

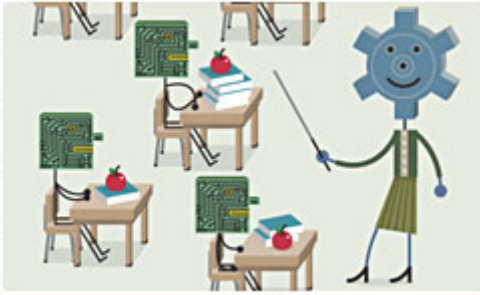
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What **high tech** can learn from slow-growth industries

To drive productivity, high-tech executives should focus not just on technological innovation but also on business process innovation.

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During high technology's boom years in the late 1990s, companies across many sectors tried to emulate their high-tech counterparts. The business models, the creativity and innovation, the speedy decisions, the headlong growth in revenues, profits, and shareholder value—slower-growth industries aspired to all of these blessings.

But now, with no technology rebound in sight, high-tech vendors must look to the business practices of their former admirers in slower-growth industries such as retailing and banking. There they will find lessons about increasing productivity and using the improvement strategically to expand their market share and better their financial performance. The challenge goes beyond simple cost cutting; it's about changing the ratio of inputs to outputs—the value of what companies put into a production process compared with what they get out (see sidebar, "[Defining productivity](#)"). High-tech companies have always focused on product innovation, and the economics of producing and selling technology in a high-demand environment enabled them to increase the value of their output for a given amount of labor, capital, and purchased goods and services. Now they must put a similar effort into delivering the same or greater output with fewer inputs and developing innovative operational processes, not just products and services.

A handful of high-tech vendors, grasping this new reality, have developed extremely productive business processes or taken advantage of lower factor costs—and sometimes both—to create and then widen their advantage over the competition. These companies offer their customers products comparable to those of their rivals as well as lower prices and thus represent a serious challenge to competitors slower to start the productivity race.

Dell, for instance, poses a threat in the market for enterprise networking products, where its lower-cost switching gear matches high-end routers in some respects. Huawei Technologies, a Chinese company with engineering labor costs one-eighth those of US players, charges about half of what many competitors ask for routers and other products. Although Cisco Systems is suing it for infringement of intellectual property, it has gone from playing catch-up in routers during the 1990s to providing near-equivalent performance, at least as measured by line board speed (speed per port). That success is reflected in Huawei's commercialization rate, which improved sevenfold from 1995 to 2002.

For high-tech companies that have long thrived by creating innovative products and services in response to technological discontinuities—in other words, by launching the "next big thing"—the transition to a new operational philosophy and approach won't be easy. Yet companies failing to make this shift risk being caught in a dilemma intrinsic to slowing industries: either protect margins and concede market share to competitors or protect market share at the expense of margins. The productivity imperative arising from this dilemma applies even to high-tech's leading names.




An end to hit making?

It may seem strange to talk of a productivity imperative in high tech, since it accounted for more than a third of the US economy's productivity surge in the 1990s—far more than any other sector, though it was responsible for only 8 percent of GDP at the start of the boom.¹ But much of the sector's productivity growth was driven by unusually high demand for increasingly powerful products—an environment that technology vendors may not enjoy again for some time. Furthermore, the success of a few stellar performers, some of which are now seeing their advantage slip, masked substantial differences among companies in

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the high-tech sector as a whole. More ominous still are three trends that may amplify the effects of slowing technology demand: the emergence of products offering equivalent value propositions at lower prices, the embedding of previously stand-alone technologies into broader offerings, and the entry of credible offshore vendors exploiting lower factor costs.

A happy confluence of events

A close examination of the numbers shows that most of high tech's productivity gains during the 1990s resulted from extraordinary gains in computing power and strong demand for products with ever better performance, capacity, and features. These advances—along with demand created by phenomena such as the Y2K problem, the e-business boom, the rearchitecting of enterprise computing platforms, and the increase in connectivity—led IT spending growth to accelerate from about 10 percent a year in the late 1980s and early 1990s to more than 20 percent from 1995 to 2000. As a result, technology spending surged from 22 percent of the total capital expenditures of US companies in 1980 to 39 percent in 2000.

High-tech companies, in other words, increased their measured productivity (encompassing quality improvements such as faster processing speeds) as a result of greater demand and the market's willingness to pay, without necessarily increasing their process efficiency. The electronic-equipment subsector, for example, achieved rather high rates of annual productivity growth from 1994 to 2001 while also increasing its labor inputs, because each new generation of chips was so much more powerful than the preceding one. During that same period, by contrast, the slow-growth metal mining, coal mining, apparel, and textile industries increased their productivity by significantly reducing the amount of labor they deployed.²

Since 2001, of course, demand for high-tech products has plummeted, but aggregate operating expenses haven't always come down at the same rate (Exhibit 1). No rebound is in sight; the most optimistic forecasts for the next three to five years show IT spending growth only in the high single digits. Nor can "hit-making" companies take comfort from current technological advances such as service-oriented architectures based on Web services (see "[Flexible IT, better strategy](#)") or infrastructure "resource virtualization" (what some call "utility computing"). After all, these innovations are designed mainly to help companies get more out of the IT resources they already have, without increasing expenditures.

EXHIBIT 1

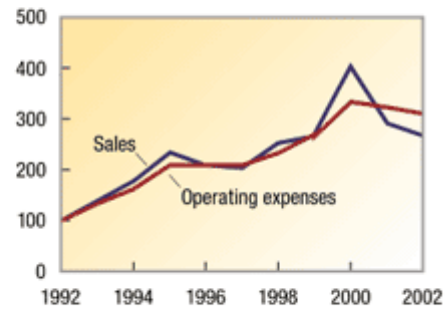
The worm turns

Change in operating expenses and sales of high-tech subsectors; index: 1992 = 100

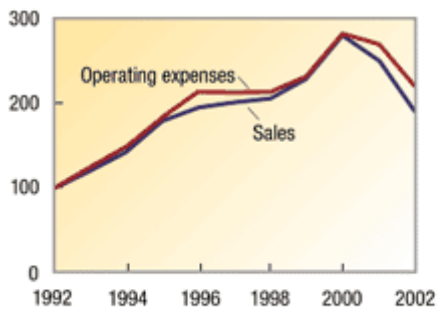
Computing and communications equipment



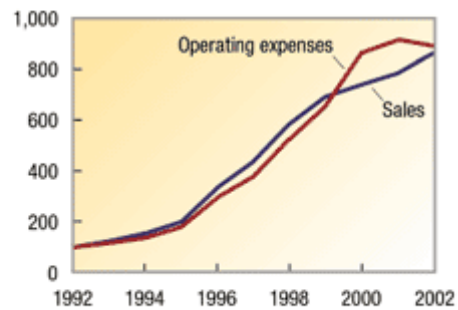
Semiconductors



Computer manufacturing



Software



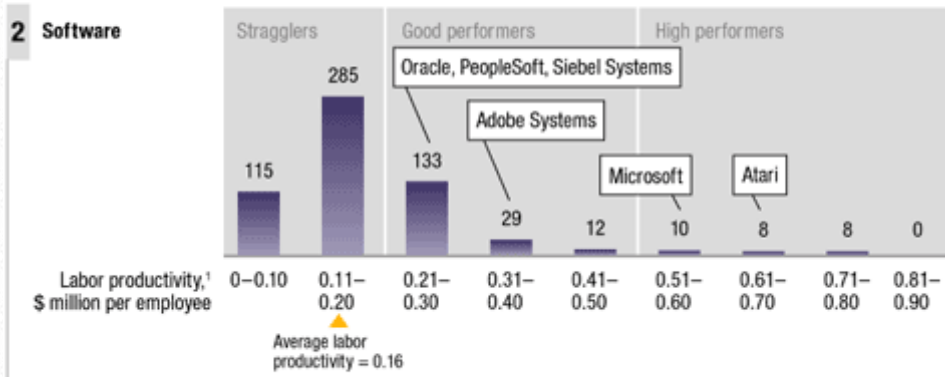
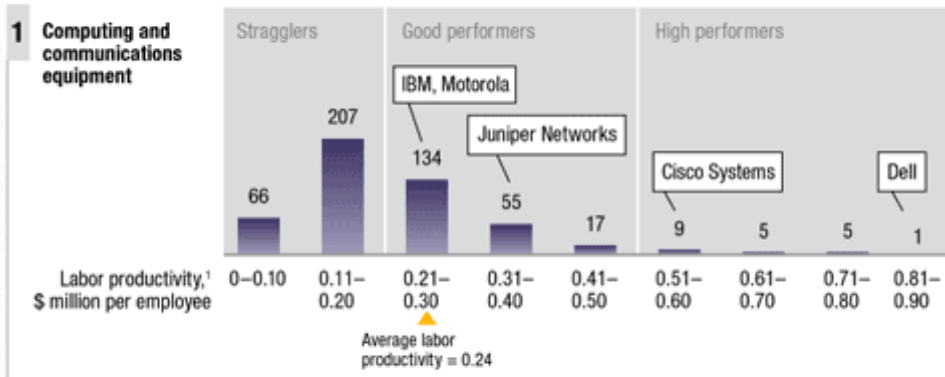
A diminishing lead

A second surprise lurks behind the high-tech sector's seemingly rosy productivity performance: the large gap between strong and weak performers, for a handful of leaders skewed the overall productivity results. In the computing- and communications-equipment subsector, for instance, Dell's labor productivity stands at \$900,000 per employee, against a subsector average of only \$240,000 (Exhibit 2, part 1). More than 70 percent of the companies in the subsector fall below even this average, and more than 60 percent fall below the average level of capital productivity. The same holds true in software (Exhibit 2, part 2) and other high-tech subsectors.

EXHIBIT 2

Leaders of the pack

Distribution of labor productivity by subsector, 2002, number of companies



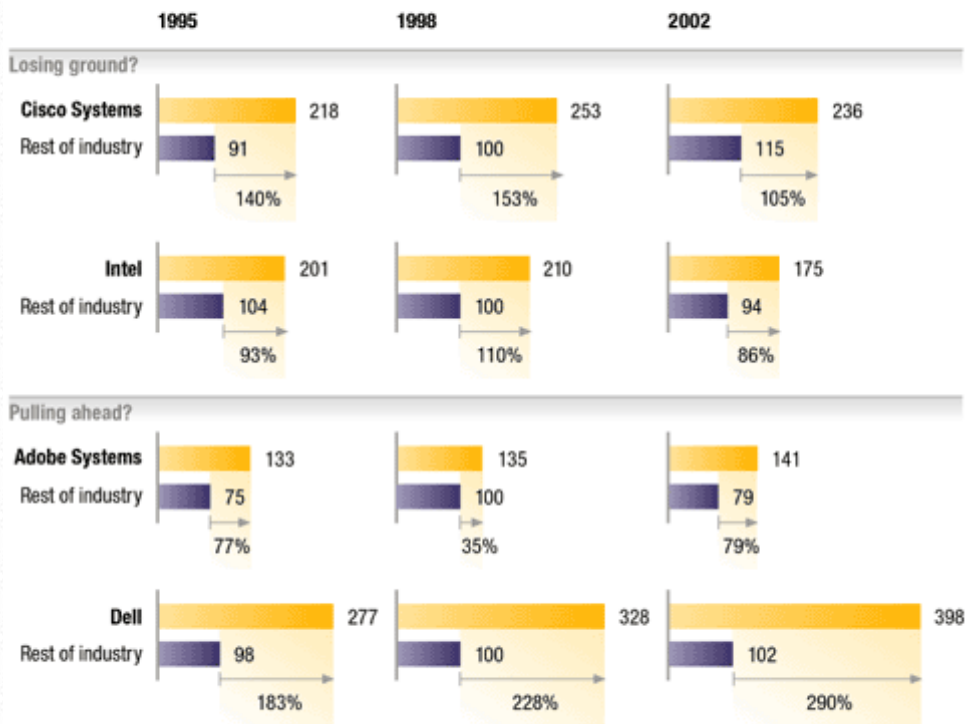
¹Defined in this exhibit as revenues divided by number of employees; results are then divided by output deflator to adjust for differences in quality of output and changes in price performance.
Source: Compustat; Global Vantage; McKinsey analysis

Even among some of the productivity leaders—for instance, Cisco and Intel—the numbers aren't necessarily encouraging: their lead, as measured, is diminishing. In sharp contrast, companies such as Adobe Systems and Dell have continued to expand their edge (Exhibit 3).

EXHIBIT 3

The productivity treadmill

Labor productivity by company; index: rest of industry = 100 in 1998



Source: Bureau of Economic Analysis; Research Insight; US Census Bureau; McKinsey analysis

Ominous trends ahead

Worse yet, fierce competition is pressing margins and redistributing demand. In some cases, companies are challenging the leaders with equivalent products that satisfy the needs of some customers at lower cost (examples: Linux-based servers, networked "Wintel" machines that provide supercomputing capabilities at a fraction of the cost of systems built around prior architectures, switches that substitute for high-end routers in enterprise networking, and modular network-attached storage systems). Typical responses—cutting prices and watching margins sink or standing pat and losing market share—are unattractive. Raising productivity would be better.

At the same time, new high-tech features, traditionally pioneered in stand-alone products, are migrating to existing core products at an accelerating rate. For example, vendors of application servers, which act as platforms for modern business applications, began aggregating stand-alone but related applications (such as enterprise-application-integration tools and business-process-management software) into their suites of middleware. They then saw the middleware being embedded into the broader offerings of, for example, vendors of enterprise-resource-planning (ERP) systems and databases. This trend toward incorporating features into core products while keeping prices steady will redistribute demand and cut aggregate margins.

Meanwhile, offshore players with very low factor costs—especially for labor—are becoming increasingly competitive. Rather than merely playing catch-up, many of these companies, such as Huawei in communications equipment and Wipro and Infosys Technologies in services, offer value propositions almost equivalent to those of their US rivals, at much lower cost.

Each of these forces by itself makes raising high-tech productivity more urgent. Together, they make increased productivity an absolute imperative for many high-tech companies in the United States and Europe.

Learning from slow-growth industries

As technology vendors target productivity, they should take a cue from high-performing companies in slow-revenue-growth sectors such as retailing, whose 5 percent annual productivity growth from 1993 to 2000 was more than twice the rate for US industry as a whole, and wholesaling, which also increased its productivity rapidly during the 1990s. In these sectors, where the demand environment is more mature, companies must perfect the art of raising productivity year after year—not as a onetime event—and exploit that growth for strategic gain. Although they also search for innovative next-generation products and services, they relentlessly identify and close gaps with industry best practices in process efficiency and pursue breakthrough productivity gains by investing in business innovations.

Consider the well-documented success of Wal-Mart Stores in retailing, a sector that until the 1990s hadn't experienced rapid productivity growth for years. Wal-Mart popularized and reproduced the big-box (large-store) format across North America, generating labor efficiencies and offering a compelling value proposition consisting of "everyday low prices," product categories historically limited to specialty stores, and a superior shopping experience for mainstream consumers. This combination created a virtuous cycle of scale-driven productivity growth and market share gains. As the volumes of Wal-Mart increased, so did its cost advantages from scale, distribution, and purchasing power. Several factors characterize such productivity leaders.

- They focus on improving the productivity of their core business processes, for investments in ancillary ones often yield little return and may even complicate the overall business system. Examples of such pivotal processes include new techniques for inventory management in general-merchandise retailing and the new product-introduction processes of high-tech OEMs.
- Once the leaders determine which processes drive their productivity, they decide where to lead and where to match and then build an enduring competitive advantage through continual improvements. By offering clean stores, friendly salespeople, and a broad product variety, Wal-Mart merely matched competitors like Kmart and Sears, Roebuck. Wal-Mart took the lead with its store format and distribution system, whose efficiency made possible the low prices that drove consistent market share increases—from zero in 1962 to 9 percent in 1987 and 31 percent in 2000. Moreover, Wal-Mart hasn't rested on its low-cost laurels: only through continual improvement has it sustained its 40 percent productivity lead even as its competitors grew more efficient in response. In high tech, Adobe is among the few software companies that have increased their productivity year on year even through the downturn.
- Rather than relying on a "silver bullet," the productivity leaders have adopted an integrated, end-to-end approach—including process innovation and redesign, the targeted application of IT, carefully crafted outsourcing arrangements, and offshoring. They generate gains from a combination of organizational change, targeted investment, and the ability to measure the right things. In contrast, companies that bet the farm on major investments, such as ERP systems, without bothering to improve processes, organizations, and strategies may be disappointed. The integrated approach is characterized by short-cycle, well-defined initiatives intended to realize year-on-year productivity gains.

Making the switch

Of course, the business issues facing high-tech companies differ from those in many slow-growth industries. But applying the principles that the lower-tech brethren employ—particularly by focusing on core business processes and picking a few for leadership—will make a great difference for high-tech companies. Just as important, they must shift their focus and culture from a preoccupation with the next big thing and learn to emphasize the importance of process improvements as well.

The effect on profitability can be substantial: raising the productivity performance of a software company with \$1 billion in revenue from sluggish to median would typically create \$120 million in additional profit, a figure that would rise to more than \$180 million if the company achieved top-quartile performance.³ Clearly, however, not all of this value will necessarily be captured as profit; the company might well choose to reinvest its surplus to

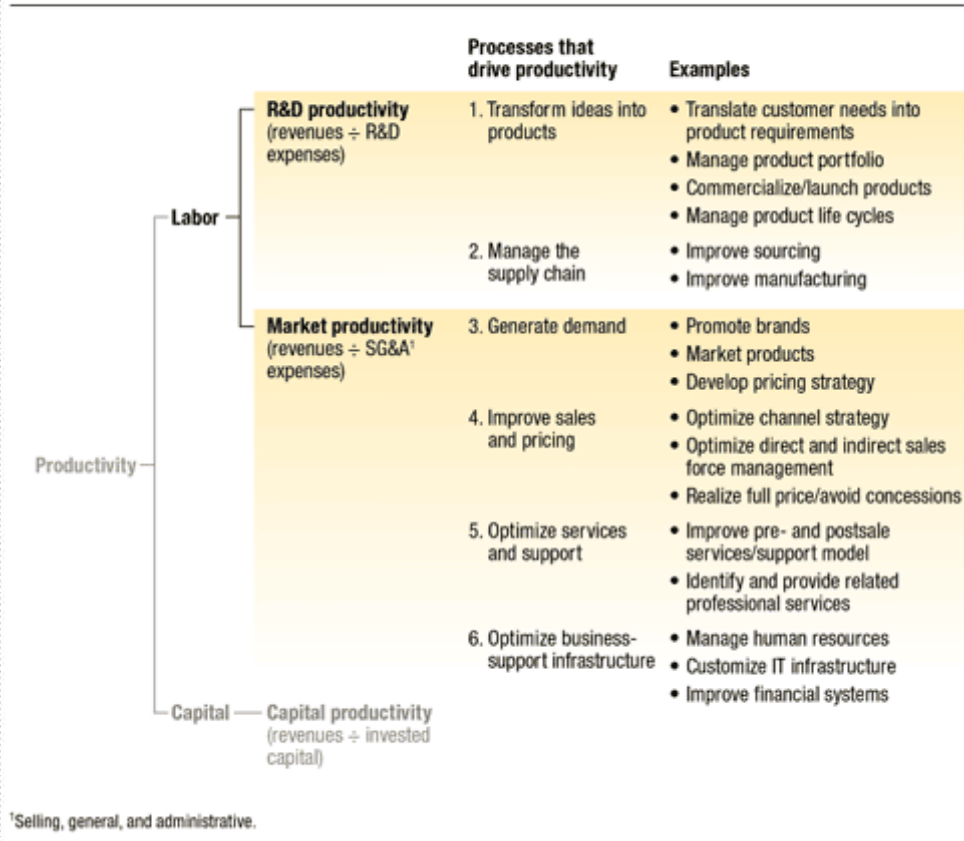
build other advantages.

Productivity tactics

Our work with a variety of high-tech companies has highlighted large differences in their performance in six operational processes (Exhibit 4). The first thing a company must do to improve its productivity is to establish which business processes have the biggest impact on the economics of its subsector (for instance, software). Then it must find out where its performance lags behind in those key processes; catching up is critical. The final step is to identify processes in which the company could develop innovations that might make it a leader in productivity.

EXHIBIT 4

Making processes productive



Establishing priorities. The relative importance of processes varies considerably across subsectors. In a pure software company, for example, marketing and R&D often account for the lion's share of operating expenses, so the idea-to-product and selling-and-pricing processes are the most important ones. On the other hand, for a large electronics manufacturer, supply-chain-management processes are often critical because in this subsector it can be very hard to differentiate products significantly, buyers are often intensely cost conscious, and inventory can decline in value rapidly.

Moving from high-level priorities to specific process goals requires a knowledge of which subelements of a vital process can most affect productivity. To the extent that software companies think about the productivity of their development processes, for example, many focus on the number of lines of code turned out per programmer. This metric may be useful, but it misses a key leverage point: how efficiently a company can understand its customers' needs and translate them into product requirements and concepts. Getting those needs right can enhance a company's performance more dramatically than can making incremental improvements in code-writing efficiency.

Deciding where to match best-practice productivity levels and where to exceed them is the next challenge. A first step is benchmarking a company's performance as compared with

that of its competitors in the relevant process or subprocesses. If, for example, a software provider continually churns out good products—suggesting high idea-to-product productivity—but has relatively low market penetration among enterprise customers, it should try to reach the sales force productivity levels of its leading competitors quickly.

Even matching best practices across-the-board won't lead to sustainable differentiation; high-tech companies must also strive for productivity breakthroughs. Of course, this is easier said than done. Often, a process innovation represents the sum of seemingly disconnected parts. The highly productive supply chain of Dell, for example, emerged because the company could connect its on-line and telephone channels to its assembly operations in real time, because a network of suppliers could deliver components quickly—and because Michael Dell got the bright idea that building computers to order could reduce inventory costs.

Integrating the process. Once the priorities are set, companies can get down to the nitty-gritty of making improvements. Myriad approaches are possible, of course. A software company that finds a critical gap in the productivity of its product-development organization, for instance, could redesign its idea-to-product capabilities through a range of targeted initiatives. Shorter-term moves might include outsourcing the maintenance and support of fading products, creating a "documentation factory" so that product units share resources more effectively, and using common metrics when developing software. In the medium term, the company could improve its testing, quality assurance, and product feedback; redesign its resourcing approach and the way it manages its project portfolio; and look again at make-versus-buy decisions for certain aspects of its product architectures. (It might, for example, choose to buy and integrate rather than build a module for security and user authentication.) A longer-term impact might come from fundamentally changing development models while also ensuring that developers stay up-to-date with new methodologies and tools.⁴

The company should assess the impact of such efforts against its near-term step-change and year-on-year productivity-improvement targets by using a scorecard that includes metrics for product quality, times to market, and efficiency—not just cost or head count reductions. In other words, high-tech companies will need to invest in business process innovation through focused, ongoing productivity programs that simultaneously extend their capabilities and raise the performance ceiling.

The organizational challenge

The biggest challenge may be for senior management to extend its focus to the more difficult (and, for some, less exciting) world of business process innovation. Many high-tech companies, still in denial, believe that they need only cut costs and hold their breath until the good old days return. Others believe their own marketing claims that the application of IT alone will improve productivity. The struggles of their customers testify otherwise. IT plays a critical enabling role—but only in conjunction with organizational, behavioral, and business process changes.

Furthermore, most high-tech companies value and reward technology innovations rather than business process improvements. When these companies do think about productivity, their efforts are typically scattered and deep in the organization. Disjointed programs probably can't move the needle.

What is vital is a commitment from the top to view productivity as a strategic imperative and to realize the organization's agreed-upon process priorities. Employees, motivated by reward and recognition systems, should understand and agree with the focus on productivity. Assembling the right team may require new skills and talent—particularly senior operating managers who can shake up the company. Some of them will probably come from more process-intensive industries.⁵

High-tech executives face a choice: continuing to bet that they can generate and ride the next wave—when none is yet in sight—or getting their organizations to focus on business process improvements that drive productivity. We think that most should choose the latter course. This approach doesn't mean forgoing the development of new products, but top management will have to spend time on long-overlooked process innovations as well.

Defining productivity

Productivity is the ratio of inputs to outputs—the value of what you put into a production process compared with what you get out. A production process has three main inputs: labor, capital (equipment and buildings), and purchased inputs (goods and services bought from other companies). The numerator of the productivity equation is value added (output minus the purchased inputs); the denominator, costs (capital costs plus labor). Labor productivity (value-added output per employee) and capital productivity (value-added output per dollar of capital stock) can be examined separately. Labor productivity is highly relevant to high-tech subsectors, particularly software and services, because much of their productive capacity resides in people.

With all else equal in a given market, a company that has higher productivity will enjoy greater profitability. A more productive company can either produce the same output with fewer inputs and thus enjoy a cost advantage or produce more or better output with the same inputs and command a price premium. Over time, the higher profitability of more productive companies will attract competition, and profitability will tend to converge. Profitability is thus a transient reward for improvements in productivity.

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Notes:

Janaki Akella is a consultant and Roger Roberts is a principal in McKinsey's Silicon Valley office; James Manyika is a principal in the San Francisco office.

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¹US productivity grew by 2 percent a year from 1993 to 2000, roughly twice the rate from 1973 to 1993. For a detailed analysis of the surge, see William W. Lewis, Vincent Palmade, Baudouin Regout, and Allen P. Webb, "[What's right with the US economy](#)," *The McKinsey Quarterly*, 2002 Number 1, pp. 30–40.

²The PC assembly industry did reduce overall employment during the 1990s but largely by outsourcing operations to contract manufacturers.

³A sluggish company, by our definition, occupies the 25th percentile of productivity and generates about \$125,000 in revenue per employee a year. A median company in our sample of public high-tech companies generates \$200,000 in revenue per employee, and a 75th-percentile company \$300,000. Our calculations assume that a company moves itself to a new productivity level by increasing its process efficiency and effectiveness so that it can reduce its costs for the same level of output or increase its output for the same level of costs.

⁴For a deeper view of innovative idea-to-product processes, see Richard Holman, Hans-Werner Kaas, and David Keeling, "[The future of product development](#)," *The McKinsey Quarterly*, 2003 Number 3, pp. 28–39.

⁵For a detailed perspective on this subject, see Emily Lawson and Colin Price, "[The psychology of change management](#)," *The McKinsey Quarterly*, 2003 special edition: The value in organization, pp. 30–41.

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