Traditional Economies

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The Digital and the Reshaping of Traditional Economies

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We are witnessing in the post-crisis decade (2007-2017) a critical turn of information technology (IT) and their applications (Brynjolfsson and McAfee, 2012). Mobile connectivity is fast and increasingly ubiquitous. Billions of people are active on social networks. E-commerce and cloud computing has got commoditized. Big data, additive technology, virtual reality, the Internet of things, machine-learning, and artificial intelligence, are opening the doors to a global transformation that is igniting fears about the possible vanishing of millions of jobs as they are replaced by robots and algorithms (Frey and Osborne, 2017).

This chapter aims to introduce the reader with the transformative nature of the digital, which explains the scale and scope of current debates about the digital society. Beyond IT, or digital industries strictly speaking, the economy as a whole is transformed by digitization, which blurs the lines between traditional sectors, drives the globalization of value chains (VC), and shapes the geography of industries and firms. We examine more in depth how century-old sectors – banking, commerce, and manufacturing – are being 'disrupted' by digitization, with potentially important geographic consequences which, however, would probably not diminish the general tendency toward the spatial polarization of capital, high value-added business, skilled jobs, and wealth.

1. Traditional industries and the transformative nature of the digital

There is no universal definition of the digital economy (Malecki and Moriset, 2008). One of its defining characteristi is that it is blurring the boundaries between industries. Amazon is both an online retailer and a leader in cloud computing. It has started to fly aircraft, and to operate grocery stores. Telecom companies have become banks. Alphabet[1] and Apple could become car makers. Worldwide IT spending in 2017 will be worth 3.5 trillion dollars (Gartner, 2017). This is about five percent of the World's GDP, but the actual extent of the digital economy is larger if we consider business sectors digitized to some degree. The McKinsey Global Institute (2015) ranks industries according to a 'Digitization Index' (table 1) based on the share of IT spending in operating costs, the weight of IT in firms' assets, and the share of tasks which are computerized. Finance, media, and advanced manufacturing, are said highly digitized. Sectors moderately digitized overall, like retail, transportation, and hospitality, include ‘digital champions’ such as Amazon, Uber, and Airbnb. Even sectors with the lowest index, such as agriculture, have become digital to some degree. Farmers and fishermen in Africa or India are rarely equipped with GPS-guided tractors and boats common in rich countries, but they use mobile phones to market their production more efficiently (Jensen, 2007).

The transformation driven by the dissemination of IT within traditional industries is suggested by the words ‘disruption’ and ‘uberization’. The latter is attributed to Maurice Lévy, former CEO of Publicis, an advertising agency.[2] It is inspired by the upheaval in the taxi industry created by Uber’s car-hailing web application. In M. Levy’s mind, companies born in the pre-Internet era have no choice but to embrace digitization and transform, or decline. As a matter of fact, advertising is among sectors disrupted by the digital: Publicis’ financial report for 2015 reveals that 54 percent of its revenue came from digital channels.

Table 1. Digitization levels across business sectors in the USA
(Adapted from McKinsey Global Institute, 2015: 5)

Digitization level	Sectors
1	ICT
2	Media; Professional services; Finance and insurance
3	Wholesale trade; Advanced manufacturing; Oil and gas; Utilities
4	Real estate; Education; Retail trade Personal services; Government
5	Chemicals and pharmaceuticals; Basic goods manufacturing Transportation and warehousing; Health care
6	Mining; Construction; Entertainment and recreation Hospitality; Agriculture

A ‘general purpose technology’

Semiconductors are regarded as ‘general purpose technology’ (GPT), as once were steam machines and electricity. They show the characteristics suggested by Bresnahan and Trajtenberg (1995): the potential for continuous improvement (as suggested by Moore’s Law), the use in a wide range of sectors (semiconductors are everywhere, from cars to household appliances), and strong innovation complementarities with other sectors. Convergence (Yoffie, 1996) and complementarity are the cornerstones of the digital economy. They are epitomized by the smartphone, which brings together many devices once separated: computers, telephones, clocks, agendas, maps, newspapers, record players, cameras, and TV sets. The smartphone has become the platform on which converge industries such as mail and telecommunications, retail, media, video-games, and banking. Complementarities and convergence give birth to brand new markets and business ecosystems. For example, the action camera (Gopro and its imitators), which is a multi-billion dollars market, has flourished at the crossroads of social demand (self-promotion on Facebook), media e-platforms and apps (YouTube, Snapchat), technical improvements (polycarbonates, optics, data capture and storage), and the growth of tourism and outdoor activities.

The globalization of IT-driven value chains

The staggering increase of computing power, data storage capacity, and telecommunications bandwidth, have driven the unbundling of value chains in their organizational and spatial dimensions (Ge et al., 2004). IT coordinating power enables the increase in complexity and scope of locational portfolios of firms, their subsidiaries, and their contractors. IT-enabled standards, metrics, and logistics reduce uncertainty and delays. That, in turn, favours outsourcing and the growth of a finely grained division of labor, because the specialization of business units is a source of economies of scale. The offshoring of parts of the production process in emerging or developing countries, notably China for manufacturing and India for services, has grown to enormous proportions, catching the eyes of media, stirring-up political controversies and justifiably attracting the attention of geographers (Peck, 2017). Advanced telecommunications made it possible the location abroad of a wide range of services said 'IT-enabled', which can be delivered in real time to other business units, headquarters, and customers. The spectrum of Business Process Outsourcing (BPO) services open to offshoring is wide: R&D, testing, design, architecture, financial and legal services, accounting, marketing, customer relations, education, and medical services.[3] Occupations can be counted by the hundred, and the educational levels asked to employees range from high school to PhD. This 'collapsing of time and space' gave birth to multi-billion dollars industries in diverse countries such as India, the Philippines, and Israel.

2. An empirical approach of the digital disruption: retail, finance, and manufacturing

2.1. E-commerce and the 'fall of the mall'

The possibility given to customers to browse online for millions of items, compare prices, and order, without regard to their physical location, has created the myth of a 'frictionless commerce' (Brynjolfsson and Smith, 2000), and justifiably caught the attention of geographers, given the possible destructuring of cities and urban life which could result from a 'fall of the mall' (Wilson, 2000).

From 2001 to 2015, e-commerce sales in the USA have increased tenfold, to 340.4 billion dollars, a 7.2 percent market share (US Census Bureau, 2017). However, the largest market today is China, with online sales worth 582 billion dollars in 2015. According to eMarketer[4], worldwide e-commerce reached 1.9 trillion dollars in 2016, 8.7 of total retail spending. Meanwhile, brick-and-mortar shopping struggles for survival. US newspapers rival in superlatives about the 'wrecking' of retail.[5] Sears, an iconic department store chain with 140,000 employees, is on the verge of bankruptcy, after losing 10 billion dollars in the last six years, and sales cut by the half since 2012 (annual report 2017). Macy's Inc. announced the closure of 68 stores in 2017 and the layoff of about 10,000 employees.[6] Shopping malls are infamously declining: there is a 'dead mall' entry in Wikipedia, and a web site dedicated to dead shopping malls, www.deadmalls.com.

The digital is not alone to be blamed for the suffering of the retail industry. The oversupply of stores, the polarization of wealth, and the squeezing of middle-class family incomes must be taken into account. But e-commerce is the immediate challenge traditional retailers are facing with, and their transformation toward 'brick and click', multichannel shopping is a matter of survival (Wrigley and Currah, 2006). Walmart, the world's biggest company by employment and revenue (481 billion dollars in 2016), acknowledges that 'consumers are increasingly embracing shopping online and through mobile commerce applications' and that it must 'build and deliver a seamless shopping experience across the physical and digital retail channels' (annual report 2017: p. 18). The digital transformation of retail is epitomized by the 'epic battle' between Walmart, and Amazon (Heller, 2016). The two companies are converging 'on a collision course'.[7] In 2016, Walmart acquired JetCom, an online retailer. On 16 June 2017, Amazon announced it will acquire Whole Food, a US chain of upscale grocery stores.

Amazon's market valuation on 9 June 2017 was twice those of Walmart – 467 billion against 239 billion dollars – despite low returns for shareholders. Amazon has so far prioritized growth. The largest share of the net cash resulting from operations is invested in infrastructures and technology. Fulfillment and logistics are the cornerstone of e-commerce (Murphy, 2003). Sophisticated web platforms and trustworthy payment systems are required to reach customers, provide them a customized shopping experience, and increase their loyalty. But swift delivery, while keeping inventory at the lowest level, is about warehouses, aircraft (Amazon experiments drones), trucks and vans, and congestion-free roads. By the end of 2016, Amazon operated worldwide nearly 160 million square feet (about 15 million m2) of fulfillment facilities, mainly warehouses (annual report 2017), the equivalent of 840 Walmart's supercenters. From the beginning, Amazon's obsessive strategy has been to decrease delivery time. Subscribers to its program 'Prime' benefit from free, two days delivery, and same day delivery across 5000 US cities (Amazon.com). In this regard, the lesson we learn from e-commerce is that geography still matters. In countries with poor physical infrastructures and congested cities, like India, the last mile conundrum is a nightmare for e-retailers. Amazon's recent purchase of Whole Food shows that the convergence toward a multichannel model of retail has increased the value of location for brick-and-mortar stores, supermarkets and supercenters, used as distribution centers and pick-up spots, if only they are easily accessible. In the 'brick and click' era, small malls and main street shops in rural areas and small and medium cities are likely to suffer the most.

2.2. Digital finance: a paradoxical geography

Since the invention of the bill of exchange, money trading has been at the vanguard of capitalist 'time-space compression' (Harvey, 1999). Modern finance, which trades an intangible substance, has epitomized the mythical 'end of geography' (O'Brien, 1992). Societies are on the way to become cashless. In Sweden, in 2015, 98 percent of payments were made through credit cards and mobile apps such as Swish[8] (Henley, 2016). In India, the government is vigorously promoting digital payments (http://cashlessindia.gov.in).

The uberization of retail banking: a disaster foretold?

Since customers no longer need to visit branches in person, but are able to proceed operations remotely through PC or smartphone applications, scaremongering discourses have predicted the collapse of retail banking (Kessler 2016). As a matter of fact, banks in Western countries are closing branches. Bank of America – 21 million customers active on mobile devices – has closed 1400 branches out of 6000 since 2007 (Wadhwa 2016). This consolidation process is pushed by the competition incumbent banks are facing from technology startups (or 'fintechs') and IT giants such as Apple, Alphabet, and Facebook (USA), or Tencent and Alibaba (China), who turn to financial services to increase revenues they make from their platforms' billion of users. According to a report by Citigroup, fintechs may grab 17 percent of banking revenues in USA and Europe by 2023.[9] In China, they have passed the 'tipping point' and surpass incumbent banks by the number of clients.

However, this evolution will probably not lead to the announced disaster, but rather, to a Schumpeterian 'churning' from routine jobs to more creative, highly skilled jobs. In the USA, finance is not forecasted to shrink, but rather to add 500,000 jobs to the economy between 2014 and 2024 (Bureau of Labor Statistics 2017). Nevertheless, branch closures are visible in employment forecasts: tellers could shrink by 7.7 percent. This would be compensated by the rise of skilled occupations and services which require face-to-face contact with customers such as analysts (11.7 percent), credit counsellors (15.5 percent), and personal financial advisors (29.6 percent).

The spatial concentration of advanced financial services

Finance illustrates the paradox that lies in the geography of the digital economy (Moriset and Malecki, 2009): although transactions through notebooks or mobiles are nearly ubiquitous, high-end services concentrate in a few financial centers, preferably in 'global cities' (Sassen, 2001) such as London, New York, Tokyo, and Hong-Kong. This issue is the subject of an abundant literature (Clark and Wójcik, 2007; Dixon, 2014). Geographic concentration of a fully-digital sector is counter-intuitive. In fact, since IT makes it possible to offer services from abroad without regard to the location of money owners, the geography of high-end financial services (currency and securities trading, asset management) is production-driven rather than market-driven. First, there is the competition for talents. Clark (2015) explains how the availability of 'star' professionals is instrumental for the prominence of London in asset management services. In addition to urban amenities which highly-paid professionals demand, London and its region host world-class universities and finance-oriented curricula (Hall and Appleyard, 2009). The presence of major financial institutions fuels a highly competitive labour market which, in turn, attracts the best specialists from abroad. Second, there is the quest for 'informational asymmetries' which distillate from the urban buzz (Storper and Venables, 2004), reduce uncertainty, and increase returns from operations. Third, digital technology itself (algorithmic, data centers, optical networks) requires agglomeration, in search for economies of scale and low latency in high-frequency trading (Wojcik et al., 2017). However, these agglomeration externalities produce their full effect only if they are leveraged by favourable regulations, like those resulting from the financial 'Big Bang' of 1986 (City of London, 2006).

3. Manufacturing and the Industrial Internet

The latest advances in digital technology may be the starting point of a great turn in the history of industrial production, notably in 'advanced manufacturing': aerospace, automobile, energy, medical equipment, and machinery. Several monikers with overlapping meanings describe the industrial near future: industrial Internet, cybermanufacturing, industry 4.0.

In the old IT-enabled industry, computer-aided operations in R&D, supply chain, and production line remained separated in time and space. Today, the pivotal concept is the integration of VC bricks into a product lifecycle, managed like a systemic loop 'from the first idea of a product all the way through until it is retired and disposed' (Stark, 2015: 1). Feedback from end-customers, information from after-sale services are analyzed and drive improvements at the design or mass-production stages. Much greater changes are potentially driven by the rise of 'the Internet of things' (IoT), which paves the way toward 'the industrial Internet.' Up to now, Internet was mostly about interaction between human beings. In the IoT, the flow of data captured, channeled, stored, and analyzed, originates from things as diverse as cars, CCTV cameras, home appliances, HVAC systems, or the blades of a turbine. Machine-to-machine connections are likely to grow from 3.3 billion in 2013 to 10.5 billion by 2019 (Cisco Systems, 2015).

> The Industrial Internet enables companies to use sensors, software, machine-to-machine learning and other technologies to gather and analyze data from physical objects or other large data streams—and then use those analyses to manage operations and in some cases to offer new, value-added services (General Electric and Accenture, 2015).

General Electric launched in 2013 a platform for cybermanufacturing, *Predix*, which might become the Facebook of machines. Predix is the product of an ecosystem (Agarwal and Brem, 2015) shared with IT companies such as AT&T (wireless communications), Cisco (collaborative tools), Amazon (cloud infrastructure), and Accenture (development and commercialization). The transformation of an old industrial conglomerate into a data-centric and software-centric company which employs about 13,000 software engineers illustrates the blurring of the frontier between manufacturing and services. Rolls-Royce Plc., a British jet engines manufacturer, shows the predictive capacity of IoT. According to the company's annual report, 52 percent of the revenue of the civil aerospace division in 2015 came from services such as engines' real-time monitoring or 'Engine Health Management.' Data acquisition is made by sensors on in-flight engines. Data are transmitted for monitoring and diagnosis to the operation center in Bristol (UK). Feedback from big data analysis benefits to the entire VC: design of more reliable and fuel-efficient engines, streamlining of the maintenance schedule, and the elimination of unnecessary, unexpected inspections and repairs (Marr, 2015).

Cybermanufacturing, robotics and the IoT have logically received much attention in Germany. The birth country of 'Industry 4.0' initiative.[10] is endowed with the strongest industrial base of any advanced economy, but it is ageing, unemployment rate is rock-bottom, and shortage of skilled workers recurrent – Japan faces similar challenges. In this context, to remain innovative and keep an edge over its rivals, Germany's industry must push forward upgrading and digitization. More globally, Industry 4.0 could drive a process of 're-shoring', bringing back in Western Europe, or USA, productions once transferred to emerging Asia. The demand for flexibility, customization, and quick delivery, favours the emergence of 'smart factories' located in the core of main markets. Adidas' 'Speed Factory' in Ansbach (Bavaria), opened in mid-2017, is a fine example. Robots and 3D printers will product 500,000 pairs of sneakers a year, offering customers short time delivery and an unprecedented choice of size, forms, colors and fabrics (*The Economist* 2017). Gress and Kalafsky (2015) explore the possible changes in the geography of global VC which could result from additive technology. Notably, 3D printing could reduce the need for remote sourcing of components.

3. Conclusion: geography still prevails

The implications of the digital on traditional industries are impossible to capture in all their magnitude. IT implementation has a vast 'disruptive' potential in education, health and medicine. Driverless vehicles could revolutionize transportation on the middle term. However, when it comes to question the geographic issue of this transformation, two ideas are emerging from the above empirical developments.

First, the importance of geography has not decreased. On the contrary. 'As spatial barriers diminish so we become much more sensitized to what the world's spaces contain' (Harvey 1999: 106-7). The existence of localized clusters (Delgado et al. 2014) in all industries is not seriously challenged. It is noteworthy that Tesla, Inc., today's most audacious venture in the automobile industry, is headquartered in Palo Alto, California, the heart of Silicon Valley.[11] Cross-sectoral, IT-driven convergences and complementarities favour large cities' industrial and research ecosystems where firms at different stages of development, from startups to behemoths like General Electric, Amazon or Citigroup, can finance their development, get in touch with high-end service providers, and easily recruit engineers and scientists.

Second, the digital drives centripetal, not centrifugal forces, and its main effect over regions and countries is the reinforcement of polarization in large cities, or 'metropolization'. Community malls are squeezed between e-commerce and Walmart's supercenters. In the banking industry, most branch closures happen in small and medium-sized cities, or peripheral communities, where household incomes and profitability are lower. The upgrading of financial services, and the competition to attract talents, increases the geographic concentration of operations. In India, the growth of IT-enabled services – which are true distance-breakers – favours 'tech cities' such as Bangalore, Noida, and Gurgaon, while rural areas are left behind. Languishing rustbelts and rural areas in developed countries, and now in China, tell a similar story.

In the end, there is few reason to think that information technology will lessen in the foreseeable future the premium given to face-to-face contacts (Leamer and Storper 2001), which is the *raison d'être* of creative hubs and technology clusters in the digital economy.

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[8] Founded in 2012, it has attracted 5.4 million users, more than half of the country's total population (www.getswish.se).
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[11] The main factory is in Fremont, CA.