CHAPTER 7

Uncertainty, Exchange and Integration

7.1 SHORTAGE COSTS

One of the advantages of goodwill competition, I argued in chapter 4, is that it reduces uncertainty with respect to the availability of supplies and the strength of demands faced by individual firms. For it is in the nature of goodwill competition that a supplying firm will give preference to its steady customers in conditions of short supply, while purchasers of commodities will give their custom to established suppliers in conditions of short demand.

But cultivating the goodwill of suppliers and customers is not the only means at the disposal of firms seeking to mitigate demand and supply shortages and the attendant costs to the firm. For it is possible to hold stocks of required inputs against uncertainties in the conditions of supply, and to hold stocks of goods completed for sale or the resources required to produce services in order to avoid being caught short by unexpected surges in demands. Alternatively, the purchasers of a commodity can place orders with suppliers in order to assure a flow of supplies in the future, while producers can take orders for future outputs in order to avoid unpredictable failures of demand.

The shortages with which I am concerned here are those which arise in conditions of uncertainty. For in a certain world outputs can be tailored to the known future levels of demands and to the inputs which will be available for their production. In conditions of risk, wherein future
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events are known subject to a probability distribution which is accepted with certainty, managers will be able to follow strategies which reduce the likelihood of incurring ruinous shortage costs to as low a level as the managers of any firm might wish. These conditions are not of interest in the present analysis because in certain or merely risky worlds actions can be tailored to strategies, whereas in a world with an uncertain future strategies must be chosen to mitigate the effects of uncertainty.

Implications of break-even analysis

Both supply and demand shortages have the effect of constraining the sales of the firm. For a supply shortage to be effective, it must entail some bottleneck in the production activities of the firm so that demands cannot be met. Demand shortages clearly limit sales, since customers cannot be forced to come forward. But what are the costs of these shortages?

One obvious shortage cost to commodity producers is the loss of sales revenue, which cannot be entirely offset by a reduction in costs. Clearly, in so far as direct materials costs are concerned, there will be a cost reduction in direct proportion to the reduction in output levels. However, there are some direct production costs which will not fall with output levels. The most obvious of these are direct labour costs and the costs of materials for the purchase of which producers have entered into long-term contracts. The costs of making workers redundant and then hiring replacements once the shortage has been alleviated could well exceed any savings in wage costs during the period of shortages. And suppliers with long-term contracts are unlikely to take kindly to the unilateral abrogation of agreed terms.

Moreover (and this is the point upon which Chandler (1977) rested much of his historical argument), indirect costs are insensitive to short-run variations in output levels. The effect of indirect costs on the cash flows — and hence survival prospects — of the firm will depend upon the size of the mark-up over costs used to determine prices and
upon the proportion of total unit costs accounted for by indirect costs. As is well-known from break-even analysis, a positive profit (or cash-flow) contribution from the sale of any commodity requires a higher rate of capacity utilization in proportion to the indirect costs of production attributable to that commodity. The higher are indirect costs of production, the closer is the break-even level of output and sales to the production capacity of the firm. As a result, the sensitivity of profits and net cash flow to changes in output levels (so-called operating leverage) is very considerable. The higher the indirect and non-variable direct unit costs of production, therefore, the more costly are shortages faced by the firm (cf. Reekie, 1975, pp. 384–9).

So much is elementary managerial economics. When combined with the concepts developed in relation to optimal modes of exchange, however, the implications are profound, although, as far as I know, they have not previously been explored.

One thing, at least, is clear. The attention of managers of firms which incur high indirect costs of administration and production will be focused upon ways of reducing either the operating leverage by reducing the high indirect cost element or the likelihood of unfavourable variations in supplies or demands. Since the size of the fixed-cost element is determined by the state of technology and input prices, one course of action which the firm might follow is to seek alternative technologies. If, however, the firm can keep demand and supply shortages within tolerable bounds, so that, on average, such shortages do not result in negative cash flows, it will be better advised to find ways of reducing total unit costs while taking advantage of any opportunity better to control unforeseeable shortages. That is to say, by containing shortage costs in other ways, firms allow themselves greater flexibility in their choice of technical changes, since they need not then ignore production processes with break-even outputs which are close to production capacities.

There are two sorts of strategy which a firm might adopt in order to mitigate the effects of any generalized demand or supply shortages. The first sort involves exchange; the
second eliminates exchange by vertical integration in production. In the next section I shall consider the exchange strategies and in section 7.3 I shall consider the strategy of vertical integration. In all cases, however, I assume that the strategy chosen conforms with the weak assumption of managerial motivation — that is, that the strategy chosen will be expected to enhance the viability of the firm and so provide consistently positive cash flows.

7.2 UNCERTAINTY AND THE ALLOCATION OF COMMODITIES

At the start of this chapter I suggested that firms could take orders for future outputs or place orders for future inputs, and that they could produce for stock or buy for stock. In this section I consider which of these modes of commodity allocation it would be economic for individual firms to adopt, provided that they do not opt for vertical integration in production.

Producing commodities to order entails higher transactions costs and lower carrying costs than producing commodities for stock. The reasons for this are perfectly obvious. If commodities are produced only to order, the terms of each order must be agreed, but the producing firm will require to hold virtually no stocks of commodities which have been completed for sale. If commodities are produced for stock, then the producing firm will incur the carrying costs of those stocks but can sell from stock to customers as they come along without first agreeing the details of what and how much is to be produced.

Production for stock is more likely, then, in the case of commodities which entail low carrying costs (commodities which are compact and durable). If, moreover, the commodities are highly standardized and in general demand, the firm could expect stock to turn over, establish its production capacity to meet the average demand for the commodity and allow the volume of stocks to vary seasonally or cyclically as the level of demand varies.
If the requirements of the producer's customers are highly specialized, so that the firm cannot produce standard commodities all of which are in general demand, then the rate of stock turn could not be very high, and the firm would require either to produce specialized outputs to order or to maintain stocks of each of a large variety of commodities. If holding stocks of such commodities were to entail any significant carrying costs over time, the producer would be likely to find that the savings on carrying costs which result from production to order would exceed any increased transactions (or order) costs.

What I am arguing here is that compactness, durability and standardization — the commodity characteristics which favour market intermediation — also favour production for stock rather than production to order.

Of course, it is necessary for firms producing to order to have some means of absorbing demand variations. If the production processes operated by the firm entail substantial fixed and indirect unit costs, then the firm would incur shortage costs if it were to be forced to curtail production during periods of slack demand. For this reason, firms producing to order queue their customers, so that the length of the queue (or order-book length) takes up any seasonal or cyclical variations in demand.

But what about the users of commodities? Will they be prepared to queue for required inputs? The answer depends upon the technological characteristics of the production processes employed by the commodity users.

The technology of production by commodity users will determine the lapse of time between the manifestation of a need for an input to the firm's production processes and the requirement to meet that need. If the commodity in question is some direct material input to the production of some item, the demand for which has increased, then the firm will require to increase its inputs of that commodity very quickly in order to satisfy its own customers. How quickly the firm will require to increase its production rate will depend on its own stocks of both inputs and outputs completed for sale. But once these stocks are depleted, the firm will begin to incur shortage costs, the size of which
will depend upon the firm's operating leverage. If the indirect and fixed costs of the firm are so high that break-even capacity is very close to capacity output, and therefore operating leverage is high, then the shortage costs will be substantial, and the firm could profitably offer a premium to producers in order to jump the queue for its outputs.

In other circumstances the need for a commodity will be less urgent once it has become manifest. This will be the case with some inputs to capital investment projects. Those inputs which are required early in the construction of new plant and equipment will be the subject of more urgent demands than the later inputs. Builders, for example, might require to purchase bricks and cement from suppliers' stocks in order to construct a factory, while the machinery, which could not be put in place until the factory building is completed, could more readily be ordered with no loss to the purchaser from taking his place at the end of the queue of machinery customers.

An example: industrial valves

The industrial valves industry is composed both of divisions of a few large firms, such as Guest, Keen and Nettlefolds, and a large number of small firms specializing in particular kinds of valves. One such firm which is well-known to the author specializes in the production of safety valves and pressure-reducing valves. Until the late 1970s this firm would design a valve for every order it received. After a change in management, however, the new management team decided to standardize its output as much as possible in order to be able to stock a relatively small number of standard parts. The fullest extent of standardization which the management team deemed feasible still left the firm with a product range of several hundred distinct sizes and types of valves.

If stored in reasonably dry conditions, there will be no significant physical deterioration of completed valves, although if they are stored long enough, they might become unsaleable through obsolescence. The larger valves are bulky, however, and to hold them in stock requires substantial
storage space. Moreover, a single valve could cost several thousands of pounds to produce, so that, at rates of interest averaging well over 10 per cent since the late 1970s, the cost of financing a valve could cost several hundreds of pounds a year, in addition to the costs of financing and maintaining storage capacity. Because demands for valves are specialized, the firm might receive orders for any particular size and type of valve very infrequently; the size of the order will depend on the particular project for which it is required, and this is not readily predictable. By producing valves only to order, the manufacturer saves substantial storage and financing costs, while at the same time orders received at the start of the construction project for which the valves are required can be met in good time to meet the needs of the buyer. Although the required delivery lags in some projects are shorter than others and, occasionally, shorter than could be met if orders were invariably filled in the order in which they were received, production scheduling can allow for necessary queue jumping so that all deliveries can be made as required by customers.

The technology of valve production rests on computer-controlled machine tools which entail large indirect costs, while direct production costs (wages and materials) are a small and falling proportion of total unit costs in the industry. In consequence, the firm's operating leverage is sufficiently high for short-time operation over several months to be ruinous to the firm. For this reason, valve producers maintain production capacities which, on average over time, are unlikely to involve output rates in excess of the rate at which new orders are received. Thus, fluctuations in demands are taken up by variations in order-book lengths, although customers' orders can usually be filled as they are needed.

7.3 VERTICAL INTEGRATION IN PRODUCTION

If vertical integration in production is the result of a focusing effect within the firm, then the analysis of the conditions leading to such a strategy need not extend the discussion in
chapter 3. In this section I shall be concerned with inducement effects which lead to vertical integration in production.

Arguably, one important class of inducement effect here is that identified by Chandler (1977) in the analysis summarized in section 5.1. It will be convenient to restate Chandler’s argument in terms of the framework developed in this book in order to demonstrate its theoretical as well as its descriptive importance.

In those industries in which technical change has led to highly mechanized production, the capital and running costs of the plant and equipment embodying these technologies have resulted in very high operating leverage which, to be profitable, requires that plant and equipment must be operated at, or very close to, full capacity. Chance shortages of either inputs or demands impose considerable cash-flow losses upon the firm, so that any uncertainty about the stability of supplies and demands must render the likelihood of a profitable outcome from investments in such technologies more uncertain. Systematic shortages simply make innovation in such technologies uneconomic.

If the firm which is investing in high-fixed-cost plant and equipment is doing so in order to grow, then its management team would do well to consider incorporating vertical integration in its growth strategy in order to reduce the uncertainties attaching to that strategy and thereby to render less vulnerable the survival of the firm. In a certain world the management team would compare the shortage costs which result from the purchase of inputs from independent suppliers and sales to independent customers with the shortage costs which would be incurred in a vertically integrated firm. If vertical integration were to reduce shortage costs by more than any increases in transactions and carrying costs which might result from vertical integration, then vertical integration would be an obviously economic element in the strategy of the firm.

Unfortunately, shortages of either inputs or demands are not always readily predictable. Input shortages could result from the bankruptcy of a supplier, which the firm could not have foreseen. The state of demand over the lifetime of an investment might result from deflationary
policies of a government, the election of which was unexpected, or in response to some volatile movement on the financial markets. In the face of such uncertainties, a firm might well seek to incur larger transactions costs, carrying costs, production costs and/or administrative costs in order to minimize the worst possible effects of events in an unpredictable future. Even so, the management team of any firm should be more likely to adopt a strategy of vertical integration the smaller are the likely increases in transactions, carrying, production and organizational costs. More to the point, in an integrated economy in which commodities are produced by means of commodities, vertical integration to secure all supplies and all demands would logically result in a firm which produced all, or almost all, of the goods and services which are available in the economy. At the very least, any management team must order the priorities given to any investment in vertical integration, since the firm can grow no faster than its finances and managerial and other resources allow. For this reason, the management team of any firm considering vertical integration would best ensure its continuing viability by integrating vertically first into those activities which hold the promise of greatest reduction in possible shortage costs for the least cost of integration. Let us consider these costs of integration.

Transactions costs If the rate of utilization of a commodity by the firm is sufficiently high to reach minimum efficient scale in exchange, then the costs of arranging transfers of the commodity within a vertically integrated firm are unlikely to be any greater than the costs of arranging transactions with independent customers or suppliers. Indeed, having a captive supplier or customer within the firm will reduce the search and information costs to below the level of which it is necessary to find and keep independent suppliers and customers.

Carrying costs The issue here is whether carrying costs will be increased or diminished by vertical integration in production. Since carrying costs are likely, on average, to be covered by the price at which the commodity is traded,
vertical integration will affect total carrying costs principally by affecting the volume of stockholdings. As we have seen, if the commodity is specialized to the needs of the user firm, or if it is bulky or perishable, the economic mode of output allocation is by queuing customers. It is more imperative to adopt this mode of output allocation as the operating leverage in the production of the commodity is higher. Nothing can be done in these conditions to reduce carrying costs further.

If, alternatively, the commodity is sufficiently standardized, compact and durable to be held economically in stock by producers, users and intermediaries, then vertical integration could affect carrying costs. Carrying costs of inputs might be reduced by vertical integration if operating leverage in the production of the commodity is low, so that the rate at which it is produced can be varied in response to demands without incurring sizeable shortage costs. Then if any likely shortage costs are less than the costs of carrying stocks of the commodity, the stocks can be very much reduced, and the savings on carrying costs in a vertically integrated firm will exceed the shortage costs which arise from any fluctuations in outputs.

If forward integration is contemplated, it is difficult to see how there could be any reduction in carrying costs unless concentrating production for captive markets involves smaller fluctuations in demands than is found in independent markets. That is, the firm could integrate forward into the production of goods or services for which the demand is more stable than usual, so that steady production rates are matched by steady rates of utilization of the commodity. In that case, it would be unnecessary for the firm to hold stocks in reserve for unexpected surges in demands or to find itself with very large stocks because of unexpected demand shortages.

Although there are many cases of forward integration in production in order to utilize outputs when traditional demands for them are falling or, indeed, of horizontal integration in order to utilize by-products from traditional production processes, I know of no cases in which a firm has integrated forward in production in order to even out
demand patterns and thereby reduce carrying costs. When firms do integrate forward to stabilize demands or even to create demands, the action appears typically to involve forward integration from production into exchange. That is, mass-producing firms take over independent intermediaries or bypass them by expanding their own sales organizations internally. This is a point to which I shall return presently.

Production costs This is quite a simple point, which is closely analogous to the discussion of transactions costs. If the scale of the demands for an input by the firm can be met by the outputs from one or more plants of minimum efficient scale in production, then the costs of production in a vertically integrated firm will not, on technological grounds, be any greater than production in independent firms. The further below the minimum efficient scale of production is the rate of utilization of a commodity by any one firm, the more costly will be the integration and, therefore, the greater must be the savings in shortage costs if vertical integration is to be a viable strategy.

Administrative costs The focusing effects which result in changes in administrative structure as the productive resources of the firm change in scope and scale were discussed in detail in section 2.3: It is, therefore, sufficient to note here that if vertical integration results in two virtually independent organizations operating under the umbrella of a single firm, there is no reason to expect any increase in administrative efficiency. Even so, vertical integration of ownership without corresponding administrative integration will reduce the prospect of shortage costs if the captive supplier gives the captive customer preference in the allocation of outputs. This preference will be important in the cases of commodities produced subject to high operating leverage either if they are produced to the particular requirements of each customer or if they are bulky or perishable. For in these conditions customers will be required to queue for the commodity. If the producers of that commodity, however, are unwilling to provide sufficient production capacity to meet the needs of the market, it will then be
necessary for the users who incur the highest shortage costs from deficient supplies of the commodity to integrate backwards in order to eliminate the market altogether and always to obtain whatever outputs are available from at least one productive establishment.

In effect, vertical integration in these cases provides enterprise in activities which have suffered from entrepreneurial failure and which would be profitable even to independent firms. In such cases, market failure induces firms with high operating leverage to integrate backwards in production. As argued in section 2.3, it is historically indisputable that vertical integration accompanied by administrative integration can yield considerable advantages in co-ordination. For investments in capacity expansion at earlier stages of production will not be undertaken unless there is a clear and known demand for the resulting outputs at the later stages of production. In allocating finance and managerial and other resources to the earlier stages of production, there is far less uncertainty attaching to the investment within the integrated firm than there would be in an independent firm, simply because the integrated firm has a captive customer in itself.

This point occasionally raises the objection that when faced with a captive market for its outputs, a firm might become inefficient in the production of those outputs (see, for example, Reekie, 1975, pp. 283–4). Whether this result is likely depends on the extent and nature of organizational integration which accompanies or follows vertical integration in production. If the firm adopts a multi-divisional form of organization, the central office, as we have seen, will be able to monitor the efficiency of the various divisions and so ensure that the presence of captive markets does not lead to inefficiencies in production.

In summary, provided that the appropriate administrative structure is adopted, one would expect vertical integration in production to reduce some of the uncertainties of investment by rendering more remote the likelihood of substantial shortage costs. For vertical integration creates opportunities for investments in production capacities, the outputs from which have as secure and predictable a market as it is possible
to find. This will be especially important where investments are in production capacities which involve high operating leverage and in which the outputs are themselves employed in production processes involving high operating leverage.

**Examples of vertical integration in exchange and production**

A classic example of the forces described above is that of James Buchanan Duke, who organized the American Tobacco Company. In 1884 Duke leased and had installed in his factory two automatic cigarette rolling machines, which between them had the capacity to saturate the American market for cigarettes, which was then in its infancy. In order to sell the resulting outputs, Duke established sales offices in the larger American cities and undertook extensive advertising campaigns. At the same time Duke signed marketing agreements with wholesalers around the world. The domestic sales offices looked after local distribution and advertising but did not supplant the intermediaries except in so far as they sold directly to the largest retail establishments. Otherwise Duke's firm continued to sell through the traditional channels: tobacco, grocery, drug and other jobbers (Chandler, 1977, pp. 290-2; Porter and Livesay, 1971, pp. 201-8; Tennant, 1950, ch. 2).

This was a case in which an existing demand deficiency focused the attention of the management team (composed only of Duke) upon the need to create additional demands. The resources of the firm at that time were devoted entirely to the production and sales of cigarettes, so that there was no focusing effect which would lead the firm to diversify horizontally. At the same time even the largest producer could not supplant intermediaries who traded not only in cigarettes but also in a wide range of dry goods. These intermediaries could secure economies of joint exchange which were not available to the specialist producer. The very high operating leverage which resulted from the technology adopted by Duke's firm, however, meant that demand deficiencies would impose very large shortage costs which the firm could not survive. Accordingly, Duke sought to
secure his markets by advertising, since he would have been at a serious cost disadvantage had he attempted to supplant either the wholesalers or the retailers by forward integration into specialized cigarette retailing. Indeed, subsequent attempts by the American Tobacco Company to integrate forward into tobacco retailing met with scant success.

Duke’s decision to lease the machines for the manufacture of cigarettes was a clear example of the focusing effect in a firm which had adopted growth as its goal. Once having chosen his growth strategy, however, Duke had no choice but to change the characteristics of the market if he were to succeed and his firm were to survive. This was an example of the inducement effect, since market characteristics largely determined the competitive strategy of heavy advertising and the investment strategy of establishing local sales offices. But, as always, the inducement effect here was not independent of the resources of the firm and the motives and ambitions of its management team. For the resources of the firm and the consequent technology it employed determined the desirable characteristics of the market for cigarettes and so led Duke to establish those characteristics in fact.

Examples of backward integration in production which result from inducement effects are not hard to find. Two obvious cases are the backward integration by oil refiners into exploration and production once they adopted large-scale refining technology and the backward integration by Continental and American steel producers into the mining of iron ore and coal. In both cases the processing technologies entailed high fixed costs and, therefore, operating leverages which made ready and secure supplies of inputs crucial to the avoidance of substantial shortage costs. In both cases there was some forward integration into exchange when wholesalers and retailers ceased to be able to obtain any economies in exchange which the producers could not themselves obtain and, in the case of the Carnegie Steel Company, the intermediaries were unwilling to undertake the investment in stock holdings which Carnegie required in order to be able to sell the high volumes of specialist steels he was producing.
While both iron ore and crude oil are durable and relatively standard commodities, both are bulky, and long-term storage was and remains expensive relative to the prices of these commodities. None the less, the high fixed costs of steel production and oil refining appear to have dominated the inducement to backward integration, although if these commodities could be stored at virtually no cost in relation to the value of the processed outputs, it does seem reasonable to suppose that extensive purchasing organizations and storage facilities could have rendered strategies of backward integration unnecessary.

7.4 MANAGERIAL AND MARKET CO-ORDINATION:
THE IMPORTANCE OF TECHNOLOGY

It has been a constant theme of this and the preceding two chapters that technology is a dominating determinant of the limits to market co-ordination of production and the ways in which productive activities will be co-ordinated by markets when such co-ordination is economic. Although dominant, technology is not, of course, the sole determinant of the existence of markets, the institutions which comprise them and the mode of allocation of commodities in those markets which do exist. The other main factors are the physical characteristics of commodities and buyer and seller concentration. Since the physical characteristics of commodities which are important in the present analysis can only be defined in relation to the technologies of transportation, storage and communication, it is really only concentration factors which give rise to inducement effects leading to vertical integration or the establishment of institutions of exchange and which are not themselves simply a result of the technology employed in production and exchange.

The only established theoretical alternative to this conclusion is that the limits to the activities of the firm and the co-ordinating role of the market are determined primarily by information costs. This is basic to the work of Coase (1937), Alchian and Demsetz (1972) and Williamson (1975),
to which I referred in section 5.1. Now, these authors do not deny that technology is important, any more than I have denied any importance to information costs. What is involved here is a judgement about which factors are dominant.

It will perhaps avoid unnecessary misunderstanding if I distinguish the present approach from theirs. I shall consider first the economic effects of disingenuous deception by parties to transactions. It will be remembered that the school of thought deriving from the work of Coase believes that corporate organization and the extent of vertical integration will be determined primarily by the need to avoid such opportunistic misrepresentation, shirking and deception.

In their book on the development of markets Porter and Livesay (1971) have demonstrated that manufacturers often sell to a few jobbing wholesalers rather than to retailers in order to reduce credit losses and other moral hazards. By way of example, they cite the president of an American firm which mass-produced watches at the turn of the century. He wrote, 'One reason we sell to the jobber is because it is much easier for us to sell to one hundred jobbing houses, who pay us promptly, than to sell to twenty-five thousand jewellers and carry credits and have a very extensive credit department' (Porter and Livesay, 1971, p. 223).

This looks, at first glance, to be precisely the sort of phenomenon which would support the case of the information-cost theorists. The manufacturer in this case chose not to integrate forward in exchange because, in his view, selling to the wholesaler rather than the retailer reduced his exposure to bad debts and reduced his costs in exchange because he was dealing with a few customers who were well-known and, in his experience, reliable. On investigating this example more closely, however, the support it gives to the information-cost theorists is far less clear.

Watches of the sort sold by this firm are compact, durable and standardized. They are ideal subjects for intermediation. In addition, the watch manufacturer clearly secured information economies by trading with 100 wholesalers instead of 25,000 retailers. But, to hark back to an earlier example, there is little to distinguish the position of the watch manufacturer from that of the manufacturer of fountain pens.
who sold his product directly to retailers. The watch manufacturer was unwilling to invest in the resources necessary to trade with many retailers rather than a few wholesalers, while the fountain pen manufacturer in the same historical period did make that very investment. Moreover, both companies have been successful and continue to trade today. And both sell through many of the same retail outlets.

There are two explanations for the different strategies of these otherwise similar firms. One is that the management team of the firm manufacturing fountain pens was composed of better entrepreneurs with the ambition to grow, and this led them to integrate forward in exchange and thereby to reap the wholesalers' profits. The manufacturer of watches might have lacked this entrepreneurial spirit. The second explanation turns on the doctrine of comparative advantage. Let us consider this possibility in more detail. I shall state the position first as an information-cost theorist might.

Each wholesaler, since he deals with a relatively small number of retailers, might be better able than the manufacturer to put personal pressure on them to pay their bills in good time. In each case there could be an element of goodwill which, because of the smaller numbers involved, could be more strongly developed than in a more impersonal relationship between one manufacturer and 25,000 retailing customers. This sounds plausible enough.

But the question which arises is whether it is really likely to be beyond the wit of a wrist-watch manufacturer to put together a sales organization in which each salesman calls on a small number of retailers and is expected to develop the same strength of goodwill as the wholesaler would have done. Moreover, by keeping track of the credit records of 25,000 retailers, the manufacturer could obviously achieve whatever specialization economies were available to wholesalers, each of whom deals with an average of only 250 retailers in the case under consideration. It seems far more likely that except in the case of entrepreneurial failure or a lack of desire to grow, the manufacturer has better and more profitable ways of using the resources available to him.

In the latter case the intermediary simply has a comparative advantage in exchange because the watch manufacturer
could use the resources not devoted to maintaining a larger credit department and sales organization and the finance not devoted to funding the credits for the expansion of production capacity, for backward integration or for horizontal diversification. If such activities hold out the prospect of a greater rate of return than would be expected from forward integration, then the intermediary has a comparative advantage, even if he does not have the absolute advantage which would follow from inequality (5.8) in chapter 5.

The essential difference between the information-cost theories of vertical integration and the theory developed in this book turns on the difference between focusing effects and inducement effects. The information-cost theorists argue, in effect, that information costs which arise from market transactions will induce firms either to integrate vertically or to refrain from so doing. The theory of business strategy developed in this book, however, leads one to accept that the information costs or, better perhaps, misinformation costs which Alchian, Demsetz and Williamson consider to be important might provide a focusing effect, but that there is nothing to render the elimination or continuance of exchange imperative on that account alone. At the very least, the fear of shortage costs in firms with high operating leverage will, to paraphrase Dr Johnson, concentrate the mind even more wonderfully than the costs of misinformation.

Having considered a case in which an information-cost theorist might argue that a strategy of vertical integration was not adopted in order to avoid moral hazard, I shall now consider a case in which one of these theorists has argued that technology is less important than information costs. I would take the opposite view.

The case in question is often cited by writers on the topic of vertical integration in production. It turns on cost savings which are made possible by integrating steel-rolling mills with the blast furnaces in which steel ingots are made. For newly produced steel is hot, and for important steel rolling processes the steel ingots must also be hot. It is obvious that by integrating in a single establishment the furnaces and the rolling
mills the rolled-steel producer is saved the cost of reheating the steel.

Now, Williamson (1975, pp. 83–4) argues that steel production and steel rolling are integrated within the same firm because it would be difficult to agree and enforce contracts between independent furnace operators and rolling-mill operators to ensure that the former would provide the latter with hot steel. In the light of the analysis of this and the two preceding chapters, however, I would argue that hot steel is perishable in respect of its heat. It is also bulky in relation to its value, so that there will be considerable savings in carrying costs — including here the cost of making good any heat loss — by using the steel furnace outputs immediately as inputs to the rolling process. In addition, there are very substantial fixed costs in the maintenance of both the furnaces and the rolling mills, so that the shortage costs of insufficient inputs to the rolling mills or demands for the outputs from the furnaces will be considerable. Both operations entail very considerable operating leverage. Thus, it is the perishability and the bulk of the hot steel, as well as the magnitude of potential shortage costs, which induce the vertical integration of steel production and rolling.

This is not to deny that the costs of contracting for the delivery of hot steel by an independent producer to an independent user will be substantial. However, the technological factors make the cost of any contractual failure very considerable indeed for both parties. Moreover, if it were not for these technological factors, the cost to both the producers and the users of the hot steel could be very much smaller.

In summary, for this case at least the information costs which Williamson deems crucial to his conclusions appear to result from the physical characteristics of the commodity in question and the technical characteristics of the processes in which the commodity is produced and used.