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III. The New Economy in France: Developments and Prospects[22]

A. Introduction

53. The dynamism of the French economy, which since 1997 has been characterized by strong growth, a falling unemployment rate, and low inflation, has raised the question of whether the country is on the verge of experiencing a period of sustained growth such as experienced by the United States since the mid–1990s. Some observers have attributed the U.S. experience to what has been dubbed the "new economy"—an acceleration in technical change in which rapid investment and use of information and communication technology (ICT) transform business practices leading to new breakthroughs and wider adoption and use of ICT. Among the most commonly cited features of the new economy are an increase in labor productivity growth, which some observers believe can be long-lived, and a rapid growth of Internet-related businesses.

54. This chapter analyzes the sources of recent changes in French labor productivity growth, including the expansion of high-tech activities, and reviews a number of policy issues connected with the development of an ICT-based new economy.[23] The chapter is organized as follows. The next section reviews evidence for the United States. The following section—which is the heart of the paper—presents a decomposition of labor productivity growth in the French business sector along the lines of influential work done for the United States. Next, there is a brief analysis of several policy issues raised by the new economy in France. A final section summarizes the findings.

55. The main conclusion is that the recent lackluster productivity growth in France is attributable to a deceleration in overall capital deepening on the heels of a continued moderation in labor costs. This deceleration reflects a waning of the heavy investment in labor-saving technologies that characterized most of the 1980s, which itself was a response to the escalation of labor costs after the mid–1970s. The deceleration in capital deepening does not, however, extend to computer hardware and software. Investment in this category has grown at rates close to 30 percent in recent years. Such a strong pace has been reflected in an increasing—albeit still small—contribution to labor productivity growth, and in the rapid expansion of high-tech businesses, notably services based on mobile-phone

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[22] Prepared by Marcello Estevão and Joaquim Levy. Laura Kodres provided valuable suggestions. The authors are grateful to L. Bouscharain, S. Audric, M.A. Estrade, N. Carnot and F. Lequelier for the data provided, without which a substantial part of the paper would not have been possible.

[23] A review of the current research on the contribution of ICT investment to German productivity growth, as well as a discussion of related policy issues, are provided in the Selected Issues paper prepared for the German 2000 Article IV consultation (SM/00/229).

telecommunications and the Internet, which have grown in France as fast as in most European countries.

B. The Experience in the United States

56. It is helpful to begin a study of the new economy in France by examining first the experience of the United States, where the term "new economy" has been used to designate the buoyant economic performance in the 1990s—high output growth with no significant signs of inflationary pressures. To explain this performance, the new economy proponents point to the rapid growth in investment in high-technology equipment in the 1980s and 1990s, which has altered the nature of business and, from a macroeconomic point of view, resulted in higher productivity growth and potential output. Research has focused on trying to link increases in productivity growth to the production of ICT equipment and to its use in other sectors of the economy.

57. An influential analysis of the contribution of information technology to economic growth was undertaken by Oliner and Sichel (2000), who use a neoclassical production function framework:

$$y - l = [\alpha_{ict}(k_{ict} - l) + \alpha_o(k_o - l)] + \alpha_l q + tfp \qquad (1)$$

where y and l represent the growth rate of output and worker-hours, respectively.[24] According to equation (1), there are three factors affecting labor productivity growth. The first is the change in the capital-labor ratio, or capital deepening: the k terms represent capital growth, and the expression in square brackets captures capital deepening of ICT and other types of equipment. The second is the change in labor quality, q, and the third is total factor productivity growth (TFP), which is the productivity growth not directly attributable to the accumulation of production factors. Oliner and Sichel break total factor productivity growth down into three components: the computer producing sector, the semiconductor sector (singled out because it is known to have had very high productivity growth), and the rest of the economy.

58. They find that annual labor productivity growth in the nonfarm business (NFB) sector rose from 1.6 percent in the first half of the 1990s to 2.67 percent in the second half of the decade, an increase of 1.06 percentage points (Table III.1). Of this, capital deepening accounts for ½ of 1 percentage point, practically all from the accumulation of ICT equipment. Total factor productivity accounted for 0.7 percentage points of the acceleration,

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[24] The α terms are output elasticities with respect to the inputs. Under neoclassical assumptions, they are income shares; and assuming constant returns to scale, they sum to one. The *ict* subscript denotes ICT equipment (computers, software and communications equipment), the *o* subscript denotes all other capital goods, and the *l* subscript denotes labor.

with half originating in the computer and semiconductors industries.[25] Thus, the accumulation of ICT capital plus the growth in total factor productivity in the computers and semiconductors industries account for over three-fourths of the labor productivity acceleration in the nonfarm business sector. Still, about one-third of the acceleration is accounted for by total factor productivity growth in non high-tech sectors, which may be linked to the use of ICT technology in those sectors. Other recent research provides broad support for these conclusions, including Whelan (2000) and Jorgenson and Stiroh (1999).

Table III.1. Acceleration in Labor Productivity
(Percentage points per year)

	1991-95	1996-99	Acceleration
Labor productivity growth	1.61	2.67	1.06
Of which due to:			
Capital deepening	0.61	1.10	0.49
IT capital	0.50	0.96	0.46
Hardware	0.23	0.59	0.36
Software	0.22	0.26	0.04
Communication	0.05	0.10	0.05
Other capital	0.11	0.14	0.03
Labor quality	0.44	0.31	-0.13
TFP	0.56	1.26	0.70
Computers	0.13	0.21	0.08
Semiconductors (SC)	0.12	0.39	0.27
Other sectors	0.31	0.65	0.34

Source: Oliner and Sichel, 2000.

59. In another influential study, Gordon (2000) takes a somewhat different approach, breaking down NFB growth by sector, rather than input. After adjusting for cyclical effects, he finds that trend productivity growth rose from 1.5 percent in the 1972–95 period to 2.3 percent in the second half of the 1990s, or an acceleration of 0.8 of 1 percentage point (Table III.2). Of this, according to Gordon, 0.2 of 1 percentage point can be explained by methodological changes in the calculation of real GDP, leaving about 0.6 of 1 percentage point to be explained by economic factors. Gordon finds that essentially all of this increase can be ascribed to the durable goods sector. Since this sector accounts for only about

[25] Note that changes in labor quality tended to slightly lower productivity growth in the second half of the 1990s.

12 percent of U.S. output, he is skeptical that the revival of growth and low inflation could be viewed as a new economy paradigm shift.

Table III.2. Acceleration in Labor Productivity During 1996–99
(Percentage points per year)

	Nonfarm business (NFB)	NFB excluding computer hardware manufacturing	NFB excluding durable manufacturing
Labor productivity growth	2.82	2.42	2.05
Contributions:			
1) Cyclical effects	0.54	0.55	0.62
2) Trend	2.28	1.87	1.43
(Past trend, 1972:2-1995:4)	(1.47)	(1.25)	(1.19)
3) Trend acceleration	0.81	0.62	0.24
3.1) Price measurement and Labor quality	0.19	0.19	0.19
3.2) Structural acceleration	0.62	0.43	0.05

Source: Gordon, 2000.

60. A key difference between Oliner and Sichel and Gordon is cyclical adjustment, which according to Gordon accounts for about ½ of 1 percentage point of the productivity acceleration. Oliner and Sichel, by contrast, argue that there is no need for such an adjustment when examining specifically the contribution of computers and semiconductors to TFP growth, because the productivity of these sectors is largely uncorrelated with the business cycle. A potential source of bias in both studies is due to the fact that productivity growth in the services sector, which dominates nondurables production, is notoriously poorly measured. If productivity in this sector has accelerated, but this has not been captured in the data, then the estimates of both studies would be too low. In particular, Gordon's conclusion that productivity growth has been largely confined to the durable goods sector would have to be modified.

C. Productivity Growth in France

61. This section examines the contribution of computers and software to labor productivity in France, along the lines laid out by Oliner and Sichel.[26] The focus is on the nonfarm business sector, although due to data constraints the financial sector is excluded. Several features distinguish France from the United States. Notably, the patterns of labor

[26] Owing to data limitations, the accumulation of communications equipment is not included in this analysis. This is probably an important omission, about which more is said below.

productivity growth and capital accumulation have differed for a large part of the 1990s, the computer hardware manufacturing industry is much larger in the United States than in France, and unemployment has fallen appreciably in France since 1997, while the U.S. rate has been more stable although much lower. These differences have important implications for the analysis of French productivity, especially when set against the backdrop of the U.S. experience.

62. The decomposition of labor productivity in the French nonfarm, nonfinancial business sector is laid out in Table III.3.[27] Productivity growth fell from 2¼ percent a year in the late 1980s to about 1½ percent a year in the 1990s and, unlike in the United States, did not accelerate in the second half of the 1990s.

Table III.3. Labor Productivity Growth in the French Nonfarm, Nonfinancial, Business Sector
(Percentage points per year)

	1986-91	1992-96	1997-99
Labor productivity growth	2.3	1.6	1.4
Of which due to:			
Capital deepening	0.9	1.1	0.2
Adjusted for capacity utilization	0.9	0.9	0.5
IT capital (unadjusted)	0.1	0.1	0.2
Labor quality	0.1	0.1	0.1
TFP	1.3	0.4	1.2
Adjusted for capacity utilization	1.3	0.6	0.9

Source: IMF staff calculations based on original data from the INSEE and DARES.

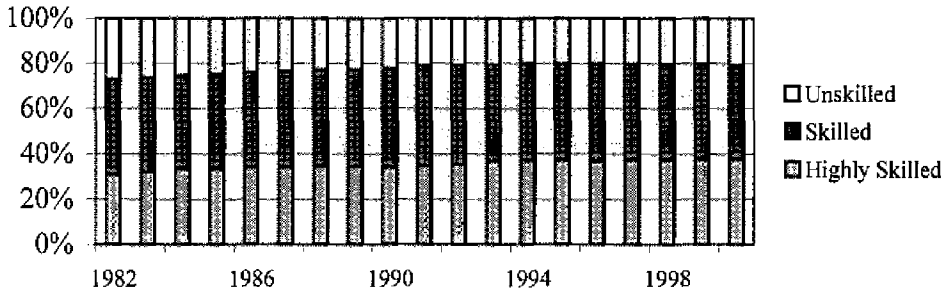
63. Before analyzing the contribution of technology and capital accumulation to this path, it is important to note that labor productivity growth in France has been affected by a steady decline in average hours worked. In addition to a break in 1982—when the statutory workweek was reduced to 39 hours—hours worked have exhibited a secular decline

[27] Labor productivity was calculated using the national statistical institute's (INSEE) data on sectoral GDP and estimates of total hours worked provided by the research office of the Labor Ministry (DARES). Output of the nonfarm, nonfinancial business sector was obtained by chain-weighting the sectoral data using prices of the previous year as a base. The figures in Table III.3 refer to different aggregate variables than the figures reported in Box 3 of the staff report for the French 2000 Article IV consultation.

throughout the 1980s and 1990s.[28] This decline reflected in part a rise in the share of part-time work, which accounted for about 16 percent of total employment by the end of the 1990s.[29] Such a structural change could be partially responsible for the deceleration in labor productivity in the 1990s if part-time work were concentrated in lower productivity jobs or in jobs that are less capital intensive.

64. The qualification of the labor force has increased substantially, with the share of workers with higher education rising from 10 percent in 1982 to close to 25 percent in 2000. This increase is due in part to public policies aimed at raising education levels since the mid-1980s, and to the difficulties faced by young workers in finding a first job. In addition, the continued increase in the share of high-skill jobs (Figure III.1) have also boosted labor quality measures.[30] As a result of both effects, as shown in Table III.3, changes in labor quality have had a positive impact on labor productivity growth. However, its contribution has remained unchanged and small. Thus, the cause of the deceleration in labor productivity in the 1990s lies elsewhere.

Figure III.1. Distribution of Jobs by Skill Level



Source: Audric et al. (1999)

[28] The statutory workweek in large firms was further reduced to 35 hours in January 2000. Small firms will follow suit in January 2002.

[29] The evolution of worked hours is only partly captured by official statistics. However, a number of researchers in both INSEE and DARES have constructed estimates of the effective work week (e.g., Accardo, Bouscharain, and Jlassi (1999), and Audric, Givord, and Prost (1999)).

[30] See Audric et al. (1999) and Bisault, Destival, and Goux (1994); the most recent ranking of jobs by skills is listed in the former.

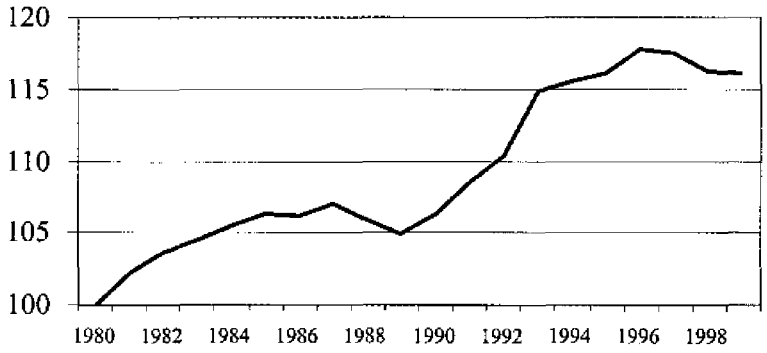
65. The decline in labor productivity during the early 1990s can be interpreted as a cyclical phenomenon: all of the decline can be accounted for by a sharp reduction in TFP growth while capital deepening remained roughly constant. During the rest of the decade, when economic activity bounced back, TFP growth also increased but labor productivity growth was held down by a slowing in capital deepening. The apparent cyclicality in TFP growth can be reduced if appropriate measures of labor effort and capital utilization are used to translate the measured use of production factors into actual use. Table III.3 shows an alternative breakdown between capital deepening and TFP growth when the rate of capacity utilization is used as a proxy for capital utilization.[31] As may be seen, changes in the rate of capacity utilization dampen the cyclical behavior of TFP somewhat but the lack of measures of labor effort may still be contaminating TFP growth as well as labor productivity growth.

66. Leaving aside the cyclical behavior in TFP growth and focusing on structural changes, the drop in labor productivity growth at the end of the 1990s was driven by a decline in the contribution of capital deepening from 0.9 percent a year during the previous economic boom to 0.2 percent a year after 1997 (in contrast, the contribution of capital deepening rose from 0.6 percent to 1.1 percent in the United States in similar periods).[32] This difference appears to be related to a shift toward higher labor utilization on the heels of a moderation in labor costs, due both to wage moderation and targeted reductions in employers' social security charges. Such a shift contrasts with the trend to capital deepening observed for most of the 1980s, which has in part been attributed to the increase in labor costs observed in the 1970s and early 1980s. In fact, the rate of overall capital accumulation halved from 1990 to 1993 and then stabilized at this lower level (around 2 percent a year). Thus, after the surge in the capital to output ratio observed in the early 1990s—which reflected the combination of a rapid buildup of capital in the late 1980s and the decline in GDP growth in 1991–93—the growth rate of this ratio has since languished (Figure III.2). The counterpart of a deceleration in capital deepening has been the "employment rich" economic recovery observed since 1997.

[31] There are two measures of capacity utilization for France, though both are restricted to industrial sectors. The INSEE measure used in this study is based on national surveys.

[32] The calculation of the contribution of capital deepening relies mainly on preliminary estimates for the nonfarm nonfinancial business sector provided by INSEE; these estimates may change with forthcoming revisions of the capital stock series.

Figure III.2. Capital/GDP Ratio in the Nonfarm, Nonfinancial Business Sector (1980 = 100)



Source: Staff calculations based on INSEE data.

67. The slowing in capital deepening did not, however, extend to computing equipment and software. On the contrary, as a result of strong computer and software investment, an increase in capital deepening in this category contributed positively to productivity growth in the second half of the 1990s. Investment in computers and related products decelerated dramatically in the early 1990s but then rebounded strongly in the late 1990s to the same rates posted in the late 1980s.[33] Software investment has grown strongly and continuously for several years, and has posted a 16½ percent average annual real growth since 1997 (possibly driven to some extent by precautionary investment due to Y2K concerns and the introduction of the euro). As a result, a much larger share of the economy's resources are devoted to the acquisition of computing equipment and software in the late 1990s than in the early 1980s: expenditure on computers and software was about 17 percent of all non-residential investment in 1999, compared with less than 5 percent in 1980 (Table III.4).

68. Nevertheless, the impact on productivity growth of computer and software investment has been only some 0.2 of 1 percentage point, as shown in Table III.3. The apparent puzzle between this finding and the investment figures can be reconciled by the still very low installed base of this type of capital. It is worth noting, however, that the data used here do not include accumulation in other types of ICT capital, particularly communication equipment. Adding an estimate of the contribution of communication equipment (using Cette et al. (2000)) would raise the contribution of ICT capital deepening to productivity growth in 1997–99 from 0.17 of 1 percentage point to about 0.25 of 1 percentage point.

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[33] For France, as the United States, data for computer investment take into account quality improvements. Until end–1998, expenditures on computers are deflated by the quality-adjusted price for computer investment calculated by the U.S. Bureau of Economic Analysis; after than, the INSEE uses its own adjustment.

Table III.4. Investment in High-Technology Equipment

Share (percentage) in Non-Residential Gross Fixed Capital Formation of:			
	Electric and electronic equipment		Software
	Total	Computers and related products	
1980	9.09	2.14	2.55
1985	15.35	4.05	5.22
1990	21.22	5.69	5.41
1995	19.30	4.74	5.99
1999	25.06	5.42	11.86
Percent change (annual rate) of real expenditures in:			
1980-90	13.90	28.94	8.39
1990-99	8.16	16.31	11.29
1997-99	17.03	28.94	16.63

Source: IMF staff calculations based on INSEE data.

69. The information needed to decompose TFP developments along the lines of Oliner and Sichel is not readily available for France. However, their results depend on the size of the computer hardware and semiconductor industries vis-à-vis the whole economy. Although France has strengths in some segments of the ICT sector (Box III.1), the share of computer and semiconductor output in total output is significantly smaller in France than in the United States. For instance, as a ratio to GDP, computer and semiconductor production in France is about half that in the United States. This suggests that the impact of productivity gains in the high-tech sector have been more limited in France than in the United States.

D. Policy Issues for the New Economy in France

Labor Markets

70. The emergence of a new economy will, as the ICT sector expands, probably increase the demand for skilled labor. French authorities estimate that ICT industries already employ 700,000 workers (Table III.5), and that employment growth in ICT industries averaged 3.5 percent in 1998–99 (versus about 2 percent for the economy as a whole). Looking forward, the demand for network skills in France has been estimated to exceed 150,000 workers by 2002, although this is only about one-third of the estimate for Germany (Table III.6).

Box III.1. Selected Aspects of France's Position in ICT Industries

France ranks well in ICT goods and services production in Europe, but according to French and OECD trade data, France's strength lies prevalently in large telecommunication equipment rather than in computers or electronic goods. Furthermore, within Europe, France is particularly strong in the production of telecom and IT services while IT hardware production is relatively low when compared with other OECD countries.[1] As a counterpart of the relatively low hardware production, imports of computers exceed exports by a large margin.

IT Market in Selected OECD Countries, 1997

	1997 level (US$ billion)	Breakdown (As a percentage of total market)		
		Hardware	Packaged	IT service
OECD	659,232	45.2	16.4	38.4
France	33,425	35.4	16.9	47.7
Germany	43,662	44.8	18.8	36.4
United States	316,634	43.8	17.1	39.2

Source: OECD.

Turning to the industrial organization of the French ICT sector, there are several large ICT firms in France, but none is among the 3 top world companies in the sector. There are three major ICT manufacturers in France: Alcatel, STMicroelectronics, and Thompson. Alcatel has a strong position in communications and is likely to earn a substantial number of international orders for the installation of the UMTS infrastructure in Europe. However, its position as a producer of phone sets is behind that of Motorola (United States), Nokia (Finland), and Ericsson (Sweden). STMicroeletronics, a semiconductor maker, has performed well, but is only the eighth largest world producer in its field. France has a number of strong IT services companies, reflecting the country's high rank in the trade of ICT services. The leading French IT service company is CAP-Gemini which became the fifth world company in this field following the merger with U.S. Ernst & Young's consulting company. Finally, France does not have a large producer of prepackaged software.

R&D expenditure is generally linked to the number of newly registered patents and both are good indicators of the future economic prospects of a given sector. In general, the share of French GDP devoted to R&D expenditure is within the EU average, and the country ranks fifth in the world in terms of overall patent applications. More specifically, R&D investment by the ICT sector may be a good approximation of the degree of high-tech innovation in a country. According to OECD data, ICT industries accounted for about 23 percent of total business expenditure in R&D in France in 1996, substantially less than in the top countries, Finland and Ireland—respectively, 41 percent and 36 percent in 1997—but about the same as in the United States (22 percent in 1996) and more than in any other major European country with available data—Germany (14 percent in 1995), the United Kingdom (10.6 percent in 1997), Italy (21 percent in 1997) and the Netherlands (16.2 percent in 1996), among others. As a counterpart of the R&D effort, ICT patent applications have picked up recently and now account for about one-third of total patent applications.

[1] IT includes hardware (computer system central units, storage devices, printers, bundled operating systems and data communications equipment), software and services (IT consulting, implementation services, operations management, IT training and education, processing services and IT support services). The ICT aggregate equals IT plus telecommunications services and equipment.

Table III.5. Employment in the ICT Sector in France
(In thousands of workers)

	France 2000 (INSEE)	France 1996 (OECD)	U.S. 1998 (OECD)
ICT manufacturing	260	40	2,049
Computer and related services	220	160	1,600
Other ICT services	190	90	1,514
Of which, telecommunications	160		1,056
Total[1]	670	290	5,163

Source: OECD; Ministry of the Economy, Finance and Industry
[1]The Ministry of Labor estimated employment in ICT industries in France at 785,388 in January 1999.

Table III.6. Demand and Supply of Networking Skills in 2002
(In thousands of workers)

	Demand	Supply	Gap
France	156.2	89.2	67.0
Germany	449.7	261.5	188.2
Italy	155.4	96.6	58.8
Spain	76.8	50.7	26.1
United Kingdom	346.3	264.5	81.8

Source: IDC, 1999.

71. These forecasts are consistent with ancillary evidence. For instance, the expansion of the ICT sector has, in other countries, been linked to an increase in the demand for skilled labor (Autor, Katz, and Krueger, 1998; Machin and Van Reenen, 1998). In part, this reflects the technology of production, but in addition the use of information technology changes business practices, including management procedures and the services offered (Bresnahan et al., 1999). As a result, the mix of skills demanded by innovative firms differs from that in non-innovative firms. In France, more than half of all workers already use computers at work,[34] and innovative firms are more likely to hire skilled workers (Coutrot, 2000; Figure III.3).

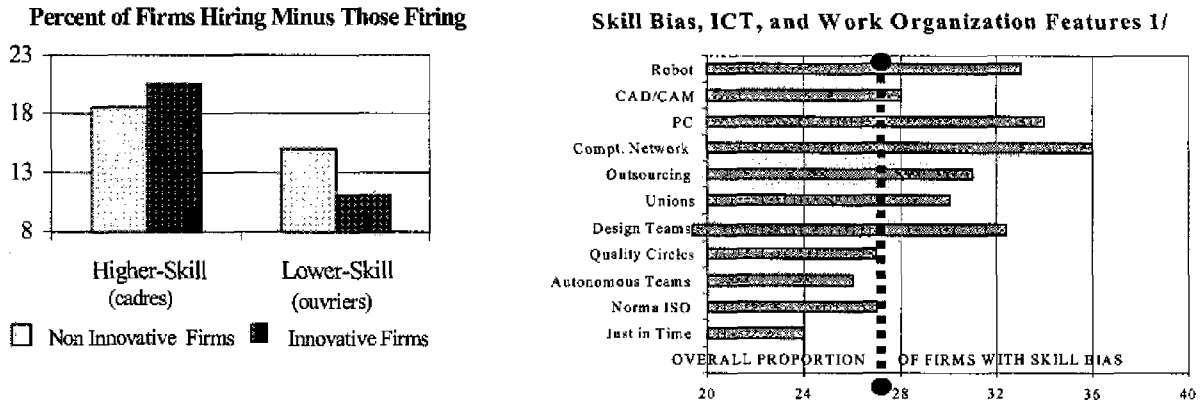
72. Labor market institutions in France appear to have already been moving largely in the direction of better meeting the flexibility needs of the new economy. In particular, there has

[34] This share ranges from less than 20 percent for non-skilled workers in the industrial sector to 90 percent for managers and engineers. Overall, the use of IT at work in France seems as intense as in the United States (OECD, 2000; Cézard et al., 1998).

been a marked increase in fixed-term, part-time, and temporary work.[35] Also, the introduction of the 35-hour workweek has opened up negotiations over work practices, potentially increasing firms' ability to benefit from an adaptation of work arrangements to the introduction of new technologies. Finally, Coutrot (2000) and Bué and Rougerie (1999) report the team-based work is spreading, and that workers perceive that they have greater autonomy and responsibility.

73. One key implication of the ongoing change in the mix of skills demanded by employers is that education and training institutions must adapt to market needs. In France, there is no apparent obstacle to an increase in the supply of training in this area. Indeed, although the educational system in France is mostly public, about one-third of workers pursue professional training every year, mostly sponsored by firms which have a legal

Figure III.3. Differences in Employment Policies of Innovative and Non-Innovative Firms



Source: Coutrot (2000)

1/ Percentage of firms with a skill bias according to the presence of ICT or innovative work-organization features.

[35] Regarding the latter, as shown in Estevão and Lach (2000), temporary workers account for an important share of employment in U.S. high-tech firms. Furthermore, basic training provided by temporary-work agencies has opened the door to a first job for a sizable number of workers.

obligation to provide such training. The French authorities have focused on promoting computer literacy among disadvantaged groups, strengthening the ICT curriculum in high schools, and revamping the skill accreditation system. (Box III.2 compares this response with that of Germany and the commitments of the Lisbon Summit.)

Measures to Stimulate Entrepreneurship

74. The development of the new economy has, in the United States, been closely linked to entrepreneurship, and the French authorities have taken a number of steps to promote small business formation. In the last three years, the government has lightened the tax burden on start-ups, raised the threshold for firms required to file VAT declarations, exempted new companies from registration taxes, aligned the tax rates on the sale of businesses to the EU average, and reduced and simplified social security taxes paid by new firms. In addition, the incorporation and registration of firms has been simplified (firms can now be registered on-line), bankruptcy laws are being revised, relevant courts (*tribunaux de commerce*) are being reformed, and tax breaks for investors in start-ups and tax credits for firms investing in R&D have been introduced.

75. In the United States, stock options have become an important form of payment not only for well-established firms in the ICT sector, but also for start-up firms with little cash flow but much promise. In France, a special tax regime for stock options issued by new companies was created (*bons de souscription de parts de créateur d'entreprise; BSPCE*), with a view to relaxing the tax regime applied to ordinary stock options. The restrictions attached to this type of stock option, which is subject to lower taxes, were relaxed in 2000. (See Box III.3 for a comparison of the treatment of stock options in France, the United Kingdom, and the United States.) On the other hand, the taxation of normal stock options has become more stringent since 1995: in May 2000, for instance, the tax rate on gains on standard stock options rose from 40 percent to 50 percent.

76. There are a number of schemes to provide funds to innovative start-up firms (Box III.4). The French government has also channeled public funds to small firms and rewarded innovation. The government has used state-owned financial institutions such as its Development Bank (BDPME) and the state-controlled *Caisse des Dépôts et Consignations* (CDC) to distribute loans and provide guarantees to private banks that lend to innovative firms. It has also distributed a number of financial rewards to firms and individuals presenting innovative projects, and has facilitated the creation of firms by researchers affiliated to universities and other public institutions.

Product Markets

77. Deregulation has been instrumental in ensuring the price decline of ICT products, fostering their penetration in the marketplace. Such a mechanism is important to explain not only the recent accumulation of ICT equipment but also the explosion in ICT services. For example, deregulation and entry of new firms have contributed to declines in prices of

Box III.2. Europe and the Internet: The Lisbon Summit and the French and German Responses

The Lisbon Summit pointed to a number of initiatives that would be needed to increase Internet access:

- A deadline was suggested for giving all workers the chance to become digitally literate through special training. To attain this objective, the Summit suggested a 50 percent increase in IT training places and courses by the end of 2002, and the establishment of a European certificate for basic IT skills.
- The Lisbon Summit also requested that all schools in the EU be granted access to the Internet and multimedia resources, and that research institutions and universities be linked to a high speed trans-European network for electronic scientific communications by the end of 2001 (only about one-third of EU schools are currently linked to the Internet or have PCs). Teachers should receive adequate IT training by the end of 2002.

The responsibility for achieving these goals falls mainly on member states, although European funds (structural and social funds) were expected to be directed to help these efforts. Within this framework, the 2000 French Employment Plan envisages that:

- The Agency for the Professional Training of Adults (AFPA) will include computer training modules in every program offered to job seekers, and is to hire 4,000 instructors for this purpose.
- Job seekers will have free access to the Internet in every branch of the national employment agency (ANPE), with 500 *emplois jeunes* being assigned to help these Internet users.
- Another €100 million will be made available in 2000 to help local authorities to connect schools to the Internet (€17 million were already transferred in 1999).
- Funds will be set aside to favor distance training, to establish the basic computer skills certificate, and to revamp the structure of professional accreditation. A bill regarding this was recently sent to Parliament.
- The age restriction in one of the three programs providing for apprenticeship-like training was relaxed. These programs, however, are likely to continue to aim mostly at non-ICT training.[1] More generally, European Structural Funds have been channeled to the ICT training of unskilled workers.

The German plan in some ways anticipated the Lisbon Summit, and includes:

- the goal of providing schools and universities with multi-media PCs and Internet connections by 2001;
- doubling the number of multi-media companies from 1,500 by 2001; and
- increasing places for IT training to 40,000 by 2002 to satisfy an additional demand, projected at 250,000 jobs by 2005; meanwhile, special visas would be issued for temporary IT workers from abroad.

The German government is also stimulating small and medium-sized firm use of the Internet and, in particular, adoption of e-commerce. Some 24 regional "centers of expertise" are also available to help start-ups. The overarching objective of the government is to achieve a leading international position in IT by 2005.

[1] Most of the about 200,000 enrollees in the largest apprenticeship program (*apprentissage*) work in traditional sectors (e.g., retail, hotels, hairdressers). Enrollees in other programs (*contrats de qualification et d'adaptation*) are involved in a broader range of activities, and typically have a higher educational level, but the vast majority of these contracts are also related to the trade sector.

Box III.3. Taxation of Employee Stock Options Plans

Country	Event			Other Constraints:	
	Attribution	Exercise	Sale of stock	Holding Period	Ceilings
France Enterprise Stock Options Plans (ESOPS) employees and directors	Difference between acquisition cost and value at exercise taxed as income tax rates + social contributions and CSG-CRDS	Holding period of option < 4 years: basic rate of 40 percent +10 percent of social contribution, when option is sold (30 percent +10 percent for first 1 million franc of gains) > 4 years: 30 percent+10 percent (26 percent for first F 1 million)	Gains after conversion are taxed at 26 percent (as other capital gains from financial instruments), except sales that are less than F 50,000 a year	Four years between attribution and exercise two years after exercise	No ceiling
France BSPCE: employees and managers – new firms, including listed in high-growth markets	Exempt	Exempt	Worker's time at the firm > 3 years: 16 percent + 10 percent of social contributions < three years: as 30 percent + 10 percent of social. Contributions.	No minimum period for exercise or sale of stock	No ceiling
United States Incentive Stock Options (ISO)	Exempt except if employee owns more than 10 percent of the capital of the firm	Holding period > 1 year minimum: 20 percent Holding period < 1 year minimum: as normal income	Taxable as ordinary capital gains (20 percent)	Option: two years after attribution Stock: one year after exercise	US$ 100,000 plus credit from previous years
United States Stock Purchase Plans ESPP	Market value, taxed as ordinary income up to a maximum of 15 percent of underlying asset	Same as ISO	Same as ISO	Same as ISO	US$ 25,000
United Kingdom Company share options plans (CSOPs)	Exempt at attribution, except if transfer is at price below of traded price of stock	Exempt if exercise occurs between 3 and 10 years of attribution and if there is a delay of 3 years between successive exercises	As ordinary capital gains: taxable amount deducted by cumulative 5 percent a year after 3rd year of holding the option	No	£ 30,000
United Kingdom Plans for 10 key employees in SMEs	Exempt	Exempt if holding period prior to exercise > 3 years	Taxable amount deducted by cumulative 6 percent a year, and exempt after 7th year the option is held.	No	£ 100,000

Source: French Ministry of the Economy and Finance

Box III.4. Mechanisms for Fostering Investment in Start-Ups in France

Seed Money (*capital d'amorçage*), Creation, Post-creation, and Development funds: Seed money is invested prior to the creation of the firm; creation funds are invested in a new firm with a view to developing the target product; post-creation funds are invested after the product development phase but before the product is produced or sold; and development funds are invested after the firm has a positive cash flow, with a view to increasing sales or introducing a new product.

Capital Investissement and Capital Risque: The first refers to all investment in non-listed stock, and the second mainly to investments in start-ups.

***Fonds Communs de Placement à Risques* (FCPR):** Created in 1989, these funds invest at least 40 percent of their assets in stocks, convertible bonds, or shares in non-listed companies. Individuals are exempt from taxes on capital gains from these funds. In 1998, the law allowed FCPRs to hold shares of other FCPRs, with a view to diversifying risks and allowing the reallocation of capital (one fund selling positions to another). Some of these funds are geared toward "sophisticated" investors, while others can offer shares to the general public. FCPRs are estimated to have collected about €500 million.

***Fonds Communs de Placement dans l'innovation* (FCPI):** These are FCPRs that must invest at least 60 percent of their assets in "innovative," non-listed companies. Such companies must have fewer than 500 employees, be held mainly by individuals, and whose R&D outlays exceed sales. Capital gains made by FCPIs are tax exempt if shares are held for more than five years. In addition, individuals can deduct from their taxes one-fourth of the funds they invested in such vehicles (below a ceiling of about €25,000 for a couple).

***Fonds Public de Capital-Risque* (FPCR):** These funds co-finance innovative firms, complementing the capital provided by FCPRs (usually, the FPCR's share is 10 to 20 percent of the total investment). The FPCR was funded with the receipts of the privatization of France Telecom (about €100 million), and resources of the European Investment Bank (about €50 million). These funds have helped raise about €1 billion in capital for small firms.

The *DSK* insurance contracts: Created in 1998, these attract special tax treatment, with income being essentially exempt from taxes if the premiums are invested in stocks listed in high-growth stock markets, non-listed stock of non-financial firms, FCPRs, or venture capital firms. At the end of 1999, DSK contracts had invested about €12 billion.

***Business Angels*:** These are venture capitalists who may in principle exempt some of their income from taxes by reinvesting it in new firms. The actual tax position depends on the time the "angel" has been involved with the company, the proportion of the capital invested relative to the total wealth of the individual, and the type of enterprise (which has to be owned mostly by individuals, and created *de novo*, rather than being a spin-off, etc.). Individual investors may also benefit from a 1994 law that permits, under certain circumstances, the deduction from income taxes of investments made in small companies. This mechanism is credited with having helped to raise €400 million, and its coverage is being extended. In contrast with tax regulation covering partnerships in the United States, it does not allow the deduction of losses from taxable income.

telecom services, which since 1996 have declined by one-sixth in France and one-fourth in Germany. In Europe, more than 40 operators have entered long distance markets and more than 220 are currently providing local calls. These price declines appear to be an important factor explaining the increase in Internet penetration in Europe in recent years (European Commission, 2000). However, the European Commission has identified the need to deregulate the so-called local loop (wires to the customer) in France, which in this regard is behind Germany, Italy, and the Netherlands.

78. The diffusion of Internet-based businesses and new software is likely to be a major factor in the development of the new economy in France. In fact, a number of studies by consulting firms and business specialists argue that increases in total factor productivity growth in the coming years are expected to stem largely from the diffusion of the Internet. Several of these studies attribute part of the explanation for the pickup in U.S. total factor productivity growth to its competitive edge in ICT-based services—although there are no direct estimates of how much these services have affected business efficiency. Therefore, further development of business-to-business electronic commerce (B2B) and easier access to the Internet through mobile phones and other small devices are expected to be particularly important for future total factor productivity growth in France. Other work by consulting companies and government agencies suggest that the impact on future GDP growth of the expansion in B2B commerce is likely to be far from trivial.[36]

79. The prospect for such an expansion in ICT services in France is good. As elsewhere, the Internet is spreading rapidly in France—the number of people with access rose by 75 percent in 1999—though the rate of access is lower in France than in the United States or the Nordic countries. This may in part be related to the fact that household computer use in France, though rising, is also below that in the United States and the Nordic countries, although it is broadly comparable to that in continental Europe (Table III.7). On the other hand, France has a relatively large share of European e-commerce (Table III.8), due largely to the Minitel system.[37]

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[36] Goldman Sachs researchers have recently studied the impact of a one-off decline in costs from the adoption of B2B in the United States, France, Germany, United Kingdom, and Japan to long-term output growth. Arthur Andersen Consultants and the BIPE/French Ministry of Industry analyzed in more detail the impact of B2B practices on French output growth for the period 2000–03. All of these studies used information from input-output tables in their simulations. The estimated final effect of e-commerce and B2B on annual French GDP growth in the next few years range from 0.25 to 0.90 percentage points depending on the particular study and the assumptions used.

[37] The Minitel is an electronic network which began in the 1980s based on inexpensive terminals linked to large computers through the telephone system. More recently, the system can be accessed via home computers.

Table III.7. Percent of Households Owning PCs, Mobile Phones, or Linked to the Internet

	PC	Internet	Mobile phones (percentage of total lines, 1999)
France	22 (1999)	5-10	25
Germany	...	10	21
Spain	...	8	28
Italy	18 (1997)	8	42
United Kingdom	58 (1998)	18	29
Nordic Countries	55 (1998)	35	53
United States	42 (1998)	46	24

Sources: French Authorities; OECD; and Merrill Lynch.

Table III.8. Indicators of E-Commerce in Europe

	E-commerce transactions in 1999 (In millions of euro)	Number of secured servers in 2000
France	1,644	1,058
Of which: Minitel	1,320	...
Germany	1,125	2,835
Italy	182	619
Sweden	218	631
Netherlands	171	462
Spain	66	619
United Kingdom	924	3,243
United States (1998)	11,500	47,056

Source: L'expansion; planete.commerce.com; OECD.

80. The growth in ICT activities in France has been heavily linked to the usage of mobile telephones, an industry in which Europe has secured a leading position. The number of subscribers in Europe exceeds that in the United States, and is expected to reach 200 million by 2001. The European standard for mobile phones has been recently adapted to carry Internet data, and phones using a new protocol are already in the market. They are seen as a first step toward ample access to the Internet through mobile phones, to occur in several stages. The most advanced type of access in sight will be offered by the Universal Mobile Telecommunications System (UMTS), licenses for which will be sold in France in 2001.

81. E-banking and e-brokerage are also growing in France. Payment systems are increasingly based on digital technology, and the rapid growth of household financial assets—with the corresponding demand for portfolio management and trade—has put the financial industry among the top IT investors. Nevertheless, Internet banking is less

widespread in France than in Germany or the Nordic countries (Table III.9), and French banks lag other EU banks with respect to cross-border e-bank strategies. Regarding e-brokerage, recent estimates point to only 200,000 accounts in France, compared with some 10 million in the United States. This difference reflects factors other than those related directly to the new economy, however. In particular, stock ownership is narrower in France than in the United States and prices for executing trades are higher. Indeed, lower trading costs in Germany have spurred trading there, including by attracting French customers (Table III.10).

Table III.9. Penetration of PC and Internet Bank
(In thousands of accounts)

	Total	PC banking	Internet		
			June 1999	December 1999	Percent of total (December 1999)
France					
BNP-Paribas	5,300	400	65	120	2.3
Crédit Lyonnais	6,000	500	40	80	1.3
Société Générale	4,000	500	50	120	3.0
Germany					
BHV	4,000	0	190	270	6.8
Commerzbank	3,500	10	190	220	6.3
Deutsche Bank	6,800	70	120	180	2.6
Dresdner Bank	4,000	300	72	100	2.5
United States					
BankOne	9,000	...	350	500	5.6
Net-Bank	50	...	39	50	100.0
Wells Fargo	15,000	...	900	1400	9.3

Source: Salomon Smith Barney.

Table III.10. Main E-Brokers in France

Brokers	Starting of E-operations	Accounts (In thousands)	Control
Fimatex	1996	38	SocGen
e-Cortal	1998	82	BNP Paribas
Self Trade	1998	11	(Swedish)
ConSors France	1997	5	(German)
ABS	1997	3	XoedBourse
Bourse Direct	1997	3	Founders
CPR e*Trade	1997	11	CPR
Ferri	1998	27	BBLambert
WEBroker	1999	...	CCF

Source: AGEFI.

Financial Markets

82. In stock markets, the capitalization of digital firms in the United States has risen dramatically in the last few years. In aggregate, such companies have a market value close to US$5 trillion and account for about half of the market capitalization of the top 100 listed companies. In Europe, this share is still only about one-third, and none of the largest companies is in information technology proper—they are all telecommunication companies (Table III.11). Moreover, despite recent growth, the German and French high-growth stock markets are still dwarfed by the U.S. NASDAQ. Venture capital, which also remains small in comparison with the United States, has grown by more than six-fold in 1995–98. In terms of attracting venture capital, France ranks third in the EU, behind the United Kingdom and Germany.

Table III.11. Size of Selected Stock Markets at the Beginning of October 2000
(In billions of euros)

	Capitalization	Number of listed firms		Capitalization	Number of listed firms
United States					
S&P 500	14,341	500	NASDAQ	6,369	4,424
France					
CAC-40	1,220	40	Nouveau Marché	33	145
Germany					
DAX	865	30	Neuer Markt	192	318
Europe					
Euro STOXX	2,790	50	EASDAQ	47	63

Source: Bloomberg.

83. The still small capitalization of stock markets and small scale of venture capital in France do not seem to be linked to problems specific to the structure or functioning of financial markets. The liberalization of these markets since the mid–1980s has been extensive and accompanied by the modernization of the financial infrastructure. French firms have been increasingly responsive to minority shareholders—including foreign institutional investors—and focused on increasing shareholder value and the transparency of disclosures and reports. In this respect, the government has also contributed by establishing an accounting committee (*Comité de la réglementation comptable*) and by heightening the profile of regulatory bodies and competition authorities. Recent changes in the regulation of takeovers were also intended to improve the functioning of the market for corporate control.

E. Conclusions

84. The evidence of the emergence of a new economy in France is still mixed. Labor productivity growth has been lower in the last three years than it was during the upswing phase of the last cycle in the late 1980s. However, the effects of desirable structural changes

that have led to increased employment may be temporarily masking an underlying increase in productivity growth driven by the adoption of new technology. In addition, the large contribution of high-tech production to growth in the United States is bound to be more muted in France, since this sector is relatively small. Also, the contribution to productivity growth of the accumulation of IT equipment and software has increased recently but remains very modest, only about 0.2 of 1 percentage point. The small size of this contribution reflects the still small stock of high-tech capital in France, but if current rates of investment hold up the macroeconomic impact of the new economy can be expected to rise substantially over time.

85. There are indications that France is not at the forefront of the new economy. For example, the penetration of mobile phones, home computers, and the Internet lags behind that in several industrial countries; although the demand for network skills is expected to increase substantially it is, as of now, lower than in Germany; and the market capitalization of the high-growth stock market in France is only about one-eighth that of its German counterpart. Key to a further, rapid development of the high-tech sector are dynamism in labor and product markets, and a continued deregulation of the latter; flexible work and compensation practices; and additional development of vibrant financial markets.

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