conseil d'analyse économique
French Council of Economic Analysis

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The Digital Economy

Les notes du conseil d'analyse économique, no 26, October 2015

Transition to digital technology is in progress. From the media to cars, tourism, agriculture and healthcare, the whole of the economy is now digital. New business models, supported by powerful network effects and large-scale use of data, upset the balance of regulations and of our social model. The digital economy tends towards market concentration, although innovation may call dominant positions into question at any time. The digital eco-nomy is also giving rise to legitimate concerns regarding the future of employment: apart from its impact on certain professions, it is causing structural changes in the distribution of employment and bringing the long-term rise in the salaried workforce to an end. This poses new challenges in terms of labour law and social security.

In this domain, France has considerable assets to draw upon including a high level of demand, the flexibility ensured by the "auto-entrepreneur" self-employed status, an experienced competition regulator (the *Autorité de la concurrence*) and a voluntarist open data policy. On the other hand, it is lagging somewhat behind as far as supply is concerned. This situation is in particular attributable to excessively rigid sectoral regulations and ill-adapted financing structures.

In order to catch up, or even conquer a position of leadership thanks to the transition of new sectors to digital technology, action is needed on several fronts. As far as regulations and competition policy are concerned, we advise against any attempt to define a "digital sector" to which special measures would be applicable, whatever the boundaries might be. Conversely, the sectoral regulations as a whole need to be rendered more dynamic and conducive to digital innovation, making it possible to experiment with new business models. Moreover, guaranteeing the portability of data and enabling their certification would promote competition, as well as access to credit and new jobs for entrepreneurs. In order to optimise the digital economy's job creation potential, for micro-entrepreneurs within the collaborative economy in particular, we recommend bringing auto-entrepreneur status into general use on a permanent basis, while correcting its principal distortions in terms of taxation. It is also necessary to facilitate the transition to other, more established forms of activity. Finally, since digital micro-entrepreneurs do not have any assets or clients suitable for being sold when they take retirement, it would be appropriate to provide them with access to savings schemes similar to those enjoyed by employees.

Although the traditional tools of competition law are suited to fighting against the abuse of dominant positions in an effective manner, the diagnosis of situations of this kind becomes more complex in the case of the digital economy, in particular, due to the fact that it is based upon "multi-sided" markets and the use of mass data. It would therefore be desirable to invest the French competition regulator with competence in the field of data processing and analysis.

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Despite being based upon technologies that are already old,[1] the contemporary digital economy is only twenty years old: it arose from the American authorities' decision to open the Internet to civilian applications, at a time when personal computers were becoming increasingly widespread within companies and households. Internet, followed by smartphones, gave rise to new ways of producing and consuming, which progressively conquered all sectors. From the media to cars, agriculture and healthcare, the whole of the economy is henceforth becoming digital. All sectors now have to reckon with the sudden emergence of one or several digital companies, which are radically calling the organisation and operation of markets and companies into question. After setting out the digital economy's pertinent characteristics, we examine the conditions of its development in France, the means of regulation and, finally, the most effective means for putting it to advantage in terms of employment.

Today's digital economy is dominated by network effects

The "digital" economy is distinguished by the major place held by phenomena of increasing productivity: the more clients a company has, the more "productive" it is, meaning that it is able to offer a better service at the same price, which attracts new clients, and so on.[2] This phenomenon is connected with network effects: the quality of the service depends upon the size of the network, that is to say upon the number of users. Although network effects already existed in the "traditional" economy (transport, hotel chains, etc.), they have been greatly increased by the digital economy (text box).

The increase in the number of businesses with network effects within the digital economy is explained by the reduction of transaction costs: digital technologies make it easier to authenticate the other party in a transaction and gain knowledge of reputations; they enable easier communication and the retracing of exchanges –in other terms, they facilitate establishment of trust between parties that do not know each other.[3] This has led to the appearance of immense platforms, on which amateurs and semi-professionals are able to find clients under optimal and secure conditions and provide them with services whose quality is sometimes higher than that offered by traditional professions. These intermediary platforms may operate on an unprecedented scale (such as Uber in personal transport). Increasing productivity is also a result of machine learning, which digital companies use in order to continually improve their performances (cost, effectiveness, quality, etc.) thanks to the collection and processing of voluminous data flows. Clients are enlisted by companies in order to contribute to making the good or service known, organise customer support or even lobby the authorities. This "viral" nature of the digital economy reinforces network effects.

These characteristics, combined in various different proportions according to the business model, drive companies towards large-scale operations and concentration. In numerous cases, the market is dominated by the company that succeeded in beginning exponential growth before the others, driven by a "snowball" effect. The first to enter the market is not necessarily the victor, but rather the company with earlier and more sustained growth than its competitors (winner takes all).[4]

The concentration of digital markets does not mean that they are free of competition. Company monopolies are less lasting in the digital economy than in traditional business networks. In the digital economy's short history, temporarily dominant companies have already been ousted from their positions by disruptive innovation or the emergence of more innovative competitors on several occasions. The web browser market has successively been dominated by Netscape, Internet Explorer and Google Chrome. Although Google has marginalised the first-generation search engines and become the world's second-largest market capitalisation, the group's position on the online research market is threatened by massive migration to mobile broadband use. The fragility of the positions gained is explained by particularly intense competition. Market entry costs are low: little physical capital is required in order to enter the majority of digital markets. There is constant pressure from new entrants: the cost of getting start-ups off the ground has fallen dramatically over the last ten years and their growth is financed by venture capital funds in an increasingly effective manner. A dominant company's competitors may regain the initiative at any time and challenge its monopoly through the rapid propagation of new processes or functionalities on a large scale.[5] Finally, large digital companies compete with each other, constantly diversifying on new markets in order to benefit from synergies and make their dominant positions more difficult to challenge.

The fragility of dominant positions can also be explained by dependence upon users. In traditional network services, economies of scale and network effects arise from the infras-

The authors would like to thank the members of the CAE, Isabelle Falque-Pierrotin and Henri Verdier, as well as Jean Beuve.

[1] The ARPANET network was put in place in 1969 by the United States Department of Defense; the first personal computers emerged in the 1970s; digital technologies began to be used on a massive scale in the financial sector in the 1980s.

[2] See Arthur W.B. (1996): "Increasing Returns and the New World of Business", *Harvard Business Review*, vol. 74, no 4, July-August.

[3] Dyer J.H. and Wujin Chu (2003): "The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan, and Korea", *Organisation Science*, vol. 14, no 1.

[4] See Kutcher E., O. Nottebohm and K. Sprague (2014): *Grow Fast or Die Slow*, McKinsey Global Institute.

[5] Brynjolfsson E. and A. McAfee (2008): "Investing in IT that Makes a Competitive Difference", *Harvard Business Review*, vol. 86, no 7, pp. 98-106.

Direct and indirect network effects

A business is characterised by "network effects" if the value (or usefulness) of the product or service that it offers grows with the number of its users.

There are two types of network effects in the digital economy:

- **Direct network effects** appear when each of the network's users benefits from the connection of other users "of the same type" to the network. The telephone example shows that the usefulness which a subscriber derives from a service grows with the number of other people likely to be connected. The dynamic of network effects depends on the fact that the "established base" of users (users already connected) exercises a power of attraction upon potential users not yet connected and on the fact that each new user increases the satisfaction of users already present in the "established base". This gives rise to pricing strategies with a major inter-temporal dimension: operators thereby aim to attract a large established base at an early stage, a condition of their future growth;
- **Indirect network effects** appear when several categories of users interact on platforms putting several types of actors in contact with each other, such as numerous buyers and numerous sellers (as against the traditional model of a single seller and a large number of buyers). In this set-up, referred to as a "two-sided" or "multi-sided market", user satisfaction on one side of the market increases with the number of users on the other side. A search engine like Google attracts Internet users by the number of contents to which it enables access; advertisers are then attracted by the number of Internet users that this platform enables them to reach. Uber puts drivers and persons wanting to travel in contact; travellers find a better quality of service when more cars are available; for their part, drivers operate in a more profitable manner when there are more users. These network effects thus enable greater differentiation of possible transactions (variety of offers, comparison of prices, etc.) and better matching of supply and demand.

The dynamic dimension of indirect network effects is connected with the need for the platform to attract both sides of the market at the same time. One side often exercises a positive externality of attraction on the other: the presence of Internet users on a search engine thus attracts advertisers rather than the reverse. For this reason, pricing strategies developed by platforms are aimed at moving the costs of the platform's operations between the two sides, "subsidising" the side of the market that exercises this externality, by means of low or even non-existent prices, and receiving payment from the other side (Google makes its search engine available to Internet users free of charge but charges advertisers for contextual advertising based upon searches).

These (direct and indirect) network effects are an integral part of "large-scale" operations: a large established base makes it possible to attract new users. The higher the number of transactions the lower the unit cost of operations for the platform. The more effectively the platform matches the two sides of the market the lower the cost of transactions for users, as a result of the presence of a large number of users on each side of the market ("snowball" effect).

tructure, which imposes high fixed costs. In the digital economy, instead of being linked to tangible infrastructures, these effects are connected with the trust inspired in users: a single high-quality "experience" makes it possible to persuade them not to consider offers from other digital companies on the same market. However, in the digital economy, where "competition is only a click away", individuals are becoming increasingly demanding. Internet heightens competition by lowering the costs of research and price comparison.[6] Consumers are constantly appealed to by new arrivals on the market, communicate with each other, coordinate their actions and henceforth constitute a vast mass capable of rapidly bringing the available offers into competition with each other. In the face of this situation, as in the past, digital companies can only entrench themselves behind material infrastructures and regulatory barriers. They have to constantly innovate in order to improve user experience.

This constant improvement feeds a virtuous circle: acquiring new customers and securing their loyalty; improving the quality of their experience, in particular by means of personalisation (including price); optimisation of resource allocation; improvement of performance through training; innovation and diversification; mobilisation of users themselves in order to increase the number of network effects. In addition, collection and processing of user data is facilitated by the progress of digital technologies (storage volume and rapidity of processing) and in terms of design and interactivity (personalisation of experience and dynamic adaptation of interfaces).[7]

Observation 1. The digital economy is characterised by powerful network effects which drive markets towards concentration. However, dominant positions are easier to challenge than in the traditional economy.

[6] Brown J. and A. Goolsbee (2002): "Does the Internet Make Market More Competitive? Evidence from the Life Insurance", *Journal of Political Economy*, vol. 110, n° 3, pp. 481-507.

[7] O'Reilly T. (2007): "What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software", *Communications & Strategies*, no 1, p. 17, 1st quarter.

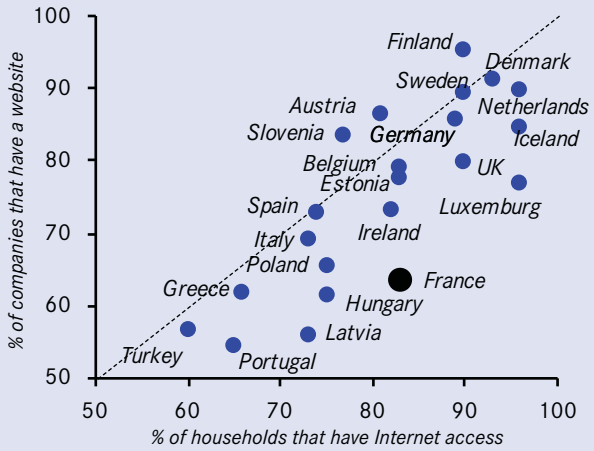
Ensuring the growth of digital companies in France

As compared with other OECD countries, France is lagging behind in the digital economy: the "ICT"[8] sectors represented 4.33% of French GDP in 2013, as against an OECD average of 5.5%. However, the French digital economy has the well-equipped character of French households in its favour: 83% of the latter have access to Internet (81% on average in the European Union); 68% of French people use the Internet on a daily basis (65% in the European Union)[9] and almost 40% of French people have smart phones (75% in the 18-24 age group).[10]

Yet, in the face of this dynamic demand, supply in France is markedly behind that of other advanced countries: in 2014, only 63.6% of French companies had a website, as against an OECD average of 76.2%; in the same year, only 17.1% of French companies used the social networking services for their client relations, as compared with 25.2% in the European Union.[11] French companies do not appear to take full advantage of the potential demand in terms of digital services (graph 1).

This backwardness may be explained by several different factors. In the first place, in terms of its workforce, in spite of France's good reputation for its school of mathematics and schools of engineering, "ICT specialists"[12] only represent 2.8% of jobs, as compared with 3.5% in Germany, 4.1% in the United States and 6.1% in Finland. Above all, the OECD PIAAC surveys reveal relatively weak skills within the working population, which complicates investment in the digital economy, implementation of the associated organisational changes and command of these technologies on the part of employees.[13] Furthermore, unsuitable regulations in the goods, services and labour markets, and with regard to business failures, hamper the deployment of digital business models, curb business renewal[14] and deter investment funds. Finally, although France admittedly has relatively plentiful private-equity funds, it is short of large-scale funds capable of taking major risks over long periods and also lacks a sufficient number of "angel investors".[15]

1. Facilities of households and companies, 2014



Sources: Eurostat (households equipements) et OCDE (compagnies websites).

Action is required in several areas in order to catch up: the launching and growth of digital companies, a legal framework conducive to their development and the deployment of infrastructures capable of accelerating the transition of the economy as a whole to digital technology.

The launch and growth of start-up companies

Entrepreneurial culture has played a key role in the increase in the number of start-up companies,[16] as well as in the success of a large number of them. Silicon Valley is a model case in this regard.[17] The largest digital companies, which got off the ground without any identified business model, were supported by an ecosystem that promoted ambition and provided cover for risk-taking. They thus succeeded in meeting early demand (often via Internet or from smartphone platforms), establishing patterns of exponential growth, raising money several times in succession from venture capital funds and, finally, perfecting their business model. Although starting far behind, France is far from lacking in entrepreneurial culture. According to France Digitale and EY, French

[8] Information and communications technologies, comprising sectors 26, 582, 61, 62, 63 of the ISIC classification rev. 4, see OECD (2015): *Digital Economic Outlook*.

[9] See European Commission (2014): *Information Society Statistics*, Eurostat.

[10] Bigot R. P.Croutte and E. Daudey (2013): "La diffusion des technologies de l'information et de la communication dans la société française", *Rapport du CRÉDOC*, no R297, November.

[11] Companies of 10 or more employees, OECD (2015), *op. cit*.

[12] ICT services managers, ICT professionals, electro-technological engineers, ICT engineers, electrical technicians and repairers see OECD (2015), *op. cit*.

[13] See Artus P., C. García-Peñalosa and P. Mohnen (2014): "Redresser la croissance potentielle de la France", *Note du CAE*, no 16, September.

[14] The average age of CAC 40 companies is currently 101 years; the average age of Fortune 500 companies has fallen from 67 years in 1955 to 15 years today.

[15] See Couppey-Soubeyran J. (2015): "Capital-investissement", *Focus du CAE*, no 4, April.

[16] The "official" definition of a start-up company in Silicon Valley is given by Steve Blank: temporary organization designed to search for a repeatable, profitable and scalable business model, see Blank S. and B. Dorf (2012): *The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company*, K&S Ranch.

[17] In the 1930s, lecturers-researchers at Stanford were prompted to create companies alongside their teaching activities. This pursued two objectives: keeping lecturers attracted by the business world in the University and securing financial resources. The second regularly quoted example is Israel, Beuve J. (2015): "Le modèle industriel israélien : conditions du succès et défi futur", *Focus du CAE*, no 2, March.

start-up companies' workforce increased by 22% between 2012 and 2014 and their turnover rose by 43%.[18] The crisis means that traditional companies have become out of reach for a certain number of persons, and young people in particular. Engineering and business schools encourage their young graduates to create start-up companies.

However, digital start-up companies cannot get off the ground and ensure the growth of their business without appropriate financing. They start off without any identified business model, constantly innovating and pursuing long-term growth on very large markets.[19] Traditional business financing, and bank loans in particular, are unsuitable for activities of this kind, which involve very high risks. Venture capital is the most suitable means of finance. In the United States, it enjoyed favourable regulatory provisions at a very early stage.[20] Having constantly expanded since the 1960s, very large-scale venture capital funds are capable of absorbing the risk connected with digital companies' exponential expansion.

Compared with the United States, France suffers from two handicaps. On the one hand, it lacks institutional investors, such as the pension funds and major universities' endowment funds which supply American venture capital funds on a massive scale. A considerable part of French savings are directed, notably by means of regulated savings and life insurance, to asset classes that are the very opposite of venture capital (real estate in particular): involving little risk but also creating little value.[21] On the other hand, French start-up companies have the benefit of financing by means of acquisition to a far lesser extent than in the United States. The digital transformation of traditional companies, in particular, presupposes major organisational changes that are difficult to implement in an economy with little flexibility.[22]

The relative scarcity of venture capital is partly offset by support measures for helping companies to get off the ground. Employment termination agreements, which were put in place in 2008, enable employees to leave their employer in order to create their own company, while receiving benefit from the French national employment agency (*Pôle emploi*). Half of France's digital companies have young innovative company status (*Jeune entreprise innovante,* JEI), which provides tax advantages and employee benefits for companies that have been established for less than eight years and devote at least 15% of their total expenditure to R&D. 75% of them have the benefit of research tax credit (*Crédit d'impôt recherche,* CIR).[23] Due to their vulnerability at the time of getting off the ground, digital companies are highly dependent upon these measures, although this has two negative effects. On the one hand, a bureaucratic approach to business: instead of adopting an overall approach, based upon an array of indexes,[24] the administration asks start-up companies to break down their activity into basic tasks and detail their allocation of human resources accordingly.[25] In order to make life easier for these start-up companies, procedures for the processing of aid applications need to be adapted to the real situation: small companies starting up without any business model cannot give detailed accounts of their activity in the same way as large companies that have reached maturity. On the other hand, an excessively technological view of innovation: in digital companies, innovation resides as much in design, use of data and business models as in actual technology which, to a large extent, has been made commonplace by open source and cloud computing platforms. By emphasising technological barriers, the administration diverts entrepreneurs' efforts and leads them to exaggerate the importance of technological R&D in their aid applications.

These negative effects show the need to reduce administrative complexity in order to stimulate entrepreneurship. Several empirical studies show that this complexity, whether "perceived" (measured by questionnaires) or "costed" (measured in terms of the resources required in order to deal with it), has a negative impact upon entrepreneurial motivation and its concrete expression in the founding of businesses.[26]

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[18] EY and France Digital (2014): *Le baromètre économique et social des* startups *numériques en France*.

[19] In the exceptional context of the speculative bubble, Amazon raised more than 3 billion dollars between its initial public offering in 1997 and breaking even for the first time in the 2003 financial year. More recently, Uber has raised more than 5 billion dollars since its creation in 2009.

[20] In 1958, the establishment of Small Business Investment Company status enabled investment companies to have the benefit of the massive assistance of virtual State equity funds, with a powerful leverage effect. In 1978, the rate of taxation of capital gains on securities was lowered from 49.5 to 28%, encouraging investors to take a better view of venture capital. In the same year, the Department of Labor revised its lines of policy with regard to pension fund investments and ended the "*bonus pater familias*" obligation with regard to their management, which considerably increased the volume of capital that could be invested in venture capital funds. See Gompers P. and J. Lerner (2001): "The Venture Capital Revolution", *The Journal of Economic Perspectives*, vol. 15, no 2, Spring, pp. 145-168.

[21] See Artus, P., Bozio, A. and C. García-Peñalosa (2013): "Fiscalité des revenus du capital", *Note du CAE*, no 9, September.

[22] Brynjolfsson E. and L. M. Hitt (2000): "Beyond Computation: Information Technology, Organizational Transformation and Business Performance", *Journal of Economic Perspectives*, vol. 14, no 4. Shrage M. (2013): "Who's Managing Your Company's Network Effects?", *Harvard Business Review*, December.

[23] EY and France Digital (2014), *op. cit*. JEI status is favourably assessed by various different reports. See Hallépée S. and A. Houlou Garcia (2012): Évaluation du dispositif *JEI*, DGCIS, September. Report of the CPB Consortium for the European Commission (2014): "A Study on R&D Tax Incentives: Final Report", *Taxation Papers, Working Paper*, no 52. Lelarge C., E. Gautier and F.C. Wolff (2015): *Alleviating the Burden of Entrepreneurial Risk? Evidence from Two French Targeted Programs*, Mimeo. It should, however, be noted that start-up companies' creativity is not solely based upon R&D in the traditional sense, but to a large extent on commercial innovations not eligible for R&D subsidies.

[24] For example, the combination of angel investors' capital and venture capital funds, membership of a business cluster or use of an application program as a special channel for interaction with clients.

[25] See the list of requirements pp. 4-6 of the application form for JEI status, available at http://cache.media.enseignementsup-recherche.gouv.fr/file/01/1/7011.pdf

[26] See Grilo I. and J. Irigoyen (200-): "Entrepreneurship in the EU: To Wish and not to Be", *Small Business Economics*, vol. 26, no 4, May, pp. 305-308.

Regulatory barriers

Because of the innovative nature of business models originating within the digital economy, it is difficult to fit them into the boxes provided by transverse and sectoral regulations, and all the more so in view of the proliferation thereof. This is illustrated by the blurring of boundaries between amateurs and professionals in the mobility (carpooling with BlaBlaCar), hospitality (rental of apartments *via* Airbnb) and driving lesson markets (appearance of "2.0 driving schools" putting candidates in contact with independent driving instructors). The applicable legal rules, which are out of step with new approaches to production and consumption, are fiercely defended by stakeholders with a vested interest in their maintenance, without start-up companies necessarily having the means to protest. This constitutes an even greater handicap insofar as the venture capital funds, which are smaller than in the United States, have greater difficulty in covering the resulting legal risks. The regulations are therefore a handicap for the development of start-up companies in France.

Digital economic infrastructures

The deployment of specific infrastructures constitutes an additional means of promoting the establishment and growth of digital companies in France. There are three types of such infrastructures:

- Physical infrastructures: France is rather well-positioned in terms of telecommunications networks and the connection of schools and public institutions. It is set to make further progress thanks to super-fast broadband Internet access;
- Open data infrastructures: in this respect, France is once again rather well-positioned, in view of the ETALAB mission for establishing open access to public data and the Bill "For a Digital Republic" (*loi Lemaire*), which extends open access to data concerning local and regional authorities, State-run corporations and data of "public interest" held by private persons;[27]
- Legal infrastructures: the legal framework for the use of personal data is a structural and complex part of the digital economy's development. Although the Lemaire Bill provides concrete responses in terms of the portability of personal data and the management of data after a person's death, its intended objective is the establishment of a consistent legal framework at the European level, in order to enable companies to directly operate within the single market as a whole, as is the case in the United States.

Observation 2. In spite of high potential demand, the digital economy has fallen behind in France, in particular due to rigid regulations, poorly-channelled savings and insufficient training. However, the voluntarist approach taken with regard to open data access constitutes an asset for French start-up companies.

Regulation and competition in the digital economy

Because of increasing productivity, the digital economy has a natural tendency to market concentration (referred to as "natural" monopolies). Existing regulation measures (concerning ownership of capital, prices, behavioural obligations, etc.) are in part ill-adapted to the digital economy's dominant companies, which derive their effectiveness from the implementation of network effects by raising barriers of entry to their markets, in particular:

- Vertical ("silo systems") and horizontal (bundling) integration in closed ecosystems designed to keep the maximum of users. Apple constitutes an emblematic example of this strategy: initially positioned on the computers, MP3 players and smartphones market, Apple progressively integrated itself by creating a contents platform (iTunes) and a software applications store (App Store), which constitute the only sources of supply for users of its products;
- The development of multi-sided business models ("platforms"), which generate indirect network effects that it is difficult for new entrants to reproduce (see the example of Google, text box).
- Although the traditional tools of competition law are effectively adapted to fighting against the abuse of dominant positions, diagnosis of abuse of this kind is made more complex by the presence of network externalities.[28]

Monitoring closed ecosystems

Companies can collect data on a mass scale thanks to regular and systematic monitoring of software application users' activities. In certain cases, this data makes it possible to create more value on a different side of the platform: the capacity to collect data on Internet users' searches thus enables Google to gain better knowledge of their centres of interest and make them targeted commercial offers through its adver-

[27] Data produced by managers of public services and organisations receiving subsidies of more than one million euros. It should be noted that France took up the Chair of the Open Government Partnership this year, with major undertakings with regard to open data access. However, the pricing of use has become an issue.

[28] For an analysis of the strategies implemented by companies on two-sided markets, see Rochet J-Ch. and J Tirole (2003: "Platform Competition in Two Sided Markets", *Journal of the European Economic Association*, vol. 1, no 4, June, pp. 990-1029, as well as Armstrong M. (2006): "Competition in Two-Sided Markets", *Rand Journal of Economics*, vol. 37, no 3 pp. 668-691, September.

tising clients. In other cases, it enables improvement and personalisation of offers, thereby making it possible to reduce the cost of acquiring new customers and securing their loyalty (Netflix, Apple). Cost savings are reinforced by further savings arising from ancillary businesses (for example, the supply of cartography and hotel reservation services within the same mobile apps environment).

These closed ecosystems, within which users adopt a product and are then obliged to only purchase terminals, software applications and content associated with it, pose sensitive issues of competition. They can be beneficial to consumers: competition tends to be more intense between closed ecosystems than between composite systems.[29] However, the fact of being "locked-in" to a given technological choice may pose problems of competition when switching costs are high and consumers purchase numerous products that are not transferable from one system to another. In this case, the act of choosing one technology restricts consumers' subsequent choices and may make them vulnerable in relation to the company operating the ecosystem. Above all, switching costs reduce the intensity of competition: once established in a given environment, consumers need to be made a significantly better offer (from the point of view of prices or characteristics other than price) in order to consent to change system. The portability solutions adopted in banking and telephony constitute an interesting possible approach for addressing this problem with regard to digital activities.

Regulating indirect network effects

Direct and/or indirect network effects benefit users: they give rise to a dynamic of growth and promote the development of standards. However, the resulting dominant positions may also prevent new actors from entering the market, since they have to put particularly attractive offers together in order to challenge the "established base" of the companies already present. For example, the more numerous the hotels referenced on a hotel reservations platform, the more useful it is to consumers, quite apart from its specific qualities and ergonomics. A competing platform therefore has to offer considerable improvement of the service provided, in order to enter the market in the face of established large-scale actors. This problem is reinforced in sectors dominated by single-homing, in which clients tend to use a single platform.[30]

In order to rapidly reach a critical mass by means of network effects, a condition for the success of a new platform, various different strategies may be put in place.[31] One such strategy is the provision of services free of charge: hotel room reservation services are free for individuals, but hotels are charged on the other side; Google distributes the Android operating system to smartphone manufacturers free of charge so as to reach a critical scale and attract software application developers, it then charges end-users for some of these applications. Determining whether these strategies are anti-competitive is a sensitive issue. The usual tests concerning predatory practices, which are aimed at determining whether a dominant company is charging prices lower than the variable cost of its product, in order to oust competitors incapable of withstanding these types of aggressive pricing strategies, are as such difficult to apply to multi-sided models. In most cases, the absence of any charge on one side of the platform is aimed at giving rise to network effects, rather than driving competitor companies out of the market. Where indirect network effects are present, subsidising one side of the market constitutes an optimal practice, when the latter exercises an externality of attraction on the other side, or is characterised by greater elasticity of demand.

The presence of exclusivity agreements on two-sided markets provides another example of strategies that may prove to be pro or anti-competitive, depending on the particular set-up. Paradoxically, when platforms attach certain actors exclusively to themselves on one side of the market, they promote differentiation of services, which prevents excessive concentration. For example, exclusive referencing of certain hotels on certain reservation platforms could enable the maintenance of several competing platforms on the market, rather than concentration in favour of a single platform. However, everything depends upon the dosage: an excessive number of exclusivity agreements, entered into by a dominant platform, may also prevent new actors from entering the market and expanding.[32]

Competition law provides the necessary tools for understanding anti-competitive practices that may be implemented by digital companies. Its concepts are transverse and sufficiently powerful to identify abusive behaviours. Its means of financial penalties are applicable. Behavioural and structural measures likely to correct situations of interference with competition can be designed in a pertinent manner. Admittedly, it may prove necessary to adapt certain tests to the digital economy's specific characteristics. For example, in order to analyse whether services provided "free of charge" are anti-competitive in

[29] When products from different companies are compatible, the granting of a reduction in a product's price by one company will be to the advantage of another company providing a compatible product. This therefore discourages the first company from lowering its prices, since the effects of this strategy cannot be completely internalised.

[30] Whereas it is easy for a consumer to consult the services of several hotel reservation platforms (multi-homing), the cost of mobile phones discourages people from owning more than one (single-homing). These two situations have different properties in competition terms. See for example Pil Choi J. (201à): "Tying in Two-Sided Markets with Multihoming", *The Journal of Industrial Economics,* vol. 58, no 3, pp. 607-626, September.

[31] Eisenmann T.R., G. Parker and M.W. Van Alstyne (2006): "Strategies for Two-Sided Markets", *Harvard Business Review*, October.

[32] This was the criticism addressed at Vente-privée.com by one of its competitors in the field of online "flash sales". Although the competition regulator (*Autorité de la concurrence*) did not accept the allegation of abuse of a dominant position, it nevertheless noted that Vente-privée.com was not in a position to justify the existence of the disputed exclusivity clauses for a period longer than sixteen weeks (see ruling 14-D-18 of 28th November 2014).

character, the "predatory pricing tests" that are usually implemented need to be revised, so as to take the two-sided character of these platforms' activities into account. However, this does not call the pertinence of the concept of predatory pricing into question, nor the customary need for competition regulators to set out an appropriate anti-competition theory of harm, explaining the strategy followed by the company and the effects its upon competition.

On the other hand, the customary –legal and economic– competence to be found within competition regulators does not necessarily provide the most suitable means of examining whether the results of Internet searches displayed by search engines are biased or whether data collected on users is being used for the purposes of anti-competitive strategies. Equipping competition authorities with the required technical skills, for example in the field of data processing and analysis, would enable them to extend their analyses more easily to all fields of the digital economy.

The data question

The collection of data on individuals' behaviours and centres of interest improves the quality of services provided. Better targeting of commercial offers on the basis of the preferences revealed by users is a source of savings on research costs for buyers and on canvassing costs for sellers, which increases the quality of matching of supply and demand. For this reason, operators may use their client base for the purpose of cross-selling, by using data collected on their clients or users in order to sell another product or service to them. Intermediary marketing activities are also optimised by means of the collection and processing of personal data. For example, services based upon geolocation (searches for hotels and drivers) enable optimised matching of supply and demand by collecting data on users' consumption habits. Apart from the provision of services properly speaking, platforms also create wealth by enabling the collection of a considerable mass of data, which can be put to profitable use on various different markets.[33]

From the point of view of competition, personal data plays an ambivalent role. It constitutes special information which may be monopolised by private enterprises and block entry to new competitors. This is all the more true in cases where users prefer to belong to a single platform (single-homing), behaviour which the platforms moreover encourage by various different means such as loyalty programmes. Development of the portability of users' personal data is a promising lever for the regulation of these situations. Personal data can also be used in the public interest. For example, in the health sector, Internet users' searches indirectly reveal information about their state of health, age, concerns and location: this data can be used by the public authorities in order to detect epidemics and the appearance of certain illnesses. Finally, digitalisation of personal data may serve the interests of the persons concerned, in particular when it makes it possible to reveal certain positive behaviours: drivers documenting their good behaviour behind the wheel, loan applicants making known their rigour in the management of their bank account.

Observation 3. In order to prevent problems of competition connected to the digital economy, it is essential to monitor switching costs and strategic use of the provision of services free of charge, exclusivity agreements and data portability. Additional competences would be useful to competition regulators in order to enable them to fulfil their role.

The digital economy and employment

The development of the digital economy tends to lead to the disappearance of certain professions.[34] This phenomenon takes *several different forms:*

- The automation of certain tasks (in particular the most "routine" tasks):[35] this concerns the manual and office work professions and, increasingly, the retail and customer service professions (increasing automation of bank branches and of reception in metro stations);
- Learning: with the development of artificial intelligence, and learning algorithms in particular, automation is beginning to affect more qualified professions, such as lawyers and doctors, which are based upon the command of wide knowledge bases;
- Reliance on end-users: digital technologies make it possible to equip users with the tools required to perform certain tasks themselves, causing the corresponding professions to disappear (for example, online purchases have an impact upon the sales profession in shops);
- Reliance on the multitude: in certain cases, production is taken care of by the mass of Internet users rather than by the actual consumers. Individuals' "unpaid work" tends to drive out certain professions (travel guide editors driven out by TripAdvisor, encyclopaedia editors by Wikipedia, and even journalists driven out by bloggers);
- Competition from amateurs: digital technologies make it possible to equip individuals, enabling them to provide products that are often less expensive and of higher quality than those offered by professionals (for example, AirBnB enables a mass of amateurs to directly compete with professional hotelkeepers).

[33] In 2012, Facebook collected 2.45 billion different new contents every day.

[34] Rotman D. (2013): "How Technology is Destroying Jobs", *MIT Technology Review*, no 12, June.

[35] This is used to mean tasks that may be described as the application of a well-defined series of rules which can therefore be encoded in the form of an algorithm and then executed by a computer or robot.

There are therefore increasing concerns with regard to digital technology's effects upon employment. Certain regulated professions are threatened in the face of the arrival of new actors: taxi drivers, booksellers and hotel keepers join forces to denounce risks hanging over them caused by the digital economy and to protect themselves against what is often described as "unfair competition". "Routine" professions, which for the most part correspond to intermediate professions in terms of income distribution, are becoming rarer due to automation. These jobs (manual and office workers, etc.) are exercised by a particularly numerous and emblematic group of the workforce: middle-class workers, for the most part employees –the very group that constitutes the heart of our social model and dominates our social representation of the world of work.

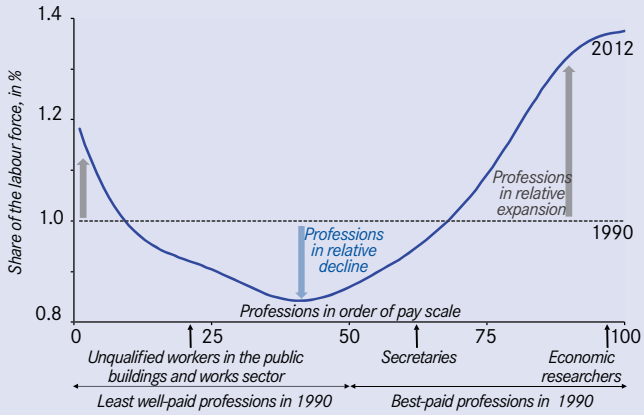
Transition to digital technology and polarisation of the labour market

Employment in the digital economy is not exclusively reserved to IT engineers; it also includes passenger car drivers, employment in online sales logistics, private individuals providing tourist services, repair work, etc. It does not therefore exclude a productive fabric of less qualified workers. On the other hand, it tends to shift routine professions, which can easily be automated, towards tasks based upon human interaction, for which robots and computers do not provide good substitutes.

This results in polarisation of the labour market. While intermediate professions, located in the middle of the wage range, tend to become rare, the digital economy principally creates two categories of jobs: on the one hand, well-paid jobs, with a managerial or creative dimension, requiring high qualifications; on the other hand, non-routine jobs requiring few qualifications, largely concentrated within personal services, which are low-paid since their productivity remains low.

This phenomenon can be seen in all of the advanced economies.[36] In France, there has been an observable reduction in the proportion of intermediate socio-professional categories in the working population since 1990, and a corresponding increase in very highly-paid and low-paid categories. This "U curve" is the characteristic signature of the polarisation phenomenon (graph 2). However, France is distinguished by its difficulty in creating low-qualified jobs: half of the difference in the employment rate between the United States and France is explained by a deficit in employment in commerce and the hotel and catering business, sectors requiring a large workforce with low qualifications. The reasons are well-known: in spite of constant policies aimed at reducing the cost of labour, at the guaranteed minimum wage (SMIC) level it remains high for companies (in particular in zones with lower productivity), while labour law makes the recruitment of staff on permanent employment contracts (*contrat à durée indéterminée*, CDI) a risky decision, in particular in the case of unqualified and inexperienced workers.

2. Polarisation of the labour market in France
1990-2012



Interpretation: Between 1990 and 2012, the proportion of the least well-paid professions within the labour force increased by 1.2 percentage points; that of professions paid at a median level fell by 0.85 percentage points; while the most well-paid professions increased by 1.4 percentage points.

Source: Catherine S., A. Landier and D. Thesmar (2015): *Marché du travail : la grande fracture*, Institut Montaigne, February.

Digital technology and the revival of self-employed work

Low-qualified work in the digital economy often takes the form of freelance activity rather than salaried employment. For example, this is the case for passenger vehicle drivers: each "micro-entrepreneur" is independently connected to the platform, where they develop an individual reputation for the quality of their service. While the proportion of non-salaried workers within employment as a whole had been in decline since the 1970s, it has been recovering since 2001 (graph 3). The success of *auto-entrepreneur* status, which 33% of the self-employed persons concerned combine with salaried employment,[37] bears witness to this change. The digital economy encourages the emergence of freelance work for several reasons. Outsourcing is easier both for companies, because of the reduction in transaction costs,[38] and workers, for whom the cost of the assets required for the exercise of their profession has been greatly reduced. The possibility of direct matching with clients via platforms enables freelance workers to have the

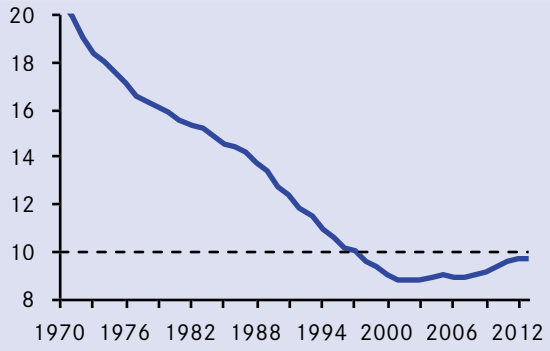
[36] Between 1993 and 2010, the proportion of intermediate jobs in employment as a whole fell by 8.6% in France, 10.9% in the United Kingdom and by as much as 14.9% in Ireland according to Goos M., A. Manning and A. Salomons (2014): "Explaining Job Polarization: Routine-Biased Technological Change and Offshoring", *American Economic Review*, vol. 104, no 8, pp. 2509-26.

[37] 982,000 registered at the end of 2014, of whom 58.5% were economically active, ACOSS (2015): "Les auto-entrepreneurs fin 2014", ACOSS Stat, no 214, July and Omalek L. and L. Rioux (2015): "Panorama de l'emploi et des revenus des non-salariés », *INSEE Références* 'Emploi et revenus des indépendants'.

[38] Companies exist in order to reduce contractual costs: when these costs fall, the justification for certain exclusive relationships within the same organisation is also reduced. See Coase R.H. (1937): "The Nature of the Firm", *Economica*, vol. 4, no 16.

benefit of flexible working hours and to combine several activities. The organisational advantage possessed by wage-earners is weakened by the personalisation of service providers' reputations (sole proprietorships naturally provide higher performance motivation).[39] Finally, in the case of France, auto-entrepreneur status constitutes a simple and fiscally attractive alternative.

3. Proportion of self-employment within jobs as a whole, in % (excluding supplements to employment)



Source : INSEE.

This revival of freelance work and the emergence of multiple activities constitute a challenge for a social model geared towards the predominance of wage-earning. Access to housing and the credit market is more difficult for workers who are not on permanent employment contracts, even when their incomes are not uncertain. It may also be feared that the new self-employed workers will fail to save enough of their earnings through short-sightedness or lack of information on the levels of pension to which they are entitled within the framework of their retirement schemes. Unlike the traditional self-employed professions (shopkeepers, private doctors, taxi drivers, etc.) digital self-employed workers do not tie up any assets, such as businesses or taxi licences, in the course of their careers. In the absence of this means of personal savings, the arrival of this population at retirement age may reveal totally new economic difficulties.

Observation 4. The digital economy gives rise to structural changes in the distribution of employment between low-skilled, intermediate and high-skilled jobs; it has brought the long-term rise of the wage-earning workforce to an end, posing new challenges in terms of regulations and the social welfare system.

Recommendations

The above observations suggest that a policy for developing the digital economy in France above all needs to be aimed at levelling-out the difficulties encountered by digital companies: complexity of regulations, barriers of entry to markets and difficulties encountered by the development of new forms of employment.

Innovation in terms of regulation and competition policy

Until now, the possibility of established companies' positions being challenged by new companies was dependent upon the capacity of competition law to ensure compliance with the rules of competition. In order to ensure the permanence of this favourable environment for competition, we believe that it would be counterproductive to put specific regulations in place for the digital sector.

Indeed, the build-up of sectoral norms, creating threshold effects and negative incentives, is a major obstacle to the development of the French economy, identified in numerous reports.[40] The temptation to resort to sectoral measures of this kind, liable to quickly recreate barriers to entry and ineffective protective mechanisms, needs to be resisted. Since all sectors are eventually destined to be transformed by digital technology, it is in any case futile to attempt to define a "digital" sector.

Recommendation 1. Avoid creating a "digital sector" to which special measures would apply, whatever the boundaries thereof.

Sectoral regulations as a whole need to be rendered more dynamic and conducive to digital innovation. One way of introducing greater plasticity into sectoral regulations would be to put in place a right to experimentation. Every day, digital start-up companies put forward commercial and technical innovations which have not yet been tested, thus disrupting existing balances. It is desirable to avoid preventing the development - or even experimental development - of models that meet with public demand and enable France to promote the full growth of digital companies.

Measures in favour of experimentation, which could be looked into by a Government-appointed expert commission, could take several different forms:

- Encouragement of experimentation in certain territories, at the initiative of local authorities. The labelling of French Tech urban areas [recognised for their start-up ecosystems] could lead to the identification of territories in which experimentation possibilities are matched with innovation efforts on the part of entrepreneurs in specific sectors. Experimentation with models that depart from existing regulations (taxis, driving schools, etc.) could be systematically authorised

[39] Ashton D. (2015): *The Case Against Full-Time Employees*, August, available on www.linkedin.com/pulse/case-against-full-time-employees-dave-ashton

[40] See Attali J. (Pres.) (2008): *Rapport de la Commission pour la libération de la croissance française*, La Documentation française, or OECD (2014): *France. Les réformes structurelles : impact sur la croissance et options sur l'avenir*, OCDE Report, October.

for limited periods, in compliance with personal safety. In the United States, certain States' initiatives aimed at facilitating experimentation with new technologies and new business models play a key role in the launch and growth of digital companies;

– A transverse mechanism, similar to fair use in the American intellectual property system, which would enable entrepreneurs to experiment with innovative business models[41] under certain conditions: stage of getting business off the ground, small scale of operation, strict compliance with safety rules, use of appropriate insurance and, above all, open access of data arising from their activities;

– Because of their digital nature, these businesses give rise to the production of voluminous data flows and can even be observed in real-time: when made available to the authorities, this data can therefore shed light upon any subsequent legislative and statutory changes, by means of assessment research (or even as open data).[42]

Recommendation 2. Introduce a right to experimentation for innovative companies, accompanied with an obligation to provide the data required for their assessment.

In order to reduce switching costs, which constitute an obstacle to competition between closed systems, the development of data portability is one solution, as proposed by the Lemaire Bill. Internet users who have purchased contents (music, application programs, etc.) in one ecosystem should thus be able to simply transfer them to another ecosystem. However, we recommend going further. Data thus represents a form of professional qualification (for example, the scores given to drivers by their clients on Uber), which could simplify requirements in terms of professional qualifications: instead of a qualification or examination, it is possible to recognise user satisfaction. It should be possible for micro-entrepreneurs to use scoring of this kind in their subsequent professional (access to other jobs) or non-professional (access to credit and housing) paths; this requires data portability to be coupled with the possibility of authentication thereof by third parties (as in the case of qualifications).

Recommendation 3. Develop data portability in all sectors and design authentication mechanisms for individuals wanting to use them.

Competition regulators are already equipped with digital search resources enabling them to conduct competition investigations in a world in which communications between companies are for the most part paperless. In order to effectively control behaviours connected with digital technology, they need to have the technical skills (computer scientists, data scientists, etc.) at their disposal required for the detection of anti-competitive behaviours linked to data collection and distortions arising from the operation of algorithms.

Recommendation 4. Give competition regulators the human and technical resources required for the conduct of pertinent investigations within the digital economy.

Promoting job creation potential within the digital economy

The changeover to the digital economy polarises the labour market and promotes self-employment. In this situation, how can job creation potential be optimised? In France, low-qualified work in the digital economy is based upon auto-entrepreneur status. This status has been met with great success but is subject to criticism; some criticise it for unfair competition with entrepreneurs having ordinary legal status; others deplore its low ceiling (32,900 euros exclusive of tax for activities providing services within the framework of the micro-enterprise system), and difficulties in adopting a different status when the ceiling is reached. In the face of these criticisms, we consider it important to ensure the permanence of auto-entrepreneur status while reducing the fiscal distortions connected with it.

Recommendation 5. Bring auto-entrepreneur status into general use and establish its permanence, while reducing fiscal distortion. Facilitate the changeover to other legal forms of activity.

In particular, this means:

– Facilitating, rather than hindering the use of auto-entrepreneur status. The Pinel Act (*loi Pinel*)[43] undermined the system's simplicity and needlessly exposed auto-entrepreneurs to corporatist barriers (obligation to register in the trades register (*répertoire des métiers*) or trade and companies register (*Registre du commerce et des sociétés*), abolition of exemption from the obligation to complete a preparatory training course before setting-up business). Conversely, it is appropriate to facilitate the adoption of this status and enable its combination with other forms of employment, inclu-

[41] See Benkler Y. (2011): "Growth Oriented Law for the Networked Information Economy: Emphasizing Freedom to Operate Over Power to Appropriate", *Rules for Growth: Promoting Innovation and Growth Through Legal Effort*, Ewing Marion Kaufman Foundation.

[42] See Grossman N. (2015): *White Paper: Regulation, the Internet Way. A Data-First Model for Establishing Trust, Safety, and Security | Regulatory Reform for the 21st Century*, Mimeo.

[43] Act concerning the skilled trades, commerce and very small enterprises (*Loi relative à l'artisanat, au commerce et aux très petites entreprises*), *Journal officiel* of 19th June 2014.

ding in the civil and local government service. In order to do away with competition with other forms of individual entrepreneurship, the tax and social security systems applicable to auto-entrepreneurs could be made accessible to all with regard to the part of turnover coming below the ceiling;

- Reducing the fiscal distortion connected with micro-entrepreneurs' exemption from VAT by creating a tax levied on sales at a low rate.[44] Micro-entrepreneurs would pay this tax back along with their social security contributions (the latter also being proportional to turnover), still comprising a single payment but at a higher rate. In order to further facilitate auto-entrepreneurs' activities and fight against fraud, intermediary platforms could take care of the whole of their taxes and social security contributions, which would then be paid at a standard rate in full discharge of their tax obligations;
- Reducing the frictions resulting from threshold effects by entrusting the tax and social security administrations with the task of deploying software infrastructures, accessible via Application Programming Interfaces (API). When auto-entrepreneurs exceed the applicable thresholds, these APIs would enable them to change over to a more suitable business status in a fluid manner by means of specialised accounting application programs (operated by the collaborative economy's platforms or by third parties), without increased administrative complexity.

Facilitating life for the self-employed also means improving access to housing, credit and savings schemes similar to those enjoyed by employees. The portability of data (including bank data in particular) in a standard format, see recommendation 4, would constitute a breakthrough innovation: it would enable private-owned companies to establish credit risk scores, capable of being automated, for self-employed persons upon the basis of their business and payments history, and therefore reduce the information asymmetry that closes the housing and credit markets to persons not holding permanent employment contracts. Intermediaries providing guarantees, including the collaborative economy platforms themselves, could develop upon the basis of this data. This would provide a private alternative to the positive record which, presented as a means of curbing debt rather than a tool for promoting access to credit, it has unfortunately not been possible to establish in France.[45]

As mentioned above, micro-entrepreneurs in the digital economy are rarely led to invest in working tools whose resale would constitute retirement savings for them (contrary to traditional self-employed professions). It is therefore not only necessary to inform them of the need to save, but also to provide them with a simple, tax-effective and easily-movable personal savings scheme, combined with a system of calculation of their future pensions. The social security administrations could deploy the necessary software infrastructures, also accessible via APIs, so that operators (collaborative economy platforms or specialised third parties) can promote these schemes for micro-entrepreneurs and operate them on their behalf.

Recommendation 6. Create a micro-entrepreneurial savings scheme, modelled on an employee savings schemes.

Conclusion

Although France has fallen behind in the field of the digital economy, it has good assets which can be put to advantage (demand, open data access and auto-entrepreneur status). By making life easier for entrepreneurs and showing greater flexibility in terms of sectoral regulations, it has the potential to become one of the world leaders in the field.

[44] This tax would be deductible for the buyer on the condition of the micro-entrepreneur having a VAT number.

[45] In countries like the United States, the FICO score structures access to the credit and housing markets by enabling individuals, even those with low incomes, to provide proof that they have regularly paid their rent and bills in the past.