GLOBAL EDITION

Macroeconomics

Policy and Practice

SECOND EDITION

Frederic S. Mishkin

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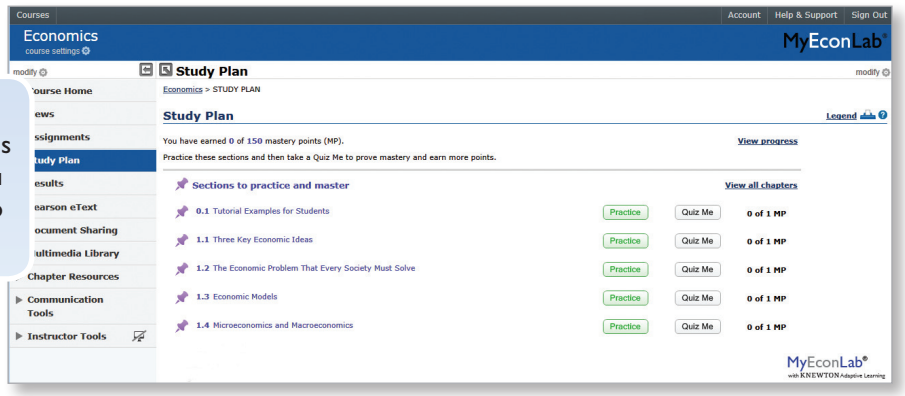

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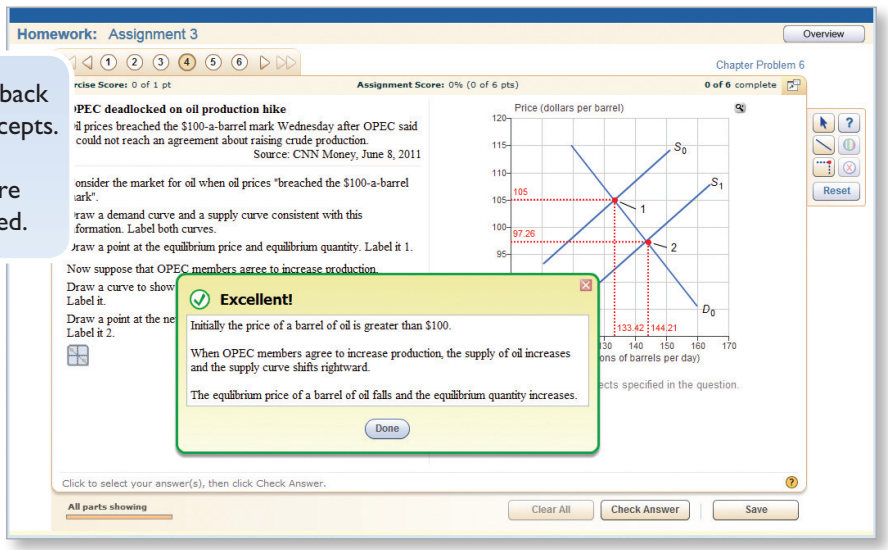

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and income. It may be instead that governments spend more on infrastructure in periods of rapid economic growth. Also, the government may overspend on infrastructure projects. It is tempting for businesses to contribute to political campaigns, or even pay bribes, to win contracts for infrastructure building, creating a recipe for wasteful spending.

The U.S. Interstate Highway System is one successful example of government spending on infrastructure. The Interstate Highway System, formally named the Dwight D. Eisenhower National System of Interstate and Defense Highways, is the largest highway system in the world, with nearly 50,000 miles of roads. It is also the largest public works program in history, costing several hundred billion in today's dollars. The Eisenhower administration sought legislation to create this system, which was started in 1956 and was largely completed by 1990. The Interstate Highway System has promoted tourism (almost all of us have taken family vacations using the system) and has substantially reduced the cost of shipping goods from one part of the country to another. Without the Interstate Highway System, U.S. productivity would likely be much lower and the U.S. way of life would be substantially different.

Increasing Human Capital

So far we have focused on two factors of production in discussing economic growth, physical capital and labor. However, another kind of capital, **human capital,** the knowledge and skills that workers have built up through education and training programs, has a very large effect on productivity. For example, scientists require many years of education and experience in the lab before they can produce new technology. Research finds that human capital is at least as important as physical capital in explaining differences in per-capita GDP across countries.[2]

With higher education and training, workers are much more productive and therefore earn much higher wages. You will be glad to know that your college education leads to a **college premium,** a higher wage over their lifetime for college graduates relative to high-school graduates. The return to education has risen substantially since 1980, with the college premium rising from 50% in 1980 to 80% today—so it is well worth your while to study hard and stay in school. (We will discuss why this college premium has increased in Chapter 20.)

Policy and Practice

Government Measures to Increase Human Capital

For most of the twentieth century, the United States set the global gold standard for educating its populace. Building on its global lead in providing free elementary education, the United States in the early part of the century invested heavily in universal high school education. By mid-century, its colleges and universities had become the world's best. The rest of the world lagged badly behind for much of the century. Fewer than 40% of older European teenagers attended secondary schools in the 1950s, compared with over 70% of older U.S. teenagers.

[2]For a discussion of research on the effect of human capital on productivity and economic growth, see David N. Weil, *Economic Growth* (Boston; Addison-Wesley, 2008).

As our productivity model would predict, investments in human capital through education spending made a sizable impact on economic growth. Between 1915 and 2005, educational improvements in the U.S. labor force accounted for about 15% of real per-capita GDP growth, or about 0.34 percentage point of growth a year. Data strongly suggest that without an educated population, countries will struggle to become productive members of the global economy. In a study of 114 nations, economists Claudia Goldin and Lawrence Katz of Harvard University identified a positive correlation between enrollment levels in secondary school and real GDP.[3] They noted, however, that educational improvements alone were not guaranteed to make a poor country wealthy.

The rest of the world has learned its lesson from U.S. successes. Today, even poor nations invest large sums in education, and wealthy regions like Europe have largely caught up to U.S. educational achievements. In a 2006 study of twenty-six wealthy nations, eighteen nations graduated a greater proportion of citizens from high school than did the United States. U.S. educational achievements began to stagnate in the 1970s, sparking a debate about whether the country had hit some natural limit on educational achievement, or whether a new educational strategy—perhaps focusing more on quality, and less on quantity, of schooling—was required.

Nevertheless, the United States continues to allocate large sums to finance education. With a budget of around $7 billion, the federally-funded Head Start Program supports local schools and other organizations that provide comprehensive child development services for poor pre-school children, giving them a leg up that will help them succeed when they go to elementary school. State and local governments spend on the order of $500 billion annually to provide fifty million children free public school education up through twelfth grade. Also, the government funds many colleges and universities and subsidizes loans to students who cannot afford college.

While not a direct investment in human capital, government spending on public health has the effect of keeping workers healthier and more productive. For example, in 2009, the U.S. government spent $1 billion on a new swine flu vaccine to contain the outbreak of the swine flu pandemic. Government spending on health care has become one of the largest items in the federal budget and is now close to $1 trillion per year.

Encouraging Research and Development

The importance of technology to economic growth suggests that countries can improve their standards of living by devoting increased resources to research and development (R&D). Private companies recognize the value of investing in research and spend a great deal on R&D. For instance, in 2009, Google invested $2.8 billion, or more than 12% of its revenue, in R&D. But because technology has the downside that it may be nonexcludable—that is, others can make use of it without paying for it—many economists believe that the private sector naturally underspends on R&D. Government encouragement of R&D is therefore less controversial among economists than is government spending on infrastructure.

There are three basic ways that governments can encourage R&D: government spending on R&D, government tax incentives, and *patents*.

[3]Claudia Goldin and Lawrence F. Katz, *The Race Between Education and Technology* (Cambridge, Mass: Belknap Press of Harvard University Press, 2008).

GOVERNMENT SPENDING ON R&D. Governments can directly increase R&D by engaging in research and development at government facilities. For example, many technological innovations have come from government labs, including nuclear power, jet planes, and the electronic computer. Governments also provide grants to universities and private researchers for basic research through agencies such as the National Science Foundation and the National Institutes of Health. Governments recognize that research universities can be an important source of economic growth for particular regions. For example, Boston has gained tremendously from having top research universities in its local area, such as Harvard University, MIT, Tufts, Boston University, and Brandeis. Similarly, Silicon Valley grew up around Stanford University. And India's own high-tech hub, Bangalore, flourished around the highly prestigious Indian Institute of Science. State and local governments, as well as the U.S. federal government, give direct subsidies to research universities. In recent years, Europeans have increased their support for research universities, recognizing the benefits that have accrued in the United States.

TAX INCENTIVES FOR R&D. Because private businesses are likely to be more efficient than the government at producing practical R&D that can be utilized immediately in developing new products and technology, governments also encourage R&D by giving private businesses tax breaks for research. U.S. tax credits for R&D were first implemented with the Economic Recovery Act of 1981. Congress has renewed these credits several times over the intervening years. Companies that qualify for the credit can deduct 20% of their research expenses above a base amount that is determined by historical expenses over a base period.

Almost all advanced economies offer some form of tax incentive for R&D. These incentives go beyond the form of tax credits by allowing firms to deduct 100% and sometimes more of their research expenses from their income in calculating their taxes. Other incentives allow firms to depreciate machinery and equipment that are involved in R&D at a higher rate than normal, thereby reducing their tax bills.

PATENTS. Another approach to managing the nonexcludability of technology is to grant intellectual property rights to inventors through a system of **patents** that give inventors the sole right to use, make, or sell licensing rights to others for a set period of time, typically around twenty years. For example, a drug company that earns a patent on a cholesterol-lowering medicine can sue anyone who tries to produce that drug without permission for decades. These property rights help businesses earn higher profits and recoup the investments they make in research and development, and encourage others to invest in R&D.

Patents are not a new idea. Indeed, at the very founding of the United States, the Constitution authorized Congress to enact laws to "promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." For example, firms in the drug industry have spent billions on research to develop drugs such as Lipitor or Tamiflu because their sole right to produce them for a number of years has provided them with enormous profits.

Effective design of a patent system is crucial. If patents are given too freely or for too long a period, technological growth may slow, since patent owners might refuse to share their knowledge or charge prohibitively high prices to license its use. Particularly worrisome in recent years has been the rise of colorfully named "patent trolls," who buy up patents and then try to extract large payments from companies that try to

develop or use similar technologies. On the other hand, if the patent right is difficult to enforce, or if patents are not given for certain types of inventions, then there might not be enough investment in R&D. Alternatively, the inventor may be unwilling to share ideas with others in publicly available patent applications, thereby hindering technological advance. For example, the Coca-Cola Company has chosen to keep its soda formula a secret, rather than disclose it in a patent application, because it does not believe its patent rights would be enough to keep competitors from copying the recipe. Patents that do not give sufficient rights to the inventor may therefore leave technology nonexcludable, and so weaken the incentives for R&D and technological progress.

Institutions and Property Rights

We now go on to analyze the role of *institutions* in economic growth. **Institutions** are sets of rules, organizations, and customs that govern the behavior of individuals and firms. The most basic and fundamental set of institutions that affect economic growth are **property rights,** the protection of property from expropriation by the government or other parties. Property rights are necessary if people are to have incentives to make investments. Otherwise, the fruits of their investments (the profits) could be easily taken away. A farmer who does not have clear-cut ownership of his land, or who worries that armed marauders may take away his crops or farm equipment, is unlikely to buy enough seeds, fertilizer, and tractors to boost his farm's production. Weak property rights thus lead to low investment and low accumulation of capital.

In this section, we outline the key characteristics of legal systems that enforce property rights and examine the key obstacles faced by these legal systems.

The Legal System and Property Rights

Residents of advanced nations like the United States often take property rights for granted. The founding fathers and their British forbearers understood the importance of property rights to the success of an economy, and a vast body of U.S. law protects private property. The government cannot take your property when it wants to; people who steal property are jailed; and people who make use of our property (either physical or intellectual, that is, property based on ideas) without our permission can be sued in courts of law.

Property rights are established by the writing and enforcement of legal contracts. Strong property rights, needed to provide incentives to invest and accumulate capital, therefore require a legal system that operates quickly and at low cost. Douglass North, recipient of a Nobel Prize for his work on the role of institutions in economic development, has emphasized the importance of the legal system to economic growth: "The inability of societies to develop effective, low-cost enforcement of contracts is the most important source of both historical stagnation and contemporary underdevelopment in the Third World."[4]

There are several elements that make up an effective legal system: the ability to enforce contracts, adequate resources, and lawyers.

[4]Douglass North, *Institutions, Institutional Change, and Economic Development* (Cambridge: Cambridge University Press, 1990), 54.

ABILITY TO ENFORCE CONTRACTS. Enacting a good system of laws is the first step in creating strong property rights. Not all legal systems are alike in this regard. A legal system based on **common law,** in which the law is continually reinterpreted by judges, originated in England. The common-law legal system is in use in the United Kingdom and its former colonies, including the United States, Canada, Australia, and New Zealand, as well as in India and many countries in Africa. Alternative legal systems based on the Napoleonic Code, which was first developed in France, determine the law primarily by statutes. The Napoleonic legal system spread to much of continental Europe during the Napoleonic Wars at the beginning of the nineteenth century. The German and Swedish legal systems have elements of both the Napoleonic and the English common law systems, with laws determined by statutes that are subject to substantial modification by judges.

The English common law system is particularly effective at enforcing contracts because it is able to evolve with changing economic circumstances. Countries with legal systems derived from English common law outperform those with systems based on the Napoleonic Code in terms of financial development and economic growth, with the performance of the German and Swedish systems somewhere in between.[5] (See Table 7.1 for a list of countries and their style of legal system.) It also matters how the legal system was imposed on a country to begin with, a subject explored in the box, "Geography, the Legal System, and Economic Growth."

ADEQUATE RESOURCES. A well-functioning legal system requires sufficient funding for courts and qualified judges. India's legal system, for example, is based on the English common-law system, which suggests it should strongly protect property rights. However, India's legal system is starved for resources and is incredibly overburdened.

TABLE 7.1 LEGAL SYSTEM ORIGINS

English Common Law	Napoleonic Law	German/Swedish
Australia	Argentina	Austria
Botswana	Brazil	Switzerland
Canada	Chile	Germany
U.K.	Cote d'Ivoire	Denmark
Hong Kong	Egypt	Japan
India	Spain	Korea
Ireland	France	Finland
Jamaica	Greece	Iceland
Singapore	Haiti	Taiwan
United States	Italy	Norway
South Africa	Turkey	Sweden

Source: Thorsten Beck, Asli Demirguc-Kunt, and Ross Levine. 2003. Law, endowments, and finance. *Journal of Financial Economics* 70, no. 2 (November): 137–181.

[5]See Rafael La Porta, Florencio Lopez-d-Silanes, Andrei Shleifer, and Robert W. Vishny, "Legal Determinants of External Finance," *Journal of Finance* 52 (1997): 1131–50; Rafael La Porta, Florencio Lopez-d-Silanes, Andrei Shleifer, and Robert W. Vishny, "Law and Finance," *Journal of Political Economy* 106 (1998): 1113–55; and Thorsten Beck and Ross Levine, "Legal Institutions and Financial Development," in *Handbook for New Institutional Economics*, eds. Claude Menard and Mary M. Shirley (Norwell MA: Kluwer Academic Publishers, 2005).

Geography, the Legal System, and Economic Growth

Geography plays an important role in economic growth. Countries closer to the equator with tropical climates have slower economic growth than countries farther from the equator with temperate climates.*

Colonies with tropical climates—for example, colonies in the Caribbean, in Africa, and on the Indian subcontinent—could not be settled by large numbers of Europeans because the death rates from native diseases were so high. The legal systems in these colonies were modified to benefit the small numbers of Europeans that ran the countries and enable them to exploit the countries' resources and local populations. As a result, legal systems in these countries were relatively ineffective at protecting the property rights of the average person, and became a serious handicap to growth as colonies became independent. On the other hand, in temperate climates, larger numbers of Europeans were able to settle in a colony, as in North America, and they were better able to resist exploitation by the home country. (The American Revolution is a dramatic manifestation of this point.) After these countries became independent, their legal systems effectively protected property rights and promoted high rates of economic growth. Indeed, differences in the quality of legal systems resulting from different patterns of European settlement can explain three-quarters of the differences in income per person among former colonies.

The variations in how colonies were settled explain why even countries whose legal systems were originally based on the British system, with its emphasis on protection of property rights, have shown such different economic performance. The United States, Canada, Australia, and New Zealand, with predominantly European populations that could resist exploitation, ended up with highly effective legal systems and prospered. On the other hand, former British colonies such as Jamaica, India, Pakistan, and Nigeria, where Europeans made up only a small fraction of the population, ended up with much less effective legal systems and have remained poor.

*See Daron Acemoglu, Simon Johnson, and James A. Robinson, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review* 91 (2001): 1369–1401; and William Easterly and Ross Levine, "Tropics, Germs and Crops: How Endowments Influence Economic Development," *Journal of Monetary Economics* 50 (2003).

In India, it takes many years to settle lawsuits. There are millions of backlogged cases in higher courts, many of which are ten years old or older. In Brazil, the airline Lufthansa was still in court almost a quarter of a century after the filing of an infamous wrongful-termination lawsuit.

ACCESS TO LAWYERS. Love them or hate them, lawyers are needed to promote property rights. When someone encroaches on your land or makes use of your property without your permission, you turn to a lawyer to stop them. Lawyers are necessary to protect your investments, and knowing you can hire one encourages you to invest in property in the first place. Without lawyers, there would be little to no investment, and thus little economic growth.

Obstacles to Effective Property Rights

Countries with strong property rights laws on the books still must enforce them to ensure a flow of investment in the economy. We will now look at obstacles to property rights systems, including corruption, costly legal processes, and greedy government officials.