

# The paradox of US industrial policy: The developmental state in disguise

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The continental Europeans, most successfully the Germans, have long deployed the might of the State to boost their manufacturing base, using largely pragmatic arguments. The Anglo-Americans, in contrast, have for the past several decades embraced a consensus against such a role, at least at the level of principle. Their rationale has rested largely on ideology, especially the ideology of the more politically oriented branch of neoclassical economics known as neoliberalism.

Ever since the election of Margaret Thatcher in 1979 and Ronald Reagan in 1980, by which time Keynesian ideas were already sidelined, strong political and intellectual forces mobilized around neoliberal or market fundamentalist ideas, as expressed in the dictum that “[t]he free market is what works, and having the state help it is usually a contradiction in terms” (Kasperov, 2012). The simplest free market champions claim that hearty entrepreneurs like Bill Gates and Steve Jobs, backed by venture capitalists and generous philanthropists, can create the innovations needed for progress – provided the government stops interfering. As Michael Lind writes, “It would be easy to get a thousand PhD economists [trained in the Anglo tradition] to sign a manifesto insisting that we should ignore history whenever it conflicts with theory ... about generic firms competing in abstract markets” (Lind, 2012).

This Anglo-American consensus has ensured that the phrases “industrial policy” and even “technology policy” and “innovation policy” are anathema in policy circles, synonymous with “pork barrel politics”, “corporate welfare” and, worst of all, “picking winners”. The United States presents a paradox, however. On one hand, public policy discourse has long been dominated by the “market fundamentalist” narrative, which draws acceptance from its smooth elision

of “market forces” with such desirable values as “freedom”, “democracy” and “meritocracy”, and its equally smooth elision of “government intervention” with “the nanny state” and “economic sclerosis” and “the road to serfdom”. On the other hand, the US government has in fact undertaken much more industrial policy than this narrative implies, from the founding of the Republic to today, including the promotion of what became major technological innovations (“general purpose technologies”). As a recent study of the biotechnology sector says of the recent period:

The knowledge economy [in biotech] did not spontaneously emerge from the bottom up, but was prompted by a top-down stealth industrial policy; government and industry leaders simultaneously advocated government intervention to foster the development of the biotechnology industry and argued hypocritically that government should let the free market work (Vallas, Kleinmann and Biscotti, 2011).

What is more, much of the technology-intensive private sector in the United States has been *cutting* investment in basic technologies in order to focus on “value extraction”, relying even more than in the past on public agencies for the basic research (Mazzucato, 2013).

This chapter explores the US paradox.<sup>1</sup> The first section examines the arguments used to justify the claim that the US government does not or should not try to boost certain industries except in occasional cases of “market failure”. These arguments and the political forces that carry them set the deeply hostile context through which proponents of industrial policy have had to navigate. In response, proponents have tried to keep their programmes out of sight of the market fundamentalists massed in politics, the media, think tanks and universities. They have barely attempted to promulgate a narrative to counter the dominant market fundamentalist narrative. The most striking example is the proponents’ failure to emphasize that a US government agency’s programme spawned the Internet. The rate of return on the publicly financed part of this one innovation must be big enough to offset by far whatever alleged mistakes the government made elsewhere across the whole domain of industrial policy.

If the American government has in fact been much more active in promoting particular technologies and industries than is generally understood, it is important that this be more generally known, because the American government

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<sup>1</sup> This chapter is one of several papers about industrial policy by the same author: for example, Wade (2004, 2010 and 2012).

both directly and indirectly, through organizations such as the World Bank and the World Trade Organization (WTO), has long told the rest of the world that, in the words of Nobel Laureate in Economics Gary Becker, “[t]he best industrial policy is none at all” (Becker, 1985); or in the words of John Williamson, “[l]ittle in the record of industrial policy suggests that the state is very good at ‘picking winners’” (Williamson, 2012); or in the pithy words of Lawrence Summers, government “is a crappy VC” (venture capitalist).<sup>2</sup>

In late March 2012 Gene Sperling, director of the White House’s National Economic Council, declared that a national manufacturing renaissance would be strongly in America’s interest. His speech (Sperling, 2012) was notable for two reasons. First, it was the first time that a key figure in the Obama administration – or for that matter in any of the past several administrations – spoke positively of manufacturing and the need to mount industrial policies to help the sector. Second, almost no one paid attention to the speech; it disappeared without trace. Industrial policy remains a dangerous subject in America, because to express sympathy risks being classed as an incompetent or worse.

So, against this background of emphatic rejection of industrial policy, the second section of this chapter gives a brief history of US industrial policy going back to the first years of the Republic and continuing through the nineteenth and twentieth centuries. The third section describes the emergence of “network-building” industrial policy in the past two decades or so. Here we see a variant of the model of the “developmental state”, although rather different from the East Asian variant (Wade, 2004). The fourth section gives some examples of current network building. The fifth section offers a broad assessment of their effectiveness. The sixth and concluding section assesses the advantages and disadvantages of the US approach and suggests two directions of reform.

It should be noted that the defence of industrial policy given here does not equate industrial activity with “making tangible objects”. Rather, it uses the term “industrial policy” referring to the whole value chain involved in making things, including the services of the scientists and engineers who design and test the things – the medical pills, the automobiles, the smartphones, and the rest (whose actual manufacturing may be abroad). What differentiates industrial policy from other policy is that it is necessarily selective among industries, products and stages of the value chain.

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<sup>2</sup> Quoted in Nocera (2011).

## 14.1 The rejection of US industrial policy: Ideological and political economy arguments

For the past three decades, the US government has espoused a *norm* of something close to laissez-faire in economic issues, more strongly than almost any other advanced capitalist country.<sup>3</sup> The laissez faire norm has been translated into programmes of deregulation, de-unionization, privatization, and free-trade agreements, which have carried neoliberal ideals into every corner of American life. Even universities, hospitals, churches and the Post Office compete to put themselves onto “sound market principles”.<sup>4</sup>

The success of the conservative ideal in America<sup>5</sup> owes much to the fact that the Right has taken concerted intellectual work and ideological promulgation much more seriously than the Centre-left. Out of economics departments such as that of the University of Chicago and think tanks such as the American Enterprise Institute (founded in 1943), the Cato Institute, the Manhattan Institute and the Heritage Foundation (all founded in the 1970s) came intellectual justification for propositions such as: “freedom is only possible under laissez faire”; “governments are inherently corrupt and inefficient”; and “interference with market outcomes is bad for welfare” (Roemer, 2011).

Not even the Great Slump, which began in 2007 and continues at the time of writing, has altered the tide, contrary to the normal response to hard times – the normal response being to support more regulation and more social insurance. Indeed, the mass embrace of free-market theory and intensified distrust of government since 2007 is unique in the American history of hard times (Frank, 2012). In 2010 Friedrich von Hayek’s polemic, *The Road to Serfdom*, was ranked at number 241 on the Amazon Best Sellers list – remarkable for a book published as long ago as 1944 (Farrant and McPhail, 2010).<sup>6</sup> By 2011 just 10 per cent of Americans said they trust government to do the right thing most of the time.<sup>7</sup> The

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<sup>3</sup> In contrast, US norms towards finance have been more ambivalent, and its norms towards social issues like abortion and same-sex marriage have been more interventionist than in many other capitalist economies.

<sup>4</sup> In this vein Jacquelyn Brechtel Clarkson, a New Orleans city councillor saw “nothing better than free enterprise and the free market to decide how this city is rebuilt” following the devastating floods there (quoted in the *Financial Times*, 10 January 2006).

<sup>5</sup> By 2010 roughly two people in America identified themselves as “conservatives” for every person who self-identified as “liberal” (in the American, not European, sense of “liberal”).

<sup>6</sup> Hayek’s argument was immediately taken up by leading American conservatives. General Douglas MacArthur, by then a civilian, gave a keynote address to the 1952 Republican Convention. He said that the Democratic Party “has become captive to the schemers and planners who have infiltrated its ranks of leadership to set the national course unerringly toward the socialistic regimentation of a totalitarian state”.

<sup>7</sup> Brooks (2012), based on an October 2011 *New York Times*, CBS News poll.

central conviction of the other 90 per cent is that government is corrupt because it is captured by rent-seekers and predators.

Much of Americans' pervasive distrust of government stems from the perception that finance – Wall Street – has put the government over a barrel. A case in point for them is the TARP (Troubled Asset Relief Program), initiated after the Lehman Brothers collapse in late 2008 and designed by then Treasury Secretary Hank Paulson, former CEO of Goldman Sachs, and by Ben Bernanke, Chairman of the Federal Reserve Board. TARP was aimed almost entirely at saving large financial institutions and resuscitating Wall Street after its disastrous mistakes, *rather than keeping people in their homes and helping regional banks*. Incoming President Obama did not break with the programme or make plans to reduce the grip of the banks on American politics. He also did not replace the management of those banks in which the government was forced to take a controlling share, thereby confirming Simon Johnson's description of a "silent coup" (Frank, 2012).

By contrast, the Roosevelt administration of the 1930s presented itself as an agent for resuscitating the economy independently of Wall Street dictation, aggressively pursuing financial wrongdoers through the US Congress and the courts and bolstering organized labour as a source of countervailing power and influence. It used the Reconstruction Finance Corporation to spread public "bail-out" resources around the nation, pouring funds into small-town banks, agriculture, public works, education, and more. Roosevelt broke up the big banks with the Glass-Steagall Act and regulated those that remained with the new Securities and Exchange Commission. At the same time the administration promulgated a narrative to the American people as to why it was doing these things in their interest.

This time around, the perception that the government is an instrument of Wall Street (a major source of funding for both main political parties) has been fuelled by an extraordinary concentration of income at the top of the income hierarchy; to the point that the top 1 per cent of households received 95 per cent of the increase in national income in 2009–12 (Saez, 2013). Income concentration has provoked mass anger and even strengthened the hand of market fundamentalists who argue that a compliant government, as much as large financial firms themselves, was the real cause of the financial crisis.

The recent grip of market fundamentalism in US politics has reinforced the longer standing hostility to any idea of "industrial policy", the hostility spanning Congress, the executive branch (especially the Department of the Treasury), the media, think tanks, academic economics departments, and the public at large. This long-established near-consensus is that "industrial policy" is synonymous with distortionary government intervention that corrodes the values

of an entrepreneurial culture, undermines the efficacy of market competition and stacks the wider incentive system in favour of one or another rent-seeking group (“Governments cannot pick winners but losers can pick governments”).

The policy conclusion is straightforward. As Tim Leunig of the London School of Economics explains: “The government should be providing conditions that help all businesses – namely, effective infrastructure, a skilled workforce and better planning. We should make no attempt to pick winners – whether individual companies, specific sectors, or manufacturing as a whole” (Leunig, 2010). In this view, if any special help is given to industry, it should only be “functional” or “horizontal”, such as subsidized credit for SMEs to offset possible failures of capital markets to supply such firms – and the credit must be equally available to SMEs in all sectors.

#### *14.1.1 A more subtle rejection of US industrial policy*

The preceding market fundamentalist argument could be described as “ideological”, in the sense that it derives directly from the values and analysis of stylized firms in idealized markets. It readily generates universal prescriptions like “governments are corrupt and inefficient”, “the [competitive] market is an efficient allocation system”, “the laws of economics, like the laws of engineering, hold in all times and places”.

There is also what could be called a political economy argument against industrial policy. It is based on an analysis of what works in a particular political setting rather than on an ideologically based presumption that industrial policy is everywhere bad. This argument comes from what is known as the “varieties of capitalism” literature. Peter Hall and David Soskice, two of its better known proponents, have no driving ideological agenda against “government” and in favour of “markets”. They argue, rather, that the shape of State–market institutions in the United States is such that industrial policy is unlikely to be effective in improving on market outcomes, when judged by a national interest test.

Advanced capitalist economies, they argue, tend to cluster with little hybridity into one of two types at the national level: the “liberal market economy” (LME), exemplified by the United States and United Kingdom, and the “coordinated market economy” (CME), exemplified by Germany and Japan. Firms in LMEs coordinate their activities mainly through the institutions of markets and hierarchies, and they tend to invest in “switchable assets” (allowing rapid entry and exit). Firms in CMEs coordinate relatively more through institutions that support ongoing cooperation, encourage credible commitments and exchange of information, and “provide actors potentially able to cooperate with one another with a

capacity for deliberation” (Hall and Soskice, 2001). Examples of such institutions include business associations, trade unions, cross-shareholding networks, and legal systems that facilitate information sharing.

Hall and Soskice and others in the “varieties of capitalism” school argue that industrial policy is more likely to be effective in CMEs than in LMEs because of the weakness of institutional support in the latter. For the United States, specifically, they argue that industrial policy is further hobbled by two fundamental political features: (1) strong separation of powers between the executive, legislature and judiciary; and (2) strong separation of powers between the federal, state and local levels. Similarly, Michael Mann argues that:

There is no serious American industrial policy; this is left to the post-war power-houses of the US economy, the large corporations. Much of this [industrial policy failure] is due to the radical separation of powers enshrined in the US constitution. A coordinated political economy cannot easily be run by a President and his cabinet, two Houses of Congress, a Supreme Court and fifty ‘states’ (which are also fragmented by the same separation of powers) – especially when they belong to different political parties (Mann, 1997).

In these conditions the government may practice what is called industrial policy – meaning, in practice, that vested interests capture the relevant parts of the state apparatus and sluice resources in their favour – but it will be uncoordinated and yield negative net welfare gains. It will be “pork barrel” or “crony capitalism”. As Kevin Philips writes, industrial policy in a fragmented political structure like that of the United States is both “inevitable and ineffective” (Philips, 1992).

## 14.2 A brief history of the US developmental state

The two lines of argument just described agree on the conclusion that, regardless of whether the US government or any government “should” do industrial policy, it cannot be effective in the US political economy. However, the conclusion rests on the assumption that industrial policy means that centralized coordination agencies develop national “visions” and national programmes to develop (or “pick”) specified industries, perhaps even extending to specified firms; in short, it rests on the assumption that industrial policy means “picking winners”. This reflects a standard (and substantially wrong) understanding of East Asian and French industrial policy.

Recent research by Fred Block, Andrew Schrank and Josh Whitford, among others, presents a different picture (Block and Keller, 2011).<sup>8</sup> It finds that US governments – including state and city governments as well as the federal government – have undertaken much more industrial policy than the standard narrative says, with generally positive net effects according to a national interest test. But much of it has been hidden, for the reasons given earlier. Before discussing this recent research, a reinterpretation of the longer history of the US developmental state is in order.

### 14.2.1 *The visible developmental state*

As also in continental European countries, fighting wars and preparing to fight wars spurred American innovation and economic growth. Alexander Hamilton, the first Secretary of the Treasury, outlined a strategy for promoting American manufacturing in order both to catch up with Britain and provide the material base for a powerful military. Published in 1791, Hamilton's *Report on Manufactures* promoted the use of subsidies and tariffs. George Washington, the first President, supported the plan. Also, from the first years of the Republic, the government invested in technological expertise for military purposes, creating the Army Corps of Engineers in 1802 and putting army engineers to work building canals and lighthouses and improving river navigation. Later, Abraham Lincoln presided over what was by then called "The American System" for promoting economic growth, using high tariffs to protect strategic industries, federal land grants, government procurement to secure markets and subsidies to infrastructure development. All through the nineteenth and early twentieth centuries up to the 1930s, US industrialization proceeded behind average applied industrial tariffs exceeding 30 per cent, amongst the highest in the world and still justified by Hamilton's ideas (Kozul-Wright, 1995).

Lincoln launched the building of the transcontinental railway in the 1860s, probably the most ambitious civil engineering undertaking in world history to that time and critical to linking the established agro-industrial bloc and the emerging engineering bloc. State and federally supported research and development (R&D) was also critical, beginning in agriculture in the 1860s by building tight linkages between the education establishment and public servants dedicated to such areas such as animal husbandry, agricultural chemistry, forestry and mining. From the turn of the century, government procurement, standard

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<sup>8</sup> I owe a broad-based debt to these chapters.

setting, and the supply of appropriate capabilities, including more formal scientific training, boosted the growth of cutting-edge mass-market industries.

Early in the twentieth century, the federal government used airmail fees to subsidize the infant civil aviation industry. Government procurement helped establish the early aircraft industry and advanced chemical sector. The commitment to agricultural research and engineering training expanded significantly after the end of the First World War, through such initiatives as the Adam Act and public laboratories committed to applied experimentation and upgrading (Nelson and Wright, 1992). The government was also heavily involved in establishing the Radio Corporation of America (RCA), which sponsored radio and television networks.

Roosevelt's New Deal provided the context for a more concerted US industrial policy, involving efforts not only to ensure industrial recovery after the Great Depression but also to change the way that business behaved and to help increasingly large firms to operate more efficiently. Doing so involved new norms and institutions to administer prices, increase dialogue amongst the various stakeholders, provide public infrastructure and curtail the power of finance. These efforts were often contested, and their impacts were uneven.<sup>9</sup> Perhaps the most visible form of a conventional (and developmental) industrial policy was the Tennessee Valley Authority (TVA), established in May 1933. The TVA was conceived both as a development agency, mandated to raise living standards in the Tennessee River Valley, and as a construction and management agency mandated to build and operate dams and other structures along the Tennessee River, whose drainage basin over seven states covers some 40,900 square miles (or 105,930 square kilometres). The TVA was to function as, in Roosevelt's words, "a corporation clothed with the power of government but possessed of the flexibility and initiative of a private enterprise". Over the 12-year period spanning its inception in 1933 and the end of the Second World War in 1945, the TVA established its institutional framework, built broad-based local support for its programmes, and constructed a physical infrastructure that would serve as the backbone for its accomplishments. By triggering an increase in the rates of return to private investment in the southern US states, the infusion of public capital through the Tennessee Valley Authority provided a major impetus for the rapid post-war industrialization of the Southern economy (Bateman, Ros and Taylor, 2009).

In the run-up to the Second World War, the existing military-industrial complex was strengthened. (It is more accurately called the government-military-industrial complex.) In subsequent decades this complex launched a series of fundamental innovations, including the atomic bomb, the hydrogen bomb, missile

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<sup>9</sup> See, for example, Blyth (2002) and Badger (2008).

technology, civilian nuclear power, computers, the transistor, preparatory work on the laser, and satellites. The dominant approach to selective industrial policy took the form of government support for “basic” research in a plethora of military laboratories. Hence the quip, “America has had three types of industrial policy: first, World War II, second, the Korean War, and third, the Vietnam War.” The focus on “basic” and “military” avoided the ideological issues around industrial policy, because even market fundamentalists accepted that government *should* fund the development of new weapons and intelligence systems (Negoita, 2011).

Those opposed to state intervention tend to airbrush this extensive history away, claiming that, from the founding of the Republic to the start of the New Deal in the 1930s, the United States grew fast in the context of a State that limited its economic role to providing an institutional framework for markets. They further claim that the country then took a wrong turn at the time of the New Deal towards excessive state intervention.<sup>10</sup> The election of Ronald Reagan as President in 1980 did much to revive and bolster this simplistic narrative that “the government is the problem, not the solution”.

### 14.3 The emergence of the network developmental state

The government simply assumed that “the market” would transform the results of military-related R&D more or less automatically into commercial innovations in civilian industry. The 1980s saw a growing realization in a narrow circle of scientists, business school academics and technology policy officials that military-related technologies were being carried into commercial applications only slowly and patchily, and that, partly for this reason, US industrialists were being out-competed across a swathe of high-tech industry by Japanese and even German firms. Between basic research outputs and commercial products lurked the “valley of death”, where potential products languished for want of private sector uptake (Mazzucato, 2013; Scott and Lodge, 1985).

In response, some parts of government such as the Defence Department, the Department of Energy and the National Institutes of Health became determined to generate and administer links between state labs, commercial labs, commercial

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<sup>10</sup> Significantly, while some prominent Americans in the fledgling international organizations established at the end of the Second World War came from the New Deal tradition, the first cohorts of Americans in senior positions at the World Bank through the 1940s and 1950s tended to be strongly anti-State and anti-New Deal. The powerful first vice-president, Robert Garner, declared in his 1972 memoir, “Roosevelt ... did more harm to this country than anyone else in history”. Quoted in Alacevich (2009).

firms, universities, and government agencies in order, first, to accelerate the move from publicly funded technological breakthroughs to commercial products and, second, to incentivize the private sector to develop latest-generation products that the public agencies themselves needed for their own work.

At just this time, in the 1980s, market fundamentalism resurged,<sup>11</sup> and any US industrial policy beyond the R end of military R&D faced hostile politics. But meanwhile the wider problems were becoming increasingly acute: the failure of military research to spill over into civilian uses “by itself” (by the market), growing Japanese and German competition, and shrinkage of the US trade surplus in technologically sophisticated products (which had helped to offset growing deficits for raw materials and basic manufactured goods). So government agencies began to actively push and prod firms in order to accelerate the D end of R&D for products and processes with civilian as well as military markets; but in a way that could be kept below the radar.

### 14.3.1 *Network-building industrial policy*

Government officials began to formulate the general strategy on the basis of growing awareness of the success, through the 1970s, of the US Defense Department’s Defense Advanced Research Projects Agency (DARPA) in channelling vast flows of federal funds to Stanford University, the University of California at Berkeley and the Lawrence Livermore National Laboratory. Private spin-off firms then helped to turn nearby Silicon Valley into the planetary centre of innovation in computing. These public officials also drew inspiration from developments in biotechnology in the 1970s, notably the birth of Genentech in 1976, which showed how government agencies could help university-based scientists establish successful firms.

In the subsequent decades many government agencies, at national, state, and even city level, have funded R&D in selected sectors and used control of funding to build and sustain links among firms, scientists, engineers, venture capitalists, and universities – in a way that escapes the simple dichotomy between “picking winners” and “horizontal” industrial policy. The programmes are run by agencies *that themselves are relatively uncoordinated*. At the national level the agencies include DARPA, the National Institutes of Health (NIH), the National Institute of Standards and Technology (NIST), the Small Business Administration (SBA), the National Science Foundation (NSF), and more.

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<sup>11</sup> This coincided with the election of Ronald Reagan and the Republican majority in Congress.

For example, NIST organizes Manufacturing Extension Partnerships (MEPs) in specific geographical areas to provide manufacturing advice to local firms. The SBA makes Small Business Innovation Research (SBIR) grants. Federal agencies with large research budgets (such as NIH and the Department of Energy) are required to allocate 2.5 per cent of grants to the SBA, which in turn distributes about 5,000 awards to 1,500 small firms per year. These awards are especially important in bridging university and commerce; for example, in recent years more than two-thirds of the recipients have included an academic or former academic among their founders.

## 14.4 Examples of network creation and maintenance

### 14.4.1 *Defense Advanced Research Projects Agency (DARPA) and SEMATECH*

DARPA (from time to time the D for “Defense” has been dropped) was founded in 1958 in response to the launch of the Soviet Sputnik satellite. Since then it has been a leading stimulator of technological innovation in – among many things – computers, computer languages and semi-conductors. For example, DARPA was the earlier-mentioned agency which sponsored the research on how to build robust and dispersed computer networks, which led on to the “network of computer networks” we know as the Internet. Recently, DARPA has been stimulating research into a priority area where private R&D was lagging: optical interconnects in multicore microprocessors. Although tiny (about 250 staff, of whom 140 are technical) and focused on over-the-horizon research, DARPA still has to fend off “pork barrel”, “picking winners” and “crony capitalism” attacks from market fundamentalists and techno-utopians arguing that philanthropists plus the 3 billion people coming online together constitute adequate self-organizing innovation systems.<sup>12</sup>

One of DARPA’s many successes is SEMATECH (Semiconductor Manufacturing Technology), a not-for-profit consortium that performs R&D to advance chip manufacturing. DARPA and the semiconductor industry association prompted formation of the SEMATECH consortium in 1987 in response to the virtual disappearance of American companies able to make the equipment needed to make latest-generation semiconductors. The leading equipment

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<sup>12</sup> This is the message of Diamandis and Kotler (2012).

makers by then were Japanese, who tended to hold back the latest-generation equipment for six months for “testing” by Japanese semiconductor makers, giving the latter a strong competitive advantage over American rivals. DARPA and the semiconductor industry association persuaded 14 American semiconductor makers to form a consortium to pool R&D and manufacturing capacities and re-enter the design and production of advanced semiconductor-making equipment. The Department of Defense (DARPA’s parent) funded the first five years. In the early years the consortium was fragile, especially when the semiconductor price cycle was up and the companies were making good profits; then they hesitated to send top-notch people to work for the consortium. DARPA’s stewardship (funding and close collaboration at the technical level, where its suggestions would be most appreciated) helped to overcome collaborators’ fears of either “getting screwed” by other collaborators’ non-reciprocity or having their collaborators “screw up” through incompetence. By 1994 SEMATECH was well-enough established that its board stopped further federal funding. It flourishes to this day.

#### *14.4.2 Public venture capital funds, pioneered by the CIA*

Since the late 1990s many US government agencies have established venture capital (VC) funds. Although inspired by Silicon Valley venture capitalists, the public funds are not for making money, but rather for enabling the agency to use financial leverage to induce the development and adaptation of commercially viable technologies for government agencies’ needs. The funds take equity investments in (mainly) small and medium-sized technology companies and play a hands-on role in those firms’ development, at the same time helping to strengthen existing inter-firm networks or creating new ones. By highlighting their co-partner role with private sector financiers and their dedication to market mechanisms, they are able to fend off attacks by market fundamentalists (Keller, 2011).

Surprisingly, the origin of the federal agencies’ VC funds was a traditionally secretive and insular agency, the Central Intelligence Agency (CIA). In 1999 the CIA established a VC arm, called In-Q-Tel, in order to overcome the problem that conventional government procurement practices (established in a slower-moving technology era) meant that the agency had to procure from big companies, which themselves sourced many of their technologies from SMEs. The result was that the CIA often obtained technologies after a long delay, by which time they were no longer cutting-edge, and the products often did not match the agency’s specific operational needs. With its own VC fund, the CIA could invest in nimble SMEs directly and get them to do its bidding.

Over the 2000s the federal VC model proliferated. The Army and the Navy, for example, both established VC funds, non-military agencies, for example, the Department of Energy established several; and the National Aeronautics and Space Administration (NASA) participated with a private non-profit VC fund. Matthew Keller summarizes: “Public sector venture capital strategies rapidly became broadly accepted tools for spurring mission-oriented technical innovation and/or to transform government research into commercial products” (Keller, 2011, p. 126).

### *14.4.3 The hazards of visibility*

About the most visible segment of the US Government’s efforts to promote technological innovation was the Advanced Technology Program (ATP). The fate of the ATP illustrates what can happen when a hidden developmental state becomes visible in a polity gripped by market fundamentalism (Negoita, 2011).

The ATP was created by the National Institute of Standards and Technology (NIST), within the Department of Commerce, in 1988, in response to the fears of surging Japanese competition in high-tech. It could be thought of as a civilian counterpart to DARPA. To stimulate the early stages of development of advanced technologies that would not get private funding, it developed strong connections with industry and academia.

By many measures it was very successful. For example, firms whose R&D received ATP funding had a 50 per cent shorter research cycle time than firms that had applied to ATP for funding but did not get it – giving the lie to the accusation that taxpayers’ money was being used to fund early-stage R&D that the firms would have done anyway. Second, participants in ATP-sponsored projects said that ATP participation generated a higher level of collaboration with other firms than would have occurred otherwise. Third, a slew of new products came out of ATP programmes: for example, small disc drives (which paved the way for multibillion dollar markets in consumer electronics, such as the iPod), also flat panel displays and plant-based biodegradable plastics.

Nevertheless, from 1994 on the ATP faced counteroffensives from market fundamentalists targeting it for extinction. They continually cut its budget, and finally in 2007 the Bush Administration and the Republican Congress killed it off.

## 14.5 Evaluation of network-building industrial policy

The foregoing is just a small part of the evidence that the US has practised industrial policy on a substantial scale, but not centrally coordinated and not derived from national plans. In the words of Schrank and Whitford (2009):

The federal government has been pursuing industrial policy within decentralized political institutions for well over a generation... American industrial policies go beyond preservation of market competition, maintenance of macro stability, and provision of public goods to address firm-specific needs in a host of different ways and through a variety of different agencies.

In the words of another study: “Below the ideological surface, a powerful ‘jerry-built’ substrate has emerged of federal, state and local government innovation support programs each filling gaps in the other” (Etzkowitz et al., 2008). An official involved in these programmes said: “We definitely see the programs as a de facto industrial policy, but we cannot use that term, so we usually call it R&D policy.”

Whereas the “varieties of capitalism” literature argues that the United States’ strong separation of powers (between executive, legislature and judiciary, and between federal, state and local) handicaps industrial policy to the point where it is unlikely to be successful (see the Mann quote above), the argument can plausibly be turned on its head. The decentralized type of US industrial policy has economic *advantages*: it better fits *both* the United States’ increasingly decentralized and networked production structure and its separation of powers. As previously vertically integrated firms have become increasingly de-integrated, smaller firms have mushroomed, scattered around the country. (By 2003, half of all PhDs employed by the private sector worked for firms with fewer than 500 employees. In addition, tens of thousands of PhD scientists and engineers are self-employed or own small businesses (Block, 2011)). As their share of production grows, so the economy’s benefit from networks of smaller firms also grows. By being brought into innovation networks, they are more likely to compete on the high road (high skills, innovation) than on the low road (cheap wages). Moreover, decentralization – with programmes run by many agencies at different levels and locations – encourages more experimentation both in innovation itself and in the permutations of industrial policy (Schrank and Whitford, 2009).

But the question remains: If inter-firm networks bring gains (not everywhere, but in sectors where demand is uncertain or volatile, supply interdependencies high, and technical change fast), why presume that the helping hand of the State in generating and sustaining them brings net gains, on top of what would be achieved by networks formed autonomously by the firms themselves? The short

answer is that state involvement can help to correct “network failure” (in contexts where network governance would be desirable, were it to obtain). Autonomous networks may fail (meaning absence of networks or fragile and short-lived ones) for at least two kinds of reasons.

One reason relates to the financing of innovation. In the general case production can be financed: (1) from sales, (2) from bank loans or other borrowings, or (3) from equity issues. Investment in innovation may be financed from sales by big, established firms but not by new, small firms; it can be financed only with difficulty from borrowings (debt) on the basis of prospective profits, because uncertainty is high. This leaves external equity as a major source of financing for innovation investment, especially for small new firms. But precisely because they are small and new, these firms may have difficulty raising equity finance. Hence, at the margin financing from public agencies (whether in the form of debt or equity), and public endorsement of the worth of the investment, can tip the balance for private financiers and accelerate the R&D process (Shapiro and Milberg, 2012).

The second merit of state stewardship comes from the fact that networks – where (often competing) firms pool knowledge and perhaps specializations, in a spirit of reciprocity – are vulnerable to Prisoner’s Dilemma incentives. Firms may try to gain from others without reciprocating, leading other firms to exit (saying “they screwed me”). Here the hand of the State can curb the incentives to defect. Likewise, the State can intervene in cases where firms want to exit because they think others are incompetent and not able to act reciprocally even though they want to (firms exit saying “they screwed up”).<sup>13</sup>

It is, however, difficult to evaluate the economic rate of return of scattered programmes of the US kind, especially by cost-benefit analysis, and these difficulties provide market fundamentalists with reasons to presume that they are a waste of taxpayers’ money compared with whatever the free market would have delivered. But several conclusions can be reached with confidence:

- The programmes have developed valuable products and processes. In addition to the evidence given earlier, US government network-building has recently helped US firms to secure the lead in globally important industries ranging from mobile telecommunications (as seen in Apple’s battering of RIM and Nokia) to hydraulic fracking (whose economic potential was transformed by public–private research projects backed by the Department of Energy).
- The programmes have been able to withdraw benefits from “losers”, at least in the civilian industrial sector (as distinct from agriculture and defence, where

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<sup>13</sup> The “screwed me” and “screwed up” distinction is made by Shrank and Whitford (2009 and 2011).

post-2008 increases in agricultural subsidies and the defence budget have had the consequence of forcing even more draconian cuts in non-defence public spending).

- Firm networks not encompassed in public network programmes have a higher rate of decline or breakup – which, on the face of it, argues for the value of public involvement. For example, Sherrie Human and Keith Provan report that, of the small firm networks (outside public programmes) they studied in the mid-1990s, more than 60 per cent had broken up by the time of their resudy in 1998 (Human and Provan, 2000). Maryann Feldman and Maryellen Kelley provide evidence that firms within *publicly sponsored networks* are more likely to sustain collaboration than those outside (Feldman and Kelley, 2001).

However, the case of solar photovoltaic (PV) energy systems illustrates that the success or failure of network industrial policy should not be judged only from the supply side.<sup>14</sup> As Schumpeter said, the technology pipeline consists of invention, innovation and diffusion, or, in later parlance, research, development and deployment. The US federal government played a vital role in making US-based networks of public and private actors the world's leading source of PV inventions and innovations, starting in the 1970s. But it mounted no corresponding federal programme to accelerate *deployment* of the innovations in public use; and state programmes (for example, subsidies and feed-in tariffs) have been bitty and widely varying from state to state. Germany, Japan and Spain all have raced ahead in installed capacity per capita. A recent report on national policies supporting solar PV deployment ranked the US fifth, behind Germany, France, Greece and Italy. The basic reason for the mismatch between R&D, on one hand, and deployment, on the other, may be that the United States has a more “locked-in” energy system, with stronger lobbies defending fossil fuel generation, than countries that have gone further with PV installation. Hence, politicians are willing to allocate funds for PV R&D but not for deployment, which might displace valued sources of campaign finance (the fossil fuel and the nuclear industries). Nevertheless, the relative failure of the United States to deploy PV technology does not detract from the success of network industrial policy in stimulating PV R&D.<sup>15</sup>

<sup>14</sup> This paragraph is based on Knight (2011).

<sup>15</sup> The collapse of Solyndra, the California-based manufacturer of solar panels, in September 2011 prompted the standard sing-along refrain from the Right that “government cannot pick winners”. The Department of Energy had given the company a \$535 million federally guaranteed loan to help move an innovation to full-scale commercial development. However, the loan came on top of large amounts of private investment, and it was private investors who were “picking winners”. The company collapsed because its internal management was a mess. See Joe Nocera, “Solar economics”, above.

In short, judging the success – comparing gains against costs – of particular network industrial policy projects or the whole programme is inevitably difficult and open to dispute. But two points are clear. First, many network-building projects have produced large gains. Second, the presumption that the “free market” of private sector investors would have produced better results overall rests on ignorance of the gains obtained through government-nurtured inter-firm networks.

## 14.6 Conclusions

Michael Lind, author of *Land of Promise: An Economic History of the United States*, summarizes one of his main conclusions as follows:

The most innovative entrepreneur in the 20th century was the US government. The federal government invented or developed nuclear energy, computers, the Internet and the jet engine. And it built the interstate highway system and completed the national electric grid, creating a continental market based on the technologies of the second industrial revolution. To be sure, the government has sometimes backed failures, usually in the fad-driven energy field ... But few private venture capitalists can match the remarkable record of success of Uncle Sam. Indeed, venture capitalists in IT and social networking have exploited and commercialized technologies from the transistor to the Internet that were originally developed by America’s home-grown version of state capitalism (Lind, 2012).

Programmes such as the ones described above constitute the hidden “network developmental state”, so hidden under free market varnish that most observers miss them.<sup>16</sup> Reviewing the history of US industrial policy since 1989, Fred Block remarks:

What is most striking about this recent period is that, with the exception of the fights over ATP, there is a discrepancy between the growing importance of these federal initiatives and the absence of public debate or discussion about them ... [J]ournalists rarely report on these programs, few academics write about them, and most politicians ignore them (Block, 2011, p. 13).

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<sup>16</sup> The phrase “hidden developmental state” comes from Block (2008).

Observers have also missed them partly because they tend to think that industrial policy means policy like those of East Asia and France, complete with national indicative plans and high profile national coordinating agencies.

This chapter has emphasized the overarching US political imperative, at least in recent years, to keep industrial policy programs substantially hidden, given the prevailing power of market-fundamentalist forces – or risk the fate of the Advanced Technology Program, which was terminated. Furthermore, the decentralized and network-building form of US policies may have net *economic* advantages (as well as political ones). These advantages include being a better fit with the emerging, more decentralized form of production structure, in which a growing proportion of total output comes from smaller, less vertically integrated firms. Other advantages of such policy decentralization include greater experimentation and avoidance of “group think”.

Invisibility is no guarantee of success. And invisibility also inhibits three of the main traits of successful developmental states: institutional coordination, ideological coherence, and a bureaucratic esprit de corps (Devlin and Moguillansky, 2011). To make current US efforts more successful, reforms should be undertaken along two dimensions: communication and organizations. In terms of communication, efforts need to be made to construct a narrative about innovation, which would, on the one hand, inform taxpayers about the benefits brought by publicly funded innovation programmes and, on the other, weaken the equation of “the free market” with “freedom” and “defence of ordinary people against government control”. The promulgation of this narrative should be complemented by efforts to organize “crowd-sourcing” forums where citizens can voice their opinions.

In terms of organizations, having a rich array of horizontal and vertical networks is necessary but not sufficient. Notwithstanding the political advantages of having no industrial policy centre, it would be desirable to coordinate the various federal agency programmes more than at present by establishing a central agency near the top of government (Newfield, 2011). Michael Porter, who used to deny the merit of national-level strategy, has since argued that: “Congress would benefit from a bipartisan joint planning group to coordinate an overall set of [development] priorities. More up or down votes on comprehensive legislative programs are needed to allow a shift to a coherent set of policies and away from lots of separate bills” (Porter, 2008).

Of course, such a coordinating body must make no mention of industrial policy in its name – better something neutral such as “Agency for Competitive Partnerships”. But, while a coordinating body would be desirable, the resurgence of mass-movement market fundamentalism since 2008 augurs badly for any such proposal in the near future.

However, moves on the industrial policy front have to be complemented by measures to link productivity improvements with incomes, reversing their decoupling over the 2000s – the first time that the incomes of the large majority of Americans have stagnated or fallen during apparently good times. Continued slow growth of median incomes relative to productivity is a recipe for further financial crises and for a lost decade or two (Wade, 2012b).

One side benefit of the current research on US industrial policy discussed in this chapter is that, by showing how the US Government has practised vigorous (also relatively cheap and uncoordinated) industrial policy for decades, it is harder for economists (including those in international organizations such as the World Bank and the IMF) to lecture developing country governments not to venture into industrial policy on grounds that “having the state help [the free market] is usually a contradiction in terms” (Kasperov, 2012). The revelation that the US has long practised a form of industrial policy, often to good effect, opens space for a more pragmatic, less ideological consideration of how to do industrial policy well, rather than simply how to do it less.

In a developing country context, industrial policy has to be threaded through the “State–market” dilemma in a way that recognizes *both* sides: the risks of “state failure” are greater in developing countries – a fact that favours a bigger market role – and the risks of “non-existent markets” and “market failure” are also greater – which favours a more active role for smart government. The first step is to give up blanket dicta such as “the best industrial policy is none at all”, “government failure is worse than market failure” and “all States are predatory”. Perhaps the West’s prolonged Great Slump may help to induce more caution about preaching and teaching such context-free ideas. Indeed, the World Bank’s Finance and Private Sector Development vice presidency established a Competitive Industries Practice in 2013, which sponsored a public conference under the title “Making growth happen: Implementing policies for competitive industries” in October 2013. Several speakers argued in favour of industrial policy, using those very words. The conference may mark an early step in the emergence of a new development policy norm.

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