There is nothing more important than getting supper on the table. Well might agriculture affect one-third of the earth’s land surface, more than any other human enterprise. It also affects the entire planetary ecosystem through the recent intensification of farming practices. Higher harvests have been achieved by means of more irrigation, pesticides, and chemical fertilizers, among other methods of modernized farming, and these measures have been widely fostered by subsidies. Many, if not most, and possibly all such subsidies appear to be costly to the economy and are often harmful to the environment, especially the natural-resource base that underpins agriculture. For instance, pesticides and chemical fertilizers severely contaminate water supplies; short-rotation cropping and reduced fallows exacerbate soil erosion; high-yielding monocultures cause genetic wipe-out among old varieties of food plants; land clearing for agriculture is the largest single cause of deforestation; and many agricultural activities release greenhouse gases.¹

What is the rationale for agricultural subsidies? Why should farmers need a helping hand at all from the government? There are several arguments. First is that governments consider it a prime responsibility to keep their citizens fed, so they feel duty bound to support
farmers. Second, farmers worldwide have often been among the poorer segments of society, so they have been thought to deserve “a little extra.” This applies especially in developing countries, where farmers generally form the majority of the population and governments are keen to keep them in favor. Third, and again in developing countries, many subsidies have been justified in times past as vital foundations of the Green Revolution; they enabled the one-third expansion of irrigated lands and the tripling of fertilizer use, thus helping to double crop yields. Overall, subsidies aim to guarantee food supplies, to keep farm prices stable, to maintain farming as a vibrant economic sector, and to support rural communities.

For all these reasons, financial support of agriculture has become an ancient and entrenched tradition in countries around the world. Farmers have become extremely powerful politically, leaving governments with the impression that to reduce agricultural subsidies would be to forfeit a pivotal part of the electorate. Remarkably enough, New Zealand, which is more dependent on agriculture than any other developed country, has grasped the nettle, with success for the government, farmers, the economy, and the environment (see the discussion later in this chapter).

Agricultural subsidies come in many shapes and sizes. As well as the obvious practice of encouraging farmers to use more inputs (fertilizers, pesticides, irrigation, machinery, etc.), subsidies can simply boost farm income by means of price supports. Less directly, they can facilitate marketing of crops by enhancing transportation networks. They can relieve weather problems and other risks by providing insurance. They can foster credit flows. They can stimulate conversion of wetlands to agriculture. Governments North and South do much to subsidize artificial pesticides and fertilizers. In developed countries, governments typically guarantee minimum prices for crops at levels above the market; in developing countries, governments primarily suppress farm prices in order to keep city communities supplied with cheap food.

This last indicates the technical differentiation between producer and consumer subsidies. The Organisation for Economic Co-operation and Development (OECD) defines the first in terms of producer support estimates (PSEs), being “an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate, arising from policy measures which support agriculture.” These PSEs totaled $274 billion in OECD countries in 1998, or $210 per hectare of agricultural land (Figure 3.1).3
Certain of these subsidies are well and good within particular perspectives. Not so justifiable are subsidies fostering crops grown in regions that would not have grown them at all had a free market existed. Notable examples are ultra-thirsty crops such as alfalfa and rice in California’s desertlands. Also irrational are those many subsidies that may have made sense when they were first established but have since become obsolete or bloated, or both. In the European Union countries, for instance, excess production has led to milk and wine lakes and butter and beef mountains (not to mention a manure mountain in the Netherlands). In early 1993, cereal surpluses of 30 million tonnes (metric tons) would have been enough to provide an Italian-style diet to 75 million people for one year. Taxpayers footed the bill to supply the subsidies that boosted these crops in the first place, and then they paid again to store or even dispose of the excess stockpiles. Much the same has applied to extravagant food surpluses in the United States, where in a typical year of the early 1990s, the Department of Agriculture obliged farmers to squander 1 billion oranges, 500 million lemons, 100,000 tonnes of raisins, and 30,000 tonnes (metric tons) of almonds.

Subsidies generate absurd outcomes in other ways too. Many countries pay their farmers to leave land fallow, whereupon they subsidize them to engage in directly conflicting activities, for example, to plant crops and practice fallowing simultaneously. Or consider the travels, if not the travails, of materials needed to make the daily 150 grams of yogurt beloved by many German consumers. To reach one of the main distribution outlets in southern Germany, ingredients are transported from all around the country and even from the Netherlands and Poland. To do the job, a theoretical truck must travel 3,500 kilometers. It is enabled to do so in part by bountiful subsidies from the European Union’s Common Agricultural Policy. Much more efficient in both economic and environmental terms would be for yogurt producers to utilize local ingredients, but they have no incentive to do so as long as subsidized supplies can apparently do the job more cheaply.

In still more extreme fashion, four airports in Japan have been dedicated to transporting vegetables and flowers, to be followed by another five costing almost $30 million in subsidies. To fly 1 kilogram of green onions from Ono, on northeastern Kyūshū Island, to Tokyo costs nearly six times as much as to transport them by road. The airports, paid for entirely by taxpayers, have been built ostensibly to integrate isolated farming communities into the Japanese agro-economy—and, more realistically, they have served as a sop to the farming lobby after it made concessions to the Japanese government’s negotiations for the 1993 Uruguay Round on world trade.

Numerous countries feature inappropriate subsidies for grains, beef, mutton and lamb, pork, poultry, milk and other dairy products, fruits, vegetables, cotton, oilseed, and tobacco, among a host of other agricultural products. So large and widespread are these subsidies that, as we shall see in detail later in the chapter, agriculture has become one of the most distorted and distorting sectors of the global economy.

In addition to economic dislocations, subsidies cause much environmental injury. Pesticides under conventional application regimes cause well-known hazards to human health even as they undermine their own usefulness. Excessive applications of nitrogenous fertilizers lead to washed-off nitrates contaminating drinking water supplies, with threats to human health. Intensified farming with heavy machinery aggravates soil erosion, as does the decline of crop rotation. Irrigation agriculture is far and away the largest user of water worldwide, and subsidies encourage farmers to misuse and overuse water on a grand scale, despite the growing evidence of sizeable water shortages impending, as examined in more detail in Chapter 6. Many agricultural activities contribute to global warming through emissions of carbon dioxide from use of fossil fuels, methane from ruminant livestock and rice paddies, and nitrous oxides from disturbed soils. These environmental externalities are widespread and unusually significant, and they merit detailed examination later in this chapter.

The Subsidies Phenomenon

In 1998, net financial transfers to agriculture in OECD countries amounted to $362 billion per year, rather higher than in 1996–1997. These subsidies exerted a profound influence not only on the agriculture sector but also on the economy at large. They equated to 1.4 percent of the collective GDPs of twenty-nine OECD countries; 1.4 percent of the European Union’s GDP; 1.5 percent of Japan’s; 1.9 percent of Norway’s; 2 percent or more of Switzerland’s and Poland’s; 5.4 percent of South Korea’s; and 10.7 percent of Turkey’s (Table 3.1).

Roughly $275 billion, over three-quarters of the subsidies, were producer supports. These producer supports were sizeable for individual farmers. In 1998, the OECD average was around $11,000; in the United States and the European Union, $19,000; in Japan, $21,000; and in Switzerland, $33,000 (though in New Zealand, the
Table 3.1. Total Supports to OECD Agriculture, 1998

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Subsidies ($ Billion)</th>
<th>Subsidies as Percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union (15 countries)</td>
<td>142</td>
<td>1.4</td>
</tr>
<tr>
<td>United States</td>
<td>97</td>
<td>1.2</td>
</tr>
<tr>
<td>Japan</td>
<td>57</td>
<td>1.5</td>
</tr>
<tr>
<td>Turkey</td>
<td>23</td>
<td>10.7</td>
</tr>
<tr>
<td>South Korea</td>
<td>16</td>
<td>5.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>6</td>
<td>2.4</td>
</tr>
<tr>
<td>Mexico</td>
<td>6</td>
<td>1.4</td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
<td>0.7</td>
</tr>
<tr>
<td>Poland</td>
<td>4</td>
<td>2.8</td>
</tr>
<tr>
<td>Norway</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Australia</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td>OECD (29 countries)</td>
<td>362</td>
<td>1.4</td>
</tr>
</tbody>
</table>


The payments amounted to 24 percent of farmers’ revenues in the United States, 17 percent in Canada, 35 percent in the European Union, 67 percent in Japan, and 112 percent in Norway, with an average of 42 percent in OECD countries as a whole (though only 7 percent in Australia and 0.8 percent in New Zealand).¹ They were sizeable too for consumers because of increased food prices as well as taxes. In the United States, the burden of total support to agriculture amounted to $363 per citizen; in the European Union, $381; in Norway, $641; in Switzerland, $879; and in Japan, $449 (contrast this with Australia, at only $92, and New Zealand, at $26, both of these countries having eliminated most of their subsidies).¹⁰ For further details, see Tables 3.1 and 3.2 and Figure 3.2.

Later in this chapter, we shall look at how many of these agricultural subsidies can be considered perverse. As an interim example of subsidies that are plainly bad news for both the economy and the environment, see Box 3.1, on sugar subsidies in Florida.

United States

The United States is the foremost food producer in the world. Each year, the country exports one-third of its agricultural products, for
revenues of more than $55 billion (which help it pay for its $60 billion worth of oil imports). But there is a price to pay for this vibrant activity: in 1998, American taxpayers underpinned agriculture to the tune of $74 billion in subsidies, and American consumers contributed $25 billion through higher food prices. Per farmer and per farm hectare, U.S. agriculture is among the most strongly supported in the world, surpassed only by such super-supportive countries as Japan, Norway, and Switzerland. Or, rather, U.S. agriculture receives some of the strongest supports in the world; whether that is supportive of the agriculture sector and the U.S. economy overall or of the environmental underpinnings of agriculture is another story.

As mentioned, production supports amounted to about one-quarter of farm revenues, or an average of $19,000 per farmer. The main purposes of these subsidies are to ensure acceptable and stable prices for crops and other produce and to safeguard the farming community in the United States, especially the family farms and their workforces. These two sets of values seemed to be at exceptional risk during the Great Depression, whereupon the New Deal legislation of the early 1930s saw to it that “no sector of the economy received more systematic federal attention than agriculture; and none received more subsidy for research and development, more technical assistance, more public investment in education, in electrification and in infrastructure, more price stabilization, more export promotion, more credit, and more mortgage relief.”

In any case, farming had traditionally been seen as a risky enterprise. Crops could be destroyed by insect pests, diseases, and bad weather, and prices were subject to marketplace swings and demand changes. All the more reason, then, for prices to be supported and stabilized by government subsidies—thereby shifting a lot of the risk from the farmer to the taxpayer. When risk was reduced, however, food production was stimulated, usually leading to bulging food surpluses, which in turn caused prices to drop, leading to the need for further price supports. And so on and so repetitiously forth. The basic principles have not changed much today.

In practice, however, things have worked out differently. Whereas the early 1930s saw rural incomes 60 percent below urban incomes, today’s full-time farmer (often a millionaire) may have a net worth
more than ten times that of the average American household. But the modern farmer is far from the family farmer of tradition. Although there are still 350,000 American farms receiving federal farm handouts, almost 30 percent of subsidies go to the top 2 percent, and over four-fifths go to the top 30 percent (5 percent of subsidies go to farmers with annual incomes of over $1 million).15 Ironically, if the U.S. government were to shift its target from the top 30 percent to the bottom 70 percent of farmers, it could save at least $8 billion a year while supplying a competitive boost to lower-income farms.16 As it is, the small-scale farmer has long been under the squeeze. At the start of the twentieth century, the farm population made up 43 percent of the U.S. population, and in 1950 it share was 12 percent, but today it has slumped to well under 2 percent. Because farm payments are based on the production of crops and livestock rather than on the means of production, most subsidies are paid to a few top-bracket farmers. So the decline in numbers of farmers reflects the tendency for subsidies to support crops rather than farmers.17

Increasingly, U.S. agriculture has become the province of bigger and more efficient farmers, who no longer run farms but now operate agribusinesses. Farmland ownership has become highly concentrated: just 124,000 owners hold half of all farmlands, and 86 percent of farms are now small or part-time operations, earning less than 5 percent of all net farm income. At the other extreme, 5 percent of all farms enjoy sales of more than $200,000 per year, pulling in 84 percent of net farm income.18

U.S. farm subsidies should have been cut back somewhat in recent years following implementation of the 1996 Farm Bill, but in 1998 total supports were still higher than in the late 1980s, and they can still be viewed as public policy headed down a blind alley. Although intended to stimulate the production of food in general, they induce farmers to plant too much of what is subsidized and too little of the rest. Overproduction of subsidized items drives down prices, whereupon more subsidies are required to compensate farmers. Raised prices undermine farm exports, whereupon exports too have to be subsidized. There is a further whammie: the consumers hardest hit are the poorest people, the ones who spend proportionally the most on food.

Many farmers protest that without subsidies, they would have to quit. This brings us to the next vexing question, that of farm jobs—and another focus of subsidies insofar as they are supposed to safeguard jobs. Today, it is efficiency rather than subsidies that determines whether farm jobs go. As in other OECD countries where subsidies are overly generous, that is to say, Japan, Norway, and those in the European Union, it is the least efficient American farms that are losing the most jobs. By contrast, reduced subsidies and farming efficiency in New Zealand have done much to keep farmers down on the farm.

Subsidies are bad news not only for the U.S. economy but also for the U.S. environment (and even the planetary ecosystem via global warming).19 Again, this is due to the overwhelming emphasis on ever more production. (By contrast, subsidies ignore or even discourage low-input and organic farming, which are more environmentally benign.) Subsidies encourage farmers to apply excessive amounts of synthetic pesticides and fertilizers, with widespread pollution of water stocks; indeed, this is one of the main forms of non-point-source water pollution (taxpayers then pay to clean up the rivers and lakes). Water stocks, and especially groundwater supplies such as the Ogallala Aquifer, are also being grossly depleted by intensified agriculture; farmers and ranchers account for two-fifths of all water withdrawals in the United States.20 Subsidies contribute to a reduction in wildland habitat and therefore in biodiversity. Nitrogenous fertilizers and flatulent cattle release greenhouse gases.21

Perhaps most important of all, subsidy regulations serve to reduce if not eliminate crop rotations. Crop-support programs have locked farmers into planting the same crops on the same land year after year. If soil fertility declines, that can be overcome by adding more subsidized fertilizer. This stimulates soil erosion to the extent that it offsets all soil conservation programs put together. Soil erosion is aggravated too by the trend toward bigger farms with fewer shelter-belts and increased use of heavy machinery. One-third of original topsoil in the United States has already been eroded away, and another 4.5 billion tonnes are lost every year (albeit only 6 percent and perhaps as little as 2 percent of the global erosion total, lost from 11 percent of the world’s agricultural lands). On-site costs comprise loss of plant nutrients, moisture, and soil depth, whereas off-site costs consist mostly of siltation of downstream water bodies, plus associated flooding. Both sets of costs together amount to $44 billion per year, increasing production costs by about 25 percent.22

Most of the above applies to arable crops, but some of it relates to livestock as well, especially on federal lands in the eleven western states, which make up one-third of “the West.” Over 20 million beef cattle roam 2 million square kilometers, with 100,000 ranches producing less than one-fifth of the country’s beef. Yet ranchers using federal lands have long paid less than one-third of the average pri-
vate-land rate. American taxpayers have been subsidizing ranchers to overgraze these rangelands at a charge of just $1.61 per cow per month, less than it costs to feed a cat. Comparable private lands bring in an average grazing fee of $10 per cow per month. These low grazing fees cost the U.S. treasury over $50 million a year—and the entire federal grazing program, including taxpayer-funded predator control, emergency feed, and cheap water, costs Americans at least $500 million a year (without counting the cost of degraded grasslands, eroded soil, muddied streams, trampled vegetation, and runoff of scarce water). Overgrazing has caused as much as 85 percent of public rangelands to lose their productivity, thanks to "socialized ranching" on the part of welfare cowboys. Overall, the cost of federal grazing permits is some $4 billion.\textsuperscript{23}

On top of economic inefficiency, there is social inequity. Many of the biggest ranches are financially marginal sideline investments by wealthy enterprises. Half of the rangelands are utilized by just 2 percent of all permit holders, these being grand-scale operators who make a fortune from the taxpayer. They include four billionaires, several oil companies, an insurance company, a California utility, and a major brewery.\textsuperscript{24}

Subsidies are also bad news for people's health. The American Public Health Association has estimated that Americans could slash their medical costs by $17 billion a year if they were all to cut their daily intake of fat by just 8 grams, the amount in half a cup of premium ice cream. The U.S. food industry spends $30 billion a year on advertising to persuade consumers to eat more, whereupon the same consumers spend $33 billion trying to rid themselves of the inevitable effects.\textsuperscript{25} There were some 400,000 liposuctions in the United States in 1998, at a cost of at least $2,000 apiece.\textsuperscript{26}

In summary of U.S. subsidies, note a recent critique:

The government subsidizes agricultural production and agricultural non-production alike, also agricultural destruction and agricultural restoration. [It] subsidizes cattle grazing on western rangelands while it also pays for soil conservation. The government subsidizes energy costs so that farmers can deplete aquifers to grow alfalfa to feed cows that make milk that is stored in warehouses as surplus cheese that does not feed the hungry.\textsuperscript{27}

All OECD Countries
In addition to the United States's subsidies of $97 billion in 1998, there were $142 billion on the part of the European Union, $57 billion by Japan, and $66 billion by other OECD countries.\textsuperscript{28} This makes a total of $362 billion, say $360 billion. For details, see Table 3.1.

Non-OECD Countries
Subsidies are pervasive in non-OECD countries too, though not nearly on the same scale. As in OECD countries, they include both producer and consumer subsidies, generally with emphasis on the latter. In fact, agriculture is often taxed to keep consumers, and especially urban consumers, content by, for example, fixing retail food prices or imposing ceilings on producer prices. Price interventions include direct regulation; state trading; tariffs, both fixed and variable; and restrictions such as discretionary import and export licenses.

As for producer subsidies, governments often support farm credit programs and salient agricultural inputs such as fertilizer. Fertilizer use worldwide and particularly in developing countries increased by 40 percent per unit of farmland between the mid-1970s and the late 1980s. In Indonesia, for instance, fertilizer subsidies constituted 2.0 percent of government spending in 1989 (though greatly reduced today), and in India, 3.6 percent.\textsuperscript{29} Producer subsidies also protect farmers through restrictions or tariffs on imported food. The net effect has generally been a huge income transfer out of agriculture.\textsuperscript{30}

Consider the experience of India. Increasingly, subsidies have been allocated to inputs such as water, irrigation, fertilizers, pesticides, farm credit, and electricity (mainly for irrigation pumps). By contrast, relatively few subsidies go to non-input factors such as agronomic research, extension services, rural roads, and soil conservation. The share of input subsidies in public expenditures increased from 44 percent in the early 1980s to 83 percent by 1990. As a measure of the expected deceleration in productivity due to declining support for research and rural infrastructure, plus lack of attention to problems such as soil erosion, salinization and waterlogging, and loss of organic nutrients, the demand for cereals is projected to exceed production by 23 million tonnes by 2020, double the largest gap to date.\textsuperscript{31} Of course, the gap will be primarily due to the increase in both human numbers and human demands, the latter arising as newly affluent people eat higher on the food chain. Yet despite heavy input subsidies, Indian agriculture is effectively taxed through artifi-
cially low prices and high foreign exchange rates. If these basic policies were corrected, there would be next to no need for subsidies at all—as is the case in many other developing countries.32

Consumer and producer subsidies together in developing countries accounted for almost 5 percent of annual government spending during the past twenty-five years—a large slice indeed. In Zambia, for instance, they soared to 17 percent of the government budget in the late 1980s.33 Overall, however, subsidies are small compared with those in the OECD countries. A recent estimate proposed a figure of $10 billion per year.34 This is not so much a cautious and conservative estimate as a gross underestimate.35 India subsidized fertilizer alone to the tune of $2.9 billion in 1999/2000.36 For want of anything better, the authors posit a minimalist total for non-OECD countries of $2.5 billion but believe that a more realistic guesstimate would be at least $50 billion.

The Environmental Resource Base

The environmental resource base underpinning agriculture is being widely degraded by a variety of farming practices.37 Much of this degradation can be ascribed in part, at least, to agricultural subsidies that foster overexploitative agriculture.38

Consider soil erosion. During the past twenty years, some 500 billion tonnes of topsoil have been eroded away, an amount roughly equivalent to all the topsoil in India’s croplands. Currently, between 25 billion tonnes39 and 75 billion tonnes40 of topsoil are lost each year, two-thirds of it from agricultural lands. During the past forty years, at least 4.3 million square kilometers of croplands were abandoned because of soil loss, an expanse equivalent to 30 percent of today’s croplands.41 Without better soil-conservation practices, between 1.4 million and 2.0 million square kilometers (the smaller expanse is equal to Alaska) will lose most of their good-quality soil over the next two decades—and this will apply in parts of Indiana and India alike.42 If soil erosion is allowed to continue virtually unchecked, it could well cause a decline of 19–29 percent in food production from rain-fed croplands during the twenty-five-year period 1985–2010.43

The on-site costs of soil erosion are borne by farmers themselves, so they are not considered to be a cost pushed off onto society and hence a hidden subsidy. Of course, the loss of cropland productivity results in higher food costs for consumers, so to that extent society eventually pays part of the on-farm cost. In the longer run, moreover, soil erosion will impose much bigger costs on society if, without enough topsoil, the world finds itself unable to grow enough food: that would be an externality indeed. Let us limit the calculation, however, to costs borne by off-farm society, these being costs that sooner or later must be picked up by the public at large. Upshot: soil erosion costs are an implicit subsidy from society to farmers. According to recent research,44 the off-farm costs worldwide can be put at $150 billion per year, just under two-fifths of total costs.

There are other societal costs of intensified agriculture, and these too can be considered as implicit subsidies from society to farmers. They include health hazards from runoff of nitrogenous fertilizer polluting public water supplies.45 In China, for instance, nitrogenous fertilizer is applied to croplands at rates as high as 1.9 tonnes per hectare per year, and the amount of fertilizer actually taken up by plants is only about 40 percent. As a result of fertilizer washoff, more than half of local groundwater stocks are contaminated above the tolerance level. The same fertilizers cause much eutrophication of water bodies such as lakes and rivers.46 The costs in China remain unquantified economically, but in the United States, runoff of agricultural chemicals causes an annual $9 billion worth of damage to surface waters.47

Another chemical additive, pesticides, can be considered as a final environmental externality. The annual average for global sales of pesticides in the mid-1990s was $30 billion.48 Many governments, especially in the developing world, which accounts for one-third of all pesticide use, give outright subsidies for pesticides. The average is 50 percent, within a range of 15–90 percent.49

Apart from direct subsidies for pesticides, there is a host of indirect subsidies, including below-market interest rates for loans from state-controlled banks, reduced prices for imported chemicals due to overvalued exchange rates, and tax advantages to agrochemical companies for the import and sale of pesticides.50 These too remain economically unquantified for the most part.

The United States, which has used pesticides longer than developing countries, now applies ten times more insecticides than in 1945; meanwhile, crop losses to insects have almost doubled due a host of factors, including the pesticide-induced demise of pests’ natural enemies and the capacity of insect pests to adapt evolutionarily to pesticides (“every pesticide selects for its own failure”). Since 1965, the number of species resistant to common pesticides has risen from 182 to more than 900.51 (Figure 3.3). Pests now destroy 40 percent of crops worldwide, a proportion that is probably higher than before pesticides were widely introduced, in the late 1940s.52
American farmers use pesticides worth $6 billion per year, one-fifth of the global total of some $30 billion. The same share arises with respect to volume: 0.5 billion kilograms versus 2.5 billion kilograms. But externality costs in the rest of the world are surely far higher by proportion, if only because of the ratio of pesticide deaths among humans: 20–25 in the United States per year versus 220,000 worldwide. Indeed, externality costs overall can be estimated at $100 billion per year, constituting a concealed subsidy from society to agriculture—and even this last figure can be confidently regarded as a severe underestimate.

Agriculture also contributes significantly to what is likely to prove the biggest environmental problem of all, global warming. Both crops and livestock produce carbon dioxide, methane, and nitrous oxide. Regrettably, there is still no authoritative economic evaluation of the potential adverse effects of global warming (except for a few minimalist efforts), so the case here must go by default.

In summary of environmental externalities as covert subsidies from agriculture to society, they amount to $150 billion per year for soil erosion and $100 billion for pesticides. Total, $250 billion per year. If there were data for broad-scale pollution by nitrogenous fertilizers, as well as biodiversity decline leading to loss of pollination services and natural pest controls, that would raise the total for these implicit subsidies all the more. Recall, for instance, the $9 billion per year in just the United States for damage to surface waters from agrochemical runoff.

Subsidies Worldwide

According to the foregoing calculations, conventional or formal subsidies to agriculture now amount to $360 billion per year in OECD countries and $25 billion in non-OECD countries, for a total of $385 billion per year. In addition, there are the environmental externalities, at $250 billion per year. This makes for a grand total of $635 billion per year.

How many of these subsidies shall we consider to be perverse? Certain subsidies have sometimes been beneficial in certain local and short-term respects, but many subsidies reveal scope to exert long-term injury on both economies and environments writ large. The documentation in this chapter makes plain that there are many unfortunate repercussions of agricultural subsidies. As can be seen in Box 3.2, New Zealand has eliminated virtually all its subsidies, and the country’s economy and environment alike are better off, as is
Box 3.2. The Case of New Zealand

In the early 1980s, New Zealand took the momentous step of phasing out its agricultural subsidies (followed in 1988 by the removal of irrigation subsidies). This was all the more remarkable in a country with an economy more dependent on agriculture and food exports than virtually any other in the developed world (it features 4 million people and 65 million sheep). By 1995, primary agriculture accounted for 5.2 percent of GDP and related industries bumped up the total to 15.4 percent, while agricultural products accounted for 51 percent of the country’s merchandise exports (excluding forestry).

During the brief period 1979–1984, supports for agriculture increased from 15 percent to 40 percent of farmers’ gross income and farm subsidies rose until they were equivalent to 14 percent of the government’s budget and 6 percent of GNP. The government decided that these amounts were far too high and started to eliminate subsidies as part of overall measures to deregulate key sectors of the economy. It canceled a wide range of support measures, including minimum prices for wool, beef, mutton, and dairy products, and it phased out land-development loans, fertilizer and irrigation subsidies, and subsidized credit.

As a result, farmland prices dropped at first by 60 percent and fertilizer use declined by 50 percent. By 1995, however, farmland prices had recovered to 86 percent of their 1982 value in real terms and fertilizer prices had returned nearly to prereform levels. Although the value of farm output initially declined, it increased again by the late 1980s. There was a halt to land clearing and overstocking, which in the past had been the principal causes of widespread soil erosion. Whereas stock raising had been encouraged by subsidies to encroach onto erodible hills, it has now intensified on better lands, and the hills have been planted with trees, leading to a 50 percent increase in the plantations’ expanse. The number of farms today, 80,000, is slightly higher than in 1983, as is the number of full-time farmworkers. The meat industry has moved from being the least efficient in the world to being the second most efficient. Farming has become more diversified and competitive in the international marketplace.1

Although there were seven difficult years as farmers adjusted, few of them want to return to subsidies. They prefer the marketplace, even with its risks, believing it is the only sustainable long-term option. Their country’s experience could eventually lead other governments to follow suit to some extent, at least, however much the reforms may have been long viewed by certain communities as practically unworkable and politically unacceptable.5


agreed on all sides. To this limited extent, we could reasonably assume that virtually all subsidies in agriculture anywhere are perverse. This would perhaps be pushing the point too far. For the purposes of this book and because of the need to come up with some concluding figure, however far from conclusive, a total for perverse subsidies is proposed that is around two-thirds of the formal subsidies total, namely $256 billion, say $260 billion, per year. This is a somewhat arbitrary reckoning, and it is applied to a sector of unusually large financial size. But it is considered a realistic reckoning, and it reflects consultations on this point with established agricultural experts in various parts of the world. The true proportion could be 15 percent higher or lower, which postulates a range of $220–$300 billion per year. The authors believe it is unlikely to lie outside this range—unless better-judgment assessments can demonstrate otherwise.

On top of this are the environmental externalities described earlier and considered to be hidden subsidies from society to agriculture. Just the two instances documented amount to $25.0 billion per year. Since they are adverse for the environment by definition and adverse for the economy through their quantified costs, they are all viewed as perverse subsidies.

So the grand total of perverse subsidies is here estimated to be
$510 billion per year, within a range of $470 billion to $550 billion (Table 3.3).

Within a broader economic context, these figures must clearly rank as a low estimate. Consider some further indirect costs. Agricultural subsidies do much to distort trade patterns and even to heighten political tensions among the international community, especially as concerns North–South relationships.66 Subsidies in developed countries make it unduly hard for developing countries to compete in international markets, thus reinforcing the inefficiency of their agriculture.57 Modest liberalization of agricultural trade would be worth $150 billion to the global economy by 2002, most of it due to cutbacks in farm protection; full liberalization would be worth almost $400 billion a year (1991 values). European GDP would be 2.5 percent higher, and some Asian economies could benefit by 8 percent; the United States’s balance of trade would be $42 billion better off.58

These ripple effects of international trade deserve a further look. Subsidized exports have undermined developing-country livelihoods by flooding local markets with cheap imported food, as witnessed in the impact of European Union beef dumped in West Africa. Pastoral farmers in Mali, Niger, and Burkina Faso sell animals in local markets, which during the late 1980s were disrupted by European beef subsidized enough to be sold at one-third of the normal price. Also in West Africa, cheap wheat imports have displaced traditional food staples in indigenous diets. Wheat imports into the coastal region increased by over 8 percent per year for the past decade, while per capita production of sorghum and millet fell. By driving down local prices, subsidized wheat exports from developed countries have done much to damage rural livelihoods.59

### Scope for Policy Interventions

However difficult subsidy removal is reputed to be, there are some success stories. One of the best is the severe curtailment of pesticides in Indonesia and the introduction of integrated pest management (IPM). This strategy allows for limited use of pesticides as part of an overall plan deploying mixed crops, staged plantings, and natural enemies of pests. In 1985, the government of Indonesia and those of Senegal, Egypt, and several other countries were covering 85 percent of farmers’ pesticide costs. In Indonesia, however, massive use of pesticides from the mid-1970s through the mid-1980s inadvertently eliminated the natural insect predators of the brown planthopper. This pest had originally been no more than a secondary and minor problem, but pesticides caused it to become a prime pest that cost Indonesia $1.5 billion in rice losses by the mid-1980s.60

During the brief period 1986–1989, the Indonesian government slashed subsidies from 75 percent to zero, using part of the savings of $180 million per year to fund its new IPM program. The government also banned fifty-seven of sixty-six kinds of pesticides.61 While rice farmers’ use of pesticides plunged by 60 percent, their rice yields rose by 15 percent—a phenomenon that reflected the recovery of the natural predators of the rice pests. During just the years 1986–1990, there were savings of $1 billion for rice growers and the national economy. The IPM strategy has subsequently been adopted in the Philippines, Vietnam, India, Pakistan, Egypt, Ghana, and most Latin American countries.62

There have also been fine results from IPM in India, China, and Brazil. In Jiangsu Province in China, pesticide use on cotton has decreased by 90 percent and pest control costs have declined by nearly 85 percent, accomplished by increases in crop yields. In Brazil, IPM use in soybean production has reduced pesticide applications by more than 80 percent.63

Let us note too that certain agricultural subsidies can generate positive spillovers into other sectors. In India, input supports during the 1980s totaled 17 percent of agricultural value added (25 percent for wheat and 35 percent for rice).64 They not only achieved much for the country’s Green Revolution but also generated many spin-off benefits. From the early 1970s through the early 1990s, agricultural

### Table 3.3. Agriculture Subsidies Worldwide, 1998

<table>
<thead>
<tr>
<th></th>
<th>Conventional Subsidies ($ billion)</th>
<th>Externalities ($ billion)</th>
<th>Total Subsidies ($ billion)</th>
<th>Perverse Subsidies ($ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD</td>
<td>360</td>
<td></td>
<td>360</td>
<td>25</td>
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<tr>
<td>Non-OECD</td>
<td>25</td>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td></td>
<td>385</td>
<td>260</td>
</tr>
<tr>
<td>Worldwide</td>
<td>385</td>
<td>250</td>
<td>635</td>
<td>510</td>
</tr>
</tbody>
</table>

(*Table 3.3. Agriculture Subsidies Worldwide, 1998*)

subsidies fed into infrastructure of many sorts, with the result that
the length of surfaced roads more than doubled and the number of
villages with electricity quadrupled.63

Moreover, there are promising signs in a few countries of a shift
away from extravagant subsidies. As mentioned earlier, New
Zealand has phased out just about all its subsidies (Box 3.2), and
Australia has gone far to follow suit in the form of reductions in irri-
tigation subsidies. The next most promising dérâche, though of far
smaller scale, will probably be in the United States, where the 1996
Farm Bill, providing policy legislation for the period 1996–2002, has
made the most sweeping changes in agricultural policy since the New
Deal. It aims to signal a new era when farmers' decisions will be dic-
tated by the competitive market rather than by government subsi-
dies. Hitherto, farmers' incomes, including subsidies, have been 28
percent higher than they would have been if farmers had to operate
at world market prices. The Farm Bill will also increase spending on
conservation of soil, water, and on-farm wetlands via the Conserva-
tion Reserve Program.66

Subsidies should be not only unlinked from production but also
relinked to a broad range of crops and environmental services. This
should prompt farmers to adopt practices that enhance rather than
degrade their farm capital.67 It would contrast markedly with the
present position, whereby price supports unwittingly foster soil ero-
sion and other environmental ills. Indeed, subsidies send farmers far
more powerful signals about how to use (or misuse) the land than do
all the small grants provided for soil conservation.68 Subsidies also
encourage overuse of agricultural chemicals such as synthetic fertil-
zers; reducing subsidies on these fertilizers would promote alterna-
tives such as use of organic manures in integrated crop and livestock
systems.69

Particularly helpful would be policy measures that foster environ-
mental safeguards, notably in the form of set-aside programs that
divert erodable farmland from crop production in order to protect
topsoil. These programs are strongly supported by governments, thus
supplying an instance of constructive subsidies. (The measure can
also serve to control the supply of food or other commodities and
thus to pop up or even raise prices.) There have been some sizeable
set-aside programs in recent years: in 1995 alone, 202,000 square
kilometers in the United States and 81,000 square kilometers in the
European Union (both equating to around 11 percent of arable land)
and 7,000 square kilometers in Japan, or 16 percent of arable land.
In return for setting aside land, farmers receive compensation pay-
ments, usually in the range of $35 to $125 per hectare, though occa-
sionally as high as $1,000 for rice paddies in Japan and $6,300 for
forestry in the European Union. Participation is usually voluntary, so
the compensation has to be as much as a farmer would have received
through crops.70 The 1996 Farm Bill authorized expenditures of $2.2
billion during 1996–2002 on agri-environmental measures, including
payments to farmers to keep highly erodable soils, wetlands, and
other key habitats out of production.71

More helpful still would be measures that prevent the most erodi-
able and otherwise vulnerable lands from being put under crops in the
first place. But that would require a level of anticipatory land-use
planning that does not yet seem feasible on a broad scale.

This leads to the question of incentives for farmers to safeguard
the environmental services they derive from their lands. These ser-

...
Pushing this general approach still further, some analysts even envisage the eventual abolition of ministries of agriculture and their replacement with ministries of land resources, which will look out for conventional agriculture together with forests for timber and recreation combined; upland watersheds, hedgerows, and coppices for wildlife; sport fisheries; and soils and biotas overall as carbon sinks. After all, rural areas are crucial in terms of not only food production but also many other forms of enterprise, including leisure activities and even the “spiritual life” of countries concerned.75

To end on a pragmatic note, consider the policy scope to foster agricultural research. If ever there was a niche for government support, this is it. We need agricultural research more than ever if we are to feed twice as many people within another three or four decades. Hence the calls from the 1996 World Food Summit for another science-based Green Revolution. Yet the budget of the Consultative Group on International Agricultural Research (CGIAR) dropped from $319 million in 1992 to $245 million by 1994, even though its network of fourteen international agricultural research centers needed $270 million merely to maintain activities at erstwhile levels.76 In light of the returns on research investment, which can be as high as 20 percent or even 40 percent per year, the CGIAR budget is absurdly small.77 There is all the greater urgency in bolstering research funding at a time when agricultural planners are aiming for an annual 2 percent increase in food production, and given that there is often a time lag of ten to twenty years before breakthrough research leads to major harvest increases in farmers’ fields.78 Note that the current CGIAR budget is less than 0.1 percent of what the OECD countries spend each year on agricultural subsidies.