1999

The choice of ownership structure in transition economies: incomplete contract approach

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by

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A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Major: Economics

Major Professor: Harvey Lapan

Iowa State University

Ames, Iowa

1999

Graduate College

Iowa State University

This is to certify that the Master's thesis of

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has met the thesis requirements of Iowa State University

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CHAPTER 1. INTRODUCTION

In the past ten years many of the world's centrally planned economies have experienced substantial institutional changes. During the 1990s about 30 countries in Eastern Europe, the former Soviet Union (FSU) and Asia started the process of transition from a planned to a market-oriented economy. Even in countries that are still considered socialist (communist), e.g. China and Vietnam, the mechanism of economic coordination has shifted to a great extent from state intervention to market allocation. The main argument in favor of transition was a desire to put the socialist countries on the path of economic growth. It was assumed that the shift of property rights from state to private hands and the shift of allocation mechanism from state to free market would soon enhance saving rates and capital formation and contribute to high growth rates. A critical factor behind privatization is the well-documented poor performance of public enterprises. Boycko, Shleifer, and Vishny (1996) is a good source of references for the studies of public and private firms around the world. In the last decade thousands of state firms in Africa, Asia, Latin America, Western and Eastern Europe were privatized.

Boycko, Shleifer, and Vishny (1994) identified two strategies for privatization. The first strategy is the sale of individual enterprises or their shares for cash or promises of future payments. Sometimes these sales take the form of auctions or investment tenders, in which case the winning buyers offer the best price or the best investment program and employment guarantees. In other cases, the sales are direct and noncompetitive, and shares are sold through the public offerings. The second strategy is the mass privatization where allocation of the assets to the population is virtually free and a big fraction of the economy's assets is sold to private hands. Because allocation of assets is free, mass privatization requires less

preparation and hence is also faster than ordinary privatization. The first approach to privatization has been used in the United Kingdom and elsewhere in Western Europe, as well as in Asia, Latin America, and more recently in Hungary and Germany. It has been tried and abandoned in Poland. Mass privatization was conducted in different forms in Eastern European countries and other post-communist countries such as Mongolia. In almost all countries some shares were granted for free to workers and managers of the enterprises, and mass privatization was combined with sales of some assets through cash auctions or investment tenders. In Czechoslovakia, Mongolia, Lithuania and Russia vouchers were distributed to the whole population with the subsequent exchange of these vouchers for shares in state enterprises. Poland used a direct allocation of shares to specially organized mutual funds, followed by distribution of shares in these funds to the population.

Russia has experienced particular difficulties in the transition from a planned to a market-oriented economy. Its recent economic conditions have been unprecedented in modern world history because of a confluence of major events. First, there was an increase in macroeconomic imbalances and structural problems during the 1980s; second, there were changes in external economic relations, including the break up of the Council for Mutual Economic Assistance (CEMA); third, there was the disintegration of the USSR; and finally, after the collapse of central planning, Russia initiated major economic reforms in its transition to a market economy. Each of these events would in itself, have had a powerful impact on the economy. Taken together, they led to a collapse in foreign trade, shortages of imported inputs that aggravated the decline in domestic output, and difficulties in financing the balance of payments and servicing external debt (Benedicte Vibe Christensen, 1994). The economy of Russia continued to decline in this transition period that started with the break-

up of the Soviet Union. Since the very beginning of the transition the Russian government started the design and implementation of reforms aimed at restructuring the Russian economy.

It became the conventional wisdom that the socialist economies could only be improved by liberalizing prices, privatizing all enterprises, and letting the market weed out the inefficient ones. Moreover, that could be best done with a big-bang.

The economic transition in Eastern Europe and FSU began with the Polish big-bang reform program in January 1990. It was generally believed that the transition would start with a recession, caused both by restrictive macroeconomic policies and by the restructuring of the economy required by the shift to a market economy.

Fisher, Sahay, and Vegh (1996) draw on data from 26 transition economies to describe their record of economic growth – how long it takes and how far output falls before growth resumes. They found that the minimum length of the transition recession is about two years; the key to rapid growth is investments and policies that promote it; fast stabilization, liberalization, and privatization bring benefits earlier. Selowsy and Martin (1997) came to similar conclusions. Table 1 presents the data on recession and growth in several transition economies in 1990-1997. Differences in output behavior are due to differences in initial conditions of the countries and exogenous shocks. Shocks in the FSU countries are typically larger than those in other countries. Also, within the FSU, the shocks in the Baltics, which moved rapidly to world energy prices, were particularly large and help explain those countries' large output declines.

Russia's macropolicy problems are rather different from those of the Eastern Europe countries, and, hence, their stabilization models cannot be readily applied to the FSU.

Table 1. Recession and Growth in Transition Economies, 1990-97

Countries	Years of GDP decline	Average annual rate of GDP growth		
		90-93	94-97	90-97
Poland	2	-3.1	6.3	1.6
Slovenia	3	-3.9	4.0	0.0
Czech Republic	3	-4.3	3.6	-0.4
Slovakia	4	-6.8	6.3	-0.3
Hungary	4	-4.8	2.5	-1.1
Romania	4	-6.4	2.1	-2.2
Albania	4	-8.8	4.9	-2.0
Croatia	4	-9.9	3.0	-3.4
Latvia	4	-13.8	2.2	-5.8
Armenia	4	-21.4	5.4	-8.0
Uzbekistan	5	-3.1	-0.3	-1.7
Estonia	5	-9.7	4.1	-2.8
Kyrgyzstan	5	-9.3	-2.4	-5.8
Lithuania	5	-18.3	0.5	-8.9
Georgia	5	-24.1	2.9	-10.6
Belarus	6	-5.4	-2.6	-4.0
Bulgaria	6	-7.4	-3.6	-5.5
Kazakhstan	6	-6.7	-6.0	-6.3
Macedonia	6	-12.9	-0.8	-6.9
Azerbaijan	6	-14.5	-5.7	-10.1
Russia	7	-10.1	-5.3	-7.7
Turkmenistan	7	-4.5	-12.5	-8.5
Tajikistan	7	-12.2	-8.4	-10.3
Moldova	7	-12.6	-10.2	-11.4
Ukraine	8	-10.1	-12.1	-11.4

Source: G W. Kolodko, (1998) "Ten Years of Postsocialist Transition: Lessons for Policy Reforms"

For Russia we have to consider the structure of the inherited capital stock and the lack of financial instruments, institutions, and markets. So the 'sink-or-swim' test in Russia was risky. Not only did some plants fail to survive when prices were competitive, but the failure of one enterprise forced a cascade of failures up and down the vertical chain in plants. Freeing prices was not sufficient. Enterprises running a cash-flow surplus either have to place it abroad or run a risk to have the real value of their cash positions eaten up by inflation. The capital inflow financed government subsidies and not industrial investment, subsidized enterprises tended to be the least efficient ones, and the resulting rise in the real exchange rate caused difficulties for the more promising firms in competing with imports (Leijonhufvud, Ruhl, 1997). At the end of June 1992, the ruble (Russian currency) was set at 125.26 to the U.S. dollar, by the end of October 1992, the exchange rate fell to 390 rubles to U.S. dollar. After ruble devaluation in August 1998 exchange rate was 6.1-6.2 rubles to U.S. dollar, (The World Bank, 1998) by the end of April 1999, it became 25 rubles to U.S. dollar. The poor performance of the Russian economy and the recent collapse of the ruble suggest that the design of these reforms may have been far from perfect.

Russia's reforms have started with price liberalization accompanied by budget control and tight monetary policy. Extended privatization reform did not start until late 1991, when Anatoly B. Chubais was put in charge of the State Committee on the Management of State Property (GKI). Privatization is one of the most important and most difficult elements in the transformation process of the economies in Eastern Europe and the former USSR. Large industrial companies account for a large proportion of output and employment in countries with transition economies. Many of them are overstaffed and need to restructure before they can become profitable.

Table 2. Industrial Enterprises in Russia, 1988

Enterprises by number of employees	Number of enterprises	Output (bln Rb)	Employment (thousands)
fewer than 100	7,511	8.327	386
101-200	4,666	14.767	678
201-500	5,582	37.025	1,806
501-1,000	3,308	48.454	2,338
1,001-2,000	1,997	66.690	2,789
more than 2,000	2,176	291.397	12,733
Economy totals	25,240	466.660	20,730

Source: Erydman, Rapaczynski, Earle et al. (1993) "Privatization Process in Russia, Ukraine and the Baltic States"

Table 2 presents data on industrial enterprises in Russia before the transition.

Most economists agree that large companies should be separated from ministries and set up as independent corporations, although it is very difficult to find private investors to take them over. From the economic efficiency point of view there are four conditions for successful privatization which are usually mentioned in the literature. First, when firms become private, political control and subsidies should disappear. Second, assets should be allocated to the most efficient users. Third, efficient governance mechanisms must be set up to make sure that the new owners actually restructure the privatized firm. Finally, privatization must be fast. Timing is very important in the case of Russia, where the transition from communism is accompanied by massive theft of state assets by managers.

The above objectives would be pursued by a benevolent government. But in practice, a government is highly influenced by political forces and its own interests. In transition economies a successful privatization program is usually populist. Most governments shape

their programs so as to benefit (or appear to benefit) large segments of the population. In Russia the idea of getting the population excited and involved in the privatization process was as important as distributing the benefits broadly.

Why did the Russian government choose mass privatization? Appropriately designed auctions are the most efficient way to privatize enterprises, the assets are allocated to the best users, and the government can maximize its revenue. But this method will work best only if the country has perfect capital markets, which Russia does not have. Most Russians do not have significant wealth, and the country needs to privatize over 25,000 firms. Low wealth implies only low prices for privatized assets, but they would still be distributed efficiently provided capital markets were functioning. This could not happen in Russia since the wealth distribution is extremely uneven. As a result, if auctions were held, not only would prices be low, but there would be few buyers, who are not necessarily politically or economically attractive. In addition, political instability resulted in many Russians believing that the country can return to old command regime with nationalization of privatized enterprises.

Russia has moved through four phases of privatization. Phase one of Russian privatization began on October 1, 1992, and involved the distribution of privatization vouchers to every citizen and the holding of voucher auctions. The distribution of vouchers that can be exchanged for shares of enterprises was a strong government commitment to privatization. A significant fraction of shares (80%) was distributed to the public through vouchers. The second phase of Russian privatization, initiated in July 1994, involved the sale of vouchers of Russian companies for cash and privatization of some of the largest Russian enterprises. On January 1994 75% of medium- and large-scale enterprises in Russia and approximately 80% of small shops and restaurants (under 200 employees) had been

privatized. The third phase, starting in the second half of 1995, was "equity-for-loans auctions." The concept behind this model was to raise long-term loans from major Russian banks in exchange for giving the bankers controlling stakes in the largest Russian enterprises as collateral, together with voting and management rights. Since late 1995, Russia has been selling shares (primarily to domestic investors) of approximately 136 enterprises considered to be the "crown jewels" of Russian industry and other enterprises. Since January 1996, the Russian Government has reported that at least 70% of Russian GDP is composed of goods and services accounted for by the private sector. Early 1997 Russian Government figures reported that the private sector accounts for 75% of manufacturing enterprises, 85% of manufacturing, and more than 80% of the Russian workforce. In 1997, President Yeltsin signed plans for privatization of Russia's natural monopolies, including power and gas enterprises as well as Russian railroads. Privatization of the natural monopolies continues to be a disputed issue.

The most common criticism of mass privatization is that it does not set up efficient governance of privatized firms. If shares are sold to the population no large blockholders will emerge, and no one will monitor the managers and enforce efficiency. To promote the formation of large blocks through vouchers the Russian programs have encouraged the creation of new private mutual funds that accept investors' vouchers in exchange for the funds' shares. Also, the programs allowed managers to acquire a large part of the firm at a subsidized price. Management in Russia bought about 13% of the shares, which they obtained at subsidized prices from the government, or from workers, or bought in voucher auctions. Vouchers were denominated in currency and were freely tradable, hence, potential

large shareholders could accumulate large blocks of vouchers and acquire large block of shares.

Combinations of the above privatization mechanisms were also utilized by the Russian government. Partial information on the ownership structure that emerged in Russia is presented in Table 3.

Table 3. Ownership Structure of Some Privatized Firms

Company type or name	Firm employ-ment	Privati-zation Variant	Percent ownership				
			Management	Workers	Outsiders	Blockholders	Property Fund
Food	130	2	60	20	20	5	0
Zil	103,000	1	5	35	35	20	25
Radio	5,000	1	5	55	20	0	20
Steel	342	2	35	29	26	23	10
Metal	350	2	18	66	16	1	0
Textile	1,200	n.a.	5	92	3	0	0
Machine tools	3,500	2	18	33	19	18	30
Trucking	1,300	2	5	58	7	1	30

Source: Boycko, Shleifer, Vishny, (1993) "Privatizing Russia"

Notes: n.a. Not available

1. Gives workers 25% of nonvoting shares for free. Managers can purchase 5% of shares at nominal prices. After privatization workers and managers can acquire an additional 10%.
2. Gives managers and workers 51% of equity, all voting, at a nominal price of 1.7 times the July 1992 book value of assets. An additional 5% could be purchased.

We can see some pattern in the table. In companies where lower-level employees carry out relatively routine tasks, higher-level employees usually have significant ownership or control rights.

The process of privatization is not completed yet, and there is a substantial portion of industrial enterprises awaiting privatization. In some cases, privatized enterprises have not outperformed production and efficiency levels of pre-privatization period. There are even instances where privatized enterprises became inactive after a change in ownership (from state to private). All these hardships are not necessarily attributable to the privatization per se, but most likely are consequences of the poor performance of the struggling economy.

CHAPTER 2. LITERATURE REVIEW

Many empirical studies show that privatization improves economic efficiency. Vinning and Boardman (1992) survey dozens of studies of public and private firms around the world, most of which show private firms to be more efficient. Studies conducted by the World Bank (1992), Megginson et al. (1994)) have shown that efficiency improves after privatization. Havrylyshyn and McGettigan (1999) summarize findings of recent empirical studies on privatization in transition countries (Table 4).

2.1. Review of Ownership Structure Literature

What type of governance structure should be established for the firms in transition period is also discussed in a number of theoretical studies. For example, Schmidt and Schnitzer (1993) develop a simple model to analyze the impact of different corporate governance structures on management incentives, the efficiency of restructuring, and the social costs of the adjustment process. The authors summarize the main goals of corporatization and privatization in the transition period, distinguish two different schemes of privatization, and discuss the incentives that can be given to managers under different governance structures. The market approach states that the best way to reform is to privatize as rapidly as possible and to leave the rest with market forces, with as little government interference as possible. The government approach, in contrast, claims that, given the scope of the transformation and the risks involved, a strong lead by government is unavoidable.

In their paper there are three types of managers. First, those who own and run the individual firms, and who carry out the restructuring. For them incentives will come mainly from the threat of bankruptcy and the career concerns.

Table 4. Recent Studies Finding Positive Effects of Privatization in Transition Economies

Study	Year	Country	Main Findings
Djankov and Pohl	1998	Slovak Republic	Privatization is associated with an improvement in performance across many indicators such as labor shedding, spinning off social assets, new markets and products, productivity.
Frydman, Gray, Hessel and Rapaczynski	1997	Czech Republic, Hungary, Poland	Strong evidence that private ownership-except worker ownership-dramatically improves corporate performance. Privatization associated with employment increase.
Pohl, Andeson, Claessens and Djankov	1997	Bulgaria, Czech Republic, Hungary, Poland	Privatization had a large impact on restructuring. On average, a firm privatized for four years will increase productivity 3-5 times more than a similar firm that is still in state ownership.
Earle and Estrin	1997	Russia	Privatization results in higher labor productivity and greater restructuring in a variety of areas.
Earle, Estrin and Leshechenko	1996	Russia	Privatization results in somewhat greater depoliticization and restructuring.
Barberis, Boycko, Shleifer and Tsukanova	1996	Russia	The presence of new owners, which results from privatization, increases the likelihood of restructuring.
Pohl, Djankov and Anderson	1996	Bulgaria, Hungary, Poland, Slovakia	Progress on privatization corresponds closely to the extent of large firms' restructuring in terms of export performance, efficiency of labor and material use, and profitability.
Belka, Estrin, Shleifer, Singh	1995	Poland	Privatization is associated with greater restructuring across a variety of areas.

Source: Havrylrshyn and McGettigan (1999), "Privatization in Transition Countries: A Sampling of Literature"

The second type of managers is directors. They monitor and control the firms in the holding company's portfolio. Financial intermediaries compensate their directors using stock options and relative performance evaluations. The third type of managers is called administrators. If individual firms have not been privatized yet, they are owned by the state and controlled by the government which hires administrators, who will behave like bureaucrats and react to political pressure.

To develop the model, Schmidt and Schnitzer use several working hypotheses. First, the transition period is characterized by rapidly changing market conditions, economic and political instability, and a high degree of uncertainty. Second, the limited use of stock options and performance-based compensation schemes play an insignificant role in motivating managers to restructure their firms efficiently while the threat of bankruptcy may have a substantial effect. Third, privatization is a commitment device of the government not to subsidize unsuccessful firms. Fourth, the incentive of the government to sell the companies after the transition period is not considered.

Their model compares two different governance structures. There are *n* firms controlled either by a holding company or by a government agency. Each firm is run by a manager. For each firm there are two states of the world, success and failure. There are only two possible realizations of the net present value of the firm $V_i \in \{\underline{V}_i, \overline{V}_i\}$, with $\underline{V}_i < V_i^L < \overline{V}_i$, where V_i^L - liquidation value, $\overline{V}_i$ - expected net present value from staying in business, and $\underline{V}_i$ - expected net present value if firm fails. The probability of success, $p_i(a_i)$, is a function of the effort a_i that manager *i* spends in reorganizing his company. Because the manager's effort a_i is unobservable, his wage w_i cannot be contingent on a_i,

thus, the manager gets a fixed salary. The manager can be induced to work harder than $a_i = 0$ in order to reduce the probability that the firm is liquidated.

The time structure of the model is as follows. In period 0 the government decides on the privatization scheme. In period 1 the manager chooses his level of effort, nature determines the success or failure of the manager (firm), and the state of the world is realized and observed by the owner of the firm. In period 2 the owner decides on liquidation of the firm and the payoff is realized.

At date 2, social welfare associated with firm i is given by

$$W_i = \begin{cases} V_i - a_i & if \quad x_i = 1 \\ V_i^L - \Delta_i - a_i & if \quad x_i = 0 \end{cases},$$

where Δ_i is the total social cost of liquidation of firm i and x_i denotes the decision whether to close down firm i $(x_i = 0)$ or keep it in operation $(x_i = 1)$. Δ_i is the aggregate of the utility loss incurred by workers (Δ_i^w), the manager (Δ_i^m) and the rest of society (Δ_i^s).

The welfare-maximizing effort level of the managers satisfies

$$a_i^{FB} \in \arg\max_{a_i \in R_0^+} \left\{ p_i(a_i) \cdot \overline{V}_i + (1 - p_i(a_i)) \cdot \max\left\{ V_i^L - \Delta_i, \underline{V}_i \right\} - a_i \right\}$$

So, in case of the socially optimal allocation, the manager should increase his level of effort until the marginal social benefit equals his marginal cost.

In case of private control, the firm will be shut down only if it is privately unprofitable. The manager does not take into account the social costs of liquidation borne by workers and the rest of society. The manager chooses a_i^p such that

$$a_i^p \in \arg\max_{a_i \in R_0^+} \left\{ w - (1 - p_i(a_i)) \cdot \Delta_i^m - a_i \right\}$$

The manager expends too little effort compared with the first-best.

In case of government control, at date 2 the government decides which firm to close down subject to the subsidy constraint. The government agency can take the positive NPV of the profitable firms to cross-subsidize the losses of some companies.

$a_{-i} = \{a_1, \ldots, a_{i-1}, a_{i+1}, \ldots, a_n\}$

L_i = the set of outcomes which lead to a liquidation of firm i

$q_i(a_{-i}) = \Pr(L_i | a_{-i})$ = the probability that firm i will be shut down if it fails.

The manager's problem is to pick a_i such that

$$a_i \in \arg\max_{a_i \in R_0^+} \{w - (1 - p_i(a_i)) \cdot q_i(a_{-i}) \cdot \Delta_i^m - a_i\}$$

If it is certain that the government will not have the funds to subsidize the firm, there is no difference between private and government control. But when the manager foresees that if he fails the government will subsidize his firm, he spends less effort compared with the private holding case. So, under both regimes the manager of an individual firm is likely to spend an inefficiently low amount of effort, but he will work harder if his company is privately controlled than if it is under the government control.

The model has several drawbacks. The authors pointed out that in the case of government control, the budget of the government may be insufficient to subsidize all firms that failed, so too many firms might be closed down. But this possibility is not formally presented in the manager's decision problem. In the model managers make their investment decision knowing that in case of failure the government will subsidize the firm, and they do not take into consideration the possibility of insufficient funds for subsidy. There is also a question about government commitment. One of the assumptions of the model is that the

government will not subsidize unsuccessful privatized firms. The authors argue that there will be only few cases when the government would subsidize a private firm because of concern about the social cost of liquidation. But many Eastern European and FSU countries have tax exemption for two or more years for newly privatized firm, which can be considered as a subsidy. Even though these subsidies are not specifically contingent on failure, priority is given to the unsuccessful firms. Also, the industries in these countries consist of very large vertically integrated enterprises, and it is very difficult for one enterprise to be profitable (even after restructuring) if others are not. So, to avoid shutting down a substantial part of the industry, the government may want to subsidize the firms even though they are in private hands. Another reason for giving a subsidy to private firms is the political pressure. In the model only administrators are sensitive to political pressure. In the real world, in transition economies the government's decision on liquidation of the private firm is still highly influenced by lobbing efforts. Interest groups successfully lobby government to control private or regulated firms to their benefit. All these reasons make as disagree with authors' confidence in government commitment.

Some of the literature on different ownership structures does not give a satisfactory answer to the source of economic efficiency improvements after privatization. More than that, this literature supplies us with an "irrelevance proposition" (Sappington and Stiglitz (1987), Shapiro and Willig (1990), and Schleifer and Vishny (1994)), which asserts that whatever economic outcome can be achieved with state-owned enterprise it can also be achieved through privatization, and vice versa. This proposition rests on two implicit assumptions. First, the country has to have a benevolent government, and there have to be unlimited side payments between the government official controlling the enterprise and its

managers. If this condition does not hold then the privatization is very likely to result in improved economic performance. This point is illustrated by Boyko, Shleifer and Vishny (1996). The authors argue that state owned enterprises can be highly inefficient due to the fact that they pursue objectives of the politicians that control them. In particular, they consider a situation when politicians try to maintain high employment levels to win future votes in re-elections. They develop a model with a firm that only chooses its level of spending on labor E. It can spend an efficient amount L or a higher amount $H > L$. The higher spending comes from excess wages and employment, and it is the source of political benefits, such as voting support from the employees and labor unions. There are two players in this model, shareholders and politician, who have preferences over E. The manager represents private shareholders, the politician represents the public. The manager owns a fraction α of the firm's profits, the Treasury owns a fraction $(1-\alpha)$, the politician owns no equity. In a public firm, α is close to zero, in private firm α is close to 1. The objective function of the politician (in dollars) is given by:

$$U_p = qE - m(1-\alpha)E$$

The marginal benefit to a politician of an extra dollar labor spending is $q < 1$. But this spending reduces the value of the Treasury's share of firm's profits. The cost to the politician of dollar of profits forgone by the Treasury is $m < 1$, and he does not care directly about the profits forgone by the manager. The objective function of the manager (shareholders) is $U_m = -\alpha E$. When the politician controls E, he maximizes profit by choosing $E = H$. In this case political benefits per dollar of extra spending on labor exceeds costs per dollar of profit forgone by the Treasury. So political control leads to inefficiencies that benefit politicians at the expense of the Treasury and other shareholders. When manager controls labor spending,

he chooses $E = L$. A subsidy from the Treasury to the firm is denoted by t. The effective subsidy is αt. The cost to the politician of making a subsidy is $k\alpha t$, $k < 1$. The objective function of the politician is $U_p = -m(1-\alpha) + qE - k\alpha t$, and the objective function of the manager is $U_m = -\alpha E + \alpha t$. Without a subsidy the manager chooses L, he and the politician then bargain and he chooses H if he is better off with H and transfers than he is with L. Privatization can raise the cost to politicians of influencing enterprises (since subsidies to private firms necessary to force them to remain inefficient are politically harder to sustain than wasted profits of state firms), and hence can lead to efficient restructuring of firms.

The second requirement for the "irrelevance proposition" to hold is the feasibility of writing complete contingent contracts which govern the entire lifespan of the firm at the stage of privatization. If the firm remains regulated after privatization, then the private owner will refrain from making relationship specific investments because he foresees that the government will exploit the fact that investment costs are sunk in order to expropriate quasi-rents. Thus, if complete contingent contracts can be written, then any organizational mode can be mimicked by any other organizational mode through a complete contract.

2.2. Review of Incomplete Contract Literature

The starting point of the incomplete contract literature is the assumption that complete contingent long-term contracts cannot be written. Suppose that the future surplus which can be generated by the involved parties depends among other things on the amounts of some non-contractible, relationship-specific investments. The division of the quasi-rents

from these investments cannot be controlled through a contract ex ante[1] but will be determined only by the ex post bargaining power of the involved parties. However, the allocation of bargaining power can be affected by the choice of an appropriate governance structure. Hence, the governance structure matters because it affects the investment incentives of the involved parties.

A number of studies (for example, Laffont and Tirole (1991) and Schmidt (1996)) tried to adapt the incomplete contract approach to the privatization context. Klaus M. Schmidt (1996) states that if privatization makes a difference it must be due to the fact that only incomplete contracts are feasible at the stage of privatization. Costs and benefits of privatization to an owner-manager are considered in a simple model with a monopolistic firm that produces a public good. In case of privatization, the new owner is also the manager of the firm. He pays a privatization price z chosen by the government. If the firm remains nationalized the government pays a fixed wage w to the firm's manager. The manager's role is to make a personal non-monetary investment (effort) $e \geq 0$ to reduce future production cost $c(y,\theta)$, where y is the output of the firm. The parameter $\theta \in \{\underline{\theta},\bar{\theta}\}$ is private information of the owner of the firm. The manager's effort affects the probability distribution over θ. Higher managerial effort yields lower cost of production. The social benefit of y is $b(y)$. Effort is unobservable and non-contractible. The economic relationship in the model lasts for three periods. In period 0, the government decides whether to privatize the firm or to keep it nationalized. In period 1, the manager makes his or her investment decision and the state of the world is realized and observed by the owner of the firm. In period 2, the

[1] Quasi-rents are non-verifiable and/or non-observable.

government may offer the subsidy scheme (s) to the firm; subsequently, the payoffs are realized. The government's payoff is given by

$$V = \begin{cases} b(y^n) - w - c(y^n, \theta) & \textit{after nationalization} \\ b(y^p) + z - s^p & \textit{after privatization} \end{cases}$$

and the manager's payoff is

$$U = \begin{cases} w - e^n & \textit{after nationalization} \\ -z + s^p - c(y^p, \theta) - e^p & \textit{after privatization} \end{cases}$$

Schmidt argues that in the case of a nationalized firm, the manager has no incentives to invest in cost reduction because the government cannot commit to reward him for good performance or to punish him for high costs since the manager's wage is fixed. In the case of a privatized firm, the government maximizes its objective function, given the manager's private information by solving a standard mechanism design problem. The solution of this model is that under privatization the manager spends too little effort as compared to the first best, but works harder as compared to nationalization. The main result is summarized in a theorem: Privatization to an owner-manager is preferred by the government to nationalization if and only if the welfare gain through the more efficient effort decision of the owner-manager outweighs the welfare loss due to the ex post inefficient low production level under privatization.

These findings are consistent with the results of Laffont and Tirole (1991). The difference is in the formalization of costs and benefits of public ownership. Schmidt states that the public firm's benefit is that the government is better able to extract the firm's informational rent, and the cost is the government's noncredible commitment to future choice of policy instruments. The cost of a private regulated firm in Laffont and Tirole is the

conflict of interest between shareholders and regulators: "each principal fails to internalize the effect of contracting on the other principal and provides socially too few incentives to the firm's insiders". They model this as a multi-principal mechanism design problem of special type. A government wants to realize an invisible project with social value *S*. A single firm can realize this project at cost $C = \beta - e$, where $\beta \in \left[\underline{\beta}, \overline{\beta}\right]$ is the manager's private information, and e is the managerial effort. The manager can commit nonmonetary and noncontractible investment, $\tilde{I} \in \{0, I\}$. Not investing ($\tilde{I} = 0$) yields no benefit. Investment $\left(\tilde{I} = I\right)$ can be used internally (private nonmonetary benefit $D > I$ goes to the firm insiders) and externally (private benefit $D' > D$ goes to outsiders). The benefit is not contractible and cannot be sold. When the government owns the firm, it gives the manager an incentive scheme based on the realization of the cost, *t(C)*. Since the government cannot expropriate the managers' investment, managers do not invest. The objective function of a utilitarian government is: $W = S - (1+\lambda)(t + C) + B_p + U$, where $U = t - \psi(e)$ is the manager's utility, B_p is the social value of the cost reduction, and λ is the shadow cost of public funds. In the case of a regulated private firm, in period 1 the government sells the firm to the public at price *p*, and in period 2 regulates the firm. The shareholders offer an incentive scheme to the managers and provide them with a reward *w*. The shareholders are taxed at the rate τ. The higher taxes reduce incentives to collect information that benefits the firm. The government observes *C* but cannot observe *w*, makes a transfer to the firm z(C). The managers produce only if they accept both offers. The government objective function is:

$W = S - (1+\lambda)(z + C - \tau(z - w)) + B_R(\tau) + U + (1-\tau)(z - w) + \lambda$, where

$U = w - \psi(e) + (D - I)$, and B_R is the social value of cost reductions. The advantage of private ownership is to make credible the commitment of nonexpropriation of managerial incentives.

The authors consider the special case when decision variables (production cost C) are perfect complements. There are cases when decision variables can be substitutes. For example, Martimort (1996) developed a model where an agent contracts separately with two principals. A contract between principal and agent specifies a transfer to the agent and the level of trade. The agent's utility function depends on the total transfer, the trades, and the agent's type. Martimort allow for both contract complements and contract substitutes. In this case, the results of the analysis can be altered to give more support to privatization.

As many other papers in this literature Laffont and Tirole deal with privatization of firms that remain regulated. Their model, while being applicable to certain firms in capitalist economies (as the authors point out in their paper), cannot be readily employed to analyze privatization in transition economies. We think that the main reason is that incentive schemes are rarely observed in transition economies as compared to capitalist economies.

Summarizing the literature review, it firmly favors private to public ownership. Although one question remains unanswered as to what type of ownership structure is most preferred for privatized enterprises. Is it the most efficient to transfer an enterprise into single hands or should a joint ownership be established? In this thesis we try to partially answer this question using a highly stylized model of a vertical chain (upstream and downstream) of enterprises trading in an intermediate output. Our model largely builds on the classical treatment of residual rights approach to ownership by Hart (1995). In the rest of this chapter we overview his basic model.

2.3. Overview of the Hart Model

Hart looks at a highly stylized situation in which there are two firms with assets a_1 and a_2, and two managers operating them, M_1 and M_2. M_2 in combination with a_2 supplies a single unit of input to M_1. M_1 in combination with a_1 uses this product to produce output that is sold on the market. The parties are risk-neutral and have unlimited amounts of wealth. Whoever owns asset a_1 or a_2 has all control rights over the asset. There are three possible ownership structures. First is non-integration: M_1 owns a_1 and M_2 owns a_2; second is type 1 integration: M_1 owns a_1 and a_2; third is type 2 integration: M_2 owns a_1 and a_2. An economic relationship lasts for two periods. At date 0 managers make relationship-specific investments that make their assets more productive. The investments of the managers affect their payoffs both if they trade and if they do not. There is no uncertainty about costs or benefits, but there is uncertainty about the type of input needed for M_1. This uncertainty is resolved at date 1 when the input is supplied and it becomes clear what the relevant type of input is. This ex ante uncertainty about the input makes it impossible to write effective long-term contract.

M_1 's ex post payoff in case of trade is $R(i) - p$, where $R(i)$ is revenue, i is investment, and p is the agreed input price. If trade does not occur, M_1 buys "non-specific" input from an outside supplier at price $\bar{p}$ or, if he has access to a_2, he hires someone to make the input for him. His ex post payoff in this case is $r(i;A) - \bar{p}$, where $r(i;A) < R(i)$ and A is the set of assets M_1 owns. Similarly, M_2 's ex post payoff in case of trade is $p - C(e)$, where $C(e)$ is production cost, and e is investment; if trade does not occur, M_2 will sell the product on the competitive spot market, the payoff is $\bar{p} - c(e;B)$, where $c(e;B) > C(e)$ and B is the set of assets M_2 owns.

There are always ex post gains from trade and the total surplus is given by $R(i) - C(e) > r(i;A) - c(e;B) \geq 0$ for all i and e, and A, B. It is supposed that R, r, C, c, and i, e are observable to both parties, but are not verifiable and cannot be part of an enforceable contract. Parties have symmetric information and realize the gains from trade through negotiation. Hart does not want to get into the details of contract negotiation and simply assumes that ex post gains from trade are divided 50:50 and input price is given by $p = \bar{p} - \frac{1}{2}C - \frac{1}{2}c + \frac{1}{2}R - \frac{1}{2}r$ and payoffs are $\pi_1 = -\bar{p} + \frac{1}{2}R + \frac{1}{2}r - \frac{1}{2}C + \frac{1}{2}c$ for M_1 and $\pi_2 = \bar{p} + \frac{1}{2}R - \frac{1}{2}r + \frac{1}{2}C - \frac{1}{2}c$ for M_2.

The solution of the model is:

$$\frac{1}{2}R'(i) + \frac{1}{2}r'(i;A) = 1, \quad \frac{1}{2}\left|C'(e)\right| + \frac{1}{2}\left|c'(e;B)\right| = 1$$

The author assumes that $R'(i) > r'(i;A)$ and $\left|C'(e)\right| > \left|c'(e;B)\right|$. The main finding is that under any ownership structure there is underinvestment in relationship-specific investments. The analysis of the optimal ownership structure is summarized in Table 5.

Summarizing, the benefit of integration is that 'the acquiring firm's incentive to make relationship-specific investments increases since, given that it has more residual control rights, it will receive a greater fraction of ex post surplus created by such investments.' On the other hand, the cost of integration is that the acquired firm's incentive to make relationship-specific investments decreases since, given that it has fewer residual control rights, it will receive a smaller fraction of the incremental ex post surplus created by its own investments.

Table 5. The results of Hart model

Assets and investments	**Definition**	**Optimal ownership structure**
a_1 and a_2 are independent	$r'(i;a_1,a_2) \equiv r'(i;a_1)$ $c'(e;a_1,a_2) \equiv c'(e;a_2)$	non-integration
a_1 and a_2 are strictly complimentary	$r'(i;a_1) \equiv r'(i;\varnothing)$ or $c'(e;a_2) \equiv c'(e;\varnothing)$	some form of integration
M_2's investment decision is inelastic	solution to $\min_e \sigma C(e)+e$ is independent of σ in the range $\frac{1}{2} \le \sigma \le 1$	type 1 integration
M_1's investment decision is inelastic	Solution to $\max_i \rho R(i)-i$ is independent of p in the range $\frac{1}{2} \le \rho \le 1$	type 2 integration
M_2's investment becomes relatively unproductive	$C(e)$ is replaced by $\theta C(e)+(1-\theta)e$ and $c(e;B)$ is replaced by $\theta c(e;B)+(1-\theta)e$	type 1 integration
M_1's investment becomes relatively unproductive	$R(i)$ is replaced by $\theta R(i)+(1-\theta)i$ and $r(i;A)$ is replaced by $\theta r(i;A)+(1-\theta)i$	type 2 integration
M_1's human capital is essential	$c'(e;a_1,a_2) \equiv c'(e;\varnothing)$	type 1 integration
M_2's human capital is essential	$r'(i;a_1,a_2) \equiv r'(i;\varnothing)$	type 2 integration
M_1's and M_2's human capital are essential	$c'(e;a_1,a_2) \equiv c'(e;\varnothing)$ and $r'(i;a_1,a_2) \equiv r'(i;\varnothing)$	all ownership structures are equally good

Non-integration is optimal when assets are independent, complimentary assets should be owned together and joint ownership is suboptimal.

In the next chapter we present my model that uses an analysis similar to the one described above. The major difference is that we allow relationship-specific investment of one of the trading partner to benefit another partner. This results in a joint ownership being optimal for certain specifications of the model. We use incomplete contract approach to the choice of ownership structure after privatization, and consider transition economy of Russia with vertically integrated industry producing private goods.

CHAPTER 3. THE CHOICE OF OWNERSHIP STRUCTURE

The focus of the model is on the structure of Russia's manufacturing sector which in the past was composed of a number of vertically integrated industries each one under its own ministry. To understand the problems inherent in such an industrial structure, one can think of the plants under one of the old Moscow ministries as analogous to a workstation on an assembly line. Like a workstation receiving its intermediate good input from the preceding station and delivering its output to the succeeding one, such an enterprise is basically without alternative suppliers for many of its inputs and largely without alternative customers for its outputs. The line is only as strong as its weakest link. If one station on the line breaks down or fails to deliver, the failure cascades up and down the whole line and brings it to a halt. If control and decision-making were to be decentralized, the result is an unstable chain of bilateral monopolies with the corresponding hold up problems in the absence of alternative suppliers and buyers (Leyonhufvud A. and Ruhl C., 1997). Currently, many enterprises cannot function due to frequent defaults of their buyers and/or suppliers.

In the analysis we ignore government revenue generated during privatization, and focus on ex post efficiency of vertically integrated enterprises under different ownership structures, given that complete contingent contracts cannot be written. If asset and capital markets are perfect, the initial ownership structure will not have any influence on the ex post efficiency even if complete contracts cannot be written. In this case, firms with highly complementary assets will establish joint ventures by acquiring each other's shares, and this merger will be value enhancing. In case firms stay independent the initial allocation will remain intact. That is, the initial allocation of ownership rights is irrelevant for the ex post

productive efficiency given that owners have access to unlimited money resources and ownership can change hands. But these assumptions are very optimistic for the Russian economy, which is characterized by asset market failures and capital market imperfections. Hence, the initial allocation of property rights can have a substantial effect on future economic performance of enterprises. Thus, in the model we make five assumptions:

- complete contracts cannot be written,
- asset and capital markets are imperfect,
- the firms' assets (the managers' investments) are complimentary,
- the payoffs of the firms are interdependent on the levels of managers' investments,
- there is no asymmetry of information between the managers.

Unforeseen contingencies, unverifiable terms, costs of enforcement, and a lack of common language all contribute to contracts being incomplete. These characteristics of contracts provide incentives to acquire ownership, since ownership is a source of power when contracts are in dispute and is a way of securing residual property rights. The ownership may change hands if managers sign the contract on creating, for example, a joint venture. In this case both managers should have the incentives to invest more since they share final surplus.

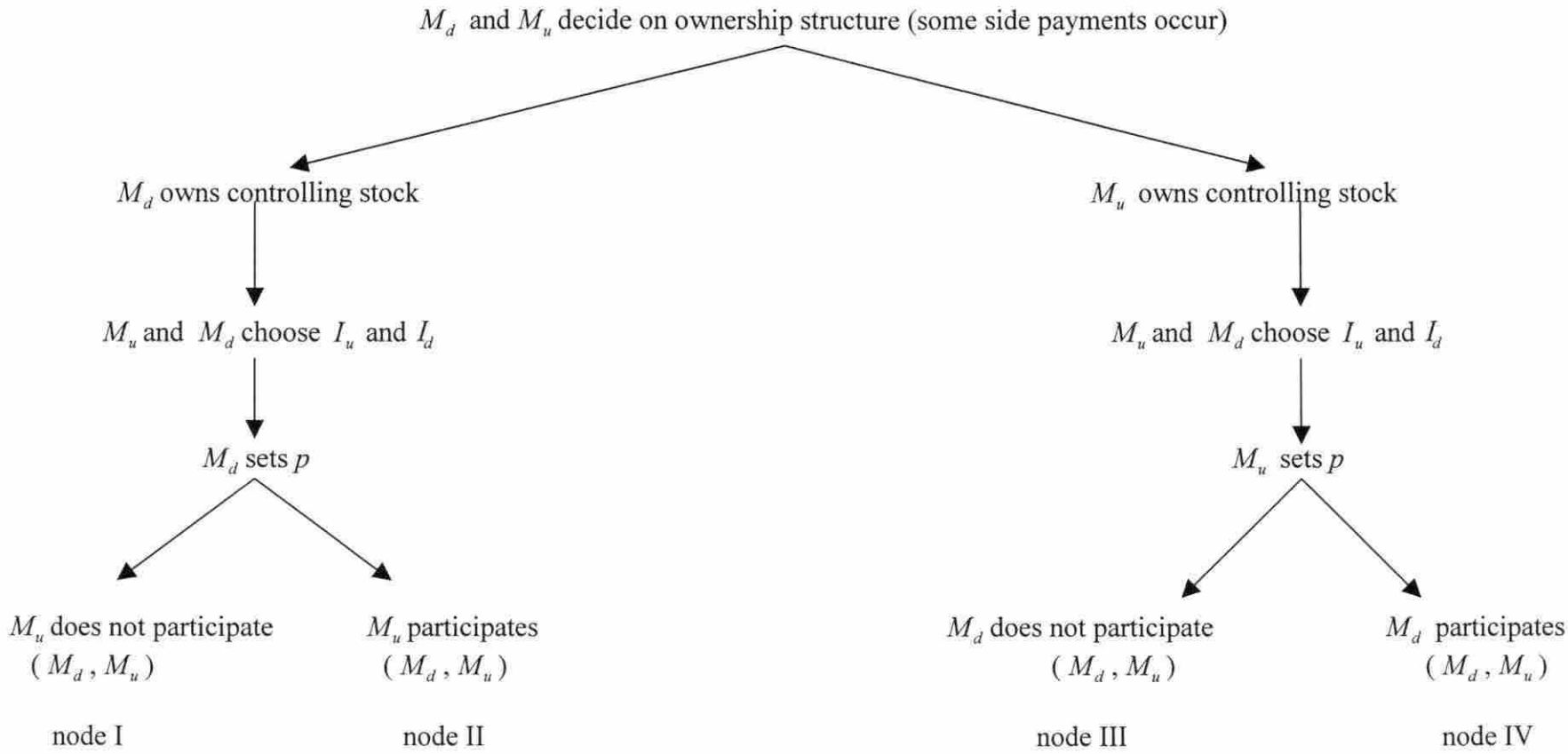
Classical models on incomplete contracting and ownership rights assume that relationship-specific investments of the manager make his own assets more productive. We assume that relationship-specific investments of the manager producing intermediate output will affect not only that manager's cost but also the cost and value of the final product, produced by the other manager. So the level of the intermediate producer's investments

affects his own payoff and the payoff of the final good producer regardless of their participation in the production process.

It is proven that complimentary assets should be owned together, i.e. one manager owns assets of both firms. In his model Hart stated that if the investments are embodied in the human capital, the same person should own the strictly complimentary assets (or assets should not be jointly owned). When investments are embodied in physical assets rather than human assets, it is no longer clear. In our model we look at the joint ownership structure where both managers have a share of the enterprise. We assume that firms' assets are complimentary and the relationship-specific investments may be investments in physical capital. Investments in physical capital means that even if one of the managers does not participate in production his investments affect the payoff of the other manager, given that this manager controls assets of both firms. The question we want to answer is whether the joint ownership is optimal under given assumptions; and if yes, what type of the joint ownership structure will lead to the optimal outcome. In the models discussed above managers have the option of buying (selling) their output from (to) an outside supplier at the market price. In our model the outside option for both managers is nonparticipation in production. Whether the manager produces or not he gets his share of the joint venture's profit. To ensure the outside option we introduce new non-transferable costs for both managers. These costs are incurred only during the production. One manager has to exert additional effort to supply the intermediate output; another manager has to put some effort to prepare the intermediate output for the final stage of production. As opposed to Hart's model, some choices of the relationship-specific investments can lead to nonparticipation solution. The level of the manager's relationship-specific investment will determine the type of the

intermediate output (its quality, value to the firm, etc.). This type will affect the non-transferable cost the other manager must bear to produce the final output with desired characteristics and the value of the final product. The better the intermediate output accommodates the final good producer's needs the lower his non-transferable costs and the higher the value of the final output. Hence, the final product's value and additional cost for the producer of the final good depends on both his own relationship-specific investments and the relationship-specific investments of the intermediate good supplier. Given these assumptions, joint ownership may be optimal.

The model is highly stylized. There are two private firms, upstream and downstream, owned by different managers. We denote the two firms (managers) by M_u and M_d, where M_u is upstream firm (manager) and M_d is downstream. The relationship between firms is vertical. The manager of the upstream firm, combined with the assets of this division, produces and supplies an intermediate output to the downstream firm. The manager of the downstream firm, combined with the assets of that division, then uses that intermediate output to produce output that is sold on the market. Each manager has a comparative advantage in running his own firm. The model has three stages (Figure 1). In the first stage, managers contract on the ownership structure of the enterprise. This contract will allocate ownership rights or residual rights of control and determine a transfer payment between the managers. We assume that managers can create a joint venture and have the following options. The manager of the downstream firm can acquire controlling stock of the venture; the manager of the upstream firm can acquire controlling stock. Managers choose $\alpha,(1-\alpha)$ - shares of joint venture stock for downstream and upstream firms respectively.



where (M_d , M_u) –(payoff for the downstream firm , payoff for the upstream firm)

Figure 1. The time structure of the model.

Some side payments may occur during acquisition. Ex ante relationship-specific investments (I_u, I_d) are made by both managers in the second stage. These investments are observable to both parties, but since I_u and I_d stand for managerial effort decision they are non-verifiable to the third party and, hence, non-contractible, they are considered to be sunk costs. Investment decisions are made independently and non-cooperatively. Although parties cannot write a comprehensive contract they can make correct calculations about the expected return from any level of investment they make. I_u is the level of effort the manager of the upstream firm exerts to reduce costs and increase the value of the intermediate good. $\varphi_u(I_u)$ is M_u 's cost of the effort level ($\frac{\partial \varphi_u(I_u)}{\partial I_u} > 0, \frac{\partial^2 \varphi_u(I_u)}{\partial {I_u}^2} > 0$). I_d is the level of effort the manager of the downstream firm exerts to increase the value of intermediate output. $\varphi_d(I_d)$ is M_d 's cost of the effort level ($\frac{\partial \varphi_d(I_d)}{\partial I_d} > 0, \frac{\partial^2 \varphi_d(I_d)}{\partial {I_d}^2} > 0$). I assume that I_u will affect output value both if upstream manager produces and if he does not. The level of the relationship-specific investments depends on the ownership structure. In the third stage, the owner of the controlling stock sets the amount of payment, *p*, to the other manager for his service and product. The owner of noncontrolling stock has an option not to participate in production and just take his share of joint venture's profit. Due to the partial ownership nature, the payment is set such that the owner maximizes his own payoff subject to the other manager's reservation utility. Reservation utility is the manager's payoff in case of nonparticipation. The owner of noncontrolling stock gets the same payoff whether he participates or not. The controlling stock's owner offers the payment only when he is

interested in the other manager's participation. So in the last stage only the owner of controlling stock makes the decision. If the manager does not participate in production, the owner of controlling stock has to hire a new manager. If parties agree to collaborate they sign a contract, which specifies p since only payment is contractible in this model.

There are four possible scenarios of the final outcome:

- M_d owns controlling stock, $\alpha \in (0.5,1]$, and M_u does not participate;
- M_d owns controlling stock, $\alpha \in (0.5,1]$, and M_u participate;
- M_u owns controlling stock, $(1-\alpha) \in (0.5,1]$, and M_d does not participate;
- M_u owns controlling stock, $(1-\alpha) \in (0.5,1]$, and M_d participate.

If the upstream manager participates in production, his cost of producing intermediate output is $C(I_u)$, ($\frac{\partial C(I_u)}{\partial I_u} < 0$, $\frac{\partial^2 C(I_u)}{\partial I_u^2} > 0$). In addition, he has to make an additional non-transferable investment $F_u(I_u)$ ($\frac{\partial F_u(I_u)}{\partial I_u} < 0$, $\frac{\partial^2 F_u(I_u)}{\partial I_u^2} > 0$) to supply intermediate output. If M_u does not participate in the production process, the cost of intermediate output is $c(I_u)$, ($\frac{\partial c(I_u)}{\partial I_u} < 0$, $\frac{\partial^2 c(I_u)}{\partial I_u^2} > 0$). The value of final output for the downstream firm if both managers participate in production is $V(I_d, I_u)$, ($\frac{\partial V(I_d,I_u)}{\partial I_d} \geq 0$, $\frac{\partial V(I_d,I_u)}{\partial I_u} \geq 0$, $\frac{\partial^2 V(I_d,I_u)}{\partial I_d^2} \leq 0$, $\frac{\partial^2 V(I_d,I_u)}{\partial I_u \partial I_d} \geq 0$, $\frac{\partial^2 V(I_d,I_u)}{\partial I_u^2} \leq 0$). If either of the managers does not produce, the value of output is $v(I_d, I_u)$, ($\frac{\partial v(I_d,I_u)}{\partial I_d} \geq 0$, $\frac{\partial v(I_d,I_u)}{\partial I_u} \geq 0$, $\frac{\partial^2 v(I_d,I_u)}{\partial I_d^2} \leq 0$, $\frac{\partial^2 v(I_d,I_u)}{\partial I_u^2} \leq 0$, and $\frac{\partial^2 v(I_d,I_u)}{\partial I_u \partial I_d} \geq 0$). I

assume that for all I_u and I_d $V(I_d, I_u) \geq v(I_d, I_u)$ and $c(I_u) \geq C(I_u)$ because the relationship-specific investments pay off more when both managers participate in production. If the downstream manager participates in production, he has to make an additional non-transferable investment $F_d(I_u, I_d)$ ($\frac{\partial F_d(I_u, I_d)}{\partial I_d} < 0, \frac{\partial^2 F_d(I_u, I_d)}{\partial I_u^2} > 0, \frac{\partial^2 F_d(I_u, I_d)}{\partial I_u \partial I_d} < 0$) to produce the final good. It may be considered as a cost for the downstream manager of adjusting the intermediate output for production of the final good. The magnitude of this cost depends on the relationship-specific investment of both managers. $F_u(I_u)$ and $F_d(I_u, I_d)$ may be considered as managers' costs of participation in production.

The total cost of production (including effort cost) when both managers participate is $C(I_u) + F_u(I_u) + F_d(I_u, I_d) + \varphi_u(I_u) + \varphi_d(I_d)$. The final product value is $V(I_d, I_u)$.

If only the downstream manager participates in production the total cost is $c(I_u) + F_d(I_u, I_d) + \varphi_u(I_u) + \varphi_d(I_d)$.

If only the upstream manager participates, the total production cost is $c(I_u) + F_u(I_u) + \varphi_u(I_u) + \varphi_d(I_d)$. The final product value in the last two cases is $v(I_d, I_u)$.

Participation decision depends on the level of I_u and I_d. Since both managers have a comparative advantage in running their firms, at the optimum, the owner of the controlling stock wants the other manager to participate in production and offers him a payment for the service. After contract on p is signed the intermediate output is supplied and state of the world is realized.

3.1. The First-Best Choice of Investments

If the relationship-specific investments were verifiable the parties could write a contract which would specify the investment level.

Managers would coordinate their actions and choose investments that maximize total ex ante payoff:

$$V(I_u, I_d) - C(I_u) - F_d(I_u, I_d) - F_u(I_u) - \varphi_d(I_d) - \varphi_u(I_u) \qquad (1)$$

The reason is that if parties choose I_u and I_d that do not maximize (1), each party can always be better off by choosing I_u and I_d that will maximize (1) and redistributing increased surplus through side payments.

The first-best investment levels, ${I_u}^{FB}, {I_d}^{FB}$, have to be chosen such that

$$\frac{\partial V(I_u, I_d)}{\partial I_d} - \frac{\partial F_d(I_u, I_d)}{\partial I_d} = \frac{\partial \varphi_d(I_d)}{\partial I_d}$$

$$\frac{\partial V(I_u, I_d)}{\partial I_u} - \frac{\partial C(I_u)}{\partial I_u} - \frac{\partial F_d(I_u, I_d)}{\partial I_u} - \frac{\partial F_u(I_u)}{\partial I_u} = \frac{\partial \varphi_u(I_u)}{\partial I_u}$$

The solution gives the investment functions for the downstream manager, ${I_d}^{FB}(I_u)$, and for the upstream manager, ${I_u}^{FB}(I_d)$. The first-best outcome is illustrated in Figure 2. The investment functions for the both managers are positively sloped.

$$D = -\frac{\overset{+}{\dfrac{\partial^2 V(I_u, I_d)}{\partial I_d \partial I_u}} - \overset{-}{\dfrac{\partial^2 F_d(I_u, I_d)}{\partial I_d \partial I_u}}}{\underset{-}{\dfrac{\partial^2 V(I_u, I_d)}{\partial {I_d}^2}} - \underset{+}{\dfrac{\partial^2 F_d(I_u, I_d)}{\partial {I_d}^2}} - \underset{+}{\dfrac{\partial^2 \varphi_d(I_d)}{\partial {I_d}^2}}} > 0 \ ,$$

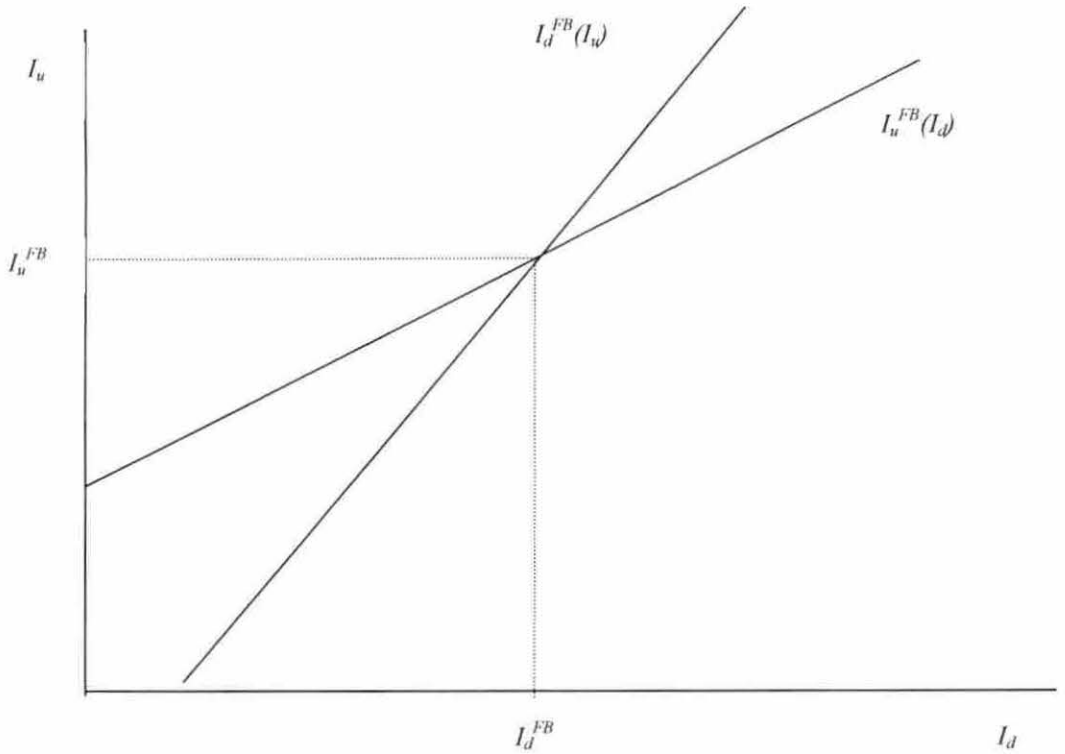


Figure 2. The first-best investment levels.

$$U = -\frac{\underset{+}{\dfrac{\partial^2 V(I_u, I_d)}{\partial I_u \partial I_d}} \underset{-}{-\dfrac{\partial^2 F_d(I_u, I_d)}{\partial I_u \partial I_d}}}{\underset{-}{\dfrac{\partial^2 V(I_u, I_d)}{\partial I_u^{\,2}}} \underset{+}{-\dfrac{\partial^2 C(I_u)}{\partial I_u^{\,2}}} \underset{+}{-\dfrac{\partial^2 F_d(I_u, I_d)}{\partial I_u^{\,2}}} \underset{+}{-\dfrac{\partial^2 F_u(I_u)}{\partial I_u^{\,2}}} \underset{+}{-\dfrac{\partial^2 \varphi_u(I_u)}{\partial I_u^{\,2}}}} > 0,$$

where D and U are the slopes of the downstream and upstream managers' functions respectively. The SOC ensure that M_d's investment function is steeper than M_u's investment function, $slope\, I_d{}^{FB}(I_u) > slope\, I_u{}^{FB}(I_d)$. The intersection of the functions gives the optimal level of effort for each manager.

The ex ante payoff for upstream firm would be

$$M_u = (1-\alpha)[V(I_u, I_d) - C(I_u)] - F_u(I_u) - \varphi_u(I_u) + \tau_u(I_u),$$

and the ex ante payoff for downstream firm would be

$$M_d = \alpha[(V(I_u, I_d) - C(I_u)] - F_d(I_u, I_d) - \varphi_d(I_d) + \tau_d(I_d),$$

where $\tau_u(I_u)$ and $\tau_d(I_d)$ are the side payments to the upstream and the downstream managers respectively, ($\frac{\partial \tau_u(I_u)}{\partial I_u} > 0, \frac{\partial^2 \tau_u(I_u)}{\partial I_u^2} > 0$, and $\frac{\partial \tau_d(I_d)}{\partial I_d} > 0, \frac{\partial^2 \tau_d(I_d)}{\partial I_d^2} > 0$).

I_u^{FB}, I_d^{FB} have to satisfy FOC for individual payoffs maximization in the first-best world:

$$\alpha \frac{\partial V(I_u, I_d)}{\partial I_d} - \frac{\partial F_d(I_u, I_d)}{\partial I_d} - \frac{\partial \varphi_d(I_d)}{\partial I_d} + \frac{\partial \tau_d(I_d)}{\partial I_d} = 0;$$

$$(1-\alpha)(\frac{\partial V(I_u, I_d)}{\partial I_u} - \frac{\partial C(I_u)}{\partial I_u}) - \frac{\partial F_d(I_u, I_d)}{\partial I_u} - \frac{\partial F_u(I_u)}{\partial I_u} - \frac{\partial \varphi_u(I_u)}{\partial I_u} + \frac{\partial \tau_u(I_u)}{\partial I_u} = 0.$$

The side payments should satisfy $\tau_u(I_u^{FB}) + \tau_d(I_d^{FB}) = 0$, and $\frac{\partial \tau_d(I_d)}{\partial I_d}$, $\frac{\partial \tau_u(I_u)}{\partial I_u}$ should satisfy FOC for the first-best. So, under any ownership structure we can find side payments that will ensure the first-best outcome.

If I_u and I_d are ex ante contractible, "the first-best can be achieved under any ownership structure, and so degree of integration of the firms is irrelevant"(S. Grossman and O. Hart, 1986). Since the first-best outcome is not supportable with non-contractible investments initial allocation of ownership rights influences the ex post efficiency. We can use the first-best only for comparison.

In the next sections we consider the second-best world where the parties choose their investment levels non-cooperatively.

3.2. The Choice of the Ownership Structure

Ownership structure (α) will affect ex ante investment decisions through the influence on the ex post payoffs. Each α will lead to different levels of the relationship-specific investments.

The model is solved backwards.

Stage three. Given I_u and I_d, the owner decides whether he needs the manager's participation or not. If participation is chosen, the participation constraint must be satisfied. Unlike Hart, we assume that some stage two decisions may result in non-participation.

Stage two. I_u and I_d will be chosen simultaneously and non-cooperatively by both managers to maximize M_u and M_d subject to participation constraint. The nonowner knows that regardless of the ex post decision, he will receive his reservation utility – payoff in case he does not participate. Owner takes the manager's effort as given and chooses his own effort level. For each subgame (scenario) there are $I_u(\alpha, I_d)$ that maximizes M_u and $I_d(\alpha, I_u)$ that maximizes M_d. The owner's payoff function and whether the participation takes place ex post depends on his choice of the effort level. Thus, the owner's payoff may not be everywhere concave. That gives the possibility of multiple Nash equilibrium for a given α. When optimal (equilibrium value of) $I_u(\alpha)$ and $I_d(\alpha)$ are found, the next step is to maximize total payoffs with respect to α, given $I_u(\alpha)$ and $I_d(\alpha)$. Each subgame has a Nash equilibrium $[I_u(\alpha), I_d(\alpha)]$ that satisfies participation constraint and gives maximum total payoff for given α.

Stage one. Given the solutions, the highest total payoff will be chosen, $\arg\max_{\alpha} [W^P(\alpha), W^{NP}(\alpha)]$, where $W^P(\alpha)$ and $W^{NP}(\alpha)$ are total payoffs for

participation and non-participation cases respectively. We look for α that maximizes total payoff because the parties can distribute increased surplus through side payments. The ownership structure that yields the highest value of the total payoff is optimal and will be chosen in equilibrium.

We now consider possible scenarios of the game separately.

3.3. The Manager of the Downstream Firm Owns Controlling Stock of the Joint Venture

In stage one the downstream manager acquires controlling stock of the joint venture. In stage two both managers make relationship-specific investments. In the third stage only the downstream manager makes the decision. Given the levels of I_u and I_d, he decides whether he needs M_u's participation or not. If the downstream owner wants M_u to participate he makes an offer, p, to the upstream manager. Finally both firms claim their shares of the joint venture's profit.

M_d's decision depends on the participation constraint, G_d. The participation constraint is the locus that separates two domains (the domain where participation is optimal and the domain where non-participation is optimal) and is the difference between gains from M_u's participation and cost of his participation.

$$G_d = [V(I_d, I_u) - C(I_u)] - [v(I_d, I_u) - c(I_u)] - F_u(I_u).$$

The solution for the case when M_d is the owner may be found in two different domains (Figure 3).[2]

$$slopeG_d = -\frac{\overset{+}{\frac{\partial V(I_u, I_d)}{\partial I_d}} - \overset{+}{\frac{\partial v(I_u, I_d)}{\partial I_d}}}{\underset{+}{\frac{\partial V(I_u, I_d)}{\partial I_u}} - \underset{+}{\frac{\partial v(I_u, I_d)}{\partial I_u}} + \underset{-}{\frac{\partial c(I_u)}{\partial I_u}} - \underset{-}{\frac{\partial C(I_u)}{\partial I_u}} - \underset{-}{\frac{\partial F_u(I_u)}{\partial I_u}}} < 0 .$$

We assume that marginal return from investments is greater when M_u produces the intermediate good than he does not, $\left|\frac{\partial C(I_u)}{\partial I_u}\right| > \left|\frac{\partial c(I_u)}{\partial I_u}\right|$.

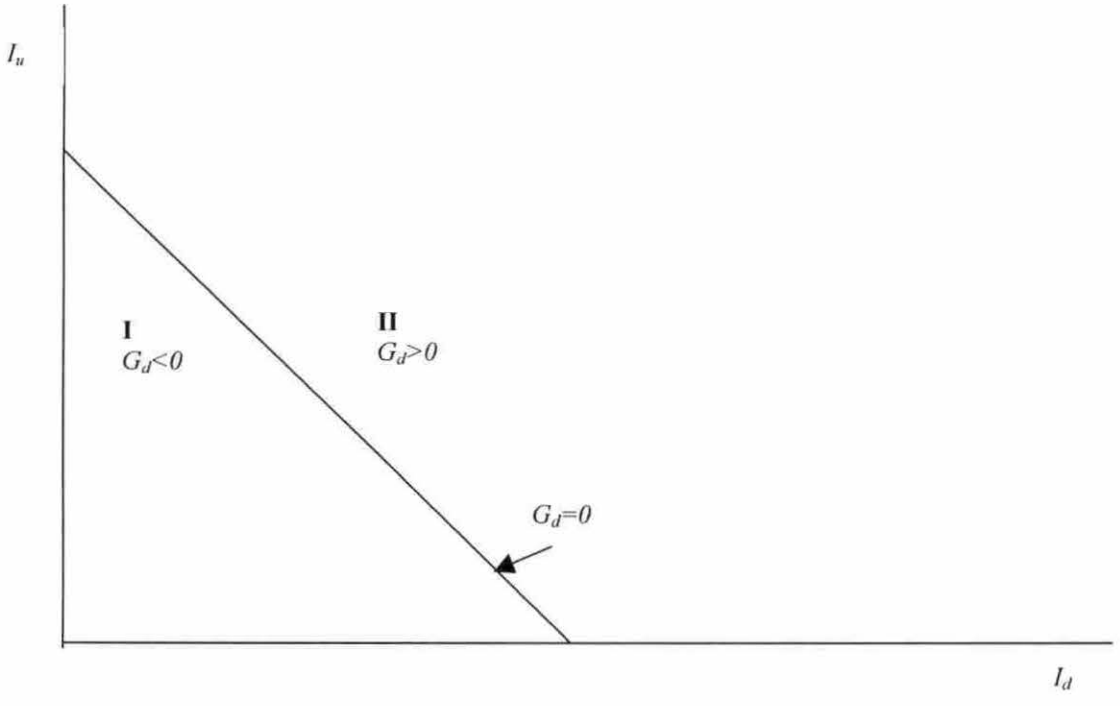


Figure 3. Domain I - M_u does not participate, Domain II - M_u participates.

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[2] The payment function is flatter than participation constraint ($|slopeG_d| > |slopeP|$) and is always positioned above ($P|G_d > 0$). It gives the third domain where $P<0$ and $G_d>0$. To ensure that P is always positive, new equations should be introduced into the model.

The downstream manager induces the upstream manager to participate when $G_d > 0$. M_d is indifferent between keeping M_u and letting him go when $G_d = 0$, and M_d does not want M_u to participate when $G_d < 0$. The downstream manager does not want the upstream to participate when the gains from M_u's participation do not cover the M_u's cost of participation, $[V(I_d, I_u) - C(I_u)] - [v(I_d, I_u) - c(I_u)] < F_u(I_u)$. G_d depends on α only indirectly, through the relationship-specific investments.

If I_u and I_d are chosen such that $G_d < 0$, the downstream manager does not want the upstream to participate or believes that the upstream manager is always going to reject his offer (Figure 1, node I). M_d does not offer the payment to M_u and maximizes his payoff given M_u's nonparticipation.

The ex ante non-participation payoffs are:

$$M_d^{NP} = \alpha[v(I_d, I_u) - c(I_u)] - F_d(I_d, I_u) - \varphi_d(I_d), \tag{2}$$

$$M_u = (1-\alpha)[v(I_d, I_u) - c(I_u)] - \varphi_u(I_u). \tag{3}$$

The first-order conditions are:

$$\alpha \frac{\partial v(I_u, I_d)}{\partial I_d} - \frac{\partial F_d(I_u, I_d)}{\partial I_d} = \frac{\partial \varphi_d(I_d)}{\partial I_d} \quad \text{for the downstream manager,} \tag{4}$$

$$(1-\alpha)\left(\frac{\partial v(I_u, I_d)}{\partial I_u} - \frac{\partial c(I_u)}{\partial I_u}\right) = \frac{\partial \varphi_u(I_u)}{\partial I_u} \quad \text{for the upstream manager.} \tag{5}$$

The value of the final output in this case is $v(I_u, I_d) \le V(I_u, I_d)$ because I_u creates more value when the upstream manager is involved in production. Also M_d hires a new manager for the upstream firm and the cost of intermediate good production is now $c(I_u)$. Since M_u has comparative advantage in producing intermediate output and downstream firm

bears additional costs of hiring new manager, paying manager's salary, etc, $c(I_u) \geq C(I_u)$. The upstream manager does not get any payment for his service and does not incur the additional cost $F_u(I_u)$ related to production process. He gets his share of the total payoff in the third stage.

If I_u and I_d are chosen such that $G_d > 0$, the downstream manager induces M_u to participate by offering M_u the payment for his product and service (Figure 1, node II). The ex ante participation payoffs are:

$$M_u = (1-\alpha)[V(I_d, I_u) - C(I_u)] - F_u(I_u) - \varphi_u(I_u) + p,$$

$$M_d{}^P = \alpha[V(I_d, I_u) - C(I_u)] - F_d(I_d, I_u) - \varphi_d(I_d) - p.$$

M_u and M_d write contract on p, where

$p = (1-\alpha)[(v(I_u, I_d) - c(I_u)) - (V(I_u, I_d) - C(I_u))] + F_u(I_u)$. This payment is set so that M_u always gets his reservation utility, i.e. M_u's payoff function is the same in case of participation and nonparticipation. So,

$$M_d = V(I_d, I_u) - C(I_u) - (1-\alpha)[v(I_d, I_u) - c(I_u)] - F_d(I_d, I_u) - F_u(I_u) - \varphi_d(I_d), \qquad (6)$$

and $M_u = (1-\alpha)[v(I_d, I_u) - c(I_u)] - \varphi_u(I_u)$.

If α is close to one there might be the case that the upstream manager is always better off not producing, his level of effort will always be in non-participation domain, especially when $c(I_u) - C(I_u)$ is very small.

The first order conditions are:

$$\frac{\partial V(I_u, I_d)}{\partial I_d} - (1-\alpha)\frac{\partial v(I_u, I_d)}{\partial I_d} - \frac{\partial F_d(I_u, I_d)}{\partial I_d} = \frac{\partial \varphi_d(I_d)}{\partial I_d} \text{ for the downstream manager,} \qquad (7)$$

$$(1-\alpha)\left(\frac{\partial v(I_u, I_d)}{\partial I_u} - \frac{\partial c(I_u)}{\partial I_u}\right) = \frac{\partial \varphi_u(I_u)}{\partial I_u} \text{ for the upstream manager.} \quad (8)$$

The solutions for FOC (4) and (5) are M_d's best-response function, $I_d^{NP}(I_u)$ and M_u's best-response function, $I_u(I_d)$. Both investment levels are also functions of the joint venture stock share, α. The response functions have positive slopes.

$$D = -\frac{\underset{+}{\alpha \frac{\partial^2 v(I_u, I_d)}{\partial I_d \partial I_u}} - \underset{-}{\frac{\partial^2 F_d(I_u, I_d)}{\partial I_d \partial I_u}}}{\underset{-}{\alpha \frac{\partial^2 v(I_u, I_d)}{\partial I_d^{\,2}}} - \underset{+}{\frac{\partial^2 F_d(I_u, I_d)}{\partial I_d^{\,2}}} - \underset{+}{\frac{\partial^2 \varphi_d(I_d)}{\partial I_d^{\,2}}}} > 0 \text{ and}$$

$$U = -\frac{\underset{+}{(1-\alpha)\frac{\partial^2 v(I_u, I_d)}{\partial I_u \partial I_d}}}{(1-\alpha)\left[\underset{-}{\frac{\partial^2 v(I_u, I_d)}{\partial I_u^{\,2}}} - \underset{+}{\frac{\partial^2 c(I_u)}{\partial I_u^{\,2}}}\right] - \underset{+}{\frac{\partial^2 \varphi_u(I_u)}{\partial I_u^{\,2}}}} > 0.$$

Since the upstream manager has the comparative advantage in producing the intermediate output and his relationship-specific investment pays off more when the manager participates in production, nonparticipation of M_u results in higher cost of production and lower value of output. These factors combined with the nature of joint ownership lead to underinvestment $\left(FOC(I_d^{FB})\middle|I_d^{NP} > 0,\ FOC(I_u^{FB})\middle|I_u^{NP} > 0\right)$ and shift the best response functions for both managers up as compared to the first-best outcome (Figures 4 and 5).

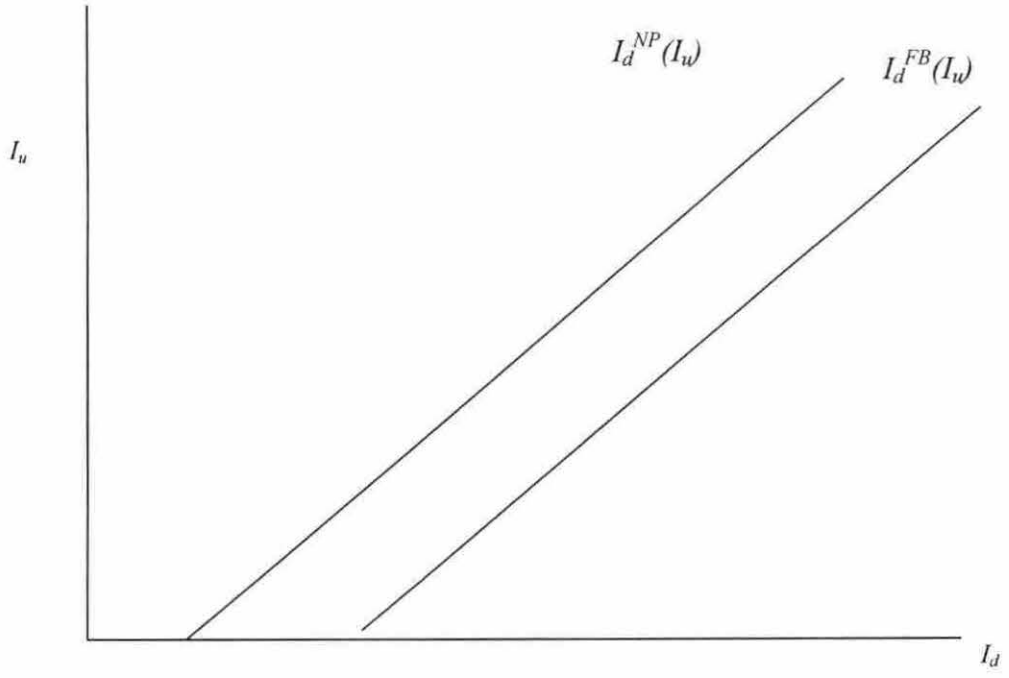

Figure 4. The downstream manager's investment level when the upstream manager does not participate.

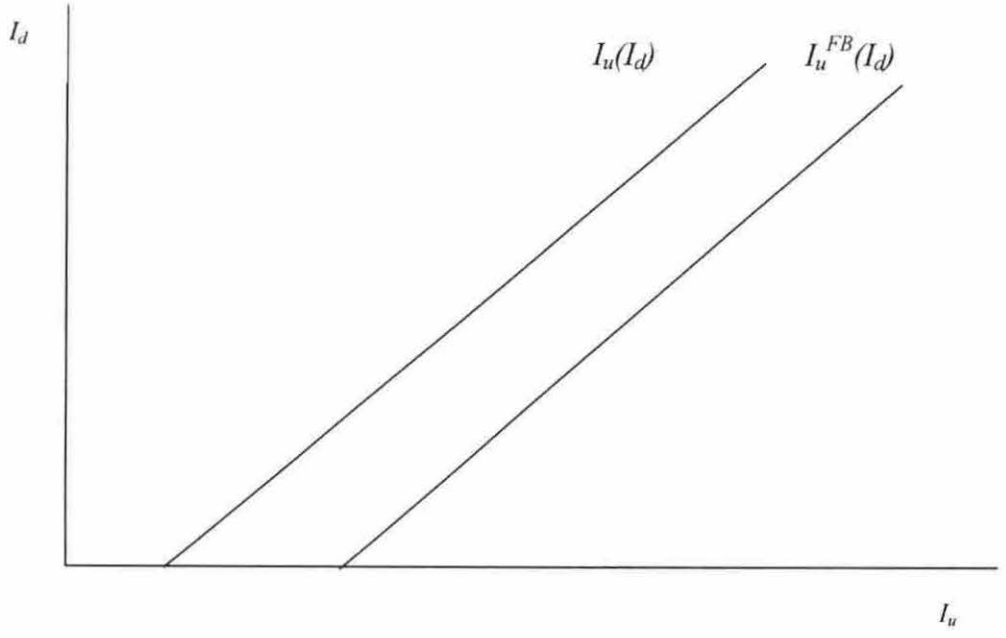

Figure 5. The upstream manager's investment level when he does not participate.

The intuition for underinvestment of I_u and I_d is the following. M_u does not take into consideration M_d 's payoff, his own payoff function does not depend on his participation , M_u gets a smaller share of net profit $[v(I_d, I_u) - c(I_u)]$ and hence he invests too little $\left(I_u^{NP}(I_d) < I_u^{FB}(I_d)\right)$. If M_d invests more, he would increase net profit of the joint venture, but his payoff would be higher only by α *increase in net profit, the rest of the gain goes to M_u. Since M_d does not take into account M_u 's payoff he underinvests $\left(I_d^{NP}(I_u) < I_d^{FB}(I_u)\right)$. The intersection of the best-response functions gives a unique pair of $\left[I_u(\alpha), I_d^{NP}(\alpha)\right]$ for $\alpha \in (0.5,1)$. $I_u(\alpha)$ and $I_d^{NP}(\alpha)$ are solutions if they satisfy $G_d < 0$.

The solutions for FOC (7) and (8) are the downstream manager's best-response function, $I_d^{P}(I_u)$ and the upstream manager's best-response function, $I_u(I_d^{P})$. The relationship-specific investments are also functions of α. Response function for the upstream manager is the as in the case of non-participation, however, for the downstream manager it is different in both cases. Both response functions have positive slopes.

$$D = -\frac{\underset{+}{\dfrac{\partial^2 V(I_u,I_d)}{\partial I_d \partial I_u}} - (1-\alpha)\underset{+}{\dfrac{\partial^2 v(I_u,I_d)}{\partial I_d \partial I_u}} - \underset{-}{\dfrac{\partial^2 F_d(I_u,I_d)}{\partial I_d \partial I_u}}}{\underset{-}{\dfrac{\partial^2 V(I_u,I_d)}{\partial I_d^{\,2}}} - (1-\alpha)\underset{-}{\dfrac{\partial^2 v(I_u,I_d)}{\partial I_d^{\,2}}} - \underset{+}{\dfrac{\partial^2 F_d(I_u,I_d)}{\partial I_d^{\,2}}} - \underset{+}{\dfrac{\partial^2 \varphi_d(I_d)}{\partial I_d^{\,2}}}} > 0.$$

I assume that marginal value of the investment (intermediate good) will be higher when both managers participate in production,

$\frac{\partial V(I_u,I_d)}{\partial I_u} > \frac{\partial v(I_u,I_d)}{\partial I_u}, \frac{\partial V(I_u,I_d)}{\partial I_d} > \frac{\partial v(I_u,I_d)}{\partial I_d}$, because I_u is more productive when

M_u participates, and vise versa. The marginal value of M_u's investment will increase with increase in M_d's investment, and this increase will be higher in participation case,

$$\frac{\partial^2 V(I_u, I_d)}{\partial I_u \partial I_d} > \frac{\partial^2 v(I_u, I_d)}{\partial I_u \partial I_d}.$$

From the (4) and (5), for the same level of I_u $I_d{}^P > I_d{}^{NP}$, as $\frac{\partial V(I_u, I_d)}{\partial I_d} > \frac{\partial v(I_u, I_d)}{\partial I_d}$. M_d's function shifts up compared to the first-best outcome, but this shift is smaller than in the case of M_u's nonparticipation . $FOC(I_d^P)\big|I_d^{NP} > 0$, so, given I_u, $I_d^{FB} > I_d^P > I_d^{NP}$ (Figure 6).

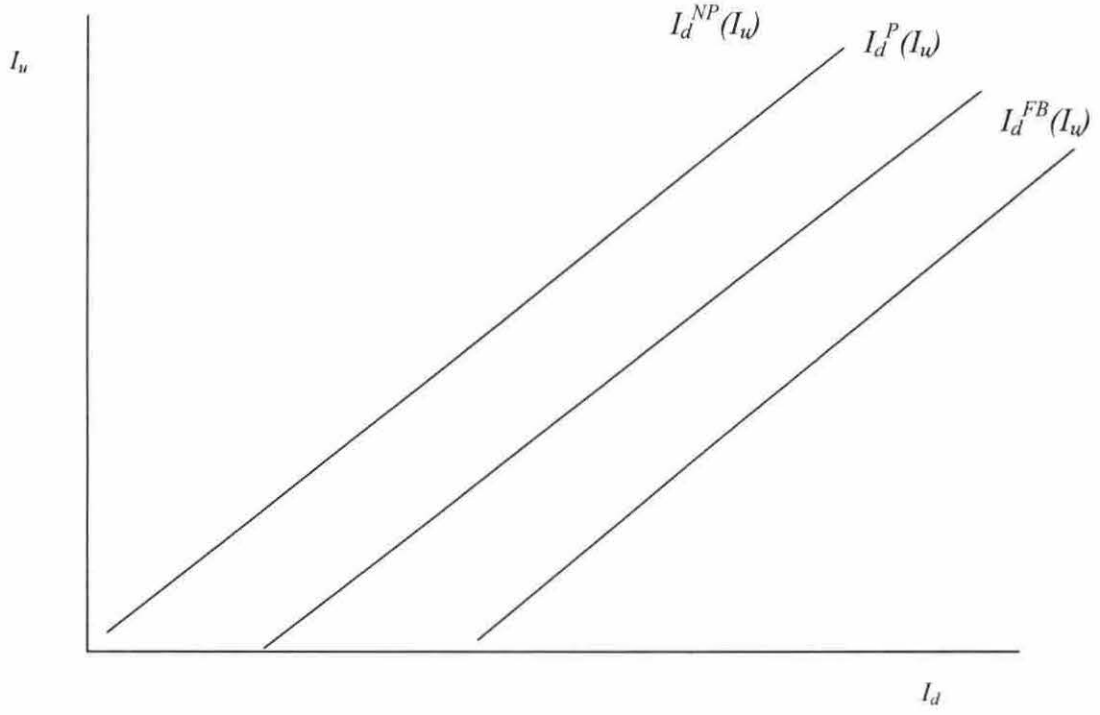

Figure 6. The downstream manager's investment level when he is the owner of the controlling stock.

For given α we can have several possible outcomes:

- no solution in $G_d < 0$, only participation solution (Figure 7);
- no solution in $G_d > 0$, only non-participation solution (Figure 8);
- both solutions may occur (Figure 9).

Since the downstream manager has different response functions in different domains, his payoff function is not globally concave. That gives as a possibility of multiple equilibrium in this subgame, i.e. for the same α participation and non-participation can be the solutions. This implies that there is also a third solution, which is a mix-strategy solution (Figure 9, point C).

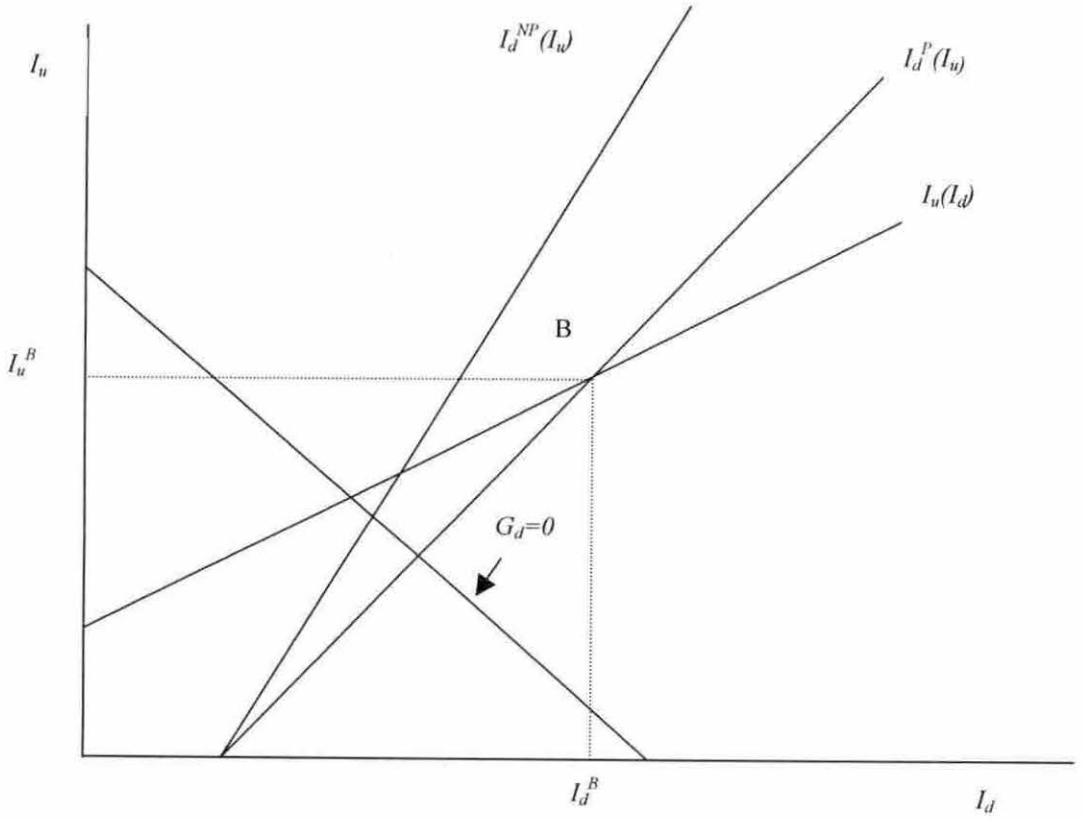

Figure 7. The subgame (M_d is owner) participation solution.

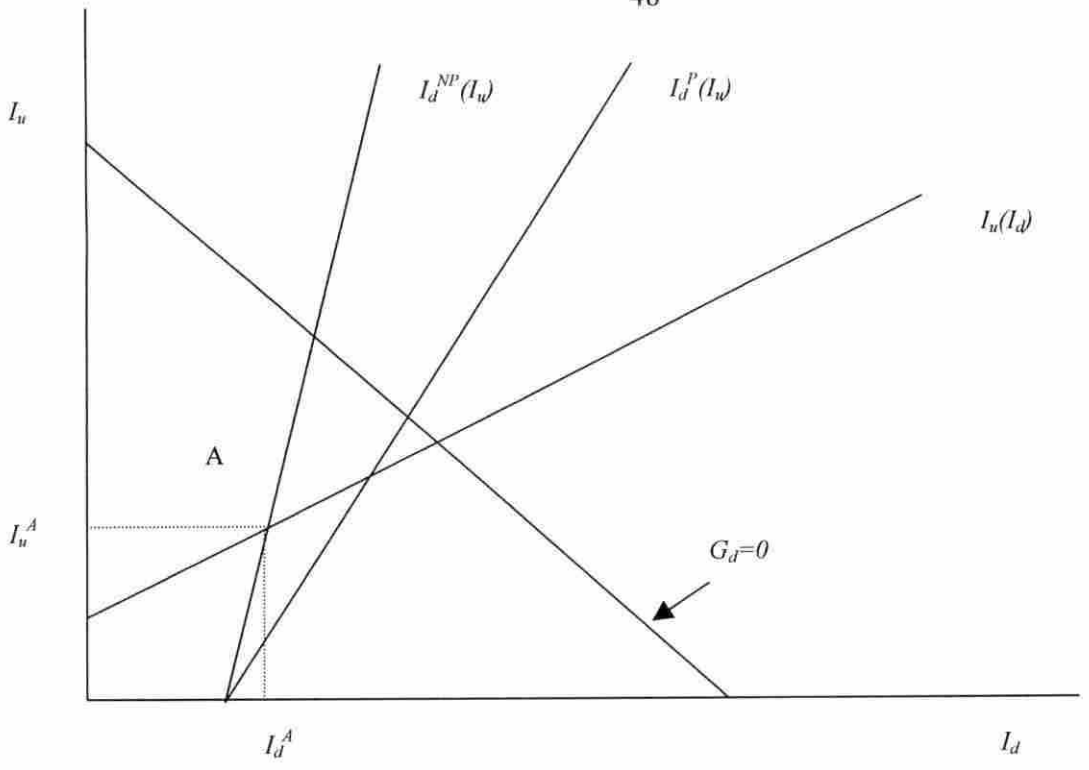

Figure 8. The subgame (M_d is owner) non-participation solution.

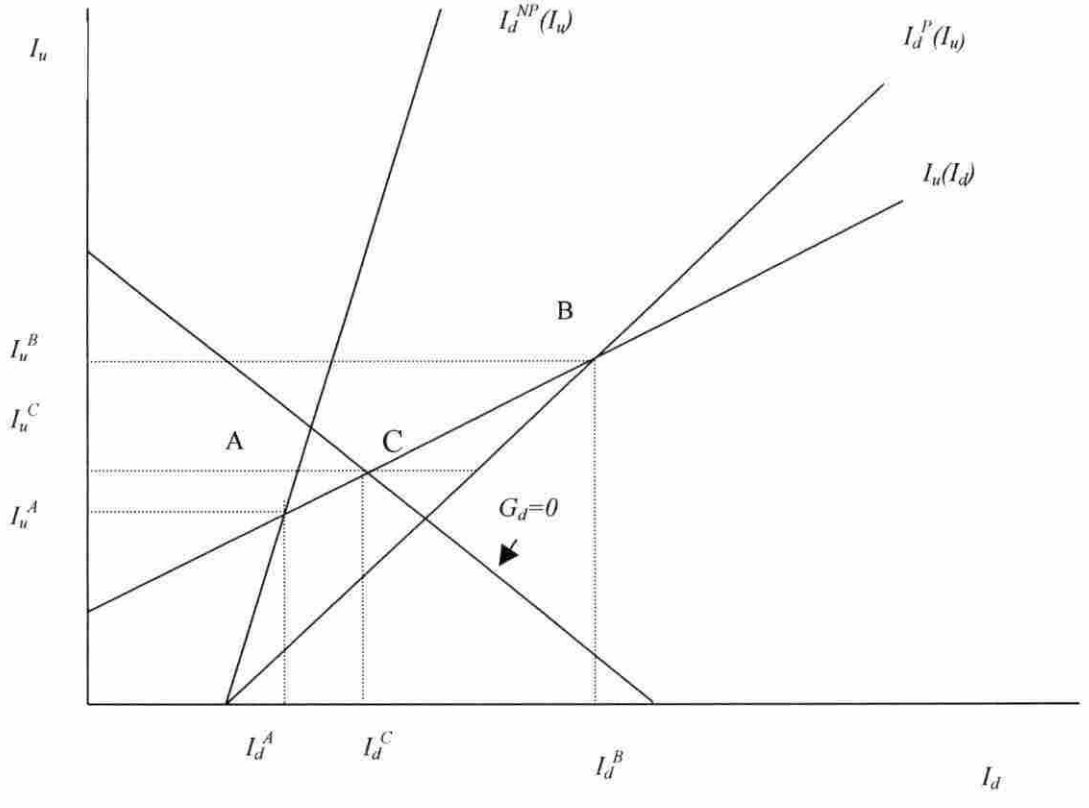

Figure 9. The subgame (M_d is owner) multiple solution.

Given the set of solutions for the individual payoffs maximization in non-participation case, α is chosen such that total payoff, $W^{NP}(\alpha)$, is maximized and

$$\alpha\left[v\left(I_d^{NP}, I_u\right) - c(I_u)\right] - F_d\left(I_d^{NP}, I_u\right) - \varphi_d(I_d^{NP}) \geq 0;$$

$$(1-\alpha)\left[v\left(I_d^{NP}, I_u\right) - c(I_u)\right] - \varphi_u(I_u) \geq 0.$$

Given the set of solutions for the individual payoffs maximization in participation case, α is chosen such that total payoff, $W^{P}(\alpha)$, is maximized and

$$V\left(I_d^{P}, I_u\right) - C(I_u) - (1-\alpha)\left[v\left(I_d^{P}, I_u\right) - c(I_u)\right] - F_d\left(I_d^{P}, I_u\right) - F_u(I_u) - \varphi_d(I_d^{P}) \geq 0;$$

$$(1-\alpha)\left[v\left(I_d^{P}, I_u\right) - c(I_u)\right] - \varphi_u(I_u) \geq 0.$$

For each $\alpha \in (0.5,1]$ there can be different sets of investments which lead to different payoffs. Managers will choose α which gives the highest total payoff, $\max\left[W^{NP}(\alpha), W^{P}(\alpha)\right]$. This ownership structure will be the Nash equilibrium of the subgame.

3.4. The Manager of the Upstream Firm Owns Controlling Stock of the Joint Venture

In stage one the upstream manager acquires controlling stock of the joint venture. In stage two both managers make relationship-specific investments. In the third stage of the model only the upstream manager makes the decision. Given the levels of I_u and I_d, he decides whether he needs M_d's participation or not. If the upstream manager needs M_d's participation in production, he makes an offer, p, to the downstream manager. Finally both firms claim their shares of the joint venture's profit.

M_u's decision depends on the participation constraint, G_u. The participation constraint is the locus that separates two domains (the domain where participation is optimal and the domain where non-participation is optimal) and is the difference between gains from M_d's participation and cost of his participation. $G_u = [V(I_d, I_u) - v(I_d, I_u)] - F_d(I_d, I_u)$.

The solution for the case when M_u is the owner may be found in two different domains (Figure 10).[3]

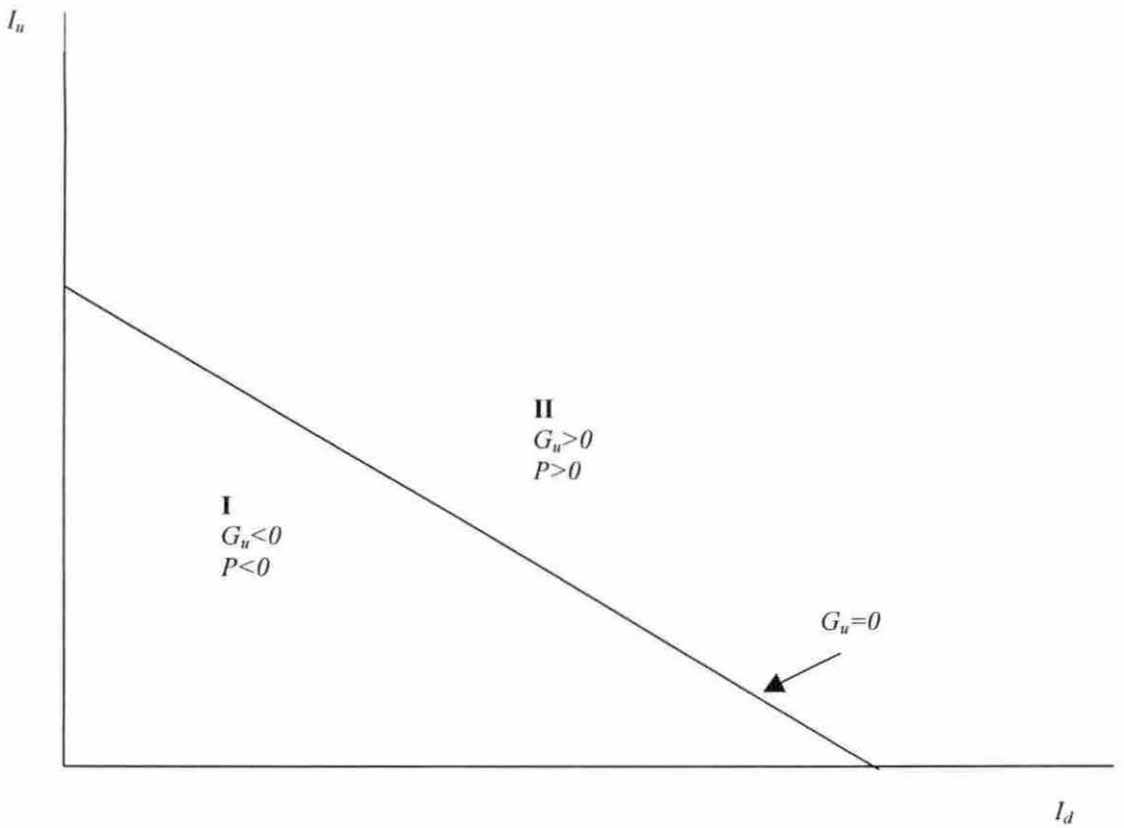

Figure 10. Domain I - M_d does not participate, Domain II - M_d participates.

[3] The participation constraint is flatter than payments function ($|slopeG_u| < |slopeP|$) and is always positioned below ($P|G_u < 0$). It gives the third domain where $P<0$ and $G_u>0$. To ensure that P is always positive, new equations should be introduced into the model.

The participation constraint is negatively slopped.

$$slopeG_u = -\frac{\overset{+}{\dfrac{\partial V(I_u, I_d)}{\partial I_d}} - \overset{+}{\dfrac{\partial v(I_u, I_d)}{\partial I_d}} - \overset{-}{\dfrac{\partial F_d(I_u, I_d)}{\partial I_d}}}{\underset{+}{\dfrac{\partial V(I_u, I_d)}{\partial I_u}} - \underset{+}{\dfrac{\partial v(I_u, I_d)}{\partial I_u}} - \underset{-}{\dfrac{\partial F_d(I_u, I_d)}{\partial I_d}}} < 0.$$

The upstream manager induces the downstream manager to participate when $G_u > 0$, M_u is indifferent between keeping M_d and letting him go when $G_u = 0$, and M_u does not want M_d to participate when $G_u < 0$.

The upstream manager does not want M_d's participation when the gains from M_d's participation are lower than M_d's cost of participation, $[V(I_d, I_u) - v(I_d, I_u)] < F_d(I_d, I_u)$. G_u depends on the ownership structure only indirectly, through the relationship-specific investments.

If I_u and I_d are chosen such that $G_u < 0$, M_u does not want M_d's participation or believes that M_d is always going to reject his offer (Figure I, node III). M_u does not offer the downstream manager the payment for his service. M_u does not participate in production and does not incur additional cost $F_d(I_u, I_d)$ related to production process. He gets his share of the total payoff in the last stage. M_u hires a new manager for the downstream firm. Since M_d has comparative advantage in producing final good $v(I_d, I_u) \leq V(I_d, I_u)$. M_u maximizes his payoff subject to M_d nonparticipation.

The ex ante non-participation payoffs are:

$$M_u^{NP} = (1-\alpha)[v(I_d, I_u) - C(I_u)] - F_u(I_u) - \varphi_u(I_u), \tag{9}$$

$$M_d = \alpha[v(I_d, I_u) - C(I_u)] - \varphi_d(I_d). \tag{10}$$

The first order conditions for payoff maximization are:

$$(1-\alpha)\left(\frac{\partial v(I_u, I_d)}{\partial I_u} - \frac{\partial C(I_u)}{\partial I_u}\right) - \frac{\partial F_d(I_u, I_d)}{\partial I_u} = \frac{\partial \varphi_u(I_u)}{\partial I_u} \text{ for the upstream manager,} \tag{11}$$

$$\alpha \frac{\partial v(I_u, I_d)}{\partial I_d} = \frac{\partial \varphi_d(I_d)}{\partial I_d} \text{ for the downstream manager.} \tag{12}$$

If I_u and I_d are chosen such that $G_u > 0$, M_u induces M_d to participate (Figure 1, node IV). The ex ante participation payoffs are:

$$M_u^{P} = (1-\alpha)[V(I_d, I_u) - C(I_u)] - F_u(I_u) - \varphi_u(I_u) - p,$$

$$M_d = \alpha[V(I_d, I_u) - C(I_u)] - F_d(I_d, I_u) - \varphi_d(I_d) + p.$$

M_u and M_d write contract on p, where $p = F_d(I_u, I_d) - \alpha[V(I_u, I_d) - v(I_u, I_d)]$. The payment is set such that M_d always gets his reservation utility, i.e. M_d 's payoff function is the same in case of participation and nonparticipation. So,

$$M_u^{P} = V(I_d, I_u) - C(I_u) - \alpha[v(I_d, I_u) - C(I_u)] - F_d(I_d, I_u) - F_u(I_u) - \varphi_u(I_u), \tag{13}$$

$$M_d = \alpha[v(I_d, I_u) - C(I_u)] - \varphi_d(I_d).$$

The first order conditions are:

$$\frac{\partial V(I_u, I_d)}{\partial I_u} - \frac{\partial C(I_u)}{\partial I_u} - \alpha\left(\frac{\partial v(I_u, I_d)}{\partial I_u} - \frac{\partial C(I_u)}{\partial I_u}\right) - \frac{\partial F_d(I_u, I_d)}{\partial I_u} - \frac{\partial F_u(I_u)}{\partial I_u} = \frac{\partial \varphi_u(I_u)}{\partial I_u}, \tag{14}$$

$$\alpha \frac{\partial v(I_u, I_d)}{\partial I_d} = \frac{\partial \varphi_u(I_d)}{\partial I_d}. \tag{15}$$

The solution for FOC (11) and (12) are M_d's best-response function, $I_d(I_u)$ and M_u's best-response function, $I_u^{NP}(I_d)$, while the solution to (14) is the best-response function, $I_u^{P}(I_d)$, if M_u induces M_d to participate. Both investment levels are also functions of the joint venture stock share, α.

Both managers underinvest as compare to the first-best outcome. The same argument as above applies. The downstream manager has comparative advantage in producing final output and his relationship-specific investment pays off more when the manager participates in production, so nonparticipation of M_d results in lower value of output. M_d does not take into consideration M_u's payoff, his own payoff function does not depend on his participation, M_d gets smaller share of net profit $[v(I_d, I_u) - C(I_u)]$ and hence he invests too little $\left(I_d(I_u) < I_d^{FB}(I_u)\right)$. If M_u invests more, he would increase net profit of the joint venture, but his payoff would be increased only by $(1-\alpha)$*increase in net profit, the rest of the gain goes to M_d. Since M_u does not take into account M_d's payoff he underinvests $\left(I_u^{NP}(I_d) < I_u^{FB}(I_d)\right)$.

The intersection of the best-response functions gives a unique pair of $\left[I_u^{NP}(\alpha), I_d(\alpha)\right]$ for $\alpha \in (0, 0.5)$. $I_u^{NP}(\alpha)$ and $I_d(\alpha)$ are solutions if they satisfy $G_u < 0$.

The solution for FOC (14) and (15) are M_d's best-response function, $I_d(I_u)$ and M_u's best-response function, $I_u^{P}(I_d)$. Both investment levels are also functions of the joint venture stock share, α. The outcomes under different types of joint ownership are illustrated in Figures 11 and 12.

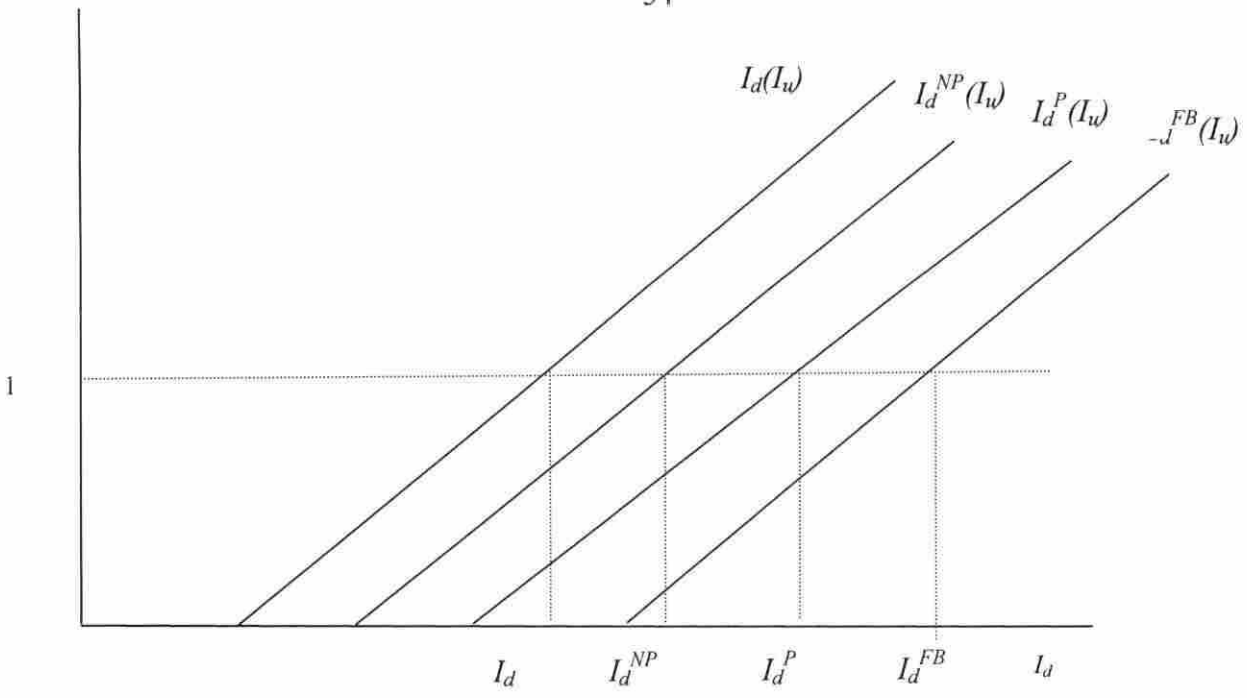

Figure 11. The downstream manager's best-response functions under different ownership structures.

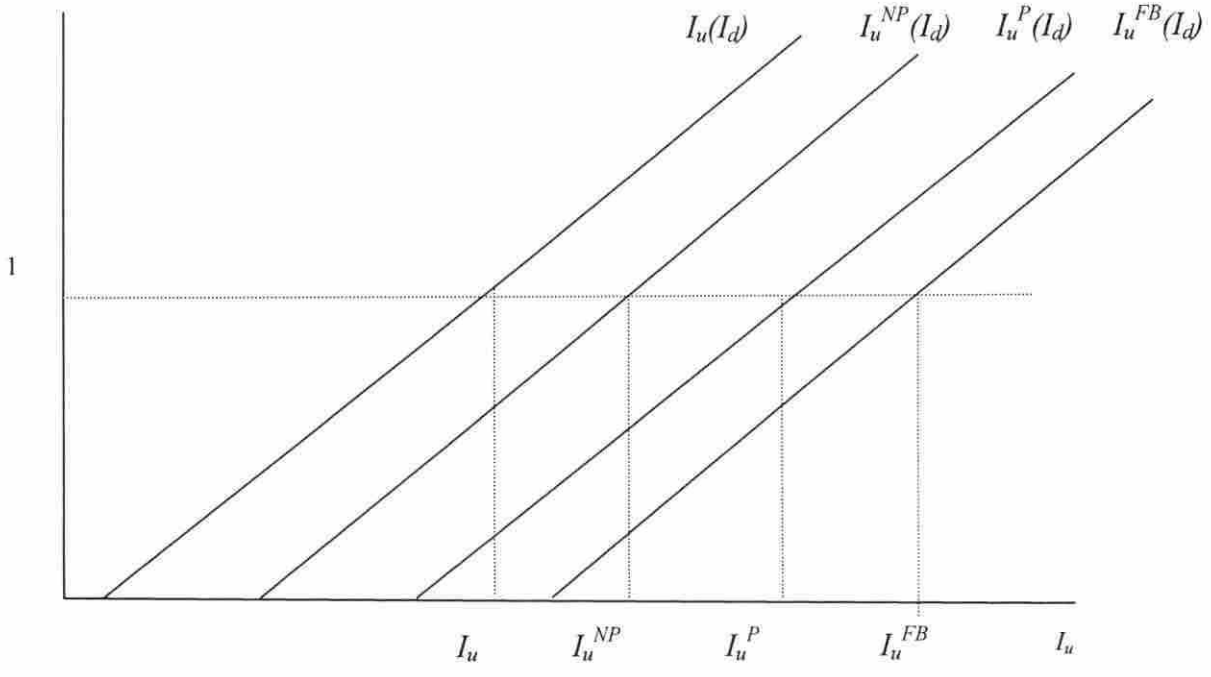

Figure 12. The upstream manager's best response functions under different ownership structures.

For the same level of I_d $I_u^{NP} < I_d^{P} < I_d^{FB}$. M_u's function shifts up compared to the first-best outcome, but this shift is smaller than in the case of nonparticipation.

For given α we can have several possible outcomes:

- no solution in $G_u < 0$, only participation solution;
- no solution in $G_u > 0$, only non-participation solution;
- both solutions may occur.

Since the upstream manager has different response functions in different domains, his payoff function is not globally concave. That gives as a possibility of multiple equilibrium in this subgame, i.e. for the same α participation and non-participation can be the solutions. This implies that there is also a third solution, which is a mix-strategy solution.

Given the set of solutions for the individual payoffs maximization in non-participation case, α is chosen such that total payoff, $W^{NP}(\alpha)$, is maximized and

$$(1-\alpha)\left[v\left(I_d, I_u^{NP}\right) - C\left(I_u^{NP}\right)\right] - F_u\left(I_u^{NP}\right) - \varphi_u\left(I_u^{NP}\right) + \tau_u(I_u) \geq 0 ,$$

$$\alpha\left[v\left(I_d, I_u^{NP}\right) - C\left(I_u^{NP}\right)\right] - \varphi_d(I_d) + \tau_d(I_d) \geq 0 .$$

Given the set of solutions for the individual payoffs maximization in participation case, α is chosen such that total payoff, $W^{P}(\alpha)$, is maximized and

$$V\left(I_d, I_u^{P}\right) - C\left(I_u^{P}\right) - \alpha\left[v\left(I_d, I_u^{P}\right) - C\left(I_u^{P}\right)\right] - F_d\left(I_d, I_u^{P}\right) - F_u\left(I_u^{P}\right) - \varphi_u\left(I_u^{P}\right) \geq 0 \text{ and}$$

$$\alpha\left[v\left(I_d, I_u^{P}\right) - C\left(I_u^{P}\right)\right] - \varphi_d(I_d) \geq 0 .$$

For each $\alpha \in (0, 0.5)$ there can be different sets of investments which lead to different payoffs. Managers will choose α which gives the highest total payoff,

$\max\left[W^{NP}(\alpha), W^{P}(\alpha)\right]$. This ownership structure will be the Nash equilibrium of the subgame.

Each subgame has Nash equilibrium that yields the highest total payoff. The Nash equilibrium of the game is the ownership structure that gives $\arg\max_{\alpha}\left[W^{P}(\alpha), W^{NP}(\alpha)\right]$.

For example, if $W^{P}(\alpha) = \left(M_d(\alpha) + M_u{}^{P}(\alpha)\right)$ is chosen, then M_u will have controlling stock of the joint venture, will induce M_d to participate in production, and that will make both managers better off.

3.5. General Results

When firms have liquidity constraints, e.g. capital and asset markets imperfections, initial allocation of property rights have a substantial effect on the ex post economic performance of the enterprises. Given the assumptions of the model, the joint ownership structure is likely to be optimal for the vertically integrated firms with complimentary assets and essential investments in human and physical capital.

If the model does not allow side payments, the managers would just exchange their shares of the firms and interior solution for α, i.e. $\alpha \in (0, 1)$, would be driven mostly by liquidity constraint. Since the model assumes some side payments between managers during the allocation of property rights, the interior solution is due to the structure of the model. The result is determined by the complimentarity of the assets and investments, and the fact that ex ante and ex post payoffs of the firms are interdependent on the levels of managers investments.

Under any type of joint ownership managers will underinvest in the relationship-specific investments as compare to the first-best outcome. Any change in the ownership structure that leads to increase in I_u (or I_d) without decreasing I_d (or I_u) is good, since such change moves firms closer to the first-best and the total payoff rises. As opposed to the Hart's model, some choices of the investment can lead to nonparticipation of one of the managers even when both managers have comparative advantage in running their firms.

Without further information about the importance of M_u's investment relative to M_d's investment it is not possible to find what type of the joint ownership structure is preferable. That is also interesting to see how the results will change with change in the relative importance of the investments.

In the next section we introduce particular functional forms to define the relative importance of I_u and I_d. The solution for the model and the sensitivity analysis are also presented.

3.6. Specified Model

To find the optimal ownership structure and analyze how the choice of the structure is affected by changes in the relative importance of I_u and I_d, we use particular functional forms for the model.

For the simplicity we assume that all functions are quadratic. This ensures the linearity of the FOC's.

Functional forms are:

$I_u \in [0,1]$ and $I_d \in [0,1]$;

$\varphi_u(I_u) = I_u^2$ and $\varphi_d(I_d) = I_d^2$;

$V(I_u, I_d) = 2I_d + I_u - 0.4(I_u^2 - 0.7I_uI_d + I_d^2) + 2$;

$v(I_u, I_d) = 2I_d + I_u - 0.8(I_u^2 - 0.3I_uI_d + I_d^2) + 2$.

Since M_d produces final output and has a comparative advantage in such production I assume that I_d creates more value than I_u. $V(I_u, I_d) \geq v(I_u, I_d)$ for $\forall$ I_u and I_d, because investments become relatively unproductive when one of the managers does not participate. For example, M_u knows his firm better than outside person, and even if a new manager's qualification is the same as M_u's, the value of the intermediate output will be lower because the outside manager is not as familiar with the production process as M_u.

$C(I_u) = 0.8I_u^2 - 2I_u + 2$;

$c(I_u) = I_u^2 - 2I_u + 2$;

$c(I_u) \geq C(I_u)$ for $\forall$ I_u, the same argument as above applies to justify this choice of functional forms for costs.

$F_d(I_u, I_d) = 0.5I_u^2 - 2I_uI_d + I_d^2 + 0.2$;

$F_u(I_u) = I_u^2 - I_u + 0.3$.

$F_d(I_u, I_d)$, $F_u(I_u)$ and the interaction term in the value functions and F_d are going to be the key determinants of the final outcome.

First-Best:

The maximization of (1) with respect to I_u and I_d gives the first-best investment levels, I_d=0.85888 and I_u=0.93098; total payoff=2.1208

Case 1: M_d is the owner of controlling stock.

If the downstream manager does not want the upstream manager to participate he maximizes (2) with respect to I_d and M_u maximizes (3) with respect to I_u. These investments are chosen non-cooperatively and simultaneously.

The results of maximization are presented in Table 6.

Table 6. M_d is the owner, M_u does not participate. The model results.

α	I_d	I_u	M_d^{NP}	M_d^{P}	M_u	*Total*	G_d
0.6	0.39752	0.35993	0.63508	0.69017	0.49028	1.1254	>0
0.7	0.40114	0.30159	0.6852	0.67792	0.34213	1.0273	<0
0.8	0.39752	0.2276	0.66292	0.57447	0.20418	0.8671	<0
0.9	0.38426	0.13103	0.519	0.32336	0.00853	0.6043	<0

M_d^{NP} and M_u are payoffs for given I_d, I_u and α. The sign of G_d is checked to validate that the choice of investments is in correct region. Also, it is necessary to calculate whether M_d^{NP} (M_u does not participate and both managers assume that) is the best response to the chosen level of I_u. This is done by considering M_d^{P} response function. M_d^{P} is the best-response function for M_d when he assumes participation of M_u while M_u chooses I_u assuming non-participation. M_u's ex post reservation is determined by $c(I_u)$, and consistency holds only if M_d is worse off by making M_u participate. So, M_d^{NP} is relevant solution only if $M_d^{NP} > M_d^{P}$ (Figure 13, compare payoffs at points A and A').

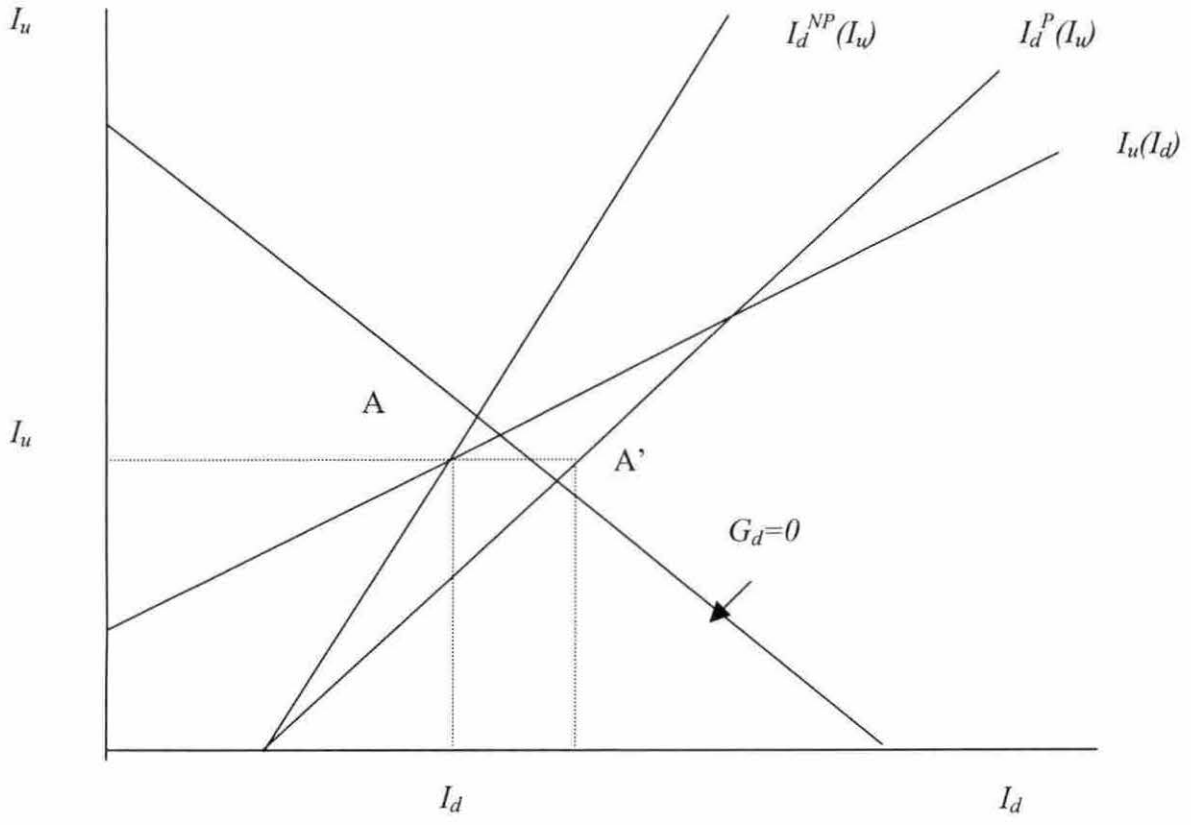

Figure 13. Non-participation solution.

For $\alpha = 0.6$ the choice of investment does not satisfy participation constraint ($G_d > 0$) and M_d^{NP} is not a valid solution since M_d is better off making M_u participate, $M_d^{NP} < M_d^{P}$. $\alpha = 0.7$, $\alpha = 0.8$ and $\alpha = 0.9$ are relevant solutions. The choice of investments is in correct region for non-participation ($G_d < 0$), and $M_d^{NP} > M_d^{P}$. When M_d is the owner of controlling stock, non-participation of M_u will occur when M_d has 70% or more of the joint venture stock.

If M_d wants M_u to participate and offers him the payment, M_d maximizes (6) with respect to I_d and M_u maximizes (3) with respect to I_u. The investments are chosen non-cooperatively and simultaneously.

The results of maximization are presented in Table 7.

To check whether M_d^P (M_u participates and both managers assume that) is the best response to the chosen level of I_u, consider M_d^{NP}. M_d^{NP} is the best-response function for M_d when he assumes non-participation of M_u while M_u chooses I_u assuming participation. M_d^P is relevant solution only if $M_d^{NP} < M_d^P$.

Table 7. M_d is the owner, M_u participates. The model results.

α	I_d	I_u	p	M_d^{NP}	M_d^P	M_u	*Total*	G_d
0.55	0.47569	0.38712	0.00033	0.59526	0.67918	0.61791	1.2971	>0
0.6	0.47861	0.36219	0.00325	0.63849	0.69645	0.53522	1.2317	>0
0.7	0.47915	0.30341	0.00967	0.68867	0.68366	0.37416	1.0578	>0
0.8	0.47119	0.2289	0.17239	0.66602	0.57917	0.22421	1.0034	<0
0.9	0.45197	0.13171	0.26751	0.52101	0.32621	0.00945	0.42073	<0

For $\alpha = 0.9$ and $\alpha = 0.8$ the choice of investment does not satisfy participation constraint ($G_d < 0$) and M_d^P is not a valid solution since M_d is better off without M_u's participation, $M_d^{NP} > M_d^P$. $\alpha = 0.6$ is relevant solution. The choice of investments is in correct region for participation ($G_d > 0$), and $M_d^{NP} < M_d^P$. $\alpha = 0.7$ is not a relevant solution since $M_d^{NP} > M_d^P$. When M_d is the owner of controlling stock, participation of

M_u will occur when M_d has 70% or less of the joint venture stock. Since $\alpha = 0.55$ gives highest total payoff, this ownership structure will be optimal for the "M_d-owner" subgame.

Case 2: M_u is the owner of controlling stock.

If the upstream manager does not want the downstream manager to participate he maximizes (9) with respect to I_u and M_d maximizes (10) with respect to I_d. I_u and I_d are chosen non-cooperatively and simultaneously.

The results are presented in Table 8.

Table 8. M_u is the owner, M_d does not participate. The model results.

α	I_d	I_u	M_u^{NP}	M_u^{P}	M_d	*Total*	G_u
0.4	0.32407	0.57859	0.762	0.87707	0.61869	1.3807	>0
0.3	0.25935	0.59992	0.86837	0.9248	0.45058	1.319	>0
0.25	0.22357	0.6093	0.90774	0.9285	0.36845	1.2762	>0
0.2	0.1852	0.61791	0.9358	0.9161	0.28835	1.2242	<0
0.1	0.009963	0.63291	0.94987	0.83297	0.1365	1.0864	<0

The choice of investments is in the correct region ($G_d < 0$) for $\alpha = 0.2$ and $\alpha = 0.1$. Payoff M_u^{NP} (M_d does not participate and both managers assume that) is the best-response function for these ownership structure, $M_u^{NP} > M_u^{P}$, where M_u^{P} is the function for M_u when he assumes M_d's participation while M_d chooses I_d assuming non-participation.

When M_u wants M_d's participation, he offers the payment and maximizes (13) with respect to I_u, M_d maximizes (10) with respect to I_d. I_u and I_d are chosen non-cooperatively and simultaneously.

The results are presented in Table 9.

Table 9. M_u is the owner, M_d participates. The model results.

α	I_d	I_u	p	M_u^{NP}	M_u^{P}	M_d	*Total*	G_u
0.45	0.35833	0.69119	0.0812	0.70189	0.84542	0.31375	1.5473	>0
0.4	0.328	0.68679	0.0591	0.76581	0.8849	0.26429	1.1492	>0
0.3	0.26156	0.67602	0.0221	0.87104	0.92986	0.17389	1.1038	>0
0.25	0.22507	0.66958	0.00805	0.90975	0.93217	0.13364	1.0658	>0
0.2	0.18612	0.6624	-0.0026	0.93716	0.9185	0.0972	1.0157	<0
0.1	0.0998	0.64557	-0.0116	0.95013	0.8334	0.0377	0.87114	<0

Since $\alpha = 0.45$ is valid solution and gives the highest total payoff, this ownership structure is the Nash equilibrium of the "M_u-owner" subgame. The closer α is to 0.5 the higher is the total payoff.

$\alpha = 0.45$ yields the highest of all total payoffs in the game,

$$\arg\max_{\alpha}[1.5473, 1.0273, 0.8671, 0.6043, 1.2317, 1.0578, 1.2242, 1.0864, 1.1492, 1.1038, 1.0658]$$

So, in equilibrium the upstream manager will own 55% of the joint venture and will induce the downstream manager to participate in production process.

Both managers have incentives to invest more since they share final surplus. The controlling stock -owner's incentive (M_u's incentives) to make relationship-specific investment increases because he receive a greater ex post payoff created by such investment.

When M_u's investments is relatively more important than M_d's investments, the optimal ownership structure is when M_u is the owner. When M_d's investments is relatively more important, the optimal ownership structure is when he is the owner of controlling stock. To show this I modify the model by changing interaction terms in value functions. New functional forms for $V(I_u, I_d)$ and $v(I_u, I_d)$ are:

$V(I_u, I_d) = 2I_d + I_u - 0.4(I_u^2 - 0.5I_uI_d + I_d^2) + 2$,

$v(I_u, I_d) = 2I_d + I_u - 0.8(I_u^2 - 0.2I_uI_d + I_d^2) + 2$. All other functions stay the same.

The first-best outcome is: $I_d = 0.8346$, $I_u = 0.9119$, and total payoff =2.0584.

The valid solutions for the new model are presented in Tables 10 and 11.

Table 10. M_d is the owner of controlling stock

α	I_d	I_u	p	M_d^{NP}	M_d^{P}	M_u	*Total*	G_d
0.55	0.46898	0.3826	0.00853	0.58217	0.65857	0.60738	1.266	>0
0.6	0.47209	0.35762	0.03727	0.62479	0.67561	0.52633	1.2019	>0
0.7	0.47331	0.29958	0.10056	0.67466	0.66360	0.36844	1.0320	>0
0.7	0.39652	0.29839	---	0.67243	0.65988	0.33729	1.0097	<0
0.8	0.3938	0.22522	---	0.65153	0.55912	0.20169	0.8532	<0
0.9	0.3820	0.12971	---	0.51147	0.31362	0.08458	0.5961	<0

The Nash equilibrium of this model is $\alpha = 0.55$. The downstream manager owns 55% of the stock and induces the upstream manager to participate by offering him the payment for his service.

Table 11. M_u is the owner of controlling stock

α	I_d	I_u	p	M_u^{NP}	M_u^{P}	M_d	*Total*	G_u
0.4	0.31952	0.68017	0.05433	0.74872	0.85752	0.25488	1.1124	>0
0.3	0.25492	0.67069	0.01944	0.85455	0.90505	0.16828	1.0733	>0
0.2	0.18091	0.61568	---	0.92229	0.89719	0.28607	1.2084	<0
0.1	0.09727	0.63163	---	0.94122	0.82141	0.13587	1.0771	<0

Participation decision depends on the level of I_d and I_u. Some choices of investments can lead to nonparticipation solution even when both managers have comparative advantage in running their firms. To show this I increase the downstream manager's cost of participation, $F_d(I_u, I_d)$. The nontransferable cost function for M_d is now

$F_d(I_u, I_d) = 0.5I_u^{\,2} - 1.5I_uI_d + I_d^{\,2} + 0.2$;

$V(I_u, I_d) = 2I_d + I_u - 0.4(I_u^{\,2} - 0.5I_uI_d + I_d^{\,2}) + 2$,

$v(I_u, I_d) = 2I_d + I_u - 0.8(I_u^{\,2} - 0.2I_uI_d + I_d^{\,2}) + 2$. All other functions are the same as in the basic model. The first-best outcome is : $I_d = 0.7043$, $I_u = 0.8121$, and total payoff =1.7284. The valid solutions for the new model are presented in Tables 12 and 13.

Table 12. M_u is the owner of controlling stock

α	I_d	I_u	p	M_u^{NP}	M_u^{P}	M_d	*Total*	G_u
0.4	0.3188	0.6487	0.0062	0.7480	0.7502	0.2433	0.9934	>0
0.3	0.2535	0.5970	---	0.8527	0.8183	0.4459	1.2987	<0
0.2	0.1809	0.6157	---	0.9223	0.8384	0.2861	1.2084	<0

Table 13. M_d is the owner of controlling stock

α	I_d	I_u	p	M_d^{NP}	M_d^{P}	M_u	*Total*	G_d
0.55	0.4218	0.3823	0.0172	0.5068	0.5713	0.5787	1.1500	>0
0.6	0.4288	0.3568	0.0444	0.5535	0.59306	0.5032	1.0962	>0
0.7	0.3672	0.2979	---	0.6147	0.5906	0.3247	0.9394	<0
0.8	0.3724	0.2249	---	0.6079	0.5072	0.1956	0.8035	<0
0.9	0.3701	0.1296	---	0.4869	0.2846	0.0829	0.5697	<0

The Nash equilibrium is $\alpha = 0.3$, the upstream manager owns 70% of joint venture's stock, the downstream manager does not participates in production and just receives his share of the joint venture profit.

If the model is fully symmetric and there are no interaction terms, the results are likely to be similar to Hart model. The party with more important investment or human capital has ownership rights, i.e. acquires the other firm.

The important results of the presented model are:

- joint ownership is optimal when the investment of one manager benefits another manager regardless of his participation in production process;
- there are some choices of relationship-specific investments that lead to nonparticipation of one of the managers being optimal;
- the interior solution for α is driven by the structure of the model. The less important M_u's investment relative to M_d's investment (and vice versa) and the higher is the cost of participation, the more likely the owner will have more than 55% of the joint venture's stock.

CHAPTER 4. CONCLUSION

Russia started extended privatization reforms in late 1991. There are cases when privatized enterprises have not outperformed production and efficiency levels of pre-privatization period. Literature on privatization firmly favors private to public ownership, although one question remains unanswered: "what type of ownership structure is most preferred for privatized enterprises?" Is it the most efficient to transfer an enterprise into single hands or should a joint ownership be established?

The Russian economy is characterized by asset market failures and capital market imperfections. The initial allocation of property rights can have a substantial effect on future economic performance of enterprises. Joint ventures emerge all the time in Russia. One of the reasons is that with capital and asset market imperfections enterprises have liquidity constraints, they do not have access to unlimited money resources and ownership cannot change hands easily. So firms just exchange the shares of their enterprises and create joint ventures since they do not usually have option of buying each other.

This thesis focuses on ex post efficiency of vertically integrated enterprises under different ownership structures, given that complete contingent contracts cannot be written. Unforeseen contingencies, unverifiable terms, costs of enforcement, and a lack of common language all contribute to contracts being incomplete. These characteristics of contracts provide incentives to acquire ownership, since ownership is a source of power when contracts are in dispute and is a way of securing residual property rights. We use incomplete contract approach to the choice of ownership structure after privatization, and consider transition economy of Russia with vertically integrated industry producing private goods.

The model largely builds on the classical treatment of residual rights approach to ownership by Hart (1995).

In the model we make a number of assumptions, including: complete contracts cannot be written, asset and capital markets are imperfect, and payoff of the firms are interdependent on levels of managers' investments. The ownership may change hands if managers sign the contract on creating a joint venture. In this case both managers have the incentives to invest more since they share final surplus. Hart stated that if the investments are embodied in the human capital, the same person should own the strictly complimentary assets (or assets should not be jointly owned). When investments are embodied in physical assets rather than human assets, it is no longer clear. We look at the joint ownership structure where both managers have a share of the enterprise. Firm's assets are complimentary and the relationship-specific investments may be investments in physical capital. Whether the manager produces or not he gets his share of the joint venture's profit. Given these assumptions, joint ownership for vertically integrated enterprises with complimentary assets and essential investments in human and physical capital is optimal. As opposed to Hart's model, some choices of the relationship-specific investments can lead to nonparticipation solution even when both managers have comparative advantage in running their firms.

If the model does not allow side payments, the managers would just exchange their shares of the firms and an interior solution for α, i.e. $\alpha \in (0, 1)$, would be driven mostly by liquidity constraint. Since the model assumes some side payments between managers during the allocation of property rights, the interior solution is due to the structure of the model. The result is determined by the complementarity of the assets and investments, and the fact that ex ante and ex post payoffs of the firms are interdependent on the levels of managers

investments. So, for Russian economy the joint ownership may be not only a necessity but also an optimal way of allocating ownership rights.

REFERENCES

Boycko, M., Schleifer, A. and R. W. Vishny. 1996. "A Theory of privatization". *The Economic Journal* 106, pp. 309-319.

Boycko, M., Schleifer, A. and R. W. Vishny. 1993. "Privatizing Russia". *Brookings Papers on Economic Activity,* pp. 139-192.

Boycko, M., Schleifer, A. and R. W. Vishny. 1994. "Voucher Privatization". *Journal of Financial Economics* 35, pp. 249-266.

Christensen, B. V. 1994. "The Russian Federation in Transition. External Developments". IMF, Ocasional paper, Washington DC.

Erydman, Rapaczynski, Earle et al. 1993. *Privatization Process in Russia, Ukraine and the Baltic States*. Central European University Press, Budapest, London, New York.

Fisher, S., Sahay, R. and C. A. Vegh. 1996. "Economies in Transition: The Beginning of Growth". *AEA Papers and Proceedings*, pp. 229-233.

Hart, O. 1995. "Firms, Contracts and Financial Structure", *Oxford University, Oxford.*

Havrylyshyn and McGettigan. 1999. "Privatization in Transition Countries: A Sampling of Literatire". IMF Working Paper.

Kolodko, G.W. 1998. "Ten Years of Postsocialist Transition: Lessons for Policy reforms". The World Bank Working Paper

Leyonhufvud ,A. and C. Ruhl. 1997. "Russian Dilemmas". *The Transition from Socializm*, vol. 87, No 2, pp. 344-348.

Laffont, J. J. and J. Tirole 1991, "Privatization and incentives," *Journal of Law, Economics and Organization* 7 (Sp.), pp. 84-105.

Megginson, W., Nash, R. and M Van Randenborgh. 1994. "The financial and operating performance of newly privatized firms". *Journal of Finance*, vol. 49, pp. 403-52.

Sappington, D. E. and J. E. Stiglitz. 1987. "Privatization, information and incentives". *Journal of Policy Analysis and Management* 6, pp. 567-582.

Schleifer, A. 1994. "Establishing property rights". *Proceedings of the World Bank Annual Conference on Development Economics*, pp. 93-117.

Schleifer, A. and R. Vishny. 1994. "Politicians and Firms," *Quarterly Journal of Economics* 109, pp. 995-1025.

Schmidt, K. M. 1996. "Incomplete Contracts and Privatization". *European Economic Review* (40), pp.569-579.

Schmidt K. M. and Schnitzer. 1993. "Privatization and Management Incentives in the Transition Period in Eastern Europe". *Journal of Comparative Economic* 17, pp. 264-287..

Selowsky, M. and R. Martin. 1997. "Policy Performance and Output Growth in the Transition Economies". *The transition from Socialism,* vol. 87, NO 2, pp. 349-353.

Shapiro, C. and R. D. Willig .1990. "Economic Rationales for the scope of privatization," in: E. N. Suleiman and J. Waterbury, eds.. *The political economy of public sector reform and privatization* (Westview Press, Boulder, CO).

Vinning, A. and A. Boardman. 1992. "Ownership vs. Competition: efficiency in public enterprise," *Public Choice*, vol. 73, pp.205-39.

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank the people without whom this thesis would have never been written.

First and foremost, I would like to express my gratitude to Dr. Harvey Lapan. I was fortunate enough to have him as my major professor, and his insights, support, patience and understanding were invaluable in shaping this thesis.

I would also like to thank the members of my committee, Dr. Beghin and Dr. Amemiya for their comments and suggestions.

My special thank you to Tigran Melkonian for introducing me to the incomplete contract literature. His advice and time are greatly appreciated.

A warm thanks to Katia Ukhova , the Kurkalov family and all my good friends for always being there for me.

Finally, my highest gratitude goes to my family. Their unconditional love and support has been a source of inspiration for me in achieving my goals.