

## CHAPTER 1

### INTRODUCTION

Chapter 1 emphasizes the internationalization of business and economic activity that has occurred since the end of World War II. Although international business activities have existed for centuries, primarily in the form of exporting and importing, it is only in the postwar period that multinational firms have become preeminent. The distinguishing characteristic of the MNC is its emphasis on global, rather than affiliate, performance. Specifically, MNCs ask, "Where in the world should we build our plants, sell our products, raise capital, and hire personnel?" Thus the true multinational is characterized more by attitude than the physical reality of an integrated system of marketing and production activities worldwide. It involves looking beyond the boundaries of the home country, and treating the world as "our oyster." Good examples include the globalization of GE's medical systems division and Arco Chemical.

After stimulating student interest with this vision of the MNC, I then introduce the financial decisions that multinationals must make. I begin by discussing the key concepts and lessons from domestic finance that apply directly to international corporate finance. The lessons include the emphasis on cash flow rather than accounting earnings, the time value of money, the importance of taxes, and the unwillingness of investors to reward companies for activities (like corporate diversification) which investors could replicate for themselves at no greater cost.

The key concepts, which I point out will arise time and again in the course, are arbitrage, market efficiency, and the separation of risk into systematic risk, which must be rewarded, and unsystematic risk, which is not rewarded. The latter concept, of course, is the intuition underlying both the capital asset pricing model (CAPM) and the arbitrage pricing theory (APT). Although imperfect, the theoretical framework of domestic corporate finance provides a useful frame of reference, and understanding it is essential before proceeding with the more complex aspects of international financial management. I devote some time to explaining that total risk matters, even if the CAPM or APT holds. Otherwise the astute student will see a conflict between the irrelevance of unsystematic risk and hedging activities.

I then outline the key decision areas in international financial management: foreign exchange risk management, managing working capital and the internal financial system, financing foreign units, capital budgeting, and evaluation and control. I emphasize the additional parameters that MNC financial executives must cope with, including multiple currencies, rates of inflation, tax systems, and capital markets, as well as foreign exchange and political risks.

### SUGGESTED ANSWERS TO "GENERAL ELECTRIC GLOBALIZES"

1. What advantages does General Electric seek to attain from its international business activities?

**ANSWER.** Aside from gaining access to markets worldwide, GE focuses on taking advantage of its global reach to find less expensive materials abroad and intellectual capital, thereby lowering its cost of designing and manufacturing products.

2. What actions is it taking to gain these advantages from its international activities?

**ANSWER.** GE is acquiring companies abroad, and setting up joint ventures with other foreign companies, to gain their assets and ability to service local customers. It is setting up manufacturing facilities abroad to access lower cost labor and materials and also sourcing more purchases abroad for the same reasons. It also is identifying and hiring engineering and scientific talent from around the world to boost its intellectual capital and is setting up R&D facilities where this talent can work.

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3. What risks does GE face in its foreign operations?

**ANSWER.** Potential increased risks from global operations include, among other things, currency risks, higher receivables delinquencies and bad debts, delays or cancellation of sales and orders, higher local currency financing costs, and a slowdown in established financial services activities.

4. What profit opportunities for GE can arise out of these risks?

**ANSWER.** New profit opportunities for GE include, among other things, lower costs of goods sourced from countries with weakened currencies, more opportunities for lower cost outsourcing, expansion of industrial and financial services activities through purchases of companies or assets at reduced prices and lower U.S. debt financing costs.

### SUGGESTED ANSWERS TO “THE DEBATE OVER OUTSOURCING”

1. What are the pros and cons of outsourcing?

**ANSWER. PROS:** Outsourcing allows Americans to buy services less expensively abroad, increases U.S. productivity, and enables U.S. companies to cut their costs while improving quality, time-to-market, and capacity to innovate. It also allows the United States to utilize its comparative advantage in financial, managerial, and technical services by specializing in and exporting such services as higher-end computer programming, management consulting, engineering, banking, telecommunications, and legal work.

**CONS:** As with any kind of trade, imports of services through outsourcing results in the loss of jobs for Americans previously employed in providing those services. Outsourcing may also put out of business U.S. companies that provide these services.

2. How does outsourcing affect U.S. consumers? U.S. producers?

**ANSWER.** As the answer to part a) points out, outsourcing allows companies to buy services less expensively abroad. Competitive pressures force companies to pass these savings along to consumers in the form of lower priced goods and services.

U.S. producers are able to boost productivity and cut costs while improving quality, time-to-market, and capacity to innovate. As such, American companies are better able to compete. This competition, however, forces companies to pass most of their savings from outsourcing through to their customers.

3. Longer term, what is the likely impact of outsourcing on American jobs?

**ANSWER.** The longer-term effect of outsourcing on U.S. jobs should be insignificant. Trade has little, if anything, to do with the quantity of jobs in an economy but rather the nature and distribution of those jobs in various occupations. Outsourcing should lead to higher average productivity of those jobs that Americans work at and, hence, to higher wages and benefits.

4. Several states are contemplating legislation that would ban the outsourcing of government work to foreign firms. What would be the likely consequences of such legislation?

**ANSWER.** Such legislation would result in less efficient and more expensive government. The end result would be higher taxes or, if taxpayers balk, fewer government services.

## SUGGESTED ANSWERS TO “ARCO CHEMICAL DEVELOPS A WORLDWIDE STRATEGY”

1. What was ARCO Chemical’s rationale for globalizing?

**ANSWER.** ARCO Chemical went global because its customers are now worldwide. For example, the company's engineering resins are sold to the auto industry. In the past, that meant selling exclusively to Detroit's Big Three in the U.S. market. Today, ARCO Chemical sells to Nissan, Toyota, Honda, Peugeot, Renault, and Volkswagen in Japan, the United States, and Europe. It also deals with Ford and General Motors in the United States and Europe. ARCO must be able to deliver a product anywhere in the world or lose the business.

2. What advantages has ARCO Chemical realized from its global operations?

**ANSWER.** ARCO Chemical has been able to sell to customers worldwide, thereby expanding its sales. Operating overseas also yields competitive intelligence, enabling ARCO to keep track of its competitors’ moves and figuring out how to counteract them.

3. What threats have arisen from ARCO Chemical’s globalizing efforts? What are some ways in which ARCO Chemical has responded to these threats?

**ANSWER.** Global operations have exposed ARCO Chemical to increasingly stiff competition from abroad in addition to its traditional U.S. competitors such as Dow Chemical. European companies have expanded operations in America, and Japanese competitors also began to attack ARCO Chemical's business lines. In response, ARCO Chemical set up production facilities around the world and entered into joint ventures and strategic alliances, thereby gaining access to competitive and market intelligence.

4. How has globalization affected, and been affected by, industry consolidation?

**ANSWER.** Globalization has forced companies to take fuller advantage of economies of scale in order to be more competitive, thereby resulting in greater industry consolidation worldwide. At the same time, industry consolidation, by allowing companies to spread overhead, distribution and research and development costs over a larger asset base, has enabled those companies in the consolidation vanguard to be lower-cost producers and to be more competitive in foreign as well as domestic markets. To realize similar low costs, competitors are forced to go overseas to spread their fixed costs over a larger sales volume.

## SUGGESTED ANSWERS TO “DEMOCRATS TURN PROTECTIONIST”

1. What might explain the candidates’ and Democratic Party’s reversal of position on free trade? Which voting constituencies would be most likely to reject free trade? Why?

**ANSWER.** The Democratic Party is heavily reliant on union votes and money. And unions, particularly the industrial unions that make up the core of the union movement is against free trade because it subjects their members to competition from foreign labor embodied in foreign goods and services. The candidates themselves are trying to appeal to the unions as they are among the best organized segment of the Democratic Party and have the ability to turn out votes in primaries where few voters go to the polls. Given the low turnout, a primary is often determined by the most committed voters, who are often union members threatened with job losses from free trade.

2. What leverage do the trade unions have in persuading Al Gore and other Democratic candidates to pay attention to their anti-free -trade position? Explain why these particular unions might be particularly powerful.

**ANSWER.** The unions’ leverage stems from the fact that their membership is concentrated in six large industrial states that are crucial swing states in presidential elections. Al Gore needs these states with their large vote totals to win a national election. There are enough industrial union members in these six states that they could tip a close race. If the union membership were dispersed throughout the United States, their leverage would be greatly diminished since they couldn’t concentrate their votes to deliver key states.

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3. What trade-offs do Al Gore and other Democrats face in accommodating labor? Explain.

**ANSWER.** If Al Gore gives in to protectionist sentiment to accommodate these industrial unions, he risks losing states like California (Silicon Valley), Washington (Boeing), New York (Wall Street), and New Jersey (pharmaceutical firms) that depend on foreign trade for their livelihood. For example, Gore has made a particular push to gain money and votes from Silicon Valley, which is highly dependent on exports. Pushing protectionist policies could lead to a backlash against Gore from Silicon Valley executives who understand that foreign countries would likely retaliate against U.S. products. Moreover, a protectionist stance could cost Gore farm state votes as well because farmers are highly dependent on exports. Gore also has to be concerned that he will lose the votes of middle-of-the-road Democrats and independents if he is viewed—as Walter Mondale was—as a tool of labor.

4. How can U.S. manufacturers compete with foreign producers? Are they doomed, as suggested by the president of the United Steelworkers of America?. Explain.

**ANSWER.** The objective evidence shows that U.S. manufacturers can compete against foreign producers, although not across the board. Rather, U.S. firms have a comparative advantage in a number of high technology industries and industries where close coordination between customer and producer is key (such as fashion design). In fact, U.S. industrial output is up but the number of manufacturing jobs has not risen; it's just that higher productivity means that companies don't have to hire as many new workers to produce the higher output. U.S. companies also have a comparative advantage in many service industries, such as financial services, consulting, and telecommunications.

5. Are the unions and their members right to be concerned about the effects of free -trade policies? What are these effects that they are concerned about? Who would be helped and who would be hurt if the unions got their way on trade? Explain.

**ANSWER.** Yes. The industrial unions have set wages and benefits well above market levels. They were able to get away with such high levels of compensation as long as they were not facing competition from lower-paid foreign workers whose labor is embodied in imported products. Lower-priced foreign imports will put pressure on competing U.S. goods and, therefore, on the compensation enjoyed by industrial union members. Thus, protectionist policies will protect the wages and benefits of these union workers. At the same time, they will lead to higher prices to U.S. consumers of both foreign goods and services and the domestic goods and services that compete with them. A less obvious effect will be the harm caused to companies that export. Protectionism will lead to less demand for foreign exchange, thereby raising the value of the dollar and making U.S. exports less competitive overseas.

## SUGGESTED ANSWERS TO CHAPTER 1 QUESTIONS

1.a. What are the various categories of multinational firms?

**ANSWER.** Raw materials seekers, market seekers, and cost minimizers.

b. What is the motivation for international expansion of firms within each category?

**ANSWER.** The raw materials seekers go abroad to exploit the raw materials that can be found there. It just happens that nature didn't place all natural resources domestically. Market seekers go overseas to produce and sell in foreign markets. The cost minimizers invest in lower-cost production sites overseas in order to remain cost competitive both at home and abroad. In all cases, the firms involved recognize that the world is larger than the home country and provides opportunities to gain additional supplies, sell more products or find lower cost sources of production.

2.a. How does foreign competition limit the prices that domestic companies can charge and the wages and benefits that workers can demand?

**ANSWER.** As domestic producers raise their prices, customers begin substituting less expensive goods and services supplied by foreign producers. The likelihood of losing sales limits the prices that domestic firms can charge. Foreign competition also acts to limit the wages and benefits that workers can demand. If workers demand more money, firms have two choices. Acquiesce in these demands or fight them. Absent foreign competition, the cost of acquiescence is relatively low, particularly if the industry is unionized. Since all firms will face the same higher

costs, they can cover these higher costs by all of them simultaneously raising their prices without fear of being undercut or of being placed at a competitive disadvantage relative to their peers. Foreign competition changes the picture since foreign firms' costs will be unaffected by higher domestic wages and benefits. If domestic firms give in on wages and benefits, foreign firms will underprice them in the market and take market share away. In this case, higher domestic costs will put domestic firms at a disadvantage vis-à-vis their foreign competitors. Recognizing this, domestic firms facing foreign competition are more likely to fight worker demands for higher wages and benefits.

b. What political solutions can help companies and unions avoid the limitations imposed by foreign competition?

**ANSWER.** The classic political solution is protectionism. By limiting foreign competition, either through tariffs or quotas, companies and workers limit the ability of foreign goods to restrain domestic price increases. The government can also subsidize domestic firms in competing against foreign firms. These subsidies allow domestic firms and unions to perpetuate uneconomic work rules, wages, and production processes.

c. Who pays for these political solutions? Explain.

**ANSWER.** Consumers pay for protectionism in the form of higher prices for their goods and service, fewer choices, and lower quality. These consumers include firms that use imports to produce their own goods and services for sale. Taxpayers pay for subsidies in the form of higher taxes or fewer of the other services provided by government.

3.a. What factors appear to underlie the Asian currency crisis?

**ANSWER.** Asian countries had run up huge debts, mostly in dollars, and were depending on the stability of their currencies to repay these loans. Worse, Asian banks, urged on by the often corrupt political leadership, were shoveling loans into money-losing ventures that were controlled by political cronies. The result was financially troubled economies that could not generate the income necessary to repay their dollar loans.

b. What lessons can we learn from the Asian currency crisis?

**ANSWER.** Financial crises can be avoided or mitigated if financial markets are open and transparent, thereby leading to investment decisions that are based on sound economic principles rather than cronyism or political considerations. Countries can stimulate healthier economies by avoiding policies that suppress enterprise, reward cronies, and squander resources on ego-building but economically dubious, grandiose projects.

4.a. What is an efficient market?

**ANSWER.** An *efficient market* is one in which new information is readily incorporated in the prices of traded securities. In an efficient market one cannot expect to prosper by finding overvalued or undervalued assets. In addition, all funds require the same risk-adjusted returns. Absent tax considerations or government intervention, therefore, market efficiency suggests that there are no financing bargains available.

b. What is the role of a financial executive in an efficient market?

**ANSWER.** In an efficient market, attempts to increase the value of a firm by purely financial measures or accounting manipulations are unlikely to succeed unless there are capital market imperfections or asymmetries in tax regulations. The net result of these research findings has been to focus attention on those areas and circumstances in which financial decisions and financial managers can have a measurable impact. The key areas are capital budgeting, working capital management, and tax management. The circumstances to be aware of include capital market imperfections, caused primarily by government regulations, and asymmetries in the tax treatment of different types and sources of revenues and costs. As such, the role of the financial manager is to search for and take advantage of capital market imperfections and tax asymmetries to increase after-tax profits and lower the cost of capital. As noted in the chapter, the value of good financial management is enhanced in the international arena because of the much greater likelihood of market imperfections and multiple tax rates. In addition, the greater complexity of international operations is likely to increase the payoffs from a knowledgeable and sophisticated approach to internationalizing the traditional areas of financial management.

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5.a. What is the capital asset pricing model?

**ANSWER.** The CAPM quantifies the relevant risk of an investment and establishes the trade-off between risk and return; i.e., the price of risk. It posits a specific relationship between diversification, risk, and required asset returns. In effect, the CAPM says that the required return on an asset equals the risk-free return plus a risk premium based on the asset's systematic or nondiversifiable risk. The latter is based on market-wide influences that affect all assets to some extent, such as unpredictable changes in the state of the economy or in some macroeconomic policy variable, such as the money supply or the government deficit.

b. What is the basic message of the CAPM?

**ANSWER.** The CAPM's basic message is that risk is priced in a portfolio context. From this it follows that only systematic risk is priced; unsystematic risk, which by definition can be diversified away, is not priced and hence doesn't affect the required return on a project.

c. How might a multinational firm use the CAPM?

**ANSWER.** The CAPM can be used to estimate the required return on foreign projects. It also can help a company raise the right questions about risk when considering the desirability of a foreign project, the most important being which elements of risk are diversifiable and which are not.

6. Why might total risk be relevant for a multinational corporation?

**ANSWER.** Higher total risk is relevant for an MNC because it could have a negative impact on the firm's expected cash flows. The inverse relation between risk and expected cash flows arises because financial distress, which is more likely to occur for firms with high *total* risk, can impose costs on customers, suppliers, and employees and thereby affect their willingness to commit themselves to relationships with the firm. In summary, total risk is likely to affect a firm's value adversely by leading to lower sales and higher costs. Consequently, any action taken by a firm that decreases its total risk will improve its sales and cost outlooks, thereby increasing its expected cash flows.

7. A memorandum by Labor Secretary Robert Reich to President Clinton suggests that the government penalize U.S. companies that invest overseas rather than at home. According to Reich, this kind of investment hurts exports and destroys well-paying jobs. Comment on this argument.

**ANSWER.** The assumption underlying Secretary Reich's memo is inconsistent with the empirical evidence. According to this evidence, U.S. companies that invest abroad tend to expand their exports from the United States. The jump in exports stems from the fact that by investing abroad, companies are able to expand their presence in foreign markets as well as protect foreign markets that would otherwise be lost to competitors. This enables them to sell more product, most of which is made in the United States. In addition, the foreign plants tend to use components and capital equipment that are mostly made in and exported from U.S. plants. Penalizing U.S. companies that invest abroad as Secretary Reich suggests would most likely lead to the loss of foreign markets as well as the additional exports that such markets generate. Such penalties would also reduce the efficiency of the world economy. After all, there is usually a reason, rooted in sound economic logic, why MNCs invest abroad.

8.a. Are multinational firms riskier than purely domestic firms?

**ANSWER.** Although multinational corporations are confronted with many added risks when venturing overseas, they can also take advantage of international diversification to reduce their overall riskiness. We will also see in Chapter 16 that foreign operations enable MNCs to retaliate against foreign competitive intrusions in the domestic market and to more closely track their foreign competitors, reducing the risk of being blindsided by new developments overseas.

b. What data would you need to address this question?

**ANSWER.** You would need to take relatively comparable firms in the same industry, but with different percentages of earnings from abroad, and compare the variability of their earnings.

9. Is there any reason to believe that MNCs may be less risky than purely domestic firms? Explain.

**ANSWER.** Yes. International diversification may actually allow firms to reduce the total risk they face. Much of the general market risk facing a company is related to the cyclical nature of the domestic economy of the home country. Operating in a number of nations whose economic cycles are not perfectly in phase may, therefore, reduce the overall variability of the firm's earnings. Thus, even though the riskiness of operating in any one country may exceed the risk of operating in the United States (or other home country), much of that risk is eliminated through diversification. In fact, as shown in Chapter 15, the variability of earnings appears to decline as firms become more internationally oriented.

10. In what ways do financial markets grade government economic policies?

**ANSWER.** Traders and their customers receive a continuing flow of news from around the world. The announcement of a new policy leads traders to buy or sell currency, stocks or bonds based on their evaluation of the effect of that policy on the market. A desirable policy leads them to buy more of the assets favorably affected by the policy, while a policy that is judged to be harmful leads to sell orders of those assets that will be hurt by the policy. The result is a continuing global referendum on a nation's economic policies, even before they are implemented.

Politicians who pursue particular economic policies that they perceive to be beneficial to them (e.g., by improving their re-election odds), even if these policies harm the national economy, usually don't appreciate the grades they receive. But the market's judgments are clear-eyed and hard-nosed and will respond negatively to unsound fiscal and monetary policies. Politicians will not admit that it was their own policies that led to higher interest rates or lower currency values or stock prices; that would be political suicide. It is much easier to blame greedy speculators rather than their policies for the market's response.

## ADDITIONAL CHAPTER 1 QUESTIONS AND ANSWERS

1. In seeking to predict tomorrow's exchange rate, are you better off knowing today's exchange rate or the exchange rates for the past 100 days?

**ANSWER.** In an efficient market, which the foreign exchange market certainly appears to be, the current price of an asset such as a currency fully reflects all available information, including the complete price history. Thus knowing today's price is as informative from a forecasting standpoint as knowing all past prices. Past prices add nothing to the current price in terms of forecasting ability.

2. Why might setting up production facilities abroad lead to expanded sales in the local market?

**ANSWER.** By producing abroad, a company can more easily keep abreast of market developments, adapting its products and production schedules to changing local tastes and conditions while, simultaneously, providing more comprehensive after-sales service. Establishing local production facilities also demonstrates a greater commitment to the local market and an increased assurance of supply stability. This is particularly important for firms that produce intermediate goods for sale to other companies.

3a. How might total risk affect a firm's production costs and its ability to sell? Give some examples of firms in financial distress that saw their sales drop.

**ANSWER.** Higher total risk can lead to lower sales and higher production costs. The inverse relation between risk and expected cash flows arises because financial distress, which is more likely to occur for firms with high *total* risk, can impose costs on customers, suppliers, and employees and thereby affect their willingness to commit themselves

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to relationships with the firm. Examples include Chrysler and Texaco, which saw their sales fall and costs of doing business rise when they were in financial distress.

- b. What is the relation between the effects of total risk on a firm's sales and costs and its desire to hedge foreign exchange risk?

**ANSWER.** Since total risk is likely to adversely affect firm value, by lowering sales and raising costs, any action taken by a firm that decreases its total risk will improve its sales and cost outlook, thereby increasing its expected cash flows. These effects help justify the range of corporate hedging activities designed to reduce total risk that MNCs engage in.

### SUGGESTED ANSWERS TO APPENDIX 1A QUESTIONS

1. In a satirical petition on behalf of French candlemakers, Frederic Bastiat, a French economist, called attention to cheap competition from afar: sunlight. A law requiring the shuttering of windows during the day, he suggested, would benefit not only candlemakers but "everything connected with lighting" and the country as a whole. He explained: "As long as you exclude, as you do, iron, corn, foreign fabrics, in proportion as their prices approximate to zero, what inconsistency it would be to admit the light of the sun, the price of which is already at zero during the entire day!"

- a. Is there a logical flaw in Bastiat's satirical argument?

**ANSWER.** No. Bastiat is precisely right. The objective of trade is to gain access to goods and services at lower quality-adjusted prices. The ultimate consequence is to make more efficient use of the world's resources and thereby increase worldwide production and consumption. Protectionism aims to prevent this end. If protectionism succeeds, world output and consumption are lower than they might otherwise be because resources are not being put to their highest valued use. In the example cited by Bastiat, protectionism will lead to a squandering of resources by replicating what the sun can do less expensively.

- b. Do Japanese automakers prefer a tariff or a quota on their U.S. auto exports? Why? Is there likely to be consensus among the Japanese carmakers on this point? Might there be any Japanese automakers that are likely to prefer U.S. trade restrictions? Why? Who are they?

**ANSWER.** It depends. To understand why, it helps to recognize the consequences of these alternative trade barriers. Both tariffs and quotas will lead to higher prices to U.S. consumers of imported Japanese cars. With tariffs, however, most of this price increase will go to the U.S. government in the form of tariffs. Japanese companies (or their dealers), on the other hand, will collect most, if not all, of the higher prices associated with the scarcity of imported Japanese cars. Once the Japanese producers hit their quota limit, they have no incentive to compete with each other by cutting price because they cannot sell more cars than they already are. The net result is that the U.S. market will be extraordinarily profitable to Japanese automakers, which it was.

Since quotas tend to be allocated based on current sales, those automakers like Toyota and Nissan with large market shares would prefer quotas, whereas those automakers like Honda and Mitsubishi with smaller market shares would prefer tariffs. The reason for the latter's preference for tariffs is that efficient companies can eventually overcome the effects of tariffs by cutting costs and prices, whereas efficiency counts for nothing in the case of quotas. Regardless of the type of trade barrier imposed, U.S. automakers will raise their prices in line with higher import prices. However, U.S. automakers are likely to prefer quotas because quotas enable them to disguise the reason for higher U.S. car prices. Consumers would be much quicker to figure out the cause-effect relationship between higher tariffs and higher prices on U.S. and Japanese cars.



- c. What characteristics of the U.S. auto industry have helped it gain protection? Why does protectionism persist despite the obvious gains to society from free trade?

**ANSWER.** The U.S. auto industry has received as much protection as it has for two key reasons. First, it is a large and powerful industry. Second, it is concentrated in several politically important states, such as Michigan and Illinois.

2. Review the arguments both pro and con on NAFTA. What is the empirical evidence so far?

**ANSWER.** NAFTA has helped increase international trade between the United States, Mexico, and Canada. The results thus far indicate that NAFTA has created some jobs in both countries and cost some jobs. Indeed, the purpose of free trade is not to create jobs but to increase the purchasing power and choice of consumers. With respect to jobs, the effect of free trade is not to create jobs, but to create higher-paying jobs that replace lower-paying jobs. The number of jobs in an economy is independent of the presence or absence of trade. It has every thing to do with the incentives that people have to work, their productivity, and the costs to employers of hiring workers. What trade does is permit workers to hold jobs in those areas of the economy in which the nation has a comparative advantage. At the same time, trade destroys jobs in those goods and services in which the nation is at a comparative disadvantage.

3. Given the resources available to them, countries A and B can produce the following combinations of steel and corn.

Country A		Country B	
Steel (tons)	Corn (bushels)	Steel (tons)	Corn (bushels)
36	0	54	0
30	3	45	9
24	6	36	18
18	9	27	27
15	12	18	36
6	15	9	45
0	18	0	54

- a. Do you expect trade to take place between countries A and B? Why?

**ANSWER.** Yes. Given the data presented, we can see that if country A has 6 units of resources and it devotes  $X$  of these units to steel production, where  $X$  is an integer, it can produce a total of  $6X$  tons of steel and  $3(6 - X)$  bushels of corn. Similarly, with 54 units of resources, country B of which it devotes  $Y$  units to steel production, it can produce  $Y$  tons of steel plus  $(54 - Y)$  bushels of corn. The net effect of these production functions is that one bushel of corn is worth 2 tons of steel in country A. In contrast, one bushel of corn is worth only one ton of steel in country B. These relative prices indicate that country A has a comparative advantage in the production of steel, whereas B has a comparative advantage in the production of corn.

- b. Which country will export steel? Which will export corn? Explain.

**ANSWER.** Given these comparative advantages, A will export steel and B will export corn. The price of corn will settle somewhere between one and two tons of steel. Suppose it settles at 1.5 tons of steel. Then, instead of producing, say, 30 tons of steel and 3 bushels of corn, it can devote an additional resource unit to the production of an additional 6 tons of steel. It can trade these 6 tons of steel with B for  $6/1.5 = 4$  bushels of corn, leaving it one bushel of corn better off. Similarly, B can now get 6 tons of steel for the 4 bushels of corn it trades to A instead of the 4 tons of steel it could produce on its own with the resources it took to produce the 4 bushels of corn.