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Where Does Growth Really Come From?

IF WE ARE SERIOUS about finding and justifying an alternative to free trade, we are ultimately going to need more than the long list of negative criticisms examined so far in this book. We are ultimately going to need an alternative *positive* explanation of economic growth, one that doesn't turn on pure free markets and thus free trade.⁶⁴⁶ We need an explanation not just of how free trade does economies harm, but of how protectionism does them good.

In the free trade view, growth comes from nations integrating themselves ever more tightly with the wider world economy through unconstrained imports, exports, and capital flows, enabling them to ever-better exploit their comparative advantage.⁶⁴⁷ But even free traders admit, in unguarded moments, that they actually have little idea *where* growth really comes from. This is a fatal flaw. As the aggressively pro-free-trade magazine *The Economist* has written:

Economists are interested in growth. The trouble is that, even by their standards, they have been terribly ignorant about it. The depth of the ignorance has long been their best-kept secret.⁶⁴⁸

But if free-trade economics is bad at explaining growth and knows it, then we really shouldn't be taking its recommendations on how to *get* growth so seriously—starting with free trade.

Economic history contradicts free-trade economics at a number of points. For example, the all-important theory of comparative advantage promotes specialization as the path to growth. Supposedly, a nation's best move is to concentrate its factors of production on the products in which it has comparative advantage and import most everything else. (Hewing to this, the World Bank has repeatedly advised heavily indebted Third World nations to specialize in one or two crops or raw materials for export.)

But if this theory is true, it would imply that economies should concentrate on fewer industries as they become richer. Instead, the reverse is observed. In reality, economies starting out from a primitive state tend to *expand* the range of products they produce as they grow.⁶⁴⁹ They only start reconcentrating when they are well past the middle-income stage and start building entrenched positions in a few sophisticated high value-added industries.⁶⁵⁰ Narrow specialization is actually a hallmark of impoverished one-crop states, colonies managed for the benefit of distant rulers, and accidental raw materials-based economies like the Gulf oil producers.

Successful nations diversify. This is an important clue that economic growth may actually be less about comparative advantage and more about something else. Economic history, in fact, suggests that development doesn't come from increasing specialization, that is, from focusing ever more on what one already produces well, but from learning to produce entirely new things. But something new that a nation learns to produce is, by definition, not something in which it already *had* comparative advantage. So Ricardian thinking is not useful here. Even if comparative advantage applies after the fact, when a nation has mastered a new industry, it cannot tell a nation today what new industries it should try to break into tomorrow or how. Ireland didn't have any comparative advantage in IT in 1970, but this industry has been a big driver of its later growth. Same for India. There is no way this industry made sense for either nation in advance based on Ricardo.

There is an even larger lesson here: economic growth is, by definition, a disequilibrium event, in which an old equilibrium level of output is replaced by a new and higher level.⁶⁵¹ So the economics of equilibrium, which means most of free-market economics (whose supply and demand curves intersect *in equilibrium*), is of little use for understanding it. That is why the quote at the beginning of this chapter cuts so extremely deep. Among other things, equilibrium economics cannot explain entrepreneurship, whose profits represent the value of creatively *upsetting* the existing equilibrium in an industry. Equilibrium is a useful concept for examining

how things stand once the dust has settled and the economy has reached a new stable state, but it is intrinsically weak at analyzing change. This is why, when confronted with entrepreneurship and innovation, mainstream economics tends to quietly give up and reach for concepts, such as the Austrian economist Joseph Schumpeter's (1883-1950) idea of creative destruction, that are genuinely illuminating but lie outside the mathematical structures of mainstream economics. And as the logic of classic equilibrium-based economics still inescapably leads to Ricardo, this ad hoc patching doesn't lead mainstream economics to the right conclusions about trade.

COMPARATIVE ADVANTAGE VS. LADDER EXTERNALITIES

But if specialization and, more generally, following one's comparative advantage *aren't* the key to growth, what is? What is that "something else" mentioned above?

Let's start with the common observation that real-world economic growth often seems to involve a virtuous cycle, in which the upgrading of one industry causes others to upgrade and so on. This has been seen time and again in nation after nation, industry after industry.⁶⁵² For example, as one industry becomes a more sophisticated consumer of inputs, it may demand that its supplier industries become more sophisticated.⁶⁵³ Conversely, it may enable its downstream industries to increase the sophistication of their outputs. This process then ripples through the economy and repeats.

Crucially, some industries are better at starting this process (or keeping it going if it has already started) than others. And the free market, *and thus free trade*, won't optimize this process automatically. Why? Because the value of an industry for the *next* step in industrial growth is often an externality, from the point-of-view of today.

We met externalities before, in dubious assumption #2 (there are no externalities) of Chapter Five. They occur when the profits of an industry do not reflect its full economic value. In this case, this means that the industry's present owners will not see profits that reflect its long-term ability to help the economy upgrade or break into other industries. As a result, the industry will remain underdeveloped, relative to its long-term value to the economy, and the free market will *not* give the optimal answer for how much of this industry the economy should contain.

When focusing on the technological aspects of this problem, economists have called these effects "location-specific technological externalities."⁶⁵⁴ More generically and colloquially, they have been called "ladder" externalities. That such externalities exist is taken as obvious by governments from Utah to Uttar Pradesh. That is why they compete to attract industries—mainly high technology—which they believe will further their economic development in a way that they *don't* get excited about somebody opening a chain of convenience stores employing just as many people.

The existence of these externalities is also taken as a given by businesses in newly industrializing nations, which is why conglomerate-like structures like the Japanese *keiretsus*, the Korean *chaebols*, and the family networks of Taiwan and Italy have played such large roles there. These structures *capture* ladder externalities by taking positions in related and newly emerging industries, so their profits don't end up in the hands of someone else.⁶⁵⁵

Even American managers are well aware of how one industry catalyzes another, though the short-termism imposed on them by the American financial system undermines their ability to exploit this fact strategically.⁶⁵⁶ In the words of former tech CEO Richard Elkus, who has been on the boards of over a dozen companies:

Some markets are considered more strategic than others. By targeting strategic markets, an infrastructure can be built that ensures a solid basis for economic expansion. However, the leverage is not based simply on the importance of one market over another, but rather on the assumption that, as they develop, strategic markets will become interrelated and interdependent, with the whole becoming substantially larger than the sum of its parts...Every product becomes the basis for another, and every technology becomes the stepping-stone for the next.⁶⁵⁷

One consequence of this is that *economic growth is path-dependent*. To grow, an economy must continually break into new industries. But to do this, it needs strong *existing* positions in the right industries. So a national economy that doesn't get onto the right path (and stay on it) risks being sidelined into industries which lead nowhere in the long run. We noted this problem before in Chapter Five: 18th-century Portugal derived no other industries from winemaking, while Britain derived many from textiles be-

cause the construction of textile machinery spawned a machine-tool industry that could produce innovative machinery for other industries. Similarly, electric cars may be the wave of the future today, but without a strong position in conventional cars, a nation is unlikely to have the know-how or supplier industries to build them.

Path dependence applies to economies at all levels of development, not just those starting to industrialize. Infant-industry protection is, of course, one of the best-known cases for protectionism and industrial policy. (It is often the one case grudgingly conceded even by free traders.) But it is, in fact, only the most obvious case of the more general phenomenon of the path dependence of economic growth. Infant industries are merely the first rungs of the ladder.

A key concept here is the "driver" technology, which enables progress in multiple other technologies. As former Commerce Department advisor Clyde Prestowitz, now with the Economic Strategy Institute, writes of Japan's makers of industrial policy:

They knew that the RAM [random-access memory chip] is the lynchpin of the semiconductor industry because, as the best-selling device, it generates not only revenue but also the long production runs plant managers use to test, stabilize, and refine the production and quality-control processes. Compared with many other chips, it is a relatively simple product, which makes it a more attractive vehicle for developing new techniques. The latest technology has always been incorporated first in RAMs, which have always been the first product to appear as a new generation. Once RAMs are refined, new generations of other products follow...The Japanese knew that if they could grow faster than the Americans in the RAM segment of the market, they could become the low-cost producer of RAMs. And if they controlled RAMs, they would have taken a long step toward dominance in other semiconductors. And if they had semiconductors, semiconductor equipment, materials, and everything that semiconductors went into, such as computers, would be next.⁶⁵⁸

Free market, free-trade economics systematically maintains the opposite of all this. It maintains that *any* industry can drive an economy upwards, just so long as it enjoys comparative advantage *right now*. And because free trade economics holds that free trade automatically steers an economy into those industries where it enjoys comparative advantage, it holds that free trade will therefore maximize economic growth.⁶⁵⁹ For

free-trade economics, there is, in fact, no important distinction between the long and the short term: comparative advantage is always right, period. Free-trade economics holds, in fact, that it is profoundly impossible for one industry to be "better" than another. This is the cause of an infamous (and subsequently denied) comment by Michael J. Boskin, George H.W. Bush's chairman of the Council of Economic Advisers:

It doesn't matter whether America exports computer chips, potato chips, or poker chips! They're all just chips!⁶⁶⁰

Why would Boskin make a statement so brazenly contrary to common sense with such confidence? Because free-trade economics holds that markets are so efficient that no industry *can* be special. In its view, there can be no ladder externalities because there can be no industry externalities at all—certainly none that are big enough and visible enough to understand and manipulate. Every industry's profits today *must* accurately reflect its value in both the short and the long term. Why? Because if any industry *did* have superior value for future growth, its expected profitability today would reflect this, that expected profitability would draw new firms into the industry, and the superior profits would be competed away.

If every industry's short-term profitability were indeed a correct measure of its long-term value, this would indeed be the case. But when long-term returns may well accrue to another company, even another industry, and someone else may capture them, short-term profitability is not a reliable metric of long-term value. So any strategy that relies on short-term profitability alone to steer an economy will necessarily underperform. (As noted in Chapter Two, short-termism is a crucial hidden part of America's trade and industrial problems.)

"Just chips" economics is wrong because industries are very much *not* alike in their long term consequences. In the words of Laura D'Andrea Tyson, Bill Clinton's chairperson of the Council of Economic Advisers:

The composition of our production and trade does influence our economic well-being. Technology-intensive industries, in particular, make special contributions to the long-term health of the American economy. A dollar's worth of shoes may have the same effect on the trade balance as a dollar's worth of computers. But...the two do not have the same effect on employment, wages, labor skills, productivity, and research—all major determinants of our economic health.⁶⁶¹

(Bill Clinton, who flirted with serious industrial policy during the 1992 campaign, never took his own advisor's advice on this subject, preferring the free-trade extremism of NAFTA. The political moment was lost, and America's much-anticipated turn to serious industrial policy never happened.)

NOT ALL COMPARATIVE ADVANTAGE IS CREATED EQUAL

Free market, free-trade thinking can't comprehend the above realities. But it still has a contribution to make to our understanding here. In light of these realities, comparative advantage doesn't disappear from the picture entirely. But a crucial insight is added: *not all comparative advantage is created equal*.⁶⁶² It is better to have comparative advantage in some industries than others, and *what* a nation has comparative advantage in determines its standing in the global economic pecking order. In the words of Paul Krugman:

Each country has a "niche" in the scale of goods; the higher a country is on the technological ladder, the further upscale is the range of goods in which it has comparative advantage.⁶⁶³

This may sound obvious, but this reality is relentlessly obscured by free-trade thinking, which defines away the possibility of some kinds of comparative advantage being better than others by its insistence that it is always best to act according to the comparative advantage that one has *today*.⁶⁶⁴ As the Norwegian economist Eric Reinert puts it:

The very idea of a nation lifting itself to higher levels of living standards through competitiveness—being engaged in activities that raise the national living standard more than other activities—goes directly against the assumptions and beliefs which form the foundations of the neoclassical economic edifice. This is not the way economic growth is supposed to take place in the neoclassical model.⁶⁶⁵

One implication of all this is that national economies tend to rise (or decline! Read "Argentina") over time to the level of income embodied in their exports. Economist Dani Rodrik has summarized this fact as "you become what you export."⁶⁶⁶ This is a fact with vast significance for industrial policy—especially for developing countries, which are desperately

trying to *become* something other than what they already are. And this fact profoundly contradicts Ricardian economics. As Rodrik observes:

Under received theory, a country with an export package that is significantly more sophisticated than that indicated by its current income level is one that has misallocated resources (by pushing them into areas where the country does not have a comparative advantage). Such a country should perform badly relative to countries whose export packages are more in line with current capabilities.⁶⁶⁷

That climbing a ladder of industry externalities can lift an economy upward shows up in the data in the fact that economies with more-sophisticated exports are not only richer today (which one would expect) but also grow faster over time.⁶⁶⁸ The latter fact, although not terribly shocking to common sense, is not obvious at all to free-trade economics. But in reality, having a foothold in industries which *intrinsically lead somewhere* is a big part of what makes economies grow.

All of the above was, of course, well known to mercantilist governments for centuries. In the words of economist John Culbertson:

This view...had been well understood by governments and writers on economic subjects centuries before Adam Smith, that industries are not homogenous. Some lead to cumulative advances in knowledge and technology, some bring new skills and capabilities to people and firms, some permit high incomes to be earned in foreign markets because of the absence of competing producers—especially of competing low-wage producers. Other lines of production have none of these favorable characteristics, and are dead ends. The nation that specializes in them will be economically second rate, at best.⁶⁶⁹

This is why it matters so much that America not get pushed out of the industries of the future, regardless of what our immediate comparative advantage says.

WHAT ARE GOOD INDUSTRIES?

If the industries a nation needs in order to grow economically are those whose intrinsic nature it is to lead onward and upward, and free trade *won't* automatically nourish them, which lucky industries might these be?

Let's start with the fact that sustained economic growth only really occurs in industries which exhibit increasing returns. This means that for a given increase in inputs, output goes up by *more than* the size of that increase. For example, because the cost of baking bread consists in a one-time investment in an oven plus a per-loaf cost for ingredients, the cost per loaf will go down with each additional loaf baked, as the cost of the oven is spread out over more loaves. So 10 percent more money will deliver 11 percent more bread and so on. The opposite of increasing returns is diminishing returns: after a certain point, 10 percent more money delivers nine percent more output, then eight percent and so on.

Increasing returns is a simple concept, but it ramifies endlessly, forming the ultimate basis of a long list of the opposite characteristics of "good" (increasing returns) and "bad" (diminishing returns) industries.⁶⁷⁰ Historically, manufacturing is the quintessential increasing-returns industry and agriculture the quintessential diminishing-returns one. But some types of each behave like the other and since the mid-1970s, the line between manufacturing and services has blurred, with a *small* segment of high-end services acquiring some of the desirable characteristics traditionally associated with manufacturing. And low-end manufacturing has increasingly come to resemble agriculture. But the underlying characteristics of increasing and diminishing returns industries have remained stable, even as which industries exhibit these characteristics has changed.

Having a lot of increasing returns industries is really the only way to be a developed economy. This is, in fact, the fundamental purely economic difference between the First and Third Worlds: the former is full of such industries, the latter is not. As a result, examining why some industries exhibit increasing returns and some do not can tell us a lot about why some economies grow and some do not. And how free trade can easily lead an economy astray.

WHY DO SOME INDUSTRIES HAVE INCREASING RETURNS?

Industries which exhibit increasing returns do so mainly because they can absorb endlessly rising capital investment. Not all industries can: buying another \$1,000,000 worth of tractors for a coffee plantation that already has tractors won't increase the plantation's productivity very much.⁶⁷¹ Neither will buying every lawyer at a law firm another desk. But putting

another \$1,000,000 into production machinery in an automobile or semiconductor plant will do a lot. And capital doesn't just mean factory floor machinery. It also means human capital or skills accumulation, and research and development.

Why are some industries so good at absorbing capital? One big reason is that they are susceptible to innovation, and R&D is a big capital absorber. This activates a virtuous cycle in which innovation absorbs capital and repays it by raising profitability, generating more capital and repeating the cycle. It is no accident that manufacturing and related fields generate over 70 percent of research & development in the U.S.⁶⁷² And within manufacturing, high technology accounts for roughly 20 percent of output, but 60 percent of R&D.⁶⁷³

This susceptibility to innovation derives largely from the fact that good industries tend to produce goods capable of infinite improvement, like laptops or airplanes, while bad industries produce goods whose character is fixed, like fruit or t-shirts. The products of good industries are also susceptible to meaningful *variety*, so firms don't end up selling the exact same product in pure head-to-head competition. This spares firms the raw price competition that drives down profits, wages, and funds available for further investment. Instead, they compete on quality, reliability, reputation, marketing, service, product differentiation, special understanding of buyer needs, rapid innovation, and managerial sophistication. This enables them to accumulate strongly entrenched competitive positions where vulnerability to pure price competition—crucially by cheap foreign labor—is not a big issue.

This lack of perfect competition in good industries activates something free-market economics despises: *market power*, also known as monopoly or quasi-monopoly power. From the point of view of free markets, this is inefficient on first principles, because companies and industries with monopoly power earn higher profits than the free market would allow. They are parasitic. The confusing term economists use for this excess profit is “rent” (which has nothing to do with rent in the normal sense)⁶⁷⁴ so, in the words of Eric Reinert:

In the static system of neoclassical economics, rent-seeking is seen as a negative term. In a world where increasing returns to scale, imperfect information, and huge barriers to entry dominate all industries of any importance, *dynamic rent-seeking* seems to be a key factor for economic growth and competitiveness.⁶⁷⁵ (Emphasis added.)

This dynamic rent-seeking generates a number of virtuous spirals. One is that rising worker incomes provide the purchasing power to sustain industrial growth. And as incomes rise, what economists call “quality of demand” also rises: people demand not just more but *better* products, driving the industries of their home nation to upgrade and reinforcing the ladder externalities discussed earlier.⁶⁷⁶

Good industries also readily absorb rising human capital or skill. That capital accumulates in the workers themselves tends to encourage well-cared-for labor for the same reason factory owners do not let valuable machinery rust away. It generates corporate and state paternalism and the Galbraithian “countervailing powers,” like bargaining leverage by workers, that spread the profits of industry beyond its owners.⁶⁷⁷ This broad sharing of profits is reinforced by the fact that good industries tend to produce products for which income elasticity is high, i.e., people buy more as their incomes go up. As a result, productivity gains don't just drive down the price of the product, and output can rise along with productivity, enabling wages to stay steady despite productivity gains which require fewer and fewer workers per unit of output.

BAD INDUSTRIES AND DEAD-END ECONOMIES

The opposite of good industries is, of course, bad ones. These are *dead-end jobs writ large*. For centuries, this has meant agriculture and raw materials extraction, but since the mid-1970s, unskilled manufacturing has been inexorably joining this category. In these industries, diminishing rather than increasing returns apply, so all the previously discussed benevolent dynamics are absent—or run in reverse.

These industries are hobbled by their very nature. For a start, demand for agricultural products is intrinsically less elastic than demand for manufactured goods, simply because of the finite size of the human stomach.⁶⁷⁸ As a result, productivity growth in agriculture tends to translate into lower prices for consumers, not higher wages for farmers. Because productivity growth in agriculture tends to go into lower prices, while productivity growth in manufacturing does not, agricultural prices generally decline over time relative to the price of manufactured goods.⁶⁷⁹ This problem has been around for a very long time: according to one British estimate of

1938, the same quantity of primary products bought only 63 percent as many manufactured goods as it had in 1860.⁶⁸⁰ Thus nations whose main exports are agricultural or raw material products have slipped further behind the industrial nations, decade by decade.⁶⁸¹

Agriculture and raw materials also tend to be bad industries simply because they are too easy for competitors to break into and thus attract too many rivals. When Vietnam, on the advice of the World Bank, started exporting coffee and rapidly became the number two producer after Brazil, this flooded the market and drove the price down from 70 cents a pound to around 40 cents.⁶⁸² Economies dominated by bad industries are subject to volatile income swings due to distant commodities markets, swings exacerbated by undiversified exports and impossible to hedge against. The dependence of agriculture on the weather only makes this worse.

Most agriculture simply can't absorb technological innovations that upgrade productivity and wages on anything like the scale manufacturing can. For example, as Eric Reinert notes:

Mexico specializes in unmechanizable production (harvesting strawberries, citrus fruit, cucumbers and tomatoes), which reduces Mexico's opportunities for innovation, locking the country into technological dead-ends and/or activities that retain labor-intensive processes.⁶⁸³

Because agriculture can't absorb technology, it can't absorb capital, either, as there's nothing to spend the money on that will pay back a return. In any case, without a strong manufacturing sector, it's hard to raise even *agricultural* productivity, because increased productivity means fewer workers are needed, and there's nowhere for the workers released from agriculture to go. So fear of mass unemployment locks society in place.⁶⁸⁴

For most of the people they employ, agriculture and other bad industries also tend to hit a fairly low ceiling in the amount of skill they can usefully absorb, so human capital doesn't accumulate any more than capital invested in technology. As a result, these industries remain undercapitalized and the societies that host them do not accumulate wealth in these industries. Whatever money is made is siphoned off elsewhere: into castles in Medieval Europe, into Europe in colonial Africa.

Agriculture and other bad industries occasionally do exhibit innovation. But this is generally only in the production process, not the product itself. And innovations, when they come, tend to come from *outside* bad industries. Agriculture, for example, has benefited from genetic engineer-

ing and improved tractors, but created neither of these innovations itself. As a result, innovations do not establish virtuous cycles of innovation □ more profit □ more innovation *inside* bad industries.

One telltale sign that a formerly good industry is turning bad is that product innovation exhausts itself and the industry turns to process innovation. And when a bad industry turns downright terrible, even process innovation exhausts itself and the industry just seeks cheaper labor. One can trace this process in individual industries over time. The shoe business, for example, began as a First World handicrafts industry, was mechanized over the second half of the 19th century, and began moving to the Third World in the 1950s—just as its productivity growth flattened out.

Which industries are good and bad changes over time as the technological frontier of the world economy moves forward. The textile industry was good for a rising economy like Britain in the early 19th century, but is not good for developed nations today. These “has been” industries either migrate to developing nations or gently stagnate in place. As an economy accumulates more and more of them (as Britain did in the early 20th century) this is a clear sign that economic decline is around the corner.

No nation can plausibly hope to have its entire economy consist only of good industries, as some bad industries are sectors one can't live without. One cannot go without haircuts, even if the productivity of barbers is no greater than 200 years ago. And even stagnant sectors contribute some output and employ some people. But the more of a nation's economy is in good industries, the stronger its economy will be today and the better its growth prospects tomorrow.

ENTIRE ECONOMIES STUCK IN BAD INDUSTRIES

The poor and slow-growing economies of the Third World are that way because they are predominantly composed of bad industries and the path-dependence of industry entry traps them there. They are stuck in industries that have no increasing returns, no technological advances, and no ladder externalities. These problems mutually reinforce each other, ramify over time, and are the ultimate basis in hard economics for the well-known phenomenon that the rich get richer. (Marx correctly observed that this happens, but he mistakenly thought that it was because the rich were *exploiting* the poor. Sometimes they do, but that's not the fundamental prob-

lem.) The United Nations Development Programme has thus estimated that the income gap between the top fifth of the world's nations and the bottom fifth was 3:1 in 1820, 7:1 in 1870, 11:1 in 1913, 30:1 in 1960, and 74:1 in 1997.⁶⁸⁵

Ironically, the gap between poor nations and rich ones was actually much smaller in the 19th-century heyday of colonialism than it is today. But this makes perfect sense: 150 years ago, there was *relatively* more to grab in colonies; there's no point in an advanced nation conquering Rwanda today, when its own per capita output is 75 times greater. Insofar as colonialism, traditional or modern, overt or covert, is a deliberate economic strategy, it is about *locking subject nations into bad industries*.⁶⁸⁶ For example, the English government stifled Ireland's nascent industrialization in 1699 by banning its exportation of woolen cloth outside the British Isles.⁶⁸⁷ Ireland obediently specialized in agriculture and even became a successful exporter. But it continued to export food even when its own people were starving. It had the capacity to produce nothing else.

Colonialism per se isn't the problem here, as the economic mechanisms that do the damage are perfectly capable of operating in nations that are politically independent. (We noted Spain as an example in Chapter Six.)⁶⁸⁸ And not all colonies have been subjected to this treatment. The danger of being trapped in bad industries was, in fact, well understood by a number of small, raw materials-rich colonial nations which managed to avoid this fate. Australia, Canada, New Zealand, and (oddly enough) South Africa are the classic examples. All these nations were beneficiaries of the British Empire getting burned trying to make the U.S. a banana republic, as the imperial authorities allowed these colonies to raise tariffs against British goods in order to pursue their own industrialization.⁶⁸⁹

THE PATHOLOGIES OF BAD INDUSTRIES

Free trade does not automatically assign nations good industries. This is the fundamental problem. Acting according to their immediate comparative advantage, it can just as easily assign them bad ones. This may be optimal in the short term, but if a nation's comparative advantage today is in producing bananas, then it will be stuck with roughly the same productivity 30 years from now.⁶⁹⁰ That isn't true in industries like computers or automo-

biles. And in the presence of a large wage gap between nations, low-wage nations will automatically tend to attract bad industries under free trade, as here will lie their immediate comparative advantage.

The interaction of free trade with bad industries is toxic in a wide variety of ways, not all of them obviously trade-related. For example, free trade tends to exacerbate all the "bad habits" of modern agriculture, as the attempt to extract more returns from a diminishing-returns industry to keep up with declining terms of trade generates a relentless squeeze. This tends to increase the amount of land under cultivation and undermine conservation programs. It tends to force intensive use of pesticides and fertilizers. It tends to replace diversified operations with large-scale feed lots and monocrop agriculture. It tends to reduce specialty crops to commodities. And it tends to place absentee owners in control, undermining family farming and rural communities.

The First World palliates (not the same thing as solving) these problems with agricultural subsidies because it can afford to. This has the unfortunate spillover effect in the Third World of generating a tidal wave of cheap exported food that destroys farm jobs the same way manufactured imports destroy factory jobs in industrial countries. Given that the combined agricultural subsidies (including hidden ones such as cheap water) of the U.S., EU, and Japan equal almost 75 percent of the *entire income* of Sub-Saharan Africa, it is no accident that African farmers, for example, cannot compete.⁶⁹¹ Once they can no longer support themselves on the land, they have no choice but to seek urban, mainly slum, life. When a Third World nation converts its food production to export and becomes dependent on imported food, it becomes vulnerable to volatility in its export markets. Bubbles in commodities such as biofuels make this worse, as when the bubble ends, it is impossible to convert back to food production in time to avoid food riots.

Raw materials extraction is the other sector notorious for bad industries. It tends to harbor many of the same pathologies as agriculture, plus a few nasty quirks of its own. Raw materials like oil notoriously breed parasitic elites composed of whomever manages to establish political control of the spot where the oil comes out of the ground. Unlike the elites of manufacturing-oriented economies, they contribute little in managerial or technical skill to the economies they dominate. They can get away with misgoverning their countries in ways that would ruin the productivity of a manufacturing-oriented economy. They have no need to share widely the

wealth derived from the raw materials they extract (except with local warlords and security forces), and little incentive to reinvest more than a fraction of that wealth in the industry itself.

During the Cold War, much opposition to capitalism was motivated not so much by literal hatred of private property (let alone actual love of communism) as by the deep-seated fear that advanced industrial modernity was a closed club of the United States and Western Europe.⁶⁹² Other nations, it was feared, could never break in, but would remain eternally trapped in bad industries—which would then guarantee their poverty and political subordination. So socialism was the only way out, with the USSR as its ultimate geopolitical anchor, even if obviously extreme as a literal economic model to imitate. But once a nation understands the above *mechanisms* of underdevelopment—better yet, how to manipulate them through protectionism and industrial policy—abandoning capitalism entirely shows itself to be an unnecessarily extreme solution. Japan and its followers in East Asia understood this, which is a big part of why they were so staunchly anticommunist during this period. Other parts of the world did not, and thus found socialism considerably more interesting.

GOOD AND BAD INDUSTRIAL POLICY

If free markets and free trade aren't always best, this *necessarily* opens up the possibility that some other policy might be better, if properly designed and implemented. This, at bottom, is what makes successful protectionism and industrial policy possible.

It is no accident that when reviewing purported free-trade success stories around the world, one often finds protectionism and industrial policy right under the surface. In Brazil, for example, the steel and aircraft industries are legacies of past import-substitution policies;⁶⁹³ in Mexico, motor vehicles are; in Chile, grapes, forest products, and salmon. In fact, of the top 20 exporting corporations in Chile in 1993, at least 13 were creations of a single government agency, the *Corporación de Fomento de la Producción* (CORFO).⁶⁹⁴

Over the last 40 years, there have been two key laboratories of protectionism and industrial policy: East Asia and Latin America. As recently as the early 1970s, both regions were at similar levels economically, and

Latin America was actually much richer at the end of WWII.⁶⁹⁵ And yet East Asia has succeeded economically, while Latin America stagnated from about 1975 until very recently. (The above examples are happy exceptions.) Protectionism and industrial policy clearly come in both effective and ineffective varieties, and neither concept deserves an uncritical endorsement.

We are now in a position to understand why some kinds of each work and some don't.⁶⁹⁶ In the words of Harvard economist Dani Rodrik, both regions employed the "carrot," that is, tariffs, industrial subsidies, et cetera, to help their industries. But only East Asian governments were politically disciplined enough to employ some needed "stick" as well, i.e., measures to prevent their industries from merely converting this help into immediate profits, not long-term upgrading of their capabilities.

An export requirement is one example of a "stick." This improves the nation's balance of payments and forces domestic producers to meet global standards for quality and cost. This policy can be implemented in a wide variety of ways, some not immediately obvious as such, like giving companies import quotas for raw materials based on their export performance. Another method is a so-called "rolling" local content requirement, where a company importing goods is required to produce a gradually increasing percentage of the final value of the product domestically. This creates a pressure to produce locally *without* getting so far ahead of market outcomes as to be hopelessly inefficient.

Other patterns of successful industrial policy emerge. It has tended to maintain domestic rivalry within industries, rather than concentrating resources on a single superficially-strong national champion.⁶⁹⁷ It has tended to involve local ownership *and* understanding of core technologies, rather than the "Lego brick" manipulation of sophisticated inputs in an unsophisticated way. It has tended to combine investment in education with investment in industries that can actually absorb educated workers. It has tended to use access to the national market as leverage to get foreign corporations to locate a share of production there, not merely as a shield for domestic producers or as a source of tariff revenue to be wasted on political pork. (Pulling in state-of-the-art foreign producers also keeps domestic producers on their competitive toes *without* subjecting the economy to an uncontrolled flood of imports.)

What did Latin America do wrong? It allowed domestic competition to wane. It permanently protected mature industries that should have been

able to survive on their own by that point. It lacked an interest in exporting, so its industries were not disciplined to reach world standards. Lack of exports then caused a lack of the foreign currency needed to import state-of-the-art production technology. Its industrial know-how therefore lagged behind the rest of the world, as it never developed comparable domestic sources of technology either. And Latin American nations either failed to emphasize education, or failed to create industries that could absorb educated workers, the latter causing investments in education to dissipate in brain drain abroad rather than accumulate as human capital at home.

THE WORST AND BEST INDUSTRIAL POLICY

In the developing world, the very worst industrial policy has tried to break into new industries merely on the basis of having cheaper factors of production, which mostly comes down to cheap labor. (Number two is probably cheap raw materials, followed by cheap land.) Unfortunately, industries based on cheap labor continually attract new entrants because cheap labor is an undifferentiated commodity, available all over the world. But incumbents are blocked from exit by costs they have already incurred, trapping them in these industries. Today's cheapest labor source is always vulnerable to being undercut by an even cheaper one tomorrow, and rival governments will subsidize even where there is no preexisting cost advantage.⁶⁹⁸ This is where the sad scramble for immediate comparative advantage ends up.

A nearby example of this misguided strategy is Mexico's string of *maquiladora* plants along the U.S. border. These 3,000 American-owned factories employ over a million workers. Though they often contain the latest production technology and have the highest productivity of any industry in Mexico, they have spawned no industrial revolution there. Although these plants often consume fairly sophisticated technology, in the form of imported capital equipment, what they *do with* this technology is not especially sophisticated. So the Mexican economy accumulates neither human nor any other kind of capital; the products produced there have no all-important scale economies *at the assembly stage*.⁶⁹⁹ For example, according to Rick Goings, CEO of Tupperware, which has a major

plant in Toluca, Mexico failed to grasp the opportunity handed to it by NAFTA:

When all of a sudden the borders opened and all these [jobs] were created for assembly and sending [products] back to the United States, they didn't invest what they needed to in building the skill base of Mexican workers. So you go down there now and what are they complaining about? Losing their jobs to China. All you have to do is follow Nike's pattern over the last 25 years: Korea, China, Vietnam. You just keep following that low labor cost—you just keep following that dragon. Unless you build in these countries an infrastructure and a skill base, they may have a short-term advantage, but it won't last.⁷⁰⁰

Such industry is a technological and economic dead end. For all that anybody will ever learn or develop by working in it or even owning it, they might as well be picking coffee beans by hand—or owning a plantation. The question a nation should always be asking about its industries is, "Is there anything left to learn here?" If there isn't, it's time to let another nation further down the ladder of industrial development take over that industry and move on. And if it isn't feasible to move on, then something is wrong with the nation's industrial strategy, because it has gotten stuck, and growth requires that it continually be able to upgrade.

What does the most successful industrial policy look like? As economies try to make the jump from the Third World to Newly Industrialized Country status and finally to the First World, the real key to growth turns out to be proactively *anti-Ricardian*, namely getting *away from* their immediate comparative advantage. They try to *shape* it, rather than just submitting to it.

Above all, good policy means getting away from advantage based merely on given factors of production and transitioning towards advantage based on *created* factors of production. Ultimately, it means transitioning from so-called lower-order sources of advantage to higher-order sources. As Harvard Business School's Michael Porter explains it:

Lower-order advantages, such as low-cost labor or cheap raw materials, are relatively easy to imitate. Competitors can often readily duplicate such advantages by finding another low-cost location or source of supply, or nullify them by producing or sourcing in the same place...Also at the lower end of the hierarchy of advantage

Does this really hold for Sweden, Ger., Japan, The U.S. has far more innovation but their success has led up to policies on high value & managed K-L relation

are cost advantages due solely to economies of scale using technology, equipment, or methods sourced from or also available to competitors....

Higher-order advantages, such as proprietary process technology, product differentiation based on cumulative marketing efforts, and customer relationships protected by high customer costs of switching vendors, are more durable. Higher-order advantages are marked by a number of characteristics. The first is that achieving them requires more advanced skills and capabilities such as specialized and highly trained personnel, internal technical capability, and, often, close relationships with leading customers. Second, higher-order advantages usually depend on a history of *sustained and cumulative investment* in physical facilities and specialized and often risky learning, research and development, or marketing.⁷⁰¹ (Emphasis in the original.)

INDUSTRIAL POLICY, AMERICAN-STYLE

For contemporary Americans, one common roadblock to understanding industrial policy and protectionism is the myth that our most successful industries have made it on their own, without government help. We tend to see industrial policy (if we accept it at all) as perhaps suitable for up-and-coming nations, but not for nations like ourselves that have already arrived. But in reality, the fingerprints of industrial policy are easy to find in our own economy, even in the post-WWII era of increasingly free trade (and increasingly strident *laissez faire* rhetoric after about 1980).⁷⁰² Let's look at two of America's most touted industries, semiconductors and aircraft, to see how they *really* became so strong—and therefore why the free market-free trade model of economic growth is so wrong.

Silicon Valley is a famous success story of free enterprise, and to a large extent it deserves this reputation. Nevertheless, its rise was shot through with government support, without which it would probably never have existed. In fact, everywhere in the world where a semiconductor industry has developed, it has been a target of state industrial policy.⁷⁰³

The entire semiconductor industry is based upon the transistor, which was invented by Bell Laboratories in 1947. Bell Labs, however, was no product of free-market capitalism, but was the research wing of the old American Telephone and Telegraph (AT&T), a government-sanctioned mono-

poly. This company could only afford to support an expensive laboratory full of Nobel-caliber scientists precisely *because* it was a monopoly: protected from competitive pricing pressures, assured that no competitor would capture the commercial value of what it invented, and dedicated to the long term. It is Exhibit "A" against the canard that large, bureaucratic, government-subsidized companies protected from foreign competition can't innovate. (This is not to say that these characteristics are positive goods in their own right, but it does rather suggest that the true determinants of industrial dynamism often lie outside *laissez faire* clichés.)⁷⁰⁴

The semiconductor industry was a massive beneficiary of infant-industry subsidies from the start. As it hatched and grew in the late 1950s and early 1960s, close to 100 percent of its output was bought by the military,⁷⁰⁵ which needed expensive high-performance semiconductors for uses like missile guidance systems at a time when most consumer electronics still ran on vacuum tubes. Even as late as 1968, the Pentagon bought nearly 40 percent of the semiconductors produced in the U.S.⁷⁰⁶ Military demand enabled companies to stake their risky investments at a time when nobody else would buy their expensive cutting-edge technology.⁷⁰⁷ It enabled them to build the expertise that was later applied to civilian markets and achieve the scale economies needed to bring costs down into the range affordable for mass consumption.

Aviation is another example of the dependence of America's most successful industries on industrial policy. The entire 7x7 series of Boeing planes derives from the 707 launched in the late 1950s, which was the civilian twin of the KC-135 aerial-refueling plane built for the Air Force. Boeing actually *lost* money on its commercial aircraft operations for the first 20 years.⁷⁰⁸ To give further examples of the military lineage that made U.S. civil aviation possible:

Lockheed sold commercial versions of its C-130, C-141, and C-5A. [The Lockheed L-1011, McDonnell-Douglas DC-10] and Boeing 747 were all spawned by technical advances on the engines used for the C5-A. In short, every generation of the new civilian air transport has relied heavily on technology developed for the military.⁷⁰⁹

Other industries have been born from U.S. government industrial policy. The latest, of course, is the Internet, which derives from the military ARPANET built to enable communications between computers used for defense research. Even Google, the ultimate better-mousetrap free-market

success story, was based on research done by founders Larry Page and Sergey Brin at Stanford while supported by a National Science Foundation grant to research digital libraries.⁷¹⁰ And the biotech industry has been incubated by, and has depended upon basic research funded by, the National Science Foundation and the National Institutes of Health.

Unfortunately, if present trends continue, America's harvest from federally funded industrial policy will inexorably diminish. Even the military itself is now lagging. According to John Young, former head of the Pentagon's Advanced Technology and Logistics division:

The [Defense] Department is coasting on the basic science investments of the last century and is losing the force multiplier advantage conferred by harvesting those investments. The last 15 years (since the demise of the Soviet Union) have seen the Department pull back substantially from many science areas. Yet, scientific knowledge is the underpinning of the current U.S. capability overmatch in most areas.⁷¹¹

It seems Sputnik did us a bigger favor than we knew! The need to beat the Soviet Union appears to have been *the* decisive factor in disciplining the U.S. government to pursue an effective industrial policy, and when the Cold War ended, serious industrial policy seems to have ended with it.

During the final push of the Cold War under President Reagan, the Defense Intelligence Agency and CIA created Project Socrates, whose purpose was to understand America's declining economic and technological competitiveness and develop industrial policies in response. But just as this project was nearing fruition, the Berlin Wall came tumbling down. President Bush was ideologically hostile to industrial policy and systematically destroyed the project.⁷¹² He had Defense Advanced Research Projects Agency (DARPA) director Craig Fields reassigned and ordered all records of the project destroyed to frustrate Freedom of Information Act requests.⁷¹³ Thus died what should have been the crowning achievement of Cold War industrial policy: a systematic codification of its economic insights. Ironically, some of the key staff of this project have since worked on economic strategy for foreign nations like Poland and Malaysia, which have diligently used this knowledge to compete with the U.S.

With the end of the Cold War, even the most basic elements of purely military industrial policy began to get short shrift. For one thing, the Pentagon ceased to care very much about buying American. In the words of

then-Secretary of Defense Dick Cheney, a key figure in this shift, policies favoring American defense producers "raise questions about my spending money on things I could get cheaper elsewhere, and it raises the specter of having to rely upon less than first-rate technology in certain areas."⁷¹⁴ Thanks to nearly two decades of such policies, the U.S. is now unable to put a single military aircraft into the sky without using components made by potential adversaries. As a 2005 Defense Department report put it:

The potential effects of this restructuring are so perverse and far reaching and have such opportunities for mischief that, had the United States not significantly contributed to this migration, it would have been considered a major triumph of an adversary nation's strategy to undermine U.S. military capabilities.⁷¹⁵

The Pentagon is now facing a rash of counterfeit electronic components in military systems, which lays the U.S. open to the kind of deliberate sabotage we have ourselves employed against adversaries such as Saddam Hussein.⁷¹⁶ We also now face politically motivated refusal of foreign suppliers to provide needed components. The best known case is a Swiss company, Micro Crystal AG, which refused to supply piezoelectric timing crystals for the guidance system of the Joint Direct Attack Munition (JDAM) smart bomb at the time of the Iraq war.⁷¹⁷ (One surviving American company was found.) The military is not unaware of this problem, but is hamstrung by the political power of defense contractors, who find outsourcing parts very profitable.⁷¹⁸

INDUSTRIAL POLICY IN REVERSE: DEINDUSTRIALIZATION

Deindustrialization is a more complex process than is usually realized. It is not just layoffs and crumbling buildings. It is, in fact, *industrial policy in reverse*. As a result, understanding industrial policy helps illuminate the complex way in which industries die.

When American producers are pushed out of foreign and domestic markets, it is not just immediate profits that are lost. Declining sales undermine their scale economies, driving up their costs and making them even less competitive. Less profit means less money to plow into future technology development. Less access to sophisticated foreign markets means less exposure to sophisticated foreign technology and diverse for-

eign buyer needs.⁷¹⁹ When an industry shrinks, it ceases to support the complex web of skills, many of them outside the industry itself, upon which it depends. These skills often take years to master, so they only survive if the industry (and its supporting industries, several tiers deep into the supply chain) remain in continuous operation. The same goes for specialized suppliers. Thus, for example, in the words of the *Financial Times's* James Kynge:

The more Boeing outsourced, the quicker the machine-tool companies that supplied it went bust, providing opportunities for Chinese competitors to buy the technology they needed, better to supply companies like Boeing.⁷²⁰

Similarly, America starts being invisibly shut out of future industries which struggling or dying industries would have spawned. For example, in the words of tech CEO Richard Elkus:

Just as the loss of the VCR wiped out America's ability to participate in the design and manufacture of broadcast video-recording equipment, the loss of the design and manufacturing of consumer electronic cameras in the United States virtually guaranteed the demise of its professional camera market....Thus, as the United States lost its position in consumer electronics, it began to lose its competitive base in commercial electronics as well. The losses in these related infrastructures would begin to negatively affect other downstream industries, not the least of which was the automobile....*Like an ecosystem, a competitive economy is a holistic entity, far greater than the sum of its parts.*⁷²¹ (Emphasis added.)

Free market economics systematically denies this greater-than-the-sum-of-its-parts aspect of the economy, as it assumes on principle that every part of the economy is always correctly priced by the market, rendering impossible any holistic effects in which the whole is worth more than their sum. The fruits of this reductionist way of thinking are visible all over the U.S. economy today.

For example, the U.S. is today inexorably losing the position in semiconductors it built up with past industrial policy. This is visible in declining plant investment relative to the rest of the world. In 2009, the whole of North America received only 21 percent of the world's investment in semiconductor capital equipment, compared to 64 percent going

to China, Japan, South Korea, and Taiwan.⁷²² The U.S. now has virtually no position in photolithographic steppers, the ultra-expensive machines, among the most sophisticated technological devices in existence, that "print" the microscopic circuits of computer chips on silicon wafers. America's lack of a position in steppers means that close collaboration between the makers of these machines and the companies that use them is no longer easy in the U.S. This collaboration traditionally drove both the chip and the stepper industries to new heights of performance. American companies had 90 percent of the world market in 1980, but have less than 10 percent today.⁷²³

The decay of the related printed circuit board (PCB) industry tells a similar tale. An extended 2008 excerpt from *Manufacturing & Technology News* is worth reading on this score:

The state of this industry has gone further downhill from what seems to be eons ago in 2005. The bare printed circuit industry is extremely sick in North America. Many equipment manufacturers have disappeared or are a shallow shell of their former selves. Many have opted to follow their customers to Asia, building machines there. Many raw material vendors have also gone.

What is basically left in the United States are very fragile manufacturers, weak in capital, struggling to supply [Original Equipment Manufacturers] at prices that do not contribute to profit. The majority of the remaining manufacturers should be called 'shops.' They are owner operated and employ themselves. They are small. They barely survive. They cannot invest. Most offer only small lot, quick-turn delivery. There is very little R&D, if any at all. They can't afford equipment. They are stale. The larger companies simply get into deeper debt loads. The profits aren't there to reinvest. Talent is no longer attracted to a dying industry and the remaining manufacturers have cut all incentives.

PCB manufacturers need raw materials with which to produce their wares. There is hardly a copper clad lamination industry. Drill bits are coming from offshore. Imaging materials, specialty chemicals, metal finishing chemistry, film and capital equipment have disappeared from the United States. Saving a PCB shop isn't saving anything if its raw materials must come from offshore. As the mass exodus of PCB manufacturers heads east, so is their supply chain.

It's the big picture that needs to be looked into. There isn't one single vertically integrated North American shop that could independently supply a circuit board. Almost every shop stays in business supported solely by revenues from 'brokering' Asian boards.⁷²⁴

All over America, other industries are quietly falling apart in similar ways. Losing positions in key technologies means that whatever brilliant innovations Americans may dream up in small start-up companies in future, large-scale commercialization of those innovations will increasingly take place abroad. A similar fate befell Great Britain, which invented such staples of the postwar era as radar, the jet passenger plane, and the CAT scanner, only to see huge industries based on each end up in the U.S.

America's increasingly patchy technological base also renders it vulnerable to foreign suppliers of "key" or "chokepoint" technologies. These, though obscure and of small dollar value in themselves, are technologies without which major other technologies cannot function.⁷²⁵ For example, China recently restricted export of the "rare earth" minerals required to make advanced magnets for everything from headphones to electric cars. Another form this problem takes is the refusal of oligopoly suppliers to sell their best technology to American companies as quickly as they make it available to their own corporate partners.⁷²⁶ It doesn't take much imagination to see how foreign industrial policy could turn this into a potent competitive weapon against American industry. For example, Japan now supplies over 70 percent of the world's nickel-metal hydride batteries⁷²⁷ and 60-70 percent of the world's lithium-ion batteries.⁷²⁸ This will give Japan a key advantage in electric cars.

IMPOSSIBLE NOT TO HAVE AN INDUSTRIAL POLICY

Because of the myriad impacts that government decisions have upon industries, there is no option of "not having" an industrial policy. There is only good and bad industrial policy. In the words of James C. Miller III, chairman of the Federal Trade Commission under Reagan, "Any discussion of industrial policy should begin with recognition that we have one. The issue

is what type."⁷²⁹ A nation that refuses to have a conscious industrial policy will still have a de facto industrial policy because the sum of its short-term tactical choices will amount to a long-term strategic choice whether intended or not.

If nothing else, the brute fact of foreign mercantilism means that the option of genuinely free trade has long since been taken away from us. In the words of Laura D'Andrea Tyson:

We must not be hoodwinked by the soothing notion that, in the absence of U.S. intervention, the fate of America's high-technology industries will be determined by market forces. Instead, they will be manipulated by the trade, regulatory, and industrial policies of our trading partners.⁷³⁰

Free trade and the absence of deliberate industrial policy are not neutral choices, free of government interference; they are *positive strategic bets in their own right*, which will only pay off if their key underlying economic assumption is true: pure free markets, at home and abroad, are always best. Taking an ideological stand against "central planning" misses the point, because the central planning that has rightly disgraced itself is *socialist* central planning, something entirely different. Similarly, ideological fulmination against "government picking winners" misunderstands the role that federal support plays. As Michael Borrus, founding general partner of the Silicon Valley venture capital firm X/Seed Capital, explains, referring to the National Institute of Science and Technology's Advanced Technology Program:

ATP is sometimes labeled with the profoundly misleading and profoundly misinformed characterization of 'picking winners and losers.' That is, frankly, flat wrong. No investor, private or public, picks winners and losers in technology innovation. Rather, it is the market (customers) that does the picking. By contrast, with ATP and other federal technology programs, the government is really helping to plant long-term technology seeds in areas of private market failure or acute public need. Some of those technology seeds will sprout, others will not. But the planting, the activity as a whole, must go forward if long-term economic gains are to be effectively harvested.⁷³¹

Opponents of industrial policy claim to oppose all industrial policy, but actually only oppose varieties they disapprove of. Despite the laissez faire myth that industrial policy was discredited with the end of the Cold War, worldwide, as Dani Rodrik explains:

The reality is that industrial policies have run rampant during the last two decades—and nowhere more than in those economies that have steadfastly adopted the agenda of orthodox [free market] reform. If this fact has escaped attention, it is only because the preferential policies in question have privileged exports and foreign investment—the two fetishes of the Washington Consensus era—and because their advocates have called them strategies of ‘outward orientation’ and other similar sounding names instead of industrial policies.⁷³²

Export processing zones are one example of this industrial-policy-by-another-name. These receive duty-free access to raw material and component inputs, tax holidays on corporate, personal, and property taxes, exemption from usual regulations (including labor laws), and subsidized infrastructure. Another example is the wide array of subsidies, ranging from tax advantages to one-stop-shop help navigating local bureaucracy, given to encourage foreign direct investment (FDI).

Meanwhile, the federal government continues to stick its head in the sand. For example, it allowed the SEMATECH semiconductor research consortium to be effectively dismantled in 1996 by opening it up to foreign manufacturers.⁷³³ The competitive difficulties of the American semiconductor industry in the late 1980s were treated as a one-off anomaly requiring merely tactical intervention, rather than as a symptom, destined to be repeated, of the difficulties experienced by an American industry trying to compete on its own against foreign industries backed by effective state industrial policy. America’s tax credit for research and development, once the world’s most generous, is now surpassed by 17 other nations.⁷³⁴ This is despite the fact that, according to one rigorous 1988 study:

A substantial gap exists between the private and social returns [to R&D] despite the availability of patents. The social rate of return is between 50 and 100 percent, so to be conservative we will say that the excess return to R&D is 35 to 60 percent above the return to ordinary capital.⁷³⁵

The George W. Bush administration abolished the only program specifically designed to increase the competitiveness of American industry by funding development of technologies that the private sector would not fund on its own: the aforementioned Advanced Technology Program. Free market ideologues repeatedly tarred this program as corporate welfare despite the fact that an audit by the respected National Academy of Sciences vindicated its claim to generate economic benefits far exceeding its cost.⁷³⁶ One single \$5.5 million grant, for example, seeded development of the small disk drive industry, which enabled creation of the iPod, the iPhone, TiVo and the Xbox.⁷³⁷ It was replaced by an alternative carefully trimmed to avoid such accusations: the Technology Innovation Program. This program is well run, but pitifully underfunded at a mere \$65 million per year.⁷³⁸

The Obama administration has proved only slightly better than the Bush administration. Although not blinded by an ideological fetish for free markets, its priorities for allocating serious money are decidedly elsewhere. Thus the giant stimulus package it passed in 2009 included money for every Congressional pork barrel under the sun, but nothing for one of the industrial-policy programs with the best track record of saving and creating jobs, the Manufacturing Extension Partnership,⁷³⁹ despite a campaign promise to double the program’s funding.⁷⁴⁰ This program maintains a network of centers in every state designed to help American manufacturers adopt innovative technologies. One evaluation found that it generated \$1.3 billion a year in cost savings for manufacturers and \$6.25 billion in increased or retained sales, all for an annual federal outlay of only \$89 million.⁷⁴¹

As a result of America’s neglect of industrial policy, there is a starvation of basic and applied research in areas such as biocomputing, computer architecture, software, optoelectronics, aeronautics, advanced materials, factory automation, sensors, energy conversion and storage, nanomanufacturing, and robotics. The U.S. will pay a serious price for this in the decades ahead. By following, rather than shaping, our comparative advantage, we are heading for industrial decline.