Chapter 1

Introduction
The age-old notion of competitive equilibrium is well established in economic literature. A competitive equilibrium provides a configuration of prices with associated demands and supplies of atomistic economic agents (price takers), such that all markets clear. According to the first fundamental theorem of welfare economics, a competitive equilibrium is efficient. This efficiency of the competitive equilibrium is based on the assumption that there are no externalities in production and consumption. Apart from the cases of market failures associated with externalities, the doctrine of competitive equilibrium is based on two other crucial assumptions. The first one is that every agent has perfect information about all the relevant variables in the economy, which influences his/her decision making. The other assumption is that a complete set of markets exists. The absence of perfect information - or costly information, as well as the absence of perfect risk markets in situations of uncertainty, pose serious problems for the functioning of the perfectly competitive markets. The absence of risk markets, in turn, can – to a large extent – be attributed to informational problems. These information theoretic concerns change the nature of economic analysis a great deal.

In spite of great deal of theoretical research and all pervasive empirical evidence of market imperfections, the free market philosophy is gaining momentum when it comes to the arena of policy making in the present day world of globalisation. However, the argument in favour of free market and liberalisation of domestic economy to international competition for economic efficiency may not hold when it comes to the question of “technology”\(^1\). This is because technology shares many of the characteristics of a public good. For example, it is expensive to develop, and once developed, it may cost relatively little to transfer to a user. This implies that if allocation of technology creating activity is left to perfectly competitive market, very little technology would be developed. This is clearly not a first best solution, since the social benefit of the technological developments would almost inevitably exceed social costs. Usually there are two ways that developed countries have tried to circumvent this problem: One is to provide public funds for research and development (R&D) under an institutional set

\(^{1}\) There appears to be no consensus on what constitutes a technology or technological system in an industry. In a narrow sense technology is technical information contained in patents or technical knowledge communicable in written form (Enos, 1989). In the above definition technology is viewed as hardware of production. Stewart (1977) has given the definition of technology by including all skills, knowledge and procedures required for making, using and doing useful things. Technology is another factor of production that belongs to the domain of such traditional factors as labour and capital (Lindert and Kindleberger, 1982). The new broader definition of technology has come from the evolutionary view of firm and industry (Nelson and Winter, 1982). There are two components of technology: (a) public knowledge element of technology; (b) tacit element of technology, which is embodied in the organisational routines and collective expertise or skills of specific production teams. While the first element of technology may be traded between firms, the second element is the essence of firm specific competitive advantage. However, for our thesis, we will consider the technology broadly as a “package” which can be transferred from one firm to another.
up, which would provide the results to anyone who wants it free of charge. The other is to
permit the private sector to keep secret or sell the result of their research by allowing short
term monopoly practices and providing legal protection in the form of patents. For the most
part, the first solution has been adopted in developed countries for 'basic' research and also
for much 'applied' research for agriculture, while the second solution has been applied to
most industrial technologies.

The implication of the above system is that the developing countries can get free access to
most of the basic research and also a good deal of agricultural research\(^2\). However,
developing countries have to buy industrial technology from the foreign companies who have
developed it. The price they have to pay depends on the legal system protecting technology in
the originating countries, the monopoly or oligopoly position of the technology sellers, and
the bargaining positions of the technology buyers. Thus, the developing countries are faced
with an intrinsically imperfect market as far as the technology transfer is concerned. Another
important dimension of technology transfer is uncertainty. When a technology to produce
some commodity is transferred, there is uncertainty with respect to prices and markets for the
product. Uncertainty may also stem from the fact that when a buyer is buying a technology he
may not have the same information about the quality of the technology as the seller might have.

As a matter of fact, in 1975, 94 % of world patent rights were owned by entities located in
developed countries; and of the 6 % patent rights registered in developing countries, 85%
were owned by multinational corporations (MNCs). Only 1% of world patents was owned by
developing countries' firms\(^3\). Given this lopsided distribution of the ownership of technology,
developing countries have to depend on the supply of technology from the developed
countries' firms for their technological upliftment.

Technology may be embodied in the form of capital goods such as machinery, equipment,
physical structures, or it may be disembodied in such forms as unpatented know-how,
management and organisation, design and operating instructions for production systems etc.
Foreign direct investment (FDI) has traditionally been one of the most important channels of

\(^2\) The GATT 1994 agreements have sought to bring patent protection under the purview of GATT
(subsequently WTO) with both the objectives of increasing the scope as well as evolving a common set
of international intellectual property rights (IPRs). As a result, the patent protection would be even
more stringent and the developing countries' access to some basic research would be even more limited
especially within the current WTO regime.

\(^3\) UNCTAD, 1976.
technology transfer. Since the 1970s, a number of other channels have grown rapidly in importance. These include joint ventures, licensing and other contractual arrangements such as franchising, management contracts, turnkey contracts etc.\(^4\)

However, in developing countries joint ventures, not wholly owned subsidiaries, are the dominant form of business organisation for multinational enterprises (Vaupel and Curhan, 1973) and are frequently used by Fortune 500 companies in the developed countries (Harrigan, 1985). The number of joint ventures is growing worldwide at an increasing pace. *Mergers and Acquisitions* (1983) reported a 59% increase between 1981 and 1983 in the number of international joint ventures involving US firms. Bleek and Ernst (1995) have reported that the domestic and cross border alliances (joint venture is the most common alliance structure) have grown by more than 25% annually in the last five years. Not surprisingly, the study of joint venture has attracted increasing interest in the popular press and academic literature because of its importance in international business.

The argument in favour of international joint venture formation can be made within the broad framework of the existence of multinational corporations (MNCs).\(^5\) The literature provides many rationales for the existence of MNC. One of the earliest contributions came from Hymer (1960) and later on from Kindleberger (1969, 1984). They focused on the market power advantage of multinationals. Dunning’s (1977, 1981) “eclectic” theory, based on the “ownership”, “locational” and “internalisation” (OLI) advantages, has turned out to be the predominant school of thought today. Ownership advantage consists of some product or production process which the other firms do not have, such as a patent, blueprint, trade secret and even a trademark or reputation. These advantages give a firm competitive edge over other firms to do business abroad. The “locational” advantage simply dictates that the production should be undertaken in the foreign country rather than producing at home and exporting it to the foreign market. The obvious sources of this advantage are tariff, quota, transport costs and cheap factor prices. The importance of the “internalisation” lies in the fact that even if a

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\(^4\) Among the other contractual arrangements, franchising and management contracts usually provide for the use of industrial property rights and/or unpatented firm specific know-how. The element usually covered in turnkey projects include the design, construction and operation of a production system as well as the plant and equipment itself. The above mentioned contracts are usually non-equity based arrangements similar to licensing contract. Joint venture is an equity sharing arrangement where the contribution of the multinational corporation frequently embraces all the forms involved in foreign direct investment.

\(^5\) An important phenomenon within international business is the increased role of MNCs, particularly large MNCs. In 1981, the sales of the largest 500 MNCs were equal to over 20% of the world’s Gross Domestic Product, over 50% of the world’s traded output, and over 80% of the foreign direct investment (Rugman, 1987) (Stopford and Dunning, 1983). The MNCs are the major suppliers of industrial technology today.
general, we define a joint venture relationship to be stable if the partners receive the payoffs in all periods in accordance with the sharing rule agreed upon at the time of joint venture formation. We interpret a joint venture relationship to be unstable when the partners deviate from the initial sharing rule and make disproportional gains over time. However, we will not be concerned with the instability of joint ventures in terms of liquidation of the venture. One important thing to note at this stage is that joint venture instability should not be equated with failure of business. As Kogut (1983) points out, any ownership structure is a temporary organisation, providing options for the future and the role of joint venture is clear in this regard. Thus, joint venture instability in terms of buy-out by one of the partners may not necessarily mean failure and these steps could well have been anticipated in advance during the formation of joint venture itself. In fact, the joint venture may have been intended as a transitional structure of ownership.

There are some characteristic differences in the joint ventures between developed and developing countries. Firstly, the instability rates of joint ventures in developing countries are consistently higher than that of developed countries. This fact is clearly borne out by the Table 1 below.

Table 1. Relationship of joint venture instability with the level of development.

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Development level of country</th>
<th>Unstable percentage</th>
</tr>
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<tbody>
<tr>
<td>1100</td>
<td>Primarily developed – Franko (1971)</td>
<td>24.1*</td>
</tr>
<tr>
<td>36</td>
<td>Developed (DC) – Killing (1982, 1983)</td>
<td>30**</td>
</tr>
<tr>
<td>66</td>
<td>Developing countries – Beamish (1984)6</td>
<td>45**</td>
</tr>
<tr>
<td>52</td>
<td>Developing countries – Reynolds (1984)</td>
<td>50**</td>
</tr>
</tbody>
</table>

Notes: * Franko (1971) defined a joint venture as unstable where the holdings of the MNC crossed the 50% or 95% ownership lines, the interest of the MNC were sold or the venture was liquidated. Includes dissolution and acquisitions. When major reorganisations added instability is 28.3%.

** Include major reorganisations.

Source: Adapted (with alterations) from Beamish (1985)

6 It should be noted here that the incidence of joint ventures between a foreign MNC and a local government is higher in developing countries as compared to developed countries; and the instability rate is even higher for this type of joint ventures (Stuckey, 1983). The instability rate of the above joint venture is 58% in Beamish's (1984) study, which was much higher than the 43% instability rate of joint ventures between foreign and local private partners. Thus, even when the more unstable government ventures are excluded from the sample of developing countries, it was still higher than the developed country level.
Secondly, many studies have shown that the joint venture was formed mainly because of
government regulations in developing countries. For instance, Beamish (1984) found that
57% of joint ventures in his study were created for this reason. In Janger (1980), the figure is
nearly half. Tomlinson (1970), using the sample of joint ventures in India and Pakistan, also
noted that the major reason for joint venture organisation was government pressure (explicit
or otherwise).

Thirdly, in developing countries’ samples of both Beamish (1984) and Reynolds (1979), in a
majority of cases (70%), the foreign firm was in a minority equity position. Only in a small
proportion of the joint ventures (nearly 10-20 %) both the partners had equal ownership. This
contrasts sharply with developed country samples, where 50% had equal ownership. Beamish
(1984) reported that the most common reason for a multinational taking a minority equity
position was the existing regulations and/or local tax advantages.

There are some theoretical models developed in the literature, which have dealt with different
aspects of international joint ventures. However, the main focus of this literature appears to be
on why international joint ventures are formed. The reasons include moral hazard problems,
policy uncertainty, asymmetric information, risk perceptions etc. Chan and Hoy (1991)
analyse East-West joint ventures where the joint venture is a means to ameliorate the “double
moral hazard” problem when both firms possess inputs that cannot be directly contracted.
Marjit (1990) has argued that joint venture is an effective mechanism for avoiding the threat
of expropriation by the host country government. In a unified framework, Das (1996)
examines the role of moral hazard, differences in attitude towards risk and the host country’s
policy towards the venture in determining an MNC’s optimal choice among the available
options of joint venture, subsidiary and licensing. Marjit et al (1995) have shown that if the
host country government and multinational firm have different risk perceptions about the
investment project, with the MNC finding the project to be more risky, a suitably designed
public-private joint venture facilitates risk sharing, thereby raising the level of investment
over the direct foreign investment (DFI). Joint venture is also seen as an effective device for
improving the quality of the transacted technology under asymmetric information. It is often
considered a preferable contractual arrangement for the MNC than just selling out the
technology when there is a difference of perceptions between the MNC and the host firm
about the success rate of the technology under domestic conditions (Marjit and Mukherjee,
However, the papers cited above are mainly restricted to static considerations. In particular, they abstract from the issue of joint venture instability. Under this backdrop, the aim of this thesis is to develop theoretical models in a dynamic setup where we focus on both the formation and instability of international joint ventures in the context of developing countries. We spell out our approach below.

The simple approach to understand the joint venture instability is to comprehend how the bargaining structure of the parties in the relationship changes over time. This bargaining power of each party would naturally depend on the stand-alone payoff to each party, which, in turn, is determined by the outside options available to the partners. In fact, the stand-alone payoff to the parties may change over time depending on both the internal and external environment in which they are operating. Harrigan (1984) suggests that the external environment influences both the initial configuration and the stability of joint ventures. In her analysis, the external environment includes such things as industry structure, competitive behaviour, technology and government policies. On the other hand, internal environment might change depending on the learning of each other’s skills and the problem of coordination between the parties in governing the venture successfully. Because of the dynamic nature of both the internal and external factors, the evolution of any joint venture relationship should be considered in the light of these factors.

Following Harrigan (1984), it stands to reason that in developing countries, the shift in government policies during the process of liberalisation is a factor behind the joint venture instability. Usually governments in these countries allow the formation of joint venture with certain restrictions on the foreign equity holding in the earlier stages of liberalisation. However, as the process of liberalisation progresses, they open up the economy fully by allowing the MNCs to set up wholly owned subsidiaries. This policy change causes instability in the joint ventures formed at the initial stage of liberalisation.

To define the scope of this thesis at the outset, we would like to state that we are not going to discuss the relative merit or demerit of this sequential liberalisation policy for the host country. In other words, at no stage of our analysis would we be concerned with the welfare implications of this kind of policy. We will take the sequential liberalisation policy to be given in our analysis since this is a common feature in most of the developing countries. So, in our analysis the government basically plays the role of a non-strategic agent, which simply sets the rule of the game by pursuing a sequential liberalisation policy. Though the rationality of this kind of liberalisation policy can be a fascinating topic in its own right, we, however,
keep that outside the purview of the present work. Our interest lies in the likely scenarios which would emerge with respect to international joint ventures given this kind of sequential liberalisation policy.

Since independence, India has pursued mainly protectionist economic policies. One aspect of these policies has been tight restrictions on foreign equity capital and on foreign direct investment or direct entry of multinational corporations. The prime motivation for restricting foreign investment has been, complete indigenisation of industry, where domestic technology was considered adequate. Where foreign technology was needed and was available only by means of joint ventures, the government’s prime objective was to increase local control by allowing for only minority ownership by the foreign partners in the joint ventures.

In comparison with other developing countries, the restrictiveness of these policies was more as pointed out by, among others, Lall and Mohammad (1983) and Lall (1987). In case of technology imports, there were restrictions in terms of royalty and lumpsum payments made by Indian firms. However, the Indian government had shifted the orientation of the earlier policies in the early nineties (from July 1991) towards a more liberalised economy and by mid-nineties, in many industries, the government even allowed foreign firms to set up wholly owned subsidiaries. As a result of this shift in the government’s policy stance, most of the joint ventures with foreign partners in India have started to experience some form of instability. In most of the joint ventures, the trend is that the foreign partners are increasing their stakes (for many such instances, see Ghosh (1996) and Bhandari (1996 – 1997)). The cases of DCM-Daewoo, General Electric (GE)-Apar, Gillete and Indian Shaving Products Ltd., to mention a few, aptly demonstrate this. The main reason cited for this behaviour of hiking foreign equity stake in many joint ventures is that the MNCs have “deep pockets” to buy the Indian partners out, whereas the Indian partners are unable to finance their share of

7 Miller et al (1996) have studied international joint ventures between firms from six developing countries (Argentina, Brazil, India, Mexico, the Philippines and Turkey) and firms from the industrial world. In their survey, over half of the companies noted that government restrictions had been the reason behind their decision to invest through a joint venture. In many cases the regulations have called for foreign companies to limit their participation to minority status. They have provided India as an example, where, until recently, foreign firms were required to be minority partners in the joint ventures, if they were to invest at all. For foreign companies that saw India as a potentially attractive market, investment as a minority partner was the only alternative to attempting to import over substantial barriers.

8 On the basis of the changes in government policy in India on foreign direct investment and foreign technology transfer, some broad ‘swings’ in policy can be identified. Sometimes the policy was more inclined towards an ‘open door’ and at other times towards a ‘closed door’ regarding foreign investment and technology flows. For details regarding these changes in policy regime see Subrahmanian (1998), Mani (1993), Agrawal (1982), Iyer and Kumar (1984) etc.
the expansion bill in the much more competitive Indian economy. On the other hand, the newer technology developed by the MNC gives it some additional bargaining power in the business. For example, consider the case of Triveni Engineering, where the partner GEC Alstom threatened to transfer the technology for new turbines to its majority owned subsidiary GEC Alstom India. The problem was clearly stated by Mr. Dhruv Sawhney, the Chairman of Triveni Engineering: “it was easier in earlier days when foreign companies had to accept a lower shareholding” and “now, with most of them free to increase their shareholding, there is bound to be a tiff” (Ghosh, 1996). To develop the theory of joint venture instability, our emphasis would be on this shift in policy regime along with some other features of market imperfection such as asymmetric information and uncertainty, which might have important implications for the nature of instability in international joint ventures.

As far as we are aware, the theoretical literature on joint venture breakdown is limited to two papers, Kabiraj (1997), and Roy Chowdhury and Roy Chowdhury (1999). Kabiraj (1997) discusses a model where the competitive pressure from an outside firm (not part of the joint venture) may cause breakdown. Roy Chowdhury and Roy Chowdhury (1999), on the other hand, develop a model with learning and moral hazard of input supply. They show that in such a model, the breakdown of joint venture may occur. In both papers, joint venture instability manifests itself in the form of breakdowns (although for different reasons) as both partners part ways to carry out their own business independently.

The existing theory does not provide any answer for certain kinds of joint venture behaviour observed in a dynamic context. For example, joint venture instability might take the form of a buy-out of the venture. One partner may partially or completely buy out its other partner. In the process of buying out, the control of the joint venture unit may change hands. Also, the threat of breaking up might cause some necessary payoff readjustments instead of an actual break-up. Although there is ample empirical evidence of this sort of joint venture instability\(^9\), the theoretical literature does not provide any explanation for it. We hope to provide some theoretical models, which would explain these scenarios.

To illustrate the structure of our thesis we discuss below a simple model, which we use as a benchmark. The latter chapters will be an attempt to make this simple benchmark model more realistic and therefore more complicated.

\(^9\)Regarding the domestic and cross-border alliances, Bleeke and Ernst (1995) stated that “nearly 80% of joint ventures ... ultimately end in a sale by one of the partners".
The model

We consider a two period model with no discounting. The model comprises of two strategic agents: an MNC and a host firm; and a non-strategic agent: the government.

We begin by describing the actions of the non-strategic agent, the government. The government is liberalising the economy stage-wise. Thus, in the first period, the MNC is allowed to hold equity up to a certain limit; and in the second period, there is no foreign equity restriction and the MNC may set up a wholly owned subsidiary. We also assume that the government restricts imports to the host country by imposing a prohibitive tariff. Under these conditions, the MNC can serve the domestic market in the first period either through licensing or by forming a joint venture with the host firm.

In this simple model, we take the first period joint venture as given. In the first period joint venture, the government stipulates a minimum shareholding of the host partner ($\alpha$) greater than 50%, so that the control of the business rests with the host firm. This is a common feature in most developing countries where foreign equity holdings are restricted to minority shareholdings in the initial stages of liberalisation.

We assume that joint venture is agreed at the prescribed limit of the foreign equity holding which is $(1-\alpha)$ leaving $\alpha$ share to the host firm in the first period. Here we analyse the second period game, which would be played by the MNC and the host firm, when the government announces full liberalisation.

We now describe the technological setting of our model. In the first period, the MNC possesses a technology, which can be used to produce a particular product in the domestic market. This technology is "drastic" as compared to the existing technology of the host firm, i.e., if any firm introduces that technology in the domestic market, that firm would be able to monopolise the market by out-competing the other firms. This technology involves a particular constant marginal cost, which is a common knowledge to both the host firm and the MNC. The existing technology of the host firm is inferior as compared to that of the MNC in the beginning of first period. The host firm can continue with its existing technology to earn its reservation payoff. For simplicity, we take the host firm's reservation payoff to be zero in

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10 For the joint venture, we need the restriction $\alpha < 1$ also.
both periods\textsuperscript{12}. We assume that the technology transfer facilitates imitation\textsuperscript{13} without any cost through a process of “learning by doing” during the first period production. Because of this imitation the host partner will have the necessary technical knowledge to carry out production with the technology without depending on the MNC in the second period.

Let us discuss the structure of the game.

\textbf{First period:} The MNC offers the technology by forming a joint venture with the host firm at an upfront fee \( T \), such that the participation constraint of the host firm is satisfied. This means that the MNC has all the bargaining power. Since the upfront payment is fixed, it does not matter to the subsequent analysis of the game. The first period profit is realised at the end of the period.

\textbf{Second period:} The MNC makes an offer of buying out some shares \(' s ' \) at a price \(' p ' \). The host firm can either accept or reject the offer. For simplicity, we assume that if the buy-out offer is accepted by the host firm, the MNC is contractually bound not to enter after that. However, after rejection, the MNC decides whether to enter with a subsidiary or not. The second period payoffs are realised at the end of the period.

In second period, if the MNC wants to set up a subsidiary it has to incur a set up cost \( F (>0) \). We assume that no contract can be written in the first period that prohibits entry in the second period. Also we rule out any contract which is contingent on outputs of the joint venture unit\textsuperscript{14}. We assume that the host firm accepts the buy-out offer, when its payoff from acceptance is weakly greater than the payoff from rejection.

The second period game can be represented by the following diagram.

\textsuperscript{12} The host firm has been operating in his existing business. The technology of the MNC is being introduced in this business (under joint venture). In this situation, the host firm would accept the offer of technology from the MNC provided that the host firm receives its total reservation payoffs in two periods. We normalise that payoff to be zero in both periods.

\textsuperscript{13} In International Finance Corporation’s (IFC’s) survey (Mansfield, 1994) of 16 countries it is reported that the countries perceived to have the weakest patent protections are India, Thailand, Brazil and Nigeria.

\textsuperscript{14} These output-based payments (royalty) are also restricted in some developing countries. For example, in India the royalty payments are normally restricted to 3-5% of the value of sales/production. We consider joint venture contract as a situation, where the parties share the realised profit depending on their equity holdings in any period.
The option of not making an offer can be thought of making an unacceptable offer which gets rejected and then the MNC can decide whether to enter or not. We assume that the host firm’s setup cost is prohibitive, so that it does not set up a new unit after selling off its shares even if it knows the technology.

We solve this game through backward induction. Thus, we begin with the analysis of the second period outcome.

**Second period**

Suppose the MNC has offered the technology in the first period with a contract of a joint venture. First, we find out what is the payoff the host firm gets in the second period, if it rejects the offer of the MNC. After rejection the MNC may either enter to set up a subsidiary or not. In case of entry of the MNC, there will be two firms in the domestic market: one is the subsidiary unit of the MNC and the other is the existing joint venture unit. So there will be Cournot duopoly competition between these two units. We assume that the management of the subsidiary unit maximises the profit of its own unit under duopoly competition without taking into consideration the MNC’s shareholding in the joint venture unit. We denote duopoly profit by $\Pi^d(c)$ and assume that the total duopoly profits ($2\Pi^d(c)$) is less than the monopoly profit ($\Pi(c)$). We assume that the entry threat of the MNC after rejection of the buy-out offer by the host firm, is credible, i.e.,

\[(A1) \quad \Pi^d(c) + (1-\alpha)\Pi^d(c) - F > (1-\alpha)\Pi(c).\]
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So the MNC would enter with a subsidiary if the host firm rejects the buy-out offer. Thus, the host firm would get $\alpha \Pi^d(c)$ by rejecting the MNC's offer. So, any acceptable offer must involve at least the payoff $\alpha \Pi^d(c)$ to the host firm; otherwise the host firm would do better by rejection.

To find out the equilibrium of the second period game we note that the entry of the MNC to compete with its joint venture counterpart involves not only the cost of setting up a subsidiary but also a competitive loss due to duopoly competition. Thus, the entry reduces the total surplus in the relationship. As a result, the MNC would try to avoid the entry so as to maximise its payoff. In order to maximise the surplus, the MNC would make a buy out offer such that the host firm gets the share of duopoly profit, $\alpha \Pi^d(c)$ and the host firm would accept the offer. This is because by rejection the host firm does not get more, since the MNC would enter with a subsidiary consequent upon the rejection. Therefore, by giving an acceptable offer of buy-out of $s$ shares at $p$ price such that $\alpha = \alpha - s$ and $\alpha \Pi(c) + p = \alpha \Pi^d(c)$, the MNC can get $\Pi(c) - \alpha \Pi^d(c)$. This is always better for the MNC than entering with a subsidiary after making an unacceptable offer so that it gets rejected. The interesting point to note is that the above buy-out offer can be made as either complete or partial. Also note that the MNC does not enter with a subsidiary to compete with its already existing joint venture counterpart.

Full game

In the first period, the MNC offers the first period technology with a contract of a joint venture such that the host firm receives its reservation payoff. Suppose the MNC charges an upfront payment $T$ and offers a share $\alpha$ to the host firm. By accepting the contract, the host firm obtains the total payoff in two periods $\alpha \Pi(c) + \alpha \Pi^d(c) - T$

And the MNC obtains from this contract

$$(1-\alpha)\Pi(c) + [\Pi(c) - \alpha \Pi^d(c)] + T.$$ 

The MNC chooses $T$, subject to the constraint that the host firm gets its reservation payoffs in two periods, which is assumed to be zero. So, the MNC gets the total payoff in two periods as $2\Pi(c)$. If the MNC does not offer the technology in the first period, it would get only the second period profit from its technology, which is $\Pi(c)$. Thus, we have the following proposition on the subgame perfect equilibrium outcome of the two period game.
Proposition. The MNC makes an offer of the technology in the first period. In the second period the MNC makes an offer of buy-out (complete or partial) to the host firm such that the host firm obtains $\tilde{\alpha} \Pi(c)$ and the host firm accepts that offer. However, the MNC never enters with a subsidiary in equilibrium. In two periods, the MNC's total payoff is $2\Pi(c)$ and the host firm obtains $0$.

The above proposition establishes a situation of instability in the international joint venture, when the government of a developing country pursues a sequential liberalisation policy. However, this instability is very general in nature and does not provide a definitive picture as to why in some cases the buy-out is observed to be complete and in some other cases it is partial in nature. It does not provide a theory as to why sometimes the partners break out to set up their own businesses. Thus our benchmark model leaves certain questions unanswered. In the subsequent chapters we attempt to provide some plausible answers to these questions.

It is also a matter of great concern that when a developing country imposes various restrictions on technology transfer, it does not receive the best technology from MNCs. Let us check whether there is any incentive for the MNC to transfer an inferior technology in the present setup. Suppose the MNC has an inferior technology. Note that in the above game the MNC has all the bargaining power and as a result, it obtains the total surplus in the relationship. Although the host firm gets some payoff in the second period but that payoff is taken away by the MNC in the first period itself through the upfront payment. Therefore, by transferring inferior technology the MNC would unnecessarily reduce the total surplus in the relationship leading to less total payoff to itself. Hence, the MNC would never transfer the inferior technology in the above structure of the game.

Given the above simple structure, various complications can be introduced to generate different forms of joint venture instability as well as the possibility of inferior technology transfer in a situation where the MNC has all the bargaining power\textsuperscript{15}. In this framework, it is also possible to provide different rationale for joint venture formation. In the thesis, we would attempt to develop some theoretical models of joint venture instability along with some other features of international technology transfer in the context of developing countries. We will

\textsuperscript{15} Although the models are developed in a structure where the MNC has all the bargaining power, these models can also be worked out with the host firm having the full bargaining strength or under some generalised bargaining structure.
maintain the assumption that there are two strategic agents: an MNC and a host firm. We consider that the host firm is a private firm with profit maximisation being the sole objective. We also maintain the assumption that the government restricts imports to the host country by imposing a prohibitive tariff. As a result, the MNC can not serve the domestic market through export from its home country. We will consider only three modes of technology transfer by the MNC to a developing country: (a) licensing out of the technology to the host firm when the MNC does not have any equity share in the business; (b) joint venture, where both parties hold equity shares and (c) wholly owned subsidiary of the MNC, where the MNC has the full ownership of the business. The rest of the thesis is organised according to the following scheme:

In the second chapter we consider a situation when the MNC can either form a joint venture or license out its first period technology. In the first period, the MNC may develop a new technology in its R&D unit abroad, which can be used for the second period production. The outcome of this innovation is uncertain. The MNC knows in the beginning of the second period whether it has been successful in developing the new technology or not. But the host firm can not observe the outcome of this innovation. As a result, the second period game starts with an asymmetric information, where the MNC has the private information about its technological capability but the host firm has only some prior belief about that.

In this framework, we provide a rationale for joint venture formation as opposed to licensing, which is very different from the existing literature. We show that under certain parameter configurations, the MNC may form a joint venture in the first period. This joint venture is unstable in the sense that the MNC will completely buy-out this venture in the second period. For all other parameter values, the MNC would license out the technology in the first period, and in the second period the MNC might enter with a subsidiary or buy-out (completely) the existing business of the host partner. We also provide a justification for the transfer of an inferior technology by the MNC in the first period.

In Chapter 3, we deal with the issue of joint venture instability again in an asymmetric information framework. Here, the asymmetry in information stems from the fact that the host firm knows more about the local demand conditions as compared to the MNC. Within the framework of a single model, we show that either there is partial share adjustment in the joint venture unit or the MNC enters directly with a subsidiary to compete with its already existing joint venture counterpart. The MNC can offer two types of contracts: (i) a pooling contract, where the same buy-out offer is made to the host firm irrespective of its private
information about demand conditions; and (ii) a separating contract, where different buy-out offers are made to the host firm depending on its private information. An interesting feature of our model is that, under certain parameter configurations, the MNC’s payoff under pooling contract is strictly greater than that under separating contract. As a result, the principal (MNC) chooses to offer a pooling contract as opposed to a separating contract, thereby deciding to acquire no information about the agent's (host firm’s) true private information. This is a distinct feature of our model. When the imitation of the foreign technology is considered to be a choice variable at some fixed cost, we find that, due to the presence of asymmetric information, the host firm sometimes under- or over-invests on imitation of the foreign technology as compared to the complete information scenario. However, this chapter is written under the assumption that the joint venture unit is managed by managers, who are interested in maximising only the profit of the joint venture unit. As a result, the nature of competition between the joint venture unit and subsidiary, when it is set up, always remains to be Cournot duopoly even if the MNC holds the majority stake in the joint venture after buy-out.

In the fourth chapter we introduce the issue of control explicitly into the structure of asymmetric information analysed in Chapter 3. Here, the issue of control plays a crucial role since it is the controlling partner in the joint venture unit which takes the output decisions. As a result, if the MNC holds the control of joint venture after buy-out in the second period then to maximise its total payoff the MNC would choose the joint venture output to be zero, in case the subsidiary too is in operation. We find that: (a) there is partial share adjustment of a joint venture unit by the MNC; and (b) in some cases the MNC even sets up a subsidiary to compete with its already existing joint venture counterpart. In the process of buy-out the MNC may take over “control” of the joint venture or leave the control with the host partner. When we allow the host firm to set up a new business even after selling off its shares in the joint venture unit, we find complete buy-out and even breakdown of the joint venture, which implies that the partners part ways to compete with their own businesses.

In the previous chapters our analyses are based on the assumption that there is no uncertainty in government policy. The government imposes foreign equity restrictions in the first period: this is followed by full liberalisation, in terms of allowing the setting up of wholly owned subsidiaries of the MNCs in the second period. In Chapter 5, we allow for uncertainty in government policy in the second period. The government either chooses to continue with the same policy (of joint venture), or it may choose to liberalise the economy fully. We provide a rationale for international joint venture formation, as well as its subsequent instability. In this
chapter we find both stable and unstable outcomes, which appear in equilibrium. It is also shown that uncertainty about the government policy in the second period plays an important role in determining the exact share distribution in the first period joint venture formation.

Chapter 6 is related to Chapter 5 in the following way. We extend the horizon of the game to infinite period and introduce the fact that the MNC has two types of technologies and transfer of these technologies facilitates imitation at some costs. However, we restrict ourselves to the licensing contract only. This chapter analyses the impact of uncertainty in liberalisation policy on quality as well as on the mode of technology transfer by the MNC to the host firm. The imitation of foreign technology by the host firm is treated as a choice variable and is shown to be an equilibrium phenomenon. As a result, it is found that the MNC and the host firm may compete with the same technology in the domestic market. The approach, thus, provides an endogenous theory of evolution of market structure. It is shown how the transfer of inferior technology affects the imitation possibilities of superior technology, when it is transferred later. Additionally, the popularly held notion, that the best technology is transferred under complete information is also re-examined.