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Globalization and E-commerce: The French Environment and Policy

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SUMMARY

- According to most indicators, the use of the Internet and the development of e-commerce (over the Internet) in France are below the level that should be reached given the French level of development.
- This can be explained by the late adoption of digital technologies by the French. However, the French lateness is less important for professional uses than for domestic uses. France began to catch up with pioneering countries during 1999-2000, but the Internet bubble reduced the pace of adoption.
- The French late adoption of digital technologies is partly due to the strong involvement of France in the development of two pre-existing technologies: the Minitel (principally dedicated to B2C) and EDI (dedicated to B2B). Both technologies provided the users with a sufficient level of service to support their business processes, but hindered their propensity to switch to new Internet-based technology. Consequently, most available indicators underestimate the actual level of e-commerce in France, especially the French business readiness to switching to Web-based commerce.
- The late adoption of technology was not the only inhibitor for e-commerce. In France's recent economic history, decisionmakers focused for too long on other issues. France had to adapt its economy and its industry to a competitive and global environment. Since the State played a strong role in an economy that was not widely open to competition, a wide set of reforms had to take place between the mid-1980s and the late 1990s.
- However, this restructuring policy prepared France for the adoption of e-commerce. as France was transformed into a service economy. Most organizations became more flexible by externalizing non-core activities and by implementing modular principles of organization. French companies went international as well. This new business climate favored the adoption of e-business and e-commerce practice by the end of the 1990s.
- When macroeconomic and industrial restructurings were achieved, the French government launched a strong information society policy. Since 1998, the government has been furthering the deregulation of telecommunication services, reshaping the legal framework to adapt to digital technologies, promoting IT training and innovation, and developing e-government.
- These policies were both a component of and aligned with the year 2000 e-Europe initiative of the European Union (EU), which promoted the development of a strong digital economy. Specific support programs (in R&D and development of content) were combined and an intensive effort for legislation and inter-member benchmarking occurred (to stimulate member states to align on the most advanced state), the Commission and the Council of the EU tried try to stimulate development of a dynamic digital industry in Europe, and to boost the adoption of digital technologies and the new-methods of work and business enabled by them.
- While the European and the French policies had a significant impact on the adoption of digital technologies and e-commerce development, they were insufficient to really enable France to catch up. The bursting of the Internet bubble slowed the pace. Moreover, B2C e-commerce was inhibited by the efficiency of the French distribution system that serves at a low cost alternative to the Internet for most of the population. The existing installed base of EDI, especially in the automobile and distribution industries, inhibits B2B e-commerce over the Internet. Consequently, the French e-commerce path of development is unique since it

relies less on the Internet than in many other countries. Despite these inhibitors, France is adopting digital technologies and related practices at a higher pace than the other European countries.

- Within France, e-commerce is quite contrasted in the various regions and industries. The Paris area (one-fifth of the French population), the IT industry, the professional services and distribution industries, and large companies are as intensively digitized as most advanced countries, industries and companies worldwide. However, many regions, industries, and SMEs remain archaic. This digital divide is a major inhibitor to the generalization of e-commerce practices, because it prevents France from benefiting from strong potential network externalities.

INTRODUCTION

While France is one of the most developed countries in the world, and it has a tradition in developing and using ITs (especially telecommunications technologies), most international comparisons point out that the use of PCs and the Internet in France is much less intensive than in countries with the same characteristics. This has a strong impact on e-commerce based on the Internet.

The early and wide adoption of alternative technologies (the Minitel and EDI) partly explains this (Brousseau, 2001). Since these technologies are still widely used, the French intensity of use of digital technologies is usually underestimated. Moreover, the in-depth implementation of these technologies in the economy and in the population delayed the adoption of the Internet. However, other factors contribute to the specific French path of evolution toward the digital economy.

Two major factors are highlighted in the paper.

- First, France's low rate of e-commerce adoption is due to the late adoption of the technologies. Until the very late 1990s, the digital revolution was not identified as a priority by most governmental and business decisionmakers, because France had to modernize its economy before going digital. While investment in ITs was not neglected, the priorities were clearly to deregulate, to go international, and to re-engineer the business process and organizations. This late take off would not have prevented a French catch-up if the bursting of the Internet bubble had not dried up the capital market and ruined enthusiasm.
- Second, many inequalities generate digital divides among the most educated and the less, the Paris region and the French "provinces", large firms and SMEs, modern and archaic industries. These divides are clearly inhibitors of e-commerce since they check adoption of both digital technologies and e-commerce. Since many potential users and businesses cannot interact digitally with others that are not digitized, many decide to delay adoption.

Both factors are not barriers to e-commerce practices; they are inhibitors, which explains why France is still behind. However, some positive factors have developed.

- First, the French production system is now composed of firms and industries whose organization allows the implementation of e-business and e-commerce practices. Innovation capabilities have been reinforced especially in ITs. Moreover, France benefits from digital skills both in terms of IT production and use. It has a tradition in producing efficient telecommunication equipment and services, as well as software. The early diffusion of on-line services, both in businesses and in the public; the generalized use of smart-cards and mobile phones by the public; and the relatively high-rate of use of EDI and on-line information exchanges by businesses combine to create a climate that is favorable to the development of e-commerce.
- Second, the French economy is now quite liberalized and open to foreign competition. Business decisionmakers are aware of what is happening abroad and seek to implement similar business processes in France.

- Third, the enabling infrastructure for e-commerce is there. France benefits from an excellent logistic, legal, and business services infrastructure. Most of the barriers that made Internet access scarce and costly (by 1997) have now been removed. There are also a few French firms that have developed viable (and sometimes profitable) e-commerce operations. In many cases, e-commerce companies are subsidiaries of retail chains that are quite successful in the global market.
- Fourth, the central government, which has a strong influence because of the importance of the state in the national economy, and because of the centralization of the country, implemented a strong policy to boost the development of a French information society and digital economy. This policy was reinforced by the European policy aimed at sustaining the development of a unified and dynamic European digital arena.

NATIONAL ENVIRONMENT

Population and Demographics

Population, Urbanization and Population Density

France is one of the four most populated countries of the EU (Table 1). As most European countries, its population is rather stable, mostly urban, and well-educated. Due to a higher rate of fertility and immigration, it is slightly younger than the average EU member. However, with the extension of life expectation, the aging population is following the European trend (Table 2). Due to its agricultural tradition, a greater share of the population still lives in rural areas as compared to other EU countries with the same level of development (Table 1). However, most of the French population lives in quite densely populated areas.

Table 1 points out that there are huge differences among European countries. First, there is a sizeable gap between large and small EU-members. The big five (Germany, U.K., France, Italy, Spain) are 4 to 10 times more populated than the small countries and there are no mid-size countries. This suggests that many figures are simply not comparable since several smaller countries are less populated than several large cities in the big five. Moreover, it is clear that large countries are less homogeneous (in terms of population characteristics, social and economic structures) than smaller ones. Therefore, comparisons among the figures of large and small countries have therefore to be interpreted cautiously.

In addition, it has to be pointed out that the urbanization intensity is significantly higher in northern Europe than in southern Europe (Germany and U.K., vs. France, Spain and Italy). This is also true for the level of development (see GDP per capita, Table 15). However, while France is clearly a Mediterranean country in terms of urbanization, it is clearly a more northern country in terms of development. This explains why many French figures reach the average European figures; France stands as a kind of intermediary country among the Northern and Southern European blocs.

TABLE 1
Demographic Overview and Urbanization

Demographics	Population 2000[a]	Urban population (% of total) 2000[b]	% over age 65 1999[c]	% under age 15 1999[c]
Germany	82,175,800	87.50	15.84	15.66
United Kingdom	59,766,000	89.50	15.74	18.79
France	58,800,000	75.60	15.65	18.89
Italy	57,298,000	67.00	17.22	14.51
Spain	40,600,000	77.60	16.46	14.85
Poland	38,765,000	65.60	11.82	20.09
Netherlands	15,956,566	89.40	13.55	18.25
Greece	10,645,000	60.10	17.32	15.56
Czech Republic	10,244,000	74.70	13.56	16.90
Hungary	10,228,000	64.00	14.40	17.25
Belgium	10,161,000	97.30	16.36	17.41
Portugal	10,020,000	64.40	16.00	17.04
Sweden	8,880,532	83.30	17.20	18.88
Austria	8,211,000	64.70	14.97	16.97
Switzerland	7,164,400	67.70	14.97	17.07
Denmark	5,330,020	85.30	14.45	18.23
Finland	5,176,000	67.30	14.59	18.54
Norway	4,485,000	75.50	15.40	19.58
Ireland	3,730,000	59.00	11.17	21.56
United States	275,129,984	77.20	11.85	21.20
Scandinavia[d]	23,871,552	78.81	15.75	18.61
European Union[e]	376,749,918	79.54	15.97	16.83
OECD[f]	1,115,304,202	77.55	12.63	20.43

[a]*Source:* International Telecommunication Union, Yearbook of Statistics 1991-2000. Geneva: International Telecommunication Union, 2001. The data for population are mid-year estimates.

[b]*Source:* World Bank Group, WDI Data Query located at http://www.devdata.worldbank.org/data-query/. WDI definition: urban population is the midyear population of areas defined as urban in each country and reported to the United Nations. It is measured as a percentage of the total population.

[c]*Source*: World Bank, World Development Indicators CD-ROM 2001.

[d]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark, and Finland.

[e]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

[f]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia, and Iceland.

TABLE 2
Evolution of the Age Distribution

	1995	1996	1997	1998	1999	2000[p]	2001[p]
Population	57,752,535	57,935,959	58,116,018	58,298,962	58,496,613	58,744,113	59,039,713
< 20 Years	26.1	26.0	25.9	25.8	25.7	25.6	25.4
20Y<x<64	58.9	58.7	58.6	58.5	58.4	58.4	58.5
> 65 Years	15.0	15.3	15.5	15.7	15.9	16.0	16.1
< 15 Years	19.6	19.4	19.2	19.0	18.9	18.9	18.8
> 60 Years	20.1	20.2	20.4	20.5	20.6	20.6	20.6

[p]Stands for provisional
Source: INSEE, 2002, (www.insee.fr).

These various elements of population and urbanization are both drivers and inhibitors to e-commerce:

- The aging population could be a strong support for the development of on-line services. However, the low digital literacy of the elderly does not encourage the development of such services.
- The relatively high-share of youth in the total population also could have a positive effect, since it is the most digitized part of the population. However, French youth remain less intensively trained in ITs than their foreign counterparts (Table 45) even if governmental actions are beginning to fill this gap (Table 44).
- The relatively lower overall density of the French population could also have a positive impact on the demand for on-line services and remote commerce systems. Most French live in quite dense areas, but the majority of households do not have access to the Internet (Figure 4). The French distribution system is based on efficient supermarket and specialty store networks, (Brousseau, 2001), so the incentive to buy on-line is not very strong. In addition, since the population remains less urbanized overall than in many other European countries, the cost and the delay to implement a high speed digital network that would cover most of the population is significantly higher than in many European countries.

Economy

GDP & Economic Growth

France's macro-economic climate has to be linked with the radical liberalization of the economy that has occurred since 1983. Prior to then, the French people believed in strongly "administrated" market economies. In addition to a dense web of regulations, the government directly operated the economy through public expenditures, large state-owned companies, and systematic arbitration of conflict. The peak of this trend was the 1981-1983 period when the French Socialist Party came to power. In 1983, however, the French Socialists made a radical ideological change and became social-democrats. Since then, the French elite—whether "liberal" or "social-democrat"—has been conducting a policy of liberalization of the French economy aimed at enabling France to compete more efficiently in the European integrated market, and more generally in the global economy.

This led to a cut in subsidies to support specific business, deregulation, privatization, and economic restructuring. The European integration process was a major driver for this evolution. The French economy had to be liberalized because of the single market policy (achieved in 1992). The process of deregulation of network industries and privatization of former monopolies is still on its way in the last highly regulated industries (electricity and railways). The government had to strongly reduce its level of direct intervention into the economy both because of the emergence of a strong anti-trust regulation at the European level (that forbid public subsidies that distort competition) and because the goal of developing a single currency (achieved in 2001) imposed strong public budget constraints.

The liberalization process of the French economy led to a wide re-engineering of French industry. Focused on the management of organizational change to adapt firms, industries, and the workforce to enable them to face a new competitive environment. French decisionmakers did not

identify the coming digital revolution early enough. This partly explains why France took off quite late (Brousseau, 2001).

At the same time, this policy was a prerequisite to enable France to be competitive in the global economic arena. As pointed out in Table 3, French exports grew at a stronger pace than imports in the last 20 years, enabling the trade balance to become structurally positive. This is the main proof of the enhancement of the competitiveness of "France Inc.".

TABLE 3
The French GNP Structure

Billions of Euros	1980	1990	1995	1996	1997	1998	1999	2000
Resources								
GDP	878.1	1,121.0	1,181.8	1,194.9	1,217.6	1,259.1	1,295.8	1,335.9
Importation	142.6	211.7	249.8	253.8	271.2	302.6	317.0	362.1
Uses								
Households Consumption	505.7	627.5	649.0	657.3	658.2	680.7	699.7	717.4
Public Current Expenditures	192.2	251.5	282.2	288.6	294.7	294.3	300.3	306.8
Non-Profit Organizations Expenditures	4.1	5.2	7.0	7.2	7.4	7.6	8.0	8.3
Investment	174.1	236.1	222.1	222.1	221.9	237.4	252.2	267.6
Net Acquisitions of Stocks	0.6	0.9	0.9	0.9	1.0	1.2	1.3	1.3
Inventories Variations	6.9	5.6	4.4	-2.6	-2.0	7.4	5.0	0.0
Exportations	134.8	205.6	266.0	275.2	307.7	333.3	346.6	390.2
Total	1,015.3	1,332.1	1,431.6	1,448.6	1,488.9	1,562.0	1,613.0	1,697.2

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

Restructuring the French economy was also an effort to make the economy more dynamic. France is today one of the European countries that enjoys steady growth (Table 5). While growth reduced for the year 2001 in all the western economies, France was one of the countries that benefited from the lighter recession. This is due to the strength of domestic demand (Tables 3 and 4), especially household consumption and business investments, which have been quite dynamic since 1998.

TABLE 4
The French GDP Growth Broken up by Macroeconomic Categories

In point of GNP	1995	1996	1997	1998	1999	2000
Households Consumption	0.7	0.7	0.1	1.9	1.5	1.4
Public Current Expenditures	0.0	0.5	0.5	0.0	0.5	0.5
Investment	0.4	0.0	0.0	1.3	1.2	1.2
Including Business Investments	0.2	-0.1	0.0	0.9	0.6	0.8
Trade Balance	0.0	0.4	1.3	-0.5	-0.1	-0.1
Including Exportations	1.7	0.8	2.7	2.1	1.0	3.3
Including Importation	-1.6	-0.3	-1.5	-2.6	-1.1	-3.4
Inventories Variations	0.6	-0.6	0.0	0.8	-0.2	0.1
GDP	1.7	1.1	1.9	3.4	2.9	3.1

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

Frances's increasing international competitiveness combined with healthy growth based on a strong domestic demand, can be interpreted as the result of the French restructuring policy that allowed significant productivity gains in the second part of the 1990s (Table 6). As compared to the other large European countries, France is today the nation that enjoys the more healthy and

dynamic economic climate. While the mid-1980s and the first half of the 1990s were characterized by "austerity" policies resulting in a depressed economic climate, the "dividend" came in the late 1990s.

This macroeconomic climate explains the late French takeoff in the digital economy and the vigor of the catch up efforts. Until 1998, the ability of French firms (and households) to invest in digital technologies was low (weak final demand, depressed investment). Moreover, productivity gains were primarily identified as deriving from industrial restructuring and organizational re-engineering. It did not incite households and businesses to go digital. Since then, firms that are more efficient invested in digital technologies and e-commerce because these technologies and the related business practices became the new drivers of productivity gains (Tables 6 and 28).

TABLE 5
Quarterly Growth Rates in GDP at Constant Prices

	1999 Q4	2000 Q1	2000 Q2	2000 Q3	2000 Q4	2001 Q1	2001 Q2	2001 Q3	2001 Q4
U.S.	2.0	0.6	1.4	0.3	0.5	0.3	0.1	-0.3	0.3
Japan	-1.3	2.0	0.8	-0.7	0.3	1.0	-1.2	-0.5	-1.2
Belgium	1.8	0.2	1.0	0.8	0.9	0.2	-0.5	0.0	-0.2
Denmark	1.5	-0.2	1.6	0.3	0.8	-0.5	0.4	0.5	0.2
Finland	1.5	2.1	0.9	1.6	0.7	0.0	-1.8	1.4	-0.5
France	1.2	0.8	0.9	0.6	1.0	0.4	0.2	0.5	-0.1
Germany	0.8	1.0	1.2	0.1	0.2	0.4	0.0	-0.2	-0.3
Italy	1.0	0.8	0.3	0.5	0.8	0.8	0.0	0.1	-0.2
Netherlands	1.3	0.8	0.6	0.5	0.7	0.0	0.3	0.0	0.0
Spain	1.1	1.2	1.0	0.4	0.8	1.0	0.2	0.9	0.2
Sweden	1.1	0.8	1.2	0.6	0.3	0.4	0.0	0.1	0.3
U.K.	0.8	0.4	0.8	0.9	0.6	0.7	0.5	0.4	0.1

Source: OECD, Quarterly National Accounts Database, 2002, www.oecd.org

TABLE 6
Trends in Multi-factor Productivity Growth[1, 2] 1990-95 and 1995-99
Business Sector, Percentage Change at Annual Rates

	1990-95	1995-99
Finland	3.0	3.6
Denmark	1.5	1.5
Netherlands	1.9	1.5
Sweden	1.3	1.3
United States	1.0	1.2
France	0.9	1.1
Germany	1.1	1.1
United Kingdom	0.8	1.0
Japan	1.3	0.9
Italy	1.2	0.8
Spain	0.9	0.5

[1]Adjusted for hours worked, based on trend series and time-varying factor shares.
[2]Series end in 1997 for Belgium and Italy; 1998 for Denmark, France, Japan, Netherlands, and U.K.; data for Germany starts in 1991.
Source: OECD calculations, based on data from the OECD *Economic Outlook No. 68.* See S. Scarpetta et al., Economics Department Working Paper No. 248, 2000 for details; May 2001.

Despite this recovery, the French growth remained behind the average European growth in the second half of the 1990s. This partially explains why the level of unemployment (Table 18)

remained significantly above the European means in the year 2000. The high level of unemployment is also the other side of the coin of the very good French performance in terms of inflation (Table 7).

TABLE 7
Economy 2000

Economy	Unemployment Rate 2000[a]	Inflation, GDP Deflator (annual %) 2000[b]	Average GDP Growth, 1995-2000[b]
Ireland	4.10	5.27	9.93
Poland	16.10	7.74	5.47
Finland	9.70	1.25	5.09
Hungary	6.40	6.76	3.66
Netherlands	3.30	2.58	3.47
Spain	14.07	3.45	3.45
Portugal	4.00	2.89	3.30
Norway	3.40	6.89	3.24
Greece	11.10	2.88	3.15
Sweden	4.70	1.57	2.96
United Kingdom	5.50	1.78	2.76
Belgium	7.00	3.61	2.65
Denmark	5.40	3.98	2.65
France	10.02	.53	2.40
Austria	3.60	2.39	2.24
Italy	10.50	2.55	1.95
Germany	7.90	-.59	1.67
Czech Republic	8.30	1.09	1.65
Switzerland	2.70	1.26	1.48
United States	4.00	2.05	4.01
European Union[c]	7.21	2.44	3.40
Scandinavia[d]	5.80	3.42	3.48
OECD[e]	6.56	4.79	3.43

[a]*Source:* International Labor Organization, LABORSTA (http://www.laborsta.ilo.org), Table 3A.

[b]*Source:* World Bank Group, WDI Data Query located at http://www.devdata.worldbank.org/data-query/. WDI definition: Inflation as measured by the annual growth rate of the GDP implicit deflator. GDP implicit deflator measures the average annual rate of price change in the economy as a whole. Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 1995 US$.

[c]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark, and Finland.

[d]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

[e]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia, and Iceland.

Sectoral Distribution

Even at an aggregate level, the evolution of the structure of the French production system can be observed. Like other developed countries, France is today a service economy, but France deepened its specialization in services for the last two decades (Table 8). Over the last 20 years, the growth of commercial services was faster than the growth of the whole economy, while the contribution of agriculture and manufacturing industries to GNP decreased. Faster growth occurred for professional services, commerce, and transportation. Public services grew a little faster than GDP, but this was mainly due to the effort toward education and to the mechanistic

growth of health expenditures with the aging population. Industry, on average, grew at a slower pace than the economy, two industries experienced strong growth: equipment and intermediary products.

The reshaping and modernization of French industry required switching to an economy based on dynamic industries (manufacturing and services) serving professional customers. It also developed skills in new industries that are essential in the "new economy": namely commerce, logistics, and transportation. One can note however, the relative weakness of the French finance industry. Second, the industries that developed the most as compared to others (professional services, logistics) confirm the idea that France switched to a modern organization of operations based on the externalization of many functions to specialized professionals that lead to the development of network firms.

TABLE 8
The Distribution of the Value Added Among Industries (In Billions of Euros 1995)

	1980	1990	1995	2000
Agriculture. Forest. Fishing	29.1	33.9	35.5	39.7
Manufactured Products	185.4	215.6	230.6	264.3
Food and Agro-business	*28.8*	*29.2*	*29.6*	*29.0*
Consumption Goods	*34.3*	*38.8*	*38.5*	*41.3*
Automobile	*13.7*	*13.6*	*13.8*	*21.5*
Equipment	*26.9*	*35.1*	*39.8*	*47.3*
Intermediary Products	*51.4*	*71.9*	*77.8*	*91.4*
Energy	*32.4*	*27.3*	*31.1*	*34.5*
Construction	56.2	62.0	57.3	51.8
Commercial Services	377.9	535.6	549.3	630.0
Commerce	*72.8*	*110.8*	*115.5*	*128.4*
Transport	*29.2*	*40.4*	*42.8*	*54.4*
Financial Services	*37.5*	*60.4*	*55.4*	*52.4*
Real Estate	*90.6*	*120.9*	*130.3*	*143.5*
Professional Services	*91.9*	*140.9*	*146.0*	*187.3*
Consumers Services	*60.7*	*62.4*	*59.2*	*65.0*
Public Services	152.9	199.0	222.5	240.6
Education,. Health,. Social Support	*86.0*	*113.4*	*126.6*	*136.2*
Administration	*66.9*	*85.6*	*95.8*	*104.4*
Adjustment	-29.6	-47.8	-39.5	-31.7
Total	778.7	999.2	1 055.7	1 195.0

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

As they concern e-commerce, these figures point out again that France had to proceed to in-depth restructuring before going digital. The late digital take off can be explained better by these significant changes than through "cultural" factors.

The reorganization of industry in networks of firms and the dynamics of commerce, transport, and professional services are strong drivers for development of e-commerce. It does, however favor the development of B2B commerce rather than B2C, since French consumers already enjoy an efficient distribution system (Table 9). French manufacturing and services industries that serve the mass market are less efficient than their foreign competitors (as pointed out by the French deficit of the trade balance for consumers services and consumption goods; see Table 9).

Openness to Foreign Trade and Investment

The evolution of the trade balance is also evidence of the reshaping of the French industry. While systematically negative in the 1980s the trade balance became positive in the 1990s (Table 9). This is explained by several factors. Except for energy, which trade balance is fully dependent on, the international oil market, French industry became more competitive in exporting goods and services. Moreover, French industry is quite efficient at exporting food and agro-business products, automobile equipment, commercial and professional services. Tourism plays an essential positive role as well (Table 10).

The main weaknesses are in consumer goods. While it is positively evolving with the passing of time, the French trade balance remains negative with most developed countries. It is slightly positive with the other EU members, negative with all the other OECD countries, and positive with the developing world (Table 11). This reflects an insufficiently modernized industry.

TABLE 9
The French Trade Balance Broken Up by Activities (1980-2000)

Billions of Euros	1980	1990	1995	1996	1997	1998	1999	2000
Agriculture. Forest, Fishing	0.2	3.6	1.4	1.8	1.9	1.9	2.3	2.2
Manufactured Products	-15.6	-23.7	-0.5	3.3	15.9	12.5	7.2	-10.1
Food and Agro-business	*0.6*	*3.8*	*5.9*	*6.2*	*8.2*	*7.2*	*7.3*	*7.4*
Consumption Goods	*-0.7*	*-6.2*	*-3.8*	*-2.7*	*-2.1*	*-4.0*	*-4.0*	*-6.8*
Automobile	*3.9*	*3.5*	*3.4*	*3.6*	*9.8*	*9.0*	*8.2*	*9.4*
Equipment	*3.6*	*-0.8*	*5.2*	*7.1*	*11.0*	*10.1*	*7.9*	*9.0*
Intermediary Products	*-1.7*	*-9.8*	*-2.0*	*1.0*	*2.3*	*-0.4*	*-0.7*	*-6.7*
Energy	*-21.4*	*-14.2*	*-9.2*	*-12.0*	*-13.4*	*-9.4*	*-11.4*	*-22.2*
Services	0.9	0.5	3.4	3.5	5.9	5.3	5.7	8.0
Commerce	*-0.6*	*-0.2*	*0.7*	*0.6*	*2.2*	*2.0*	*2.3*	*3.5*
Transport	*0.5*	*-0.3*	*0.4*	*0.7*	*1.0*	*1.2*	*1.0*	*0.7*
Financial Services	*0.1*	*-0.3*	*0.4*	*0.0*	*0.4*	*-0.3*	*0.1*	*0.8*
Professional Services	*0.9*	*1.4*	*2.2*	*2.7*	*2.6*	*2.7*	*2.6*	*3.1*
Consumers Services	*0.0*	*-0.1*	*-0.4*	*-0.5*	*-0.3*	*-0.3*	*-0.4*	*-0.1*
Correction CAF/FOB	2.4	3.3	3.3	3.2	3.6	4.1	4.3	4.5
Territorial Correction	1.4	6.6	8.5	8.3	10.2	10.9	13.4	15.2
Total Trade Balance	-10.7	-9.8	16.2	20.1	37.4	34.6	32.9	19.8

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

TABLE 10
The French Trade Balance in the Year 2000 Broken Up by Activities[2]

Billions of Euros	Balance	Imports	Exports
Goods (FOB/FOB)	-21.9	2,147.30	2,169.20
Tourism	99.4	215.5	116.1
Non-Tourist Services	52.7	277.9	225.3

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

TABLE 11
The French Trade Balance in the Year 2000 Broken Up by Regions

Billions of Euros	Exports	Imports	Balance	Exports/Imports in %
European Union 15	168.2	166	2.1	101.3
Non EU OECD	46.0	53.1	-7.0	86.8
United States	24.5	27.9	-3.4	88.0
Japan	4.1	12.5	-8.4	32.9
Developing Countries	40.6	25.0	15.5	162.2
World	272.23	268.43	3.8	101.4

Source: Ministère de l'Économie, des Finances et de l'Industrie, 17/12/2001(www.industrie.gouv.fr)

In 2000, imports and exports each accounted for around one-fourth of the French GDP (Table 3). The French economy is therefore widely open. This is primarily true with the other members of the European Union, but the U.S. is an essential partner as well (Table 11).

This strong role of France in the global economy can also be seen in the FDI statistics (Table 12). Among large economies and together with the U.K., France has exported and imported capital with higher intensity. This reflects both the attractiveness of the country and the recovered international competitiveness of its industry.

TABLE 12
Inward and Outward FDI Flows as a Share of GDP (Average 1990-98)

	Inflows	Outflows
Japan	0.04	0.67
Italy	0.31	0.70
Germany	0.31	1.68
United States	0.92	0.99
OECD[1]	1.00	1.40
EU	1.38	2.12
France	1.42	2.11
Denmark	1.69	1.72
Spain	1.69	1.01
Finland	1.80	3.32
United Kingdom	2.29	3.38
Netherlands	3.12	5.53
Sweden	3.20	3.75
Belgium-Luxembourg	4.67	3.47

[1] Excluding the Slovak Republic; for outward flows, excluding Greece, Ireland, and Mexico.
Source: OECD, International Direct Investment database, May 2000.

Foreign affiliates represent a very significant share of the manufacturing industry, although they are more marginal in services (Tables 13, 14). FDI figures illustrate that French firms are used to competing in a global arena and that French service companies are quite competitive (with the exception of the finance industry).

TABLE 13
Share of Foreign Affiliates in Manufacturing Turnover[1] and Employment
(1998 or latest available year)

	Turnover	Employment
Japan	1.8	1.1
Germany	10.8	6.0
Italy (1997)	16.2	11.5
Finland (1999)	16.2	15.9
United States	18.3	13.4
Sweden	21.9	21.1
Netherlands (1997)	30.4	19.7
United Kingdom (1997)	31.4	17.8
France	31.7	27.8
Ireland	72.3	47.5

[1] Production instead of turnover for Canada and Ireland.
Source: OECD, AFA database, May 2001.

TABLE 14
Share of Foreign Affiliates in Services, 1998

	Turnover	Employment
Japan (1997)	0.67	0.24[1]
United States (1997)	8.29	3.59
France	9.02	5.26
Finland	15.33	8.93
Netherlands (1997)	16.78	8.85
United Kingdom (1997)	17.17	9.73
Sweden (1997)	18.15	4.83
Italy (1997)	20.96	7.21
Belgium (1997)	26.60	18.86

[1]1994 for foreign affiliates and 1995 for all domestic firms
Source: OECD, FATS database, May 2001.

To sum up, the French economy was deeply restructured from the mid-1980s to the late 1990s. In 20 years, this country whose industry was dominated by large state owned companies (so called "National Champions"), where businesses were coordinated by very powerful administrative services that managed national plans, and whose economy was heavily regulated, was turned into a country in which most of the markets are now competitive and open to foreign competitors, most of the former public monopolies (except for railroads, gas and electricity) have been being privatized and deregulated, and in which industry is global and open to global competition.

The French restructuring prepared industry to go digital. Its structures are now modernized around a model of flexible specialization. Firms dynamically re-engineer their relationships with a network of business partners to adapt to competitors' strategies, and to the evolving preference of consumers, and to technological changes. Since digital technologies and networks have to be used in such a model, the renewed shape of French industry should be a major driver for the development of e-commerce. In addition, the quality of French professional services companies, the efficiency of the logistics-distribution system, and the openness of the French economy should further facilitate the development of both B2B and B2C commerce. However, the late take off combined with the dot com crash contributed to a specific path of development with less

impressive growth. There was less cash burning, since the French managers are more careful and benefit from foreign experiences.

Wealth

French GDP per capita is a bit above the average level of EU (Table 15). In comparison, the GDPs per capita of the U.K. and Germany are significantly inferior to the U.S. and reach the average of OECD countries.

It has to be pointed out that these differences in wealth per capita among nations are not really due to significant differences in terms of productivity. Indeed, when deflated by the numbers of hours worked per year (Table 16) it can be seen that the French GDP per capita is not far from the U.S. level. This shows that the French industry does not suffer from a strong competitive disadvantage when compared to the U.S., while it is a much less intensive user of ITs. Moreover, the French GDP per capita grew at a 3% per year trend for the last five years, confirming the dynamism of the French economy (Table 17).

In terms of inequalities, France ranks a little higher than the average EU member does. The U.K. is one of the most inequalitarian countries in Europe. The upper and the middle classes, representing more than 80% of the population, is wealthy enough to access digital networks and to consume on-line. From an economic point of view, the smaller percentage of those unable to afford IT is this is not a significant inhibitor for e-commerce. This is, however, a political issue since they could become second class citizens that would be excluded from wealth, jobs, and social life. This political aspect of the digital divide is particularly sensitive in France due to the persistent (while decreasing, see Table 18) rate of unemployment that has a strong social cost (de-skilling of the unemployed population, social support programs, urban violence).

TABLE 15
Wealth and Inequalities, 2000

Wealth	GDP in billions US$ 2000[a]	GDP per capita 2000[a]	Share of income or consumption, richest 20% 1987-1998[b]	Share of income or consumption, poorest 20% 1987-1998[b]
Norway	$159.43	$35,548.04	35.80	9.70
Switzerland	$241.01	$33,639.37	40.30	6.90
Denmark	$162.41	$30,470.04	34.50	9.60
Sweden	$227.37	$25,603.08	34.50	9.60
Ireland	$94.76	$25,403.52	42.90	6.70
United Kingdom	$1,416.09	$23,693.92	43.00	6.60
Finland	$120.81	$23,341.17	35.80	10.00
Netherlands	$367.81	$23,050.88	40.10	7.30
Austria	$188.92	$23,008.57	33.30	10.40
Germany	$1,866.12	$22,708.86	38.50	8.20
Belgium	$225.70	$22,212.32	34.50	9.50
France	$1,280.17	$21,771.62	40.20	7.20
Italy	$1,070.82	$18,688.63	36.30	8.70
Spain	$555.00	$13,670.06	40.30	7.50
Greece	$111.93	$10,515.00	40.30	7.50
Portugal	$104.61	$10,439.93	43.40	7.30
Czech Republic	$50.76	$4,955.46	35.90	10.30
Hungary	$45.63	$4,461.60	39.90	8.80
Poland	$157.61	$4,065.74	40.90	7.70
United States	$9,962.65	$36,210.70	46.40	5.20
Scandinavia[c]	$670.02	$28,067.79	35.15	9.73
European Union[d]	$7,792.53	$20,683.55	38.40	8.29
OECD[e]	$25,461.49	$22,829.19	40.19	7.71

[a]*Source:* International Telecommunication Union, Yearbook of Statistics 1991-2000. Geneva: International Telecommunication Union, 2001. ITU definition: the data are current price data in national currency converted to US$ by applying the average annual exchange rate (from the International Monetary Fund, IMF) to the figure reported in national currency. GDP per capita is calculated by dividing GDP in US$ by the mid-year estimate of population obtained from the United Nations.

[b]*Source:* United Nations Development Program, Human Development Report 2000. New York & Oxford: Oxford University Press, pp. 169-172. Dates for the data vary by country from 1987 to 1998.

[c]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark, and Finland.

[d]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

[e]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia, and Iceland.

TABLE 16
French GDP Per Capita and GDP Per Hour Worked, 1999

	GDP per capita (US = 100)	GDP per hour worked (as % of US)
Belgium	73	110
Netherlands	78	109
Italy	68	106
United States	100	100
France[1]	65	97
Germany	70	94
Denmark	79	93
EU	66	91
United Kingdom	68	87
Sweden	68	84
OECD[2]	72	82
Finland	67	82
Spain	54	76
Japan	75	74

[1] Includes overseas departments.
[2] Excluding Poland, Turkey, and the Slovak Republic.
Source: OECD, GDP and population from National Accounts database; working-age population, labor force and employment from Labor Force database; hours worked from OECD calculations, see S. Scarpetta, et al., Economics Department Working Paper No. 248.

TABLE 17
French GDP & GNP Per Capita 1980-2000

In Euros/Inhabitants	1980	1990	1995	1996	1997	1998	1999	2000
GDP per Capita	7,972.4	17,351.4	19,886.5	20,326.8	20,908.9	21,746.3	22,393.0	23,170.2
GNP per Capita	8,017.3	17,282.4	19,781.4	20,315.1	20,957.2	21,847.7	22,540.5	23,356.4

Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

TABLE 18
French Working Population, Unemployment, and Salaried Employees 1990-2000

In Thousands	1990	1995	1996	1997	1998	1999	2000
Population	58,170.9	59,429.7	59,634.3	59,838.8	60,049.3	60,293.8	60,628.4
Working Population	25,431.7	25,998.0	26,295.4	26,479.6	26,645.4	26,926.4	26,958.2
Unemployment	9.4%	12.0%	12.8%	12.9%	12.3%	11.7%	10.3%
Salaried Employees	79%	78%	77%	77%	78%	79%	80%

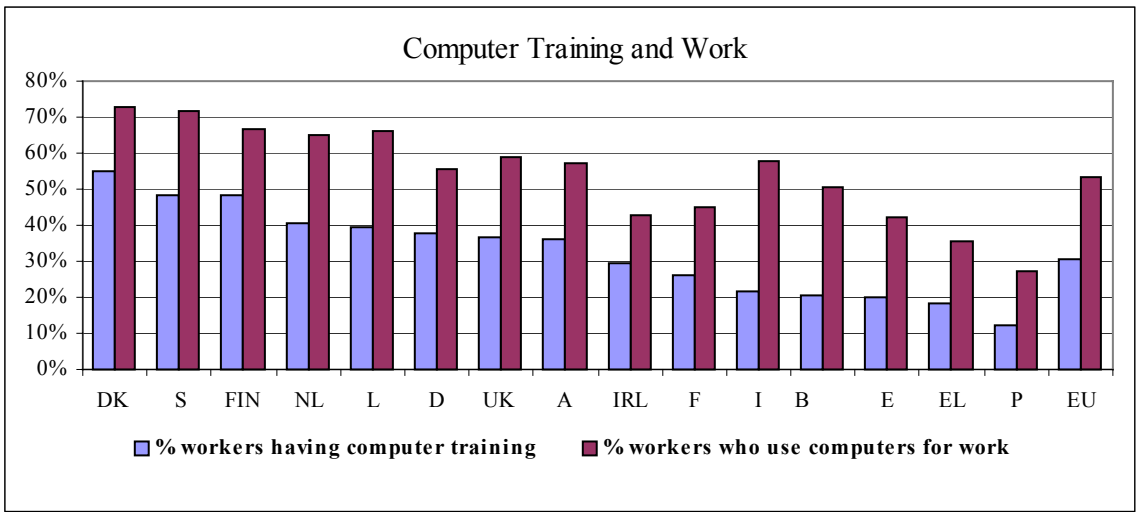
Source: INSEE. Comptes Nationaux. 2002. www.insee.fr

Potential E-commerce Participants

While French wealth and inequalities should rank France in the set of countries where e-commerce is intensively used, France remains behind most of the developed countries when one considers the use of e-commerce on the Internet.

One of the main causes is the under-training of French citizens and workers in the use of digital technologies. When compared to Europeans, French workers use computers less intensively in the work place (Figure 1). The fact that they have been able to access on-line services though Minitel, is one of the causes of this situation. French efforts to promote digital literacy have been insufficient as well.

FIGURE 1
Digital Literacy[1]



Source: European Commission, 2001a, Euro barometer, Brussels: European Commission, November

Behind the aggregated numbers, it has to be pointed that there are at least two digital divides in France, leading to a highly contrasted evaluation when one tries to assess e-commerce readiness.

First, as in many countries, age and professional skill are strong determinants in using digital technologies (Figures 2 and 3). While the lack of reliable figures does not easily permit international comparisons, it seems that France is characterized by a high rate of inequality in access to digital technologies. French under 49 and executives seem to use computers and the Internet as intensively are their foreign counterparts. The intensity of use remains quite low for many categories, especially for farmers, blue collars workers, and even white collar workers (Figure 3).

Second, there is a huge gap between the Paris region and the rest of France. Since France is a highly centralized country, Paris is not only the center of political power, it is the center of the economic activity as well. It accounts for one-fifth of the French population and almost one-third of French GDP (Table 19). Paris is therefore wealthier than the rest of France. Its population is more dynamic and better educated. Paris concentrates many of the activities that relate closely to the digital economy, as well. As a result, it is one of the most dynamic regions in Europe (Table 20). These explain why Paris is an area where the level of development of the digital economy is quite comparable to many large developed cities, while the rest of France (with the exception of 2 or 3 other large cities) is far behind.

[1] In this figure and in Figures 4, 5, 7, 8, 9, 10, the abbreviations stand for: DK=Denmark, S=Sweden, FIN=Finland, NL=The Netherlands, L=Luxemburg, D=Deutschland, UK=United Kingdom, A=Austria, IRL=Ireland, F=France, I=Italy, B=Belgium, E=Spain, EL=Greece, P=Portugal.

FIGURE 2
Households with PCs according to the Age of the Reference Person

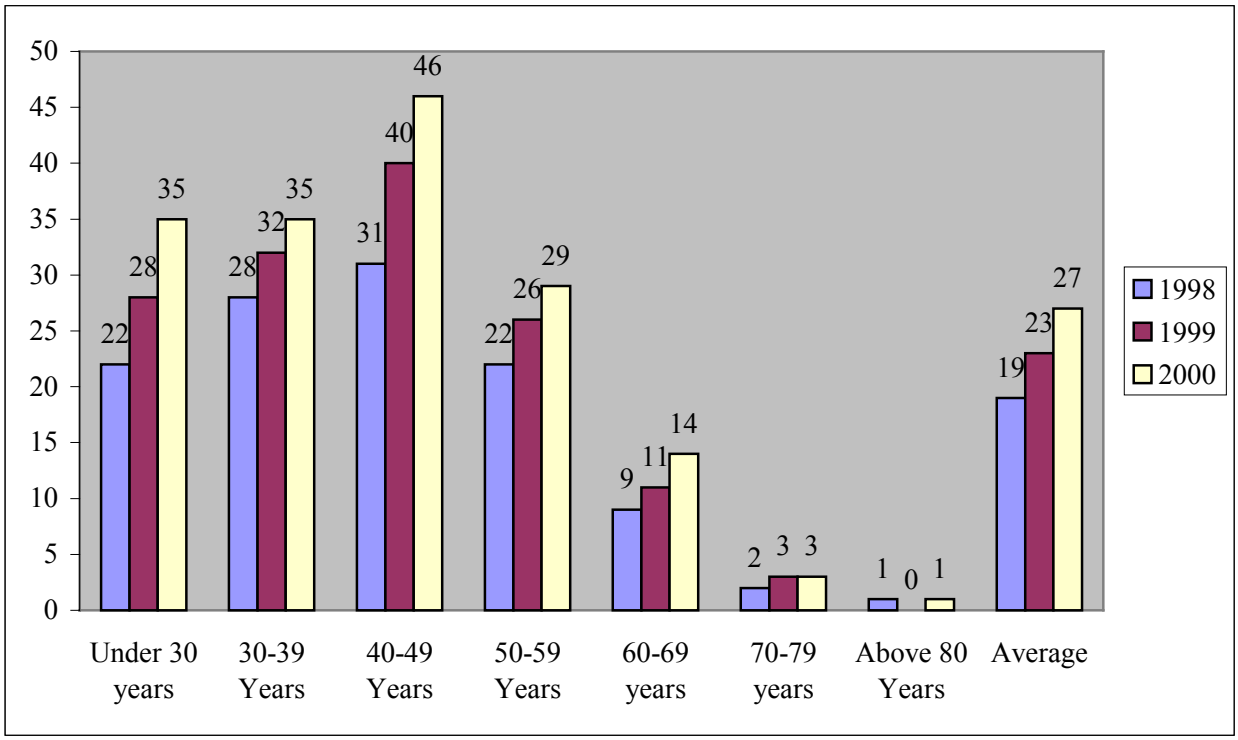
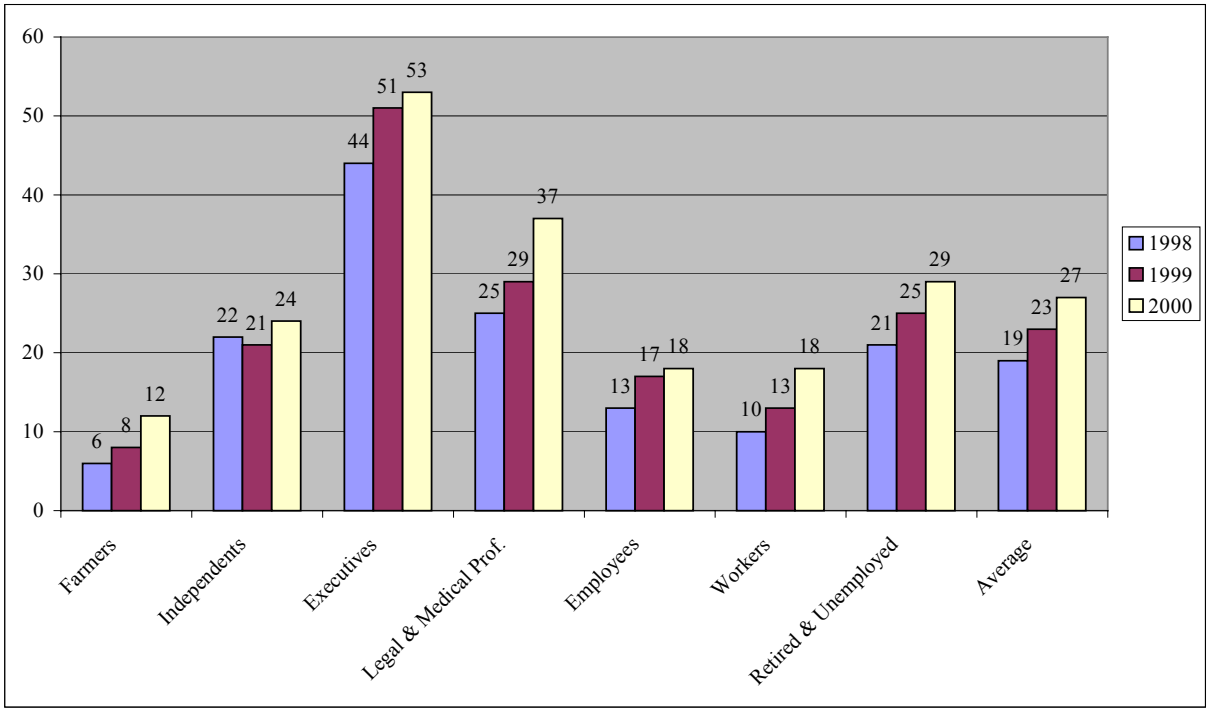


FIGURE 3
Households with PCs according to the Social Status of the Reference Person



Source: INSEE, Enquête Permanente sur les Conditions de Vie des Ménages (EPCVM), n°106, 2001

TABLE 19
Paris and France

	Paris region	Rest of France	Paris region vs. rest of France in %
Population (in millions)	10.9	47.5	22.3%
GNP 2000 (in millions of Euros)[1]	395,228	988,125	39.9%
PIB/Inhabitant (in Euro, 2000)[1]	35,946	20,638	174.2%
Value Added/Employee (in Euros, 1999)[1]	70,580	49,850	141.6%
Employment/Total Population in %[1]	45	36	125.0%
% of Engineers and Executives in the Active Population	24	9	266.7%
Distribution of IT Start-ups[1, 2]	50.7	49.3	102.8%
Percent of SMEs with an Internet Access[3]	73	57	128.1%
Geographic Distribution of Employment in the Computer Industry[4]	47.8	52.2	91.6%
Geographic Distribution of Employment in the TV and Communication Industry[4]	26.1	73.9	35.3%
Geographic Distribution of Employment in the Software and Information Service Industry[4]	58	42	138.1%

Source: [1]INSEE, [2]IAURIF, [3]UFB/locabail, [4]GARP, [5]ESE INSEE

TABLE 20
Paris and the Other Major European Cities

	GNP/Inhabitant index	Share of National GNP (in %)	GNP growth for the past 10 years (%)
EU Average	100		
Frankfurt	179	7	+70.4
Brussels	166	14	+58.8
Paris	165	29	+51.0
Stockholm	148	23	+37.9
London	145	23	NA
Amsterdam	119	46	+54.5
Milan	119	20	+40.3
Madrid	82	16	+85.1

Source: CROCIS, "L'île de France et les Métropoles Européennes", Enjeux Ille de France, N° 25, 01/2001

When one contrasts European countries, it is clear that the most advanced countries, in particular in Scandinavia, are wealthier and more urban with a better-educated population. They are also less centralized than France. Decentralization stimulated the emergence of multiple local experiences and initiatives, while their homogeneity probably enabled these initiatives to percolate in the whole society. In contrast, many French initiatives were national and did not fit well with the specific needs of local populations. French citizens are not as familiar with English and Minitel already supported a wide portfolio of on-line services.

Industry Structure

Industry Concentration and Structure

The French economy is one of the most service intensive economies in Europe, although it is far from the U.S. in that respect (Table 21). French industry is divided between large and small companies (Table 22), while Germany and Italy, for instance, are characterized by a dense web

of SMEs that are active on the global market. Large companies are more internationalized, more high-tech and in general more modern than, the network of small companies that are their subcontractors. They employ more skilled workers, use IT more intensively, and are managed as most of their global competitors. In contrast, French SMEs often do not go international and do not feel the necessity to use IT intensively. Those that use IT intensively work generally with large clients that pressure them to go digital. This is the case in the mechanical construction industry where French automakers extensively implemented EDI in the late 1980s (Brousseau, 2001). Of course, these features are very much dependent on the industry: some industries are mostly composed of small firms (intermediary goods and consumption goods), while others are more concentrated and dominated by large firms (equipment), even very large firms (automotive industries) (Table 23). The later are more likely to go digital than the former because large firms are generally more digital and because they tend to incite their competitors/partners in the industry to adopt ITs. There are therefore clear contrasts among industries in term of degree of digitization. While France modernized for the last two decades, its industry remains highly hierarchized between national champions (that are no longer public, and no longer national monopolies) and a web of smaller companies that are less dynamic. This generates a third type of digital divide.[2]

TABLE 21
The French Industry in Perspective

	France	Germany	Italy	Spain	U.K.	U.S.	Japan
Population (in millions)	58.7	82.1	57.6	39.4	59.6	275.5	126.5
GNP (in billions of Euros)	1,404	2,032	1,165	606	1,533	10,804	5,145
Share of Manuf. Indus. In GNP (in %)	19.1	23.5	21.7	19.5	20.7	16	23
Share of World Exportations (in %)	5.3	8.8	3.9	1.9	4.6	12.5	7.7

Source: Ministère de l'Économie, des Finances et de l'Industrie, 17/12/2001; (www.industrie.gouv.fr).

[2] (See also Brousseau, 2002c.) The three digital divides are:

- The first is among individuals in function of wealth, education, and urbanization. It plays both at work and at home.
- The second is linked to the physical localization of firms and individuals, whether they are in Paris or elsewhere.
- The third is due to the size of firms that access and use the Internet and digital technologies.

These three do not systematically overlap. Large firms located in the countryside can be intensive users of ITs, especially if they employ highly skilled workers, while small firms with unskilled workers will be low intensive in ITs, even if they are in Paris.

TABLE 22
French Manufacturing Firms

Firm size by No. of employees	No. of companies	Cumulated employment	Cumulated sales	Exportation (FF millions)	Investment (FF millions)	Sales/ employee (FF OOO)	Export/ sales (%)	Invest/ sales (%)	Benefit/ sales (%)
Small (20-499)	20,696	1,474,959	1,467,672	373,045	59,506	995.1	25.4	4.1	2.6
Large (>500)	887	1,454,781	2,684,945	982,236	121,297	1,845,.6	36.6	4.5	3.0
Non sign*.	760	38,517	136,588	44,803	1,857	3,546.1	32.8	1.4	2.9
Total	22,343	2,968,257	4,289,205	1,400,084	182,660	1,445.0	32.6	4.3	2.8

* Non Significant relates to holding companies
Source: SESSI, (Service des Etudes et des Statistiques industrielles), 2001a

TABLE 23
French Industry Structure

Market Type	Market Share of the Four Main Competitors (C4 Index)	Market Share of Small Firms (20-499 employees)	Market Share of Firms Owned Mostly by Non-Residents
Consumption Goods	5.6	46.8	36.9
Automotive Industry	63.7	7.7	20.1
Equipment	13.9	38.6	39.3
Intermediary Goods	7.8	50.6	36.4
Total	---	40.4	34.5

Source: SESSI (Service des Etudes et des Statistiques industrielles), 2001a

Innovation Capabilities

France's innovation capabilities are generally considered strong since the French (public and private) R&D system has been performing well since World War II. After the war, the French developed national technologies dedicated to large public equipment (ground transportation, aerospace, energy, nuclear, etc.). France was successful developing self-sustainable technological systems and exported them.. This explains some of the large French successes, such are Ariane (Space), Airbus (Aerospace), Alsthom (High speed trains) and Alcatel (Telecommunications). Thanks to these technological champions, the French trade balance remains positive for high-tech and medium-high-tech products (Table 24).

This strength in managing large innovative projects aimed at developing integrated technological systems became a weakness with the globalization of the economy. The focus of the French R&D system on large integrated projects can explain why France missed the digital revolution at its early stage, and therefore why the French ICT industry is weak as compared to the French innovation capability (Table 25).

- First, the innovative regime in the digital era is based on a decentralized process of step-by-step innovation, since standardized interfaces enable integration of the decentralized designed set. French firms were used to designing large integrated systems and this explains largely why there are few French players in the computer market.
- Second, in the knowledge-based economy, the decentralization of the innovation process goes with the intensive use of Intellectual Property (IP). Inventors purchase a technology, marginally enhance it, and then resell the enhanced technology to other innovators. The

French tradition was to build comprehensive and independent technological systems under the leadership of one National Champion and/or the government. Firms did not develop capabilities to use IP instruments (as illustrated by the relatively low flows of IP revenues in the trade balance; Table 27). Therefore, French IT companies partly missed therefore the digital revolution because they were not involved in the decentralized R&D process that sustained it, due to their lack of competence in participating in such a process.

This specific feature largely explains the French difficulty to catch up despite tremendous investments in ITs by the end of 1999 (Table 26). Because of its post-WWII tradition, France failed to develop a computer industry that would have been able to be integrated in the global computer industry. At the same time, the French telecommunication industry benefited from that national ability to innovate by developing large national projects. By the mid-1980s, France had one of the most digitized and modern telecommunication network in the world. But that strength became a weakness with the development of the Internet, because the French national system of innovation was unable to recognize that Internet technologies will dominate digital networks and that French innovation capabilities were poorly prepared to contribute.

Nevertheless, Table 30 points out that these elements began to change recently. France is one of the EU countries that invests the most in R&D, software, and education, with most of the increase taking place after 1995. Such figures seem to confirm qualitative observations. In the 1990s, France began to reshape its innovation capabilities to adapt to the new competitive environment. Public funds were dedicated to the support of innovative efforts by SMEs. The French IP system was reshaped, companies were encouraged to train their personnel in IP, and public research institutions were stimulated to cooperate more closely with the business sector. While the French innovation system remains influenced by its traditional organization, it is evolving. This has an influence on the French ability to develop some strong competitive advantage in digital technologies, especially in software.

France benefits from another driver for the Internet and e-commerce—the importance of its IT industry. Several large international computer companies (IBM, Apple, Microsoft) located their European headquarters in France. The presence of these essential players is a strong driver since they promote the innovative use of ITs (both by their clients and their business partners). They also have a favorable influence on the emergence of innovative start-ups (that are more able to interact with them than if these large firms were only abroad). The strong French telecommunication equipment manufacturers and telecom operators also have been playing also a positive role after they changed their views about the Internet in 1997.

TABLE 24
Contribution to the Manufacturing Trade Balance, 1999
(As a percentage of manufacturing trade)

	High-technology	Medium-high-technology	Medium-low-technology	Low-technology
United States	5.0	0.4	-0.9	-4.5
United Kingdom	2.4	1.0	0.6	-4.2
Sweden	1.7	-2.2	-0.7	1.1
Japan	0.7	14.4	-0.8	-14.3
Denmark	0.5	-3.1	-0.9	3.6
France	0.4	1.6	-0.6	-1.6
Belgium-Luxembourg	-1.2	-0.1	1.1	0.2
Finland	-1.5	-7.2	0.8	7.8
Netherlands	-1.6	-0.9	0.8	1.8
Germany	-2.6	7.4	-0.5	-4.6
Spain	-4.0	0.6	2.4	1.1
Italy	-4.2	-0.1	0.5	3.8

Source: OECD, STAN database, May 2001.

TABLE 25
Share of ICT Value Added in Business Sector Value Added, 1999

	ICT Manufacturing	ICT Services
Finland	6.9	6.3
Sweden	3.1	8.4
United Kingdom	2.5	8.2
United States	2.8	7.7
France[2]	1.7	8.1
Netherlands[2, 3]	1.8	6.7
Denmark	1.5	6.6
Japan[1, 5]	4.3	3.8
Spain[1, 2, 4]	0.9	7.1
Belgium[4]	1.0	6.3
Italy	1.3	5.8
Germany[1, 3]	1.6	5.4

[1] 1998.
[2] Postal services included with telecommunications services.
[3] ICT wholesale (5150) and rental of ICT goods (7123) are not available.
[4] ICT wholesale (5150) is not available.
[5] Includes only part of computer related activities (72).
Source: OECD estimates, based on national sources; STAN and National Accounts databases, June 2001.

TABLE 26
Business R&D Expenditure by Selected ICT Manufacturing Industries, 1999[1]

	R&D in ICT/GDP	R&D in ICT in millions of current PPP dollars, 1999[1]
Spain	0.06	130
Italy	0.13	1,789
Denmark (1998)	0.14	185
United Kingdom	0.16	2,215
Belgium (2000)	0.25	669
Germany	0.29	5,743
France (1998)	0.30	3 851
Netherlands (1998)	0.31	1,203
United States	0.50	46,638
Japan	0.71	22,260
Sweden	0.85	5,925
Finland	1.08	1,273

[1] 1999 or latest available year.
Source: OECD, ANBERD database, May 2001.

TABLE 27
IP Revenues Flows as a Percentage of GDP 1999 or Latest Available Year

	Payments	Receipts
Belgium	1.71	2.05
Switzerland (1998)	0.51	1.14
Denmark	0.61	0.95
Germany	0.77	0.59
United Kingdom (1998)	0.22	0.43
United States	0.14	0.40
Italy	0.36	0.29
Japan	0.08	0.19
France (1998)	0.22	0.18
Finland	0.05	0.08
Spain (1998)	0.18	0.03

Source: OECD, TBP database, April 2001.

The number of persons employed in the information and communications technology sector has been rising at a sustained rate since 1998: 3.8% in 1998, 3.4% in 1999, and 3.7% in 2000. Today, the information and communications technology sector employs an aggregate workforce of nearly 3 million.

The information and communications technology sector is currently growing by 13% a year. The gap in growth rates between the information and communications technology sector and the rest of the economy has widened, at 9.5 points today, versus 4.4 points in 1996. Since 1996, the sector has accounted for 20% of France's total economic growth (Table 28).

TABLE 28
Growth of the Information and Communications Technology Sector and Overall Economic Growth in France (annual growth rates)

	1996	1997	1998	1999	2000	2001
IT Industries	5.6	10.8	11.6	10.5	13.5	13.8
Non-IT Industries	1.0	2.4	2.8	2.3	3.4	2.7
Whole Industry	1.2	2.8	3.3	2.8	4.0	3.5

Source: Ministère de l'Économie, des Finances et de l'Industrie, 2001, http://www.minefi.gouv.fr/

Recent adjustments in the telecommunications and Internet sectors should not overshadow their ability to innovate and their potential for further expansion. Demand for engineers and experts in the information and communications technology sector has been steady.

Human Resources

As most European countries, France invest significantly less in education than the U.S. (Tables 29, 30). This explains why the share of the population with a university degree is significantly higher in the U.S. than in most OECD countries (Table 29). In that respect, France seems to rank a little bit below the average for developed countries.

This is partly due to the specificity of the French education system. The level of the upper-secondary education system is generally considered quite high in France. Until the 1970s, university degrees were not a prerequisite to go on the job market. The university system had small capacities and it was not developed sufficiently rapidly when the need for higher education led an increasing share of the population to enter universities. While the pace of evolution was too slow, France made a huge effort in favor of education since the 1980s.. This led to important results. In the younger generation, 60% of each age class received an upper secondary degree of education; and 18.5% of the 25-34 years have a university degree.

The French situation shows contrasts. On the one hand, the relatively poor level of education of the population (as compared to most other developed countries) is probably one of the inhibitors to an intensive use of ITs by the population. On the other hand, it seems that the efforts made by the country to modernize significantly broke these barriers recently. The younger generations are better educated and more technology literate than the older ones.

TABLE 29
Human Resources

	Distribution of the population aged 25-64 by level of educational attainment, 1999				Expenditure per student on public and private institutions, 1998 (PPP dollars)
	Below upper secondary education	Upper secondary education	Non-university tertiary education	University level education[1]	All tertiary level[2]
United States	13	51	8	27	18,493.1
Switzerland[3]	18	58	9	15	16,563.3
Sweden	23	48	16	13	13,223.5
Total OECD[6]	36	40	11	14	11,463.6
Netherlands	35	42	2	20	10,756.5
Japan	19	49	13	18	9,870.6
Denmark	20	53	20	7	9,562.0
Germany[5]	19	53	15	13	9 466.0
United Kingdom[4]	18	57	8	17	9,421.9
Belgium[4]	43	31	14	12	7,784.3
Finland	28	40	17	14	7,327.0
France	38	40	10	11	7,004.8
Italy[3]	56	30	4	9	6,294.9
Spain	65	14	6	15	5,037.8

[1]Tertiary type A and advanced research programs (ISCED 5A and 6).
[2]Data refer to total tertiary education (ISCED 5A, 5B and 6).
[3]Expenditures per student include public institutions only.
[4]Expenditures per student include public and government-dependent private institutions only.
[5]Expenditures per student data refer to 1997.
[6]Average of the available countries.
Source: OECD, Education database, May 2001.

TABLE 30
Investment in Knowledge as Percentage of GDP, 1998

	R&D	Software	Higher education	Average annual growth rate 1991-98[5]
Italy	1.02	0.48	0.59	-0.61
Spain	0.90	0.46	0.83	4.34
EU[4]	**1.81**	**1.03**	**0.73**	**3.07**
Belgium	1.87	1.39	0.42	
United Kingdom	1.83	1.34	0.78	3.57
France	2.19	1.16	0.76	2.96
Germany	2.31	1.17	0.68	2.15
Netherlands	1.95	1.66	0.65	3.76
Denmark	1.92	1.52	1.12	5.89
OECD[3]	**2.23**	**1.21**	**1.25**	**3.41**
Japan	3.01	1.09	0.60	2.65
Finland	2.89	1.17	1.10	6.78
United States[1]	2.60	1.51	1.94	3.85
Sweden	3.80	1.90	0.85	7.58

[1]Education data includes post-secondary non-tertiary education (ISCED 4).
[2]Average annual growth rate refers to 1992-98.
[3]OECD total refers to the available countries and the average annual growth rate excludes, Belgium, Czech Republic, Korea, Mexico, and Switzerland.
[4]Average annual growth rate excludes Belgium.
[5]1995 US$ using purchasing power parities.
Source: OECD, National Accounts database; Education database; MSTI database and International Data Corporation, March 2001.

TABLE 31
High-skilled IT Workers[1] and High-skilled Workers[2] in the EU and the US
(Average Annual Employment Growth—1995-99)

	High-skilled workers	High-skilled IT-related workers	1999 Share of high-skilled IT workers in total occupations
Netherlands	4.90	10.99	3.16
Sweden[3]	3.17	3.96	2.82
United States	2.92	4.97	2.40
Finland[3]	9.44	48.87	2.29
Denmark	3.55	10.03	2.18
United Kingdom	2.47	11.86	2.04
Belgium	3.21	10.89	1.85
France	1.13	4.74	1.70
EU-14[4]	**2.81**	**8.83**	**1.65**
Germany	1.64	7.66	1.51
Spain	6.34	14.71	1.13
Italy	5.80	7.14	1.08

[1] High-skill IT-related occupations are defined here as ISCO-88 classes 213, 312 and 313, while computer workers refer only to the sum of the first two classes, see box.
[2] High-skill occupations refer to ISCO-88 classes 1, 2 and 3.
[3] 1997 instead of 1995.
[4] 1995 estimated.
Source: OECD, based on the Eurostat Labor Force Survey and the U.S. Current Population Survey, May 2001.

Infrastructure

Transportation Infrastructure

France benefits from an excellent transportation infrastructure that is both efficient and pervasive. Due to the dense web of existing road infrastructure, and the continuing lobby efforts of the truck and the automaker industry, the road is the privilege means to move individuals and freight (Tables 32, 33). But France also benefits from a quite efficient railroad system (which is heavily subsidized by the government). For a long time, it inhibited the development of air transportation, but the French capabilities developed over for the last 20 years with the development of medium and long distance travel, with the increased wealth of the population, and with the rise of competition that bring prices down. France benefits from a competitive national carrier (Air France), but its main competitive advantage is the capacity of Charles-de-Gaule Airport near Paris. It is one of the main airports in Europe (with London, Amsterdam, and Frankfurt) but it benefits from larger extension capacities. As a result, the Paris airport is the European hub of many passenger and freight carriers.

The French transportation infrastructure can be considered as a driver for e-commerce. The dense web of railroad and road, together with the existence of many efficient transportation and logistics management companies, support delivery problems linked to on-line sales. Most of the companies that developed on-line business models and B2B working practices did not experience difficulties in identifying subcontractors (freight, parcel service, courier and delivery companies) able to do the tangible work for them. The French air-transportation capabilities are also a facilitator for the development of e-commerce application in foreign markets.

TABLE 32
The French Freight Transportation System (in billion t-km)

1999	Railroad	Road	River	Pipelines	Total
EU	188.6	1,102.1	117.5	76.6	1,484.8
	12.70%	74.23%	7.91%	5.16%	
France	52.1	182.5	6.8	21.3	262.7
	19.83%	69.47%	2.59%	8.11%	

Source: Direction des Transports Terrestres (M‡j le 01/06/01) www.transports.equipement.gouv.fr/

TABLE 33
The French Person Ground Transportation System (in million of person-km)

1999	Car	Railroads	Bus	Total
EU	3,303	261	314	3,878
	85.17%	6.73%	8.10%	
France	700	67	41	808
	86.63%	8.29%	5.07%	

Source: Direction des Transports Terrestres (M‡j le 01/06/01)
www.transports.equipement.gouv.fr/

TABLE 34
The French Transportation Industry

1999	Number of companies	Number of employees (in thousands)	Value added (billions Euros)	VA(in %)
Air	211	62.6	4,616.92	10.27%
Sea	389	11.6	581.29	1.29%
River	1,044	3.6	132.17	0.29%
Road Freight	42,866	312.0	10,677.68	23.74%
Road Local Transport	16	1.0	125.92	0.28%
Road Transportation	29,985	168.6	6,210.47	13.81%
Railroad	12	174.8	7,328.38	16.30%
Metro	1	38.5	2,644.53	5.88%
Ski	188	6.8	458.41	1.02%
Logistic Platforms	1,330	40.7	1,722.22	3.83%
Infrastructure Management	1,071	44.0	5,713.48	12.70%
Logistic Management	3,127	119.0	4,760.37	10.27%
Total	79,940	983.5	44,971.85	100.00%

Source: Direction des Transports Terrestres (M‡j le 01/06/01)
www.transports.equipement.gouv.fr/

Information and Telecommunications Infrastructure

In terms of ICT infrastructure, France ranks always a little bit below the mean of the most industrialized country. It is largely behind the U.S. and Scandinavia for most of the figures, and generally a little behind the U.K. and Germany. It is, however, above Italy, Spain and other Mediterranean countries (Tables 35-39). Internet figures (Table 39) do not significantly differ from the other indicators related to the ICT infrastructure. There are, however, some exceptions to be pointed out.

- In terms of (TV) cable network, France remains far behind the other most developed nations (Table 35). This is largely due to the big failure of a national plan to equip French cities with fiber to the home cable system in the late 1980s. Despite the investments made by the late 1990s, the French cable TV system remains weak, limiting the ability to develop high-speed access to the Internet. This does not exist in large cities where cable and DSL access have been easily available since the year 2000. However, it persists in small cities and rural areas.
- While investing significantly in ITs, France does not perform well in producing them (as compared to its size) (Table 36).
- Table 37 confirms that the French economy chose to focus its IT expenditures on telecommunications and services as a whole, while it neglected to heavily invest in hardware
- Table 38 points out, the tentative catch up of France in digital technologies, since France was one of the countries that increased the most significantly its investments in IT for the 1990s. More generally, France's poor relative statistical performance has to be mitigated by the strong evolutions that occurred in recent years:
- The number of households with computers has almost doubled since 1997. Today, there are personal computers in almost one-third of all households. According to research institutes, between 26 and 33% of all French households owned a computer at the end of 2000, as compared to only 16 to 19% in 1997. The growth in computer ownership by French households has been in line with the average reported for other European countries.
- The use of mobile phones and digital television has sharply increased. As of 30 June 2001, 55.1% of France's population—representing more than 33 million people—had mobile phones. Only 10% owned mobile phones in 1997. Because cable television was launched recently in France, cable systems are digital. This is the same for satellite television. France is Europe's second-largest market for digital televisions after the United Kingdom. There is a significant potential for growth beyond the 13% of all households that currently own digital televisions.
- In 2000, between 7 and 11 million persons in France used the Internet (depending on how "Internet use" is defined), up from 1 to 2 million in 1997. Access to the Internet from home, public terminals and work has been growing in France at a more sustained pace than in the rest of Europe.

These figures confirm the specificity of the French path to the digital economy. Because the French IT industry was more oriented toward traditional telecommunication technologies than toward computers-in-network technologies, French decisionmakers did not identify the Internet revolution sufficiently early in the 1990s. This led France to under-invest in computers and digital networks for the first part of the decade. When the Internet took off, the French had to invest in the development of new applications and hardware, and the lack of an installed base was an inhibitor to the early development of the Internet. Since voluntary national plans were launched, France began to take-off in the late 1990s.

TABLE 35
Telecommunications Infrastructure, 2000

Telecommunications Infrastructure	Telecomm Investment as % of GDP, 2000[a]	Main phone lines per 1,000 population, 2000[a]	Cell phone subscribers per 1,000 population 2000[a]	% Digital phone lines, 2000[a]	CATV subscribers per 1,000 population 2000[a]
Denmark	.69	752.55	609.92	100.00	264.76
Norway	1.33	729.10	702.56	100.00	183.57
Switzerland	.91	719.95	644.58	100.00	360.11
Sweden	1.09	682.03	713.70	100.00	199.31
Netherlands	1.02	619.12	671.20	89.00	388.55
Germany	3.16	601.15	585.88	100.00	247.03
United Kingdom	.57	582.39	669.56	100.00	56.89
France	.26	580.17	494.09	100.00	45.24
Finland	.75	546.95	726.43	100.00	183.54
Greece	1.08	531.64	559.04	93.36	1.22
Belgium	.40	499.36	548.86	100.00	372.86
Italy	.81	473.89	737.25	99.00	1.05
Austria	.45	473.63	785.53	100.00	123.37
Portugal	2.12	430.49	665.16	100.00	92.30
Ireland	.40	426.27	667.56	100.00	179.62
Spain	.40	421.22	609.26	86.60	11.82
Czech Republic	2.37	377.94	424.25	85.72	93.23
Hungary	1.19	364.69	293.35	85.80	157.12
Poland	.87	282.36	174.05	77.60	92.61
United States	.29	699.74	397.91	91.60	252.13
European Union[b]	1.22	546.46	624.78	98.04	115.83
Scandinavia[c]	.99	677.33	691.20	100.00	207.55
OECD[d]	.73	524.53	457.27	94.82	145.37

[a]*Source* of data: International Telecommunication Union, Yearbook of Statistics 1991-2000. Geneva: International Telecommunication Union, 2001. ITU definitions: main telephone lines refer to telephone lines connecting a customer's equipment (e.g., telephone set, facsimile machine) to the Public Switched Telephone Network (PSTN) and which have a dedicated port on a telephone exchange; telecommunications investment refers to the annual expenditure associated with acquiring ownership of property and plant used for telecommunication services and includes land and buildings; cellular mobile telephone subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology that provides access to the PSTN; digital per cent refers to the % of main lines connected to digital exchanges (indicator does not measure the percentage of exchanges that are digital, the percentage of inter-exchange lines that are digital or the percentage of digital network termination points); "CATV subscribers" refers to households subscribing to a multi-channel television service delivered by a fixed line connection. The per capita values are calculated using the estimated mid-year population value.

[b]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark and Finland.

[c]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

[d]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia and Iceland.

TABLE 36
IT Infrastructure, 2000

IT Infrastructure	IT as % of GDP, 2000[a]	PCs per 1,000 population 2000[b]	IT Hardware production, US$M 2000[c]	IT Hardware exports, US$M 1999[c]
Sweden	4.96	506.73	$243.08	$584.02
Switzerland	4.72	502.48	$746.22	$1,164.67
Netherlands	4.21	244.41	$3,282.50	$22,050.24
United Kingdom	4.10	301.17	$16,166.73	$19,527.42
Denmark	3.99	431.52	$128.46	$894.41
Finland	3.76	396.06	$785.17	$866.13
France	3.66	304.76	$7,134.88	$9,604.06
Germany	3.48	336.35	$12,000.72	$12,430.98
Czech Republic	3.43	122.02	$161.50[g]	$266.00
Belgium	3.41	228.94	$2,063.40	$3,183.94
Norway	3.29	490.52	$246.30	$444.23
Austria	3.04	276.46	$496.98	$772.52
Hungary	2.86	144.70	$2,880.00[g]	$3,317.00
Ireland	2.29	364.61	$10,013.14	$15,686.49
Italy	2.10	139.45	$5,753.55	$3,481.56
Portugal	1.95	249.50	$518.11	$76.54
Spain	1.90	142.86	$1,800.40	$1,419.87
Poland	1.76	68.88	$303.37[g]	$75.00
Greece	1.35	70.46	$129.45	$66.00
United States	4.56	585.18	$88,488.62	$38,488.00
Scandinavia[d]	4.11	462.89	$1,403.02	$2,788.79
European Union[e]	3.33	263.59	$60,516.60	$90,644.18
OECD[f]	3.60	312.01	$231,341.80	$182,730.10

[a]*Source:* International Data Corporation, The 2000 IDC Worldwide Black Book. IT is defined as "the revenue paid to vendors (including channel mark-ups) for systems, software, and/or services.

[b]*Source:* International Telecommunication Union, Yearbook of Statistics 1991-2000. Geneva: International Telecommunication Union, 2001.

[c]*Source:* Reed Electronics Research, The Yearbook of World Electronics Data, 2000. Surrey, U.K.: Reed Electronics Research, 2000.

[d] Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark and Finland.

[e]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

[f]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia and Iceland.

[g]1999 data.

TABLE 37
IT Intensity[1] by Component, 1999

	Hardware	Software	Other IT services	Telecommunication equipment and services	Total
Spain	0.7	0.7	0.5	2.3	4.1
Italy	0.7	0.7	0.8	2.5	4.7
Japan	0.9	1.4	1.3	4.4	8.0
EU-14[2]	**1.1**	**1.6**	**1.2**	**2.5**	**6.4**
Germany	1.1	1.8	1.1	2.3	6.3
OECD-28[3]	**1.3**	**1.7**	**1.3**	**3.0**	**7.3**
France	1.0	1.7	1.7	2.3	6.6
Belgium	1.2	2.1	1.1	2.5	6.8
Finland	1.5	1.8	1.0	2.4	6.7
Denmark	1.4	2.2	1.4	2.4	7.4
United Kingdom	1.4	2.0	1.7	2.7	7.8
Netherlands	1.5	2.4	1.3	2.8	8.0
United States	1.7	2.1	1.5	2.6	7.9
Sweden	2.0	2.9	1.6	2.7	9.2

[1]IT expenditures as a percentage of GDP.
[2]Excludes Luxembourg.
[3]Excludes Luxembourg and Iceland.
Source: OECD, based on World Information Technology and Services Alliance (WITSA) / International Data Corporation (IDC), 2000.

TABLE 38
Growth in Total and in ICT Investment at Constant Prices in Selected OECD Countries
1999 Index (1990 = 1)

	Aggregate investment	ICT investment
Japan	0.9	2.4
Italy	1.2	2.5
Germany	1.3	2.7
Finland	1.0	3.6
Australia	1.4	3.8
France	1.3	4.0
Canada	1.3	4.4
United States	2.0	4.9

Note: Estimates of "harmonized" price indexes assume that price ratios between IT and non-IT products have the same time patterns across countries, with the United States as the benchmark.
Source: OECD, STI/EAS estimates based on National Accounts (SNA93), March 2001.

Internet

Until 1999, the Internet infrastructure was poor. Because the telecommunication operators had not recognized the importance of the Internet and because of the low density of CATV systems, broadband access was not available, and connection costs were high because local calls are time metered (Table 40). Both because of the competitive race among ISPs to capture Internet users among ISPs and because of governmental decisions aimed at bringing connection prices down, the situation has been evolving positively since then. Broadband access is available in large cities: 39% of professional users and 14% of domestic users had broadband access by the end of 2001 (IPSOS, 2001); the number of domestic broadband access was increased five times in the year 2001 (Médiametrie, 2001); and access costs decreased widely to the average European level (Tables 39, 40 and Figure 5 show in particular that the average access cost for 20 hours

decreased from $54 for the 1995-2000 period to $30 in 2001). In addition, the recourse to Minitel began to significantly decrease in 2000, confirming the progressive switch of French citizens to the new technological basis. However, a large share of the population, especially the elderly, continue to use the Minitel (Figure 6).

Despite these gains, France remains below most developed countries in terms of number of Internet users (Table 40) and home connections (Figure 4). In that respect, its performance is poor and below the European means[3]. In addition to the late takeoff, this poor performance can be explained by the fact that since French households were poorly equipped with PCs, the cost of accessing the Internet included not only the ISP's subscription and costs of communication, but also the investment in a PC. While the prices of PCs have been falling, it is still a significant investment for many households.

The lack of Internet users is probably one of the reasons why there are few French hosts (Table 39 and Figure 7 for secure servers). French service providers were less motivated to invest than in any other developed countries since the customer basis was and remains tiny, as compared to the size of the population. It resulted in a poorer choice of services for the French Internet-users.

Consequently, France faced a chicken-and-egg problem since neither the users, nor the providers were motivated to rush to the Internet. This seemed to change in the year 2000 when the French population began to massively adopt the Internet. However, the collapse of the Internet bubble in 2001 dried up the capital market. Except for the few services that won the audience race, the quality of many services that had emerged in the years 1999-2000 decreased. Also, prices increased—many free services became fee-based—and many services became unavailable. This trend concerned all kind of Internet related services: ISPs, portals, media, e-commerce. This had obviously a negative influence on the rate of development of the Internet, while the number of users is still evolving.

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[3] **Internet penetration in EU households** increased from about 18% in March 2000 to 28% in October 2000, 36% in June 2001, and stand at 38% in December 2001. This means the rapid rise during 2000 and early 2001 may have reached a plateau. The next measurement in May 2002 will test if this is true. Available national statistics seem to confirm this trend.

The slowdown in Internet takeup may be explained by the fact that Internet connections are linked to the availability of Personal Computers which sets an upper ceiling to penetration. Internet through TV sets and mobile devices remains marginal but may grow rapidly in future. The EU countries with the highest penetration levels have reached Internet penetration rates of around 60% of households and further growth will be limited. The fact that they may no longer be driving EU Internet take-up may also explain the slow down in EU growth.

Internet use in the whole population is higher than that shown by household penetration rates. In November 2001, almost 50% of the population (over 15 years) used the Internet either at home, at work, at school, in public access places or on the move. Over 80% of Internet users go on-line at least once a week. In absolute numbers, there are nearly as many Internet users in the European Union as there are in the U.S. Usage has increased in all different locations but by far the highest growth is in use at home. However, growth in Internet penetration in Europe last year has still been slower than in the U.S.

Internet penetration in businesses is far higher than the household rate and now almost 90% of enterprises with more than 10 employees have got an Internet connection. More than 60% have a Web site.

It has to be noted, however, that the French seem less enthusiastic with the Internet than many other OECD citizens. According to a poll performed in February 2002, of the 59% of the French citizens above 15 years who do not benefit from Internet access (neither at home, nor on the workplace), only 25% expressed an intention to be equipped in the next month. Almost one-third of French citizens express a de facto reluctancy to use the Internet because they consider it useless and too costly (Sofres, 2002). This has obviously to do on the one hand with the availability of alternative means to access on-line contents (the Minitel or digital TV), and with the low interest in e-commerce due to spatial distribution and the organization of marketing channels, and on the other hand, with the costs of the equipment required to access the Internet and with the uses costs of the Internet (all of which elements are developed in the relevant section of this paper).

TABLE 39
Internet Infrastructure, 2000

Internet Infrastructure	Internet hosts per 1,000 population 2000[a]	Internet users per 1,000 population 2000[a]	Access cost, 30 hours, peak, US$ 2001[b]	Access cost, 30 hours, off-peak, US$ 2001[b]
Finland	102.25	372.30	$29.50	$21.53
Netherlands	101.75	244.41	$50.65	$30.81
Norway	100.93	490.52	$47.92	$47.92
Sweden	67.08	455.83	$56.05	$35.87
Denmark	62.66	365.85	$34.46	$34.36
Austria	58.85	255.75	$48.29	$32.50
Switzerland	36.64	297.86	$62.46	$45.31
Ireland	29.64	210.19	$56.99	$32.31
Belgium	29.54	228.94	$80.85	$41.72
United Kingdom	28.08	301.17	$35.24	$28.09
Germany	24.83	292.06	$24.13	$24.13
France	19.09	144.56	$30.79	$30.79
Italy	17.80	230.37	$40.12	$28.38
Czech Republic	15.55	97.62	$46.24	$16.06
Spain	11.22	132.70	$42.17	$26.85
Greece	10.39	93.94	$34.49	$29.09
Hungary	10.21	144.70	$61.79	$36.13
Poland	8.77	72.23	$29.11	$29.11
Portugal	6.20	249.50	$41.00	$25.16
United States	292.83	346.58	$22.05	$22.05
European Union[c]	27.78	237.88	$43.22	$30.11
Scandinavia[d]	80.08	424.15	$41.96	$34.92
OECD[e]	91.76	256.03	$39.43	$29.66

[a]*Source:* International Telecommunication Union, Yearbook of Statistics 1991-2000. Geneva: International Telecommunication Union, 2001. ITU definitions: Internet hosts refer to the number of computers that are directly connected to the worldwide internet network (however, the statistic is based on country code in host address and may not correspond with actual physical location); Internet users is an estimate of the number of Internet users.

[b]*Source:* International Telecommunication Union, World Telecommunication Development Report 2002, Reinventing Telecoms. Geneva: International Telecommunication Union, 2002.

[c]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark and Finland.

[d]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

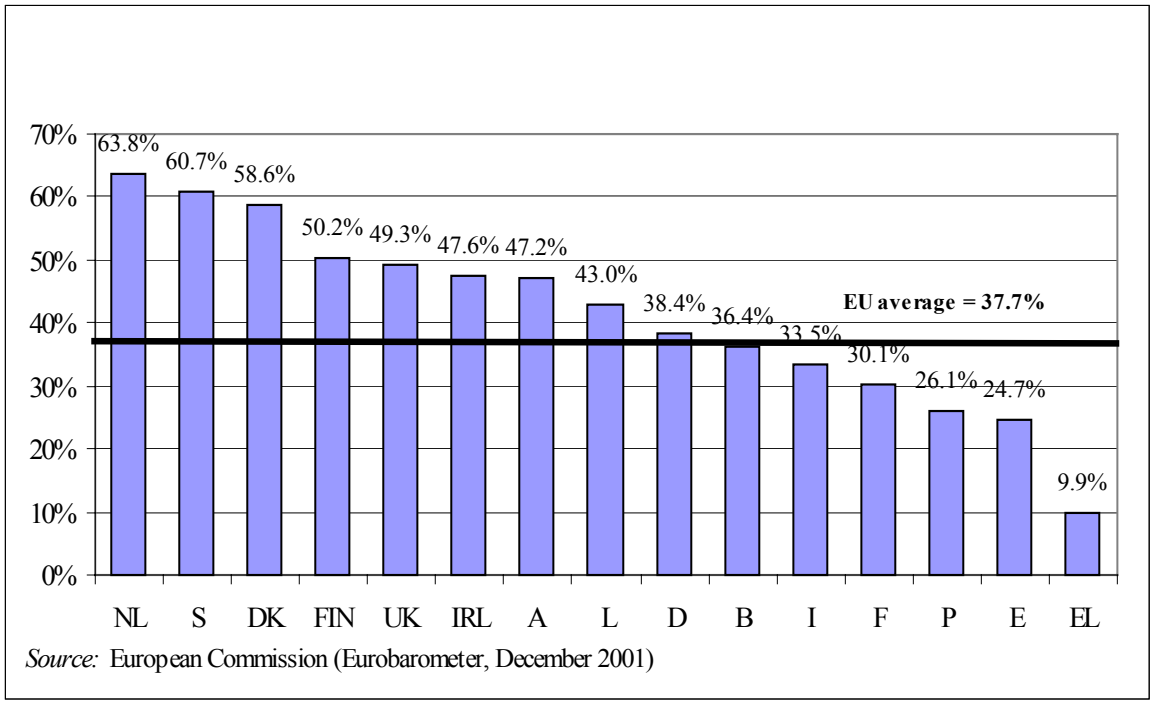
[e]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia and Iceland.

TABLE 40
Number of Internet Hosts Per 1,000 Inhabitants, gTLDs Adjusted[1], July 1997 - October 2000

	1997	2000	OECD share (%), October 2000	Average price for 20 hrs Internet access 1995-2000, in PPP dollars
OECD	20.33	81.52	100	56.37
United States	56.51	234.20	70.7	31.71
EU	12.25	37.43	15.5	
Japan	8.40	32.49	4.6	59.12
United Kingdom	15.66	52.50	3.5	49.65
Germany	10.27	31.67	2.9	64.59
Italy	3.68	32.61	2.1	48.78
Netherlands	21.86	81.62	1.4	48.84
France	5.26	19.19	1.3	54.06
Sweden	35.00	106.31	1.0	36.89
Finland	68.07	159.06	0.9	30.88
Spain	4.01	15.74	0.7	78.32
Belgium	7.93	39.65	0.4	72.84
Denmark	26.02	72.48	0.4	54.15

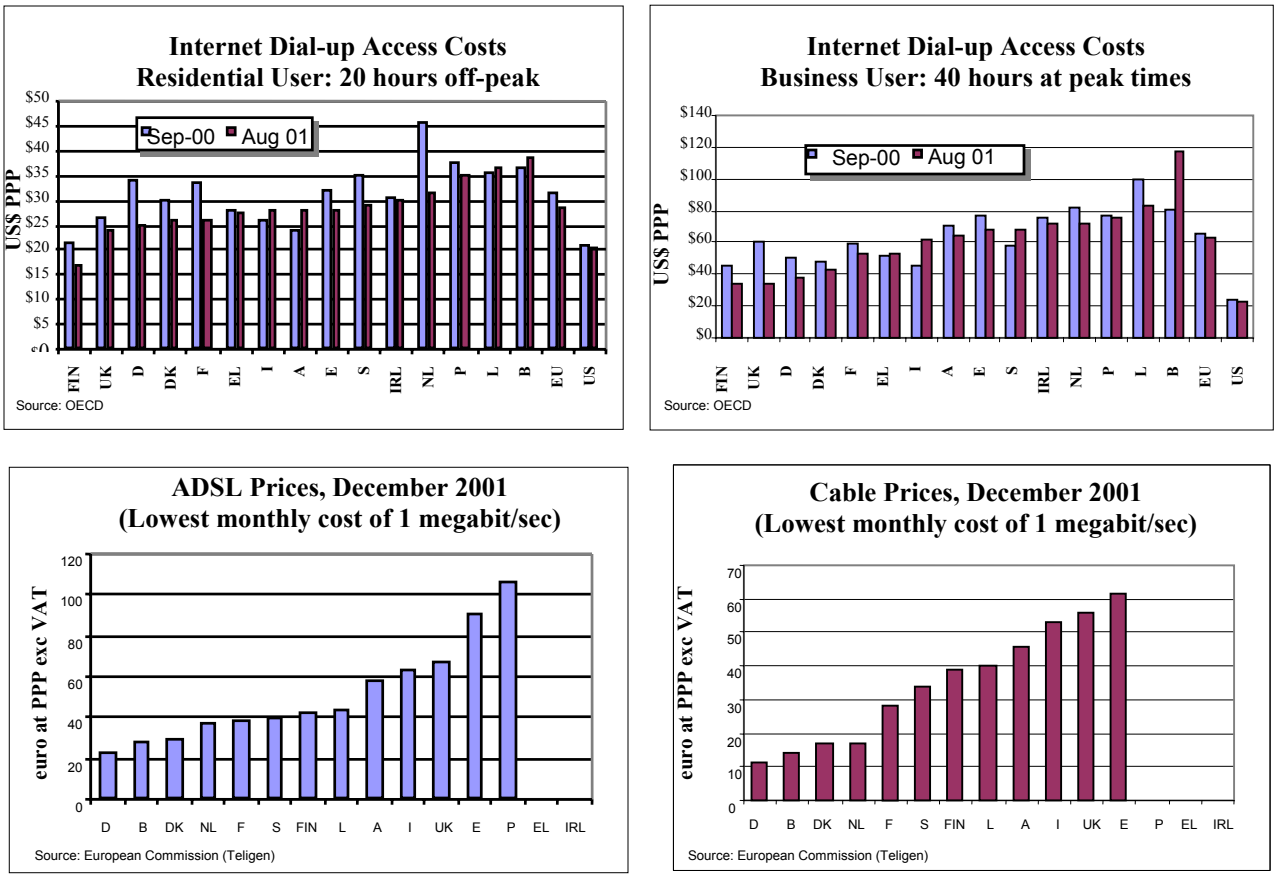
[1] Global Top Level Domains (gTLDs) are distributed to country of location.
[2] Internet access costs include VAT and cover both peak and off-peak.
Source: OECD, *Communications Outlook 2001*; OECD calculations based on Netsizer (www.netsizer.com), May 2001.

FIGURE 4
Internet Penetration
(% EU Households Connected, December 2001)



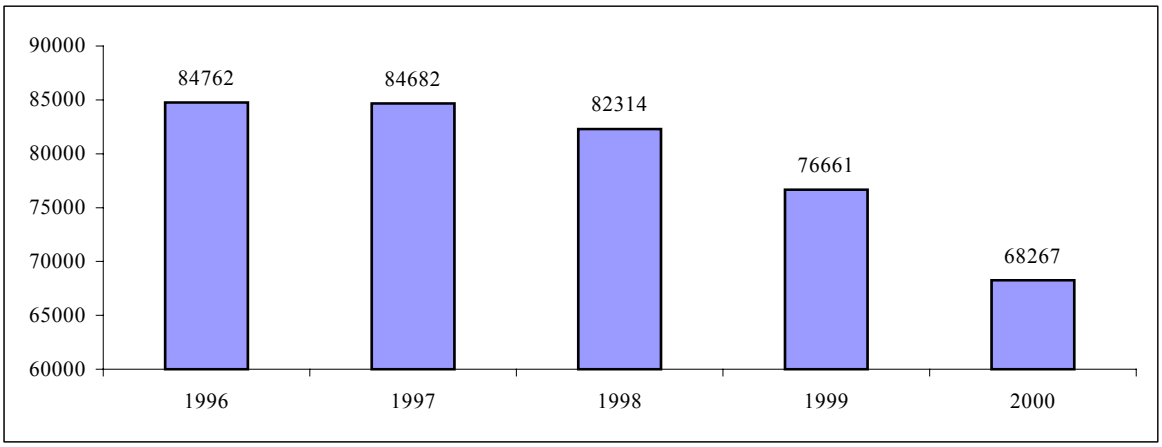
Source: European Commission (Eurobarometer, December 2001)

FIGURE 5
Internet Access Cost



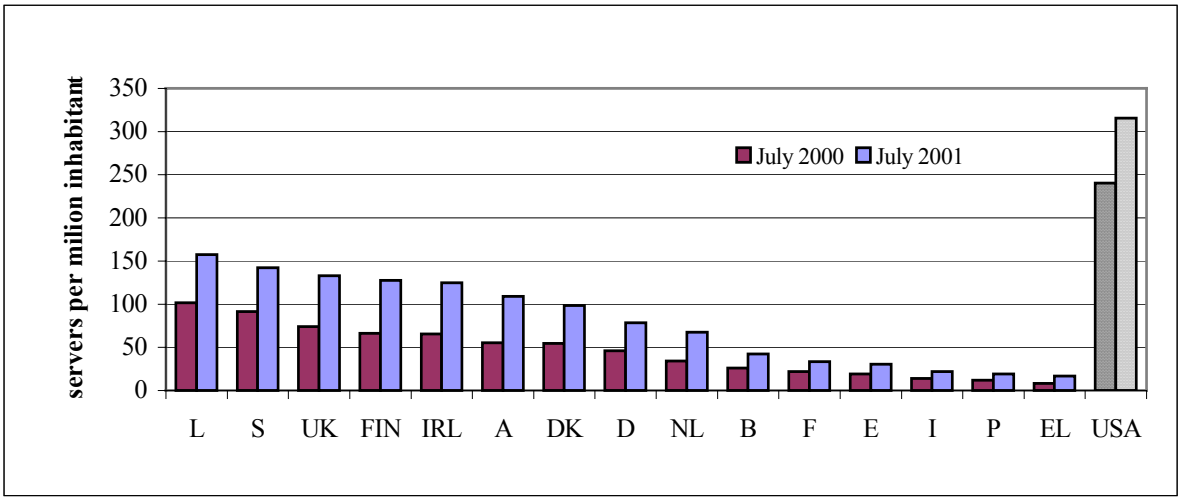
Source: European Commission, 2001c

FIGURE 6
The Decrease of the Minitel Use (in thousands hours of connection)



Source: France-Télécom, quoted by, P. Mathonnet, D. Kaplan, Tableau de bord du commerce électronique Mission pour l'Economie Numérique, Issue 1.0, Novembre 2001

FIGURE 7
Secure Servers



Source: OECD, *Communications Outlook 2001*; Netcraft (www.netcraft.com), May 2001.

Business Readiness and Environment

As pointed out above, the French industry benefits from an efficient web of dynamic and internationalized professional services, logistics management, and distribution companies. This is a major driver for both B2B and B2C e-commerce. However, at the same time, the French financial industry is quite weak as compared to its main competitors (essentially the U.K. and Germany).

More precisely, the French banking systems performed quite well at financing the traditional French innovation system based on "strategic national projects". Public funding was combined with long term loans to develop research programs, while long-term loans to developing countries enabled them to buy the French turnkey projects of infrastructure. For the last 15 years, the French government worked hard to transform the French financial system into a market based system in which specialized players, in particular venture capitalists, would emerge. From 1985 to 1995, the financial industry has been widely deregulated. Since the late 1980s, various measures were taken to stimulate the development of a venture capitalist industry.

While France continues to lay behind the EU mean in its capability to finance innovation through venture capital (Table 41), its efforts enabled the development of an actual venture capital industry able to finance the burgeoning start-ups that were born in 1999-2000. Table 42 points out that French venture funds were intensively invested in ICTs, with a bias in favor of communication technologies that reflect the French specialization in these technologies.

TABLE 41
Investment in Venture Capital as a Percentage of GDP, 1995-99

	Early stages*	Expansion*
Japan (1995-98)	0.0038	0.0127
Denmark	0.0066	0.0173
Italy	0.0089	0.0247
Spain	0.0073	0.0385
France	0.0149	0.0429
Germany	0.0183	0.0405
EU	***0.0157***	***0.0514***
Finland	0.0272	0.0443
Sweden	0.0250	0.0537
Belgium	0.0349	0.0697
United Kingdom	0.0104	0.1063
OECD-19	***0.0425***	***0.0929***
Netherlands	0.0474	0.1086
United States	0.0696	0.1373

*Early Stages refers to the financing of the launch phase of a start-up; Expansion refers to the financing of its development before introducing it on the financial market

Source: OECD, based on data from EVCA (Europe); NVCA (United States); CVCA (Canada); Asian Venture Capital Journal (The 2000 Guide to Venture Capital in Asia). Data compiled in the second half of 2000.

TABLE 42
Share of High-technology Sectors in Total Venture Capital (in %)*, 1995-99

	Communications	Information technology	Health/biotechnology
Japan (1995-98)	6.18	17.02	0.47
Italy	7.44	2.79	1.32
Spain	9.12	7.31	2.58
United Kingdom	6.88	9.45	6.61
EU	***8.15***	***11.46***	***6.77***
Sweden	5.61	11.70	10.26
Netherlands	8.08	16.60	5.95
France	12.12	11.46	7.51
Germany	7.27	17.43	9.25
Finland	6.82	17.94	10.57
Denmark	6.81	18.87	10.54
Belgium	23.42	26.24	9.61
OECD-19	***16.66***	***32.79***	***12.47***
United States	22.01	45.24	15.50

*Venture capital funding other domains of activities represents the remaining part of total venture capital up to 100%.

Source: OECD, based on data from EVCA (Europe); NVCA (United States); CVCA (Canada); Asian Venture Capital Journal (The 2000 Guide to Venture Capital in Asia). Data compiled in the second half of 2000.

While the French finance and banking industry is generally considered as less efficient than its foreign competitors at financing innovation and industry in general, it developed a quite efficient payment system relying on the fact that almost any citizen is provided a bank account with related payment means and services. The French law makes it mandatory to have a bank account and to pay large amounts through a traceable means (check, wire, etc.). Moreover, the French banking industry started to develop a single payment credit card system by the late 1970s. This system called "Carte Bleu" is very attractive for the customers since it is unique and therefore widely used by retailers (840,000 of them accept card payment). As a result in the year 2000, almost any French adult had a payment card. Indeed, 40.9 million credit cards were in use in

2000 (19.3 million Visa, 16.3 M Eurocard, 5.8 M CB) up from 19.5 millions in 1990. Payment cards are the second means of exchange (after the checks) and this should facilitate the rise of B2C e-commerce. Cards are used both for cash withdrawal (64 billions of Euros in 2000) and for retail payment (157 billions of Euros) (Source: Groupement Carte Bancaire, 2000 & Banque de France).

Another fact that should play a positive role: Francophony. French is spoken in 55 countries by 150 million people (among which 110 million are daily French speakers). The francophone space represents both a linguistic area and a cultural area where common values are exchanged and in which France has the leadership. This provides many opportunities for French companies developing on-line services to serve a wide market, although only the European and the Northern America market are wealthy enough to support significant markets.

Basic E-commerce Facts

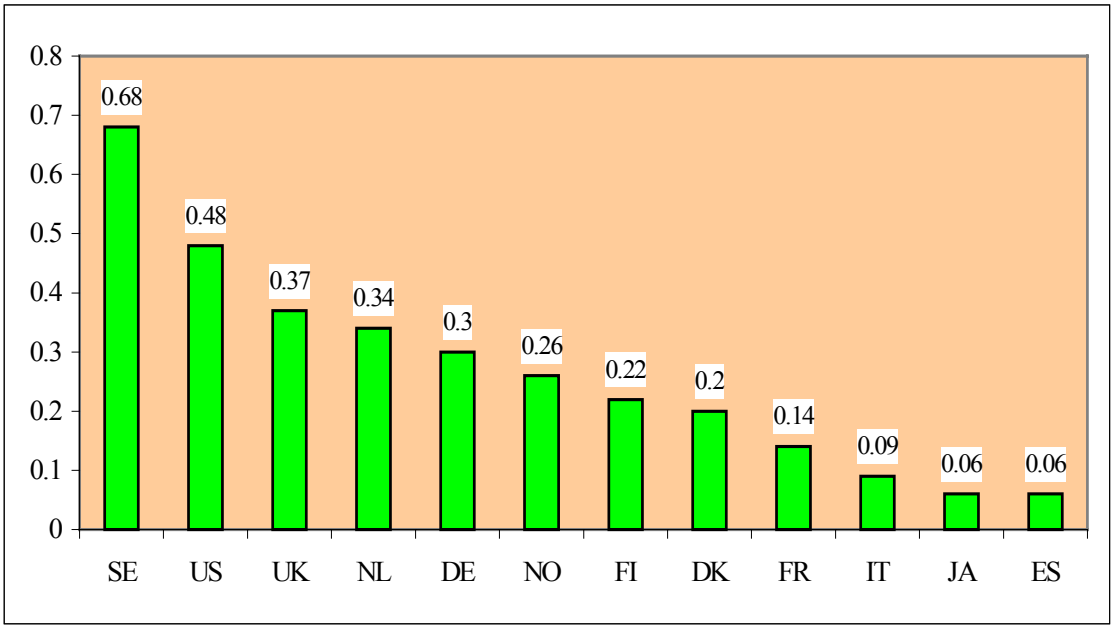
Most assessments about the level and intensity of e-commerce sales rank France in the lower quarter of developed (or European)[4] countries (Figure 8, Table 43).

[4] In Europe, final demand from consumers for electronically traded goods and services has grown only slowly over the past year. In October 2000, 31% of EU Internet users had purchased on-line and this rose to 36% by November 2001. This slightly underestimates growth in absolute numbers, as the number of users increased by nearly a quarter. However, only 4% of users classified themselves as frequent purchasers and this is a major problem for e-commerce.

There are variations between Member States in the proportion of Internet users who have purchased on-line. The pattern broadly corresponds to that of Internet penetration, higher proportions in northern Europe, lower in the south. The relatively higher on-line consumption of the U.K. and Ireland may reflect the greater availability of English language services on-line. U.K. and Ireland may also benefit from greater familiarity using credit cards. In Germany, greater experience of off-line catalogue shopping may raise the propensity for on-line shopping.

There are also indications that many willing shoppers do not complete their shopping due to high shipping/delivery costs. Another factor is trust, how confident are consumers in being able to obtain redress in the event of an on-line dispute. Lack of trust works against small firms as large companies benefit from their brand image. This may be another explanatory factor behind the greater on-line consumption of anglophone countries who are perhaps more easily targeted by large U.S. companies.

FIGURE 8
E-commerce Sales as a Percentage of Retail Sales, Year 2000



Source: OECD, quoted by, P. Mathonnet, D. Kaplan, Tableau de bord du commerce électronique Mission pour l'Economie Numérique, Issue 1.0, Novembre 2001.

It has to be remembered, however, that the convention used by most organizations to assess e-commerce (Internet sales) disfavors France, and does not provide the observer with a precise vision of the commercial use of electronic networks.

- While decreasing, a significant volume of business (especially B2C) is still performed on the Minitel network (Brousseau, 2001). The professional association of on-line service providers (FEVAL) estimates that Internet sales accounted for 670 millions Euros (in 2001), while the Minitel generated 550 millions Euros of sales.[5]
- Traditional EDI is used intensively in the distribution and automobile industries that both represent a significant share of French industry (Table 8).

While French figures should be up-graded to get a better vision of the actual situation, it is clear that the recourse to the Internet to trade is less developed than in countries of similar development. This is not a surprise since there are fewer Internet users and on-the-Internet service providers in France. This shortage of players is further reinforced by a lower propensity of Internet users to trade on-line.

[5] In addition, it generated 440 millions Euros of revenue for on-line information services providers (potential registration fees are not taken into account). These 440 millions correspond to information services and not to telecommunications (access) services as sold by ISPs. Indeed the "Kiosk" system enables the telecommunication operators to charge telecommunication bills for the information services provided by third parts. Information services providers do not therefore directly bill the users, while they provide fee based services ranging from database access to transactional services (Cf. Brousseau, 2002b and c).

- Few French companies buy or sell on-line (Figure 9).[6]
- French Internet users seem to be more reluctant than their foreign counterparts to buy or sell on-line (Figure 10).

However, French dynamic performance is better than static figures suggest.

- B2C transactions on the Internet increased tenfold from 1998 to 2000. Aggregate volume was 4 billion francs in 2000, up from a mere 400 million francs in 1997.
- Over the past three years, France's share of European e-commerce over the Internet has doubled. It rose to 8.8% of consumer purchases in 2000, from 4.8% in 1998, and increased over the same period to 11% of all B2B transactions, from 5% earlier.

The Parisian "niche" and the French pace of development enabled almost 100 on-line sellers to survive by the end of 2001. Among them 30 companies are already profitable. The profiling of these profit-making on-line sellers is stimulating. Less than 10 of them are pure players. Their common characteristic is to have adopted reasonable strategies by not going international at first, and by consolidating a core business (that is not quite innovative most of the time). Main companies in this category include RueduCommerce, Paysan.org, Chapitre.com, and Kelkoo. The remaining 20 profitable on-line sellers are all subsidiaries of traditional big players: either retailers (Alapage, Fnac.com, Darty.com, etc.), or transportation companies (sncf.com) (Le Monde 26/03/2002).

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[6] At the European level, overall take-up by businesses is still relatively slow. On average, around 20% of European companies buy and sell over the Internet, with Germany, Ireland and the U.K. spearheading the sales part and Denmark and Finland strong on the on-line purchasing side. Big companies are buying and selling more on-line than small companies and the services sector is clearly in the lead regarding the use of the Internet to sell or purchase goods and/or services.

In six Member States, more than 30% of all enterprises purchase some or all of their supplies via the Internet, with Finland and Denmark above 40%. At the other end of the scale, only 5% of Portuguese and 10% of French enterprises use the Internet to purchase their supplies. The percentage of companies selling on-line varies from more than 30% in the U.K. and Germany to less than 10% in Spain, Greece, and Portugal. The same level of disparity applies to the use of electronic marketplaces where figures range from 3% of companies in Portugal to 21% in Germany.

These results confirm both other benchmarking results and the conclusions drawn from measuring Internet penetration and Internet access costs. In those countries with a high level of Internet penetration and low Internet access costs, more companies use the Internet to buy and sell on-line than in less advanced countries.

The fact that fewer companies sell than purchase on-line is probably because of the higher costs of on-line selling. Buying only requires a connection and a credit card, whereas selling requires a Web site to be set-up and maintained with adequate security and possibly logistics organization. This European disparity between buying and selling on-line is not observed everywhere. In France, in particular, the percentage of companies buying on-line is the same as the percentage off companies selling on-line (see Figure 9).

TABLE 43
E-commerce in 2000

E-commerce	Secure servers per 100,000 population 2000[a]	Secure servers with strong encryption per 100,000 population 2000[a]	B2B trade in US$M 2000[b]	B2C trade in US$M 2000[b]	% e-commerce Sales of GDP 2000[b]
Sweden	11.23	6.29	$2,360.79	$736.23	1.36
United Kingdom	10.25	6.33	$13,815.62	$3,873.00	1.25
Switzerland	14.58	9.11	$2,291.27	$496.47	1.16
Denmark	6.82	4.09	$1,474.51	$261.39	1.07
Norway	8.03	4.84	$1,402.42	$308.03	1.07
Germany	6.07	4.60	$15,171.02	$3,185.51	.98
Austria	7.68	5.63	$1,487.05	$315.11	.95
Finland	9.09	6.30	889.98	$213.64	.91
Netherlands	4.84	2.73	$2,734.78	$441.04	.86
Italy	1.77	1.10	$5,544.70	$841.43	.60
Belgium	3.37	1.50	$1,156.11	$170.01	.59
France	2.67	1.25	$6,170.95	$1,119.60	.57
Ireland	8.98	6.19	$346.70	$82.76	.45
Spain	2.28	1.27	$2,001.21	$405.99	.43
Greece	1.12	.74	$295.48	$50.00	.31
Portugal	1.33	.86	$285.72	$39.56	.31
United States	28.30	25.11	$118,457.20	$44,084.29	1.63
Scandinavia[c]	9.16	5.53	$6,127.71	$1,519.30	1.14
EU[d]	4.98	3.18	$53,734.62	$11,735.30	.84
OECD[e]	10.09	8.39	$268,500.30	$69,146.65	1.33

[a]*Source:* Netcraft. http://www.netcraft.com. Strong encryption is defined as having a key length greater than 40 bits (systems limited to a 40-bit key are classified as 'weak' since it has been shown that messages encoded using a 40-bit key with RC4 can be broken in about a week by a good computer science student using facilities available in a good computer science lab).

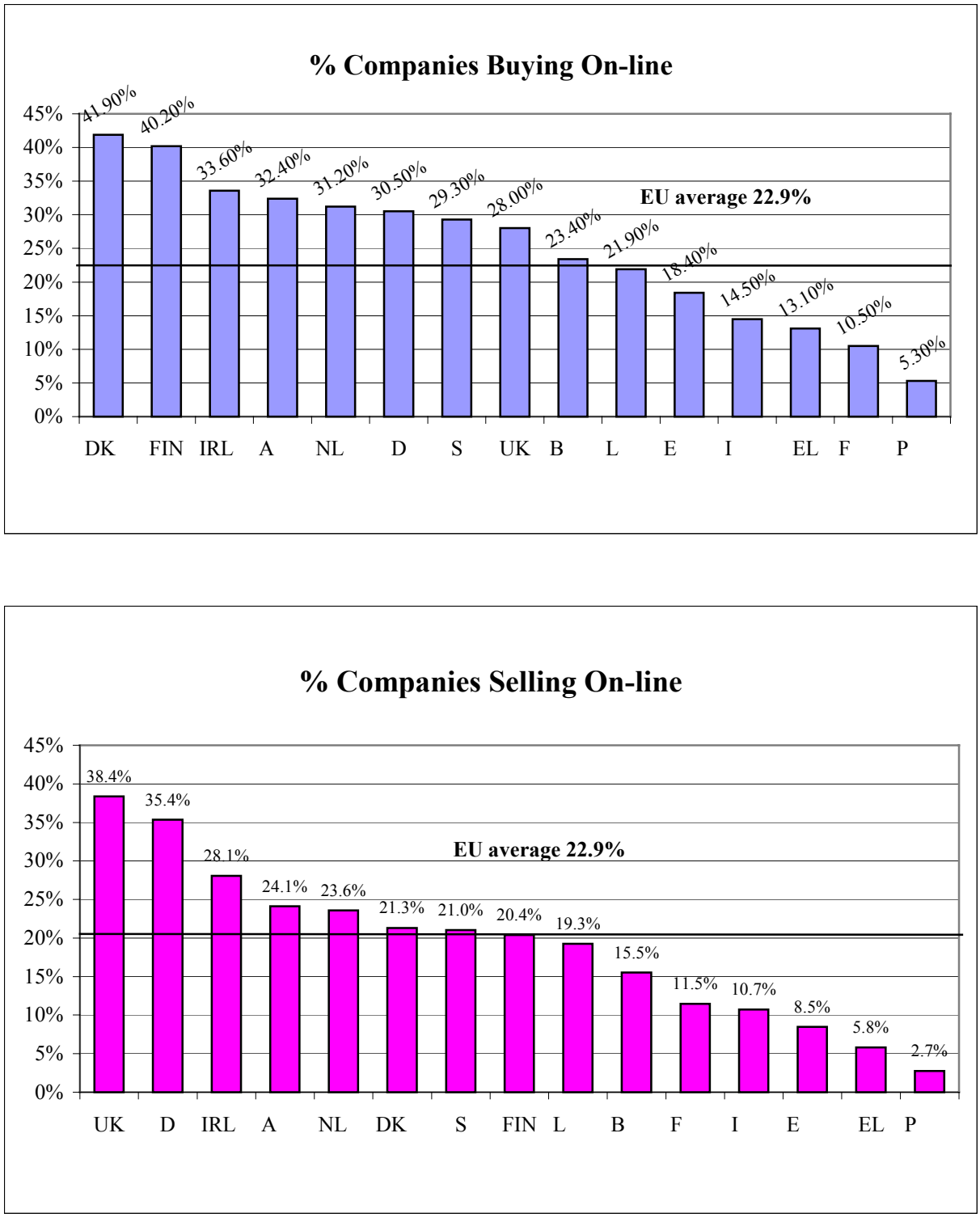
[b]*Source:* IDC, Internet Commerce Market Model, Version 8.1 (2002).

[c]Only countries included in the 44-country sample are used in the classification. Scandinavia here consists of the following countries: Norway, Sweden, Denmark and Finland.

[d]Only countries included in the 44-country sample are used in the classification. EU here includes the members of the European Union excluding Luxembourg.

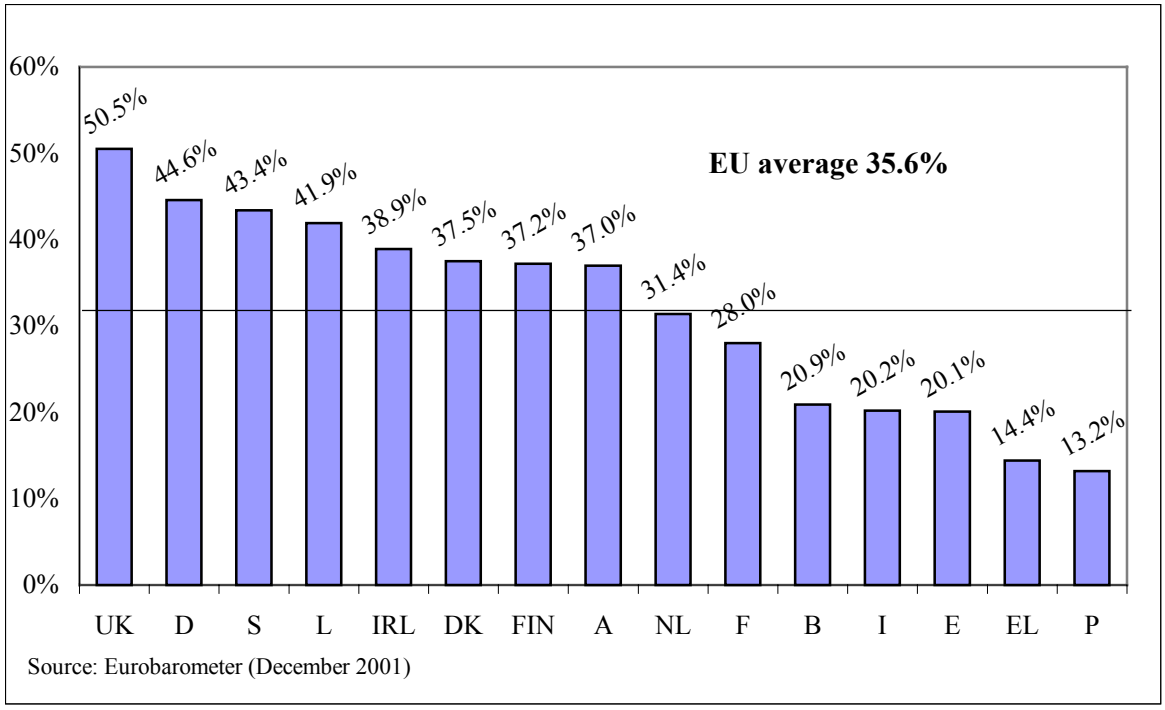
[e]Only countries included in the 44-country sample are used in the classification. OECD here denotes the OCED member countries, excluding Luxembourg, Slovakia and Iceland.

FIGURE 9
Percent of Companies Buying or Selling On-line



Source: European Commission (Eurobarometer, November 2001).

FIGURE 10
Percent of Internet Users Buying On-line



NATIONAL POLICY

Given the gap between the U.S. and Europe, and France in particular, in the development of the Internet and e-commerce, both the European Commission and the French Government implemented policies to stimulate the evolution of Europe and France toward a digital society.

These policies, implemented in the late 1990s, were in a sense the follow-up to former policies in the Union and member states to strengthen European competitiveness. In particular, these policies led to the deregulation of most network industries throughout Europe, to coordinated efforts in high-tech industries (ranging from integrated R&D programs to support for the emergence of "continental champions"), to creation of a single market that is more competitive and allows firms to fully exploit economies of scale, and to the implementation of the single currency in January 2002, that forces members to run joint economic policies.

Since the EU policy was the force in many European countries for the modernization of policies to adapt industry to a more competitive and global economy, the Union played a major role in the design of national e-policies. Indeed, the stakes raised by the information society and e-commerce were perceived as calling for a deepening of this modernization policy. In addition to additional deregulation in the telecommunications and services industries, the rise of digital networks and related new practices has been seen as a way to promote change in many fields such as the functioning of public services or the performing of governments. Moreover, most national states identified that the relevant level of action was the European regional one. Since a European single market existed, it would have been irrelevant to develop incompatible national

policies in the matter of digital networks and e-commerce. In addition, many national state recognized that a unified Europe would be more able than each state to develop and implement policies that would fit the basic principles of the European humanistic and democratic principles…. and economic interests. Put another way, coordinating national policies was seen as the only way to balance the U.S. hegemony in all areas of digital networks: regulation of the networks and of the content, enforceable legal principles, privacy, control and security of digital exchanges, anti-trust issues, e-commerce and e-business.

France's national policy in e-commerce cannot be understood without considering the EU policy. The European Commission, which is the administration that implements the EU policy under the control of the European Parliament, uses two major tools:

- Directives, that have to be approved by the Council, that make mandatory adaptation by each member national laws in order to harmonize them according to the guidelines stated by the EU. These directives are not laws per se, but they make mandatory the implementation of legal principles in each national law. Consequently, when the EU publishes a directive, there is a 2 to 4 year delay before generalized enforcement in all member states.
- Integrated programs that distribute funding according to the priorities decided by the Council of Government. These funds support coordinated policies in R&D and support specific industries (especially, agriculture, culture and education).

As far as it concerns digital technologies and e-commerce, the EU policy lies principally in the passing of directives aimed at harmonizing and adapting the European institutional framework. The policy also focuses on the development of several European programs aimed at stimulating R&D and the development of innovative uses of ITs. Member states coordinate their national policy in of education and e-government, etc. to stimulate the spread of ITs throughout Europe.

While France launched a decentralization policy in the 1980s, it remains a highly centralized country. Cities and regional governments have quite limited power economics affairs, technological policy, education, and public infrastructure. While the economy was considerably liberalized in the 1980s-1990s, the national state continues to have a deep influence on the behavior of businesses. Consequently, the central government is the principal designer of e-policy. The liberalized environment (EU antitrust policy, WTO) and the intrinsic nature of the digital revolution favors decentralized innovation. The France elite became convinced that the traditional interventionist public policies were somewhat useless, and so the government implemented a policy that is principally based on the design of an appropriate institutional (legal) framework and incentives, rather than on direct intervention into the economy. Such a policy is efficient if local governments, business and citizens use the tools provided by the government to leverage their own efforts. A part of the French policy is also performed at the diplomatic level when the French government negotiates the making of the EU policy in Brussels.

The French policy cannot be understood without considering simultaneously the European policy since both policies are designed in close co-operation. Indeed, the EU plays a strong role in harmonizing national policies so as to deepen the integration of European national economies. Moreover, the EU identified ITs as a strong driver for the modernization of Europe. It strongly incited national governments, and also local authorities, businesses and citizens, to "think digital" and to develop innovation related to ITs. In the following pages, we will develop the

main features of the French policies regarding information society then e-commerce. However, this presentation should be completed by the analysis of the EU policy, which is described in Brousseau [2002b].

In both cases, the aim of the policies is twofold. First, it is to reduce the digital divide between Europe (or France) and the U.S. Second, it is to use the innovative potential of these technologies, especially when they are applied to business and governmental practices, to boost reforms in Europe and France. At the same time, most European decisionmakers do not consider that these technologies impose a specific social logic. The purpose is to use these technologies to stimulate the rise of a more flexible, democratic, and equitable society based on a dynamic economy featured by a sustained development path.

French PAGSI: The Knowledge Based Economy and the Information Society as a Main Target

The French government implemented a voluntary policy aimed at stimulating the rise of the Information Society and Digital Economy in 1998. The new government led, by Prime Minster Lionel Jospin, made France's entry into the information society one of the government's top priorities and launched a program called PAGSI (Government Action Program for the Information Society), which is still in Force in the year 2002. The objective was to "build an information society for all" to prevent a widening of the "digital gap" and to help France catch up with other countries in terms of Internet use.

This official involvement contributed to the removal of obstacles that hindered the development of the Internet in France. The program based on a set of priorities and a budget around Euro1.5 billion for the past four years, has begun to produce results. Given the main obstacles identified in 1997, PAGSI focuses on seven main targets:

1. Developing Internet access
2. Stimulating the use of ICTs in education
3. Setting a cultural policy aimed at developing content and services
4. Meeting the challenges of industrial and technological innovation
5. Using ITs as a tool for modernizing public services and for stimulating the use of ITs by the population and businesses
6. Encouraging the emergence of effective regulation and a protective framework for digital networks
7. Facilitating the development of e-business and e-commerce

These are detailed below:

1. Developing Internet access. In 1997, while the French Telecommunication market was largely open to competition[7], access to the Internet was scarce and costly. Dial-up on the telephone network was costly because of time metering of local calls. In 1998, the government implemented a special regulation aimed at suppressing metered time access to Internet servers. In addition, it resolved the conflicts among cable operators and telecommunications operators that delayed the deployment of cable access to the Internet. It also promoted the development of ADSL and wireless access to the local network.

More generally, the French government promoted competition among telecommunication operators and ISPs to multiply the channels and decrease the costs of access. The major act in that respect was the Decree of 12 September 2000 that broke up the monopoly on local loops and allowed private operators access to France Telecom's local networks.

At the same time, the government took more voluntary actions to develop access. In particular:

- It decided in 2001 to promote the development of broadband Internet by generalizing the principle of open access to the mobile Internet providers and satellite service providers. It also removed barriers to the subsidization of telecom infrastructure by local authorities and decided to force telecom operators to implement broadband capacities and access. Over the next five years, broadband access to the Internet will be made available nationwide, including in areas with few facilities. The CDC, a public bank specialized in the support of local governments, has set up an assistance fund to which it will contribute 1.5 billion francs from its own assets over the next 5 years. Low-interest, 30-year loans will be available for local governments, jointly financed by banks as part of a 10-billion franc program. In addition to financial assistance, a dedicated agency, CIADT, has called for access to the national electrical power grid for the development of an optical fiber telecommunications network.
- Since substantial inequalities remain in terms of access to computers and the Internet, the government has taken several measures to enable more people to take advantage of new information technologies. By 2003, a total of 7,000 public terminals will have been set up at public libraries, post offices, employment centers, information centers, town halls and voluntary agencies. They will include 2,500 public "digital facilities" where, in addition to gaining access to tools, the public will be offered a free introduction to multimedia in the form of a "passport to the Internet and the new media".

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[7] In France, the liberalization of telecommunications began in 1986 when a principle of open competition in mobile communication was implemented. The national public telecommunication operator, France-Telecom, became independent in 1990, right before the competition was launched in long distance telephony (1991). In 1996, France Telecom was privatized and the Law on the Regulation of the Telecommunication Market was passed. It implemented a principle of generalized competition, regulated by an independent Regulation Commission: the ART, established on 1/1/1997. The new law allows the ART to provide license to large networks and services; a simplified registration process governs the entry of small networks and local services. It supervises the settlement of interconnection tariffs that are either negotiated or regulated depending of the size of the competitors. In 1998, universal service obligations were made mandatory to all network operators. In the year 2000, the local loop was fully deregulated. According to OECD, France is now one of the countries in which the telecommunication market is the more open to competition.

2. Schools with computers and access to the Internet. Until 1997, the Government was not involved in the development of multimedia training in schools. During the years 1994-1996, the only governmental policy was to push local public authorities (responsible for the infrastructure of education in France) to subsidize the connection of schools to the Internet. However, nothing was done to stimulate the development of content and the digital literacy of teachers. Moreover, since the contents available on the Internet were mostly in English, the incentives to use it were poor.

French authorities were reluctant to develop a voluntary policy in favor of ITs since a major plan of computerization of schools, launched in the years 1983-1985, had failed because the French government of that time made the wrong technological choice. Briefly, in the early 1980s France recognized the importance of developing digital literacy and launched a major plan to equip schools with at least one computer per room. However, French PCs (manufactured by Thomson) were preferred to IBM and Apple PCs, resulting in a useless park of computers because of the shortage of software and what the pupils learned in school was somewhat useless at work where IBM PCs were preferred. This costly and inefficient plan of computerization of schools discredited both the Government and the teachers that had supported it, resulting in a "wait and see" policy when the Internet began to develop.

The French government, therefore, decided to implement a new policy based on the idea that the dominant standard technology should be adopted and that the policy should not address the issue of connection only. The development of content and the enhancement of teachers' digital literacy were considered as priorities.

Today, multimedia training is available in all teacher-training institutions and many specific and advanced programs have been launched. However, due to the shortage of specialists in ITs, it is quite difficult for the school system, especially at the high school and university levels, to keep skilled people to teach MIS to students.

The vast majority of schools are now connected to the Internet (Table 44). However, when compared to other European countries, France remains behind the most advanced countries in the use of the Internet and computers at school (Table 45).

TABLE 44
Percent of Schools with access to the Internet

	1997	2000
Grade school	0.6	30
Junior high school	11	89
High school	32	98

Source: French Ministry of Education, 2001

TABLE 45
Pupils Per Computer in EU Schools

	Off-line computers				On-line computers			
	Primary	Secondary	Prof./tech.	All Schools*	Primary	Secondary	Prof./tech.	All Schools*
Denmark	4	1	2	3	6	2	3	4
Finland	7	7	3	6	12	8	4	8
Sweden	10	4	4	7	14	5	5	8
Netherlands	8	9	3	8	44	15	5	28
Ireland	12	8	1	9	30	13	2	18
Austria	11	9	6	9	39	11	7	17
United Kingdom	12	6		9	23	9		15
Belgium	11	8	3	10	33	14	6	24
France	16	10	3	11	49	22	7	27
EU	**15**	**9**	**4**	**12**	**37**	**15**	**8**	**25**
Spain	14	14	4	14	39	28	7	30
Italy	22	9	8	18	59	19	19	46
Germany	23	14	29	20	63	23	48	40
Greece	67	17	5	20	183	43	11	53
Portugal	26	18	6	25	56	40	10	54

*All Schools = means of Primary, Secondary, and Prof./tech.

Source: Commission of the European Communities, e-Europe 2002 Benchmarking, European youth into the digital age, 2001

A new engineering school specializing In Internet and digital technologies was created in 2000. It is supposed to complete the existing French system of education in IT that already has a large number of engineering schools, which specialize either in telecommunication or computing and two business schools, which specialize in MIS, as well as several university departments.

3. Setting a cultural policy aimed at developing content and services. In line with the e-Content European Program (Brouseau, 2002b), the French government identified the lack of French content on the Internet as one inhibitor to its democratization and intensive use. Moreover, due to French historic and cultural heritage and the attractiveness of the label "France" to many foreign citizens, the French know-how in software development and on-line services (Minitel), the development of the WWW is perceived as an opportunity to enlarge the distribution of French cultural, entertainment, and information services. Developing content should consolidate France's presence on the Internet, allow the development of on-line cultural industries and services, stimulate the valuation of France's touristic capital and niches, and open new spaces for artistic creation.

Steps have been taken to provide support for multimedia publishers and authors, to encourage the development of French-language multimedia and on-line content. A fund managed by the National Center for Cinematography provides support for the creation of French multimedia products and their translation into other languages. A fund for innovation allows all multimedia SMEs to benefit from the advances of research in the domain. A modernization fund for daily newspapers and news services contributes to the digitization of these media and their archives. The Ministry of Education coordinates a web of firms involved in the production of multimedia educational content, and grants products with an “educational interest” a special label. In

addition, the French Ministry of Education launched in 2001, a plan to support public universities in the development of on-line education programs. In each of their own areas of expertise, the various ministries are supporting the development of French content. France is, however, still at the very beginning of that process.

In the same spirit, The French government supported the development of strong French companies in the communication and entertainment industry. Vivendi-Universal or TF1, for instance, is the product of such a policy. It did not benefit from any public subsidies, but the company, and many others involved in the media industry, got support from the national or local authorities that facilitated the provision of licenses in France and abroad, and initiated or facilitated mergers and acquisitions.

However, to date, the French "voluntarism" did not turn into a really significant, comprehensive and consistent program. Many initiatives have been taken and the industry and the research community benefited from the spreading of public funds. These means are insufficiently coordinated and concentrated, resulting in uncertain impacts.

4. Meeting the challenges of industrial and technological innovation. The fourth aspect of the governmental policy was to enhance the French research capabilities in ICTs. The governmental action plan had two targets: (1) to stimulate a close cooperation between public research and private businesses; (2) to reinforce the public research capabilities in ITs.

More Funds and a New Organization for Public Research and Development

Public funding for private innovation has been multiplied by four in 1998 and by three in 2000. Moreover, the government targeted some specific domains considered of strategic importance: ITs and biotechnologies.

In July 2000, the government decided to allocate an additional 1 billion francs for research and to increase the number of persons working on information and communications technology in the public research sector by 25% over the next five years. Grants from the National Science Fund (FNS) and the Technological Research Fund for work on information and communications technology were increased by 50% in 2001. The number of people working for the National Information Technology and Computer Research Institute (INRIA) is expected to rise significantly by 2003 (to 1,180 from the current 755), as will the Institute's budget (which was increased by 60 million francs in 2001). The National Center for Scientific Research (CNRS) added 40 new positions in 2001 and reorganized in order to create a new department fully dedicated to research in information and communication sciences and technology.

Significant and Effective Incentives for Business

Government incentives for businesses to make use of the Internet and upgrade their information systems have been implemented. Measures have been taken to make more venture capital available (a fund of 900 million francs was created in 1998 and an additional one billion franc fund was approved in 2000 (Table 41). Tax incentives have been offered to life-insurance funds that invest in equities and venture capital. The 1999 Finance Act created special warrants for

employees of new companies, which allow firms to grant their employees a special stock option plan. The legislation, which has encouraged start-ups in France, was extended in 2000.

These measures, together with the development of the Internet bubble, had a significant impact on the French ability to launch new innovative businesses. The number of firms listed on the Nouveau Marché of the Paris Stock Exchange (the French market for the introduction of successful start-ups) rose from 24 1997 to 179 in 2001. New firms in the field of information technology have been accounting for a steadily rising proportion of all start-ups. From 3.9% of the total in the first half of 1996, their share rose to 5.7% in the first half of 2000 and 6.5 in the second half of that year (Table 42). In 2000, almost one in every 15 start-ups was in the information and communications technology sector. More important, the absolute number of high tech start-ups went from 7,653 in 1998 to 10,777 in 2000.

5. e-Government: Modernizing public services and inciting France to go on-line. In 1997, the government and its agencies could not be reached via the Internet. Since then, making government services available on-line has been a priority of the government's modernization program. Access to government agencies via the Internet has improved considerably. In April 2001 the Parliament's member T. Carcenac pointed out that close to 4,200 Web sites had been created in the public sector (local authorities, universities, national government agencies, ministries, decentralized public services, etc.) over the past four years. Most services were considered as still insufficiently interactive.

Free access to essential public data has been expanding rapidly. The official Gazette and legal announcements have been posted on the Web since January 1998; official government reports since January 1999; and requests for proposals by government agencies since July 1999. The National Library's site, which was opened in January 2000, provides free access to 35,000 works on the Internet, as well as 45,000 images. The government journal for voluntary agencies and collective agreements went on-line in 2001. Some 1,100 official forms can be obtained on-line as of the beginning of 2002 (up to 600 by the end of 1999). This represents all the administrative forms that individuals have to manage and most of the current administrative registration procedures for businesses.

More than 80 major on-line public services are now available. In particular, all laws and public decisions can be retrieved on line (since the year 2000). In 2001, several on-line procedures were launched after the implementation by the French administration of digital signature. For instance, tax registration and on-line reverse auction for public procurement have been implemented.

Modernizing the Operations of Public Institutions

In conjunction with the effort to facilitate the access of citizens and business to governmental services, the French government boosted the diffusion of ITs in public administration. The objective was, to catch-up with the private sector in terms of computerization and to use the digital revolution to implement changes in the public methods of management.

In January 2000, the government's planning department (Commissariat au Plan), issued a report (Lasserre's report) claiming that the public sector had caught up with the private sector in terms

of computer use. By April 2001, a total of more than 675,000 personal computers were in use at government agencies, at least half of which were connected to the Internet or to an intranet, and more than 300,000 could receive e-mail (30% of all work stations in 2001, up from 5% in 1997).

By mid-2000, an Intranet linking all the Central State Public Administration was launched. All ministries are now connected to the government's intranet (AdEr), a fast, secure system designed to facilitate the sharing of information by agencies. Regional information networks (the intranet linking national government agencies in a region or department) are valuable instruments for promoting interdepartmental cooperation at the local level. All regional information networks have been operating since the end of the first quarter of 2001; 85% were already in use at the end of 2000.

The results of these policies are obvious. Surveys of a sample of public sites conducted in 2000 and 2001, show that the number of visitors rose by a factor of 4.5 from 1998 to 1999 and doubled again between 1999 and 2000. French Internet users are among the more intensive users of e-Government services (Table 46) and, according to several surveys, the quality of these services is high. Moreover, civil servants use the Internet more intensively than French citizens in general: one-third civil servants use either the e-mail, the Web or an intranet, while only one-fourth of French citizens do (Sofres 2002, www.internet.gouv.fr). While it is too early to assess whether this policy will be able to modify significantly the efficiency of public services and the relationship between the public bureaus and the citizens, it is obvious that e-government applications play a strong role in inciting business and citizens to go on-line, both because of the quality of the services and because of the influence of the state in France.

TABLE 46
On-line Contacts with Public Services: Changes between June and November

In % of all Internet users	June 2001	November 2001
Sweden	63	67
Denmark	57	63
France	49	55
Belgium	47	50
Netherlands	46	47
Total EU 15	**43**	***45***
Italy	42	44
Germany	41	43
Spain	42	42
United Kingdom	38	37
Finland	42	36

Source: EOS Gallup Europe, Internet and the Public at Large Flash Eurobarometer 112, European Commission, Directorate General « Press and Communication », November 2001

It has to be recognized that, while this is one of the domains in which France seems to belong to the group of most advanced European nations, many services have still to be developed to really generalize the notion of e-government. Moreover, public administration is still far from functioning as on-line public services. As in private companies, organizational changes and process re-engineering are complex to manage, and take time. E-government and e-administration initiatives remain pioneering applications that do not reflect the performance of the entire French administration, but they play a very strong demonstration role for civil servants, for public and private decisionmakers, and for citizens.

6. Reshaping the legal framework for digital networks. Because of the early attention to privacy in a digitized society (Law on "Computers and Society", passed in 1976), and of the early development of on-line services (the Minitel has been in use since 1982), the French legal framework had already been adapted to many aspects of digital networks. However, the French government passed a series of laws in 1999-2001 to adapt the French legal framework to the development of the Internet and electronic commerce. Since many of these measures (freedom of encryption, recognition of digital signature, etc.) relate to e-commerce, they will be detailed in the next section. One of the essential elements in the reshaping of the French legal framework is the Law on the Information Society (LSI) that was passed in the summer 2001. It seeks to raise public confidence in networks by guaranteeing freedom of expression on-line, setting forth the legal framework for electronic commerce and improving security. The legislation also aims to extend Internet access to all by improving access to computerized data and promoting the expansion of networks throughout the country.

The later aspects of LSI have already been mentioned as components of the Internet access policy of the French Government. We focus therefore on the public liberty aspects of the LSI, which seeks to:

- Reinforce on-line privacy and on-line freedom of speech: The European principle of banning racist and sexist speeches, as well as certain forms of pornography, and of protecting personal life are maintained, freedom of speech over the Internet has become recognized by aligning the Internet with the rules that regulate other media. However, ISPs are non-liable for content and governmental agencies are able to track and to sue individuals or organizations responsible for publishing unauthorized content. In the matter of privacy, it is now mandatory to erase all archives related to the use of the Internet. Databanks of personal records can be more easily created than before, but the rights of the individuals for their personal data have been reinforced (any individual can check personal information in any databank, modify it and claim for easement). Authority of the National Commission for Information Technology and Liberty (CNIL) to control how these databanks are used has been expanded. This regulation does not discriminate between public and private databanks.
- Promote on-line democracy: The law implemented a principle of systematic on-line consultation about bills. In addition it set up a forum of the rights and laws of the Internet. This is a consultative body, composed of representatives from various government components, businesses, and of "Civil Society". It aims to constitute a think tank on needed evolutions of the law, of regulatory frameworks and of the institutional frameworks to govern the Internet and the activities it supports. Both innovations, while they remain experiments, are very important in the French institutional context, since they recognize a de facto right to "co-regulate" private entities and individuals.
- Reinforce network security: There is now total freedom for cryptography, but the Law is designed as a regulation to govern Police digital search. It also increased sentences against digital crime (e.g., viruses; former law of 1988). The Government took two additional measures to improve network security:
- In 1999, it created a computer emergency response team (CERT/A) in charge of detecting attacks on government information systems by “hackers”, as well as monitoring technological advances.

- It created an agency to fight crime involving information and communications technologies (Decree of 16 May 2000); this interdepartmental agency has been granted nation-wide jurisdiction. It provides assistance to all agencies responsible for fighting computer crime.

7. Facilitating the development of e-business and e-commerce. This aspect of French policy is developed in the next section.

E-Commerce Policy

E-commerce policies are only one aspect of more general policies launched by the EU or by the French government to stimulate the use of the Internet and to develop the information society. In addition, there are two main elements: (1) the development of a legal framework adapted to e-commerce and (2) the setting of a task force within the Ministry of Economics, Finance, Commerce and Industry aimed at making recommendation to the Government to take relevant legal measures or to implement specific policies.

1. Legal framework to protect exchanges and privacy.

a. Encryption: total freedom of use in France. In the year 2000, the government decided to amend the law of 1996 that was no longer appropriate as it restrained the use of encryption, without allowing the authorities to efficiently combat cyber crime. The new law is based on the following orientations:

- It implements total freedom to use encryption products, with one restraint to maintain control over exports, which result from France's international commitments;
- It suppresses the mandatory nature of having recourse to a third party while it extend the role of these intermediaries to other tasks, such as certifying electronic signatures. Recourse to self-enforcement and private enforcement is encouraged. However, certifying entities are allowed to apply for certification by a public authority.
- It allows the authorities to efficiently combat the use of encoding procedures for illicit ends. To this end, the pre-existing legal frame was supplemented by new obligations to reveal the transcription of encoded documents to the legal authorities when they so request. Moreover, the technical capacities of the authorities were reinforced.

b. Data of a personal nature: ensure a high level of protection. The transposition of the 1995 European directive dedicated to the protection of data of a personal nature was performed in 2001. It recognizes the freedom of creating databases, based on personal data, but forbids merges of such databases (either within the government or among private operators). It reinforces the right of citizens to control the content of these databases and to forbid certain types of uses. It reinforces the means of the National Commission for Information Technology and Liberty (CNIL) and reinforces its power to control expost how personal data are processed.

c. Digital documents and electronic signatures: lift the legal obstacles. Legal obstacles to fully digitized exchanges were removed by modifying the law to allow secured on line exchanges. The "Evidentiary Law and Electronic Signatures" was passed in 2000 and acknowledges the legal force of electronic documents and signatures.

2. The E-commerce Task-force

In 2001, the *Mission pour l'économie numérique* (Digital Economy Task Force) was established. It coordinated the work of nine working groups and the completion of an e-commerce scoreboard (Table 47). A second phase of work starts in 2002 with the setting-up of an "international" group, making it 10 working groups.

The working groups do not directly have authority to make decisions. However, they are granted resources to prepare decisions. Their strength is due to the fact that they mix representatives from different components of the public administration and the business world. They group various skills and benefit from certain legitimacy due to their ability to take into account various stakeholders' interests.

TABLE 47
Working Groups of the E-commerce Task Force

Working Group	Description
I: Macro-economic and sectoral impact.	In a first phase, the Group made an analytical survey of available studies concerning the impact of ICTs on growth. It now focuses on the production of statistical data for to analyzing the impact of ICTs on work organization and labor productivity, and how various contextual factors (such as labor flexibility, monetary policy, lead times, and effectiveness of training) influence the impact of ICTs.
II: The digital economy and businesses.	The group puts forward 22 proposals for action in two main areas: government support of SME interest in ICTs, and better coordination between local and national levels (support systems, coordination with local stakeholders, and training policy).
III: The digital economy and competition law.	The group studied the competition issues raised by changes in B2B relations arising from the digital economy, especially through the marketplace. It focuses on the relationship between competition law and the industrial/intellectual property rights protecting both hardware and software; the impact of digital technologies on the competitiveness of the relationships between distributors and between distributors and consumers.
IV: E-consumers and confidence.	Following the work done by this group in the field of consumer protection, a press release on codes of conduct and seals of approval will be issued in 2002. The initiatives by the OECD, European Union and large businesses in the GBD is carefully studied in order to ensure the consistency of the French regulation of consumer protection.
V: On-line financial services.	In the first phase, the group issued recommendations on the security of payment facilities used on the Internet. It is now responsible for implementing them, in particular by designing an information repository (development procedure and payment facility conformity); creating a security label, investigating the feasibility of setting up a central certification authority to issue digital certificates; improving user protection.
VI: Security of electronic procedures.	This group is responsible for designing and the "*e-Ministère*" (e-Ministry) program aimed at implementing most governmental services on-line.
VII: On-line public procurement.	This group is responsible for the generalization of the uses of Internet tools and marketplaces in public procurement.
VIII: Legal certainty of electronic procedures.	This working group focuses on determining the legal "weak points" of electronic procedures and, where appropriate, proposing legal or practical solutions.
IX: Fraud control.	This working group will set up a technological intelligence network ("e-watch") to acquire and pool the special technical expertise needed by inspection and auditing directorates.
X: International.	The purpose of this group is to coordinate French action in international bodies.

E-Commerce Drivers and Inhibitors

The French case illustrates the complexity of the web of factors influencing e-commerce adoption. As will be argued hereafter, some factors are clearly drivers or inhibitors, while some others play a more dialectical role. Moreover, the role of some factors can evolve with the passing of time. For instance, late adoption by one group of users is at the beginning an inhibitor, because it prevents adoption by other groups. It can then favor catch-up because late adopters benefit from the experience of early adopters, and can implement the most recent technologies or the most advanced practices.

In the case of France, early adoption of e-commerce practices in the 1980s, through the spread of Minitel (for B2C) and EDI (for B2B) clearly played an ambiguous role (Brousseau, 2002c). Both technologies accustomed the population and businesses to on-line sales. Moreover, they stimulated business process re-engineering. In that sense, these technologies stimulated readiness. However, they also slowed the adoption of the Internet, both by households and businesses. This had an impact on e-commerce adoption because most innovative practices were developed on that new platform. French e-commerce players remained national, depriving themselves of the benefit from their 10 years of experience when e-commerce became a global activity. In the long run, it is not clear whether early adoption will continue to be an inhibitor or not. Indeed, readiness should favor catch-up (to the limit that the dot com crash severely reduced enthusiasm and dried up the capital market).

There are however clearer driver for the diffusion of e-commerce. Two of them are common to B2B and B2C. The first is the French level of wealth and the quality of its infrastructure (telecommunication, transportation, but also legal or financial). Both for consumers and firms, cost of entry into this activity (and risks) are relatively low since a modern, dense and reliable economic and logistic infrastructure is available. Second, the French economy is quite open and internationalized. Foreign firms already operate many activities and can implement international practices. French firms, at least the large ones, are competing on the global market and do experience and implement e-commerce abroad.

In addition, some other factors play a more specific role in each of the e-commerce segments:

- On the B2B market, one should mention first, the French and EU modernization policies that has existed for the last 20 years. Firms became more flexible, more internationalized, more accustomed to competition and reorganized accordingly. This was a necessary condition for the implementation of e-commerce practices. Second, public policy and the effort made by the telecommunication operators in favor of the Internet, while late, were essential to popularize B2B e-practices and to incite adoption (both through decreasing prices and providing subsidies to innovators). Third, the readiness of business services companies was a vector of diffusion, both because French firms benefited from an efficient supply of consultant services or ready-to-use on-line services, and because business services providers gave an example of successful implementation.
- On the B2C segment, the availability of several platforms in addition to the Internet (Minitel, but also mobile telephony and digital TV) is an essential factor since it enables reaching several clienteles. It partly compensates for the low diffusion of the Internet. It can sustain

the development of multi-channel e-commerce systems in which fixed costs (databases design and maintenance, securization, advertising) are written off on different and complementary markets. Moreover, synergies can exist among channels. For instance, personal identification systems inherent to mobile telephony can be used to secure on-line transactions.

Inhibitors of e-commerce that are common to B2B and B2C fall into three categories. The digital divide really ranks first. In the case of B2B, it is the difference between small and large firms and the difference between Paris and the rest of France that is essential. In the case of B2C, it is more the difference between the wealthy, educated and urban citizens and the others that play a significant role. In both cases, it delays adoption because potential business adopters face small markets. The wideness of the French digital divide reinforces the impact of the second inhibitor: the late take off of the Internet in France. Delayed adoption of the Internet and related technologies played a very negative role because it combined with the dot com crash. The later arose while France was catching up. It resulted in extended delays of adoption. The third major inhibitor is the French specialization in ITs. The focus of France on traditional telecommunication technologies led businesses, the government, and the public to ignore for too long the potentiality of digital technologies, and of the Internet in particular. This resulted in delayed adoption and in a shortage of digital skills, both at the individual and collective levels.

As far as more specific segments are concerned, additional inhibitors can be identified:

- In the B2B segment, the French system of innovation can be considered as an inhibitor, since these large organizations aimed at developing domestic and consistent technological systems were poorly adapted to the market-oriented and decentralized innovation process that characterize the new economy in general, and more specifically, digital technologies. This resulted in a poor ability of the French innovation system to absorb the new technological base and to turn it into successful application. This had a direct impact on the capability of this innovation system to have its innovation percolating in the whole industry. The poor ability of French SMEs to innovate (and to use ITs) is another reason for the poor development of B2B e-commerce. Innovation is traditionally performed by large firms that cumulate the technical expertise and the financial ability to sustain it, SMEs do not spontaneously innovate and B2B e-commerce failed to develop in the industries where there were no large leading firms.
- On the B2C segment, the poor equipment of households is clearly an inhibitor since the potential clientele is still too tiny to write off most necessary investments for firms to go on-line. This poor level of equipment is also a consequence of the weak supply of services. There is indeed a vicious circle that characterizes the adoption of most network technologies in an early stage of development. Another factor that seems to play a strong role is the efficiency of the existing distribution channels that are both quite competitive in terms of costs and spread over the French territory. On-line merchant of physical goods hardly compete with these channels, except in some niches. The last inhibitor is probably the excessive centralization of France. While the country is quite heterogeneous in terms of life style and wealth, most business models developed in France apply to only a part of it resulting in low adoption in average.

In the near future additional factors might influence the French path of development of e-commerce:

- First, some of the causal relationships qualified above as "vicious" might naturally become "virtuous", because the logic of the diffusion process of network technologies and practices might come into play. Network technologies are characterized by a S-shaped curve of adoption, with slow pace in the first phase linked to small externalities of adoption due to the small installed base. This dynamic inverses when a threshhold of diffusion is reached, since new adopters benefit from strong network externalities due to a wider installed base. When the diffusion rate stands above this threshhold, new adopters rush in. Such a virtuous logic could be facilitated in France due to the readiness of both business and consumers.
- Second, the government has invested in efforts to further IT education. A more computer-literate population should have a greater propensity to buy or sell on-line.
- Third, the strong efforts of the public administration to go digital might play a role, due to the traditional structuring impact of the administrative practices in France on life styles and the economy.

Hence, the complexity of the analysis of the drivers and inhibitors of the development of e-commerce lies in the fact that the dynamic of adoption is impacted by factors that are evolving with the passing of time and among which the relationships evolve: the distribution of the technology (often referred as the digital divide), the early adoption (based on a different technology) and the impact of exogenous events (like the Internet bubble).

Conclusions

France's level of development in e-commerce reflects a "middle of the road" standing that characterizes the use of the Internet in France as well. Statistics on French digitization and e-commerce are around the Europe average. This seems to reflect the peculiar nature of France that shares characteristics both with Northern Europe countries (level of development, skill of the population) and Mediterranean countries (low digital literacy, less intensive urbanization). This also reflects the digital divides that characterize France and that seem to be an important inhibitor to the digitization of the country.

This, together with traditional organization and processes in industry, the National system of innovation, and governmental bodies that did not favor the adoption of the Internet technologies inhibited the early, rapid and innovative development of Internet based business methods and commercial practices. However, the French recent history is also the history of the progressive removal of barriers to the implementation of new methods of work and commerce. Indeed, over the last 20 years, the French industry and innovation system have been totally reshaped. Moreover a deep process of liberalization and internationalization of the market and the industry have been performed. This generated the necessary conditions to develop e-commerce practices. In the past five years, the Government implemented a policy favoring a French "new-economy". The development of the Internet and equipment in ITs was encouraged, digital training was developed, the legal framework was reshaped and e-government skyrocketed. This together with the financial and media bubble over the Internet had a strong influence on the adoption behavior of business decisionmakers who rushed into e-business and e-commerce in the late 1990s.

This rush occurred only to shortly before the dot com crash, and an insufficient level of cash and energy was dedicated to allow France to really catch up. Many potential adopters delayed their decision to go digital in the year 2001, reducing the pace of adoption.

While less than expected two years ago, all figures about e-commerce confirm an increasing intensity of use. France is therefore progressively switching to a digital economy. The advantage of this slower and later process of digitization is that the users and service providers are more careful about the long-term viability of the applications they implement. E-commerce is now being implemented when really useful and profitable.

REFERENCES

Benchmark Group. 2000. *Le commerce electronique sur l'Internet en France–2000*. Paris: Benchmark Group. http://www.benchmark.fr

Brousseau, E. 2000. Commerce electronique: Ce que disent les chiffres et ce qu'il faudrait savoir. *Economie et Statistiques*. 339-340 (2000-9/10):147–170 (English translation at http://www.insee.fr).

Brousseau E. 2001. Globalization of e-commerce: Growth and impacts in France. *Report for the Center for Research on Information Technology and Organizations* (CRITO). University of California at Irvine, and the U.S. National Science Foundation (CISE/IIS/CSS), Globalization and E-commerce Project; http://www.crito.uci.edu/git/gec/

Brousseau, E. 2002a. The governance of transaction by commercial intermediaries: An analysis of the re-engineering of intermediation by electronic commerce. *International Journal of the Economics of Business* 8(3), 2002.

Brousseau, E. 2002b. The european union information society and e-commerce policy. *Report for the Center for Research on Information Technology and Organizations* (CRITO), University of California at Irvine, and the U.S. National Science Foundation (CISE/IIS/CSS), Globalization and E-commerce Project, http://www.crito.uci.edu/git/gec/

Brousseau, E. 2002c. E-commerce in France: Did early adoption prevent the development? *The Information Society*. forthcoming 2003.

Bureau d'Information et de Prévision Economique (BIPE). 2000. *Bonjour la nouvelle économie: Les enjeux prospectifs de la révolution numérique*. Paris: BIPE.

CROCIS. 2001. L'île de France et les métropoles européennes, *Enjeux Ile de France*, No. 25, January; http://www.ccip.fr/crocis/

EcaTT. 2000. *Benchmarking progress on new ways of working and new form of business in Europe*. Report for the IST Program. Brussels: European Commission. D.G. Information Society; August; http://www.ecatt.com

EOS Gallup Europe. 2001. Internet and the public at large, *Flash Eurobarometer.* No. 112. Brussels: European Commission, Directorate General Press and Communication. November.

ESIS (European Survey of Information Society Projects and Actions). 2000. Basic facts & indicators, Brussels: European Commission; November; http://europa.eu.int/ISPO/esis

European Commission. 2001a. *Eurobarometer.* Brussels: European Commission, November.

European Commission. 2001b. *Web-based survey on electronic public services.* Brussels: European Commission; <http://europa.eu.int/information_society/eeurope/egovconf/documents/pdf/eeurope.pdf> (last access: 04/02/02).

European Commission. 2001c, *e-Europe 2002 benchmarking.* Brussels: European Commission; <http://www.europa.eu.int/information_society/eeurope/benchmarking

European Commission. 2001d. *e-Europe 2002 benchmarking, European youth into the digital age*. 2001. Brussels: European Commission. November. SEC(2001) 1583.

Feuvrier, P., and Heitzmann, R. 2000. Informatique et télécommunications dans l'industrie Française, des entreprises de plus en plus communicantes. *Le 4-Pages des Statistiques Industrielles*. SESSI (Service des Etudes et des Statistiques industrielles), Ministère de l'Economie des Finances et de l'Industrie (Census Bureau from the French Ministry of Economic, Financial and Economic Affairs) 137(August):1–4.

Forrester Research, Inc. 2000. Global E-Commerce Model; <http://www.forrester.com/Home/0,3257,1,FF.html

Heitzmann, R., and. Loué, J.F. 2001. L'Internet: Les Français se hâtent lentement. *Le 4-Pages des Statistiques Industrielles*. SESSI (Service des Etudes et des Statistiques Industrielles), Ministère de l'Economie des Finances et de l'Industrie (Census Bureau from the French Ministry of Economic, Financial and Economic Affairs) 152 (August): 1–4.

INSEE. (French Census Bureau). 2001. *Enquête permanente sur les conditions de vie des ménages* (EPCVM). Paris: INSEE No. 106.

INSEE. (French Census Bureau). 2002. On line Statistics; http://www.insee.fr

INSEE. (French Census Bureau). 2002. Comptes Nationaux; http://www.insee.fr

International Data Corporation. 2000. *The 1999 IDC Worldwide Black Book.*

International Data Corporation. 2001. *The 2000 IDC Worldwide Black Book.*

International Data Corporation. 2002. *Internet Commerce Market Model*, Version 8.1.

International Labor Organization. 2002. LABORSTA; <http://www.laborsta.ilo.org

International Telecommunication Union. 2001. *World Telecommunication Indicators*. Geneva: International Telecommunication Union.
International Telecommunication Union. 2001. *Yearbook of Statistics 1991-2000.* Geneva: International Telecommunication Union.
International Telecommunication Union. 2002. *World Telecommunication Development Report 2002, Reinventing Telecoms*. Geneva: International Telecommunication Union.
IPSOS, 2001. On-line Polls; http://www.ipsos.fr
Mathonnet, P., and Kaplan, D. 2001. Tableau de bord du commerce électronique Mission pour l'Economie Numérique, Issue 1.0, Novembre 2001.
Mathonnet, P., and Kaplan, D. 2002. Tableau de bord du commerce électronique, Mission pour l'Economie Numérique, Ministère de l'Economie des Finances du Commerce et de l'Industrie, Avril; http://www.men.minefi.gouv.fr/webmen/informations/tabord/tabord200204.pdf
Mediamétrie. 2001. On line Statistics; http://www.mediametrie.fr
Ministère de la Jeunesse, de l'éducation nationale et de la recherche (French Ministry of Youth, Education and Research). 2001. On line Statistics; http://www.education.gouv.fr/
Ministère de l'Économie, des Finances et de l'Industrie (French Ministry for Economic Affairs, Finance and Industry). 2001, On line Statistics. (17/12/2001); http://www.industrie.gouv.fr
Ministère des Transaports (French Ministry for Transportation). 2001. On line Statistics. Direction des Transports Terrestres. June; http://www.transports.equipement.gouv.fr
Moati, P. 2001. *L' avenir de la grande distribution*. Eds. Odile and Jacob. Paris.
Netcraft. 2002. http://www.netcraft.com
NetValue. 2001. http://www.netvalue.fr
Observatoire du Commerce et des Échanges Électroniques. 1999. *Les chiffres clés du commerce électronique.* http://www.edifrance.org/
OECD. 2000. *The economic and social impacts of electronic commerce: Preliminary findings and research agenda.* http://www.oecd/e_commerce/summary.htm
OECD. 2000. *International direct investment database.* Paris: OECD, May.
OECD. 2001. Basic science and technology statistics (BSTS). 2001 edition. Paris: OECD. http://www1.oecd.org/dsti/sti/index.htm
OECD. 2001. *Communications outlook 2001.* Paris: OECD, May.
OECD. 2001. *Economic outlook*. No. 68. Paris: OECD, May.
OECD. 2001. On-line databases, Paris: OECD, May.
OECD. 2002. *OECD information technology outlook 2002.* Paris: OECD. http://webnet1.oecd.org/
OECD. 2002. *B2C e-commerce statistics-an update;* http://www1.oecd.org/dsti/sti/index.htm
OECD. 2002. Quarterly national accounts database. 2002; http://www.oecd.org
OECD. 2002. *Update on official statistics on Internet consumer transactions.* Paris: OECD. http://www1.oecd.org/dsti/sti/index.htm
Rallet, A. 2001. Commerce électronique et localisation urbaine des activités commerciales. *Revue Economique*, [special issue] "*Economie de l'Interne,t*". eds. E. Brousseau and N. Curien. October, 52, 267-290.
Reed Electronics Research. 2000. *The yearbook of world electronics data, 2000.* Surrey, U.K.: Reed Electronics Research.
Scott Morton , F., Zettelmeyerf, F., and Risso, J. 2000. Internet car retailing. Mimeo. Yale University and NBER.
SESSI (Service des Etudes et des Statistiques industrielles). 2001a. On-line Statistics. August; http://www.finances.gouv.fr/minefi/chiffres/index.htm
SESSI (Service des Etudes et des Statistiques industrielles). 2001b. *Tableau de bord de l'Innovation.* 5th ed. Ministère de l'Economie des Finances et de l'Industrie (Census Bureau from the French Ministry of Economic, Financial and Economic Affairs), April.
Sofres. 2002. French citizens and the information society. Poll. February; http://www.internet.gouv.fr
Taylor Nelson Sofres. 2000. *Global ecommerce report.* http://www.tnsofres.com/
United Nations Conference on Trade and Development. 2001. *World investment report 2001*. New York.
United Nations Development Program. 2000. *Human development report*. New York: Oxford University Press.
World Bank. 2001. *World development indicators.* CD-ROM.
World Bank Group. 2002. http://www.devdata.worldbank.org/data-query/