R&D policy: The United States

Abstract

The United States is the most innovative country in the world. Half of the 50 most innovative companies in the world, by Business Week in 2010, are American. The country dominates the most R&D intensive industries. For example, it creates a third of the value added in the global information and communications technology industry. American enterprises also employed one in four people working for the 250 biggest ICT companies in the world and accounted for nearly a third of total revenue. How does the United States do so well? First, sizable public spending: gross expenditure on R&D was almost 3 percent of GDP in 2008, above the OECD average. Second, this spending is linked well to superb broad tertiary education base: the United States accounted for a third of the total OECD population with higher education. Its universities can reap the commercial payoff of R&D, even when it is federally funded. Third, federal funding is not the sole driver of innovation: private firms spend a lot. The partnership of venture capitalists and entrepreneurs in places like Silicon Valley has driven new innovations, changing businesses and expanding the technology frontier. Fourth, product market competition, labor market flexibility, and substantial management talent increase the payoff to R&D spending.

Half of the 50 most innovative companies in the world, by Business Week in 2010, are American. (figure 38). Prior to the crisis the ratio was even higher.¹ The success of companies like Google or Facebook established the country’s reputation in the IT business: in 2008, 8 out of the top 10 Internet companies in the world were based in the United States.²

Global leaders in innovation

The strong innovative performance of the American economy is represented especially by high-level R&D intensive industries. The United States leads in the global information and communication technology (ICT) sector, accounting for more than a third of the value added. What is more, American enterprises employed one in four people working for the 250 world biggest ICT companies and accounted for nearly a third of total revenue.³

Figure 38: The 50 most innovative companies in the world (2010), and R&D investment by the top 1,400 companies in the world (2010), by country

All these results were achieved with gross expenditure on R&D of 2.8 percent of GDP in 2008, which is less than in Israel (4.9 percent), Sweden (3.8 percent), Finland (3.7 percent), Japan (3.4 percent), and Switzerland (3.0 percent), but more than the OECD average.

Becoming the leader

The success of US innovation stems from its high-powered presence in high-level, R&D intensive sectors (figure 39). In 2008, 7 of the world’s top 10 computer software firms were from the United States.\(^4\) Highly R&D intensive ICT sector allows economies to be more competitive and grow faster. Andes and Ezell (2010) reports that ICT sector accounted for a quarter of US economic growth after 1995.

Figure 39: ICT sector value added in OECD countries

Many of those successful ICT companies are young leading innovators (“yollies”)—enterprises set up after 1975 that managed to become world leaders thanks to investment in R&D.\(^5\) Yollies accounted for half of the leading American innovators, whereas in Europe the share stood at 20 percent. These young enterprises tend to be more R&D intensive than their older counterparts.

Second, the development of innovation processes is favorably linked with a superb tertiary education base. The United States accounted for a third of the total OECD population with higher education, while its universities top the world rankings. Out of 200 universities listed in the recent Times Higher Education World University Rankings for 2010, 72 were American.\(^6\) Each university from the top five was from the United States. In the Academic Ranking of World Universities, 8 out of the top 10 were American universities.\(^7\)

The US government was able to successfully change policies in the beginning of the 1980s to support the growth of innovation processes. After the Second World War, American companies enjoyed limited competition and robust profits, allowing for increased and risky investment in new technologies. Block and Keller (2008) suggest that until the 1970s, most successful innovations were funded by the private sector, while federal expenditure on R&D focused mostly on military sector. However, when companies faced increased competition thanks to lower barriers of entry and the computerization of businesses, the profit margins of the US companies were slashed, forcing them to cut costs. Many corporations closed down laboratories, reduced R&D operations, and/or shifted toward greater cooperation with government laboratories and universities.
These developments, together with increased international competition in the world during the 1980s, forced federal authorities to engage further in R&D activities. The authorities encouraged researchers and organizations to commercialize existing research and shifted their focus from the military sector toward commercial solutions. The Small Business Innovation Research was established to fund projects suggested by smaller companies. There were also several other R&D initiatives, including providing technical support for firms, encouraging collaboration of companies within particular industries, and granting tax credits. It is estimated that $1 spent on R&D credit triggers from $1 to $2 of R&D business (Atkinson and Castro 2009). Block and Keller (2008) suggest that in comparison to the 1970s, more successful innovations come from collaborative effort of various agents (government, university, and industry) rather than solely private projects. In fact, the Global Benchmark Report 2011 indicates that the United States is characterized by the best collaboration between universities and the private sector in the world.

Third, federal funding is not the sole driver of innovation. The Partnerships of venture capitalists and entrepreneurs in places like Silicon Valley allows for greater collaboration and joint funding of projects. The cohesive and connected network allows venture companies to control the financial and management side of start-ups. Venture capitalists can shape their clients and industries through, for example, legal and recruitment services. This close cooperation contributes to the development of informal ties, trust, and information sharing that fosters innovation performance. Lychagin et al. (2010) find that the geographical proximity of researchers triggers spillover effects, improving the overall R&D performance.

Adapting to the change

Although successful, US innovation performance was outpaced by other countries, especially in terms of funding. Gross expenditure on R&D as a percentage of GDP was higher in 1985 (2.8 percent) than in 2007 (2.7 percent) (figure 40).

Figure 40: Gross expenditure on R&D in the US (as % of GDP), 1981-2007

Asian emerging economies are catching-up quickly, especially in the ICT sector. In 2008 Chinese ICT exports were 2.5 times bigger than the American exports. According to OECD (2010b), the US comparative advantage in ICT goods declined slightly in 2008 compared to 1998. Reduced confidence and therefore investment of venture capitalists in Silicon Valley were also observed after the 2008 crisis. For US innovation performance to remain competitive, funding itself might
not be enough: clusters like Silicon Valley need a constant inflow of gifted researchers and entrepreneurs. That presses for more even more advancement in education and research as well as mechanisms that allow for a transfer of an academic idea to specific business solution.⁹

Despite these challenges, the US innovation market still has a lot to offer. Even if companies like Google, Apple, or Facebook fail to provide more cutting-edge solutions, the brand of US innovation clusters may attract many researchers and entrepreneurs. The US companies are still leaders in funding. In 2009 Silicon Valley accounted for 40 percent of total US venture capital investment and represents a greater value than total European venture capital spending (Meyer 2010).
COUNTRY BENCHMARKS

Sources


Notes

1. Before the crisis, in the Business Week ranking from 2007, American enterprises accounted for nearly three quarters of all companies listed in the top 50.
5. See Cincera and Veugelers (2010).
6. Ranking has following criteria: teaching (learning environment), international diversity (staff and students), industry income (innovation), research (volume, income, and reputation), and citations (research influence).
7. Conducted by the Center for World-Class Universities and the Institute of Higher Education of Shanghai Jiao Tong University, China. Ranking is based on four criteria: quality of education, quality of faculty, research output, and per capita performance. First published in June 2003.
8. Unit: billions of USD, current prices.
9. The transfer of researchers has been somehow more difficult due to stricter immigration procedures since 9/11.