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Introduction

During the 1970s the United States began to accumulate government regulations covering water effluents, air emissions, solid wastes, the manufacture and use of hazardous and toxic substances, and workplace health and safety. These new regulations forced industries in the United States to expend huge amounts of capital, and they induced fundamental changes in the domestic structure of many industries. As this collection of laws grew, it became obvious to economists that some industrial firms in the United States were spending more for pollution control than were firms in many other industrialized countries, and a great deal more than the modest expenditures necessary in countries outside Western Europe and Japan. The industries claimed not only that the costs of pollution abatement were high, but that the new regulations made it increasingly difficult for them to build and operate production facilities, even when they spent large amounts of money on environmental control.

As a consequence, many observers in the United States noted that the costs and logistics of complying with environmental regulations might prove a significant factor in determining the competitiveness and location of industries involved in world trade. Many policymakers, labor unions, business leaders, environmentalists, and academics expressed concern that strict domestic pollution-control standards might impair the ability of U.S. industry to compete with imported products and in foreign markets, although they proposed very different solutions to the problem. They feared that producers based in the United States would lose their comparative advantage in certain industrial sectors as a result. It was expected that many American firms, particularly multinational corporations with experience operating overseas, would respond by transferring facilities to countries where regulatory costs and encumbrances could be minimized.

Two related theories sought to explain how and why environmental regulations would alter the prevailing allocation of comparative advantage in industrial production. The first was that regulations would push an increasing number of industries out of the United States and other advanced industrial nations (the industrial-flight hypothesis); the second

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was that less-developed countries would use lenient environmental regulations to attract multinational industries (the pollution-haven hypothesis). The combination of the push out of industrial countries and the pull toward less-industrialized countries was expected to exert a powerful influence on international patterns of industrial location and to strengthen the industrial-development strategies of Third World nations.

Some observers claimed that this would be a positive development, because it would reflect the increasing desire for service-sector and high-technology jobs in the advanced industrial countries and would encourage the spread of industrial development to the Third World. Still, such prospects raised two major political and economic concerns. First, the trend could have adverse effects on the U.S. economy, and national security might be threatened if many U.S. industrial facilities transferred production abroad. Second, environmental groups and some observers in developing countries feared that U.S. firms, taking advantage of the desperate desire for industry in developing countries, would set up factories that wantonly polluted the atmosphere and the water, make inadequate provisions for the health and safety of their workers, and cause other serious environmental hazards.

The debate intensified during the early 1980s for several reasons: output was low and unemployment high in many large industries hit with high regulatory costs; first industry and then the Reagan administration increased their efforts to water down or restructure environmental regulations; growing emphasis was placed on stimulating U.S. exports; and the federal government proposed policies designed to catalyze a reindustrialization of the United States. Frequently, environmental regulations have been blamed not only for increasing costs for American consumers and depressing the financial outlook of many domestic industries, but for making it more difficult for U.S. firms to compete with foreign firms and for constraining or actually reducing America's overall industrial capacity.

In addition, environmental and labor groups, contending that U.S. companies are moving to other countries to escape environmental regulations, have made an effort to follow them around the globe and examine their environmental records. These investigators have gathered evidence that American companies sometimes create pollution, neglect workplace health, and cause community-wide environmental problems in host countries.

This study attempts to assess the industrial-flight and pollution-haven hypotheses. It analyzes recent foreign-investment and import trends among U.S. firms to determine whether standards for pollution control and workplace health have pushed U.S. industries abroad and whether the U.S. industrial base and balance of trade have been negatively affected. On the basis of case-study research in four rapidly industrializing coun-

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tries – Ireland, Spain, Romania, and Mexico – the study will assess whether adherence to a pollution-haven strategy has strengthened industrial development. The case studies illustrate the economic, political, and public-health dangers for governments of underindustrialized countries that follow such a strategy. They also point to the problems encountered by multinational corporations that assume that underindustrialized countries have so many more-important concerns that they will not take punitive action against polluting companies.

Theory and methodology

From a theoretical perspective, this study focuses on whether and how a relatively new set of factors – environmental and pollution-control regulations – has affected all the processes that now influence the distribution of international comparative advantage in industrial production.

The industrial-flight and pollution-haven hypotheses were derived from the work of theoretical economists who adapted classical factor-proportion explanations of trade, and least-cost approaches to industrial location, to predict the impacts that differences in national pollution-control regulations would have on the distribution of international comparative advantage. Yet, although classical theories of international comparative advantage and industrial location do provide a good starting point for analysis, they are not sufficiently dynamic or politically oriented to account for many real-world distortions and emergent conditions.

This study presents a theoretical framework that draws on several interrelated bodies of economic and political theory. This framework helps to provide a better understanding of the allocation of international comparative advantage in industrial production. In particular, five broad theoretical domains – each at a slightly different level of generality or geographic specificity – are relevant to the composite picture of international comparative advantage that forms the foundation for the research presented in later chapters. These domains are the concept of a *product cycle* in manufactured goods, which makes comparative advantage much more fluid than its classical construct; theories that explain why *foreign direct investment* takes place rather than trade or the transnational movement of other factors (for example, labor or portfolio capital); theories explaining the *industrial-location decisions* made by individual firms; the body of literature on the most advantageous *industrial-development strategies* for underindustrialized nation-states; and explanations of the *bargaining process* that determines the terms of the relationship between the international corporation and its host nation-state.

The first two chapters of this study, although they do not purport to offer a definitive or even consensual exposition, provide an overview of

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these theories so that the reader will be better equipped to generalize from the specific research presented in subsequent chapters. The continuous "fit" between the different levels of trade-and-investment theory noted above can be briefly summarized as follows.

Innovating firms in one country initiate production of a manufactured good; if they do so under particularly advantageous circumstances, they may also export the good to foreign markets. At some point, the economics of production and marketing shift to favor the commencement of production abroad as well. Sometimes circumstances encourage producers from the first country to set up production plants abroad; in others, foreign firms start up facilities of their own. When the individual firms in the first country react to these circumstances, several factors affect their decisions about whether, when, and where to set up production facilities abroad. Governments of foreign countries – particularly underindustrialized countries – in turn pursue a variety of strategies to attract foreign firms or to encourage domestic firms to build production facilities for manufactured goods entering the stage of internationalized production. When a country does succeed in luring a foreign firm to its soil, the country and the firm begin a continuous process of give and take, during which the relative advantage of each waxes and wanes. This bargaining process determines the ground rules of the relationship between the foreign firm and the country. Subsequent chapters will test the industrial-flight and pollution-haven hypotheses in the context of this dynamic framework.

A word about methodology is in order. To test for evidence of the validity of the industrial-flight and pollution-haven hypotheses, two types of information are necessary: statistical data that identify changes in investment patterns and trade patterns within and between the United States and industrializing nations, and information that sheds light on the reasons for the statistical trends and the motivations of the crucial actors – multinational corporations and governments of industrializing nations. Without knowledge of the internal conditions that affect the companies in so-called pollution-intensive industries and those that motivate the industrialization efforts of governments, the aggregate data cannot support the hypotheses but can only invalidate them by failing to conform to expected trends.

As it is, the data do help to eliminate some possibilities from further consideration but do not invalidate the hypotheses altogether. Thus, the methodological approach followed in this study is to narrow down to particular problem areas by establishing a series of tests whose results set the terms for the next level of inquiry. It is analogous, therefore, to peeling away the layers of an onion to reveal the core.

First, it is necessary to identify industries that have encountered extreme difficulties as a result of environmental regulations and concern about

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environmental problems. To do so, we shall examine capital spending on pollution controls in the last decade for all U.S. industries and for key industrial sectors. In addition, several other indicators of environmental difficulties for industry will serve as a cross-check in selecting the industries most susceptible to industrial flight.

Second, we must devise some means of assessing whether trade and investment patterns follow the expectations of the hypotheses. To do this, we shall examine aggregate figures for foreign investment and imports by key U.S. industrial sectors identified as pollution-intensive. If these industries have increased overseas investments and imports rapidly in recent years, and if a growing share of this activity involves countries outside the other heavily industrialized nations, it is possible to conclude, at a minimum, that recent trends conform to those expected.

However, the trade and investment statistics alone cannot provide the crucial information necessary to know whether the environmental factors have caused the trends, have influenced them, or have been only incidental. Thus, individual industries that show large increases in foreign investments and U.S. imports are analyzed within the whole range of political and economic factors that have affected them in recent years. This requires recourse to numerous industry reports, knowledge of the impact of particular regulations, and a general analysis of industry trends and economic factors.

Similarly, certain rapidly industrializing nations have increased their industrial production in certain industrial sectors, but we do not fully understand the reasons for this success. Thus, the industrial-development strategies of these countries are examined as a whole, in an effort to identify the importance of pollution factors in such strategies. And, because a nation can become a pollution haven unintentionally or as the result of bad negotiating, poor planning, lax enforcement of laws, and other political factors, we shall study the role of pollution in the relationships and controversies between industrializing nations and multinational corporations.

Summary of the chapters

As already noted, the first two chapters delineate the two most important sets of factors that determine the distribution of comparative advantage in industrial production: (1) the natural dynamics that account for the direction of trade and the location of industries on an international basis; and (2) the numerous interventions that are structured by particular nation-states to affect international patterns of trade and investment.

Chapter 1 contends that classical trade theory alone cannot account for the evolution of comparative advantage in industrial production because

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it does not adequately explain the movement of capital between countries and largely ignores the question of how firms engaged in production for international markets make locational decisions. Drawing on recent theoretical contributions, we shall show how the velocity of change in international comparative advantage has increased as a result of the mobility of capital and the cycle of technological diffusion.

Chapter 2 argues that as a result of such a process of constant evolution in international comparative advantage, the artificial factor endowments created by governments have become at least as important as natural factor endowments for countries seeking to gain comparative advantage in some industries. It provides a framework for analyzing the role of international trade in the industrial-development strategies devised by nation-states, examines many of the policy choices that governments must make in this process, and outlines the bases of the relationships that industrializing nations often form with the primary international movers of capital and technology – multinational corporations.

Chapter 3 introduces the question of whether the strong antipollution regulations recently enacted in leading industrial nations have affected the struggle for the world product. It shows how the classical trade theories based on an assessment of relative factor endowments guided the initial international discussions of the ways in which strong environmental regulations in the industrialized countries may affect trade and investment. These theories stress that countries will generally produce and export goods manufactured with factors that are abundant within the country and will import those for which factors of production are scarce. On this basis, economic theorists, policymakers from both industrialized and industrializing nations, and spokesmen for international agencies and private corporations all tended to assume that highly polluting industries would gradually move from countries with scarce environmental factor endowments to countries where such factors would be abundant.

By examining recent international trade and investment statistics for U.S. industries, Chapter 4 identifies the industrial sectors most likely to have felt the pressures for environmental redeployment and highlights some of the especially dynamic industrializing nations that may benefit from such a process. These aggregate figures indicate that no large-scale evolution of comparative advantage in industrial production seems to have begun as a result of U.S. environmental-control regulations. However, several trends indicate the possibility that there has been more selective industrial flight on the part of particular industries in the major industrial sectors examined, and that the success of some industrializing countries in a few of these industries has been boosted by their selective use of pollution-haven status.

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Thus, Chapter 5 discusses the importance of pollution factors in the industrial-development strategies and experiences of four rapidly industrializing nations. This chapter shows how planners of industrial development in Ireland, Spain, Mexico, and Romania responded in the late 1970s to the possibility that they could take advantage of environmental standards in the advanced industrial nations to increase their advantage in certain industries. In each case, government officials took note of the possibilities and acted more or less in conformance with the pollution-haven hypothesis. However, evolving attitudes toward pollution and other political and economic factors have made it more difficult to call any of these countries a pollution haven today.

Chapter 6 demonstrates how the emergence of concern about industrial pollution has affected the bargaining relationship between foreign companies and the governments of host countries. In the past, multinational corporations often were perfectly willing to go along with the failure of industrializing countries to outline effective pollution-control regulations, even though from the company's perspective the pollution incentive was not a crucial variable in the bargaining process. But in recent years officials of these industrializing countries have become more sophisticated in bargaining over pollution, and this has often increased the friction between countries and companies.

Chapter 7 shows, in fact, just how politicized the issue of pollution has become in industrializing countries and how this is affecting the relationship between these countries and multinational corporations. This chatper looks at some dynamic political factors that influence the way in which pollution affects multinational corporations operating in rapidly industrializing countries. It describes how governments and important political constituencies have tended to react to increased awareness of the adverse environmental and health effects of certain industries. And it outlines some of the political and institutional barriers that have often frustrated industrializing countries, and to a lesser extent corporations, in their efforts to reduce the harmful environmental side effects of export-oriented industrial development.

The final chapter attempts to outline some of the theoretical implications that this study holds for recent explanations of international investment, industrial location, industrial-development strategy, and the relations between host countries and foreign investors. It concludes by offering a series of practical policy prescriptions for the major actors whose behavior is examined in this study: the U.S. government, the governments of rapidly industrializing nations, and officials of multinational corporations.

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The dynamics of international trade and industrial location

The classical law of comparative advantage sought to demonstrate that productive resources in all countries could be more efficiently employed if each country, through the exchange of goods and raw materials, specialized in producing the few goods and raw materials that it could produce most proficiently.[1] A more neutral way of thinking about the concept of comparative advantage is that it describes the array of social, economic, and political forces that account for the general export and import patterns prevailing between nations. In this sense, all the other bodies of theory discussed in this and subsequent chapters contribute to an understanding of comparative advantage.

Although much of its original elegance has been muddled as a result of empirical testing, the theory of comparative advantage put forth by Eli Heckscher and Bertil Ohlin remains the highest level of generality in explaining patterns of world trade.[2] In essence, the Heckscher-Ohlin theory holds that differences in comparative advantage among countries are explained by different relative costs for the separate factors of production; these relative factor costs are determined by how well endowed each nation is with those factors. Because different goods require different factor proportions in their manufacture, countries will tend to export those goods that use large portions of their more abundant factors and import those that depend upon their scarce factors of production.[3]

In elaborating the theory of comparative advantage, economists until recently generally assumed that only commodities, not physical factors of production, moved across international borders. In large measure, this assumption reflected objective international economic circumstances. Although large firms from both the United States and Europe began to

1. David Ricardo, *Principles of Political Economy and Taxation* (1817), reissued as vol. 1 of P. Sraffa, ed., *The Works and Correspondence of David Ricardo* (Cambridge: Cambridge University Press, 1951).
2. Bertil Ohlin, *Interregional and International Trade* (Cambridge, Mass.: Harvard University Press, 1933).
3. An excellent summary of the factor-proportion approach to international trade and its limitations is found in Jan S. Hogendorn and Wilson B. Brown, *The New International Economics* (Reading, Mass.: Addison-Wesley, 1979), pp. 230–235.

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establish production facilities abroad during the late 1800s, the vast majority of all private foreign investment before the Great Depression was in the form of portfolio rather than direct investment.[4] Also, much of the foreign direct investment that did take place during the first half of the twentieth century was for the exploitation of raw materials in underdeveloped areas outside the United States and Europe. Both of these types of factor movement could be reconciled within classical comparative-advantage theory because they did not substitute for trade and did not alter the relative advantage available to a country from specialization in a particular commodity for trade. An account of factor mobility, therefore, was not essential for an understanding of comparative advantage.

However, this situation was complicated when, especially after World War II, foreign direct investment in manufacturing industries became a more prominent form of international capital movement. The large-scale flow of physical capital across national borders can affect comparative advantage more directly than portfolio capital does because, like the transnational migration of labor, it can alter the relative abundance of physical production factors over a relatively short period of time, and thus it can change not only the magnitude but also the makeup of trade. A growing number of economists have viewed international factor movement as a potential substitute for trade and as a possible means by which a country can increase (or decrease) the abundance of a particular factor (in our case physical capital) so as to alter its parameters of comparative advantage.

In explaining factor movements under unrestrained conditions, the economist J. E. Meade, among others, pointed out that factors will move whenever the marginal product of the factor in one country exceeds the marginal product in another by more than the cost of movement.[5] In addition, as Robert Mundell noted, the potential interchangeability between factor movements and trade may be significantly affected by border restrictions covering international economic intercourse: any increase in trade impediments is likely to stimulate a compensatory increase in factor movements; conversely, increases in restrictions on factor movements may boost trade.[6] Thus the ability to move physical capital in addition to commodities across borders and the ability of nation-states to speed up or slow down this process significantly complicate the calculation of comparative advantage.

4. See John D. Daniels, Ernest W. Ogram, Jr., and Lee H. Rodebaugh, *International Business: Environments and Operations* (Reading, Mass.: Addison-Wesley, 1978), pp. 64–89.
5. J. E. Meade, *Trade and Welfare* (London: Oxford University Press, 1955), p. 420.
6. Robert A. Mundell, "International Trade and Factor Mobility," in Richard E. Caves and Harry G. Johnson, eds., *Readings in International Economics* (Homewood, Ill.: Richard D. Irwin, 1968), p. 101.

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Widespread movements of physical capital – as well as numerous exogenous changes in international political, economic, and technological circumstances – have made it necessary to move beyond the static conception implied in the general theory of comparative advantage and to seek more dynamic expositions of how international trade and investment patterns change as factor proportions themselves evolve. In particular, even if one accepts the general validity of the Hecksher-Ohlin model, it is important to explain

1. the process and sequence by which comparative advantage in different manufacturing activities shifts as a result of changing factor inputs or factor endowments; and,
2. why the movement of physical capital through foreign direct investment (with its many inherent logistical problems and the xenophobic reactions it often provokes) is undertaken instead of commodity trade, portfolio-capital flows, or the direct sale of physical capital and expertise to would-be foreign producers.

These questions are discussed in the following expositions of the so-called product cycle and foreign-direct-investment theories, respectively.

The international product cycle

The role now played by advanced technology – and hence by research and development – in manufacturing industries has made comparative advantage a much more diffuse and artificial concept than was the case in earlier phases of the industrial revolution. That is, comparative advantage in particular manufactured products may shift from one country to another in relatively few years or decades as new technologies are introduced and mastered. In addition, the allocation of comparative advantage, when highly dependent upon levels of technological capability, may be as much a creation of competitive choice as the fulfillment of a nation-state's natural bounty.

The increased mobility of physical capital has only added momentum to the growing diffuseness and artificiality of comparative advantage, because one country need not build its own indigenous capacity before it can imitate producers in more advanced countries. A lagging country can instead find a foreign firm willing to sell technology and expertise or to take up production inside its borders.

Although rapid technological advancement and dispersion have made matters more complex than is described in simple factor-account models, this does not mean that the process by which comparative advantage evolves is entirely helter-skelter. To understand the rhythm of postwar patterns of world trade and investment, many contemporary economists view comparative advantage in terms of the stages through which manufactured products pass after their introduction. Actually, the idea of tech-

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