

Economia Internazionale

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Capitolo 9(b)

L'outsourcing di beni
e servizi

Introduction

- A vast array of products consist of materials, parts, components, and services that are produced in multiple countries.
- The provision of services or the production of various parts of a good in different countries that are then used or assembled into a *final good* in another location is called **foreign outsourcing**, or simply **outsourcing**.
- Outsourcing is a type of trade that differs from what we have studied so far.

Introduction

- Outsourcing is the trade in *intermediate inputs*, which can sometimes cross borders several times before being incorporated into a final good.
- Outsourcing is a relatively new phenomenon as the costs of transportation and communication have fallen so much that it is now economical to combine resources from many countries to produce a good or service.

Introduction

- Is outsourcing different from the type of trade we studied in the Ricardian and Heckscher-Ohlin models?
- We will look at how outsourcing compares to these models. In some ways it is similar and in some ways it is different.
- Outsourcing results in lower prices, but changes the mix of jobs in the U.S.
- In some ways outsourcing is similar to immigration as U.S. companies can employ foreign labor although those workers still live in their own countries.

Introduction

- The goal of this chapter is to examine in detail the phenomenon of outsourcing and describe in what ways it differs from trade in final products.
 - ◆ How does outsourcing affect the demand for skilled and unskilled labor and their wages?

Outsourcing versus Offshoring

SIDE BAR

- The term “offshoring” is sometimes used to refer to a company moving some of its operations overseas, but retaining ownership of those operations.
 - ◆ Intel produces microchips in China and Costa Rica using subsidiaries that it owns.
 - ◆ Intel has engaged in foreign direct investment (FDI) to establish those offshore subsidiaries.
 - ◆ Mattel, on the other hand, arranges for the production of the Barbie doll in several different countries.

Outsourcing versus Offshoring

SIDE BAR

- ◆ The difference is that Mattel does not actually own the firms in those countries.
- ◆ Mattel is engaging in outsourcing as it contracts with these firms, but has not done any FDI.
- In this chapter we will not worry about the distinction between “offshoring” and “outsourcing.”
- We will use outsourcing whenever the components of a good or service are produced in several countries, regardless of who owns the plants that provide the service or components.

A Model of Outsourcing

- To develop the model of outsourcing, we need to distinguish all the activities used to produce and market a good or service.
- Figure 7.2 (a) describes the activities in the order in which they are performed.
- However, for outsourcing, it is more useful to look at the activities according to the ratio of skilled to unskilled labor they use which is shown in figure 7.2 (b).
 - ◆ We start with the less skilled activities and move to more complex components and then onto the more skilled labor activities.

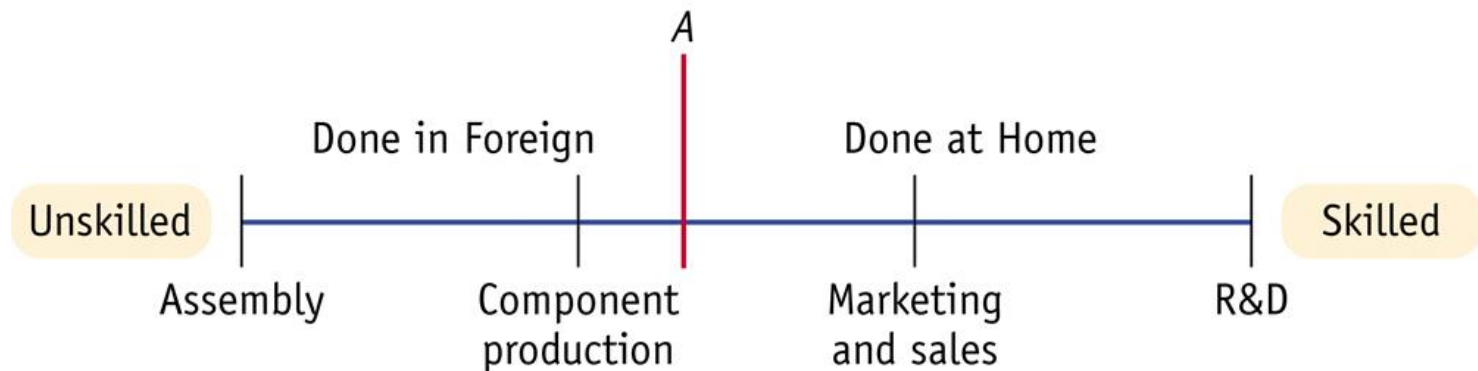
A Model of Outsourcing

Figure 7.2

(a) Activities Ranked by Order in Production



(b) Activities Ranked by Skilled/Unskilled Labor



A Model of Outsourcing

- Value Chain of Activities
 - ◆ The whole set of activities we just described is sometimes called the **value chain** for the products.
 - Each activity adds more value to the combined product.
 - ◆ Some of the activities can be transferred to other countries when it is more economical.
 - ◆ By looking at activities in terms of their relative amount of skilled labor, we can predict which ones are likely to be transferred abroad.

A Model of Outsourcing

- This prediction depends on several assumptions:
 1. Relative Wage of Skilled Workers
 - ◆ We assume that Foreign wages for unskilled and skilled workers are less than those at Home.
 - ◆ $W^*_L < W_L$ and $W^*_S < W_S$
 - ◆ Additionally, we assume the *relative* wage of unskilled labor is lower in foreign than at home.
 - ◆ $W^*_L / W^*_S < W_L / W_S$
 - ◆ Remember that unskilled labor in developing countries typically receives especially low wages.

A Model of Outsourcing

2. Costs of Capital and Trade

- ◆ Although labor costs are lower in Foreign, the firm must also take into account extra costs of doing business there.
 - Higher prices to build a factory or for costs of production.
 - Extra costs in communication or transportation.
- ◆ In making a decision to outsource, the firm will balance the saving from lower wages against the extra costs of capital and trade.
- ◆ We assume that these extra costs apply uniformly across all the activities in the value chain—a somewhat unrealistic assumption.

A Model of Outsourcing

3. Slicing the Value Chain

- ◆ Based on our previous assumptions, it will make sense for the firms to send the most unskilled-labor intensive activities abroad and keep the more-skilled labor intensive activities at Home.
- ◆ In figure 7.2 that might be all activities to the left of the vertical line A.
- ◆ This is referred to as *slicing the value chain*.
- ◆ Activities to the left of line A are sent abroad because the cost savings from paying lower wages in Foreign are greatest for the less-skilled labor intensive activities.

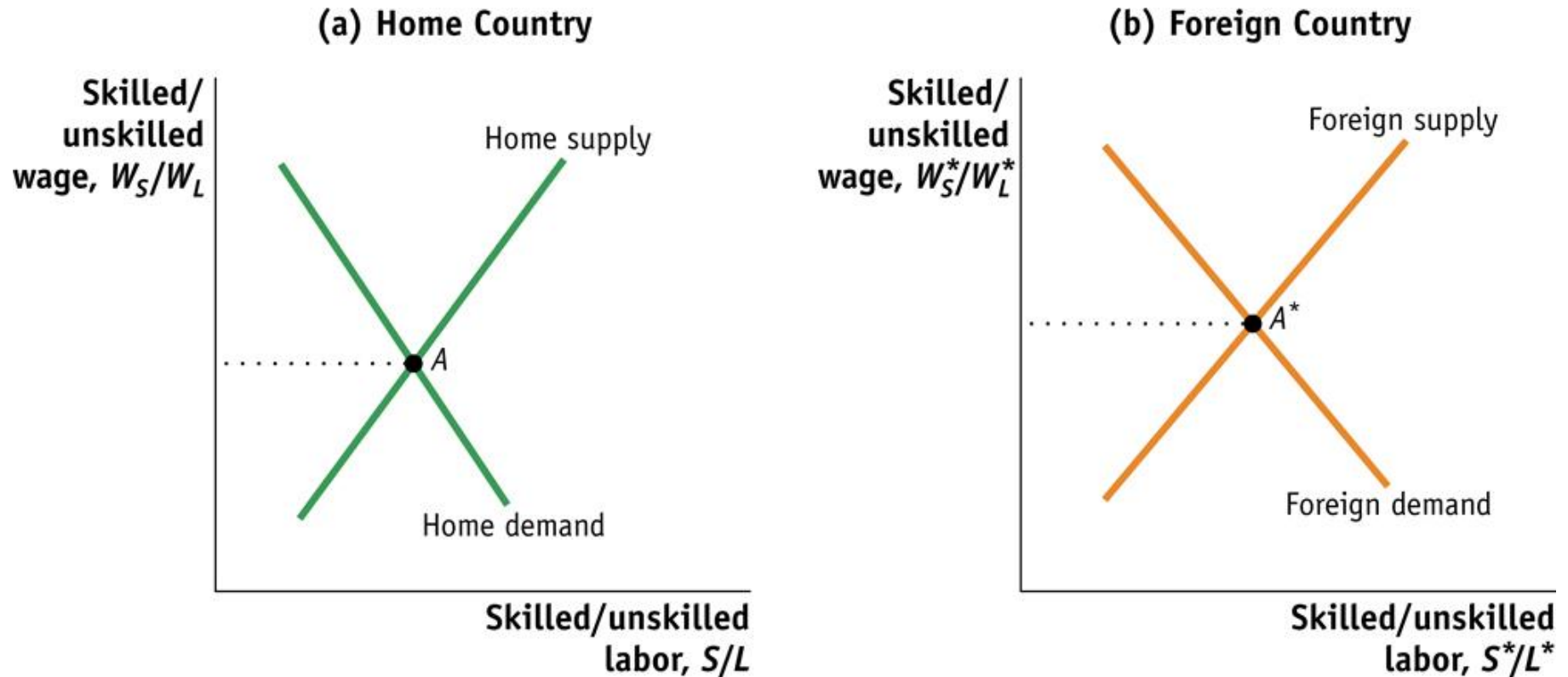
A Model of Outsourcing

4. Relative Demand for Skilled Labor

- ◆ Figure 7.3 graphs the demand for labor in each country.
- ◆ For Home we graph the relative demand for skilled labor at Home, S/L against the relative wage, W_S/W_L for activities to the right of line A.
- ◆ The relative demand curve slopes downward because a higher relative wage for skilled labor would cause home firms to substitute toward less-skilled labor in some activities.
- ◆ We can do the same thing for Foreign.

A Model of Outsourcing

Figure 7.3



A Model of Outsourcing

- Relative Demand for Skilled Labor
 - ◆ We can add a relative supply curve to the graph.
 - ◆ The relative supply curve is upward sloping because a higher relative wage for skilled labor will cause more skilled individuals to enter the industry.
 - ◆ The intersection of the relative demand and relative supply curves gives the equilibrium relative wage in this industry in each country.
 - ◆ We can now study how the equilibrium changes as Home outsources more activities to Foreign.

Changing the Costs of Trade

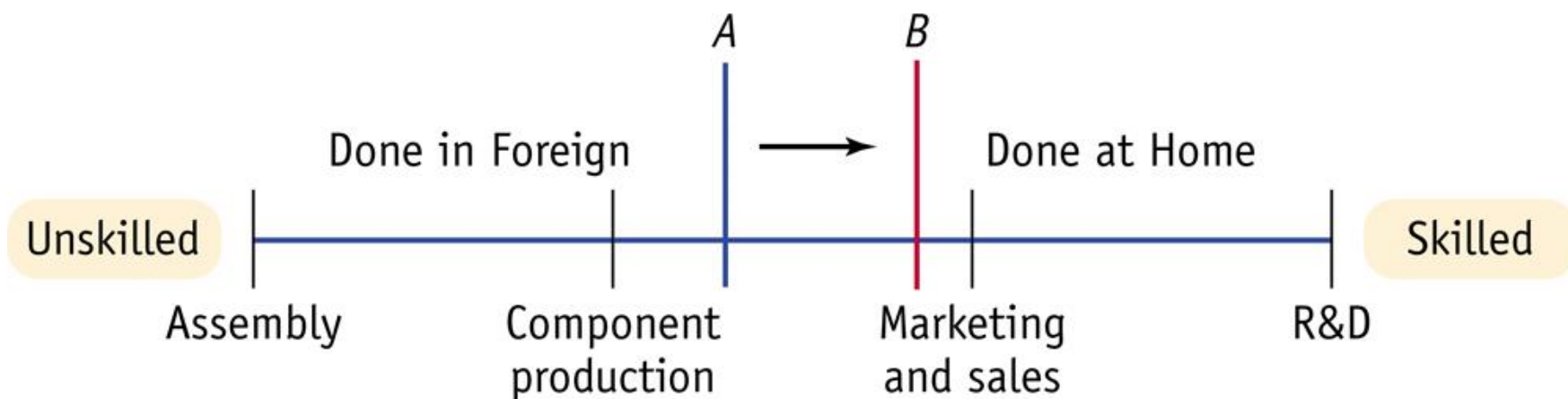
- Suppose that the costs of capital or trade in Foreign fall.
 - ◆ E.g. NAFTA lowered tariffs charged on goods crossing the U.S.-Mexico border.
- Lowering trade costs makes it easier for Home to outsource to Foreign.
- What are the effects of these changes on labor demand and relative wages?

Changing the Costs of Trade

- Change in Home Labor Demand and Relative Wage
 - ◆ When costs of capital or trade decline in Foreign, there is an incentive to shift more activities in the value chain from Home to Foreign.
 - The dividing line in the value chain shifts right (shown in figure 7.4).
 - ◆ The activities shifted to Foreign are less skill-intensive than the ones left at Home.
 - ◆ The range of activities now done at Home are more skilled labor intensive on average.
 - ◆ The relative demand for skilled labor at Home will increase.

Changing the Costs of Trade

Figure 7.4



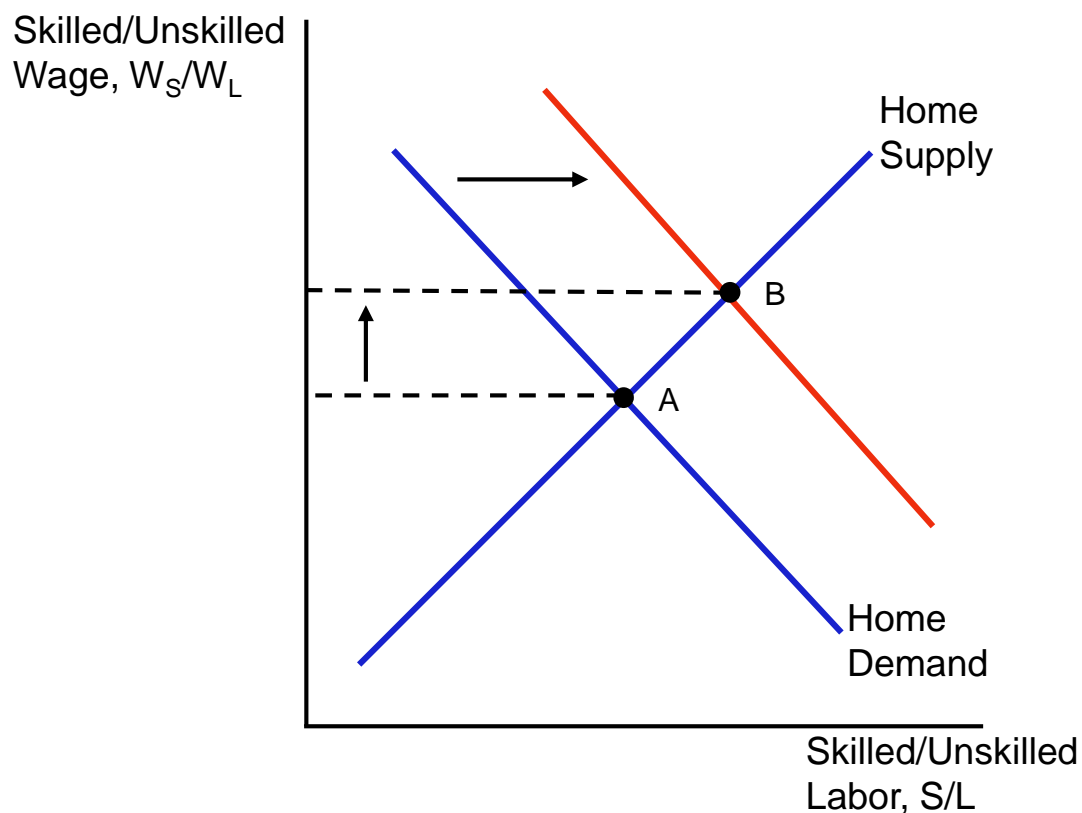
Changing the Costs of Trade

- Change in Home Labor Demand and Relative Wage
 - ◆ The Home demand curve will shift right, shown in figure 7.5 (a).
 - ◆ Remember this graph shows the *relative* demand, not the absolute quantity of labor demanded.
 - We would expect the absolute demand of skilled and unskilled workers to decrease with increased outsourcing.
 - ◆ BUT, *relative* demand increases because the activities still done at Home are more skill-intensive than before.
 - ◆ The relative wage of skilled labor will increase due to outsourcing.

Changing the Costs of Trade

Figure 7.5

(a) Home Country



Relative demand increases because the jobs done at home are now more skill intensive than before.

The relative wage of skilled labor increases due to outsourcing.

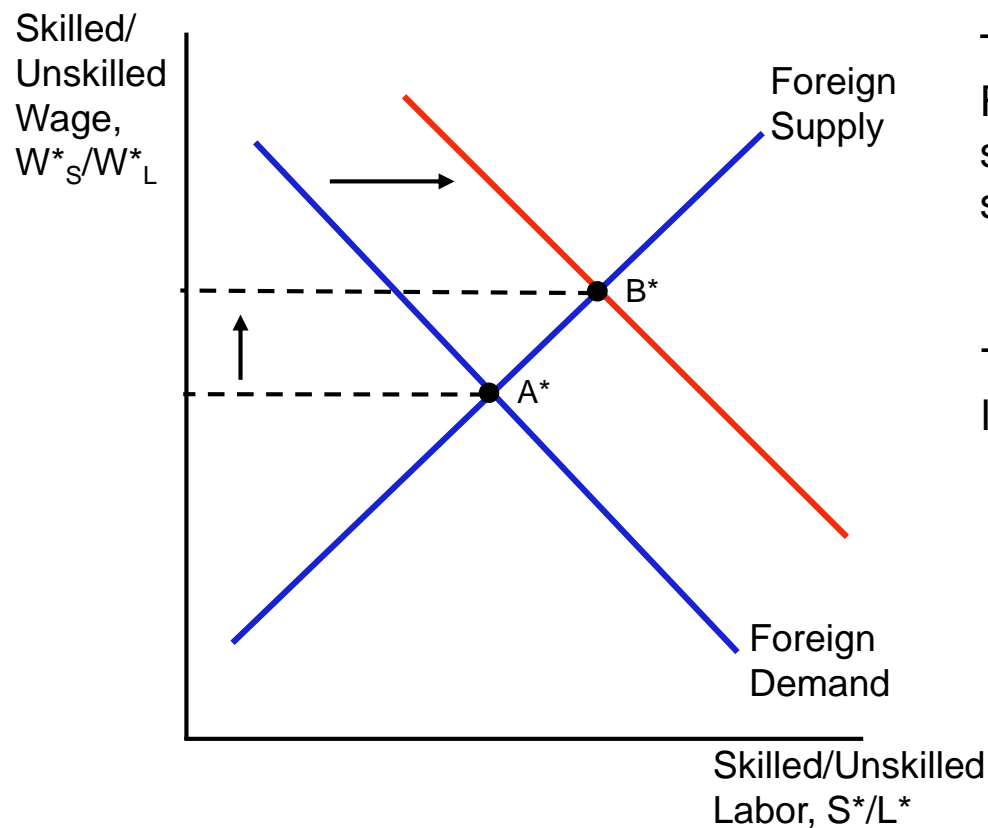
Changing the Costs of Trade

- Change in Foreign Labor Demand and Relative Wage
 - ◆ For Foreign, the activities that are newly outsourced there are more skill-intensive than those initially outsourced to them.
 - ◆ The range of activities in Foreign are more skilled-labor intensive on average.
 - ◆ Therefore the *relative* demand for skilled labor in Foreign will increase.
 - ◆ The demand curve shifts to the right as seen in figure 7.5 (b).
 - ◆ The *relative* wage of skilled labor increases in foreign.

Changing the Costs of Trade

Figure 7.5

(b) Foreign Country



The activities outsourced to Foreign are more skill intensive so the relative demand for skilled labor increases

The relative wage of skilled labor increases in Foreign

Changing the Costs of Trade

- From this model we can see that both countries experience an increase in the relative wage of skilled labor due to increased outsourcing.
 - ◆ As activities in the middle of the value chain are shifted from home to Foreign, they raise the *relative* demand for skilled labor in both countries because these activities are the *least* skill-intensive of those formerly done at Home but the *most* skill-intensive of those done in Foreign.
 - ◆ So the relative demand for skilled labor rises in both countries along with the relative wage.

Change in Relative Wages in the United States

APPLICATION

- Since the early 1980s, the wages of skilled workers have risen relative to those of unskilled workers in the U.S. as well as other countries.
- We can use data from the manufacturing sector on “production” (unskilled) and “non-production” (skilled) workers.

Change in Relative Wages in the United States

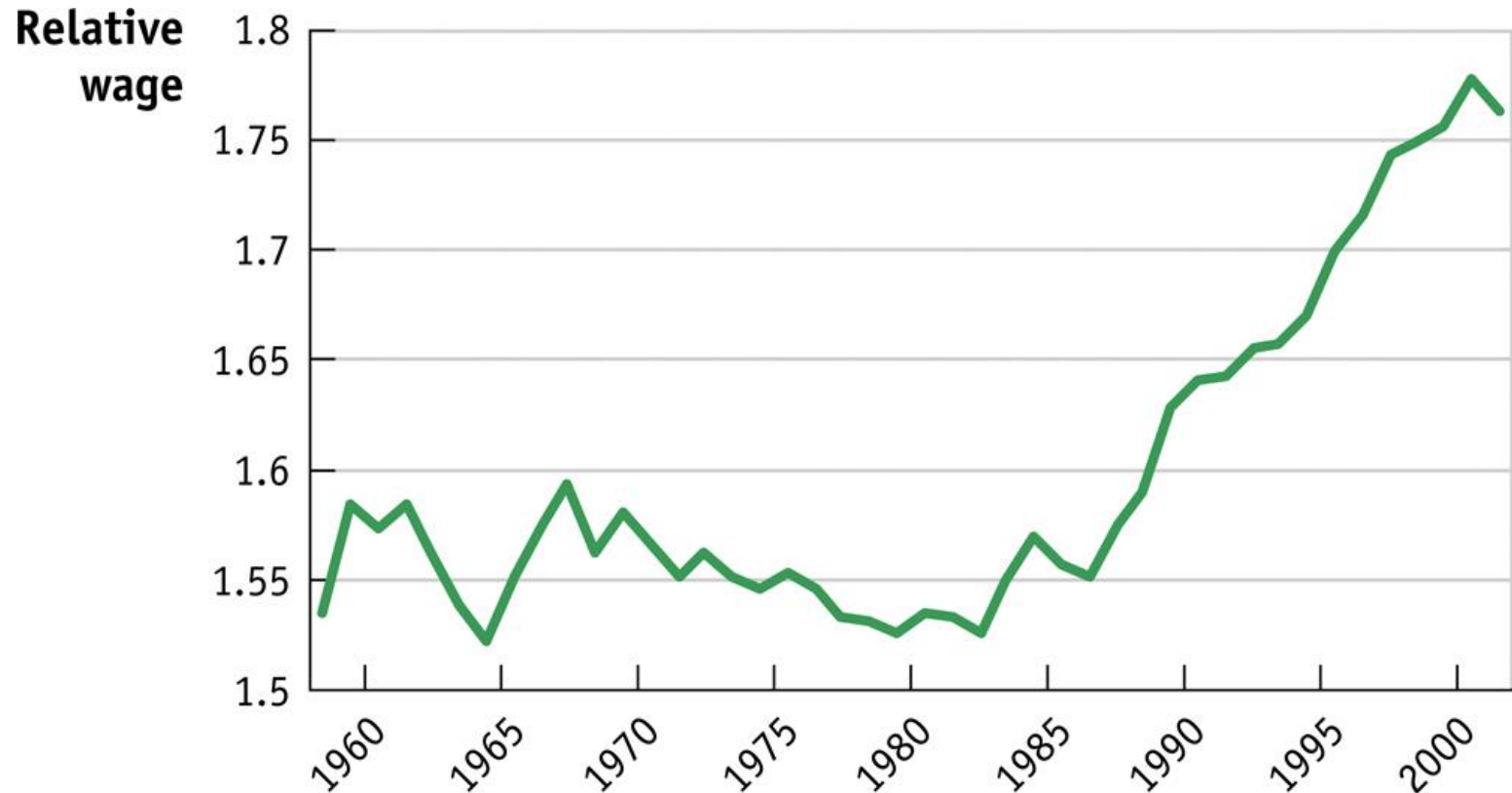
APPLICATION

- Relative Wage of Non-production Workers
 - ◆ Figure 7.6 shows the average annual earnings of non-production workers relative to production workers in U.S. manufacturing from 1958 to 2001.
 - Relative earnings were erratic from 1958 to 1967, and fell from 1968 to 1983 due to increased supply of college graduates.
 - In 1983 the relative wage increased steadily to 2000.

Change in Relative Wages in the United States

APPLICATION

Figure 7.6



Change in Relative Wages in the United States

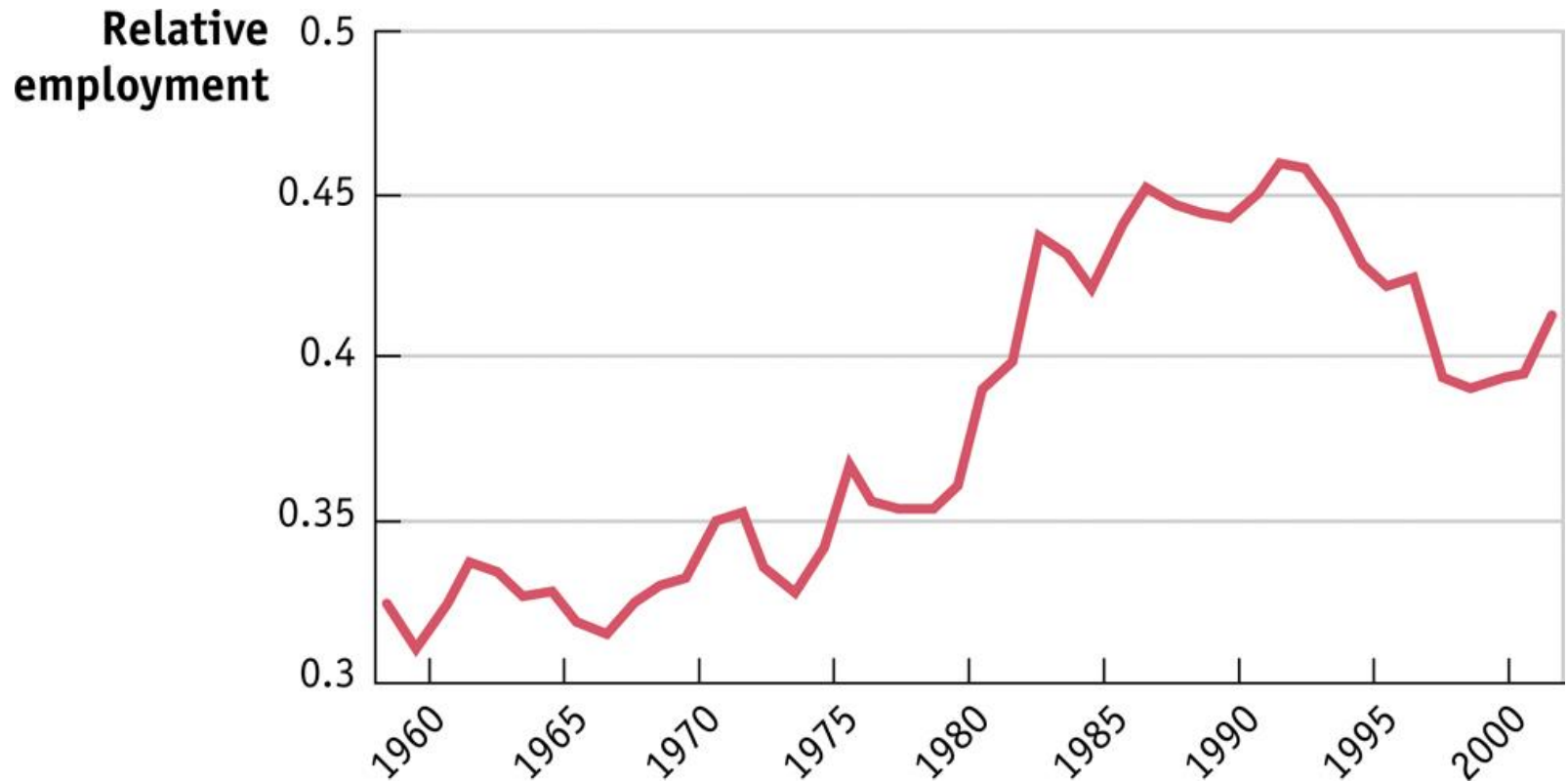
APPLICATION

- Relative Employment of Non-production Workers
 - ◆ Figure 7.7 shows a steady increase in the ratio of non-production to production workers employed in U.S. manufacturing until the early 1990s.
 - Firms were hiring fewer production, or unskilled, workers relative to non-production workers.
 - In 1990s there was a fall in the ratio of non-production to production workers.
 - ◆ From 1980 to about 1990, the relative employment of non-production workers continued to rise even with a rising relative wage of non-production workers.

Change in Relative Wages in the United States

APPLICATION

Figure 7.7



Change in Relative Wages in the United States

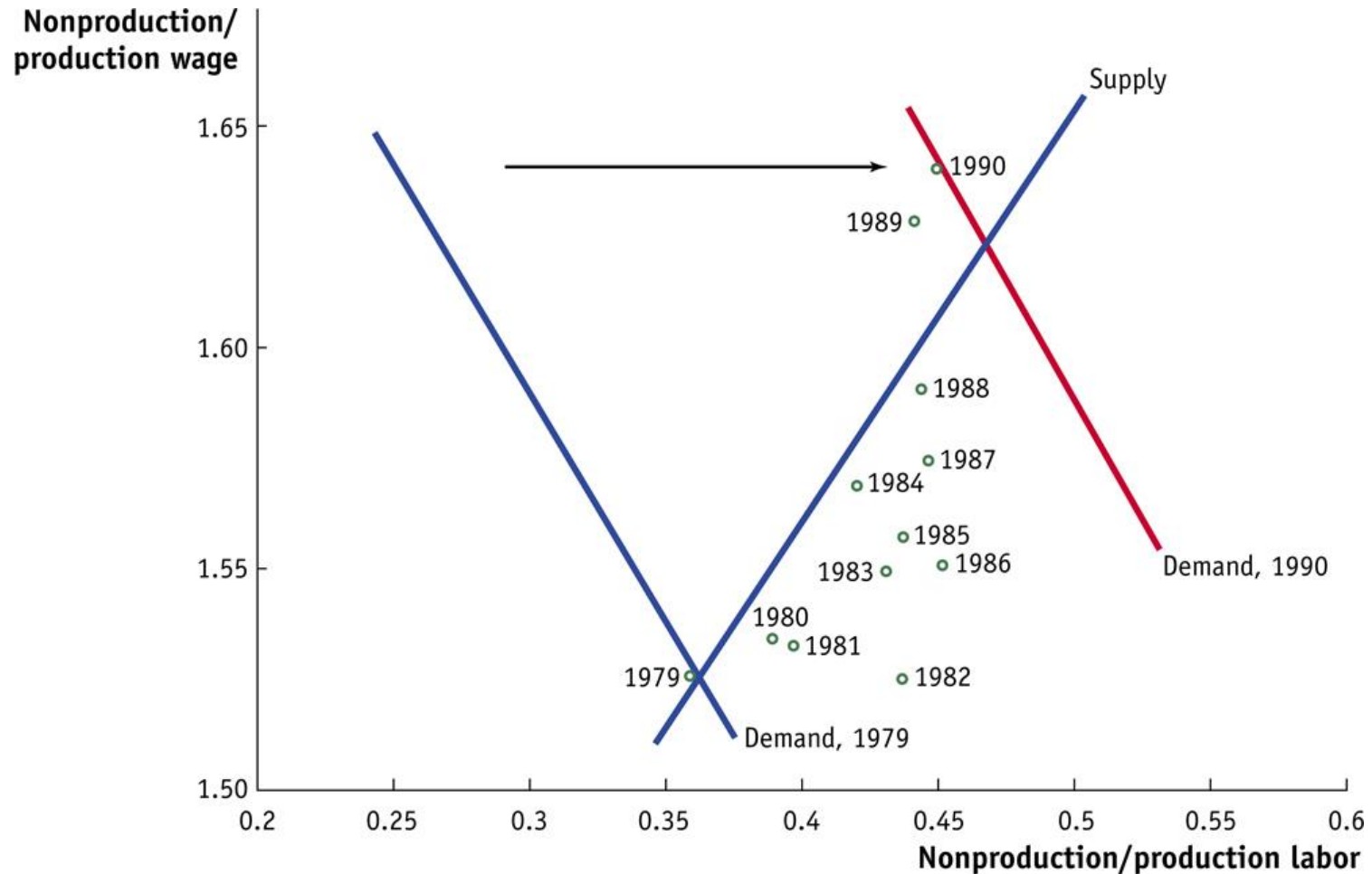
APPLICATION

- Relative Employment of Non-production Workers
 - ◆ The only way both of these could increase is if there was an outward shift in the relative demand for non-production (skilled) workers during that time period.
 - This would lead to a simultaneous increase in their relative employment and in their wages.
 - ◆ We can see this in figure 7.8 where we plot the relative wage and employment of non-production workers from 1979 to 1990.

Change in Relative Wages in the United States

APPLICATION

Figure 7.8



Change in Relative Wages in the United States

APPLICATION

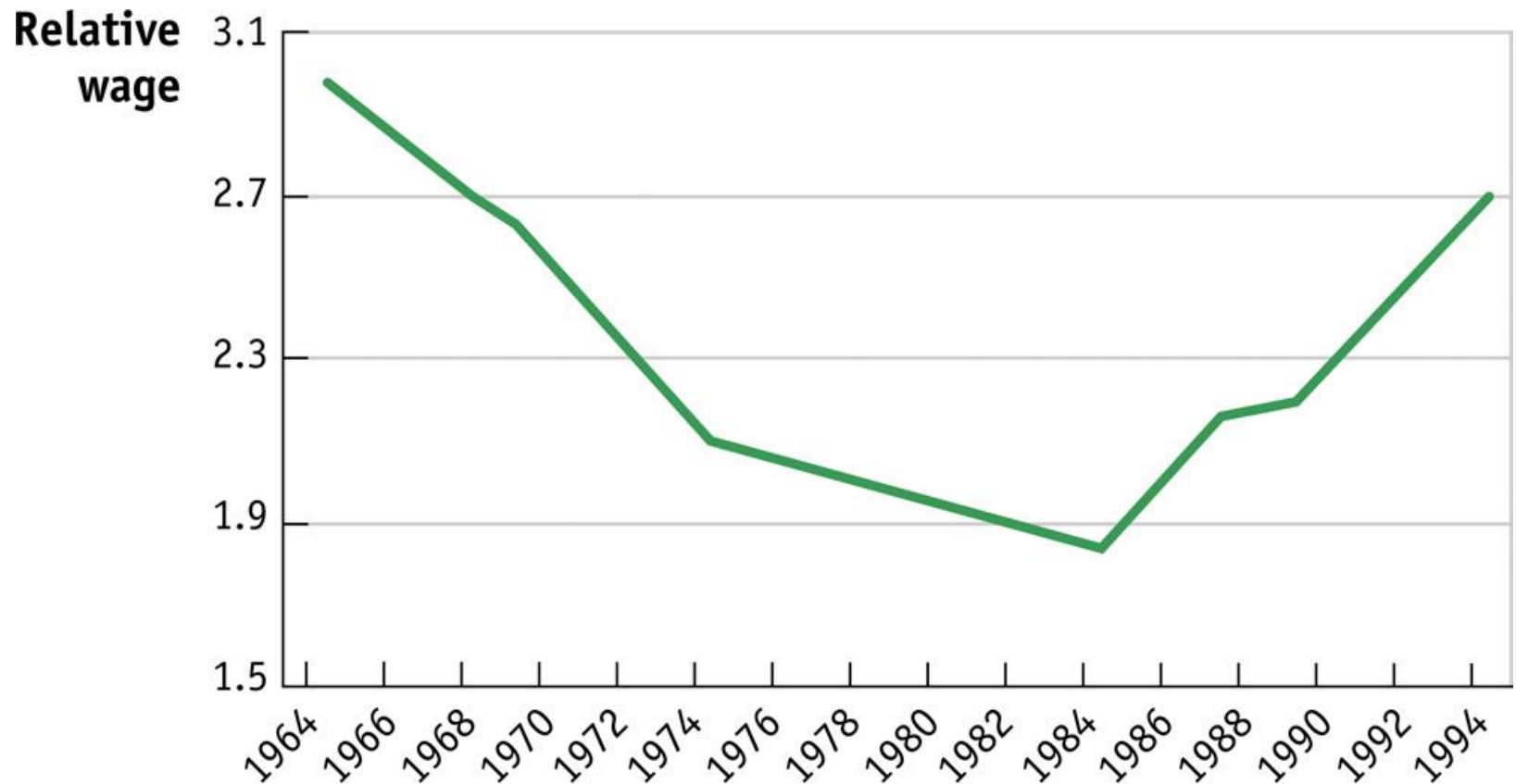
- Explanations
 - ◆ One factor that can lead to an increase in the relative demand for skilled labor is outsourcing.
 - ◆ The evidence from the manufacturing sector in the U.S. is strongly consistent with our model of outsourcing
 - ◆ Another possible explanation is the increased use of personal computers in the workplace during that time frame.
 - This would also cause an increase in the relative demand for skilled labor as workers who knew how to use them would be needed.
 - ◆ This is called skill-biased technological change.

Change in Relative Wages in Mexico

- Our model of outsourcing predicts that the relative wage of skilled labor will rise in both countries.
- We have seen this for the U.S., but what about for Mexico?
- Figure 7.9 shows the relative wage of non-production labor in Mexico from 1964–1994.
 - ◆ Data comes from the census of industries in Mexico which occurs infrequently.
 - ◆ We can see the data seem to follow the same trends that we saw in the U.S.
 - ◆ Relative wages do move in the same direction in both countries.

Change in Relative Wages in Mexico

Figure 7.9



Change in Relative Wages in Mexico

- In summary:
 - ◆ Changes in relative prices in the U.S. and Mexico match from 1964 to 1985 (relative wages falling) and from 1985 to 1994 (relative wages rising).
 - ◆ Outsourcing from the U.S. to Mexico was rising from 1985 to 1994, so the rise in relative wages matches our prediction from the model of outsourcing.

The Gains from Outsourcing

- We have shown that outsourcing can shift the relative demand for labor, and raise the wage for skilled workers.
- Since the wage for unskilled workers is the reciprocal of that for skilled workers, that means that outsourcing will *decrease* the relative wage for *unskilled* workers.
- However, outsourcing reduces production costs which, in a competitive market, reduces prices so outsourcing benefits consumers.

The Gains from Outsourcing

- The goal of this section is to try and balance the potential losses faced by some groups (unskilled labor) with the gains enjoyed by others (skilled labor and consumers).
- In the previous chapters, the Ricardian and Heckscher-Ohlin models generate more gains than losses.
- Is this true for outsourcing?

A Simplified Outsourcing Model

- Suppose there are only two activities: components production and research and development (R&D).
- Each activity uses skilled and unskilled labor, but we assume components uses unskilled labor intensively and R&D uses skilled labor intensively.
- The costs of capital are equal in both activities.
- We want to compare the no-trade situation to an equilibrium with trade through outsourcing, to determine if there are overall gains from trade.

A Simplified Outsourcing Model

- Suppose that the firm has a certain amount of skilled (S) and unskilled (L) labor to devote to components and R&D.
- The two kinds of labor are free to move between the two activities.
- Given the total amount of skilled and unskilled labor, we graph a production possibilities frontier (PPF) for the firm between components and R&D activities—figure 7.10.
 - ◆ Points on the PPF show the mix of skilled and unskilled labor used in the firm for each good.
 - ◆ Moving along the PPF shows opportunity cost.

A Simplified Outsourcing Model

- Production in the Absence of Outsourcing
 - ◆ Suppose that the firm, initially, cannot engage in outsourcing.
 - The component production and R&D done at Home are used to manufacture a final product at Home.
 - It cannot assemble any components in Foreign nor send any of its R&D results abroad.
 - ◆ An isoquant is used to determine how much of the final good is produced.
 - Similar to a consumer's indifference curve except, instead of utility, it illustrates production of the firm.
 - A curve along which the output of the firm is constant despite changing combinations of inputs.

A Simplified Outsourcing Model

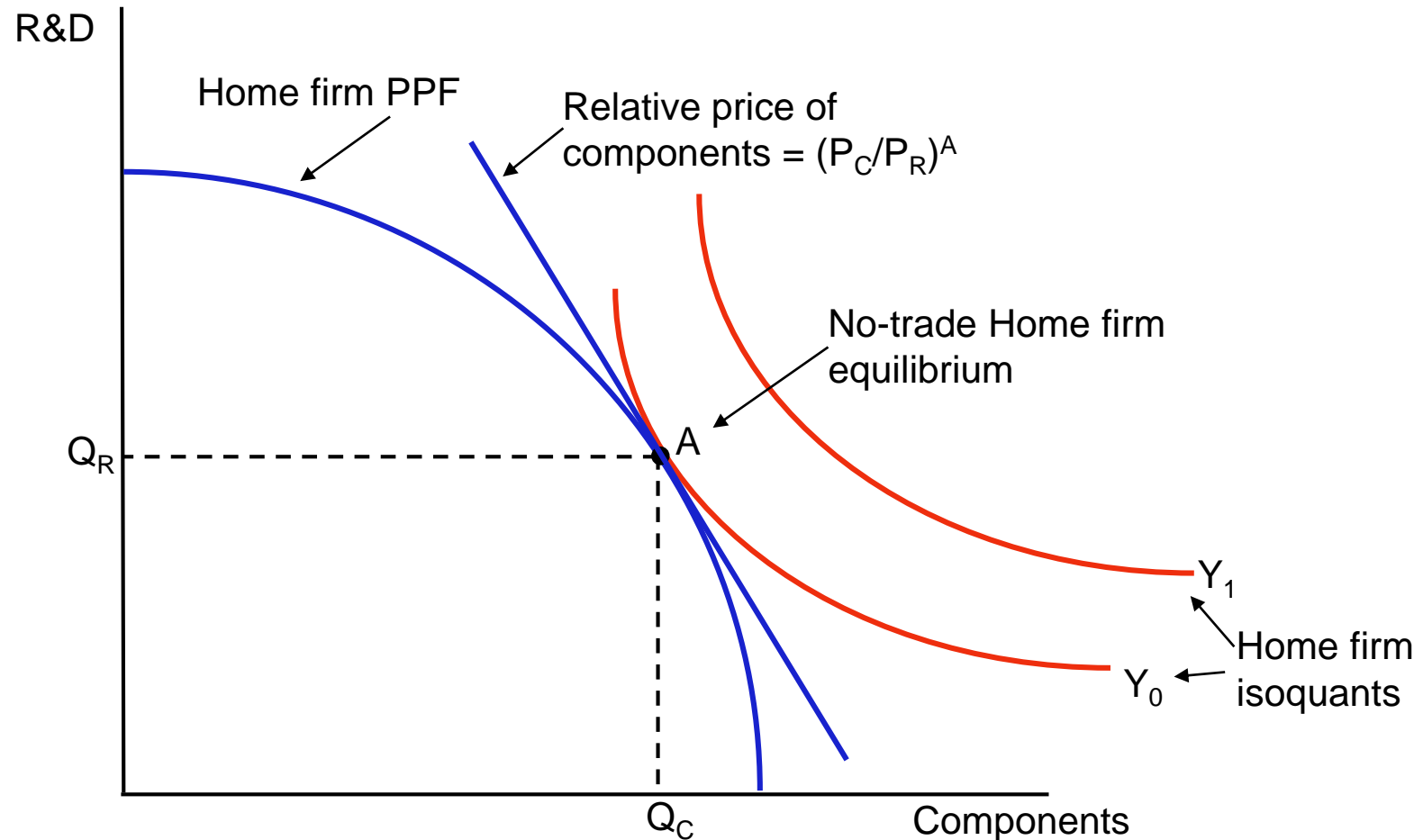
- Production in the Absence of Outsourcing
 - ◆ Figure 7.10 shows production in the absence of outsourcing.
 - ◆ The quantity of the final good Y_0 can be produced using the quantity Q_C of components and the quantity Q_R of R&D shown at point A.
 - ◆ This isoquant is tangent to the PPF showing this is the highest amount of product that can be produced with current amounts of components and R&D.
 - ◆ Y_1 cannot be produced without outsourcing because it lies outside the PPF.

A Simplified Outsourcing Model

- Through the no-trade equilibrium A in figure 7.10, we draw a line with the slope of the isoquant at point A.
- The slope of the isoquant measures the value, or price, that the firm puts on components relative to R&D.
- We can think of these prices as reflecting the marginal costs of production of the two activities.
- The slope of the price line through A is the price of components relative to the price of R&D, $(P_C/P_R)^A$, in the absence of outsourcing.

A Simplified Outsourcing Model

Figure 7.10



A Simplified Outsourcing Model

- Equilibrium with Outsourcing
 - ◆ Now suppose the firm can import and export its production activities through outsourcing.
 - The quantity of the final good is no longer constrained by the Home PPF.
 - A higher level of production (isoquant) is possible by trading intermediate activities.
 - ◆ We will refer to the relative price of the two activities that the Home firm has available through outsourcing as their world relative price, $(P_C/P_R)^{W1}$.
 - ◆ Assume the world relative price of components is cheaper than Home's no-trade relative price.

A Simplified Outsourcing Model

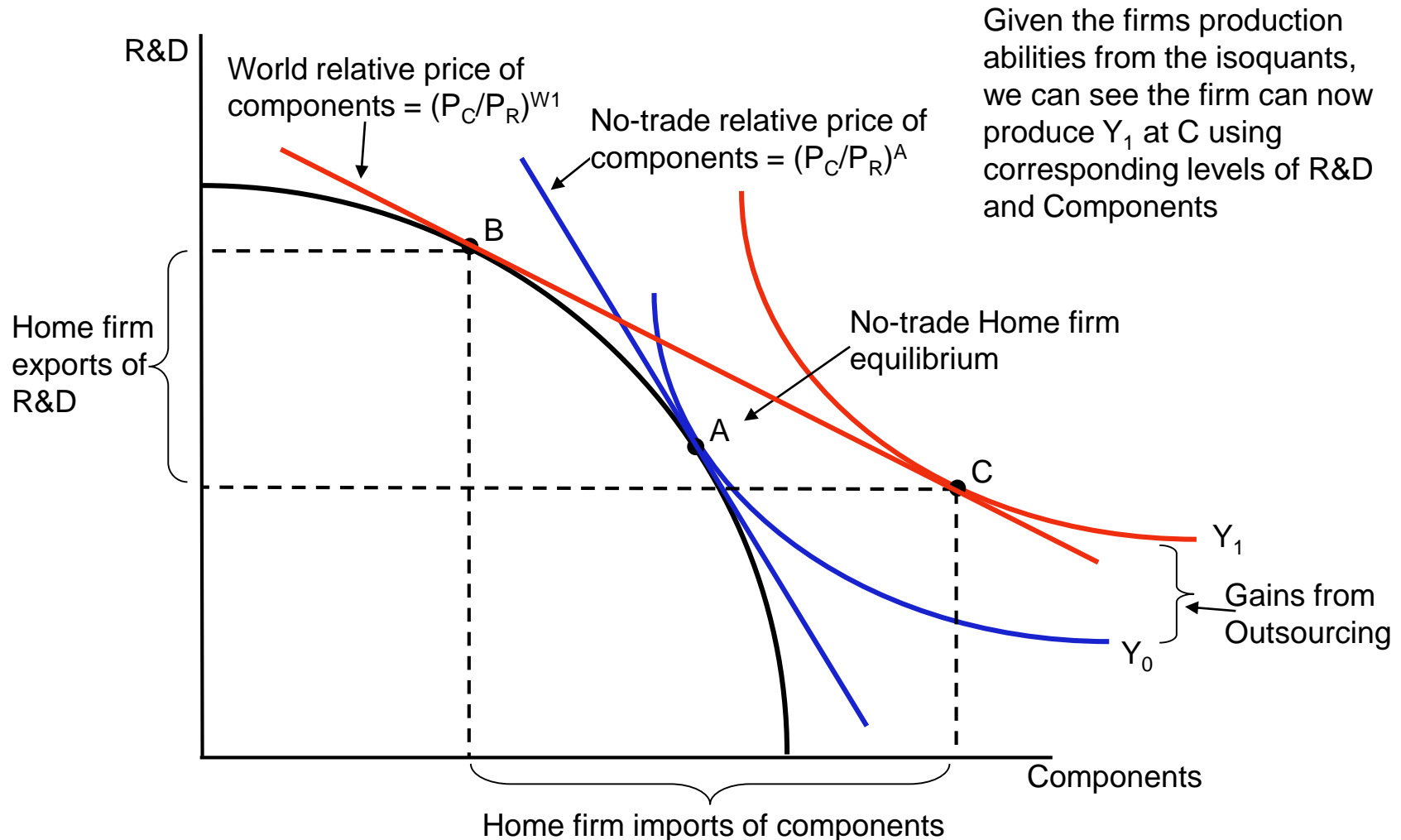
- Equilibrium with Outsourcing
 - ◆ With a lower relative wage of unskilled labor in Foreign, the components assembly will also be cheaper in Foreign.
 - ◆ It follows that Home will want to outsource components, which are cheaper abroad, while Home firms will be exporting R&D, which is cheaper at Home.
 - ◆ The Home equilibrium is shown in figure 7.11.
 - ◆ The world relative price is tangent to the PPF at B, and is flatter than the no-trade relative price line at Home.

A Simplified Outsourcing Model

- Equilibrium with Outsourcing
 - ◆ The flatter line reflects the lower world relative price of components as compared to the no-trade relative price at Home.
 - ◆ The Home firm undertakes more R&D and less component production, moving from point A to point B on the PPF.
 - ◆ Starting at B, the Home firm exports R&D and imports components, moving along the relative price line to point C.
 - The isoquant is tangent to the world price line at a new maximum amount of the good, Y_1 , that can now be produced.
 - ◆ Home can produce more with outsourcing.

A Simplified Outsourcing Model

Figure 7.11



Given the firm's production abilities from the isoquants, we can see the firm can now produce Y_1 at C using corresponding levels of R&D and Components

A Simplified Outsourcing Model

- Gains from Outsourcing Within the Firm
 - ◆ The increase of final goods produced ($Y_0 - Y_1$) is a measure of the gains from trade to the Home firm from outsourcing.
 - ◆ Because more of the final good is produced with the same overall amount of skilled and unskilled labor available in Home, the Home company is more productive.
 - Its costs of production fall.
 - Price if the final product falls.
 - ◆ The gains for this company are therefore spread to consumers as well.

A Simplified Outsourcing Model

- Gains from Outsourcing Within the Firm
 - ◆ Our first conclusion therefore is: *when comparing a no-trade situation to the equilibrium with outsourcing, and assuming that the world relative price differs from that at Home, there are always gains from outsourcing.*
 - ◆ We now need to consider the impact on a country's *terms of trade.*

Terms of Trade

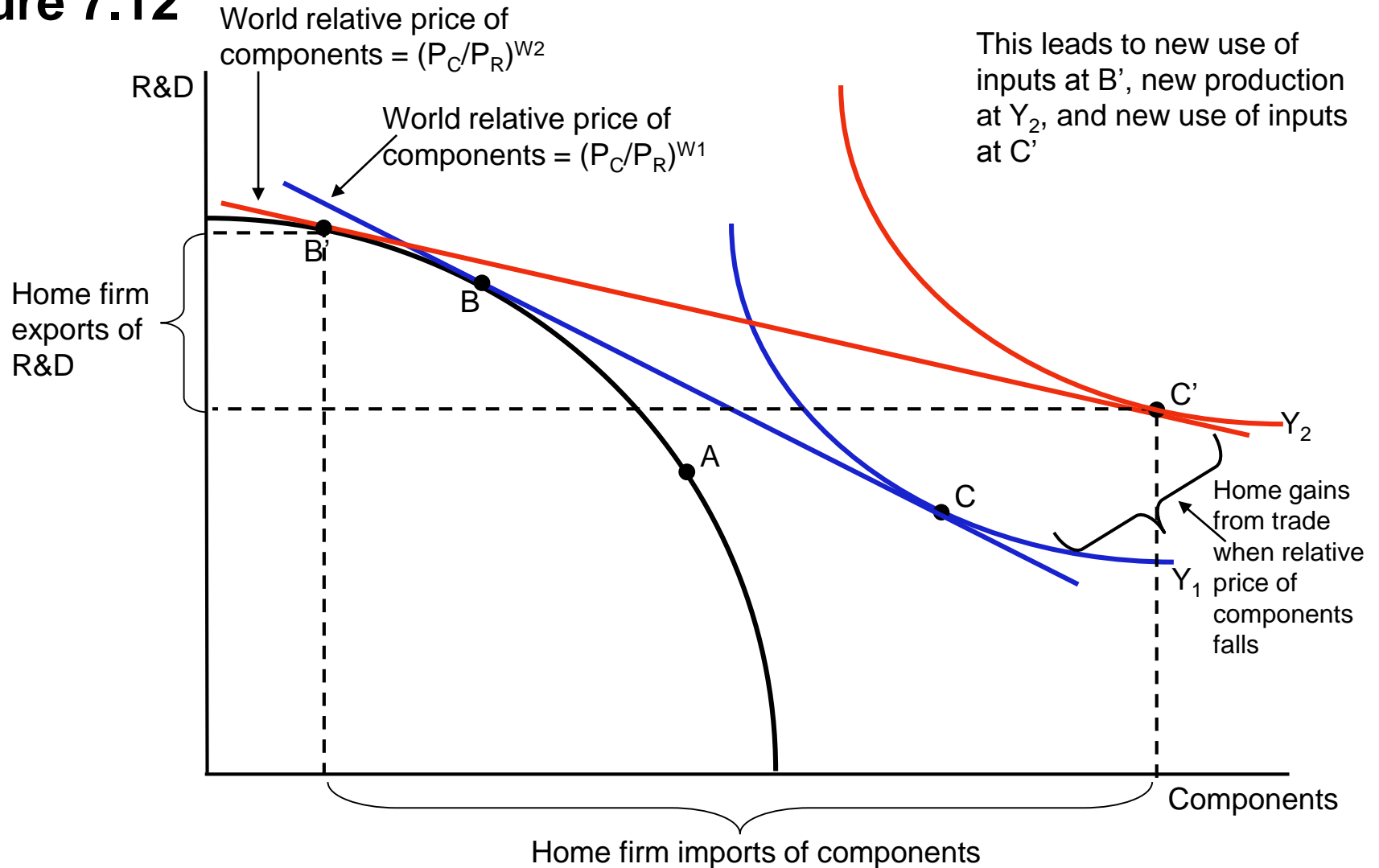
- As before, the terms of trade equal the price of a country's exports divided by the price of its imports.
 - ◆ Home terms of trade are $(P_R/P_C)^{W1}$ since Home is exporting R&D and importing components.
- A rise in the terms of trade indicates that a country is getting a higher price for its exports, or paying a lower price for its imports—both benefit the country.
- Conversely, a fall in the terms of trade harms a country, because it is paying more for its imports and getting less for its exports.

Terms of Trade

- Fall in the Price of Components
 - ◆ Turning to figure 7.12, let the Home country start at the equilibrium with outsourcing shown by points B and C.
 - ◆ Suppose there is a fall in the relative price of component production.
 - Maybe Foreign improves its productivity in components.
 - ◆ This raises the terms of trade for Home.
 - ◆ The world price becomes flatter and production shifts to B'. The firm ends up at point C'.
 - ◆ Production of the final good is $Y_2 > Y_1$.
 - ◆ Home enjoys greater gains due to outsourcing.

Terms of Trade

Figure 7.12



Terms of Trade

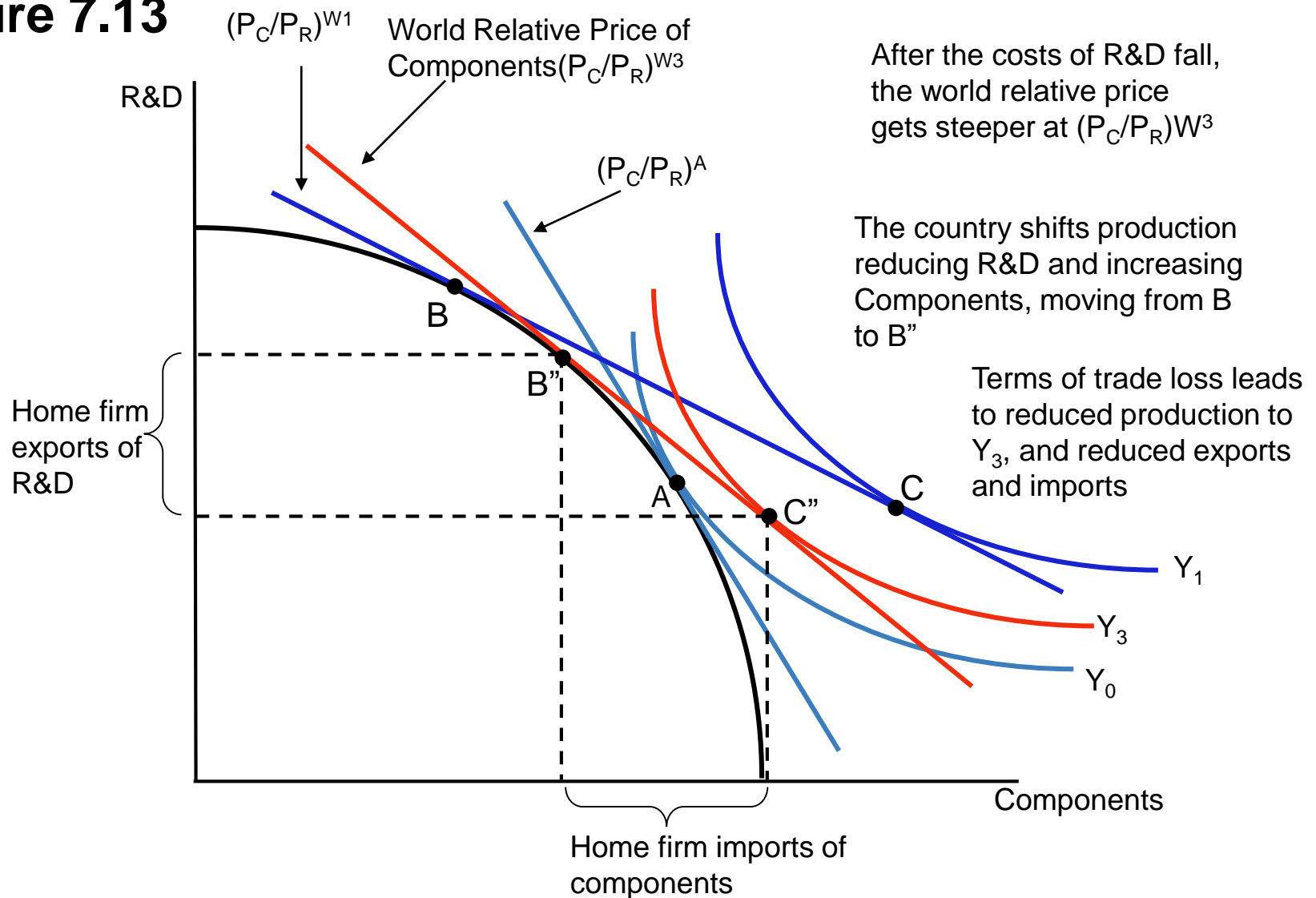
- Fall in the Price of R&D
 - ◆ Samuelson was referring to this when he stated that outsourcing might allow developing countries to gain a comparative advantage in those activities where the U.S. once had the comparative advantage.
 - ◆ For example, as Indian companies like Wipro (an information technology service company) engage in more R&D, they compete directly with American companies exporting the same services.
 - Competition can lower the world price of R&D services.

Terms of Trade

- Fall in the Price of R&D
 - ◆ Figure 7.13 again shows the no-trade equilibrium at point A and Home production at B with outsourcing from figure 7.11.
 - ◆ A fall in the world relative price of R&D will lead to a steeper price line (P_R falls).
 - ◆ Home shifts production to point B'', and by exporting R&D and importing components, moves to point C''.
 - ◆ Final output has fallen from Y_1 to Y_3 .
 - ◆ The fall in the price of R&D services leads to losses for the Home firm compared to point C.

Terms of Trade

Figure 7.13



Terms of Trade

- Fall in the Price of R&D
 - ◆ Remember Home is exporting R&D and importing components in the initial outsourcing equilibrium: terms of trade are P_R/P_C .
 - ◆ When the price of R&D falls, Home terms of trade have worsened and Home is worse off compared to initial outsourcing equilibrium.
 - ◆ Samuelson's point is that the U.S. *could* be worse off if China or India become more competitive in, and lower the prices of, the products that the U.S. itself is exporting.

Terms of Trade

- Fall in the Price of R&D
 - ◆ Additionally, notice that the final output of Y_3 is still higher than Y_0 —the no-outsourcing output.
 - ◆ *There are still Home gains from outsourcing at C'' as compared to the no-trade equilibrium at A .*
 - ◆ Samuelson's point is that a country is worse off when its terms of trade fall, even though it is still better off than in the absence of trade. When there is a fall in the terms of trade, some factors of production will lose and others will gain, but in this case the gains of the winners are not enough to compensate the losses of the losers.

The Future of US Comparative Advantage

- As China and India grow, we should expect that the industrialized countries will face increasing competition in world markets.
- The final issue we address in this chapter is to identify the types of goods or services for which the U.S. can be expected to retain its comparative advantage.
- We will argue that not all production is suitable for outsourcing.

The Future of US Comparative Advantage

- One of the first service activities to be outsourced to India was the transcription of doctor's notes from spoken to written.
- Since then other types of medical services have been outsourced and a New York Times article identified the reading of X-rays as the next area to shift overseas.
- However, there are only certain types of radiology jobs that could potentially be transferred.

The Future of US Comparative Advantage

- The reading of X-rays is difficult and takes years of training and practice to perfect.
- In a few cases, such as mammograms, it is possible that the work can be outsourced.
- Firms known as “nighthawks” already provide some outsourcing services primarily during nighttime hours.
 - ◆ Headquartered in U.S. but have radiologists at offshore sites.
 - ◆ These services allow smaller hospitals that cannot afford a full-time night radiologist.

The Future of US Comparative Advantage

- In many cases, the services being outsourced are not directly competing for the daytime jobs, but instead are complements to these U.S. jobs.
- Radiology is under no imminent threat from outsourcing because the profession involves decisions that cannot be codified in written rules.
- The recognition of patterns cannot be simply passed onto another person or firm—work cannot be outsourced.

The Future of US Comparative Advantage

- In every profession there will be jobs that cannot be duplicated by someone who is not on-site.
- In many manufacturing industries, the U.S. is likely to continue to maintain some activities like R&D and marketing at home, even if a portion is shifted abroad.
- Finally we should recognize that outsourcing ultimately makes the U.S. companies involved more profitable, and therefore able to withstand foreign competition.
- This allows other activities to remain in the U.S.

Conclusions

- We have studied outsourcing, a type of trade that is becoming more important.
 - ◆ Some production is shifted to another country while some is kept at home.
- In our model of outsourcing, since unskilled labor is relatively cheaper abroad, it makes sense for Home to outsource the *less skill-intensive activities* to the Foreign country while keeping the *more skill-intensive activities* at Home.

Conclusions

- From *both* the Home and Foreign point of view, the ratio of skilled to unskilled labor in value chain activities goes up.
- A major conclusion is that an increase in outsourcing will raise the relative demand (and hence the relative wage) for skilled labor in *both* countries.

Conclusions

- We concluded the chapter by exploring outsourcing in service activities.
- The new type of outsourcing that is getting a lot of media attention consists of higher skilled jobs performed by college educated people in countries like India.
- The fact that it is not only possible to shift these activities to India, but economical to do so, shows how new technologies make possible patterns of international trade that would have been unimaginable a decade ago.

Conclusions

- One likely prediction is that the activities in the U.S. that cannot be codified in written rules and procedures, and that benefit from face-to-face contact as well as proximity to other highly-skilled individuals in related industries, will continue to have comparative advantages.