Limit Pricing and Vertical Blending

"You tremble, carcass, but you would tremble still more if you knew where I am going to take you."
Marechal de Turenne

Blending is the coexistence of two types, one observed affirmed by signals (management type) and the other displayed in effective action (player type). [Vertical blending is an exercise of type rather than a case of structural determination. This assumes that it is in the **management's power** to act differently (Lukes, 1975).] For example, the appointment of a new CEO will introduce a new type of management, so we need to further understand how the type of management is blended into the type of player. Vertical blending occurs when the type of management influences the type of player. Management type is embedded within the firm and signalled to the market as a player type. This is important because it links the performance of the company to the type of management. Management are appointed by shareholders or private equity because of their type. Some are known as ruthless cost cutters, some believe in growth by acquisition, some believe in organic growth. The appointment of a new CEO sends a signal to the market, and it is for the market — competitors and equity analysts — to identify the management type in order to avoid misreading the signals and actions of the company as a player.

Weak vertical blending occurs when the culture of the firm or company, composed of all its stakeholders, may influence the type of management by getting management to do what they do not want to do by influencing or shaping or determining their actions. Stakeholders may prefer to persuade management as to a course of action, coerce management to take an action, that is, to secure their compliance by controlling their thoughts and actions. Rational management as a player may simply duplicate the reasoning process of the stakeholders. However, taking control is an irreducible fact because taking control emanates from the control of information within the organisation per se and through the game process. As the game unfolds, management's actions ultimately define the type of player the company has become in the game.

Signalling

Once management realise that they have the power to act differently, and act differently, blending is complete. Therefore, the process

arises when management's actions mean something to them as individuals. In other words, they are capable of processing their own experience in a manner that can confound all predictions by a near rival, all predictions based on the fact finder's observations or the near rival's description of the type of management. The difficulty for management is trying to understand the blend in a rival firm, and the difficulty in coping with the blend may be due to the fact that the type of management per se has been formed, during the game, in reaction to competitors.

The key issue is to provide a template for how management can best represent the blend created within the company in actions or words. To do that is to understand the words and actions of management: the signals. The template is based on player interdependence in a game. While the actions are interdependent, for example, in a sequential pricing game of leader-follower, the signals by which they are prompted are mutually independent. This is because player actions mean something to management as individuals, and different managements will interpret the same signal differently. Consequently, we refer to taking an action as the observed reality: the game success or pay-off, the Porterian competitive advantage, is obtained from knowing when and how to act.

Mutual Interdependence

The type of player arises from an economic foundation based on a theory of oligopoly. Oligopoly is a market structure characterised by a few players, usually fewer than five. The number is significant because with so few players there is a greater interdependency amongst the players, and a greater probability that one of the players will recognise this and try to exploit it. The object is to maximise the economic position of the player, the pay-off, and indeed to obtain a preferred outcome for all players, that is, the market.

In oligopoly markets we are more likely to observe a consolidation across the market shares of the players in time period $t+1$. We make this assumption for the purposes of this book. Consolidation is at the point at which the zero-sum constraint becomes acute. A fact finder

will observe constant market shares. Player A's market share loss from 35.2 per cent to 35 per cent translates into a gain for player B. For game theory to become an appropriate tool of analysis, we require that the underlying environment does not change too fast, so that we can equate management behaviour in terms of an equilibrating behaviour. In other words, player A realises that the range 35 per cent to 35.2 per cent is the best market share obtainable given the likely reaction to their action from other players as competitors in the market-as-a-game. So player A does nothing to regain the lost 0.2 per cent market share because there is a probability of losing 0.2 per cent. Once player A realises this outcome, we are at a Nash equilibrium, and the realisation may be due to the fact that one of the players may have played a game in an earlier time period.

When decision making is interdependent, the outcome accruing to one player from an action will be co-dependent on the reaction of another player. When players take cognisance of their mutual interdependence, they are players in a game and a time will come in the game when there is no unilateral incentive to deviate from an agreed position. So when companies take cognisance of their mutual interdependence, they become players in the market-as-a-game and the game dimension is described by geography, space and product-process technology.

Players are ascribed a type by opponents based on observed patterns of behaviour — the signals that represent a sequence of moves in the game. Game theory is about rational people interacting with each other in a way to achieve their own goals. This branch of game theory is non-cooperative game theory and while the rules of the game are pre-determined, players can consider the consequences of different types of rules as the **game situation** creates a mechanism on how the game can be played. Gurven (2004) noted that people can become more or less likely to cooperate depending on the type of cooperation required. For example, a group may readily cooperate in fishing, but not in conservation. Business may cooperate in innovation, but not in price fixing or market share allocation. So the context in which the game is played — the game situation — plays an important role in players' preferences and behaviour.

Strategy

Player A decides to reduce price, and the key is whether or not B will react to any price movement. If A believes that B will react, then it is imperative for A to have a reply to the likely reaction from B. Hence we have the strategy triangle of action-reaction-reply. If A does not have a Nash reply, then it is because A did not expect a reaction. The key to understanding our definition of strategy in Framework Tn=3 is to ask: Why did A not expect a reaction? What is it about B's pattern of behaviour that led A to believe that B would not react to any price change from A? One of the contributory factors is B's type, defined in terms of the type of player and the type of management. Type of management refers to the subjective behaviour of management in terms of a preference for pricing or organic growth. Type of player is to be understood in terms of the patterns of observed behaviour of the company in the market. For example, we seldom observe price wars between Pepsi and Coca-Cola in their core market, unlike with Sony, Nintendo and Sega, who experienced a lengthy price war in the video games market in the 1990s. A key question is: Given their strategy, how should they behave? For example, player A reduces price to correct declining total revenue, but competitor B does not know the reason why the observed price has fallen. Could player A be a Baumol type? If so, the price move observed is a one-shot move and may not require a reaction from player B. So, to avoid any misunderstanding, player A could reveal its type as a Baumol type. It helps to understand some basic economics of strategy in order to identify a type of management.

Limit Pricing Model

Otherwise known as the Bain-Modigliani model, the limit pricing model defines a game between an incumbent type and a camouflaged entrant type. In order to understand player type, we will work with the Bain-Modigliani or limit pricing model.

The limit pricing model (see Figure 6.3) represents the classic example where a player considering entry into a new market is presented as a demonstration of non-cooperative game theory. The biggest

uncertainty faced by the new entrant is predicting the reaction of the incumbent player in the market, whose perceived options are to either be accommodating and allow entry or to react aggressively with price cuts or discounts. An aggressive response could reduce the value of the market due to an ensuing price war. In this analogy, the incumbent is more likely to cede market share to avoid a price war. If the decision is taken not to enter the market, the pay-off for the new entrant will be 0 and the incumbent retains the full value of the game (10). Should the company decide to enter, the incumbent has two strategies to pursue: retaliate with aggressive price cuts, thereby risking a price war that will leave it with a reduced pay-off of 2, or accommodate. In the above example, the new entrant cannot afford such a price war and will fail to return a profit from the venture (losing 7). If the incumbent accommodates the new entrant, its pay-off is reduced to 8 through ceding market share to the newcomer, who makes a successful entry with a profit of 5. Self-interest (profit maximisation) governs the likely response of the market incumbent, thereby negating the value of any probability calculation if the incumbent's first response is to prevent entry. While it is sufficient to analyse the probability of the reaction options, it is necessary to be guided by what actions the rational, self-interested respondent is likely to reply with in the game.

Retaliation

The reply will depend on the player's belief about the type of player the competitor is in a game. Like the Galton's ox weight contest, each player will observe how individual errors and biases in predicting likely reactions will tend to cancel each other out as the sought-after information about type is distilled in some aggregate measure of belief. Players will either adopt a binary approach or not:

Player A asks:

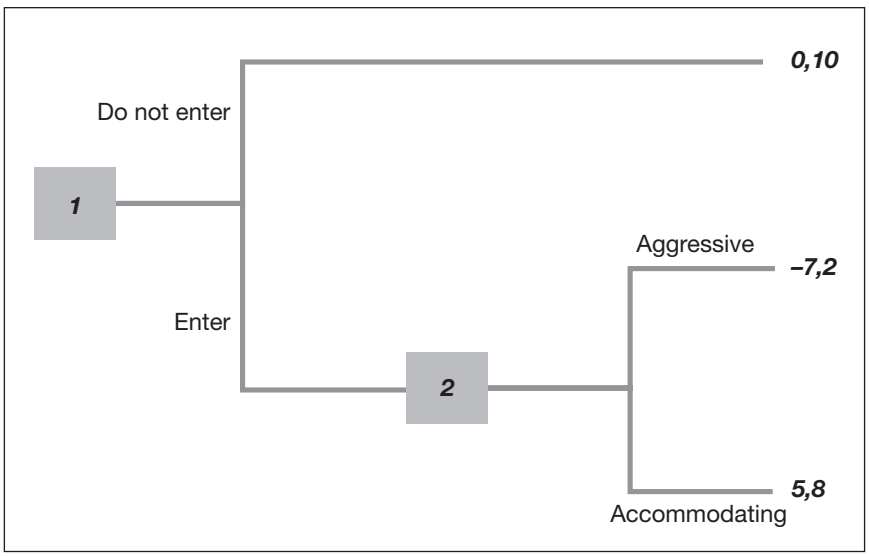
Binary: Will player B react? Yes or No
Non-binary: Player B will react: Probability = X%

Notice that in Figure 6.1 each of the options open to the rival results in a change in the total value of the game. Retaliation would lead to a price war in which lower profits would devalue the total returns available to all players. In this example, the resulting market losses are 5. Alternatively, allowing the new company to enter would grow the market value overall to 13, the sum of the pay-offs 5 and 8. The strategies open to the players are clear. Notice that the first decision lies with the new entrant, and the subsequent response by the incumbent makes this a sequential game. Outlining the strategies forms the key to systematic thinking about which strategy is the optimal path to follow.

Limit Pricing Strategy Set

Do not enter, do not retaliate (status quo)
Enter and retaliate
Enter and accommodate

Figure 6.1
Market Entry Decision: Extensive Form

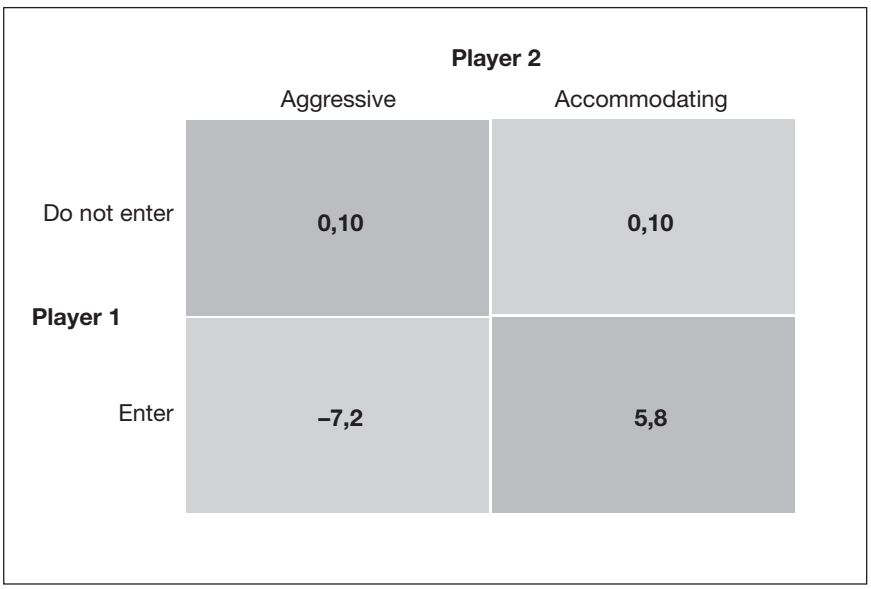


Dominant Strategy

The same game can be represented in pay-off matrix form as illustrated in Figure 6.2. The game matrix directs the players to only logical strategic choice. Player 1 assumes that player 2 will act in rational self-interest, and it is in player 2's interest to assume the reciprocal arrangement applies. Suppose that there is a first strategy that 'under no circumstances yields a lower pay-off and sometimes does better' than a second option. It is said that the first strategy **dominates** the second. In Figure 6.2, player 1 has no dominant strategy. If they do not enter they will have no pay-offs, and the incumbent does not need to react and will retain the market value. The 'do not enter' strategy only dominates the 'enter' strategy if the incumbent reacts with discounts. A zero pay-off is better than a loss of 7.

However, for player 1, the 'accommodating' strategy of the incumbent would result in a higher pay-off for the new entrant than not entering at all. It is clear that player 1 has no dominant strategy. Player

Figure 6.2
Market Entry Pay-offs: Normal Form



2, however, has a dominant strategy. In both cases of 'do not enter' and 'enter', the incumbent is better off accommodating the new entrant. This is indicated by the pay-off of 10 if the newcomer does not enter and a higher pay-off of 8 versus a payoff of 2 if player 2 accommodates. In this scenario, accommodation strategy dominates the aggressive retaliation strategy. The optimum strategy in this game is that player 1, knowing the pay-offs (as opposed to the probabilities), realises it is in player 2's best interest to accommodate and will therefore enter the market.

Player Types and Signals

Markets characterised by incumbent management who regard a threat of entry as an actual plan of entry at a time period yet to be decided can be described as contestable. A contestable market is as close as we get to the textbook competition. However, as geography begins to define the market boundaries, incumbents face the possibility of a de novo entrant type. A **de novo type** is a player in the same geographic market as the incumbent in at least two product markets that are complementary to a third product market, the incumbent's market. The de novo type will seek to gain the synergy and acquire the incumbent. So a de novo entrant type grows by acquisition as the boundaries of the market expand. The boundaries can expand due to technology, innovation or change in regulations. With changes in technology at time period t, a player can exit a game and return in time period t+1. Netscape, for example, exited the Internet browser war with Microsoft but has re-entered the market-as-a-game as Mozilla and is competing with incumbent players Google and Apple Safari. This is a good example of a **newborn** player, who re-enters the game as technology changes. Kodak could be defined as a newborn in that having allowed the digital revolution in cameras to pass it by, as a newborn player it has adopted digital technology.

The difficulty for an incumbent is to determine whether or not the entrant type is a **potential entrant type** with no intention to enter in time period t, or a de novo type, who has every intention to enter. Depending on the management's belief, actions will differ as to how best to limit entry. Each action will further act as a signal to the other players

in the market and may invite a reaction from the other incumbent players. For example, if an incumbent type believes with a high probability that entry will happen, the incumbent reduces its pre-entry price, triggering a reaction from the incumbent players who have lost a price differentiation advantage as a direct consequence of the pre-entry price reduction.

Believable Bills

In markets, the incumbent type is easily recognised as an endogenous historic player already in the market because of, say, government imprimatur or national geography or a survivor in the market-as-a-game. A defining characteristic of an incumbent type is protection of market share, and this requires effort and management time to attempt to delay or prevent entry by an entrant type. Vertical blending with such players creates 'believable Bills' based on the belief that if entrants enter the market, then profits post-entry would be driven to zero. The believable Bills will do everything to delay, retard or prevent entry. Accommodation is not a dominant strategy for believable Bill type (see Table 6.1).

Entrant types, by definition, are seeking entry, but they can be subdivided into potential entrant types, who threaten to enter at a point in time, and de novo entrant types, who actually do enter at a point in time. The difficulty for an incumbent type at a point in time is in determining the type of entrant, and the incumbent management's belief as to the entrant's type of management will determine the pre-entry actions of the incumbent player.

Table 6.1
Player Types

	Incumbent Action Believable Bill	**Probability of Entry Doubting Thomas**
Potential Entrant Type	Reduce price Increase output	High & incorrect Low & correct
De Novo Entrant Type	Dividends policy Increase share price	High & incorrect Low & correct

Doubting Thomas

The entrant type will signal to the incumbent type its intention to enter the incumbent's market. This gives rise to the 'doubting Thomas' incumbent who does not perceive a threat of entry at a point in time. The doubting Thomas knows how the entrant will act because he knows the entrant management will act rationally. However, the entrant is a player, and if the entrant's signals are deviant, the doubting Thomas may not be able to respond should the entrant actually enter the market. If the believable Bill incumbent believes that the entrant type will actually enter the market, then the incumbent management will take actions to deter entry, for example, they may reduce the market price or increase the quantity produced in the pre-entry period.

However, if the entrant type is a potential entrant type with no intention to enter in time period t, then the believable Bill incumbent has reacted to a threat of entry that will not materialise at time period t. If an incumbent management behave in such a manner, then they believe that the threat of entry was credible, that is, that there was a high probability that the entrant type would have entered, hence the rationale for reducing the market price. Conversely, a doubting Thomas incumbent would not have reduced the price on a threat of entry but at the higher price may have left itself exposed to price differentiation by other players, including other incumbent players who may opt to exploit the price differences.

Rank and Type

If all the incumbents have the same belief structure, the low price will signal to the entrant that the incumbent expects entry in time period t and that the incumbent believes that the entrant is a de novo type. That means that there is a probability of entry at time period t. Earlier we had distinguished between believable Bill and doubting Thomas: the bB reaction is to prevent entry whereas the dT reaction is to dismiss the threat at this point in time. Conversely, if the incumbent player initiates a signalling game by an aggressive dividends policy, this may be interpreted as a signal of the presence of a de novo entrant in the expanding geographic market. In other words, a bB player, concerned

about a possible threat of takeover, may opt to return capital to its shareholders in the form of generous dividends. This would occur if bB management were Marris type.

However, if a second incumbent feels threatened by the price action of the first incumbent, then there is every possibility that both incumbent players could end up in a price war. The players that survive a price war are referred to as **extant** types. A price war outcome may have been the original intention of the entrant type who had earlier signalled its intention to enter the incumbent's market. But the price war outcome arises simply because one incumbent reduces price in the belief that the entrant is a potential entrant type and likely to enter at time period t+1. However, no entry occurs.

Conversely, in the case of a de novo entry, for example, one incumbent may place a takeover bid for a second incumbent player, either as a defensive strategy (two incumbents are less likely to be acquired than one alone) or by breaking rank. The presumption with rank is that incumbents in a game remain silent until an external shock to their market. The shock may manifest itself as the arrival of new technology, the adoption of new innovation or the emergence of a de novo entrant in the newly expanding geographic market. But one player may have anticipated the external shock and readjusted its decision making to reveal its type as an endogenous rank-breaking player only in the post-shock environment.

An incumbent type, for example, can readjust its actions from any agreed rank; an incumbent that breaks rank is referred to as an **endogenous rival** type. The presumption here is that the players in a rank game are able to act jointly because each player observes the behaviour of the others, and that each obey the rules: think of a taxi rank, where the rule is that the taxi at the head of the queue goes first and a random customer arriving at the rank is requested to join the queue for a taxi. The rank is a good example of rational cooperation that is both desirable from the customer's point of view and sustainable from the player's point of view. A rank may be more acceptable than a cartel because altruistic motives are ascribed to the players, and thus the players can act jointly in the knowledge that their joint behaviour will not be condemned by a third party.

In order to understand the behaviour of an endogenous rival type we need to consider the significance of ascribing altruistic motives to the players. For example, at one time it was regarded as in the public interest to have a national monopoly with responsibility for, say, public utilities, a view that has progressed into a national champion theory and probable xenophobia. National banks have traditionally served a national population; with the transcending of national boundaries in a single European market, the same national banks begin to rethink their strategy. Either they become the target of de novo entrants as they expand beyond national geographic boundaries or they break rank by acquiring smaller incumbents or adopting new technology faster than other incumbents, signalling an aggressive organic growth strategy that remained silent under the rules of the rank. However, because we use banks as a fictitious example, and bank behaviour is not immune from antitrust investigation, banks as players would be advised to deny a rank ever existed, notwithstanding the observations of the fact finder.

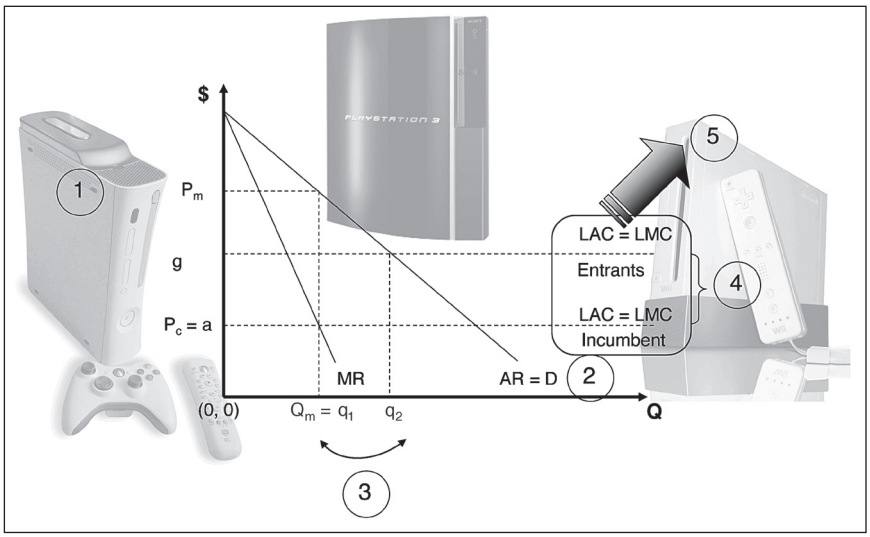
Why Enter? Entry Function and Technology

It may be helpful for management to derive an entry function in order to re-focus the debate on the restrictions on entry:

$$E(q) = q^{2m}$$

where $q = [Q - q^*]$, Q is total demand and q^* is incumbent output, or q_1 in Figure 6.3. Of particular interest is the exponent term '2m' — it will generate the concavity of the entry function. The specification of the entry function and its concavity highlight the restrictive nature of entry. E(q) translates into an actual market share if entry was impeded. As the incumbents increase q^*, q tends to 0 and $E(0) = 0$. The function $E = E(q)$ maps the optimal level of exclusion output for each number of entrants. Technology and economies of scale in production make exclusion output easier to produce — this could be interpreted as a fall in the price of exclusion resources. This would imply a higher return on each dollar spent on exclusion and a shift upward in the function. The equilibrium outcome is one of a smaller number of smaller firms than before entry deterrence.

Figure 6.3
The Bain-Modigliani Model (Limit Pricing)



An unanticipated change in technology may have left incumbent players with considerable excess capacity even though demand has not expanded. Alternatively, as Landes and Posner argued, a decline in demand may have left firms with excess capacity. Whatever the reason for excess capacity, suppose the dominant player is matched with an entrant with the capacity to produce another X per cent of output without a significant increase in marginal cost. In this case, the excess capacity of the entrant would limit the dominant incumbent's efforts to raise price above marginal cost. Competition policy might argue that the incumbent's excess capacity may make any threat by an incumbent to engage in predatory pricing — to keep out new entrants — more credible. If the incumbent monopolist has used real resources in order to deter entry, the issue to explain how the opportunity cost of those resources factors into the traditional costs of playing a game. New entrants probably would not find an industry operating at excess capacity an attractive one to enter even in the absence of predatory threats. The E(q) function would support this type of outcome, an outcome that requires a debate on credible mechanisms and the Bertrand dilemma, which is discussed in Chapter 9.