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**Innovation and growth:  
supply and demand factors in the US expansion**

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## **Abstract**

It is widely held that the social-economic context of the United States, characterised by labour market flexibility and deregulation of product and capital markets, lies at the basis of the innovative capacity displayed by the country's productive system in the '90s, thus accounting for the growth differential with Europe. Starting from a different interpretative model of innovation and growth, the paper focuses on both supply (institutional and technological) and demand factors. It is argued that, when their interaction is duly taken into account, there is no strong evidence that more deregulated labor and product markets are among the factors allowing for US growth. In accordance with the view that there is no single road to innovation and growth, this leaves room for exploration and implementation of policies that might reconcile innovation and growth with the safeguard of fundamental features of Europe's social institutions.

**Jel classification:** E2, L50, O3.

**Key words :** innovation, growth, deregulation, macroeconomic policies.

**INNOVATION AND GROWTH:  
SUPPLY AND DEMAND FACTORS IN THE US EXPANSION**

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**1. Introduction**

In the last few decades the advanced economies have gone through a huge process of restructuring, with effects on employment differing greatly between the US and Europe. Since the 1970s, total employment has grown enormously in the US, while it has risen only marginally in the European Union (EU)<sup>1</sup> (table 1). Accounting for the United States' superior performance in employment growth is an ongoing challenge to economic analysis.

Two explanations have come to the forefront. The first has it that the reasons for US success in creating employment – compared to the poor European record – are to be found in the different degree of market flexibility. This explanation, which dates back to the mid-80s, has passed through various re-definitions of the relevant rigidities. At the outset, the focus was on the labor market. The productivity slowdown and adverse supply shocks of the '70s, it was argued, met with Europe's inflexible labor markets, and the ensuing fall in profits led to the adoption of labor saving techniques which in turn increased unemployment (Blanchard, 1997).

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<sup>1</sup> It is by now a widely recognized fact that it is not very meaningful to talk of a "European economy". The EU countries are still very different from one another, in terms of stages of development, institutional set-ups and employment records. Moreover, European unemployment is geographically concentrated in some regions to a marked degree, while other regions outperform the US (in the aggregate) both in terms of lower unemployment and in terms of higher growth. The co-existence of widely different unemployment situations within the same country suggests that the labor market institutions cannot be blamed for the high European unemployment level. Other reasons, such as retarded development or de-industrialization, brought about by the huge process of restructuring over the last few decades, are more likely to explain the level and the characteristics of European unemployment, thus calling for appropriate policies.

Although labor market rigidities may not have thwarted the process of rationalization in the mature industries<sup>2</sup>, they obstructed the creation of new jobs and the growth of new firms. The labor market institutions can thus be made to explain the persistence of unemployment. The difficulties encountered with this explanation<sup>3</sup>, together with increasing awareness of the multiplicity of factors shaping a country's process of growth and transformation, has meant a wider scope of factors, or markets, to be taken into account in order to explain the different performances across countries. Thus, it has been suggested, focus on the labor market alone cannot explain this difference: the degree of flexibility of the other markets (be they financial or product markets) should also be considered (Krueger and Pischke, 1997; Blanchard and Giavazzi, 2001). This has been promptly translated into a normative conclusion, i.e., that Europe should follow the US in de-regulating not only the labor market, but all markets.

The idea that unshackled market forces alone can guarantee a smooth process of restructuring, whereby production factors are reallocated away from contracting activities and into newly expanding ones (Caballero and Hammour, 2000, p. 19) is a central tenet of neoclassical theory. In these models, knowledge is treated essentially as information that can be readily absorbed, so that the problem of creation, adoption, and diffusion of new technologies can be traced back to a problem of (possibly conflicting) incentives: protection of property rights and reduction of barriers to entry. Thus, the growth of new industries depends solely on the functioning of factor markets: an efficient institutional setting is one that operates in such a way as to reduce the transactional impediments preventing each factor from being paid its contribution to the social product. Faced with different institutional environments, the process of change and restructuring has produced expansion and growth in the US, but unemployment in Europe.

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<sup>2</sup> In fact, data on manufacturing employment in the cycle do not indicate that differences in the functioning of the labor markets prevented major adjustments of labor in downturns. In the '70s and '80s many European countries resorted to a range of measures - such as early retirement, subsidized temporary lay-offs, and short-term work subsidies - in order to ensure adequate short-term employment flexibility, which made for a larger response in terms of hours rather than workers.

<sup>3</sup> Cf. Simonazzi and Villa (2000) for a critical survey of the empirical studies on the significance of various forms of rigidity for unemployment. It is argued there that the single features characterizing the labor market are part of a social and institutional set-up, so that the same policy measure may produce different results when applied in different socio-economic and institutional systems.

The paper argues that this analysis is lacking in two aspects: on the one hand, it neglects the complex of factors affecting the capacity of an industrial structure to adapt to changes in technology and demand, and, on the other, by assuming continuously clearing markets, it allows for the exclusion of any role for demand<sup>4</sup>. Yet, exit from the mature industries does not guarantee that resources will flow into the new growth industries. Even in the two countries that came closest to the ideal model of factor markets flexibility – the US and the UK – the evidence does not support the view of recessions as a spur to innovation and restructuring<sup>5</sup>.

Demand plays center-stage in an alternative explanation, which relates the increase in unemployment to the pace and the quality of capital accumulation. In this approach, the different stance in macroeconomic policies across the Atlantic in the 1980s and 1990s plays a crucial role in explaining the fall in the level of European investment (Modigliani, 1996) and its quality (Fitoussi, 1997, Simonazzi and Villa, 1999). Differences in the *policy mix*, rather than differences in fiscal or monetary policy per se, differentiate the US and the “European” countries. In the US, in fact, fiscal and monetary policies have never been simultaneously restrictive, and it is precisely this complementarity that has been lacking in Europe.

The argument that slow growth in demand, resulting in low investment, may have inhibited the process of upgrading and diversification in European industry seems to fit better to European experience. Even so, it is not obvious whether a higher level of demand would have, in and of itself, ensured a full exploitation of the possibilities which were being created by the new technologies. In fact, the birth and growth of new industries presupposes the existence of a network of knowledge, skills and capabilities, and requires the existence of demand needed to activate

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<sup>4</sup> As Caballero and Hammour (1996, p. 820) put it: “in the efficient economy, destruction would not take place if the economy is not ready to create...Incomplete contracting between labor and capital can disrupt this synchronized pattern and decouple creation and destruction”.

<sup>5</sup> Cf. Caballero and Hammour (2000, section 3.2) for the US and Geroski and Gregg (1997) for the UK. While the former explain this result by resorting once again to institutional failures, this time on the financial market, the latter observe that, in recession, most changes concentrate on labor adjustment, and most labor adjustment is just job shedding. They conclude that “it is hard to believe that recessions are a good substitute for vigorous competitive pressures in product markets, or that the extreme adversity they create for some firms (and many workers) is a good way to stimulate economic growth and development” (Geroski and Gregg, 1997, pp. 152-153).

dynamic linkages. Institutions, demand and technology shape the characteristics of ‘national systems of innovation’ (Lundvall, 1992; Nelson, 1993) which govern the various countries’ patterns of technical change and innovative performance. An institutional setting supportive of incremental (process and product) innovation may not be the most suitable for radical innovation. One country’s response to change will thus be affected by the degree of flexibility of the whole set of institutions presiding over innovation, and the new technologies can create a virtuous or vicious circle depending on the economic and institutional environment within which they are embedded<sup>6</sup>.

Embracing this view, we argue in this paper that the American performance can be explained in terms of the interaction of supply/technology factors with demand factors. The features of the US institutional context have allowed the US economy to exploit the growth potentialities of the information and communication technology (ICT) revolution and to consolidate its comparative advantage in those industries promising to remain among the more dynamic in the near future. However, the diffusion of innovations and exploitation of dynamic comparative advantages require dynamic demand in order to activate the virtuous circle of growth. In the US this was achieved with a mix of policies (at the aggregate and at the industry level) that ensured the demand needed to sustain growth.

The next section addresses the question of the role played by macroeconomic policies in the EU’s dismal employment performance. The remaining sections address the question of the higher US growth. Three issues will be considered. In the first place we investigate the interdependence between supply and demand factors in sustaining the growth of the new high-tech sectors and the interaction between sectoral and aggregate growth. In this context, the paper addresses the question of whether – and if so to what extent - growth was dependent on economic de-

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<sup>6</sup> Cf. Freeman and Soete, 1997 (p. 398): “What a revolutionary new technology can do is to create the basis for a virtuous circle of growth in which investment is high, labor productivity grows fast but output grows even faster, so that there is a net growth of employment. Whether this virtuous circle can be sustained depends on macro-economic policies, employment policies and trade as well as on the new technologies. If there is a good match between technologies, policies and institutions prolonged periods of full employment can result”.

regulation. In the final section, the paper takes up an issue concerning the long-run sustainability of the US growth model.

## **2. Macroeconomic policies and the pattern of restructuring**

The divergence in macroeconomic policies across the Atlantic in the 1980s and 1990s derives from the interaction of different, domestic and external, constraints. In the US, a less binding external constraint has favored the sustainability of expansion. The degrees of freedom and the privileges still enjoyed as the hegemonic country enabled the US to manage its domestic demand with no direct consideration of the external constraint. In the 1970s, attack on the labor market institutions (well documented in Harrison and Bluestone, 1988) was accompanied by expansionary fiscal and monetary policies, and the pressure of increasing external deficits on the exchange rate was dealt with by letting the dollar fall (the policy of “benign neglect”). In the following two expansions, in the first half of the ‘80s and in the ‘90s, the piling up of external deficits was not considered a sufficient reason for curbing domestic growth. Only when domestic expansion threatened the stability and the international hegemony of the US financial system was monetary policy tuned to its defense, with scant consideration of the effects this might exert on the rest of the world.

In the European countries, on the contrary, economic policies had to take account of a different degree of tightness (real or self-imposed) of the balance of payments constraint and this confined the management of domestic demand within the straitjacket of the external constraint. At some point in the ‘70s each European country had to come to terms with balance of payments crises<sup>7</sup>. The institution of the European Monetary System (EMS) reflected the attempt, on the part of the major European countries, to create an area of trade and monetary stability against the vagaries of the dollar, thus reducing the risk of competitive devaluations. The evolution of the EMS shaped the evolution of each member country’s economic policies. In the first half of the ‘80s several factors combined to favor the smooth

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<sup>7</sup> In the mid-‘70s, reflation in Italy and the UK ended in foreign exchange crises that required the intervention of the IMF. The German experiment of concerted reflation in 1979-81 (demanded by the US and agreed upon at the Bonn summit of 1978) came to coincide with the second oil shock and resulted in a worsening of the current accounts. This experience left German policy-makers weary of expansionary policies. The Mitterrand experiment, abruptly interrupted in 1982 by a balance of payments crisis, marked the end of any reflationary attempts by European countries.

functioning of the system: dollar appreciation paved the way for a much needed weakness of the Deutsche mark, while controls on capital movements and frequent realignments within the system allowed for the autonomy of domestic policies. In the latter part of the '80s, however, management of the system underwent a drastic change: realignments were forgone and capital controls removed<sup>8</sup>. With the autonomy of monetary policy thus relinquished by all the countries but Germany, German policy set the pace of growth for the whole region. The effects differed widely across the European countries. The institutional and economic characteristics of the German economy worked in the direction of making deflationary policies more bearable in terms of unemployment, at least up to unification. On the contrary, the consequences were dramatic for the other two major European countries, France and Italy. Their experience showed the costs of borrowing another country's "credibility", when it meant implementing the very same policies that the "leader" country had chosen as the most suitable for its objectives, given its institutional and economic context. This comes out clearly in figure 1, which shows the different degree of complementarity of fiscal and monetary policy in Germany, as compared with France and Italy<sup>9</sup>. The high interest rates required to secure stability for the exchange rates within the new EMS in the first period, and the restrictive fiscal policies needed to join the monetary union subsequently, depressed demand and transmitted a deflationary impulse throughout Europe. The low growth of the 1980s degenerated into a generalized deflation that eventually drew even Germany along with it (table 1).

The conduct of economic policy has also been influenced by the social and institutional setting. In the US, an intimidated labor market might have been instrumental to US growth, making the long cycle of US expansion sustainable. In Simonazzi and Vianello (2001), however, it is argued that, in the US, the social setting not only facilitated expansionary policies, but also made them more necessary than in Europe. With private and social safety nets largely discarded, the US could hardly support long periods of high

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<sup>8</sup> Cf. Simonazzi and Vianello (2001) for a more complete treatment of the economic and political reasons behind transition to the "new EMS", and for analysis of the consequences that this new regime entailed for macroeconomic policy.

<sup>9</sup> The OECD indicator of budgetary stance has serious problems. In fact, the measure of structural deficit is based on the estimated NAIRU. Revisions of the NAIRU will result in changes in the structural deficit even if fiscal policy is unchanged. Cf. Baker and Schmitt (1999, p.15).

unemployment, and this can explain a more pragmatic application of macroeconomic theories<sup>10</sup>. In Europe, on the contrary, the safety net effect was not so much to raise unemployment as to make deflationary policies more socially tolerable. Moreover, as the continuous shift in the non-accelerating inflation rate of unemployment (NAIRU) experienced in the US economy in the last few years has shown, the mechanical relationship between unemployment and inflation postulated by modern macroeconomics disregards the combination of factors which enter into the determination of price changes: the price of imported goods, the level of capacity utilization, the degree of competition, the rate of productivity growth, and interest rates<sup>11</sup>.

Given the macroeconomic policies adopted since the inception of the EMS, the disappointing EU growth and employment performance is hardly surprising. By giving absolute priority to disinflation and price stability in the '80s, and to exchange rate stability and fiscal adjustment subsequently, the European governments sent dark omens on the rate of future expansion to the business community (and to households). Pessimistic expectations on

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<sup>10</sup> The different attitude towards reduction of public deficits illustrates this point nicely. In the '90s, both the US and Europe committed themselves to reducing public deficits. But in the US the potentially recessionary effects of this policy were not disregarded. The budget provided for an emergency package in case the deficit reduction caused recessionary effects. Moreover, the FED ensured its willingness to ease the process of fiscal adjustment through an accommodating monetary policy (Blanchard 1997a, pp. 198-202). In Europe, on the contrary, the Maastricht conditions were to be fulfilled irrespective of prevailing economic conditions. Reviving the hard-to-die idea that it is necessary and sufficient to create a pool of savings in order to increase investment - which had already been criticized by Keynes in his evidence at the Colwyn Committee (Keynes, 1924) - former EU commissioner for monetary affairs, De Silguy, for instance, sustained that the savings in public finance obtained through the austerity measures would free capital for private investment (International Herald Tribune 23 September 1998). The outcome differed greatly: in the US a booming economy sustained demand and income, thus making the public deficit reduction possible, while in Europe, with fiscal austerity pursued in recession, investment and consumption fell in a whirl of pessimistic expectations, and the room created by public virtue was wasted in falling income. In the event, the recession waxed so severe that the Maastricht conditions had to be quietly ignored.

<sup>11</sup> The continuous reduction in NAIRU is an embarrassment for macroeconomics. Advocates of the new economy cite various factors, such as increased labor market flexibility, increased information flows, organizational changes and reduced transaction costs (Stiroh, 1999) and the loss of firms' pricing power (Greenspan, 1999). Cf. Ginzburg and Simonazzi (1999) for an alternative explanation of the 'great disinflation' of the 1980s and 1990s and its connections with the international debt crisis.

the rate of growth of future sales can explain the disappointing trend in investment in the major European countries, and the self-fulfilling result of these expectations (table 1).

The macroeconomic environment can also explain the quality of investment. Due to the gloomy climate created by macro-policies and the increasing competition brought about by markets opening up, investment in Europe has been mainly of the intensive type: demand-constrained firms have resorted to process innovation and rationalizations aiming mainly at reducing costs and increasing productivity. Lack of demand, rather than labor market rigidities, explains why the shake out of labor has not been compensated for by the creation of new jobs. Duménil and Lévy (1999), for instance, argue that the higher unemployment recorded in Europe in the '80s and '90s was substantially due to the fact that European technology was still catching up on the US standard (more mechanization, faster growth of labor productivity), but within a deflationary environment. Thus they explain the increasing capital/labor ratio in Europe by reversing the consensus explanation, based on Eurosclerosis. The European problem is not due to "the record performance of the US concerning technical change, but quite *ibid.*, p. 41) i.e., to a faster rate of technical progress in Europe, as evidenced by the increasing capital/labor ratio, and it illustrates the danger of catching up in recession.

While Duménil and Lévy provide a convincing description of the process of rationalization which swept through European industry, their interpretation of the increase in the capital/labor ratio as evidence of catching up calls for qualification. In fact, evidence from case studies on rationalization of "mature" industries seems to indicate that the pressure to reduce costs has been common to both US and EU firms, so that the process of rationalization in US firms has not been less dramatic or painful (OECD, 1996)<sup>12</sup>. The convergence in the capital/labor ratio may partly derive from composition effects. The faster growth of the services, characterized by a lower capital/labor ratio, might have reduced the increase in the capital/labor ratio in the US, thus contributing to reduce the gap to be closed. A greater weight of "human" capital in the new technologies may have gone in the same direction. It is possible therefore that European firms

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<sup>12</sup> In some European countries, such as Italy, however, a larger weight of "mature" industries may have increased the employment effects of the process of capital deepening in the 'existing' industries.

might have become as efficient as their American competitors in those industries that underwent restructuring, while lagging behind in the creation of new high-tech industries. In Germany, for instance, the process of rationalization has been quite successful in strengthening the sectors of traditional comparative advantage, thus revealing powerful dynamism in the well-established sectors, but also pointing to a difficulty in breaking new fields. On the contrary, the leading position of the US in the new high-tech industrial and service sectors is evidenced by various indicators at different stages of the production chain, from innovation - as indicated by data on patents - to the production and export of hardware and software and the diffusion and use of ICT products (Bassanini *et al.*, 2000; OECD, 2000). This takes us back to the problem of what affects success in economic restructuring and whether, and to what extent the US employment performance is due to a greater ability to develop new growth industries.

### 3. Institutions

The evolutionary theory of economic growth maintains that the innovative performance of firms and countries is affected by their institutional settings. This is a dynamic, two-way relation, whereby interaction of new technologies with the existing institutional and social environment leads to the emergence of new forms of business organizations and new supporting institutions (Nelson, 1998). Proponents of the varieties of capitalism perspective argue that institutional settings supportive of incremental (process and product) innovation may not be the most suitable for radical innovation<sup>13</sup>. Radical innovation demands an institutional environment supportive of risk taking and entrepreneurship, favoring entrepreneurial mobility, managerial autonomy, ample availability of venture capital, and the ability to promptly reorganize teams of workers, scientists and managers (Casper and Vitols, 1997). On the contrary, productive systems based on co-operative relations<sup>14</sup> are more supportive of incremental and process innovation.

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<sup>13</sup> There is no unanimity on the definition of radical and incremental innovation, but the two terms may be taken not to denote distinct categories, but rather to represent poles on a continuum.

<sup>14</sup> Birecree *et al.* (1997, p.8) define systems of cooperative production as characterized by the importance given to high levels of worker training and their involvement in product and process innovation, relational rather than hands-off inter-firm links, intervention “by

According to this view, the US innovation system was better suited to take advantage of the new technologies. Its institutional context (the close connection between universities and industries, the growth of technology-oriented disciplines, the characteristics of vocational training, availability of venture capital) has favored radical change, the development of new products and the growth of new industries. The European countries, conversely, had an institutional background less supportive of radical change<sup>15</sup>. Long-term, stable customer-supplier relations can play an important role in well-established industries, while being unimportant, if not a hindrance, to new fast-changing ones<sup>16</sup>. Likewise, long-term relations between firms and banks, which have characterized the credit markets in continental Europe, can ensure more patience on the part of the lender, thus consenting the development of projects with a long term repayment period. Yet, when it comes to growth in the new sectors, a highly speculative form of financing may be more effective than a more patient but inevitably more prudent banker<sup>17</sup>. In the US, venture capital has played an important role in financing the explosion of new high-tech firms (Florida and Kenney, 1990;

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the state, trade association, trade unions and other organizations (to set) norms and rules, standards to regulate competition and the relation between the *social partners*".

<sup>15</sup> Casper and Vitols (1997, p.6), for instance, describe the 'German model' as characterized by a complex of institutions - encompassing the areas of industrial relations, education and training, inter-company relations, and capital markets - that, while supportive of incremental innovation in established R&D intensive technologies, can "inhibit the very different organizational strategies needed to support radical product innovation". Cf. the issue of *Industry and Innovation*, no.1, 1997 for a thorough analysis of the German system of innovation.

<sup>16</sup> In her research on the US auto industry Helper (1995) found that adoption of computer numerical control was discouraged by arms' length supplier-customer relationships. On the other hand, according to Chesbrough (1999), the close link between European producers of hard disk drives and the captive needs of their system design companies limited their capacity to manufacture high volumes with low costs. When the technology became more standardized, this factor, combined with EU firms' failure to move production offshore, forced them out of the market.

<sup>17</sup> 'Relationship banking' has failed to work smoothly throughout the continent, however. De Cecco (1997), for instance, notes that in Italy bank lending has relied more on the existence of collateral than on long-standing business relations or project evaluations. As for Japan, Aoki (1986) has argued that abundant supply of capital, coupled with organisational innovations of large established firms, have made the lack of a market for venture capital and start-ups not particularly disadvantageous to successful high-tech industrialisation.

Gompers and Lerner, 2001)<sup>18</sup>. In Europe, on the contrary, complaints by small innovative firms over lack of ‘venture capital’ are very widespread<sup>19</sup>. Finally, in Europe (and Japan) new firms do not seem to enter the picture so readily (Krueger and Pischke, 1997): this may give incumbent firms more time to adjust, but it can also weaken the industry’s overall dynamism and capacity to innovate.

The explanation offered by the institutional approach should not be interpreted in a static way, though. In the various countries, patterns of industrial organization do adapt to the challenges posed by new technologies. The absorption, utilization and diffusion of new ideas and of radically new codifiable knowledge, however, requires the development of new – or modification of existing – knowledge and capabilities. Since most knowledge is tacit and local, capabilities are specific to organizational and geographical locations. This favors the internal circulation of knowledge, while impeding its external accessibility. Moreover, new knowledge is built upon what is already known in a cumulative fashion, so that drastic jumps in technological competencies are unlikely. One country’s response to change, therefore, involves interaction between internally and externally generated codifiable and tacit knowledge, and entails a process of institutions adaptability. Industrial or technology policies can affect firms innovative capabilities and promote institutional adaptiveness by acting on the incentives and constraints created by the institutional environment (Casper, 2000)<sup>20</sup>. Successful adaptation to change is therefore affected by the

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<sup>18</sup> The higher vulnerability of the stock market to waves of speculation and sudden change of moods qualifies the advantage provided by a highly speculative venture capital. An increasing number of US established companies are investing resources to recruit long-term investors and create a core of long-term shareholders in their stocks. Moreover, with US institutional investors also shrinking their time horizons, US companies are trying to recruit institutional investors in Europe, because they tend to have longer time horizons (Byrne, 1999).

<sup>19</sup> Deeg (1997), for instance, finds that, although the German financial system has been quite effective in supporting modernization in the traditional branches, it has at the same time represented a barrier to the start-up of new high-tech companies. According to OECD data (OECD, 1998, p. 230) in 1996 78% of deals (accounting for 71% of the funds raised) in the US were accounted for by 5 sectors (computer-related, communication, medical and health, biotechnology, semiconductors). In Europe these same sectors accounted for only 32% of deals (20% of fund raising).

<sup>20</sup> Cf. Carlin and Soskice (1997) Lerher (2000) and Casper (2000) for analysis of the evolution of Germany’s technological policies in support of high-tech firms and

flexibility of the whole set of institutions shaping the social relations of production and presiding over innovation (Unger, 2000).

#### **4. Creating a market**

In the US, the greater potentialities opened up by an institutional context more supportive of change have been seized thanks to the interaction of demand and supply factors. An informal industrial policy has provided a captive demand for the new industries in their infancy, while the rise of new dynamic user sectors (telecommunications, finance, biotechnology) has taken over the role of providing an outlet for the products of the new high-tech industries subsequent to the end of the cold war, with defense playing a smaller role.

The role played by the American defense system in the support of sunrise high-tech industries is by now largely recognized (Markusen *et al.*, 1992). In the early '80s government defense spending came to constitute an effective industrial policy that worked to support and enhance undisputed US leadership in technological innovation. Given the existence of cumulative economies of scale and increasing returns, policies that increase output can reduce unit costs and give the industry of a country a clear lead over competitors. Aircraft, semiconductors and telecommunications are instances of industries where the extent of the market can provide a decisive advantage, and where public expenditure, and in particular military procurement, have been particularly important in fulfilling the double function of sustaining the level of demand and subsidizing the costs of research. The sheer size of the economy has also made it possible to cover the whole range of the high-tech sector, enabling firms to reap the increasing returns in R&D and demand deriving from interactions along the whole value chain. These factors can explain the greater efficacy of the US informal industrial policy vis-à-vis the “national champions” policies pursued by each single European country<sup>21</sup>. By providing a breeding field

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entrepreneurship and Unger (2000) for a comparative analysis of the effects of institutional differences on their response to change in four European countries.

<sup>21</sup> “National champion” policies fragmented the European market, making it difficult for each national industry to reap the economies of scale needed to become competitive. The failure in one stage had consequences throughout the value chain of European suppliers. Malerba and Torrisi (1996), for instance, explain the failure of the European computer industry with the poor performance of European software developers. Failure to develop a computer industry, in turn, doomed the European semiconductor industry. Japanese firms,

for innovative firms, public policy enhanced the process of structural change and allowed them to rush down the learning curve. The spread of knowledge within the local system - sustained by dynamic interaction between supplier and user industries and the spawning of an infrastructure of supporting business services (consultants, programmers, marketing, advertising) - created externalities and dynamic economies of scale which reinforced the competitive advantage of the local system. The considerable mobility of highly qualified personnel contributed to activating a process of competition, cross-fertilization and diffusion of innovations within the local system of innovation. In the US computer industry, for instance, startup firms, staffed by managers from incumbent firms, very frequently displaced leading firms (Chesbrough, 1999). The high rate of new startups and rapid turnover in firm leaderships continuously shifted the frontier of new products and processes, pre-empted the market in many fields and limited the followers' chances of success, thus contributing to defend the country's leadership.

The extremely rapid diffusion of the ICT innovations in the user sectors - in both consumption and investment - has provided support for the US high-tech manufacturing industry when sharp cuts in large-scale defense, space and energy spending in the late '80s reduced government direct support to the high-tech industries<sup>22</sup>. More than 70 per cent of the increase in real GDP in the expansion of the '90s came from consumption, with over a third coming from investment. The growth of these two components of expenditure have more than offset the reduction in public expenditure, which played such an important role in the previous expansion (when it outweighed investment in its contribution to economic growth). The growing importance of the new sectors in fuelling the investment boom is evidenced by the weight of information processing equipment in total producers' durable equipment: its share has increased steadily since the early '80s (from 21% in 1982 to 30% by the end of the decade), soaring to 45% by 1997. The services have been by far the most important supporter of the investment drive (Triplett, 1999). The financial sector stands out as the

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on the contrary, were able to use the consumer electronics market to build up production volume for the products of the semiconductor industry in much the same way that American firms originally used the defense markets (Freeman and Soete, 1997).

<sup>22</sup> The reduction in the defense budget by no means implied the end of government support to R&D and to high-tech industries, which, on the contrary, continues to be considerable. Cf. Economic Report of the President, 1999, p. 172.

most important investor (its share in total fixed investment grew from 10% in the '70s to over 20% in the late '90s, Henwood, 1999, p.125). However, the more traditional services, such as the wholesale and retail trade or social and personal services, have also contributed in sustaining the demand for high-tech capital equipment (ranging from the use of optical scanners for electronically controlled inventories and check-out operations in trade to specialized equipment in health).

Consumption has been the other driving force in the latest expansion. The personal saving rate plummeted from 10 per cent in the mid '80s to 1 per cent in 2001 (Lusardi *et al.*, 2001). The "autonomous" component of consumption has been taking over an increasing role in activating the income multiplier, supplementing the more traditional autonomous components of demand - investment and public expenditure - and contributing to boost investment through the accelerator effect. Capital gains are the factor usually quoted as favoring the increase in consumer spending and households' readiness to enter indebtedness. Though the highly skewed distribution of stock ownership makes it very unlikely for direct wealth effects to have played a relevant role in the surge in consumption, the stock exchange boom might have affected consumption through the working of the "confidence channel", i.e., by affecting confidence about the future of those households that do not own stocks (Poterba, 2000). The tightness of their budget constraint has been loosened by the willingness of the deregulated financial sector to satisfy the demand for credit of even low-wage households, with financial competition abetting progressive relaxation of prudential norms<sup>23</sup>. As a consequence of the increasing reliance on debt-financing the ratio of debt to disposable personal income soared dramatically, from 76 per cent in the '80s to 92 in the 1991-99 business cycle, with a "disturbing increase in the fraction of families for whom debt payments amount to more than 40 per cent of income" (Lusardi *et al.*, 2001, p. 106).

## **5. Deregulation, competition and efficiency**

The build up of the new technology sector coincided with a wave of deregulation in the services, which was inaugurated in the Carter-Ford era

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<sup>23</sup> We read in the Economic Report of the President (February 1998, p. 67): "mortgages that require no down payment at all are now available for consumers willing to pay very high rates"... while home equity loans are used to finance other large expenses previously financed by separate consumer loans, because their interest is tax deductible".

and energetically pursued by Reagan. By dramatically lowering entry barriers, changing the economies of scale and scope and blurring the separation of product markets, the new technologies were blunting the industrial characteristics upon which regulatory policy was premised, thus calling for a substantial overhaul of regulatory principles. This met with a new economic and political environment that fuelled distrust of the regulators' capacity to devise the right rules to cope with change. The prospects of profits for entrepreneurs (already exploiting the loopholes in regulation being created by technical change) reinforced this political climate (Vietor, 1990).

Was deregulation instrumental in sustaining the vigorous growth of the service sector, and specifically of the so-called high-tech services? The classical argument in favor of deregulation is that, by enhancing competition, it favors the creation and implementation of new technologies, thus fostering efficiency and growth through productivity gains. However, both theory and empirical literature are inconclusive on the relative merit of government and public ownership in promoting overall efficiency (Megginson and Netter, 2001). Although privatization is generally credited with making divested firms more efficient and profitable, its macroeconomic effects on growth and employment are far from being established. Moreover, scant consideration has been paid to the fact that both the strategies and the outcomes of privatization and de-regulation will be affected by differences in productive, organizational and institutional settings<sup>24</sup>, which explains the conflicting results obtained by empirical studies on the impact of privatization on employment and on the distribution of the welfare gains (and costs) among stakeholders<sup>25</sup>.

By freeing the big American corporations from restrictions that had prevented entry into other sectors and limited their abilities to attack foreign markets, deregulation unleashed the profit potentialities hitherto compressed

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<sup>24</sup> In their comparative analysis of the process of deregulation and restructuring in telecommunications in Britain, Germany and the US, for instance, Batt and Darbishire (1997) find that "differences in industrial relations systems play a central role, both at the industry level in shaping regulatory policy, and at the firm level in shaping corporate strategy and work restructuring" while, with respect to the politics of market deregulation, different priority given to the interests of different stakeholders (producers and shareholders, workers, or consumers organization) contributed to shape new market rules or, "re-regulate the market in ways that privilege some actors more than others".

<sup>25</sup> Cf. Megginson and Netter (2001) for an overview of empirical studies on privatization.

by policies fixing price caps or maximum rates of return and preventing product diversification<sup>26</sup>. Moreover, the process of deregulation went along with a more lenient attitude towards mergers, so that the increase in competition was accompanied by lively merger activity<sup>27</sup>. Last but not least, the deregulation wave was implemented within deregulated labor markets. As a consequence, in most industries deregulation brought in competition from non-unionized, low cost new entrants. Firms and industries responded to the increased pressure on costs by combining swift adoption of innovations with labor cost cutting measures: incumbents negotiated major wage concessions from their unions (as in the case of the airline industry), or bought and operated new entrants' low cost, non-unionized companies (as in the truck industry), or increased non-union supervisory personnel in craft and clerical occupations (as did AT&T after the 1984 break-up) (Peoples, 1998). The effects on unionization, real wage and employment differed widely across industry, but in general the bargaining power of labor declined following deregulation, and wage differentials (with the rest of the non-regulated industries) substantially decreased<sup>28</sup>. As a consequence, wage cuts account for a large part of the substantial cost reductions obtained in the deregulated services<sup>29</sup>. The changes in the regulatory legislation interacted with the technical and social conditions of production in shaping the new work and industrial organization (Wilkinson and Moore, 2000, p. 238).

Finally, financial deregulation has produced mixed results. On the one hand, it has provided a most important channel of support of aggregate

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<sup>26</sup> For instance, deregulation lifted the rule that prevented AT&T from entering data processing or other non-telephone markets. Moreover, both At&T and IBM were able to seek new alliances to facilitate their entry into European telecommunication markets (Dang Nyugen, 1985). Diversification into new products, previously prohibited, is also reported as one of the main determinants of the increased profits in the banking industry (Berger *et al.*, 1995).

<sup>27</sup> In the banking industry, for instance, between 1979 and 1994 over a third of independent banking organizations (mostly small banks) disappeared (Berger *et al.*, 1995).

<sup>28</sup> According to Fortin and Lemieux (1997) about one third of the growth in inequality which occurred in the US in the '80s can be accounted for with institutional changes, specifically, the real value of the minimum wage, the fall in the unionization rate and economic deregulation.

<sup>29</sup> "Cost reduction was the most painful, but central, aspect of deregulation. Reductions in headcount, wages and workrules, operations and asset utilization affected every sector" (Vieter, 1990, p.30). Winston (1998) estimates that cost reductions were in the order of 25-75% , but observes that "the transition ... to market forces has not 'equalized' deregulated prices and services across all consumer groups and geographical areas" (*ibid.*, p.102).

demand. Through continuous innovations in instruments and institutions, financial deregulation opened new channels of credit to firms and consumers, facilitating the financing of investment in new industries and sustaining consumption. One could argue that in the US debt financing has played the same function of supporting consumption as performed by the welfare state in Europe, with private indebtedness taking the place of public indebtedness. On the other hand, however, the dramatic increase in household debt, together with the marked change in the portfolio composition away from 'safe' assets (cf. Pollin, 2000, table 5), reinforces the likelihood of systemic responses to wealth shocks. In fact, stock and property price declines are bound to shake not only peoples' confidence in job security and income stability, thus reducing their consumption, but, even more importantly, they will inevitably affect the degree of confidence of the financial institutions. With debt exposure at very high levels, the sudden drying up of credit might result in an increase in debt delinquency. The balloon of personal and corporate debt on which the boom has grown, and the consequent increasing financial fragility of the US system, provide yet another reason for a more permissive monetary policy. In fact, should boom turn to bust, or should the monetary policy turn too restrictive, consumption would plummet, dragging real income, employment, and financial stability after it<sup>30</sup>. Moreover, contrary to 1981, the high rate of private indebtedness severely limits the possibility to resort to interest rates in order to defend the exchange rate, should a run on the dollar occur<sup>31</sup>. The seriousness of the threat to long-term growth posed by the build-up of increasing social and financial disequilibria has been emphasized by various authors (cf. Eatwell and Taylor, 1999) and the greater pragmatism recently shown by US monetary policy may well also be a necessary consequence of this growth model.

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<sup>30</sup> In 1987, easy money was required to prevent a stock exchange crack. Tighter money in 1988 suddenly interrupted the run-up of the debt-income ratio, brought a sharp hike to household debt service payments, sent consumer confidence plummeting, and opened the way to the 1990-91 recession and the rise in the household debt delinquency rate. In 1991-92 interest rates had to be cut again in order to avert a banking system crash.

<sup>31</sup> In the 1992 EMS crisis, the high net financial exposure of the private sector (both businesses and households) made it impossible for the UK government to defend the exchange rate.

## 6. Long-term sustainability of US growth

A common perception that the US economy was losing ground in the competitive race still persisted in the early '90s. The long expansion of the '90s combined with slow growth in Europe and deflation in Japan turned alarm into over-confidence. The increase in employment and the growth of the new high-tech economy put an end to the debate regarding both US competitiveness and the need for an industrial policy which had seen keen participation in the '80s<sup>32</sup>. The recent sudden halt in growth, while clearing the ground of much nonsense about the end of the business cycle, risks plunging overconfidence back into pessimism. The long-term sustainability of growth rests on the capacity of the "traditional" sector of the US industry to innovate and pursue quality improvements. However, whether the information revolution has been successful in driving a fundamental transformation of the economy and how deeply the "new economy" has affected the "old", more established industry remain unanswered questions. The recent slowdown in productivity growth (compounded by data revisions) seems to vindicate the more cautious view taken in the productivity debate prompted by the boom<sup>33</sup>. According to this view, the diffusion of IT productivity effects throughout the economy has been extremely limited<sup>34</sup>, and a substantial part of the post 1995 total factor productivity (TFP) acceleration can be traced back to the pro-cyclical behavior of productivity<sup>35</sup>, and is therefore likely to be transitory. The sustainability of recent growth trends therefore hinges on the persistence of the factors feeding the present expansion.

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<sup>32</sup> Cf. Norton (1986) for an overview of the debate.

<sup>33</sup> An optimistic view of the way IT has improved the efficiency of the whole economy is taken by Oliner and Sichel (2000) and, more cautiously, by Nordhaus (2001). Jorgenson and Stiroh (2000), however, find that the burst of investment in high-technology assets has not been matched by a corresponding growth of industry-level productivity in those industries that use IT most intensively, such as finance, insurance and real estate, and other services. They conclude that "the apparent combination of slow productivity growth and heavy computer use remains an important obstacle for "new economy" proponents who argue that the use of IT is fundamentally changing business practices and raising productivity throughout the US economy" (*ibid.*, p. 178).

<sup>34</sup> According to Gordon (2000) there has been no acceleration in the productivity trend outside of durable goods manufacturing.

<sup>35</sup> The long-run effect of the growth of production on productivity for the US manufacturing industry is stressed by Bonifati (2001).

The division of the economy into new and old is, however, misleading: the IT revolution has had an impact on manufacturing, services and trade which goes beyond cost reduction. In fact, the efficiency-inducing effects of the new technologies - the product innovations of the new economy are the process innovations of the old economy - are inseparable from their contribution to the process of quality improvement and product innovation of the old economy: in this way, new products and new markets for “mature” industries have been created. But, as argued in the previous sections, changes in technology, combined with changes in regulation and competition, have also profoundly affected the organization of production in both industry and services. Employer response to pressures to cut costs has favored restructuring and downsizing, obtained by outsourcing a number of operations previously performed within the firm. This has produced mixed results. In spite of its stress on investment in human capital as an important factor in the new economy, the idea that skilled work can be readily replaced by technology has favored neglect of the middle range of the technical skill base, built up by experience and knowledge. In many cases the skills required of employees have been reduced, and there has been an increasing reliance on low-wages<sup>36</sup>. The most obvious consequence of the new employment relations has been the sharp reduction in job security, which came at the very time when the changes in organizational practices induced by new technologies required greater involvement of the shop floor, thus calling for greater job security and training (Cappelli *et al.*, 1997).

The reorganization of production has also changed the power relations within the value chain, affecting the distribution of income not only between capital and labor, but within different segments of capital and labor. In fact, by outsourcing most of the manufacturing operations, while retaining only the final (or more human capital intensive) stages of production, many manufacturing firms have moved forward to provide services. Not only have

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<sup>36</sup> This process has not spared high-tech industries or areas. High and low paid workers co-exist in the same high-tech sectors (manufacturing, assembly and support service jobs). “In some of California’s electronics or circuit-board assembly plants, virtually the entire frontline work-force consists of women from Vietnam or Central America, often hired on a contract basis and not sharing in the stock options of the professional and managerial workforce” (Finegold, 2000, p. 69-70). The Economist (“The Future of Work”, January 29, 2000, p.92) reports that in Silicon Valley the poorest fifth of the valley’s households saw their real income fall by 8% between 1991 and 1997 while income for the richest fifth rose by 19%.

services emerged as 'core' value added activities<sup>37</sup>, but - as the sale of goods grows ever more intertwined with the sale of services (as in the case of computer and software, telecommunications, distribution, training, repair, construction and leasing)<sup>38</sup> – the brunt of competition has been increasingly shifted backwards, to the suppliers. Thus a substantial part of the value chain, made up of all those sectors operating upstream or in complementary activities, has become more price-elastic. The changed balance of power between final service producers (and world-wide distribution) relative to manufacturing has put pressure on the latter's profits<sup>39</sup>. Not even those producers who had relied on non-price factors (such as quality, trade-marks or design) for their competitiveness were exempt from this threat<sup>40</sup>. The pressure on profits has been passed on to wages: with the threshold to wage cutting largely removed by labor market deregulation, wage inequality has dramatically increased.

This process has been reinforced by the operation of foreign trade. By affecting the financial and stock markets, the booming high-tech sector has produced an appreciation of the dollar which, in turn, has speeded up the

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<sup>37</sup> 'Manufacturing' firms, such as IBM, Ericsson and General Electric, realize an increasing share of their total revenue from services (such as software, systems design, consultancy, technical and after-sale services, and finance) and most of their personnel are now in these services, while manufacturing is subcontracted.

<sup>38</sup> Gartner Group, a specialist computer consultancy firm, estimates that support costs – as opposed to purchase costs – amount to about three-quarters of the lifetime costs of a PC, and a significant part of this is outsourced to specialized companies (cited in Dalum *et al.*, 1999, p. 110). The share of services is increasing also in investment 'goods'. According to a study of the US International Trade Commission, hardware represented 80% of the total value of a computer in the early '70s, with software accounting for the remaining 20%; by 1980 these shares had reversed and the share of hardware is constantly declining. The same trend is occurring in sectors as disparate as airplanes and farm tractors (quoted in OECD, 1996, p. 22).

<sup>39</sup> Given the dramatic changes in relative prices between inputs and final products and services, different deflation criteria can seriously affect the allocation of productivity growth between sectors, and may go someway in the direction of explaining the 'productivity puzzle'.

<sup>40</sup> The case of Nike is emblematic. After long resistance, the firm had to accept to market its products on the net. On that occasion, Nike's CEO expressed concern that, with the diffusion of internet trading, quality differences might be swept away in favor of simple price considerations. Not even the services are protected from the grip of price competition, as far as the process of commoditization of services goes: a recent report by the OECD notes that with the proliferation of "leased" lines from private telecommunications companies, bandwidth had become a commodity like wheat or oil (quoted in Fuller, 1999).

hollowing out of the economy. The process of international de-localization of production has led to increasing flows of imports and exports of intermediate products, as the most labor intensive phases are outsourced. This process has to varying degrees affected all industries, irrespective of their technological ranking<sup>41</sup>. While the reliance of US industries on imported inputs increased, so did the elasticity of the domestic content of inputs to prices (and exchange rate)<sup>42</sup>. Klein et al. (2000) found that this response is asymmetric: “appreciations play a significant role in job destruction, but job flows do not respond significantly to dollar depreciation”. This “ratchet effect” indicates that, once delocalization has occurred, it might be very difficult to undo. The ballooning trade deficit thus reflects the strength of the US expansion as much as the effect of the appreciation of the exchange rate on domestic industry. The strength of the new industrial and service complex is producing an increasing surplus in the services account, which in 1998 offset a third of the US deficit on trade in goods<sup>43</sup>. Yet, as the process continues, the capacity of the services to pay for

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<sup>41</sup> ‘Mature’ products such as textiles and apparel are the most common examples, but moving production off-shore became a necessary condition to remain competitive also in the high-tech industries, as in the case of computer hardware (see footnote 17 above). As a result, the production of ‘mature’ (or labor intensive) products by the developed countries has not entirely been relinquished, whereas the share of the developing countries in high-tech products is increasing, substantially reducing the heuristic content of traditional classifications (such as high-tech versus mature sectors, or classifications à la Pavitt).

<sup>42</sup> Campa and Goldberg (1997), for instance, report that the US industries’ reliance on imported inputs increased sharply between 1975 and 1985, and reverted to a more balanced external exposure by the early ‘90s. A significant effect of the exchange rate on job creation and job destruction in US manufacturing over the period 1973-1993 is also reported by Klein *et al.* (2000). The exchange rate can affect the relative competitiveness of domestic firms in a more general way: the fall in the dollar after 1985, for instance, increased the Yen cost of imported inputs of Japanese transplant in the US, which relied heavily on parts sourced from Japan. With the possibility to pass the increased costs onto prices blocked by competition on the US market, this translated into a sharp reduction in the Japanese firms’ profitability.

<sup>43</sup> ‘Royalties and license fees’ and ‘Other private services’ – an item which includes a variety of services: education; financial services; insurance; telecommunications; business, professional and technical services; and other affiliated and unaffiliated services – together accounted for 37.5 per cent of total exports of services and 55.3 percent of the surplus in services. Moreover, since foreign markets in many services are better serviced by local production (through foreign direct investment) rather than exports, foreign trade statistics understate the US firms’ leadership in the world market. The total amount of direct sales by foreign affiliates (of US companies on foreign markets and of foreign companies to the US

the part of manufacturing that is being relinquished will be correspondingly impaired.

To conclude, by focusing on flexibility and wage cutting strategies, the US economy may have forgone important benefits accruing to a more regulated labor market<sup>44</sup>. Some of the features of the US institutional setting - such as arms-length (and sometimes adversarial) customer/supplier and employer/employee relations – that might have served the new growth sectors well, can explain America’s relative failure at the ‘widely diffusing stage’ of the product cycle (Wilkinson and Moore, 2000, p. 239)<sup>45</sup>.

## 7. Conclusions

The US “employment miracle” has been supported by a virtuous circle of supply and demand. The presence of an institutional environment favorable to innovation has created the potentialities for the development of a new high-growth sector, whereas targeted demand policies and a favorable macroeconomic stance have interacted in creating the demand for the new expanding sectors. Technical progress in high-tech sectors and rapidly expanding markets for new consumption and investment goods, together with sky-rocketing investment in the user sectors, have sustained the growth of the new industries and are among the major factors behind the accelerating growth of the last few years. With the support of a generally accommodating monetary policy, development in the high-tech sector saw a virtuous growth circle set in, driven by demand for consumption and investment and fed by an extraordinary increase in profits and the stock-exchange which, in turn, helped keep the wave of optimism at a peak.

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market) exceeds exports and imports, although the surplus arising from sales by foreign affiliates is smaller than the surplus on cross-border trade. In the case of ‘computer and data processing services’ for instance, cross border exports are dwarfed by direct foreign sales of US MNCs, classified both in this industry, and in several other industries, particularly machinery manufacturing and wholesale trade. Cf. “US International Services”, *Survey of Current Business*, October 1999.

<sup>44</sup> The importance of a work organization that rests on trust and co-operation in raising efficiency, improving quality, and generating faster rates of product, process and organizational innovation is now widely recognized. Cf. Kitson *et al.* (2000) for an overview.

<sup>45</sup> Trying to explain the negative productivity growth of sectors that are heavy investors in IT, Jorgenson and Stiroh (2000) suggest that factors that have no association with technology may have a role. The authors cite lower quality of management and a worsening of industrial organization.

Expansion of demand throughout the economy helped create the investment-friendly climate lying behind the spectacular growth in employment over the last decade. The long expansion has been supported by a subdued inflation rate. Slow growth in world prices for manufactures and raw materials, as a consequence of the high dollar and slow growth abroad, resulted in a very slow growth in the prices of US imports and made it more difficult for US firms to raise the prices of tradable goods. The change in the balance of power between capital and labor has made it more difficult to obtain wage raises in spite of the increase in employment. Finally, the brisk rate of technological progress in the high-tech sectors has seen a sharp drop in the prices of intermediate and investment goods, encouraging increased investment in the new technologies (capital deepening) by user sectors. With inflation subdued, the Federal Reserve has been willing to tolerate the piling up of financial, domestic and external, disequilibria.

The process of restructuring, which has been obtained within the context of an unregulated labor market and rapid economic deregulation, has elicited a rush towards labor cost reduction. This has been reinforced by change in the market power and in the distribution of profits within the various sectors of the economy. The brunt of competition was passed back to suppliers, and eventually on to their employees. Given the absence of an adequate safety net, this process has dramatically worsened the income gap, which was only marginally affected by the full employment conditions of the late '90s. It is therefore unlikely that a more equitable distribution can be obtained through a trickle down effect, without recourse to more radical institutional reform.

To conclude, the greater flexibility of the overall institutional setting has favored the growth of the new economy. It does not, however, seem that low wages did play any important role in the development and growth of the high-tech sectors, or that the flexibility of the labor market, in and of itself, played a crucial role in determining the US employment "miracle" of the 1990s, regardless of demand. Should expansion subside, no degree of labor market flexibility could guarantee permanently low unemployment rates, as the cyclical downturn and the consequent increase in unemployment in the early 1990s remind us.

Likewise, low employment creation in Europe seems to be accounted for by a blend of supply and demand factors which have retarded growth in the new sectors, thus weakening the compensatory effects of rapid technical

change. The general stance taken in macroeconomic policies has aggravated the disadvantage of an institutional setting less favorable to radical innovation. While acknowledging the need for reform in Europe, the above analysis warns that – as the Single market experience has demonstrated – open markets do not suffice for the creation of a virtuous circle between production and consumption, and that long-term growth requires more than free markets. The present system of innovation calls for new forms of industrial policies, focussed on the aim to bridge the gap between newly emerging technologies and their swift transformation into forms in which they can be absorbed (Lehrer, 2000), and to favor the incorporation of elements of new technologies into products and processes based on established technologies. This can be achieved by promoting cooperation between firms and the scientific community, sustaining production and ensuring a more balanced diffusion of innovations<sup>46</sup>. Radical de-regulation is not the answer<sup>47</sup>. Regulation can be adapted to suit the growth of a high-technology industry, and some sort of regulation may actually favor the growth of the industry<sup>48</sup>. The few, but rapidly increasing, examples of European success in the high tech industries (telecommunications, the Airbus, biotechnology) show that knowledge and skills can be created (and comparative advantage defended) even within an institutional system of highly regulated labor. With labor market institutions still offering a safety net, reform in the product markets may escape the disruptive effects obtained in the US.

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<sup>46</sup> Dalum *et al.* (1999, p.127), for instance, cite culture, education, life styles, a R&D dominated telecommunication environment, and public measures to promote adoption and diffusion of new technologies among the factors which have given Northern Europe a world leading role in some telecommunications industries.

<sup>47</sup> Chang (1997) has observed that it is somewhat paradoxical that the deregulation wave comes at a time when economic theory (from the new trade theories to the theory of endogenous growth) is reconsidering the positive role that state intervention and regulation can play in the technological race.

<sup>48</sup> The adoption of a common standard is cited as one factor that gave the European industry a lead in mobile communication. The development of a huge domestic market can provide an outlet for European semiconductor producers and support for new advances in information technology.

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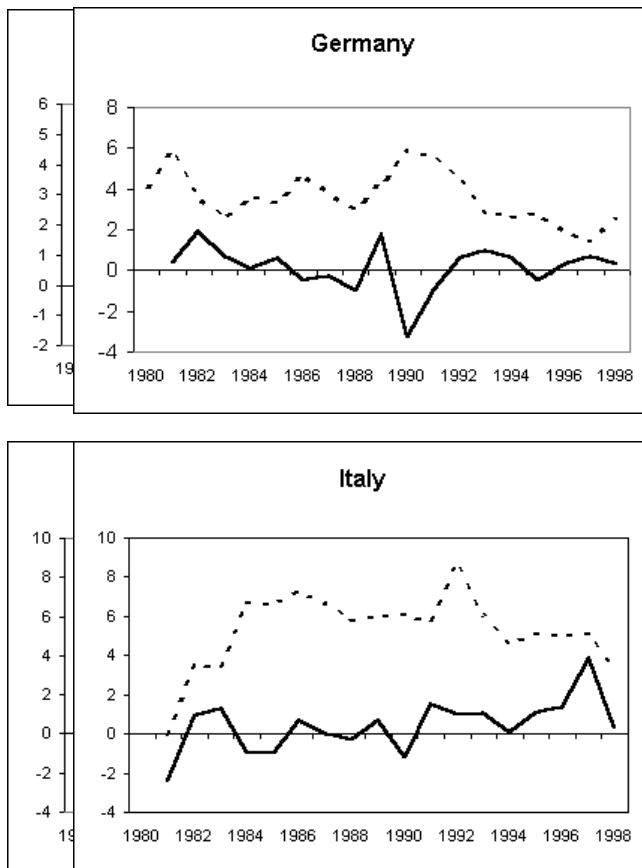
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**Table 1. Average rates of growth of GDP, investment and employment**

<b>GDP at 1995 market prices</b>					
	France	Germany	Italy	EU15	US
1961-70	5,6	4,4	5,7	4,9	4,2
1971-80	3,3	2,7	3,6	3,0	3,2
1981-90	2,5	2,2	2,2	2,4	3,2
1991-2000	1,8	1,9	1,5	2,0	3,4
<b>Real Gross Fixed Capital Formation</b>					
	France	Germany	Italy	EU15	US
1961-70	7,8	4,2	5,1	6,0	3,9
1971-80	2,5	1,2	1,7	1,6	2,8
1981-90	2,3	1,6	1,6	2,4	2,4
1991-2000	1,4	1,8	1,5	1,9	6,5
<b>Employment, persons; total economy</b>					
	France	Germany	Italy	EU15	US
1961-70	0,6	0,2	-0,5	0,3	2,0
1971-80	0,5	0,2	1,0	0,4	2,1
1981-90	0,3	0,5	0,7	0,5	1,8
1991-2000	0,5	0,3	0,2	0,5	1,5

**Fig.1 Budgetary impulse and monetary policy**



Change in the structural deficit (continuous line: negative values indicate a change towards a more expansionary policy) and short term real interest rates. Source: OECD, *Economic Outlook*, various issues.