economy began to shift as a rural exodus took place. Advancements in farming methods meant that farms needed fewer workers and yields were higher. Grain farmers in particular faced competition from imports from the colonies of other European countries. The Canton saw a steady rise in the number of workers who left small towns to look for jobs in the city – or in other countries. Switzerland was a country of emigration until the late 1800s.

Industrial activity in Switzerland in 1900

Map appearing in the 1900 federal census,
published in 1907

Number of people working in various trades, by district.
Each symbol corresponds to 100 people.
Groups of five symbols correspond to 500 people.
The trades are as follows:

- | | |
|--|---|
|  | Silk spinning |
|  | Silk weaving - fabric |
|  | Silk weaving - ribbons |
|  | Silk dyeing and printing |
|  | Cotton spinning |
|  | Cotton weaving |
|  | Cotton dyeing and printing |
|  | Wool production |
|  | Rope-making, linen, and hemp fabric |
|  | Hay and horsehair |
|  | Embroidery |
|  | Paper production |
|  | Forging, foundries, and machine fabrication |
|  | Other metalwork |
|  | Jewelry |
|  | Watchmaking |
|  | Electricity |
|  | Musical instruments |



Source: Swiss Federal Statistical Office

The construction – and especially railway – industries began to take off in the late 1800s. These labor-intensive activities had an almost insatiable appetite for workers, which the young men coming from local farms weren't enough to fill. As a result, salaries grew and emigration slowed; Switzerland even started recruiting workers from neighboring countries.

INDUSTRIAL DEVELOPMENT

In Vaud, the spread of manufacturing activities was mainly driven by the food, precision mechanics (watches and music boxes), machinery, and hydroelectric power industries. By the turn of the 20th century, the Canton had become one of Switzerland's leading regions for food production, which accounted for between 15% and 19% of Swiss food production jobs at the time.

That reflects not only the expansion of Nestlé and other smaller chocolate makers, but also Vaud's cheese producers and wine growers. In the early 1900s, Orbe, Moudon, and the Riviera region were known for their chocolate and dairy products. Vaud was later surpassed by other cantons, but still has a strong food-producing industry, anchored by Nespresso and Nescafé.

The presence of many food producers in the Canton gave rise to a machinery industry skilled in specialized equipment. Companies born at the time include Bobst and two smaller firms that are now part of the packaging division of German engineering giant Bosch: SAPAL (Société Anonyme des Plieuses Automatiques Lausanne) and Demareux. Meanwhile, in Vaud's traditional watchmaking region along the Jura mountains, watchmakers leveraged their unique know-how to create a renowned precision-equipment industry. Their high-end products included not only watches, but also music boxes and mechanical parts.

One such company, the Paillard family business created in 1814, built up an international reputation in the 20th century. Throughout its lifetime the company diversified into many fields: music boxes, phonographs, gramophones, typewriters, film cameras, and more. Its portable typewriter, the Hermes Baby (also branded the Hermes Rocket), was appreciated by journalists and writers, including John Steinbeck and Ernest Hemingway. Its lightweight camera, marketed under the brand name Bolex, was also very popular and was used by artists like Andy Warhol and David Lynch, as well as reporters and scientists. The company lost ground as mechanical equipment became increasingly replaced by electronic devices, and disappeared shortly before 1990.

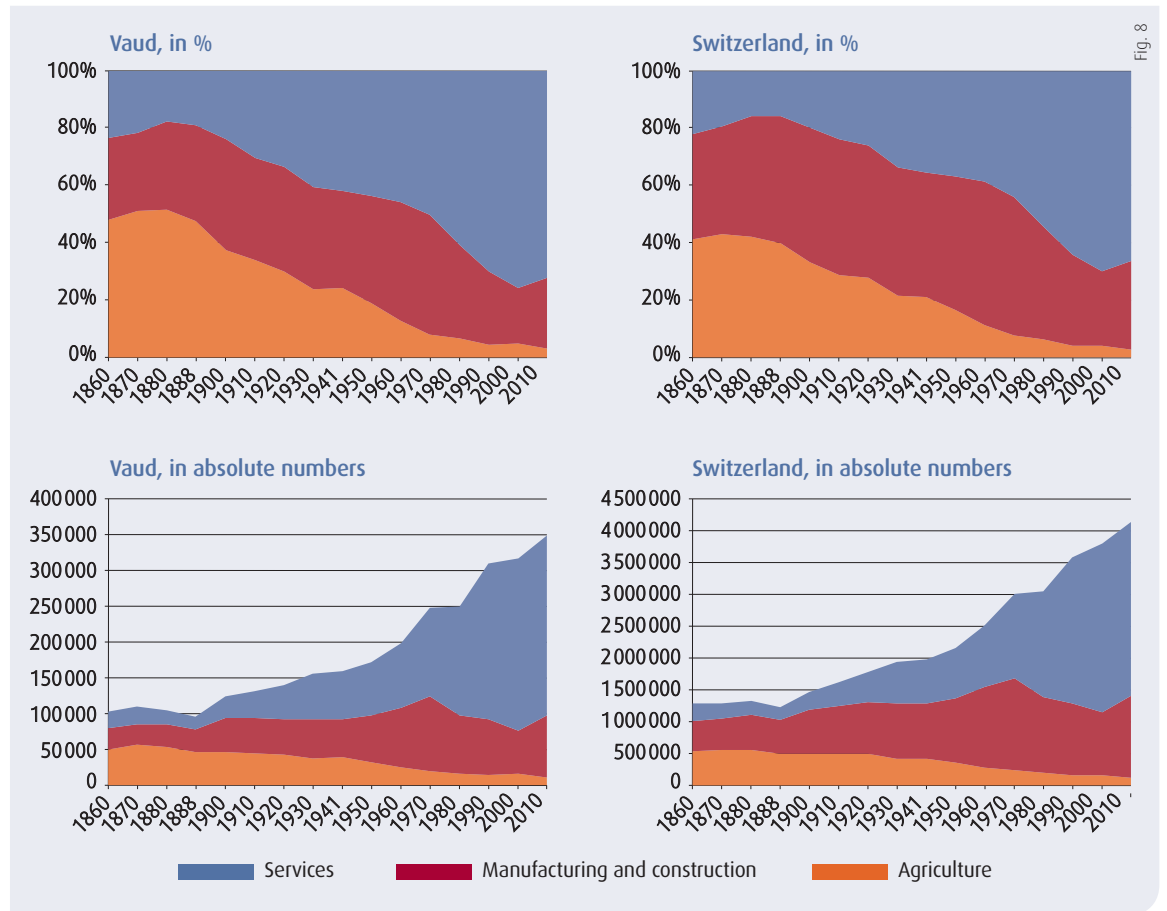
Between the late 1800s and early 1900s, Vaud played an important role in the tobacco industry – even becoming Switzerland's second-biggest canton for tobacco production. While the industry later moved to other cantons like Ticino, Geneva, and Neuchâtel, it still plays a non-negligible role in Vaud's economy. Philip Morris International's headquarters and British American Tobacco's regional offices are both located in Lausanne.

Long before it became Switzerland's high-tech capital, Vaud was a pioneer in another "modern" technology: electricity generation. In 1882 Lausanne became Europe's first city to have electric lighting. Hydroelectric plants were built around the Canton, and in 1888 Switzerland's first electric tram line was inaugurated connecting Vevey, Montreux, and Chillon.

A ROMANTIC DESTINATION

Very early on, Vaud stood out from other cantons for its dynamic services sector. In 1860 Vaud had a higher percentage of people working in services (23%) than Switzerland as a whole (22%). Initially those services were concentrated in personal

Breakdown of workforce by sector in Vaud and Switzerland



Source: Swiss Federal Statistical Office

services, retail, and transportation – the last of which also served as a catalyst for the development of other industries. Vaud's railway network was first built in the late 1850s with lines connecting Vaud towns to each other and to Geneva and the German-speaking part of Switzerland. International connections were added in the decades that followed, including to Paris and to Italy through the Simplon tunnel – making Lausanne a stop on the Orient Express.

But even before Vaud's railway network was established, the Lake Geneva region was a popular travel destination. Especially Lausanne, which in addition to being a university town and Bishop's residence, was an important stop for stagecoaches crossing the country. Vevey was also a favorite lakeside resort town. The picturesque area around Montreux was used as the setting for a scene in Jean-Jacques Rousseau's 1761 novel *Julie, or the New Heloise*. And that novel was what enticed

Lord Byron to visit this part of Switzerland; he stayed in Geneva with the Shelleys and visited the Château de Chillon, where he learned about François Bonivard, a 16th-century Geneva patriot who was held political prisoner for six years in the Chateau's dungeon. François' story inspired Byron's 1816 poem *The Prisoner of Chillon*, which he wrote at a hotel in Lausanne.

The Alps and the Lake Geneva region, with their majestic mountains and dramatic landscapes, were perfectly suited to the fashion at the time for grandiose, picturesque scenery. Switzerland had become a trendy destination – not only Vaud but also central Switzerland and the Oberland around Bern. By reducing the distances and the cost of travel, railways helped the country's tourist industry take off. By 1910 tourism was the services industry that employed the most people in Vaud, alongside retail. However, the 1929 depression and the two World Wars reduced the number of travelers coming to the Canton.

FINANCIAL SERVICES

At the end of the 19th century, large infrastructure projects in Switzerland emerged as a powerful magnet for investing excess savings. However, this triggered concerns that financing could dry up for local businesses. In order to help channel local savings into the Canton, Vaud set up a cantonal bank in 1845, making it one of the first cantons to do so. Numerous other savings and loan institutions were also created, including Crédit Foncier Vaudois, Caisse d'Epargne et de Crédit, Caisse d'Epargne Cantonale Vaudoise, Union Vaudoise de Crédit, and Banque Vaudoise de Crédit. The number of people working in financial services grew by a factor of ten between 1888 and 1960.

The 20th century saw a wave of consolidation among Vaud banks. Today the main ones left are Banque

Cantonale Vaudoise (BCV); the local subsidiaries of major Swiss banks UBS and Credit Suisse; Raiffeisen and Postfinance (which got its banking license in 2012); some local savings institutions; branches of wealth management firms; a handful of local private banks; some independent asset managers; and a few financial intermediaries. In the late 1990s a start-up was created in the Canton that went on to become Switzerland's leading online trading website: Swissquote.

Vaud's insurance industry dates back to 1811 with the creation of a company that offered insurance against fire damage. In 1858, one year after Schweizerische Rentenanstalt was founded in Zurich, Switzerland's second life insurance company – and the first in the French-speaking part of Switzerland – was established, called La Suisse Assurances. Other companies eventually followed, such as Assurance Mutuelle Vaudoise in 1895 and the Vaud Canton pension fund in 1907. Since then a number of insurance companies from elsewhere in Switzerland and abroad have opened offices in the Canton. The industry also underwent significant consolidation, so that today the main insurers based in Vaud are Vaudoise Assurances, Retraites Populaires, and Etablissement Cantonal d'Assurances (ECA). Vaud is also home to the headquarters of health insurer Assura as well as La Mobilière's life insurance business and Generali Suisse's non-life insurance business.

STAGNATION IN THE 1990S

Vaud's economy has weathered many crises since the 19th century: two World Wars, the Great Depression, the oil crises of 1973 and 1979, the bursting of Switzerland's property bubble in 1990, the collapse of the dot-com bubble in the early 2000s, and the 2008 financial crisis and subsequent global recession. However, through most of them, unemployment in the Canton remained lower than

that for Switzerland as a whole. For instance, from 1931 to 1938, average unemployment was 2.5% in Vaud but just over 3% on a national level. And during World War II, it remained under 1%. The same was true for the period from 1976 to 1990, although Switzerland managed to export some of its unemployment during the oil crises by not renewing the jobs of seasonal workers.

Of the most recent crises, the one that hit Vaud's economy particularly hard was the bursting of Switzerland's real-estate bubble in the 1990s. Unemployment in the Canton rose to above 7% between 1994 and 1997, whereas it stayed mostly under 5% for the country as a whole. That crisis had major effects on Vaud's construction, banking, and retail industries, as well as on its manufacturing industry, which was simultaneously undergoing a structural shift. The Canton's finances took a blow with a jump in the public deficit, higher public debt, and a wave of cost-cutting programs. The 1990s was also the decade when cartels were broken down and the domestic market was opened up.

Things started to improve in 1997, when the deficit began to shrink and the trend in unemployment started to reverse. Between 1997 and 2013, Vaud's real GDP rose an average of 2.4% per year or a total of 45.5%. However that average growth rate masks some sharp fluctuations. Economic output grew until 2001, then stumbled in 2002 and 2003 in the wake of the dot-com bubble and 11 September terrorist attacks. Four exceptional years then followed, from 2004 to 2008, driven by a sanguine global economy. However, the benefits of the Canton's renewed economic base really became apparent in 2009: as the world suffered a recession after the Lehman Brothers collapse, the Canton's GDP declined only slightly.

After that, Vaud's economy soon returned to strong growth rates despite weak demand in the eurozone

and a sputtering global recovery. It was helped by the currency floor of EUR/CHF 1.20 that the Swiss National Bank introduced in September 2011 to halt a rise in the Swiss franc. The SNB then removed that floor in January 2015 – sending the franc sharply higher. While the franc has since retreated, the stronger currency is one of the main challenges facing Vaud's economy today.

THE ROLE OF IMMIGRATION

The various crises affecting the Vaud and Swiss economies all took a toll on immigration. While the percentage of foreigners among Vaud residents grew from 2.2% in 1837 to 14.4% in 1910, that figure subsequently fell to 6.0% in 1941 – largely as a result of the two World Wars. Immigration bounced back in the 1950s, even more so in Vaud than the country as a whole. The number of foreigners in the Canton grew an average of 7.4% per year until 1970, when foreigners accounted for 22.6% of the population. The 1970s oil crises pushed immigration into negative territory. It recovered in the following decades, but grew at half the rate as before. Immigration slowed again in the 1990s. The number of foreigners rose an average of 3.0% per year between 2000 and 2010, then an average of 3.4% until 2014.

While some of those who came to Vaud were fleeing war-torn countries, most were looking for work. In the 19th and 20th centuries, immigrants played a key role in building the country's infrastructure. More recently, the number of foreigners in the Canton's workforce grew by roughly the same rate as the number in the overall population, reaching 21% in 1970 and 31% in 2010. That means that in absolute numbers, immigrants' contribution to the growth in the Canton's workforce was slightly higher than the contribution of native-born Swiss.

Number of Swiss and foreigners in Vaud's workforce, by industry

Occupation		1970	2010	Change, 1970-2010	% change, 1970-2010
Agriculture & forestry	Swiss	18,282	7,973	-10,309	-56.4%
	Foreign	1,111	2,165	1,054	+98.4%
Manufacturing and civil engineering (ex-construction)	Swiss	36,534	16,907	-19,627	-53.7%
	Foreign	17,366	9,672	-7,694	-44.3%
IT & engineering	Swiss	10,905	20,657	9,752	+89.4%
	Foreign	2,587	9,729	7,142	+276.1%
Construction & mining	Swiss	9,294	7,448	-1,846	-19.9%
	Foreign	5,645	8,000	2,355	+41.7%
Business administration, transportation and traffic	Swiss	32,685	31,340	-1,345	-4.1%
	Foreign	4,398	13,144	8,746	+198.9%
Hospitality & consumer services	Swiss	17,217	12,679	-4,538	-26.4%
	Foreign	10,164	18,137	7,973	+78.4%
Management, administration, banking, insurance and law	Swiss	35,259	68,616	33,357	+94.6%
	Foreign	3,885	21,890	18,005	+463.4%
Healthcare, education, sciences and the arts	Swiss	16,799	54,857	38,058	+226.5%
	Foreign	3,723	17,134	13,411	+360.2%
Other	Swiss	83	2,398	2,315	+2,788.8%
	Foreign	22	1,010	988	+4,488.7%
Total	Swiss	177,058	222,875	45,817	+25.9%
	Foreign	48,901	100,880	51,979	+106.3%
Total workforce		225,959	323,755	97,796	+43.3%

Fig. 9

Gainfully-employed people aged 15 or over. Industries grouped according to the Swiss Standard Classification of Occupations.
Source: Swiss Federal Statistical Office

Breaking it down by profession, between 1970 and 2010, the number of Swiss people working in the agricultural, construction, hospitality, retail, and transportation industries declined, while the number of immigrants grew. Similarly, the number of Swiss people working in manufacturing fell faster than that of foreigners. Native-born Swiss were moving into higher-added-value fields such as management, administration, finance, law, healthcare, teaching, sciences, and the arts. But that's not to say foreigners were absent from those fields. In fact, the number of foreigners working in those professions has grown by a factor of five in the past 40 years – while the number of Swiss people merely doubled. The growth in the number of immigrants was especially pronounced in management, finance, and administration, with a 463.4% increase between 1970 and 2010, and in healthcare, education, sciences, and the arts, with a 360.2% increase.

One recent trend is growth in the number of people who work in Vaud but don't live in the Canton. They either commute in from another canton or from neighboring France. In 1990, 92% of people who worked in Vaud lived here; by 2010 that figure had

fallen to 82%. Around two thirds of the remaining 18% live elsewhere in Switzerland and one third in France. But the commuting goes both ways – in 1990, some 96% of gainfully-employed Vaud residents worked in the Canton; in 2010 that figure was 86%. Over half of the remaining 14% worked in Geneva. These figures indicate that the people who commute into and out of Vaud from another canton basically cancel each other out, and the “extra” labor that the Canton enjoys come from the cross-border workers.

3 A highly-specialized secondary sector

Vaud's secondary sector, which brings together manufacturing and construction, experienced a slump in the 1990s following the bursting of the real-estate bubble and an economic downturn. Since then, trends within the sector have varied: some industries have really taken off, while others have fared less well.

A DROP IN EMPLOYMENT

In the 1990s, much was said about the “deindustrialization” of Vaud Canton and Switzerland as a whole. That issue sprang up again in 2015 after the Swiss National Bank dropped the EUR/CHF floor rate and the franc jumped sharply higher.

But is Vaud's secondary sector really in trouble? In terms of jobs, the numbers do show a downward trend, with the number of full-time equivalent (FTE) jobs falling 9.4% between 1985 and 2013. The sector's share of total jobs in Vaud was also down, dropping from 29.1% to 20.3% over the same period, mainly because of a rise in jobs in the services sector. Between 1985 and 1998, the secondary sector shed over a quarter of its workforce (-26.5%). After that the trend reversed, with a 23.3% gain in jobs between 1998 and 2013.

So if you look at the workforce alone, manufacturing and construction have indeed lost ground over the past 30 years. But the sector's value added tells a different story. Nominal value added was CHF 10.1 billion at end-2014, compared with “just” CHF 7.3 billion in 1992. The sector made up 25.3% of Vaud GDP in 1985 and 20.3% in 2014, a much softer decline than that seen in jobs. So the rapid growth in the Canton's services sector over the past 30 years has by no means marginalized manufacturing or construction.

Behind this employment trend and apparent “deindustrialization” of the economy lies a deeper structural change within the secondary sector. Some industries – essentially those that are not high up the value chain – have contracted while others have managed to stand their ground. And some even experienced solid growth. But there is a common thread to these diverging trends: a move towards niche, and even highly specialized niche, markets, and it is gaining momentum all the time. Vaud manufacturers are becoming increasingly skilled in high-tech and precision products, and productivity is constantly on the rise. With almost a thousand new jobs a year in the secondary sector since 1998 – despite two recessions in-between – it would seem more accurate to say there has been a sort of reindustrialization of the Canton.

MIXED TRENDS

So how has the sector changed? At the start of the 2000s, pessimism prevailed. The 1990s had been particularly bleak, with some high-profile plant closures. One famous example was the closure of metal engineering firm Ateliers de Constructions Mécaniques de Vevey. The company was founded in 1842 and became one of the crown jewels of Vaud manufacturing. In the 19th century, the company made boring machines for the Gotthard tunnel. And in its heyday, it produced hydroelectric turbines, polar

cranes for French nuclear power plants, reservoirs for LNG carriers in the USA, tractors, trolleybuses, and metal building structures. It was forced to close in the 1990s.

In early 2000, more plants had to shut down. One of the better-known cases was the plant owned by hosiery manufacturer Iril in Renens. Two years later, the Vaud plant of Filtrona, a maker of cigarette filters, was also closed after it was bought by a UK company following the break-up of the Baumgartner Group. Kodak also laid people off in droves before finally closing its plant in the region in 2006.

Looking back, however, the media frenzy and industrial unrest around these major closures covered up the emergence of a different trend. Industries that were not very present some 30 years ago, such as pharma, had begun to gain ground. As had the construction industry – the backbone of Vaud’s secondary sector – which was boosted by the Canton’s swelling population, which grew 22.6% between 2000 and 2014.

Watchmakers and the contractors that serve them also saw a rebound. And producers of electronic components, lab equipment, and medtech sprang up, backed by local know-how in precision instruments.

Machinery – another longstanding industry in Vaud – experienced the opposite trend, at least in terms of jobs. Some machinery manufacturers managed to stay afloat by going international and keeping only their more complex operations in Switzerland. But others did less well. Rubber and plastics manufacturing tells a similar story, as does the non-metallic minerals industry. In fact, for these more standard products, “made in Switzerland” has become a rare commodity.

THE HEAVYWEIGHTS OF VAUD’S SECONDARY SECTOR

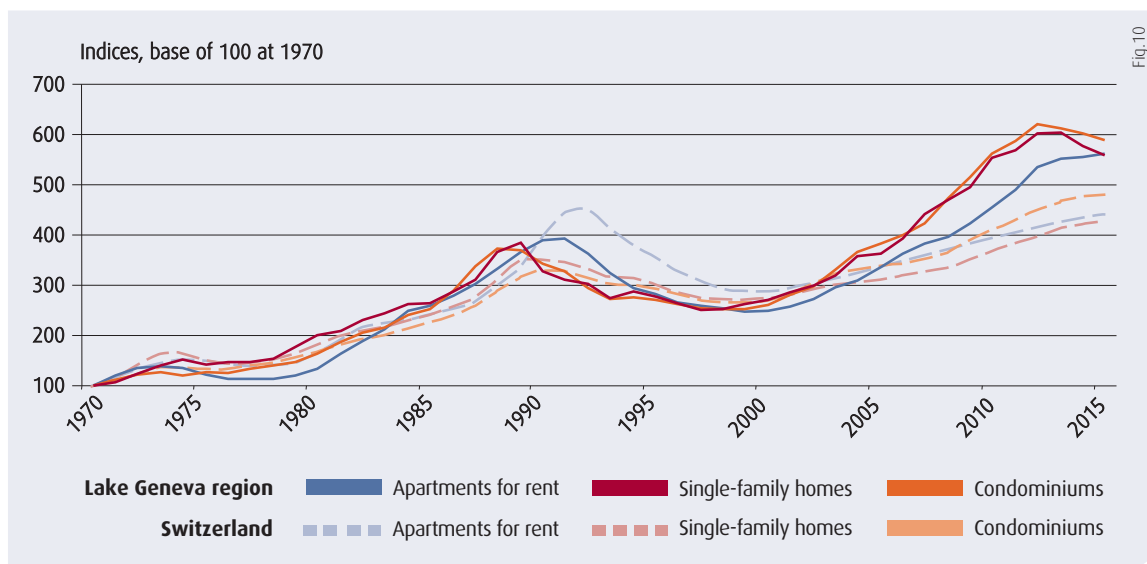
1. Construction

The trend in the construction industry reflects the trend in the Vaud economy as a whole – manufacturing, construction, and services combined. As the saying goes: “When construction’s ok, everything’s ok.” However, a closer look at jobs in construction and civil engineering shows that the number of FTEs was flat between 1985 and 2013.

But there are other factors to take into account as well, like the fact that the construction industry in Vaud – and indeed throughout Switzerland as a whole – collapsed in the 1990s. This was a consequence of the 1987 market crash, which led to a major expansion in the international money supply. The expansion was even greater in Switzerland, as the Swiss National Bank had poorly judged the impact of the new Swiss Interbank Clearing System and new liquidity requirements for banks. Speculation rapidly took over the real-estate market, and prices soared 20% in just two years. Inflation went from 2% in 1988 to 5% the following year, reaching 5.3% in 1991. The SNB then abruptly put the brakes on borrowing, with rapid rate hikes. At that time, most property owners had variable-rate mortgages, and the interest rate soared from 5% in 1989 to 7% in 1990 and then 8% a year later.

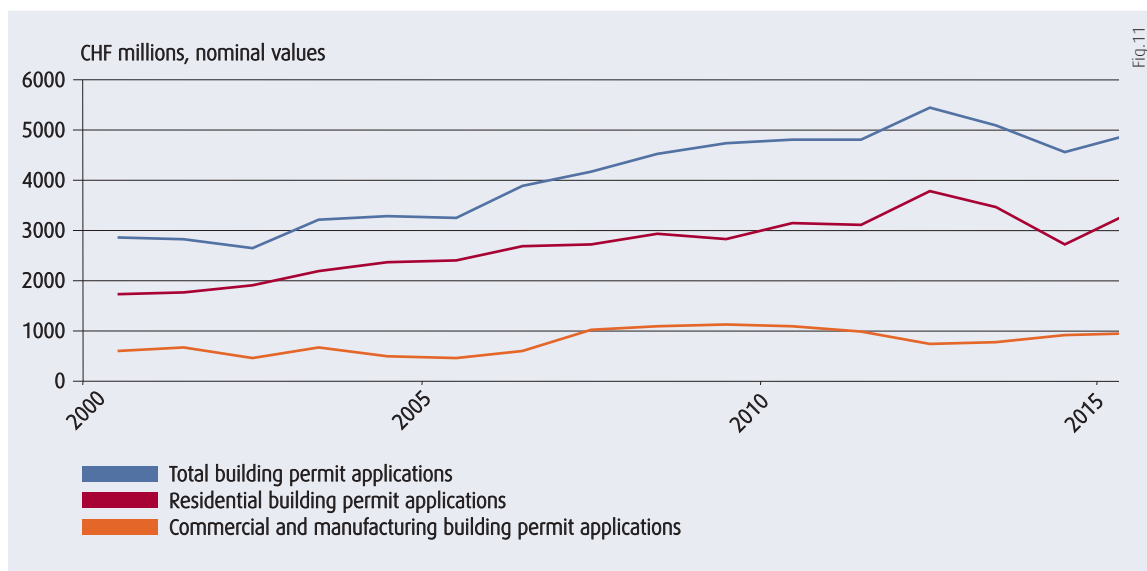
This hit the banking industry hard, leading to rapid consolidation. But it hit the construction industry even harder. The number of construction jobs in Vaud plummeted, falling a total of 33.6% (down 3.1% a year) between 1985 and 1998. A period of stabilization then followed before the industry started to recover, gaining more momentum after 2005. From 1998 to 2013, the number of FTEs in the industry rose by a total of 45.7% or 2.5% a year.

Property price indices in the Lake Geneva region and Switzerland



Source: Wüest & Partner, Swiss National Bank

Construction investment in Vaud



Source: Statistique Vaud

This upturn resulted from a combination of two factors: the Canton's population grew as the economy diversified, and interest rates fell almost continuously following the bursting of the dot-com bubble in 2001.

Vaud's construction industry comprises three main segments: building, civil engineering, and specialized construction (e.g., demolition, electrical facilities, plumbing, and fixtures and fittings). In building and civil engineering, FTEs fell a total of 33.5%, or 3.1% a year, from 1985 to 1998. By 2013, the number of FTEs was back up to the pre-crisis level, rising 50.6%, or 2.8% a year, since 1998. The industry's nominal value added stood at CHF 615 million in 2014. In real terms, it rose 27.1% between 1997 and 2014, an average of 1.4% a year.

Within the construction industry, building, which accounts for around 85% of the industry's output, recovered more quickly than civil engineering, which experienced a more sluggish comeback. Civil engineering's value added only really began to take off in 2010, which no doubt reflects the cantonal government's concerted efforts to reduce its debt burden, which reached CHF 8.65 billion in 2004.

The 1990s downturn had a similar impact on specialized construction. The number of FTE jobs in this segment shrank 33.6%, or 3.1% a year, between 1985 and 1998. Then the number of jobs rose 44.0%, or 2.5% a year, until 2013. SMEs in this segment created a constant stream of new posts, with several hundred additional jobs each year.

Specialized construction accounted for close to 27.8% of secondary-sector jobs in 2013, compared with 26.4% 30 years earlier. After a more challenging decade in the 1990s – when construction represented more or less a quarter of secondary-sector jobs – specialized construction came out as one of the main

employers in the Canton's secondary sector. This segment made up a solid 5.8% of all jobs in Vaud in 2013, compared with 8.3% in 1985 (despite the job growth in the services sector).

Specialized construction has also contributed substantially to value added. From 1997 to 2014, value added rose 1.7% a year in real terms, reaching CHF 1.7 billion in nominal terms. This represents 16.7% of total secondary-sector value added, compared with 14.6% in 1998. Specialized construction accounts for 3.4% of Vaud GDP, and has done for a long time.

The entire construction industry now represents 22.7% of the value added of Vaud's secondary sector, slightly above the 1997 level of 20.1%. What's more, these companies are the biggest employers in the secondary sector, with 38.2% of jobs, compared with 35.8% in 1985.

The real-estate boom has also had a positive knock-on effect on other manufacturing industries. The value added produced by the wood industry – sawmills, wood profiles for construction, kitchens, joinery, carpentry, and window and doorframes – for example rose 23.4% between 1997 and 2014, reaching CHF 208 million by the end of the period.

2. The food industry

Another well-established industry in Vaud is food, beverages, and tobacco. One of the pioneers in this industry was Nestlé, which now has several local subsidiaries including Nescafé, Nespresso, and mineral-water producer Henniez-Lithinée SA (acquired by Nestlé in 2007). The food industry includes related companies such as livestock feed producer Protector, now taken over by Cargill. There are also a number of cheese manufacturers, including Fromco, which is now part of Swiss group Emmi, as well as UHT milk production plants, and a cheese and a pow-

NESPRESSO. WHERE ELSE?

When you're in a mature market like foods, the only way to grow is to innovate. But how? Hundreds of new products hit the supermarket shelves each year, but few of them are still there two years later. And the ones that are often fall victim to changing fads or competition from even newer products. Just a handful reach the ubiquitous status that Nespresso enjoys – making it the perfect example of in-house innovation done right.

Nespresso is a subsidiary of food giant Nestlé, based in Vevey. In the 1970s, Nestlé wanted to build on the success of its Nescafé instant coffee and expand into the ground coffee segment. Its researchers came up with an idea for an easy-to-use coffee machine employing capsules. The company filed a patent in 1976, and in 1986 launched the first machines on the market under the brand name Nespresso – a start-up that Nestlé created in its home town. But the first few years were tough. Nespresso initially targeted the professional market segment (cafés, bars, restaurants, and offices) with patchy success. It wasn't until the firm repositioned in 1989 to focus on affluent households looking for an easy way to enjoy premium coffee that sales really took off.

Another Nespresso innovation was its coffee club, which bypassed traditional coffee retailers to sell directly to customers. The firm was also a pioneer in online sales, allowing customers to buy capsules over the internet as early as 1998. In 2000 it opened its first Nespresso store on Rue du Scribe in Paris; by end-2014 its chain of exclusive shops had expanded to 410. Today it opens an average of one store somewhere in the world every two to four weeks.

For its coffee machines, Nespresso teamed up with kitchen-appliance manufacturers like Turmix, which made the first Nespresso machine in 1990, then Krups in 1995, and later Alessi, De'Longhi, Jura, Magimix, Philips, and Siemens. The firm reached breakeven in 1995 and sales starting booming in the late 1990s. In 2000 it

had 331 employees and generated revenue of CHF 210 million – a drop in the bucket compared with parent company Nestlé's CHF 81.4 billion of revenue that same year. But Nespresso's 2015 revenue was estimated at over CHF 5 billion (Nestlé doesn't break down revenue by subsidiary), with an estimated operating margin of 30%. Those are the kinds of margins typically seen in the luxury goods industry. This makes sense since Nespresso is positioned as an upscale product, but it remains an exceptionally profitable product compared with the rest of the food industry.

Nespresso is a concrete example of the Swiss manufacturing industry's ability to regenerate by targeting niche markets. All of the company's production plants are in Switzerland, initially in Orbe with new plants built in Avenches in 2009 and Romont (in the Canton of Fribourg) in 2015. The company may eventually decide to open plants in other countries to support its international expansion. Over the past ten years Nespresso has invested over CHF 1 billion in its production facilities. Today it has over 1,000 employees in manufacturing and a total of 10,500 employees worldwide. And there's plenty of scope for expansion – even though it already sells its hallmark capsules in some 62 countries, most of them are in Europe. The US and emerging markets are still ripe for the picking.

Few other companies in the developed world share Nespresso's combination of local production and rapid growth. In Switzerland, Stadler Rail, in the Canton of Thurgau, has also seen impressive growth over the past 20 years, but some of its plants are overseas. Other companies active in Vaud, such as Medtronic and Ferring, have expanded quickly, but their size in the local market is well below Nespresso's.

dered-milk factory, both of which are now owned by Swiss company Cremo. Renowned tobacco manufacturers – Meccarillos, Rinsoz, and Ormond – are also present in the Canton.

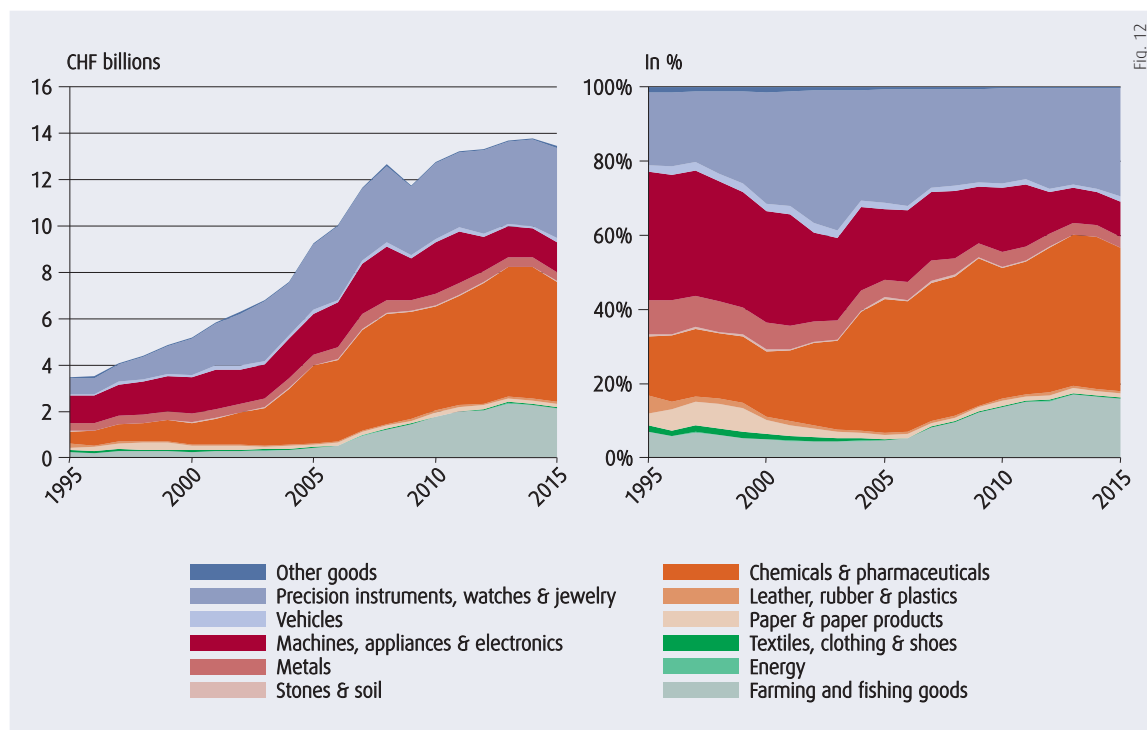
From 1985 to 1998, the number of FTEs in the food, beverages, and tobacco industry plummeted 48.4%, or 5.0% a year. There were several reasons for this decline: machines began to replace people in production processes, consumers lost interest, and there was worldwide consolidation in the tobacco industry.

The number of jobs in this industry levelled off in the early 2000s before picking up again in 2010. By the end of 2013, there had been a total rise in FTEs of 58.7%, or 3.1% a year, over 15 years. This increase

was driven largely by the success of Nespresso (see case study on p. 33). But there are other reasons as well. Century-old companies, such as vinegar producer Reitzel & Poupon and wine merchant Schenk, have also continued to expand.

The value added of the food, beverages, and tobacco industry increased 46.7% in real terms between 1997 and 2014 (or 2.3% a year) reaching CHF 964 million in nominal terms. The food industry is the greatest contributor, with nominal value added of CHF 741 million. In real terms, growth was 2.4% a year. It picked up in 2005–2006, when Nespresso booked more than CHF 1 billion in sales. In beverages, growth was 1.7% a year in real terms over the same period, reaching CHF 206 million in nominal terms.

Vaud exports



Source: Swiss Federal Customs Office

Tobacco practically doubled its value added in real terms (3.8% a year) reaching CHF 17 million in nominal terms. But this figure does not fully reflect the size of the tobacco industry in Vaud, which is home to the headquarters of Philip Morris International and a sales branch of British American Tobacco (BAT), as these companies' sales and marketing operations come under the services sector.

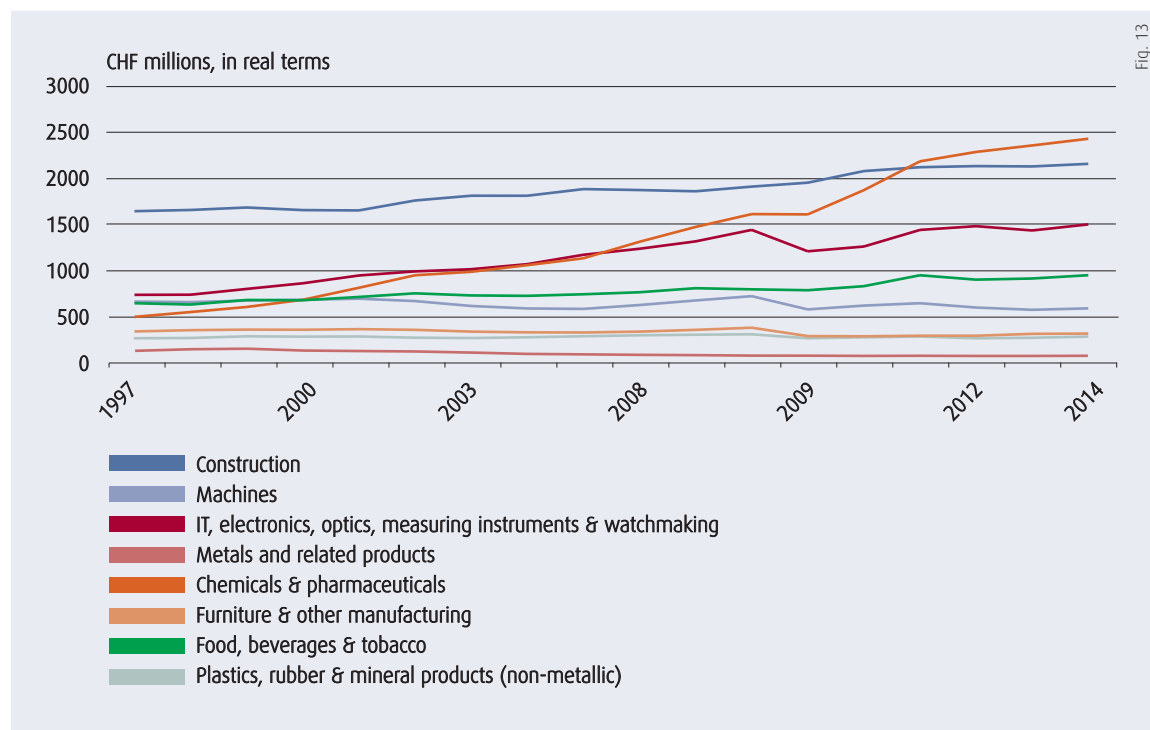
3. Medtech, electronics, precision instruments and watchmaking

Another manufacturing industry that has done particularly well is the fabrication of IT, electronic, optical, and precision equipment. This industry may seem like a catch-all sector and includes companies as varied as: Kudelski, an encryption specialist;

Medtronic, a world leader in pacemakers; Tesa (a Hexagon Metrology company), a manufacturer of precision measuring instruments; Logitech, a designer of IT accessories based in EPFL's innovation park; Fischer Connectors, which produces connectors; watchmakers such as Piquet, Breguet (a Swatch company), Blancpain (a Swatch company), Jaeger-LeCoultre (a Richemont company); subsidiaries that make components for timepieces, including Vacheron Constantin and ETA (a Swatch company); and sub-contractors in the same fields, including Dubois Dépraz, Piquet Frères, and Gasser-Ravussin.

Between 1985 and 2013, the number of FTEs in medtech, watchmaking, and electronics rose 32.6%, or 1.0% per year. But value added saw an even

Value added of Vaud manufacturing industries



Source: Swiss Federal Statistical Office, SECO, CREA

BOBST, 125 YEARS OF INNOVATION

Bobst – one of Vaud’s favorite home-grown multinationals – is the world’s leading supplier of machines for the manufacture of packaging materials. The company has annual sales of CHF 1.3 billion and over 4,800 employees worldwide, including 1,800 in Mex, near Lausanne. In addition to its long history – it celebrated its 125th anniversary last year – and global presence, what sets Bobst apart is that it’s still family owned and run. Its current CEO, Jean-Pascal Bobst, is none other than the great grandson of founder Joseph Bobst.

Joseph Bobst, originally from Solothurn Canton in German-speaking Switzerland, moved to Lausanne in 1883 to study French. He soon set up a business selling printing supplies; in 1908 he opened a printing-machine repair shop and in 1912 started making printing equipment. In 1918 he founded the joint-stock company J. Bobst & Fils with his two sons, Otto and Henri.

The young company ran into tough times in the 1920s. Joseph sold its cardboard-making assets to Paris-based Marinoni in 1924, while Otto and Henri went to work in Strasbourg. Business picked up in the 1930s: in 1936 Henri, who took over the family firm after his father’s death in 1935, bought back the cardboard business from Marinoni. Two years later the company built a production plant in Prilly. Sales surged from CHF 1.3 million in 1937-1938 to CHF 7 million in 1949-1950, while headcount tripled to 239 employees. Bobst’s revenue crossed the CHF 200 million mark in 1975; at that point the company had over 2,000 employees. The Prilly site became too small, so the company opened a second site in Mex, where it moved all its operations in 2013.

Bobst’s success reflects the novel management methods instituted by Henri in the wake of the company’s crisis in the 1920s. He kept a close eye on cash flow and introduced HR policies that were exemplary for the time, such as setting up the company’s own school for its apprentices. The firm also began investing heavily in R&D, which by

1978 accounted for 10% of its revenue or CHF 28 million. In 2014, that figure had expanded to CHF 74.2 million or 6% of revenue – and by then the company had 1,400 patents.

From its local roots, Bobst has grown into a global player that exports over 90% of its products. In the 1980s it became a multinational with the acquisitions of Martin in France, Peters GmbH in Germany, and a 50% stake in Italian machine manufacturer Schiavi. Those acquisitions transformed Bobst into one of the world’s biggest producers of equipment for making corrugated cardboard; they also gave it a foothold in the market for flexible packaging. In 1990, the company started up a plant in Germany and later opened branches in Malaysia, Thailand, Taiwan, Indonesia, and India. It also opened plants in China and Brazil and additional sales offices in Russia and central Europe. The firm expanded further into the flexible packaging market in 2014 when it acquired a business from Finland-based Metso.

Its exposure to the global economy meant the company was hit especially hard by the 2008 financial crisis. Revenue plunged by one third in 2009, forcing the company to scale back its site in Mex and transfer more operations abroad. Its problems were compounded by a strong Swiss franc and heightened competition. The company was just getting out of the woods when the Swiss National Bank dropped the EUR/CHF currency floor – sending the franc up even higher. Market conditions have since settled, but Bobst will likely face major challenges in the years ahead.

Source: *Dictionnaire historique de la Suisse, Portrait de 250 entreprises vaudoises*. Henri Rieben, Editions 24 Heures, 1980

stronger rise, doubling in real terms in the space of just 15 years, up a total of 103.0% or 4.3% a year. In 2014, nominal value added stood at CHF 1.519 billion.

This strong rise in value added across this industry is mainly down to a boom in medtech and watchmaking, two industries that have a lot of similarities in terms of their workforce, know-how, and history. Both require extreme precision on an industrial scale in areas such as soldering, mechanics, connectors, and electroplating.

Vaud has long been on the medtech map and has gone from strength to strength in this cutting-edge industry. It has home-grown companies like the world leader in dental solutions, Dentsply Maillefer, which was originally Les Fils d'Auguste Maillefer SA before it was bought by US group Dentsply, as well as major multinationals. Medtronic, for instance, has had its European headquarters in Vaud since 1996. This US group initially intended to employ some 250 people when its factory was at full capacity. Its headcount has now reached 800.

Behind these well-established companies, many start-ups have also got into this niche market. They include Abionic, Sensimed, and Aleva Neurotherapeutics on the EPFL campus and Yttermed and Awaiba in the Y-Parc technology park in Yverdon-les-Bains. While these young companies are essential for the future of manufacturing in Vaud, they do not carry much weight in terms of jobs. And some come under R&D in the services sector.

Watchmaking has also played a major role in increasing the industry's value added over the past 20 years. Swiss watchmakers have positioned themselves at the high end of the market. As a result, total watch exports have doubled in value since 2000, in particular thanks to growth in the Chinese market. In 2000,

Swiss watchmakers exported CHF 10.3 billion around the world, with only CHF 45 million to China but CHF 1.4 billion to Hong Kong. By end-2014, total exports stood at CHF 22.3 billion, with CHF 1.4 billion going to China and CHF 4.1 billion to Hong Kong. Although exports stalled slightly in 2015, they nevertheless remained high.

As with construction and food production, there has been an upturn in this industry since the end of the 1990s. In 1998, the number of FTEs fell below the 5,000 mark. Fifteen years later, the figure is almost two thirds higher, up 3.5% a year. The industry now accounts for 12.1% of all secondary-sector jobs, making it the second-largest employer in the sector.

4. Pharma

Along with medtech, the expansion in the pharmaceutical industry is another side of Vaud's new positioning in healthcare. Pharma has even become the Canton's main export industry.

The pharmaceutical industry does not have a longstanding presence in Vaud, with the notable exception of Zyma, which was founded in Nyon in 1917 and is now part of GlaxoSmithKline.

Pharma has grown in Vaud over the past 15 years in terms of both jobs and value added. The number of FTEs has surged 134.2%, or an average of 3.1% per year, since 1985. Employment in this industry stagnated in the 1990s before picking up in the 2000s. Recently, there has also been a spate of new arrivals and major investments. Serono, which was subsequently bought by German group Merck and changed its name, came to the Canton in 1984 and opened a major R&D site in 1999, which it then expanded in 2008. Although Merck closed its Geneva offices in 2012, it has strengthened its operations in Vaud. And the company intends to begin producing biosimilars in Switzerland soon, too.

Swedish company Ferring moved to the Canton in 2006 and now employs 600 people. Other pharmas in the Canton include B. Braun Medical, which has 300 employees in Vaud, and Debiopharm, which has its headquarters in Lausanne. Not to mention all the start-ups active in this industry, such as AC Immune and Sophia Genetics. For the moment, these companies are included in the R&D segment of the services sector.

Pharma's value added increased fivefold in real terms between 1997 and 2014, up a total of 469.1% or 10.8% a year. In 2014, it stood at CHF 1.713 billion in nominal terms. Pharma therefore now contributes 16.9% of secondary-sector value added in the Canton, which is similar to the national level (18% in 2010). Its contribution was just 7.2% in 1997.

With just a handful of companies – there are just over 20 pharmaceutical companies in Vaud – pharma overtook the medtech, electronics and watchmaking industry in 2007 and continues to go from strength to strength each year. What's more, the pharmaceutical industry offers high productivity: according to a study by the BAK Basel Economics institute published in 2015, the industry's productivity amounted to CHF 627,000 per FTE in Switzerland in 2014, which is four times higher than the average for the Swiss economy and two times higher than that of the banking industry¹.

Pharma is now the second-largest secondary-sector industry in the Canton in terms of value added, trailing only the wider construction industry. But if we break down the construction industry by segment, pharma comes in ahead of specialized construction, which is the sector's biggest employer, and becomes the sector's biggest contributor of value added. This is quite a feat given that back in 1997, pharma still trailed behind machinery, electricity and gas, and electronics, optics and watchmaking.

5. Chemicals

The Vaud chemical industry has also experienced rapid expansion, with the number of FTEs growing 127.6%, or 3.0% a year, between 1985 and 2013. It has also seen major growth in value added, which soared 102.1% between 1997 and 2014, up an average of 4.2% a year. In 2014, nominal value added stood at CHF 242 million. This industry really started to expand in the 2000s, following a period of stagnation.

Major chemicals firms in Vaud include Sicpa, which specializes in security inks, and Saline de Bex. In 2010, UK group Ineos moved its international headquarters to Vaud, which helped to strengthen the industry's presence in the Canton.

STRUGGLING INDUSTRIES

Some industries have fared less well. The machinery industry, for example, saw FTEs decline 49.9%, or 2.4% a year, between 1985 and 2013. Machinery accounted for 9.1% of secondary-sector jobs back in 1991 but only 4.7% in 2013. Its value added also shrank by 11.0% in real terms between 1997 and 2014. Companies in this industry have nevertheless fought back, focusing on training and repositioning their operations to concentrate on niche products. Bobst, the world's foremost supplier of packaging equipment and services, is based in Vaud and has done a lot to boost this industry in the Canton (see case study on p. 36).

Vaud is also home to a number of highly-specialized rubber and plastics manufacturers. Other producers of non-metal materials include Vetropack, a glass-packaging manufacturer, Isover, which produces insulation, and Holcim, a leading supplier of cement, concrete, and aggregates. Plastics and mineral materials saw FTEs drop 29.7% between 1985 and 2013, while value added rose 5.2% from 1997 to 2014.

¹ "The Importance of the Pharmaceutical Industry for Switzerland," BAK Basel Economics, November 2015.

http://www.bakbasel.ch/fileadmin/documents/reports/The_Importance_of_the_Pharmaceutical_Industry_2015_Interpharma.pdf

Printing has also been hit hard in recent years, with a shift towards electronic formats and away from paper. Value added peaked at CHF 215 million in 2001 but has since gradually declined. In 2014, the industry produced just CHF 142 million in value added. The paper and cardboard industry has suffered a similar fate, with value added dropping 39.8% in real terms between 1997 and 2014.

Local producers of electronic equipment – such as Leclanché – also saw FTEs drop between 1985 and 2013, by 56.8%. They also cut the number of trainees by half. In terms of value added, the decline was more gradual. It fell just 9.5% between 1997 and 2014. It nevertheless accounted for just 1.6% of manufacturing value added by 2014, twice as low as the 1997 figure.

There has also been a decline in the value added coming from Vaud's energy industry. It fell 20.7% between 1997 and 2014, and while it accounted for 14.7% of the secondary sector's value added in 1997, that figure now stands at 7.8%. A similar trend can be observed in the water and waste disposal industry, where value added dropped 30.6% in real terms from 1997 to 2014. However, taken together, FTEs of these industries increased over the same period.

4 A modern economy driven by services

Vaud's services sector is today the driving force of its economy. The sector has seen rapid expansion in the past 30 years in particular, thanks to surging demand for business services, healthcare, and education.

A TYPICAL SUCCESS STORY

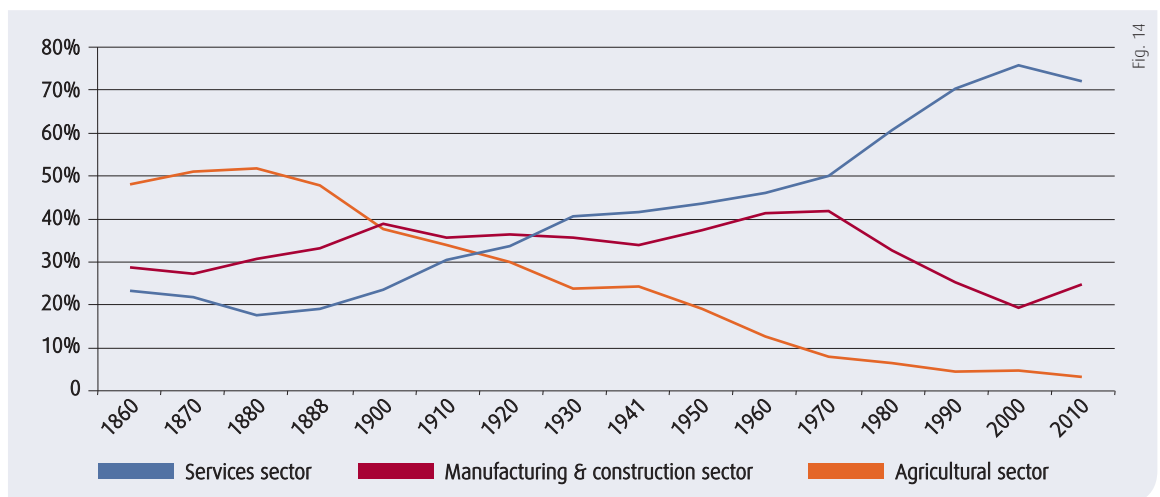
Temp agency Adia Interim is a success story typical of the region. It was founded in Lausanne in 1957 by local entrepreneur Henri-Ferdinand Lavanchy. After nearly 40 years of business expansion, in 1996 it merged with a French competitor into Adecco, which is today the global leader in HR services. Adecco's headquarters remained in Vaud for 20 years, until the company decided to transfer it to the Canton of Zurich.

While not all Vaud-born services providers go on to be global leaders, the example of Adia is emblematic of the sector's steady growth. The number of FTE

jobs in this sector swelled 59.2%, or 1.7% per year, between 1985 and 2013. In terms of value added, the sector expanded 48.5%, or 2.5% per year, between 1997 and 2014. Depending on how you measure it, services make up between 75%-80% of Vaud's economy.

Three main industries account for most of this sector's activity: business services, consumer services, and the broader public sector (mainly public administration, healthcare, and education). But the lines between these segments can sometimes get blurry. For instance, some services like banking, legal, and transportation are provided

Breakdown of workforce by sector in Vaud and Switzerland



Source: Swiss Federal Statistical Office

to individuals as well as companies. And some firms work as intermediaries, putting businesses in touch with consumers. However, in the segment that is generally known as business services – IT, legal, accounting, head office, consulting, HR, facilities management, leasing, and other enterprise services – the Vaud market has been booming.

GROWTH IN BUSINESS SERVICES

Vaud's business services industry as measured by FTE jobs has nearly tripled since the 1980s, growing 175.2%, or 3.7% per year, between 1985 and 2013. In terms of real value added, it has expanded some 3.8% per year since 1997, reaching CHF 11.437 billion in 2014 (in nominal terms). Most of these firms are small and mid-sized companies, although there are some heavyweights such as Securitas and Protectas (security solutions) and ISS (facilities management).

Some services like security have developed in response to new business needs. Others like payroll were previously done in-house, but have recently been outsourced – largely due to increasing cost pressure and the need for firms to be faster and leaner. Staffing firms in particular have benefited from outsourcing. The number of FTE jobs at these firms, which in Vaud includes giants Adecco and Manpower as well as smaller enterprises, has tripled since 1985. Their output grew 6.2% per year (in real terms) between 1997 and 2014 to reach CHF 154 million in 2014 (in nominal terms).

The brisk expansion in business services can be attributed to several factors. First, it's a natural reflection of the Canton's bustling economy, especially since the early 2000s. Second, it's partly due to the growing trend by companies to outsource activities not directly related to their core businesses. And third, it reflects the increasing number of multinationals that are setting up headquarters in

Vaud. Some of those companies have also set up production sites, which further boost demand for specialized services. Studies have shown that the arrival of these multinationals has had a net positive effect on both jobs and public finances. Between 1997 and 2014, value added (in real terms) from the head offices of multinationals and from management consulting services expanded 4.0% per year – the same rate as job creation from those companies – to reach CHF 1.556 billion (in nominal terms).

All of that has been a boon to traditional Vaud companies as well. Thanks in part to the many local firms providing key business services, Vaud companies have been able to implement successful growth strategies – especially due to closer links between the Canton's economy and international markets. While Switzerland has been active in the global economy for decades, its role picked up in 1990 when the country negotiated an agreement with the EU to introduce simplified border controls and customs procedures for the cross-border trade of goods. The two regions also enhanced cooperation at border checks. The new agreement marked a major step forward from the free-trade agreement signed in 1972. After Switzerland voted not to join the European Economic Area in 1992, it entered into a series of bilateral agreements with the EU that, according to a number of studies, have delivered tangible benefits to the Swiss economy. The Canton also successfully leveraged the flexibility allowed by Swiss federal law to set lower tax rates for corporations in economic redevelopment areas.

IT, TELECOMS AND INNOVATION

Within Vaud's business services industry, one of the fastest-growing markets is IT. Back in 1985, companies had just started to install centralized systems and individual workstations were the hot new thing. The PC by IBM was only four years old; the Mac had appeared just a year earlier. But even by then,

DISRUPT. GET DISRUPTED. REBOOT. REPEAT: HOW TO STAY ON TOP IN TECH

Few industries move faster than digital content distribution. Remember Betamax? If you don't, you're not alone. A compelling product at the pinnacle of videocassette technology when it was introduced in 1975, it failed to become the industry standard, losing out to VHS and ultimately disappearing. VHS had a longer run at the top, but ultimately was displaced by the emergence of the DVD, which itself has now been rendered largely obsolete by online multimedia content distribution. In tech, products get old fast – often along with the companies that make them.

The Kudelski Group has escaped this fate thanks to its capacity to reinvent itself. The story of the company began, as so many local success stories have, with immigration. The Kudelskis fled Poland during the onset of WWII, initially to France and then to the Lausanne area in 1943. Their teenage son Stefan studied engineering at what was to become the EPFL (Swiss Federal Institute of Technology), where he built his first tape recorders – ultimately selling one, called the NAGRA I, to Radio Geneva in 1951. He was 22 at the time. Stefan's recorder was a revolutionary development in audio: far more portable than existing devices, in part thanks to its wind-up motor, it was used to record an expedition to Mount Everest in 1952.

Stefan released improved versions of his invention throughout the '50s, culminating in 1958 with the NAGRA III, which made his technology the industry standard, most notably in Hollywood. His devices won him three Academy awards. On a less glamorous but perhaps more telling note as regards the quality of the engineering, Stefan's small, discreet recorders were also widely employed by intelligence agencies for espionage purposes during the Cold War.

Of course, the technology that powered the early NAGRA recorders is now long since obsolete. But Stefan's constant tinkering with his device – he successively added stereo capacity, circuit boards, transistors, and instrumentation tape recording – remains at the heart of Kudelski Group's corporate

DNA. Innovation is a fundamental part of the firm's identity.

Stefan's son André, who took over as CEO in 1991, has continued to embrace innovation and change: he turned pay-TV into "digital content distribution" in the 1990s, and a decade later bolted on a facility- and resort-access business line. More recently, the company has moved into cybersecurity. In June 2016, it announced the opening of a second corporate headquarters, in Phoenix, AZ, to get closer to the epicenter of expected growth in the global cybersecurity market and reduce exposure to the Swiss franc.

There have been ups and downs along the way – Kudelski lost CHF 18 million in 2011 – and some challenges remain for the company, including the perennially strong Swiss franc and an operating margin that's on the low side (8.5% in 2015 on CHF 123 million of operating profit). But the firm has proven capable over the years of both disrupting its market and, crucially, of bouncing back when its own businesses get disrupted. This resilience is no doubt due in part to Kudelski's ingrained culture of innovation, but another key factor is a family-first shareholder structure that lets management take the long view rather than run the business "from quarterlies to quarterlies."

The result? Today, Kudelski is a global market leader in digital content distribution and security, facility access, and cyber security, with 3,500 employees in 32 countries. Whether you're skiing in Colorado, watching a movie on cable in France, attending a World Cup soccer match in Rio, or streaming proprietary content on your smartphone in South Korea, chances are that your experience is made possible in part by Kudelski technology – technology that generated revenue of close a billion Swiss francs for the company in 2015. Firms that currently license patented Kudelski know-how include Google, Netflix, Disney, and Bloomberg – proof that this Vaud family firm is playing in the tech big leagues.

Vaud had its share of high-tech pioneers. The Smaky 100, developed by Professor Jean-Daniel Nicoud at the Swiss Federal Institute of Technology's (EPFL's) microcomputers lab, came out in the same year as the Mac. And that same lab played a key role in improving the mouse (invented in the US in the 1960s). What's more, a Vaud company – Logitech – was on track to become the global leader in that market. However, most of the people working in the IT industry were in software; incidentally, most of Logitech's production takes place in Asia.

Since then, the IT landscape has completely changed. Apple and Logitech are still around but IBM doesn't make PCs anymore. Smakys have become museum artifacts; the company that made them now develops software. Mice are starting to be replaced by tactile screens on tablets and smartphones. Indeed, the past three decades have seen numerous upheavals in the IT industry: exponential leaps in processing power; new graphic interfaces; standardized enterprise applications; tumbling memory prices; and more recently the internet, dot-com bubble, and Web 2.0.

In Vaud, FTE jobs in the IT industry grew 302.8%, or 9.1% per year, between 1985 and 2001. The pace slowed to 4.9% per year starting in 2001. Nevertheless, IT is more pervasive within companies than ever before. The internet has become an important sales and marketing channel for many Vaud businesses. In terms of traditional IT like hardware and software, servers and enterprise applications have become the backbone of several Vaud companies. Today most of those components are standardized; demand for customized solutions has waned, which is one reason why job growth in the Canton slowed. In terms of real value added, Vaud's IT industry grew 5.8% per year between 1997 and 2014, reaching CHF 1.187 billion in 2014 (in nominal terms).

Telecoms is another industry that has seen major disruption, globally and in Vaud as well. One of Switzerland's three mobile phone operators – Orange, founded in 1998 by the eponymous UK company and the German conglomerate Viag – is based right here in Vaud (in Renens). The operator changed hands several times over the years, reducing headcount and closing its call center near Lausanne. In 2015 it was acquired by French entrepreneur Xavier Niel and renamed Salt. Orange's tumultuous history in the Canton is representative of wider trends in the industry, where competition and pricing pressure are fierce, disruptive technology is always just around the corner, and a powerful incumbent, Swisscom, is clinging tight to its market share. It's also an industry that requires heavy capital investment in infrastructure. While FTE jobs in this area grew 40.2% between 1985 and 2001, they subsequently contracted 21.8% between 2001 and 2013. Output in the local IT industry grew 11.5% per year in real terms until 2006, when growth fell to 1.2% per year. It stayed at that rate until 2011, when output began to contract, by 1.0% per year. In 2014 the industry was worth CHF 544 million (in nominal terms).

In terms of innovation, Vaud is known across Switzerland as being a well-spring of successful start-ups, as we saw in Chapter 1. However, innovation is taking place at established companies, too. Edwards Lifesciences, a US maker of artificial heart valves that has its European headquarters in Nyon, is busy coming up with the next generation in critical care monitoring systems. And Debiopharm, a global biopharmaceuticals company based in Vaud, is carrying out advanced research in cancer treatment. The Canton's research, science, and engineering industry as a whole, as measured by real value added, expanded 2.9% per year between 1997 and 2014 to reach CHF 881 million in 2014 (in nominal terms). Jobs in the industry grew at a rate of 3.1% over the same period.

PROPERTY MARKET REBOUND

After suffering a crash in the 1990s due to a burst real-estate bubble, Vaud's property market has staged a remarkable recovery. That's thanks in large part to the region's buoyant economy and favorable demographics, coupled with low interest rates on mortgage loans.

Most of the real-estate demand in Vaud is for housing. New building permit applications for residential property totaled CHF 3.8 billion in 2012 – up 118% from CHF 1.7 billion in 2000. For commercial property, permit applications rose 20% to CHF 733 million. Many of the residential permit applications are for condominium-style housing, since a housing shortage and low interest rates are prompting many Vaud residents to become buyers. And because suitable land is scarce in some areas of the Canton, the supply of housing is struggling to keep up with demand. House prices have doubled since 2000. However, the rate of increase slowed in 2013, reflecting the already-high level that prices had reached and measures taken by the Swiss government and financial regulators to ward off another real-estate bubble.

Of course, all those new homes and buildings needed to be designed, which led to a sharp increase in the number of architecture and civil engineering jobs in the Canton. Today there are nearly three times as many people working in those professions than there were 30 years ago; the number of FTE jobs rose 187.3%, or 3.8% per year, between 1985 and 2013. In 2014, Vaud's architecture and civil engineering market was worth CHF 1.232 billion (in nominal terms).

Once built, the properties needed to be sold and managed. The number of FTE jobs with real-estate agencies and management firms grew 182.0%, or 3.8% per year, between 1985 and 2013. That market was worth CHF 775 million in 2014.

CONSOLIDATION IN FINANCIAL SERVICES

Vaud's financial services industry has seen moderate but steady growth over the past 30 years. The number of FTE jobs rose by 25.2%, or 0.8% per year, between 1985 and 2013. However that figure masks stark differences among the various segments. In ancillary activities, including insurance brokerage, for example, the number of FTE jobs surged by 748.2%, or 7.9% per year, during the same period. In banking, the number of FTE jobs was almost flat, adding 5.1% over the three decades, while in insurance the number of FTE jobs actually fell by 17.0%.

Value added in the financial services industry grew 3.3% per year (in real terms) between 1997 and 2014 – which is twice as fast as job growth during the same period (1.4% year). The industry was worth CHF 3.398 billion in 2014 (in nominal terms).

This is an industry that has weathered its fair share of storms. Some of them local – like the burst property bubble in the 1990s and consolidation among banks – and some global, like the 1987 stock market crash, the dot-com bubble, and the 2008 financial crisis. Along the way, the industry has also been transformed by advancements in IT systems and the rise of the internet.

In insurance, moves by the Swiss government in the 1980s to break down cartels triggered a wave of M&A activity among both life and non-life insurers. Big names at the time such as La Genevoise, La Neuchâteloise, La Bernoise, La Suisse, and Union Suisse disappeared from the market. And the insurers that remained took a big hit on their stock portfolios when the dot-com bubble burst. They were forced to streamline their operations and leverage economies of scale. However, this was offset by job growth in the health insurance market. Today Vaud is still home to numerous large insurance companies including La Vaudoise, Retraites Populaires, and Assura, and

to the headquarters of La Mobilière's life insurance division and Generali's non-life insurance division.

In banking, Vaud's real estate crisis in the 1990s fundamentally changed the industry's landscape. A great deal of consolidation took place: Banque Cantonale Vaudoise (BCV) acquired Banque Vaudoise de Crédit in 1993, while Credit Foncier Vaudois acquired Caisse d'Épargne et de Credit. Two years later, Credit Foncier Vaudois was taken over by BCV. The consolidation trend was seen on a national level, too. Crédit Suisse bought out Swiss Volksbank in 1993 and UBS merged with Swiss Bank Corporation in 1998.

Amid all that upheaval, the seeds were planted for what is today Switzerland's leading e-trading website: Swissquote, founded in Gland in 1996.

INCREASING INTERNATIONAL COMPETITION IN HOSPITALITY

Vaud's hospitality industry has been hit particularly hard by international competition. It has shed 1,000 FTE jobs over the past 30 years, which corresponds to a decline of 5.6%, or 0.2% per year. In terms of real value added, the industry shrank 0.3% per year between 1997 and 2014, totaling CHF 876 million in 2014 (in nominal terms).

Two thirds of the contraction in jobs was in the hotel market. That partly reflects growing competition from other tourist destinations around the world. In Switzerland's traditional tourist areas, the number of guest nights spent at hotels levelled off in the 1970s and started falling in the 1990s. In Vaud, the number of guest nights decreased 8.9% between 1986 and 2014. Most of that decline stems from a 14.3% drop in nights spent by foreign tourists. But it's not that foreigners are shunning Vaud – on the contrary, the number of foreign visitors actually increased 12.7% during that same period. It's that their stays are shorter: an average of 2.3 days in 2014, compared

with 3.1 days in 1986. That's mainly due to the strong Swiss franc and fallout from the 2008 financial crisis, which has depressed economies across Europe – where most tourists to Vaud come from.

Tourist numbers from regions outside Europe remain strong. Swiss tourists have shortened their stays even more dramatically, from an average of 3.4 to 1.9 days. Yet their number of stays has shot up 82.1%. These trends have led to consolidation in the local hotel industry with a higher number of beds per hotel.

The Canton's restaurants have fared better, losing only 300 FTE jobs, or a total of 2.7%, since 1985. The reasons for the decline range from new consumer habits – such as shorter lunch breaks and a preference for fast food – to the 2009 ban on smoking in public places and the lowering of the legal limit for blood alcohol content to 0.5‰ in 2005. Vaud's 1990s downturn also played a role – that's when the number of jobs first started to decline. Employment in this market has since levelled off, due in part to the abolishment of a law limiting the number of restaurants, and to the expansion of catering services. Nevertheless, the local restaurant market remains a tough one to crack; some 30% of eateries change hands every year.

HIGH-QUALITY EDUCATION AND HEALTHCARE

Vaud is home to two major universities – the University of Lausanne and the Swiss Federal Institute of Technology Lausanne (EPFL) – that attract students from across Switzerland and abroad. They have helped make education the second-fastest growing segment of Vaud's economy by jobs. The number of FTEs rose 115.4%, or 2.8% per year, between 1985 and 2013. Another factor behind the rapid expansion is the Canton's growing population, which is outpacing that of the country as a whole.

THE SILICON VALLEY OF SPORTS

Sports enthusiasts across the globe will recognize Lausanne as home to the International Olympic Committee (IOC), the organization that heads up the worldwide Olympic movement. But real sports fans will know Lausanne for something much more: as home to over 40 international sports federations as well as a rich ecosystem of sports universities, research centers, and other worldwide sports organizations. It's not for nothing that Lausanne was recently referred to as the "Silicon Valley of Sports" in *The New York Times*.

Lausanne's roots as the capital of international sports date all the way back to 1915, when French Baron Pierre de Coubertin – the father of the modern Olympics – decided to move the IOC headquarters from war-torn Paris to Lausanne. He had created the IOC in 1894 on the firm belief that reviving athletic competition between nations, as was done in ancient Greece, could promote understanding across cultures and be a force for peace. And he found in Lausanne a "proud, independent culture that would allow the Olympics to thrive." An Olympics museum and center for Olympic studies were later opened on the IOC's lakeside campus; in 1994 the city was officially named the world's Olympic Capital.

Lausanne's Olympic heritage prompted a host of other international sports organizations (ISOs) to set up in the region. Today the Canton of Vaud is home to some 60 such associations, for sports ranging from golf, hockey, and bowling to judo, cycling, and horseback riding. These organizations also include international governing bodies, such as the Court of Arbitration for Sport, the World Anti-Doping Agency (European headquarters), and the Olympic Solidarity Commission.

The economic impact of having so many sports organizations in Vaud is considerable. A study carried out by Dr. Claude Stricker at the International Academy of Sports Science and Technology (AISTS) looked at the impact of ISOs in Vaud and Switzerland as a whole, and found that ISOs and their visitors bring in

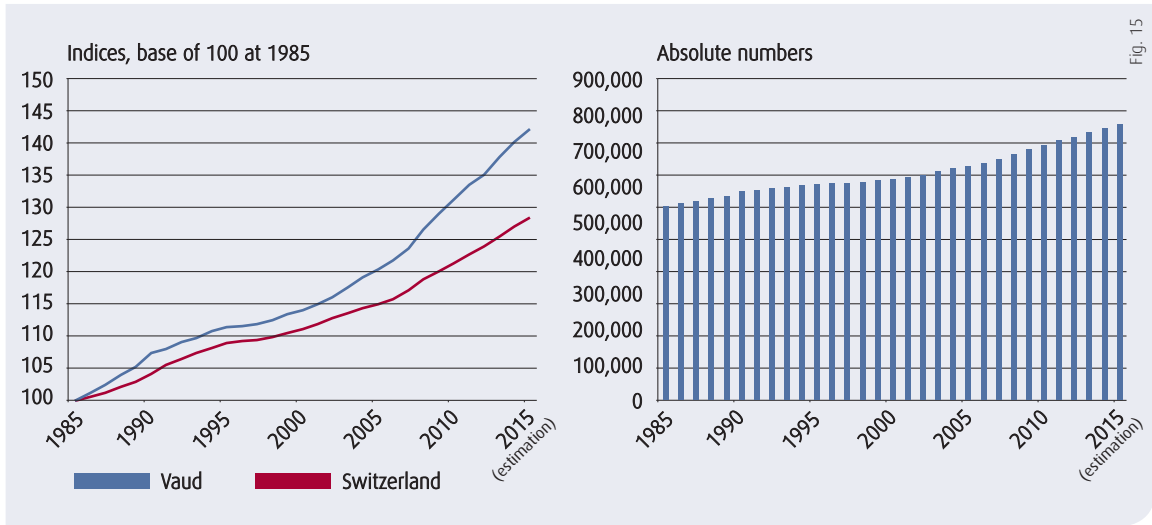
CHF 550 million yearly to the Canton's economy. They employ 1,300 people in Vaud and pay CHF 40 million in income tax. ISOs are particularly beneficial to the local economy because they make most of their revenue overseas but spend a substantial amount domestically. The study also found that for every franc that an ISO spends in Switzerland, the local economy gets a boost of 1.55 francs.

Recently, Lausanne and the Canton of Vaud have stepped up their efforts to attract international sports federations. Already drawn to the region by its political neutrality, central location, and amenable private arbitration laws, today sports federations are also being enticed by tax exemptions, simplified work permit procedures, and two years' rent-free housing. In 2006, Lausanne partnered with the Canton of Vaud and the IOC to build the Maison du Sport International, an office complex that houses the headquarters of all types of sports organizations. Other recent initiatives include ThinkSport, a network of sports organizations and businesses designed to drive innovation, and the Smart Cities & Sport Summit, held by the World Union of Olympic Cities in Lausanne to promote best practices among host cities.

But the defining characteristic of any "Silicon Valley" is the synergies created by having universities and research centers located right next to practicing professionals – and the Silicon Valley of Sports is no exception. Lausanne is home to top-tier sports research and education institutes including two at the University of Lausanne, and AISTS (jointly founded by the IOC, Swiss universities, and public-sector organizations), whose research spans all sports-related disciplines including economics, sociology, medicine, law, and technology. They have been offering targeted degree programs for over two decades and play a key role in fostering an athletic community across the Canton and boosting the reputation of Vaud's sports cluster abroad.

Sources: "The economic impact of international sports organisations in Switzerland, 2008–2013." Dr. Claude Stricker and Amandine Bousigue, AISTS (International Academy of Sports Science and Technology), Lausanne, 2015. "Swiss City Is 'the Silicon Valley of Sports.'" Rebecca R. Ruiz, *The New York Times*, 22 April 2016.

Vaud population growth



Source: Swiss Federal Statistical Office

The Canton also counts a number of prestigious private-sector schools such as Institut le Rosey, Collège Champittet, Aiglon College, Ecole Lémania, Brillantmont International School, and Collège Beau Soleil. In terms of real value added, the local education industry grew 0.7% per year between 1997 and 2014 to reach CHF 385 million (in nominal terms).

Healthcare is the segment of Vaud's economy that has seen the biggest jump in jobs by absolute numbers. It's also the Canton's third-largest industry. Some 14,700 new FTE jobs were created in Vaud between 1985 and 2013, for a growth rate of 108.1% or 2.7% per year. The industry's value added (in real terms) expanded 3.9% per year between 1997 and 2014, growing from CHF 3.455 billion to CHF 6.436 billion in nominal terms.

In addition to the expanding population, Vaud's healthcare industry is also being driven by advancements in medicine, greater staffing at hospitals, a higher number of specialists, and the development of home healthcare services. Vaud is known for its extensive hospital network consisting of the Centre Hospitalier Universitaire Vaudois (CHUV), a teaching hospital with five sites, and 13 regional care centers that together have 25 sites. The Canton also has several private clinics run by Genolier Swiss Medical Network (Genolier, Montchoisi, and Valmont) and Hirslanden (Bois-Cerf and Cecil), as well as other clinics including CIC Riviera, La Lignière, La Source, La Métairie, La Prairie, and Bon Port.

5 Challenges on the road ahead

A SOLID FOOTING

The Vaud economy has gone from strength to strength in recent years, but new challenges lie on the road ahead: the strong Swiss franc, the future of relations with the European Union (EU), pending corporate tax reform, and the sluggish global economy, just to name the most evident. Growth already slowed in Vaud and Switzerland as a whole when the Swiss National Bank dropped its exchange rate floor for the euro, sending shock waves through the economy. Going forward, we're unlikely to soon see the same momentum we saw in 2004–2008 or 2010–2011, when economic growth in Vaud was comfortably above the 3% mark.

But Vaud has been through hard times before and has always managed to bounce back. Throughout this report, we have seen just how far back Vaud's success goes, and just how deeply rooted it is. In the early 2000s, for instance many people – including politicians, the media, and the general public – were pessimistic about the future of the Vaud economy, when in reality it had already started to turn the corner.

Some industries were already flourishing: pharma, biotech, diagnostics, and medtech were all expanding; watchmaking had shifted to the very high end of the market; and the food industry saw the arrival of newcomers like Nespresso and innovative manufacturing methods and sales strategies. Other industries that faced fierce international competition, such as machinery, electrical equipment, and furniture making, responded by overhauling their

operations and focusing on innovation and added value. The economy was further strengthened by the first bilateral agreements with the EU, which removed trade barriers and made it easier to employ EU citizens.

In 2009, when the global economy was going through one of the worst recessions in decades, both Vaud and Switzerland as a whole came off quite lightly. Population growth, low interest rates, and solid public finances meant that Vaud could rely on its healthy domestic economy. Vaud also succeeded in changing with the times, by diversifying into niche markets.

The Canton's success was further facilitated by proactive public policies like offering tax relief to companies to encourage them to relocate some activities to Vaud. That has attracted multinationals like Ferring and Medtronic and enabled Swiss companies like Serono (now Merck) and Nestlé to grow their businesses. This globalization of the Vaud economy has had several positive impacts, including a major boost to local SMEs.

But Vaud already had the foundations for economic resilience. There has, for example, always been a small number of pharmaceuticals in the Canton, even if this has never been a major industry. Vaud also has a strong watchmaking and micromechanics industry, as well as a microengineering lab at the EPFL. And then there's Nestlé and its strong presence across the Canton, to mention just a few examples of the economy's diversity and solid basis.

NEAR-TERM UNCERTAINTIES

However, despite all its strengths, Vaud's continued success should not be taken for granted. One of the major challenges is that the Swiss franc is unlikely to weaken anytime soon. During the first few months of 2016 it was not as highly overvalued as it was in January 2015 – when it had shot up by more than 15% against the euro – but it was still about 10% higher than its fair value against the single currency. Although a strong Swiss franc is nothing new – it has been appreciating since 2009, when the euro was just below the CHF 1.60 mark – adjusting to this new level to remain competitive in international markets is not something that can be done overnight, particularly in the manufacturing sector. What's more, employment in some export industries began to fall in 2011, and initial figures point to an accelerated decline in 2015. In less-specialized manufacturing industries, employment is directly linked to the strength of the Swiss franc. As a result, some companies have already announced closures or relocations of some operations, and subcontractors are feeling the pressure. An overvalued Swiss franc also has ripple effects for tourism and locally-focused industries, like retail.

Maintaining – and even increasing – Vaud's appeal will be essential. The upcoming corporate tax reform will be a first crucial test. Vaud has one of the highest corporate income tax rates in Switzerland. By mid-2016, the Canton had already decided to substantially lower its standard corporate tax rate as part of the reform, but the federal framework for the reform will probably be put to a national referendum. If the reform is not adopted or properly implemented, there's a likelihood that a number of multinationals may up and leave. This would have several knock-on effects on business services, real estate, and construction, as well as on the hotel, retail, and corporate catering industries.

Regarding relations with the EU, constraints on hiring EU workers or a long-running dispute with the EU could lessen Vaud's appeal and have a negative impact on the economy. A lot of companies in Vaud are internationally oriented and focused on innovation, and they didn't come here simply for the tax relief. The Canton offers easy access to a highly qualified workforce, world-renowned universities, and relatively few administrative hurdles. And if the EU cuts Switzerland out of its research programs, this would seriously affect R&D in the Canton and could hit the start-up industry hard.

ADJUSTING TO CHANGE

The global economic climate is another source of concern for export industries. Growth remains sluggish in the EU, and the debt problems of many eurozone countries are far from being resolved. The main emerging-market economies – China, Brazil, and Russia – have all lost steam, and Japan is still not showing any signs of a sustainable recovery. Only the US seems to be firmly recovering from the 2008–2009 crisis, but growth there is still below pre-crisis levels.

In manufacturing, the watchmaking industry, which benefited from China's rapid growth, now has to deal with a changing economic climate and competition from new products like smartwatches, which have the potential to shake up the whole industry. The machinery industry has already made many adjustments, but makers of furniture, electrical appliances, and metal products still need to keep on their guard. Many companies will undoubtedly need to implement more changes – or even major overhauls. Pharma and medtech, however, have so far proven to be more resilient, mainly because of their innovative product lines.

Construction, one of Vaud's largest secondary-sector industries, is more domestically oriented and should not be so adversely affected by international trends. There could however be some knock-on effects down the line. Demand should continue to be fuelled by rock-bottom mortgage rates and low unemployment, and there are also several major residential construction projects in the pipeline. Building renovation should get a boost from the drive for more energy efficiency. But if quotas for EU workers are reintroduced and the labor market stalls, this would slow population growth, which could dampen these positive effects.

In services, the hotel industry is the most exposed to the rise in the Swiss franc, as eurozone tourists are likely to go elsewhere for their alpine holiday. Retail has taken a blow from competition from shopping tourism and online vendors based outside Switzerland. One major retailer estimates that Swiss people spent CHF 12 billion abroad in 2015, and shops in border towns are, of course, even more vulnerable.

Against these headwinds, keeping Vaud's economy going at the same pace will be no mean feat. The people of Vaud may have their hands firmly on the wheel, but there will be twists and turns on the road ahead.

Impressum

Authors

Jean-Pascal Baechler
Observatoire BCV
de l'économie vaudoise
Place Saint-François 14
1001 Lausanne
jean-pascal.baechler@bcv.ch
www.bcv.ch

Philippe Gumy
Vaud Chamber of Commerce
and Industry (CVCI)
Avenue d'Ouchy 47
1001 Lausanne
philippe.gumy@cvci.ch
www.cvci.ch

CREA Institute of Applied
Economics,
University of Lausanne
Internef Building
CH-1015 Lausanne
crea@unil.ch
www.hec.unil.ch/crea

Dyai Conde
Independent economist
Rue Emile Nicolet 9
1205 Genève
dyai.conde@unil.ch

With Sylvia Smith, Rosemary
Wells, and David Jemielity at
BCV for English adaptation
and original content.

Design and printing

TAZ Communication
Passage Saint-François 9
1003 Lausanne
taz@taz-communication.ch
www.taz-communication.ch

Photo credits

iStock

Publication

Observatoire BCV
de l'économie vaudoise
info@bcv.ch
www.bcv.ch

June 2016

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