The Operating and Financial Performance

of Privatized Firms: An Empirical Investigation

by

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ABSTRACT

The purpose of this dissertation is to analyze the impact of privatization on a firm's operating and financial performance. In a first step, a theoretical discussion of the impact privatization can have on the effort provided by the manager operating the firm in the name of the owners is exposed. It is shown that shareholders acquiring a privatized State-Owned Enterprise can get an effort monitoring advantage over the government. If the government's objectives pursued through the ownership of a firm change from being socio-political to profit maximization, then this comparative monitoring advantage of shareholders explains the privatization decision.

In the second part of the dissertation, several financial aspects of share issue privatization are analyzed. Models developed for the Initial Public Offering (IPO) market are re-assessed in light of privatization particularities. It is argued that capital market limitations rather than a desire to signal good future prospects explains the fraction of ownership retained by the government in a share issue privatization (SIP). Uncertainty with respect to the future prospects of privatized firms along with a desire to insure the success of privatization share issues explains the underpricing of SIPs. Finally, unlike portfolio of IPOs, a portfolio formed of privatized firms is hypothesized to be not systematically outperformed by the market portfolio or by a portfolio composed of firms similar to the privatized firms.

The empirical implications of the discussion which focus on the financial aspect of privatization are tested on a set of state-owned enterprises which were privatized between 1980 and 1995. The results of the tests are generally consistent with the predictions.

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For everything you have done for me, *merci Marcel!*

Chapter I   Introduction

The privatization of state-owned enterprises by governments around the world is an economic phenomenon which poses challenging questions to the research community. Proponents of privatization argue that the society as a whole benefits from the sale of the state's assets. They argue that privatized firms operate more efficiently and that following a privatization, consumers benefit from lower prices due to increased efficiency and market competition. But most importantly, governments are said to benefit from privatization because they get to use the sale's proceeds to reduce debt, thereby reducing the current and future tax burden imposed on citizens. Those who oppose privatization argue that the recent outburst of state-owned enterprise (SOE) privatizations is more or less a liquidation of some of the crown's jewels. They argue that SOEs are important instruments which the governments could use to achieve socio-political objectives. Selling off these instruments implies abandoning the pursuit of such objectives, which in turn represents a net loss in terms of social welfare.[1]

The purpose of this dissertation is to shed some light on issues surrounding privatizations which are completed through share issues. Share issue privatizations (SIPs) are transactions which often are so large that they set new records in terms of the size of a one time transaction occurring in a given capital market. In this dissertation, questions with respect to the impact of privatization on a firm's operating efficiency and stock price performance are addressed.

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[1] See the Wall Street Journal supplement on privatization (October 2nd 1995, p. R27) for a discussion of the pros and cons of privatization. In the article, two experts who have opposite views on the matter express their opinions.

It is well known that capital markets provide shareholders with various devices to align the interest of firms' managers with the objectives of shareholders. Economists have argued that capital markets can discipline managers, while the principal-agent literature shows that the use of the stock price as a performance measure can alleviate moral hazard problems. The discussion of the impact that privatization could have on a privatized firm's operating performance draws from the agency theory literature. It is argued that shareholders are in a stronger position than governments to motivate managers when value maximization is the objective pursued by the firm. Private shareholders have a comparative advantage because once a firm is listed on capital markets, the stock price can be used as a complement to the existing performance measures.

In this thesis, the financial aspects of a share issue privatization are discussed from three different perspectives. The question of retained ownership is addressed first. When governments decide to make the ownership in a state-owned firm available to the general public, it faces the choice of retaining a proportion of the firm's ownership in its own hands. Signaling models applied to the Initial Public Offering (IPO) market show that an entrepreneur can use retained ownership to signal private information to investors (Leland and Pyle, 1977). Whether the government can do the same is an interesting question. The fact that the governments' objectives may conflict with those of private shareholders must be taken into consideration in analyzing retained ownership in a share issue privatization. Further, the size of some countries' capital markets may be limited, such that retaining zero ownership in a firm privatized through a share issue may not be feasible.

Second, the underpricing of share issue privatization is analyzed. In the case of initial public offerings, underpricing is a well documented phenomenon (Rock, 1986). From a public finance point of view, the question as to what extent privatization share issues also are underpriced, and thus provide large short term returns to investors, is interesting. The underpricing of a privatization issue represents a wealth transfer from the country's taxpayers to investors. But it may be an unavoidable wealth transfer if underpricing is necessary to compensate investors for uncertainty and potential losses caused by an adverse selection problem (Rock, 1986) or to ensure the success of present and of future privatization share issues (Vickers and Yarrow, 1991).

Thirdly, the long run stock price performance of privatized firms is addressed. Empirical research in the IPO market has shown that portfolios formed of IPOs tend to be outperformed by the market portfolio (Ritter, 1991). Also, when compared to firms operating in the same industry, IPOs earn lower than average returns. At present, the underperformance of IPOs is tentatively explained by assuming either initial systematic overpricing that is corrected in the long run or an initial incorrect risk assessment on the part of investors. Since privatized firms differ from the typical IPO on important dimensions such as size, age and growth potential, the arguments used to explain the long run underperformance of IPOs may not apply to share issue privatizations.

The thesis is structured as follows. After briefly reviewing the literature on privatization in Chapter II, an attempt to model the impact that privatization can have on a firm's operating performance is made in Chapter III. Theoretical issues with respect to the fraction of retained ownership, underpricing and the long run stock price performance of share issue privatizations

are discussed in Chapters IV, V and VI respectively. These discussions each lead to the formulation of hypotheses. Empirical testing of these hypotheses is presented in Chapter VII, and Chapter VIII concludes the thesis.

Chapter II   Review of the Literature on Privatization

In recent years, there has been an impressive number of studies on privatization. The purpose of this review is not to provide an exhaustive list of these studies, but rather to discuss the key results of the research which is related to the operating and financial performance of privatized state-owned enterprises (SOEs). The remainder of the thesis builds on these results as well as on earlier research on the market for initial public offerings. The research on IPOs is reviewed in subsequent chapters.

In Section 2.1, we briefly describe the ways through which the privatization of SOEs can be completed. The theoretical literature on privatization is reviewed in Section 2.2. A substantial part of the research on privatization has been aimed at identifying the objectives that governments are assumed to pursue through the privatization of SOEs. Other studies have focused on the impact of privatization on social welfare while some studies have adopted a neo-classical approach to explain the privatization phenomenon. The section reviewing the theoretical research examines the three approaches.

Section 2.3 reviews the empirical research aimed at testing the hypotheses formulated under each of the three approaches. We conclude the review of the literature on privatization in Section 2.4.

2.1   Definitions

This study is mainly concerned with privatizations which originate from government divestitures, i.e. a transaction through which a government sells partial or total ownership of an

asset to another organized entity. The type of privatization we are interested in therefore occurs when there is a tangible transfer of ownership in an SOE from the government to the private sector.[2]

Different methods have been used around the world to implement such asset transfers. For example, shares of an SOE can be entirely or partially sold to a pre-identified group of purchasers. This kind of assets transfer is labeled a Private Sale of shares. A different version is a Management or Employee Buyout, where the buyer is clearly identified as being a group formed by management and/or employees. These can be leveraged buyouts. Further, rather than selling shares, governments can choose to sell the assets of an SOE as a whole or separately to a group of purchasers. In this situation, the transaction is labeled a Sale of Assets, and the assets are said to be sold not as a "going concern". Finally, Lease and Management Contracts refer to situations in which private sector management, technology and/or skills are provided under contract to a state-owned enterprise for an agreed period and compensation.

These kinds of asset transfers do not necessarily make use of the capital markets. In this study, we intend to use the characteristics of capital markets to assess the impact of privatization. Because of this, we focus on privatizations made through public offerings. When this kind of privatization is chosen, the state sells all or a large block of ownership in an SOE to the general public. The enterprise is assumed to be a going concern, set up as a public limited company. This kind of transaction amounts to a secondary distribution of shares, often referred to in the literature as an unseasoned offering.

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[2] In this definition, the "private sector" refers to any organization/individual which does not have any sort of relation with the government. Notice that Yarrow [1986] provides other good definitions for different forms of privatization.

Government public offering of shares in SOEs may be done on a fixed price or on a tender basis[3] and these offerings are most often underwritten. This type of transaction will be further referred to as a Share Issue Privatization (SIP). The following sections examine the research aimed at explaining why privatization can produce a desired outcome.

2.2   A Review of the Theoretical Literature

The first part of this section reviews a number of theoretical papers which have mainly focused on defining and validating the objectives underlying privatization. The second part discusses the research that has adopted a more normative approach. The last part reviews research that have used neo-classical arguments to explain privatization.

2.2.1   The Objectives of Privatization

2.2.1.1   Technical Efficiency Gains

Almost every author who has written about the objectives of privatization mentioned that privatization should result in technical efficiency gains. Even though the definition of technical efficiency is subject to different interpretations, most authors agree that technical efficiency refers to the optimal use of inputs to produce the optimal amount of output. Using

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[3] See Pint [1990] Note 5 (p.297). " In an [fixed] offer for sale, the shares are offered to the public at a fixed price determined in advance. Individuals then apply by mail for the number of shares they want... " " In a tender offer, bids are invited at or above a stated minimum price. After all the bids are received, the government sets a striking price. All bids above the striking price are accepted. The underwriters may be required to purchase any remaining shares at the minimum price. Individual applicants have been allowed to offer to buy at the striking price (before it is known) ". According to Pint, tender offers are aimed primarily at institutional investors.

this definition of technical efficiency, it is argued that privatization implies a shift of emphasis in the objectives pursued by the privatized SOE. After a privatization, more attention is devoted to technical efficiency at the expense of other objectives pursued by the state-owned firm. Following is a discussion on why privatization could result in technical efficiency gains.

An important stream of arguments relates technical efficiency improvements to an improved effectiveness of managerial incentives. The extent to which the incentives' effectiveness changes after a privatization depends upon two factors. First, managerial incentives can become more efficient because private shareholders can assess the managers' performance more precisely. Second, the effectiveness of external disciplining devices, such as takeover mechanisms, can be increased after a privatization and as such, can have a positive impact on managerial incentives. The following explains how managerial incentives can become more efficient.

In terms of the precision of managerial performance evaluation, privatizing through a SIP permits the use of the stock price as a performance measure (Shapiro and Willig [1991], Yarrow [1986]). New owners can use the new performance measure to implement more efficient risk sharing between the manager and the owner. Further, the existence of more than one performance measures can be used to induce the desired balance in multi-dimensional effort. [4] Models drawn from the agency theory literature have been used to support these arguments. In these models, private ownership superiority in terms of potential profitability is ensured by the fact that private shareholders are better able to observe the manager's effort than government (Bös and Peters [1991]). Given that private shareholders are exogenously assumed

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[4] These elements are more formally modeled in Chapter III.

to be in a better position to observe managerial effort than the government, it is easier for the shareholders to motivate profit maximization.

In terms of external disciplining devices, the existence of takeover mechanisms disciplines managers by imposing a threat of severe penalties to managers whose underachievement is revealed to market raiders. If a raider assumes that a firm is undervalued because of manager underachievement, then the raider could attempt to acquire the firm, change the management team and realize a gain. It can be further argued that in an SOE, managers have less incentive to promote technical efficiency because the government cannot credibly commit to let the SOE go bankrupt.[5] In this situation, it is the disciplining impact of creditors which is lacking to motivate managers in an SOE (Bös [1992]).

The extent to which managers need to be disciplined may however vary according to the objectives that the owners wish to pursue. Boycko, Shleifer and Vishny [1993] examine a situation where the government does not wish to maximize the firm's profit. In their model, the government pursues a socio-political objective which take the form of a suboptimally high level of employment for the public firm. In other words, the government uses the SOE to discretely subsidize employment.[6] They argue that, in certain circumstances, the population prefers to see the government promoting employment rather than reducing taxes. In this situation, subsidizing employment results in increased popularity for the government in place. At the point where the marginal benefit of reducing taxes exceeds the marginal benefit of increased employment, the government faces two alternatives. It can induce the manager to lower the

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[5] An implicit assumption here is the fact that governments are less able to monitor managers' effort, probably due to the lack of adequate performance measures.

[6] In fact, the subsidy takes the form of foregone profits by the SOE. This is assumed to usually go through without being noticed by the population.

level of employment or privatize the firm. Using the second alternative, the government gets not only cash inflows from the sale but also gains a share of the privatized firm's profit through tax revenues and/or retained ownership. Most importantly, however, the government refrains from subsidizing employment because direct subsidies are much more noticeable by the public than foregone profits.

Boycko, Shleifer and Vishny raise the interesting question of which types of objectives are pursued by the owner of a firm. Governments often get involved in SOEs to achieve socio-political objectives (Boardman, Eckel and Vining [1986]). On the other hand, shareholders act as wealth maximizers and operate a firm so as to maximize its long term profitability. Presumably, managers are required to put in more effort to maximize long term profit than to promote employment. Hence, when socio-political objectives are pursued, the absence of more efficient disciplining device is less important since their existence is less crucial. When the maximization of long term profitability is pursued, disciplining devices may be needed to promote technical efficiency. If a firm's focus is shifted from the pursuit of socio-political objectives to profit maximization, privatization can represent an efficient way to allow the owners to make use of disciplining instruments like new performance measures or takeover threats.

Related to the issue of technical efficiency is the problem of X-inefficiency. Leibenstein [1966] introduced the concept of X-inefficiency. This concept is applicable to SOEs which are natural monopolies, such as public utilities. As monopolists, these SOEs are sheltered from competition and may refrain from pursuing cost minimization. A firm is labeled X-inefficient when it operates in the absence of competition, and that absence reduces the motivation to

maximize the productivity of inputs, (Babilot, Franz and Green [1987]). Privatization can reduce the intensity of X-inefficiency if it results in increased competition or if better productivity monitoring ensues from privatization.

To summarize, privatization provides more efficient managerial incentives which can be helpful in promoting technical efficiency. Managerial incentives are more efficient either because their precision is enhanced or because disciplining devices, such as market discipline imposed by takeover threats or non-zero probability of bankruptcy, are more directly applicable. More efficient managerial incentives are likely to be needed if the firms' objectives are changed from being socio-political to be aimed more towards maximizing profits. Privatization therefore becomes especially interesting when a change in the objectives of the privatized firm occurred. Private corporations are often perceived to be more efficient than SOEs because shareholders are attempting to maximize profits and have more cost-effective mechanisms for inducing managers to pursue that objective.

2.2.1.2 Increased Market Competition

Besides technical efficiency gains, another objective which has been used to support privatization is the fact that it could lead to an increased level of competition in the SOE's industry.[7] The potential competitors of a SOE typically observe that most governments have large investment power. This power is often so large that bankruptcy is seen as an impossible outcome for state-owned firm. In this situation, competition with SOEs can be perceived as being unfair to these competitors. Privatization then becomes an instrument through which the

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[7] In fact, this argument has been used by governments to explain or back up their privatization policies. The British government has made use of such reasoning. See Marsh [1991].

competition between a privately held firm and the privatized firm becomes fairer. The basis for this argument is that privatization eliminates the government's implicit guarantee against bankruptcy for the SOE. In fact, privatization reduces the potential of any type of government intervention (like subsidies) which would be aimed at favoring SOEs at the expense of their competitors. Eventually, competitors become more willing to enter an industry in which they can compete with the incumbent on more equal grounds.

Those who support privatization suggest that if it results in increased market competition, then privatization is socially desirable. Increased competition can lead to lower prices and more efficient supply of outputs demanded by the public. Increased competition can also have a positive impact on the SOE itself. Two of the main disciplining devices provided by free markets are the threat of takeovers and fierce competition. However, some argue that the threat of takeover has been documented to have minimum impact (Kay and Thompson, [1986]). Therefore the threat of bankruptcy and the increased competition may be the main devices for promoting efficient management. In the case of SOEs, privatization can be seen as the only way to impose both these threats on managers.

On the other hand, the fact that privatization results in increased competition has been debated in the literature. Some have argued that since nationalization of firms often occurred due to a lack of competition in the industry, privatization will result in increased competition if the industry's economic conditions have substantially changed (Kay and Thompson, [1986]). Others maintain that in the negotiating process preceding a privatization, the cooperation of the SOE's managers is necessary to ensure the success of the transaction. Hence, managers can

use their negotiation power to influence the government and promote lower levels of competition.[8]

2.2.1.3 Impact on the State's Financial Position

It is often argued that privatization can have an important impact on the state's financial position. As such, another assumed objective of privatization is to reduce a state's debt.[9] Debt reduction is implemented by privatization related cash inflows collected by governments, who then use such cash inflows to repay creditors. The cash inflows are a direct consequence of the proceeds of the privatization and sometimes can be due to increased tax revenues from privatized SOEs which have experienced increased profitability.[10]

Marsh [1991] argues that selling public assets appeared to be a much easier way to reduce the demands on the Public Sector Borrowing Requirement than cutting public expenditures for the UK government. Therefore, satisfying liquidity needs appeared to be an objective pursued by the British governments through its privatization program.

2.2.1.4 Widening Share Ownership Among the Population

Another important objective analyzed in the literature has to do with the encouragement of share ownership among the general population (Vickers and Yarrow [1991], Bös [1992]).

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[8] Marsh [1991] provides many examples of such occurrences. Kay and Thompson [1986] also point out that managers are one of the most influential groups on which privatization has an impact. As such, they can oppose to any move towards artificially increased market discipline.

[9] Williams [1992] mentions that one of the objectives of the New Zealand privatization program was to reduce the state's debt. Marsh [1991] argues that in the United Kingdom, concerns expressed by the Public Service Borrowing Requirement played a central role in the launch of the privatization program.

[10] See section 2.2.1.1, where we explain how increased profitability can arise due to the new orientation brought about by private owners.

This objective has been put forth by those who argue that right-wing governments believed that a privatization policy aimed at encouraging share ownership among average citizens would prompt sustained interests in stock markets among the population. Further, cash movements due to share acquisition would favor the mobilization of large amounts of money stored in savings accounts.

2.2.1.5 Other Objectives

Objectives like increased efficiency or competition, wider share ownership among the general public and improve government's financial position are among the main objectives of privatization, as stated by governments. Other potential objectives, which are not so clearly expressed by governments, have sometimes been said to exist. For example, it has been argued that privatization could be used to reduce the power of public sector unions. This kind of impact related to privatization can either be a side-effect or an objective pursued by government. However, some might argue that privatization appears to be a rather drastic means of pursuing such an objective, and that there must exist other ways to achieve it.

The main conclusion to be drawn from this section of the literature review is that each of the hypothesized objectives of privatization considered in isolation are subject to criticism. In some cases, different objectives can be complementary, like promoting efficiency gains and improving the state's financial position. In other situations, some objectives can be conflicting. For example, increasing the profitability of an SOE conflicts with increasing the competition in the SOEs' industry.

This leads us to conclude that privatization programs can be prompted for a variety of reasons. The "technical efficiency gain" argument appears to get general support among those who support privatization. The fact that this objective can be inter-related with other objectives only provides more arguments to those who think that privatization is socially beneficial. The following section reviews the theories which link certain objectives together.

2.2.2 Privatization and Allocative Efficiency

A substantial part of the theoretical literature on privatization has been aimed at defining the conditions under which privatization results in improved allocative efficiency. Under this approach, social welfare is defined as a function of the population's needs. In this context, allocative efficiency means the allocation of resources among the government, the producers of goods and services and the consumers in such a way that social welfare is maximized. One typical assumption is to base the social welfare value on the present discounted sum of the society's consumption stream.

In order to define the conditions under which privatization becomes an optimal outcome, proponents of this approach first define a welfare function in which state or private ownership in a firm is a choice variable. Social welfare typically is a function of variables such as consumer and producer surplus. The type of ownership has an influence on social welfare because the owners of a firm have an influence on how the resources used and produced by the firm are allocated, thereby influencing consumer and producer surplus. The problem then becomes to choose the fraction of state ownership under which resources are allocated the most efficiently such that social welfare value is maximized.

To solve this problem, governments can determine a minimum "social value" for a firm while taking into consideration the social value of the inputs used and the outputs produced by the firm. If a private entrepreneur is willing to pay more than the firm's minimum social value, then privatization becomes an optimal outcome. The minimum price the government is willing to accept for a firm is a function of the impact that a change of ownership can have on the way resources are allocated. As for the private buyer, he is usually seen as a value maximizer. The maximum price he is willing to pay for the firm typically is a function of the amount of profit the firm can generate under his management. As long as the difference between this maximum price and the government's minimum acceptable price is positive, privatization is feasible and probably optimal.

The main problem with the allocative efficiency approach is to define the weights used to determine the welfare function. Jones, Tandon and Vogelsang's [1990] theory on privatization is an exercise in modeling privatization using allocative efficiency. They first attempt to derive conditions under which privatization is desirable. In their model, social welfare is a function of such variables as change in consumer surplus, producer surplus and government revenues. They test their model using a simulation and argue that the results they get are highly sensitive to the definition of the variables affecting the components of the social welfare function.[11] They conclude that the main challenge to privatizing governments is to correctly identify the government's objectives and the impact that privatization has on these objectives.

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[11] See Chapter 8 of their book.

In a privatization, governments are not forced to fully transfer the ownership in a state-owned firm to the private sector. Therefore, the social welfare approach can also be used to determine an optimal fraction of governmental ownership in a firm. Using this approach, models typically assume that producer surplus is a decreasing function of government ownership, and that privatization (i.e. decreasing government ownership) favors producer surplus at the expense of consumer surplus (Bös [1992]). The problem is solved by setting the fraction of government's ownership at a level where the marginal welfare gain associated with an increase in government ownership is equal to the marginal decrease in profit for the private buyer.[12]

The difficulty in defining the weights to use in the social welfare function lead some authors to explore alternative research avenues to study privatization. The neo-classical approach has also been adopted to study privatization, and the next section reviews the research in this area.

2.2.3   The Neo Classical Literature

Neo-classical economists have adopted a "positive" approach to explain privatization. Researchers attempt to explain why privatization is increasingly popular by examining the conflicts between the government, the management of SOEs, and the population which the government represents. Using this approach, the benefits of a privatization are taken for granted. Privatization is assumed to be a solution to the numerous conflicts which the government faces rather than an attempt made at maximizing a welfare function.

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[12] This is almost equivalent to saying that optimal profit occurs where marginal cost equal marginal revenue.

Sappington and Stiglitz [1987] define a fundamental theorem of privatization. Their argument is inspired by a paper on utility regulations written by Loeb and Magat [1979]. They define an equilibrium in which the government transfers the right to produce some output to a private producer. Assuming there exists more than one risk neutral bidder having homogeneous beliefs with respect to the value of the right to produce the output, they argue that the government can transfer the right to produce the output to the private sector at no cost. Such a transfer can occur when the government agrees to pay to the private producer an amount equal to the marginal social value of each output. By doing so, the government imposes the same output valuation function on the producer, who then identifies the same optimal production point as the government.

Of course, the assumptions of homogenous beliefs and the existence of more than one risk neutral bidder are crucial, and the authors examine the impact of relaxing these assumptions. The fact that the government pays the private producer an amount equal to the social value of the output is also crucial. [13] In this situation, only producer surplus is increased when privatization occurs. Further, it is increased only if the private producer has a cost function different from the cost function of the government, such that he can produce the optimal amount of output at a lower cost.

Boycko, Shleifer and Vishny's [1993] model on conflicts between socio-political objectives and the Treasury's requirement is also inspired from the neo-classical literature. [14] This model is interesting because it underlines the conflict that can exist between pursuing

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[13] Notice that this is equivalent to regulating the selling price of the producer's output at a price equal to marginal social value of one more unit of output.
[14] This model is reviewed in section 2.2.1.1

socio-political objectives, like full employment, and the demands of the Treasury, which increase when the government is perceived to be in a weak financial position. As the Treasury's demands become more intense, governments may be in a position to let go of socio-political objectives and concentrate on profit maximization. The theoretical model discussion exposed in Chapter III is inspired by the privatization dilemma imposed on governments which are in a weak financial position.

2.3   The Empirical Literature

Some of the theoretical research summarized above has resulted in the formulation of testable hypothesis. The empirical research aimed at testing the hypothesis is reviewed below. The structure adopted to cover the empirical literature is similar to the structure we used to cover the theoretical literature.

2.3.1   The Objectives of Privatization

On the empirical side, numerous studies have investigated the degree to which the hypothesized objectives of privatization have been achieved. The main focus of the empirical privatization literature has been on efficiency comparisons. The most complete investigations of efficiency improvement have been conducted by Vining and Boardman [1989] and Megginson, Nash and Van Randenborgh [1994]. Vining and Boardman summarized the results of a large number of studies which compared the efficiency[15] of firms operated under private

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[15] The expression "efficiency" will be used loosely from here on. Efficiency is usually measured through financial ratios addressing several aspects of firms' operations. The most common ratios used are Return on Equity for profitability, net income/sales to number of employees for efficiency and capital expenditures to sales for investment.

ownership compared to public or mixed ownership. The authors conclude that ownership matters for both technical and allocative efficiency and they found strong evidence of superior private corporation performance. For a sample varying between 30 and 60 privatized firms originating from various countries, Megginson *et al.* document efficiency improvements following privatization. Interestingly, they also document an average increase in employment for privatized firms. Assuming a profit maximization objective, this finding could be explained by firm growth following privatization.

Hartley and Parker have written several papers[16] on efficiency gains for privatized UK firms. Using financial ratios comparison, they failed to document improvements in efficiency for 12 privatized UK firms. In Parker and Martin [1993], a more thorough analysis is conducted where qualitative factors are introduced. The authors conclude that privatization tend to be associated with performance improvement. However, they mention that performance improvements are also possible in the public sector when the incentives and the will exist. They argue that market competition appears to play at best a diffuse role on efficiency gains.

Even more specific case studies have been conducted. For example, Green and Vogelsang [1994] report efficiency improvements for the specific case of the British Airways privatization. Haskel and Szymanski report a decrease in employment for some privatized British firms but no decrease in wages. Boardman, Freedman and Eckel [1986] studied an interesting case of nationalization. They concluded that in the particular case on which they focused, a loss of between 8% and 19% in firm value could be attributed to government control and the anticipated pursuit of non-profit objectives.

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[16] See Parker and Martin [1993], Parker and Hartley [1991], and Dunsire, Hartley, Parker and Dimitriou [1988].

Many theoretical papers concluded that privatization should have a positive impact on managers' effort. However, results which transpire from the empirical literature on the impact of privatization on manager's behavior are mixed. Many case analyses of privatization[17] conclude that the impact may have in fact been negative. This could be explained by the fact that managers of SOEs may have been able to impose their views on governments privatizing SOEs. For example, Abromeit [1988] mentions that " the B[ritish] T[elecom] managers... succeeded... in inducing the government to drop most of its original ideas about liberalization in the telecommunications industry."

Earlier research tends to show that privatizations have resulted in a more intensive use of performance measures. Bishop and Thompson [1994] note that performance pay did not exist prior to 1980 in United Kingdom's SOEs. It appears as though performance pay has been introduced in at least some privatized SOEs. Ogden [1995] studied the specific case of water privatization in the UK.[18] His conclusions are interesting as he stresses the fact that one impact of privatization is to change the " accounting vocabulary" within the firm. After the privatization, the term " profit" entered the language and stock price was used as a measure performance. In fact, one positive impact of privatization is that the performance measures used within the firm change to become more precisely defined. Performance has also improved at the same time.

Turning our attention to the impact of privatization on industry competition, we first note that according to Marsh's [1991] review of privatization in the United Kingdom, " almost

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[17] Case analyses referred to in this section have mainly been done in the United Kingdom. See Marsh [1991] for a good review of those analyses.

[18] In 1989, the British government privatized its water distribution operations. The first step consisted in dividing the water distribution process into 9 territories. The government then proceeded by separately privatizing each of the nine ensuing firms through a SIP.

all observers agree that asset sales have rarely lead to increased competition ". Earlier, Baldwin [1990] and Thompson [1990] argued that " the government was anxious to ensure the successful sale of the privatized companies and this success was much more likely to occur if the company retained its monopoly position ".[19] Several other industry specific studies have been conducted in the United Kingdom.[20] Authors are unanimous in their belief that privatization alone has not helped to introduce competition in any industries. In fact, there appears to be a consensus that whenever a firm operates as a monopoly, regulations are necessary to increase competition. Privatized monopolies are no exception to this rule. To that effect, Winward [1994] mentions that in the United Kingdom, one of the benefits of privatization has been the establishment of a more powerful, open and logical regulatory regime.[21]

Finally, some studies have been aimed at establishing links between the widening of share ownership in the general public and privatization. With respect to the degree of achievement of this objective, Veljanoski [1990] mentions that following the privatization movement in the United Kingdom, there has been a widening but not a deepening of share ownership among the British population. That is, more people own shares but they own only a small fraction of shares issued by privatized SOEs.[22]

To date, there have been no reported empirical studies aimed at assessing the impact privatization had on government financial positions and on public sector unions. The impact

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[19] Also taken from Marsh [1991]. Vickers and Yarrow [1988] expressed similar concerns when they argued that the " desire to privatize speedily ... has stood in the way of devising adequate measures of competition and regulation for the industries concerned".

[20] See, among others, Yarrow [1994] on Electricity, Cowan [1994] on water, Price [1994] on gas and Aylen [1994] on steel. They represent the most recent studies of industry competition and privatization.

[21] Here, a regulatory regime works as a substitute for market competition.

[22] This argument is later repeated by Grout [1994].

that privatization can have on government Treasury requirements is hard to isolate, as many other factors, such as the national and international economic cycles, can influence the state's financial position. As for the impact on unions, a longer period of time might be required to fully assess the impact of privatization on union membership.

In research specifically interested in SIPs, many authors have documented underpricing of share issues.[23] Some authors argue that underpricing of SIPs can be used as a vehicle through which share ownership is widened. They argue that underpricing can be seen as a bonus paid to people willing to buy shares in SIPs. These authors have found that SIPs are on average underpriced. Among others, Pint [1990] and Kay and Thompson [1986], document large underpricing in British fixed offers, moderate underpricing in French fixed offers and no underpricing in British tender offers.

2.3.2   Privatization and Allocative Efficiency

We mentioned earlier that precisely defining a welfare function for the government is a difficult task. Empirical research aimed at measuring improvements in allocative efficiency following privatizations are therefore difficult to design. As a consequence, only a few empirical studies have been developed along these lines.

An interesting empirical study aimed at measuring allocative efficiency gains has been conducted by Galal, Jones, Tandon and Vogelsang [1991]. They argue that according to the results of a number of case studies, privatization has resulted in net welfare gains in countries

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[23] This research is more thoroughly reviewed in Chapter V, Section 5.4

like the United Kingdom, Chile, Malaysia and Mexico. In their study, welfare gains are measured through variables which approximate the change in consumer surplus and producer surplus (namely the privatized firm's profit). The impact privatization has on input suppliers and competitors is also included in the change in welfare calculation.

2.3.3 Neo-classical Explanations of Privatizations

The arguments developed in section 2.2.3 should not be seen as easier to confirm than the "allocative efficiency" arguments. In order to test these models, the researcher requires data which, as for welfare improvements, is not easily accessible. For example, testing whether managerial effort is motivated differently after privatization calls for the comparisons of compensation contracts written prior to privatization to those written after. One of the two is often not available.

This may explain why empirical papers addressing privatization from the neo-classical angle are so few in number. Jones, Megginson, Nash and Netter [1994] conducted an empirical analysis based on the arguments put forth by Boycko et al. [1993] and North's [1994] paper on adaptive economic efficiency. In their research, privatization is seen as a necessary step to create conditions under which efficiency gains will occur.

Jones et al. argue that originally, SOEs are created to generate welfare. As the SOE becomes increasingly inefficient, a group of organized beneficiaries benefit at the expense of consumers. They argue that privatization is a necessary tool for the government if it wishes to break the control that the organized beneficiaries have over the SOE's operation. Once privatization becomes necessary, the authors argue that underpricing can be used as

compensation paid to those willing to acquire a share in the inefficient firm. Such treatment of underpricing also explains why some governments limit the fraction of shares sold outside the country.

Jones, Megginson, Nash and Netter's empirical results are mainly related to underpricing. The authors document a positive relationship between underpricing and the existence of foreign ownership restrictions. They found that underpricing is more pronounced for unseasoned than for seasoned issues. Underpricing also is a decreasing function of the size of the issue.

2.4   Conclusion

This literature review should not be seen as exhaustively covering everything that has been written about privatization. In fact, almost every instance of privatization has been the subject of a case study at some point in time.[24] Further, given that privatization is a much debated phenomenon, it has been discussed from various viewpoints. The purpose of the above review is not to summarize everything that has been said on privatization, but to summarize any rigorous attempt made at assessing the impact privatization can have on the operating and financial performance of a privatized firm.

With respect to the impact of privatization on the operating performance of a firm, there appears to be a consensus among authors that privatization most probably results in technical efficiency gains. Shareholders appear to have better tools than government to motivate managerial effort, and they also appear to be more constantly supporting profit

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[24]   See The Economist for editorial and factual articles preceding and following almost every case of privatization around the world.

maximization. In terms of the financial aspects of a privatization transaction, the focus of earlier research have been mainly placed on underpricing. The underpricing phenomenon has been linked to a desire to ensure the success of share issues and to widen share ownership among the population.

Chapter III   Privatization and Managerial Incentives

The model discussed in this chapter is an extension of Boycko, Shleifer and Vishny's (BSV) theory of privatization. The approach adopted to define conditions under which governments privatize state-owned enterprise is basically the same as in their model. The main distinction consists in recognizing that managers and buyers (shareholders) of state-owned enterprise play a different role through the process of privatization.

In their model, the owners and the manager are assumed to be the same person pursuing the same goal, that is profit (or cashflow) maximization.[25] In this model, we allow for the existence of the classical agency conflict between the agent (manager) and the principal, which is the government in the case of a public firm and shareholders in the case of a private firm.[26] Implicitly, this recognizes a distinction between the roles played by managers and shareholders because once the SOE is privatized, a risk averse manager and risk neutral private shareholders have conflicting objectives. It is argued that shareholders are able to implement more "efficient" production processes through the use of better designed compensation contracts. Shareholders have more flexibility and can use a wider variety of instruments to write compensation contracts different from those the government can write.[27] Given this increased flexibility, shareholders' compensation contracts can provide improved risk sharing between the shareholders and the manager. Further, the use of more than one

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[25] For the most part of this chapter, the words profit and cashflow are assumed to have the same definition. Profit can be defined as the end-of-period dividend paid to the owners of the firm.

[26] At the end of their paper, BSV discuss cases where managers and shareholders preferences' differ. However, they do not explore the agency setting in the same way that it is discussed in this thesis.

[27] Reasons why such an assumption is made are discussed in section 3.4.2 of this chapter.

performance measure can be used to induce the manager to choose actions in such a way that the objectives he pursues are better aligned with those of the shareholders.

In this chapter, we first describe the preferences of the three main actors involved in the model. These are government, the private shareholders to whom the government wishing to privatize sells its ownership in the firm, and the manager of the firm. The discussion that follows tackles the conditions under which a state-ownership or a privatization equilibrium are obtained. These equilibria not only depend on the main actors' preferences but also on other externalities. Basically, state-ownership is preferred to private ownership when the pursuit of socio-political objectives appears more important to governments than the pursuit of profit maximization.

Privatization usually follows from a change in governments' priorities with respect to the objectives pursued by the state-owned firm. Factors and or conditions under which such a change can occur are also discussed in this chapter. We conclude the chapter by discussing why shareholders are believed to be in a better position than governments to provide incentives to managers when profit maximization becomes the firm's main objective

3.1   Description of the Setting

This introduction to the model is a re-formulation of BSV's setting. We adapt their model to fit the theoretical arguments provided in the thesis. Consider a state-owned firm for which the level of profitability is chosen by the government. The government can choose to run the firm efficiently, thus setting profits at a level corresponding to the use of optimal

inputs to produce optimal outputs.[28] This level of profit is referred to as the optimal profit. Alternatively, the government can choose to run the firm inefficiently, accepting lower profits in order to achieve some non-profit socio-political objectives. In other words, maximizing profits and pursuing socio-political objectives are generally conflicting objectives, and the government must choose which objectives the state-owned firm is to pursue.

Government can use a state-owned firm in many different ways if it wishes to achieve socio-political objectives. In this thesis, we consider two basic approaches to pursuing socio-political goals. As for any other type of firm, the production process of a state-owned firm consists of transforming inputs into outputs. To operate at the optimal profit level, the state-owned firm must transform the optimal level of input into the optimal level of output. If the state-owned firm wishes to achieve objectives other than profit maximization, we assume that it does so either by using a sub-optimal level of input to produce the desired level of output or by producing a sub-optimal level of output. Of course, the two approaches are not mutually exclusive.

Consider the following examples. It can be part of a government's socio-political objectives to achieve a higher level of employment than that which would result from efficient production. The governments can use a state-owned firm to contribute to this employment objective by requiring management to hire more employees than are necessary to produce the efficient level of output. BSV mention the example of Air-France, where the management suggested laying off employees in order to increase profits. The French

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[28] Optimizing the ratio of input versus output is often referred to as achieving "technical" efficiency. The word efficiency is used throughout this Chapter to refer to technical efficiency. See Chapter II Section 2.2.1 for a discussion of the several types of efficiencies.

government refused because employment was an important socio-political objective at the time.[29] This is an example of firm operated so as to use a sub-optimal level of input to produce the desired level of output.

On the other hand, state-owned firms that produce sub-optimal level of outputs are common in the transportation industry. For example, in Canada, which is a fairly vast country, low population numbers in some remote places make air transportation services to those areas unprofitable. In fact, for an airline company, the cost of providing air transportation to such remote places exceeds the revenues associated with the service. A profit-maximizing airline would certainly cancel such a service. In the seventies and early eighties, the Canadian government was the sole owner of Air Canada. The Canadian government ordered the airline to provide air connections from selected remote places to the country's main centers, because such a connection was seen as an essential service for the people living in remote places.[30] This is an example of a situation in which the government uses the output of a state-owned firm to achieve a socio-political objective. Notice that by doing so, the government foregoes an opportunity to increase the profits of the state-owned firm.

Hence, it is through a choice with respect to inputs, outputs or both that governments trade off the benefits of achieving socio-political goals relative to maximizing profit. Choosing sub-optimal level of inputs and/or outputs results in favoring socio-political

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[29] See BSV, page 5.

[30] In Canada, air transportation to remote places, essentially concentrated in the northern part of country, was subject to severe regulation prior to 1987. Deregulation occurred in 1987, but the National Transportation Agency still has power to regulate schedules imposed and tariffs charged to travelers visiting remote regions. The prospectus supporting the September 1988 share issue of Air Canada discusses such regulation (see p.10 in the French version of the prospectus).

objectives over generating more cashflows. Ultimately, this results in favoring the achievement of socio-political objectives over the Treasury's requirements.

3.1.1 The Government's Preferences

The previous arguments leads us to analytically define the preferences of the government. Consider the following objective function for the government:

(3.1) $\qquad U_g = m\alpha E[\pi|a] - qa$

This utility function is expressed in dollars. In this equation, π represents the amount of profit generated by the state-owned firm. α, which is the fraction that the government owns of the state-owned firm, also represents the fraction of those profits to which the government is entitled. To qualify as a state-owned firm, α needs to be a fraction close to one. We allow for the existence of a minimal fraction of ownership (1-α) to which a group of shareholders is entitled.

The profitability of the state-owned firm depends on a, a parameter which represents a measure of management activity. We assume that there exists an $a*$ such that $E[\pi|a*] > 0$ and $E_a[\pi|a] = 0$. If we assume $E_{aa}[\pi|a] \leq 0$, then the profit function $E[\pi|a]$ is concave and increasing in a, and $a*$ is the point at which profits are maximized. Moving away from $a*$ results in either a use of sub-optimal input to produce the desired output, the production of sub-optimal output or a combination of both types of inefficiencies. At this point, we constrain the model to consider only uni-dimensional activity aimed at optimizing the ratio of

input to output. We later consider the impact of multi-dimensional activities, but at this point, the set A of all possible actions is defined over the following interval:

$$(3.2) \qquad A = \left[\underline{a}; \overline{a}\right]$$

Coming back to equation 3.1, the parameter m represents the marginal political benefit to the government associated with one more dollar of profit generated by the state-owned firm. Parameter q, which is assumed to be strictly greater than 0, represents the marginal political benefit to the government associated with shifting the manager's focus from profit maximization to the pursuit of socio-political objectives. Given this representation of the government's preferences, the nature of the government's objectives is represented by parameters q and m. The greater is q, the more value the government directly places on the achievement of socio-political objectives. Conversely, as m increases, more value is placed on profit maximization

Given the government' preferences as represented by equation 3.1, we can characterize the manager's action which is socially optimal. This optimal action, denoted a^S, is obtained when the following condition is met:

$$(3.3) \qquad m \alpha E_a \left[\pi | a^s\right] = q$$

which is the action for which the marginal value of an increase in profits is equal to the marginal socio-political gain. Given our representation of the government's preferences, notice that $a^s \leq a*$ and that $E[\pi|a^s] \leq E[\pi|a*]$, with strict inequalities when q>0.

The parameter q represents the governments' perception of the desirability of intervening in the market to compensate for market failures. For example, if a country's economy is more capital intensive such that the unemployment rate is perceived as being at an unacceptable level, then a government may find it politically beneficial to use state-owned firms to favor employment by hiring more workers than there need be. In the earlier illustration, the French government basically decided that it was more important to sustain employment through the state-owned Air France than to use cash inflows generated by employees' layoffs to reduce taxes or reimburse debt. The Canadian government used a state-owned airline to compensate for another kind of market failure. It felt that it was more important to provide airline services to remote population than to use the dividends paid to Treasury by a potentially more profitable airline company which would not provide services to remote places. In these situations, q is greater than 0, and managers are asked to implement actions which are not profit maximizing.

On the other hand, the parameter m can be seen as measuring the intensity of the Treasury's requirements at a given point in time. If we assume that the role of the Treasury is to balance the government's financial position, then the fraction α of each incremental dollar of profit generated by the state-owned firm is paid in dividends to the Treasury, which can use such new resources to say, reduce taxes. Governments obviously feel the positive impact of a tax reduction through an increase in its popularity. m thus represents the marginal utility

associated with say, an incremental dollar of tax reduction. It can then be said that the greater is the tax burden imposed on the citizens at a certain point in time, the greater is the desire to reduce it. Parameter m can be assumed to be high in such periods.

The above reasoning is basically an extension of BSV's paper on privatization. The arguments presented here are slightly modified to fit the requirements of this thesis, but the conclusion are basically the same as in BSV[31].

3.1.2 The Shareholders Preferences

Given the setting described above, shareholders hold a fraction (1-α) of ownership in the firm, which entitles them to receive (1-α) of the profit generated by the firm. As we said earlier, in an SOE, α is close to one, and hence the fraction of ownership to which shareholders are entitled is low (possibly close to zero). In any event, it is still useful to describe the preferences of shareholders because, as potential buyers, they play a crucial role in the privatization exercise.

In this model, we assume that shareholders are well diversified investors, such that they behave as risk neutral individuals with respect to the firm's operations. Shareholders are individuals who are only minimally interested in socio-political objectives, and their main objective is to maximize their wealth. The following equation is used to express the shareholders' preferences:

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[31] In their paper, BSV only motivate the achievement of socio-political goals through inefficiencies with respect to the use of sub-optimal input. In fact, they use the example of employment as the only way through which state-owned firm are used to achieve the socio-political objective, that is to diminish the level of unemployment. Even though it can be argued that employment is the main channel through which governments use a state-owned firm to achieve a socio-political objective, we believe that it is not the only available channel. Including sub-optimal output production allows us to use the notion of profit, which provides a better fit to our upcoming arguments without altering BSV's conclusion.

(3.4) $U_s = (1-\alpha)E[\pi|a]$

This utility function is also expressed in dollars. The main distinction between U_S and U_g is that shareholders only care about the positive amount of dollars that the state-owned firm generates. The shareholders' utility function is maximized at activity a^* defined earlier. Shareholders have no socio-political objectives in mind. As such, the parameter q is not considered in the representation of their preferences. They prefer the implementation of a^*, which is the activity that the government also prefers if $q=0$. However, in the case of $q>0$ then the government prefers to implement a^s which is likely to be lower than a^*. Because a^s represents an activity which favors the achievement of socio-political objectives and that we assume that socio-political objectives are pursued at the expense of profit maximization, then the relation $E_a[\pi|a^*] > E_a[\pi|a^s]$ is likely to prevail. In fact, in the case of $q>0$, the shareholders' objectives conflict with those of the government.

When $q>0$ and α exceeds the point where the government gets control over the operation of the firm (i.e. the government is a majority shareholder), it is most likely to choose a^s. Private shareholders will be willing to own shares even though the government wishes to implement a^s, but will only be willing to pay $(1-\alpha)E[\pi|a^s]$ for these shares. The government thus incurs an opportunity cost by issuing these shares. This cost is equal to $(1-\alpha)\{E[\pi|a^*] - E[\pi|a^s]\}$. Notice that once the investors have bought the shares, it is in their interest to convince the government to implement a^*.

On the other hand, for $q = 0$, then the shareholders' objectives no longer conflict with those of the government, and both owners wish to maximize profits. In such a case, α can take any value. Such a value would most probably depend on factors like the government's desire to let the ownership in a state-owned firm go private or on the private sector's capacity to absorb the ownership of a large SOE. [32] Notice that in the real world, situations where α ≈ (1-α) exist. Firms with such an ownership structure are labeled mixed enterprises.[33] Mixed ownership can occur under particular circumstances, which are discussed in subsequent chapters of the thesis.

Also notice that equation (3.4) does not allow shareholders to benefit in any way from the government's achievement of socio-political objectives. The intention here is not to ignore the fact that, as citizens, shareholders benefit from the government's pursuit of such goals. The idea is more to recognize that the benefits associated with one dollar spent by the government on the pursuit of a socio-political objectives is to be divided among all those who benefit from such an expense. Given that the number of beneficiaries is usually quite large, the shareholder, as a citizen, gets only a small fraction of the benefit. On the other hand, the loss associated with one dollar of foregone profits is to be divided among owners only. Given that the number of owners (or of ownership shares available) is usually much smaller than the number of citizens who get the benefit of socio-political spending, shareholders place much more emphasis on one dollar of foregone profits than on the benefit associated with one more dollar spent on the achievement of a socio-political objective.

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[32] See Chapter IV, where theoretical arguments with respect to government's fraction of retained ownership in privatized SOE's are discussed.
[33] See Eckel and Vining [1985] for a thorough discussion of the mixed enterprises phenomenon.

Therefore, in equation (3.4), we simply assume that the small fraction of benefit associated with one more dollar spent on socio-political objectives is zero. Given that shareholders place close to zero weight on the achievement of socio-political objectives, ignoring its existence eliminates notation without altering the conclusion.

3.1.3 The Manager's Preferences

In BSV, the manager's preferences are assumed to be the same as the shareholders' preferences. In the concluding comments, BSV recognize that usually, managers and shareholders have different preferences.[34] They discuss the impact of these differences, but on a different dimension than the one that is chosen for this thesis. They argue that the manager's preferences are in between those of the shareholder and the government in terms of weighting socio-political objectives and profits. In the model presented here, the manager's preferences are defined over his wealth and over the action he implements.

The manager considered in this study is a risk averse individual who incurs a direct personal cost if he implements action a.[35] The direct personal cost incurred by the manager is denoted $C(a)$, which is a convex function increasing in a and for which $C(\underline{a}) = 0$. $C(a)$ represents the manager's preferences between actions that are focused on profit and those that are focused on socio-political objectives. By assuming $C(a)$ is increasing and convex, we implicitly assume that the manager prefers actions through which socio-political objectives are pursued.

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[34] See BSV, page 14.
[35] See the earlier discussion of effort a in Section 3.1.1

The manager's preferences are defined over his end-of-period wealth, denoted W, which is comprised of the compensation he receives, denoted $z(\tilde{x})$, minus the personal cost he incurs to implement action a. The random variable $\tilde{x}$ is the pre-compensation profit number as reported by the manager of the state-owned firm to the owners. We assume that the pre-compensation profits x is the only contractible information available to the government; in particular, we assume there is no contractible information regarding the socio-political activities. The manager's preferences are represented by a negative exponential utility function:

(3.5.1) $U_m(W) = -e^{-rW}$

(3.5.2) $W(z;a) = z(\tilde{x}) - C(a)$

$U_m(W)$ is a concave function increasing in W.[36] The parameter r denotes the manager's absolute risk aversion. The compensation paid to the manager is a non-decreasing function of the profit variable $\tilde{x}$. The use of a non-decreasing function allows for the possibility of using a compensation scheme under which the manager is paid a fixed salary. To implement such a scheme, government lets $z(\tilde{x}) = z_0$, where z_0 is a constant.

Given the link between the managerial actions and the firm's profitability, the following connection between $\tilde{\pi}$, the post-compensation profit, and a is derived:

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[36] The manager's utility function U_m is chosen to be of the HARA (hyperbolic absolute risk aversion) class for analytical tractability. See Pratt [1964] for more details on the attributes of this class of utility functions.

(3.6.1) $\widetilde{\pi} = \widetilde{x} - z(\widetilde{x})$

(3.6.2) $\widetilde{x} = B(a) + \widetilde{\varepsilon}_\pi$

In the above, $B(a)$ is the firm's expected pre-compensation profit given the manager implemented action a. We assume that $B_a(a) \geq 0$ and $B_{aa}(a) \leq 0$, such that B is a concave function non-decreasing in a. If the government can observe a and if we assume the manager's reservation utility $\overline{U}_m$ [37] to be 0, then $C(a)$ is the compensation cost and $E[\pi|a] = B(a) - C(a)$. When a is observable, the manager is compensated for the personal cost he incurs, and the ensuing post-compensation profit is a concave function non-decreasing in a.

We introduce $\widetilde{\varepsilon}_\pi$ in (3.6.2), which is a random uncontrollable component of the profit function. We assume $\widetilde{\varepsilon}_\pi$ to be normally distributed with mean zero and variance σ_π^2 (i.e. $\widetilde{\varepsilon}_\pi \sim N(0, \sigma_\pi^2)$). This component introduces uncertainty with respect to the link between a and π and is helpful in making the model more general.[38]

Given the framework adopted in this thesis, there are gains associated with privatization only if such a move helps solve or improve upon an incentive problem. If there are no problems in motivating the desired managerial action, then the government can design a compensation contract which cannot be improved upon. Such a contract is labeled a first

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[37] The manager's reservation utility $\overline{U}_m$ is calculated by applying the manager's utility function to the compensation he could get by working elsewhere.

[38] The above setting has been mostly inspired by Feltham and Xie's [1994] paper on multi-task principal-agent relations. Their setting has been adapted to fit this model's needs. We choose to use their characterization because it allows for an easier generalization to multi-tasking, which is discussed in the Appendix of this Chapter.

best contract.[39] Following is a discussion of the conditions under which such a contract can be written in our setting.

In this analysis, we assume that the manager selects action a and that this choice is unobserved. Given his personal preferences, if not induced otherwise, the manager chooses $a = \underline{a}$, thereby minimizing his personal cost. This has the effect of maximizing the firm's socio-political impact. In our model, there are circumstances in which the government, acting as the principal, adopts a behavior which is uncommon to most other agency settings. As a matter of fact, when $m\alpha$ is small relative to q, then it is not the wish of the government (principal) to maximize profit, but the government is rather favorable to the achievement of socio-political objectives.

In the extreme case of $m=0$, the manager and the government can write a first best contract under which the manager is required to implement action $\underline{a}$. In return, the government agrees to pay the manager a fixed amount z_0 such that:

$$(3.7) \qquad U_m(W(z_0;\underline{a})) = \overline{\overline{U}}_m$$

Recall that when $m=0$, the government prefers to have a state-owned firm pursuing socio-political objectives rather than maximizing profits. The fixed compensation z_0 paid to the manager in this case need only to be set such that condition (3.7) is met. Therefore, when $m=0$ and the government is the majority owner, the first best contract takes the form:

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[39] Which is equivalently labeled a Pareto-efficient contract in the agency literature.

$$(3.8) \qquad z(x) \; = \; U_m^{-1} \, (\overline{U_m}) = z_0 \qquad \forall \, x$$

Given that the manager is paid a fixed salary, he has no incentive to increase effort because he is not compensated for the cost associated with such an increase. Hence, a fixed salary induces action $\underline{a}$. Under these circumstances, the manager agrees to pursue any other socio-political objectives which the government requires him to pursue, because this is done at no cost to him. Neither the manager nor the government could improve on such an agreement without altering the utility of his partner.[40]

If $m\alpha > 0$, then the government wants to induce some action $a > \underline{a}$. If the manager's action could be observed, then the government would require that he implements a^S where:

$$(3.9) \qquad m\alpha\big[B_a(a^s) - C_a(a^s)\big] = q$$

and the government would agree to compensate the manager for his costly effort. Therefore, to reach a first-best agreement, we either need to have $m=0$ or a observable.

If we assume that the manager's action is unobserved, then the government must provide an incentive contract if it wishes to induce the manager to select $a > \underline{a}$. In this situation, the government must compensate the manager for his personal cost of effort. It must also pay a risk premium due to the random component $\tilde{\varepsilon}_\pi$ which introduces noise in the

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[40] The risk averse manager cannot improve upon this agreement because he is paid a fixed amount equivalent to the maximum amount he could get elsewhere, while he is asked to provide minimal effort. The government cannot improve upon this agreement since minimal effort is what is induced by contract (3.9). When $m=0$, minimal effort is the effort level the government wishes to induce.

relation that exists between x and a. Under these circumstances, the government is likely to induce $a < a^s$. Due to the risk premium, it may be too costly to induce a^s. We focus more on this situation in section 3.4.1.

3.2   State-Ownership as an Equilibrium

The above representation of the manager's preferences is an adaptation of an agency model to fit the framework proposed in this thesis. Essentially, we modify the notion of managerial action so that the manager can choose to favor profit maximization at the expense of socio-political objectives. By increasing the value of parameter a, the manager increases his focus on actions aimed at improving profitability. Focusing on actions which favor the pursuit of socio-political goals is assumed to be more preferred (less costly) to the manager.

To illustrate using the airline example, the model assumes that it is less costly in terms of managerial effort to hire than it is to lay-off employees. Laying-off employees may result in a better ratio input/output, but in order to achieve such a task, the manager is subject to the pressure of unions who typically oppose such an action. Recruiting, on the other hand, is perceived as being a more enjoyable task from the perspective of the manager, irrespective of the fact that it may push the quantity of inputs used away from of its optimal level. Therefore, it is assumed that when the manager is laying off employees, he incurs a direct personal cost. When he invests effort in recruiting, such an effort is assumed costless. When the manager is asked to hire rather than to lay-off employees, then managerial effort is set at a level closer to $\underline{a}$, and the ensuing expected profit decreases. This is equivalent to arguing that when the firm operates inefficiently, lower profits are generated.

What has been established so far is a setting in which sufficient ownership to control the operations of a firm is in the hands of the government. The government delegates the task of operating the firm to a manager. When q is large relative to $m\alpha$, in equilibrium, the firm is operating inefficiently because the government is using such inefficiencies to achieve socio-political objectives. In the extreme case of $m=0$, the manager is paid to choose action $\underline{a}$, a point at which effort is not costly to the risk averse manager. The manager is willing to accept a fixed compensation to operate the firm if such a minimal amount of effort is required. In this extreme case, risk sharing is optimal because no risk is imposed on the risk averse manager.

Even though this model appears to be simplistic, it can explain why we often see state-owned firms which are not operated so as to maximize profits. The Air-France example illustrates this situation. Further, the compensation packages of managers operating state-owned firms are usually not contingent on performance measures of any kind. As Bishop and Thompson [1994] put it, "our findings on the internal organization of the UK's publicly owned enterprises that at the beginning of the 1980s, performance pay was ... almost wholly absent."

The above discussion is not aimed at condemning such a behavior, but rather to explain why privatization can end up in efficiency gains. What is first needed, though, are conditions under which the relative value of q decreases with respect to $m\alpha$, such that the demands of Treasury become more important than the achievement of socio-political goals. Only if such reversal occur do efficiency gains resulting in increased profitability become the government's priority.

3.3 Efficiency versus Socio-Political Objectives

Given the specificity of the model, it is argued that without a significant decrease in q relative to $m\alpha$, privatization is not likely to become a desired outcome. Privatization results in letting shareholders control the operations of the firm. Such a control would also undoubtedly be delegated to a manager. However, according to the shareholders' preferences which were defined in equation (3.4), shareholders would certainly try to implement a change in the firm's objectives. The firm's objectives would then become to maximize profits, because shareholders are looking to maximize their wealth.

If q remains large relative to $m\alpha$, there are no reasons to believe that the government would voluntarily give up the control over the firm's operations while knowing that by doing so, the firm's objectives would be changed. Such a move would be irrational for the government if its preferences are not changed.

On the other hand, it does not suffice for an increase in the value of m relative to q to totally justify the privatization of the state-owned firm. One needs to explain the reasons why the government cannot implement the turnaround which is required to make the state-owned firm pursue the different objective which is profitability. After all, if performance pay is all that is required, one may wonder why such a compensation scheme is not introduced in the public sector.

The argument made in this thesis is that for privatization to become a desired outcome, we need a combination of two factors. First, we need a reversal in the governments' objectives such that cash or liquidity requirements, as illustrated by the

demands of Treasury, become more important than the achievement of a given set of socio-political objectives, those which the state-owned enterprise pursued.

Second, the dynamics of the relations between the manager of the state-owned firm and the government must be such that the government cannot efficiently induce the manager to provide more effort and thus, to make him implement the turnaround which is needed to pursue a different set of objectives. Privatization ends up in letting shareholders control the firm, and the manager's relation with shareholders must be different enough than his relation with the government to allow shareholders to implement the required turnaround.

In this section, we analyze the conditions under which we may see a change in the objectives pursued by the government. Based on the above discussion, we either need to see an increase in m or a decrease in q.

3.3.1 A Change in Ideology

Consider the case of a decrease in q. An illustration of such an event occurs when the government's ideology changes. In other words, for the weight on the set of socio-political objectives which were pursued by the state-owned firm to decrease, an internal change of the government must occur or the population's preferences must evolve.

In the first case, the replacement of a government following an election or an internal re-alignment of ministers could prompt a change in ideology. The United Kingdom's movement towards privatization of state-owned enterprises constitutes a good example of how a change in ideology can lead to privatization. In the first half of the eighties, early after having taken over the direction of the country from the Labor party in 1979, the Tory

government of Margaret Thatcher introduced an impressive privatization program. Privatization is more in line with the objectives of right wing government than with the ideology of a left wing government. In the United Kingdom, a change in ideology immediately preceded the launch of a privatization program.[41]

Similarly, the turn to capitalism which occurred in socialist countries like Poland, Romania and Hungary after the fall of the Berlin Wall also prompted an impressive number of privatization in these countries.[42] Such examples of a turnaround in ideology are expressed analytically by a decrease in parameter q. Combined with other factors, the decrease could end up in the implementation of privatization programs.

As for the evolution of population's preferences, we can again consider a transportation example. In most industrialized countries, airline transportation has increasingly substituted for railway transportation. On the other hand, many important railway companies which used to be state-owned are being privatized. The United States started the movement by selling its share of ownership in Consolidated Rail (Conrail) in 1987. Japan privatized East Japan Railroads in the early nineties. Canada has recently privatized the railway operations of Canadian National in what has been one of the biggest Canadian Initial Public Offering ever.[43] The United Kingdom is also setting plans to privatize the state-owned railway system.[44]

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[41] See Bishop and Thompson [1994] as well as Marsh [1991], who trace back the origin of the British privatization movement to the change of government which occurred in the United Kingdom in the late seventies.

[42] Husain and Sahay [1992] provides a useful table (see Table 1, p.802) describing the evolution of privatization movements in Albania, Bulgaria, in the Czech and Slovak Federal Republic as well as in Hungary, Poland and Romania.

[43] The prospectus of this share issue is dated November 17, 1995.

[44] Dodgson [1994] describe the problems which the UK government is currently facing with respect to the Railway privatization.

We could explain such a popularity of railway privatization by saying that given the evolution of the population's preferences, railway companies are no longer a good instrument to achieve socio-political objectives. Since these companies can no longer be used effectively to achieve socio-political objectives, governments are looking to operate such companies efficiently. Privatization may be the only way to implement a turnaround towards efficiency.

In fact, the evolution of the population's preferences is closely linked to changes in the economic environment. In the transportation example, technological innovations have transformed the transportation industry in such a way that railway transportation, which used to benefit from monopoly rents over long distance transportation, became subject to competition from the airline companies. Given that airline transportation has expanded the population's alternatives with respect to long distance transportation, pressures due to competition can now serve as a device to discipline railway companies.

What is happening in the railway industry is illustrative of a general phenomenon. Governments frequently got involved in industries where market failures allowed producers to earn rents at the expense of consumers. However, when technological changes reduce the producers' ability to earn such rents, then the government no longer has the same incentives to control the firm's operations. Governments may then choose to privatize, especially if this implies that the firm will operate more efficiently.

3.3.2 An Increase of the Treasury Requirements

We now turn our attention to cases where m is increased, which corresponds to an increase in the intensity of the Treasury's requirements. An increase in the intensity of liquidity needs can occur if a government's spending goes out of control and is no longer covered by tax revenues and/or if an economic slowdown occurs such that a decrease in a government's revenues is not covered by spending cuts. In any event, both of these situations result in an increase of the state's debt. A question which is addressed is whether such events appear to take place prior to the launch of privatization programs. If it is the case, then a link between cash requirements and privatization can be hypothesized.

Treasury requirements appear to have played a role in certain privatization programs. In New Zealand, Williams [1992] states that "Annex 4 to the 1988 Budget statement lays down the Government's objectives... The objectives include reducing public debt... ". Prior to the sale of Volkswagen and Veba shares in Germany, an article in The Economist [July 5, 1986] argues that one of the reasons for the sale resides in the finance minister requiring the sale's proceeds to cut government's borrowing. Marsh [1991] argues that the United Kingdom's Public Service Borrowing Requirement played a crucial role in the privatization program prepared by the Thatcher government. Finally, in Canada, the desire to reduce the public debt was used to a certain extent by politicians backing the privatization of Canadian National.[45]

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[45] On the other hand, by selling state-owned firms, governments also turn their back to the SOE's future profits which would have been otherwise used to service the government's debt. This part of the equation is most often not mentioned by advocates of privatization. In fact, privatization only has a positive impact on debt reduction if the private sector can run the firm more efficiently than the government and if the government can sell the firm at a price which reflects the expected value of future profits earned by the privatized SOE's shareholders.

There are other examples where the government's financial position appears to have played a role in the preparation of privatization programs. The point is not to provide an exhaustive list of such occurrences, but rather to illustrate that the Treasury's requirements can intensify over time. Analytically, this is equivalent to an increase in parameter m of equation (3.1). In the above examples, a direct link is established between an increase in Treasury's requirements and the launch of a privatization program.

Notice how an increase in m and a decrease in q are not mutually exclusive events. It can be further argued that under certain circumstances, both events are complementary. That is to say, a negative change in the government's financial position can prompt a change in ideology. For example, this could mean that an increase in debt can cause high enough dissatisfaction among the population, who would prefer to vote for a change of government at the next election. Such a vote would force a change in ideology. Of course, foreseeing such an event, the government in place could change its ideology through a revision of its socio-political objectives prior to a call for re-election. In any event, the point is that an increase in m can cause a decrease in q, thus enforcing the reversal of government's preferences which is at the genesis of privatization programs.

3.4   An Analytical Interpretation of a Change in Government's Preferences

Coming back to our model, suppose that the value of m increases relative to q. Such an event results in the corporatization of the state-owned firm. Corporatization occurs when the objectives of a state-owned firm are changed from being socio-political to being the

objective of a typical corporation, which is to maximize profits.[46] New Zealand's State-Owned Enterprises Act 1986 was used as the main inspiration for the word corporatization. The Act advised the New Zealand Government to re-examine the current operations of SOEs. The corporatization of SOEs, which is referred to in the Act, consisted mainly in changing the SOEs objectives. The State-Owned Enterprises Act provides new guidelines to existing SOEs, such that, among other things, an SOE would operate as a "...profitable and efficient corporation".[47]

In practice, the corporatization of state-owned firms sometimes include the restructuring of the firm's constitution. For example, through a corporatization exercise, the ownership structure of a state-owned agency can be reorganized so as to include shares of ownership. Those are often seen as necessary steps prior to privatization.

Most importantly, the corporatization of state-owned firms implies a re-definition of the firm's objectives. Because parameter m and/or q have changed, the government now wishes to operate the firm so as to place a greater emphasis on profits. Referring back to equation (3.6.2), we see that the only way through which the government can increase profitability is by inducing the manager to expend more effort on increasing profits. On the other hand, the manager requires increased compensation to increase a because he incurs a direct personal cost when he moves away from $\underline{a}$. Furthermore, the mechanisms for inducing more profit oriented effort are costly to the firm.

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[46] BSV refer to such an event as restructuring.
[47] See Williams [1992].

3.4.1 The Turnaround Toward Efficiency

Even though governments face a more intense incentive problem when m gets large relative to q, there exist conditions under which governments can still write a first best contract. In this section, we first explore how such conditions could be met. As m gets large relative to q, government starts to favor the profit maximization over the pursuit of socio-political objectives. Accordingly, the government would prefer to induce actions closer to a^*, such that the expected value of π is increased. If a^S is strictly greater than $\underline{a}$, then the government is facing an incentive problem, as it is required to compensate the manager for the cost of effort $C(a^S)$ and to pay him a risk premium due to the fact that x is a noisy representation of a.

For any $q>0$, the first best action from the government's perspective is $a^S \geq \underline{a}$. In this situation, incentive problems are absent only if one of the following conditions is met. First, there are no incentive problems if the manager is risk neutral, i.e. $r = 0$. If so, then the first best contract takes the following form:

$$(3.10) \qquad z(x) = \left[1 - \frac{q}{m\alpha B_a(a^s)}\right] x + const.$$

The constant is set so as to satisfy the reservation utility constraint, i.e.:

$$(3.10.1) \qquad const. = C(a^s) + U_m^{-1}(\overline{U}_m) - \left[1 - \frac{q}{m\alpha B_a(a^s)}\right] B(a^s)$$

In contract (3.10), the manager's share of x is set so that it is reduced appropriately for the extent to which the government has socio-political objectives and therefore does not want the manager to maximize profits. Observe that the contract takes the form $z(x) = x + const.$ if $q=0$. That is, in the case of a risk neutral manager and no socio-political objectives, the manager takes over the firm and realize x. This is a standard result.

Another condition under which a first best agreement is attainable is if the manager is effort neutral ($C(a) = 0, \forall a$). In this situation, the government simply asks the manager to implement action a^s and agrees to pay the manager according to the contract illustrated by equation (3.8). The manager has no reason to refuse to implement the desired action since he incurs no direct personal cost associated with effort.[48]

Finally, a first best agreement can be reached indirectly if a is observable. Such a situation can occur, for instance, if $\sigma_\pi^2 = 0$. In this case, the realized value of x reveals a and a first best contract making use of penalties can be written. A contract of the form illustrated by equation (3.11) is then proposed to the manager:

$$(3.11) \qquad z(\tilde{x}) = \begin{cases} z^s \text{ if } x = B(a^s) \\ 0 \quad \text{otherwise} \end{cases}$$

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[48] See Grossman and Hart [1983] proposition 1, for general conditions under which first best agreements are reachable between a principal and an effort averse agent.

where z^S is set such that $U_m \ (W(z^S \ ; \ a^S)) = \ \overline{U}_m$ and a^S is still picked such that equation 3.9 holds. In such a case, x is noiseless and perfectly reveals a. If any other value of profits than $B(a^S$) is observed, then the government knows for certain that the manager did not implement action a^S and refuses to pay compensation. The compensation package is set such that the manager is compensated for implementing action a^S , and the manager has no reason not to implement profit maximizing action accordingly. This agreement cannot be improved upon.

In this study, we assume the agent is risk and effort averse and $\sigma_\pi^2 > 0$. In other words, we assume the existence of an incentive problem between the government and the manager when the government wishes to increase profits. Uncertainty with respect to x implies that the risk averse manager incurs some risk by agreeing to a compensation contract contingent on x and he requires to be compensated for such a risk. The optimal contract, given x is the only available performance measure, is obtained by solving the following problem:

(P1) $\underset{z,a}{MAX} \quad \int_X [x - qa - z(x)] P(x|a) dx$

S.T. (1) $\quad \int_X U_m(W(z(x);a)) \ P(x|a) dx \ \geq \ \overline{U}_m$

(2) $\quad \int_X U_m(W(z(x);a)) \ P(x|a) dx \ \geq \ \int_X U_m(W(z(x);a')) \ P(x|a') dx \quad \forall \ a' \ \in A$

where X is the set of all possible values for x. (P1) is a simple application of a typical agency problem. The resolution of (P1) yields a second best contract z, i.e. the contract which is the least costly for inducing the desired action $a^\dagger$. In (P1), $P(x|a)$ is the function which defines the probability of x given action a. In this setting, the government is a risk neutral principal who wishes to implement action $a^\dagger$ such that its utility is maximized. The contract z maps the set of all possible outcomes X to compensation $z(x)$.

The objective function reflects the fact that the principal seeks to maximize the expected net profit. The first constraint ensures that the manager's expected utility is at least equivalent to his reservation utility. The second constraint ensures that the compensation function z induces the manager to choose the desired action. This constraint is typically referred to as the incentive compatibility constraint.

In the extreme case where $q=0$, the government wishes to maximize the SOE's profits. In the presence of an incentive problem, the government makes the manager's compensation contingent on the reported measure of profit x, which is an imperfect representation of the action a. In other words, because the manager is risk and effort averse and that the government cannot observe a, the government is forced to design a second best contract $z(x)$ which ensues from the resolution of (P1).

We have established a setting in which the government can induce any action. Privatization is attractive in that setting if it permits the development of a more efficient incentive contract. If q is positive, then the government will have to forego its socio-political objectives if it privatizes. However, if q is small, the gains from improved contract efficiency

through privatization may more than offset any loss in the government's socio-political objectives.

The optimal compensation contract ensuing from the resolution of (P1) is typically not linear. However, we exogenously restrict the analysis to a linear approximation of the optimal contract. The approximation is of the form:

(3.12) $z(x) = \beta + vx$

where β is the fixed part of compensation and vx is the part of the contract which provides incentives to increase x. We choose to restrict the analysis to linear contract because they are frequently observed in practice and provide analytical tractability.

3.4.2 Implications

The purpose of this section is to establish the circumstances under which government would consider privatization. In this model, a change in governmental objectives is first necessary to prompt a change in the desired action of management in terms of effort. We provided some evidence of what appeared to be changes in governmental objectives prior to privatization movements.

However, a change in governmental objectives alone is not sufficient to justify privatization. As the model establishes, in cases where a direct noiseless link can be established between profits and managerial action, no owners can do a better job than the government with respect to inducing the optimal action on the part of the manager. On the

other hand, if the link between managerial action and profit is noisy such that x does not completely reveal a, nothing in the reasoning we have presented so far could lead us to believe that a different owner would do better in terms of inducing the optimal action. To justify privatization using the results of the agency theory literature, we need to illustrate why shareholders may be able to design a better incentive agreement with the manager than the government can.

In this section, we provide arguments to justify the conclusion that shareholders can design compensation packages which provide more efficient risk sharing. The first argument is related to the availability to shareholders of a greater range of compensation contracts. In private companies, we often see managers getting paid substantial bonuses or being compensated with stocks and/or stock options which provide important wealth gains if the firm is successful. On the other hand, the dismissal of the manager of an unsuccessful company is not uncommon. The literature on "golden parachutes", which are important lump sum payments to managers who get fired, provides sufficient background to argue that in troubled times, the position of a Chief-Executive-Officer is not so safe.

On the other hand, it appears that governments do not have the same freedom as shareholders in terms of paying out bonuses or punishing managers who do not implement the required action. Because they are under intense media scrutiny, governments have less flexibility than private shareholders with respect to the compensation packages they can propose to SOE managers. Due to such scrutiny, governments are most often forced to pay SOE managers fixed salaries which can be of much lower value than what is paid on average to managers having similar positions in the private sector.

To illustrate, one of the main criticism of the British privatization program, as expressed by those who opposed the program, was related to the increase in salaries paid to executives after privatization.[49] Managers of state-owned firms are often seen as a type of civil servant, and it is hard for governments to politically justify paying bonuses to such employees. As a matter of fact, Bishop and Thompson [1994] find that performance pay is infrequent, if not absent in SOEs. Compensation using shares of ownership is also not feasible because ownership shares in an SOE are most often not publicly traded.

The consequence of the lack of flexibility resulting in the difficult implementation of performance pay is that the design of second best contract of the type described in equation (3.12) is impossible. Further, the consequence of lower average pay is the reduction of the number of talented managers willing to work as managers of SOEs. Recall that in our model, in order to accept a position, a manager must expect to receive an amount which corresponds to his reservation utility. By paying less compensation on average than what is paid by the private sector, governments condemn themselves to hire managers which have less alternative employment opportunities. They can also attract more risk averse managers who discount more heavily the contingent compensation package typically offered in the private sector, and who are therefore more willing to accept the typical fixed compensation offered by governments. The fact that governments are forced to design compensation packages which are less flexible and which on average pay lower amounts of money can be assumed to have an adverse effect on the quantity and on the quality of managers willing to act as directors of SOEs.

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[49] See The Economist editorial comment in the 1995, March 11th issue (see p.16), or Dana Milbank's article in the Wall Street Journal's supplement on worldwide privatization in the 1995, October 2nd issue (p. R17).

It can be further argued that shareholders have a clearer idea of the nature of the relation between x and a. After all, shareholders are in the business of investing precisely to maximize their wealth and as such, there is a possibility that shareholders have a clearer idea of the distribution of x and, consequently, of the nature of the function $P(x|a)$ for any type of firm. On the other hand, governments emphasize profits only when m is large relative to q. Governments do not usually set up SOEs to make profits, but to achieve socio-political objectives. It is only when m gets large relative to q that governments shifts the focus toward profit maximization. Privatization therefore provides gains if the private shareholders can take advantage of their superior knowledge of the relation between x and a to write more efficient compensation contracts.

Consider also that privatizing through a SIP provides shareholders with an additional instrument which can be used in compensation contracts. This instrument is the firm's stock. First, shareholders can use the stock price as a performance measure. Given that stock price is determined by the expectations of market participants with respect to the firm's terminal dividend, it represents an objective evaluation of the firm's value. If stock price is not a sufficient statistic for year-end profit figure, it can be used as a supplemental performance measure because it reveals new information with respect to a.[50]

Also notice that shareholders often wish to induce effort which is multi-dimensional. In that setting, the stock price may be used to help attain goal congruency. Goal congruency is attained when the manager's incentives are aligned with those of the principal's objectives.

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[50] In Appendix A, circumstances under which a supplemental performance measure could have a positive impact on profits are discussed. Laffont and Tirole [1993, Chapter XVII, p.641] also discuss the disciplining impact of capital market monitoring on managers.

Typically, the shareholders' aim is to maximize the firm's market value. At any point in time, value depends on both short term and long term profitability and the manager's current period actions affect both short term and long term profits. A problem therefore arises when shareholders use a single performance measure because when they do, shareholders inevitably favor one aspect of profitability over the other.

Current period accounting earnings typically reflect short term profitability. When the firm's owners make the manager's compensation contingent on the realization of current period accounting earnings, they induce actions that maximize short term profit and not aggregate value.[51] On the other hand, the stock prices at the end of a period is influenced by investors beliefs about the future profitability. As such, the stock price provides a performance measure which incorporates long term profits.

Given that firm value depends on both short term and long term profitability, firm owners who wish to maximize firm value are better served if they use both accounting earnings and end-of-period stock price as performance measures. The use of both performance measures is more efficient for aligning managerial efforts along both dimensions which are important for maximizing firm value. When a firm's stock is not publicly traded, as is the case of SOEs, the stock price is unavailable and the firm's owners may not be able to use a substitute which reflects long term profitability as well as the stock price does. Therefore, one further benefit associated with privatization is to provide a

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[51] See Smith [1989] for a list of examples in which the use of accounting numbers in compensation contracts leads to managerial behavior which adversely affect long term profitability.

supplemental performance measure which can be used to design more efficient compensation contracts.[52]

The manager's and shareholders' objectives are often not congruent because of different attitudes with respect to risk. As a risk averse agent, the manager of an SOE discounts more heavily the future value of risky projects which can have high expected payoff. However, shareholders acting as risk neutral investors, are interested in projects with high expected payoffs, irrespective of the risky nature of the cashflows associated with the project. Publicly traded shares allow for the use of employee stock options, which can be used as incentives to induce managers to undertake risky projects with high expected payoffs. The grant of a call option to the manager alleviates the risk associated with the project by eliminating the downside risk.[53] Notice that stock options are not available as compensation instruments to governments unless ownership shares in the firm are publicly traded.

Besides compensation problems, it is also often assumed that governments can not credibly commit to let a state-owned firm go bankrupt. Therefore, one other difference between firms held by governments and those held by shareholders is the fact that the latter face the possibility of going bankrupt. The consequence of this possibility for the manager is the same as getting fired and the possibility of bankruptcy can serve to motivate the manager to provide more effort. In a situation where bankruptcy is not a possible outcome, as is generally the case under government ownership, managers may have the tendency to care less about the consequences of their actions.

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[52] Appendix A discusses this aspect in more detail, based on the arguments of Feltham and Xie [1994].
[53] Notice that incentives based on accounting numbers can take the form of bonuses that also avoid downside risk.

It has also been argued in the literature that in situations where shareholders do not know whether lower than expected firm value is caused by manager's shirking or uncontrollable factors, capital markets can be helpful by serving as disciplining device. [54] If a group of outside investors (typically called a "raider") which is informed about the nature of uncontrollable events exists, then it is able to determine the cause of low firm value. As Scharfstein [1988] puts it:

> " If firm value is low because the manager shirked, the probability of a takeover is high. Shareholders tender their shares at a low price because they perceive the value of the firm to be low, while the raider knows that the value of the firm (if run properly) is high. ... Thus the takeover mechanism provides a means of penalizing the manager precisely when he should be penalized - when firm value is low because the manager shirked and not because the environment was unfavorable. "

Recognizing that takeover mechanisms are only present when the shares of the firm are publicly traded, then privatization, by making shares of ownership available to the raider, provides a new means through which managers are disciplined.

If it is a fact that shareholders are better suited to implement efficiency improvements, then this coupled with a change in governments priorities can explain why privatization programs have been launched around the world. In this chapter, we have provided reasons to believe shareholders are in fact better suited to provide incentives to managers and circumstances under which governments priorities do change. Among the main reasons why shareholders are better able to induce optimal action, we note the fact that they can write better suited compensation contracts and that threats of bankruptcy and/or takeovers can act as disciplining devices.

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[54] For more on the disciplining effect of takeover mechanisms, see Grossman and Hart [1980] and Scharfstein [1988].

In this chapter, we discussed why it might be better for an SOE to be privatized if a change in the objectives pursued by the owners occur. In the next Chapters, the mechanisms through which privatization is processed are reviewed. In Chapter IV, we analyze the impact of government's fraction of retained ownership on the valuation of SIPs. In Chapters V and VI, we also analyze the impact privatization can have on a firm's short and long term stock price performance, respectively.

Chapter IV   Privatization and Retained Ownership

The purpose of this chapter is to discuss the factors that may lead governments to retain some percentage of ownership in the SOE that they privatize. This discussion is based on the theoretical arguments developed in Chapter III and on the relevant literature on retained ownership in initial public offering (IPO).

The ownership in firms that are privatized through a share issue privatization is not always entirely made available to public markets.[55] SOEs privatized through SIPs where governments retain some fraction of ownership are a form of mixed enterprise (ME). The mixed enterprise appellation is used for firms of which the ownership is shared between the government and the private sector.[56] For some cases of privatization, governments retained as high as 90% of an SOE's ownership, but in several other instances, governments retained no ownership at all.   There can be more than one explanation as to why governments sometimes retain a share of the ownership in a privatized SOE. In this chapter, we address the question from three different perspectives.

A model taken from the IPO literature is discussed first. In this model, retained ownership serves as a signal of government information about firm value. Secondly, the question of retained ownership is tackled from the point of view of the theory of mixed enterprises. According to this theory, governments retain some share of ownership so that the privatized firm could still be a channel through which socio-political goals are pursued.

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[55] The prospectuses supporting SIP's typically mention the fraction of the ownership in the firm which is offered.

[56] See Eckel and Vining [1985] for a complete discussion of this form of ownership.

In the third section, we consider the case where the SIP is simply too big to be absorbed by the local capital market. In this situation, governments are forced rather than choose to retain some share of ownership in the privatized SOE.

Local capital market limitation appears to be the most compelling argument to explain why governments retain ownership in SIPs. There exist distinctions between SOEs and privately held firms which makes the signaling argument at best tentative to explain retained ownership. The theory of mixed enterprises, on the other hand, provides arguments with respect to the creation of firms with mixed ownership when funding is limited rather than when governments' priorities are changing.

In any case, this chapter's concludes with the statement of competing empirically testable hypotheses in section 4.4. The formal hypothesis which is most favored to explain retained ownership is the one which exploits the restrictions imposed by local capital market's limitations.

4.1   Retained ownership as a signal of firm value.

This section is based on the model developed by Leland and Pyle [1977]. At an Initial Public Offering, Leland and Pyle argue that the entrepreneur attempts to communicate private information to the market which is likely to have a positive impact on the value of the firm. If such information can credibly be conveyed to investors, they will raise their valuation of the firm.

4.1.1 Description of the Model

The Leland and Pyle model establishes that under informational asymmetries, entrepreneurs can credibly convey information to the market through the fraction of ownership they retain in the ventures that are brought to the capital market. In their model, entrepreneurs can communicate the high quality of the offering through a costly signal, namely higher retained ownership. Retained ownership is a costly signal because it precludes the risk averse entrepreneur from diversifying his holdings as much as he might want to. On the other hand, it is less costly to the entrepreneur to retain ownership in a firm with good future prospects because if the entrepreneur can credibly convey such good news to the market, investors are willing to revise upwards their expectations with respect to the firm's future value. Such an increase in the valuation of the firm's terminal dividend causes an increase in firm value, which is reflected in an increase in the wealth of the entrepreneur who retained some ownership.

The separating equilibrium that ensues from Leland and Pyle's model is one where the entrepreneur with better future prospects than another entrepreneur retains a greater share of ownership in his venture. The market interprets the share of retained ownership as a credible signal of good future prospects. The equilibrium fraction of retained ownership is increasing in the entrepreneur's expectation about the firm's long term profit and decreasing in his level of risk aversion. Because investors are able to infer firm value from the retained ownership signal, Leland and Pyle predict a positive relationship between the fraction of ownership retained (which is typically labeled α) and the value of the entrepreneur's venture. Downes and Heinkel [1982] provide strong empirical support for a positive association between retained ownership

and firm value.[57] Clarkson, Dontoh, Richardson and Sefcik [1992] document the same result

using a sample of Canadian firms.

The question of retained ownership can also be tackled from the point of view of the

agency literature. Jensen and Meckling [1976] argue that if the entrepreneur remains as the

manager once the firm has gone public and if his actions is unobservable, then he is subject to

the same moral hazard problem typically discussed in the agency literature. The choice made

by the entrepreneur with respect to retained ownership can then be seen as an offer of a

compensation package made by the manager to shareholders. Given retained ownership, a

portion of the manager's compensation consists of returns from his own firm. This type of

compensation imposes risk on the manager and motivates him to act in the best interests of the

owners of the firm.[58]

Empirically, this model leads to the same conclusion as the Leland and Pyle model,

since the greater is the fraction of retained ownership, the more the manager is expected to act

in the interests of the shareholders. Therefore, shareholders interpret an increase in the fraction

of ownership retained by the entrepreneur as an alteration of an incentive problem, and increase

their valuation of the firm accordingly. Notice however that governments are different from

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[57] Datar, Feltham and Hughes [1991] used a setting similar to Leland and Pyle's to model the role of auditors in initial public offerings. In their model, the auditor is chosen first and the audited report conveys incomplete information about the firm value. Investors infer the range of possible types in which the firm belongs according to the audited report and the quality of the auditor. Ownership retention is then used to eliminate all remaining lower types. Using a sample of American firms, Feltham, Hughes and Simunic's empirical study [1991] failed to document the marginal value effect of higher audit quality. Using a sample of Canadian firms, Clarkson and Simunic [1992] found that the level of ownership retention in higher risk firms that choose a high quality auditor is less than the entrepreneur's retained ownership in lower risk firms which choose a low quality auditor. This provides some support for Datar, Feltham and Hughes' analytical model, at least in the Canadian environment. According to these authors, the difference between American and Canadian results can be attributed to the more litigious environment which prevails in the United States.

[58] Hughes [1988] extends Jensen and Meckling's model to consider the case of a risk averse manager.

entrepreneurs, and typically would not act as managers after the share issue. Jensen and Meckling's argument therefore appears hardly applicable to privatization.

4.1.2 Applicability of the Signaling Model to Privatization

There are two key assumptions in the Leland and Pyle's equilibrium which ensures the applicability of retained ownership as a credible signal. First, relative to investors, entrepreneurs have superior information about the venture brought to public markets. Otherwise, there would be no need to use a signal because there would not be anything to communicate to the market. Second, to be credible, the signal used by the entrepreneur must not only be costly, but must also be more costly for an entrepreneur with bad future prospects than for an entrepreneur with good future prospects.[59] These two assumptions must hold in order for Leland and Pyle's separating equilibrium to apply to any case of IPO. In the case of a SIP, the government is the entrepreneur who attempts to sell part of the ownership in the SOE to the public. The two assumptions must be re-examined while keeping in mind the particular aspects and objectives of the government which now acts as the entrepreneur.

Typical IPO firms that have been studied in the literature are generally small firms involved in new or growing industries. Ritter [1991] presents a survey of American IPOs from 1975 to 1984 in which most firms are involved in emerging industries like computer manufacturing or data processing (20% of the sample), communications and electronic equipment (9%) and oil and gas (8%). Other firms are dispersed among several industries like banking, wholesaling and restaurants. It is typically assumed that at the time of the IPO,

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[59] Otherwise, the entrepreneur with bad future prospects can costlessly mimic the signal of the entrepreneur with better future prospects, and the signal loses its credibility.

entrepreneurs have superior information with respect to the growth opportunities of such firms. These firms have no trading history and are usually relatively young such that information with respect to the firm's growth opportunities is not widely dispersed. It is more in the hands of the entrepreneur. Therefore, it is assumed that the entrepreneur attempts to convey future prospects with respect to growth opportunities through the retained ownership signal.

The typical IPO sample of which are studied in the literature are therefore very different from privatized SOEs. In the population of firms that have been privatized around the world, firms are typically not involved in industries growing at the same rate as IPOs and typically have a longer history of operations. On that basis, the applicability of Leland and Pyle's reasoning to privatization can be questioned.

Even though such differences exist among the two populations, it can still be argued that the government possesses more information than the public at the time of the public offering of the privatized firm's shares. For example, it can be argued that even though governments are often assumed to be more transparent than private entrepreneurs, some pieces of information are hard to disclose as they are almost impossible to audit. Information regarding future legislation about which only the government knows at the time of the public offering is difficult to disclose in a credible manner. Further, only the government knows about the detailed situation of the SOE prior to privatization. Information about which action is currently chosen in order to increase or maintaining the efficiency of the SOE prior to the privatization, or about what sort of non-profit maximizing objectives are pursued under the government's management are difficult to disclose as these aspects are difficult to measure.

Therefore, it would appear as though the first assumption underlying Leland and Pyle's model can hold for a privatization. There can exist information asymmetry between the government and potential investors at the time of a SIP. Such information can be useful to investors and can also have a significant impact on value. Government may desire to communicate such an information to investors through a credible device and, as Leland and Pyle argue, retained ownership may represent such a credible device if it is costly for the governments to retain ownership in the firms that are privatized.

The second question to be answered is whether the government incurs a cost related to retained ownership. A signal must be more costly for the low quality firms because, otherwise, mimicking higher quality firms imposes no disadvantages on lower quality firms, and the signal loses its credibility. In the IPO literature, the signal is costly when a risk averse entrepreneur must forego an opportunity to diversify his holdings in order to retain ownership in his venture. The two key aspects are that he must be risk averse and in an undiversified position in order to incur the cost associated with retained ownership.[60] For the signal to be costly, it must be that retaining holdings have a significant impact on the level of diversification of the governments portfolio[61] or that the government incurs some other cost associated with retained ownership.

As opposed to entrepreneurs, who wish to maximize their wealth, most governments seek to maximize social welfare.[62] To do so, governments engage in a variety of projects. An important part of the economic literature suggests that governments should behave as a risk

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[60] Leland and Pyle assume that prior to go public, ownership in his venture is the only asset that the entrepreneur holds. Being in such an undiversified position, the entrepreneur incurs the cost of risk associated with retained ownership.

[61] As opposed to the entrepreneur whose aim is to maximize his wealth, the set of governments' holdings can be seen as a portfolio put together so as to maximize "social welfare", whatever this term refers to in the mind of individuals who form the government.

[62] See Jones, Tandon and Vogelsang [1990] on how the maximization of social welfare is typically modeled.

neutral entity when it evaluates investment projects. Samuelson and Vickrey [1964] argue that governments invest in a great number of projects, such that they are in a position to diversify away project specific risk. According to such an argument, whether governments are risk averse or not is irrelevant because, since they are in a diversified position, they behave as if they are risk neutral.

Arrow and Lind [1970] on the other hand, argue that "governments should ignore uncertainty in evaluating public investments ... because the government distributes the risk associated with any investment among a large number of people". Their argument reflects the fact that governments act as a decision maker in the name of a large number of constituents. This number is so large that each constituent is asked to bear only a small fraction of risk associated with each investment decision made by the government. As a consequence of such efficient risk sharing, government should behave as a risk neutral decision maker.[63]

Given the size of the countries considered in this thesis, retained ownership is not likely to have an impact on the diversification of government's set of investments projects. Most countries considered in this study are reasonably well developed countries. Government's are usually diversified enough so that the divestment or the investment in a SOE do not have a significant impact on the state's diversification of activities. Governments also represent a large number of citizens, so that the Arrow and Lind argument with respect to governments' risk attitude is likely to apply. Consequently, unlike in an IPO, retaining ownership in a partially privatized SOE can hardly be assumed to materially affect the state's portfolio diversification.

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[63] Notice that these arguments fit the framework of this thesis which consider an SOE setting where ownership and control are separated. Other studies of privatization, like Sappington and Stiglitz [1987] and Leyden and Link [1993], do not separate ownership and control. As a consequence, they consider the impact of risk on the government from the point of view of the manager rather than from the point of view of a well diversified owner.

Therefore, for the purpose of privatization, it cannot be argued that retaining ownership imposes a cost associated with risk to governments. For the reasons cited above, project specific risk is not considered costly to governments. Therefore, exchanging risky returns associated with retained ownership in a partly privatized SOE for the riskless return associated with reducing debt cannot be viewed as imposing a cost to government.[64] If the Leland and Pyle model applies to a privatization exercise, then it must be because retained ownership imposes a cost on governments which is not related to risk.

The existence of such other costs cannot be ruled out automatically. By retaining ownership, governments forego an opportunity to liquidate one of its assets, namely its holding in a SOE. It might be argued, for instance, that there exists a political cost associated with foregoing an opportunity to reduce debt. If the public believes that any reduction in debt is beneficial even though it means giving up future dividends from the SOE, then the government incurs a cost associated with its decrease in popularity when it retains ownership.[65] Notice that this type of cost can only be attributed to the special case of SIPs because in a regular IPO, the proceeds are generally used internally so as to finance growth. This is usually not the case for a privatization. Privatized SOEs are firms which grow at a slower rate than the sample of IPOs analyzed in the literature. The funds generated by the issue are used by governments not only

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[64] The uncertain dividend which is to be paid to shareholders of the partly privatized SOE is typically considered a more or less risky return, depending on the firm's activities and capital structure. On the other hand, using the proceeds of a SIP to reduce debt results in eliminating the interests costs associated with such debt. Given this spending cut is known for certain, it is considered a riskless return.

[65] The literature on the political advantages of privatization for the government is quite rich. Marsh [1991] cites many authors who argue that when reducing debt becomes imperative for some country, selling state assets is politically much easier than cutting public expenditures (see also Brittan [1984]). Therefore, if foregoing an opportunity to sell an asset implies more spending cuts to compensate the loss of revenues, then there is a political cost associated with retained ownership since the sale of state assets is more popular than spending cuts are.

to finance growth but also to satisfy other needs, such as debt reduction. A privatization is more a transfer of propriety rights than it is a risk sharing exercise, and this is why it is a special case of IPO. Such a special case has a different type of cost imposed on the entrepreneur, but nonetheless, a cost of such a different nature like political costs, is expected to exist.

Also recall that in Chapter III, private shareholders solved the manager's incentive problem more efficiently precisely because a privately held firm is not subject to the same constraints as it is under government ownership. For shareholders of a partially privatized SOE, there is a cost associated with more or less retained ownership on the part of the government. The presence of a government shareholder can limit the ability of shareholders to design efficient incentive contracts with managers through renewed compensation agreements. Government may still be subject to heavy criticisms if the firm uses performance pay to compensate managers even though the government only partially owns the firm. Government partial ownership can also reduce the risk of bankruptcy and the possibility of a hostile takeover. Hence, rather than taking advantage of retained ownership on the part of the government, all types of shareholders involved in a mixed enterprises may incur a cost.

Therefore, the two necessary conditions for Leland and Pyle's model of retained ownership to apply to a privatization appear to hold to some extent. Governments have private information which they may wish to credibly communicate to the market and governments incur a cost associated with retained ownership. This cost can either be a political cost associated with the fact that retaining ownership results in foregoing an opportunity to reimburse debt or the cost of efficiency losses associated with the presence of the government in the group of shareholders.

However, we believe that the Leland and Pyle signaling arguments do not provide a compelling explanation retained ownership in privatization. The main reason why signaling is unlikely in privatization is related to the presence of efficiency losses associated with government ownership. This cost is incurred by every investor holding a share in the firm, and as a result, private investors may not wish to share ownership with the government in the privatized SOE unless they can acquire the shares at a price which reflects the potential loss in efficiency. In such a situation, retained ownership would have a decreasing effect on the stock's price rather than the increasing effect predicted by Leland and Pyle. Hence, retained ownership would be found to have an adverse effect on firm value if the efficiency cost hypothesis is verified.[66]

That is why the extent to which retained ownership can be used by the government to convey private information to the market is questionable in the case of a SIP. Unlike in a regular IPO, it cannot be said that retained ownership imposes a cost related to risk on the government. The nature of the efficiency cost which could otherwise be imposed on government, thus making the signal credible, is such that all other investors are also forced to bear the efficiency cost. Hence, it is not clear how using retained ownership as a signal of good future prospects could have a positive effect on firm value.

Notice that we do not formally rule out Leland and Pyle's model to explain the fraction of retained ownership. On the other hand, the conclusion of the above analyses forces us to explore other avenues to explain this fraction, and this is the purpose of the next two sections.

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[66] The next section elaborates on this issue by calling upon the conclusion of the theory of mixed enterprises developed by Eckel and Vining [1985].

The next section describes how retained ownership can potentially be used by governments to retain some control over the privatized SOE's activities.

4.2   The Theory of Mixed Enterprises

There exists an interesting literature which has been aimed at explaining why mixed enterprises are created. It can be argued that privatization of state-owned enterprises with retained ownership is an indirect way to create an ME. A direct creation of an ME occurs when a government joins its effort and resources with those of the private sector to create a jointly owned firm. Such enterprises are often formed to accomplish a specific objective or project which requires either an investment too large for the sole private sector or which is too risky to be supported by the private sector alone. Mintz [1982] argues that "... by investing capital in the form of equity, the government shares with the private sector the risk inherent in ... capital projects and thus encourages entrepreneurs to invest in projects that have uncertain future profitability".

The literature which refers to the theory of mixed enterprises is more interested in the direct creation of mixed enterprises, but given that the partial privatization of an SOE also results in a firm with mixed ownership, it can be interesting to analyze whether the reasoning underlying the theory of ME also applies to privatization with retained ownership.

4.2.1   Description of the Model

Eckel and Vining [1985] develop the first elements of a theory of ME. Their theory is aimed at explaining why mixed ownership can be preferable to both fully private or full state

ownership. They provide three basic reasons why mixed ownership can be optimal. First, they argue that in certain situations, the government socio-political objectives and the shareholders pressure to become more efficient can act simultaneously. In other words, Eckel and Vining assume that in certain circumstances, even though government may constrain inputs used or outputs produced in order to achieve a given set of socio-political goals, the presence of shareholders ensures that the ratio of input to output is optimal given the government's restrictions.

Second, they argue that under mixed ownership, governments' actions may be less restricted than under full state ownership. For example, mixed ownership can eliminate the requirement that employees of public enterprises be represented by government employee unions. Hence, the forces which tend to push government away from efficiency would be less severe under mixed ownership. Third, according to Eckel and Vining [1985, p.85], "...mixed enterprises may represent a compromise between the desire on the part of the government to pursue public goals and the availability of funding". Given such an argument, the creation of a ME can be due to the combination of a desire to achieve socio-political objectives with lack of financial resources on the part of the government.

The first two arguments expressed by Eckel and Vining can be summarized by saying that under certain circumstances, an ME can become an arrangement which provides the "best of both worlds". Under mixed ownership, government can still achieve socio-political objectives, but can do so efficiently because the presence of private shareholders (or the existence of traded stock) ensures that these objectives are pursued efficiently.

Boardman, Eckel and Vining [1986] discuss the disadvantages as well as the advantages of mixed ownership. In line with Eckel and Vining, most of their arguments are with respect to the fact that mixed enterprises are well suited to meet a vast array of socio-political objectives which would potentially be ignored if the firm were fully privately owned. They add that in smaller countries, private financial markets may be unwilling to finance projects which require large amounts of initial capital. Further, if smaller countries have poorly developed capital markets, the authors argue that mixed ownership can play an efficient risk sharing role. Among the disadvantages of mixed ownership, Boardman *et al.* cite the government's inability to use efficient incentive instrument such as performance pay. They further argue that the presence of government among the group of owners eliminates the possibility of bankruptcy and of a hostile takeover.

Boardman and Vining [1991] provide a typology of MEs and develop the theory of MEs further. They identify six classes of MEs, where the criteria considered are whether the government's proportion of total shares is low, medium or high and whether private share distribution is concentrated or dispersed. This typology allows for predictions as to the government's influence on the firm's objectives, the extent to which the manager is able to achieve his own objectives, and the firm's technical efficiency. The dispersion of share distribution has a positive impact on the ability of the manager to pursue his own objectives, which are usually not congruent with those of the owners. The more ownership is dispersed, the less control one particular owner has over the manager's activities. Given the manager is less controlled, he can pursue his own objectives more freely, and these objectives are assumed not to correspond with those of the owners. On the other hand, an increase in the

government's proportion of total shares ensures that the pursuit of socio-political goals can become important.

Therefore, at one extreme, low dispersion along with a large proportion of shares in the hands of the government ensures that socio-political goals are pursued. On the other hand, high dispersion combined with low proportion of shares in the hands of the government ensures that the manager's objectives prevail. The degree to which these objectives are pursued in between these two extremes varies according to the influence of both parties. Notice that in Boardman and Vining's [1991] model, MEs no longer represent the best of both worlds. In fact, their argumentation supports the notion that due to the conflicts existing among the different types of owners, mixed ownership may be the least desired solution.

4.2.2   The Applicability of the Theory of Mixed Enterprises to Privatization

The theory of MEs predicts that private shareholders are likely to pay a lower price for shares in SIPs where the government retained a fraction of the ownership. According to this theory, there are two main reasons why a government wishes to get involved in an ME. First, to achieve socio-political goals and, second, if market conditions are such that without the government's participation, the firm would not exist. Such market limitations are the subject of the next section. If we exclude momentarily market limitations as a justification for government's participation in a mixed enterprise, it can be argued that there exists an opportunity cost related to retained ownership on the part of government. The presence of government among the group of owners inevitably ensures that socio-political goals are

pursued, at least to a certain extent. Such a pursuit can only be made at the expense of profitability. This opportunity cost has to be reflected in the offering price because otherwise, private shareholders would not acquire shares.

As for the participation of private shareholders, the Eckel and Vining theory assumes that their presence serves as a disciplinary mechanism to ensure that taking into consideration the set of objectives pursued, the firm is operated so as to maximize profits. In other words, other things being equal, the ME should achieve greater profitability than an SOE even though both types of firms may pursue exactly the same goals.

This theory of the ME therefore leads to opposite conclusions to Leland and Pyle's model with respect to the impact of retained ownership on the value of the privatized SOE as perceived by investors. The theory establishes that excluding market constraints, only the attempt to achieve socio-political objectives justifies the presence of government among the group of owners of a firm. If the presence of government is made at the expense of profit maximization, then it can be argued that firm value is a decreasing function of the fraction of ownership retained.

Empirical tests on the comparative efficiency of SOEs and MEs appear to contradict this conclusion. Boardman and Vining [1989] use financial ratios as efficiency indicators to compare the efficiency of several firms with different types of ownership. They conclude that after controlling for a wide variety of factors, MEs often perform worse than SOEs. This finding leads them to argue that partial privatization may sometimes be worse in terms of profitability than complete privatization or continued state ownership.

In a study which aggregated almost all the results of studies which compared efficiency given different kind of ownership, Vining and Boardman [1992] concluded that "...the more recent studies almost universally indicate superior private corporation performance." Results of more extensive statistical tests generally indicate that SOEs and MEs are less efficient than private corporations, but fail to document superior performance for MEs over SOEs.

Notice that these empirical results fit well with the theoretical argument discussed in Chapter III. We argued that socio-political goals and profit maximization are in fact conflicting objectives and as such, cannot be pursued at the same time. Implicitly, this says that at a given point in time, socio-political objectives cannot be more or less pursued; they either are pursued or not. The presence of government as an important player among the group of shareholders may imply that in certain periods of time, socio-political objectives dominate profit maximization in the ME. Boardman and Vining's empirical results can be explained by assuming that their sample of MEs is dominated by firms where government has a share of ownership large enough to influence the firm's objectives. In such a case, it is the government's objectives which predominates, and socio-political objectives are pursued at the expense of efficiency and profit maximization.

Given such results, one may be lead to conclude that retained ownership on the part of government has a negative impact on firm value as perceived by investors. If retained ownership is large enough and that the government can dictate or influence the firm's objectives, then there is a possibility that at one time or another, the management of the firm is asked to operate so as to achieve socio-political objectives rather than maximize profit.

Further, instruments which could otherwise have been used by private shareholders, such as more efficient incentive contracts, or events which discipline managers, such as threat of bankruptcy or takeover threats, could no longer play their role if the fraction of ownership retained by the government is too large in relative terms.

However, one must be careful with the application of the theory of mixed enterprises to a privatization with retained ownership. The dynamics that underlie the creation of a mixed enterprise are totally different from the dynamics that underlie privatization. Underlying the creation of a ME may be the assumption that there are many important socio-political objectives which are currently not being achieved and that government wishes to achieve. The creation of the ME is worked out specifically to meet these objectives. At the creation of the ME, shareholders are aware that the government joins the private sector specifically to create an instrument which is to be used to pursue a socio-political objective, and they price the shares of ownership accordingly.

In the case of a privatization, socio-political objectives have become less important than other requirements, such as financial needs, and are presumably no longer a priority.[67] Proceeding to a partial privatization while continuing to use the firm to pursue the same socio-political objectives is difficult to justify, especially considering that there exists alternative means to pursue such objectives.[68] If privatization is prompted by a change of ideology, a change in the financial situation of the state or a change in the population's preferences, then privatization with the intention to continue to pursue the same socio-

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[67] Most authors analyzing states' privatization programs note that an increase in financial needs play an important role in privatization. See Marsh [1991] and Williams [1988], among others.

[68] For example, governments often control industrial activities using regulations, as is done by the Canadian government in the case of air transportation.

political objectives is not the right solution to the new problems which these changes have created.

As in the case of the Leland and Pyle model, the theory of mixed enterprises does not seem to provide a good explanation for the existence of retained ownership in privatization of SOEs. Recall however that Boardman, Eckel and Vining [1986] discussed another situation where partially privatizing SOEs and creating mixed enterprises can be the only feasible outcome. They argued that when the public market in which the enterprise operates has limited capacity, the creation of an ME may be the only workable type of privatization. We address this question in the next section.

4.3   The Limitations of Capital Markets

According to the capital market limitations argument, problems with capital market liquidity could explain retained ownership on the part of the government. This argument is more versatile than the theory of mixed enterprises because it can apply to both the direct and indirect creation of an ME. If the government of a given state detects a business opportunity but realizes that the public market has limited capacity and could not generate enough funds to finance the initial investment, it can share the ownership in a firm with a group of private investors to create an ME. Such a situation can occur when the initial investment is particularly large or when the expected payoffs are particularly risky. If successful, the consequence of shared ownership is the direct creation of an ME.

On the other hand, the same government may first forego the opportunity to share ownership with the private sector and act solo. It may also have been forced to acquire a private firm which was facing bankruptcy. In such a case, an SOE rather than an ME is created. If the government later wishes to privatize the venture, it may still be facing the same market limitations in terms of capacity. In such a case, even if financial requirements have become more important than socio-political objectives for the government, it is still forced to only partially privatize the venture because of the market limitations.

Mintz [1982] argues that in economies without well-developed capital markets, government participation is desirable if entrepreneurs cannot efficiently share risks due to limited capital market capacity. In these circumstances, government can enable entrepreneurs to indirectly exchange shares by acquiring partial state ownership and redistributing the profits earned on government investment back to individuals. Notice that this latter approach fits better with the theoretical discussion of Chapter III. If limitations in terms of market capitalization are invoked to justify retained ownership, then the government is forced rather than prefers to retain ownership in the privatized SOE. On the other hand, shareholders would be willing to pay a higher share price to acquire full ownership of the firm in order to avoid the constraints to which the government is subject as well as to fully benefit from the advantages of public markets on efficiency. The problem is that full privatization is simply not workable when the capital market has limited capacity in terms of liquidity.

In today's international markets, such a situation can only occur if the government limits the foreign investors' participation in the share issue. Many governments chose to limit the participation of foreign investors in SIPs in order to avoid being accused of selling

the crown's jewels to foreigners.[69] If the participation of foreign investors is not restricted,

projects are unlikely to be large enough such that the entire world business community would

have difficulty to absorb them. Therefore, the market limitation argument can only apply if

the government limits the foreign investors' participation.

If the local capital market is constrained by liquidity problems, retained ownership

does not serve as a signal nor is it bad news for the private investors. It is simply a

consequence of the market limitations.[70] In the case of a privatization subject to these

limitations, the SIP could be accompanied by a promise of future issues of government shares

contingent on the relaxation of market limitations.

The three different approaches aimed at explaining retained ownership on the part of

government which are discussed above allow for different empirical implications. These

empirical implications are the subject of the next section.

4.4 Empirical Implications

The theoretical discussion of retained ownership in share issue privatization leads to

the conclusion that governments are most likely to retain a fraction of ownership in the

privatized SOEs when the financial market's capacity to absorb the whole issue can be

questioned.

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[69] For example, the United Kingdom limited the participation of foreign investors to 18.5% of all share issues of water utilities. It did the same for the privatization of electric utilities, limiting foreign participation to 20%.
[70] Several authors have argued that capital market limitations have played a role in the extent to which SOE's are fully or partially privatized. For example, Hensley and White [1993] argue that for one, the Malaysian equity market has limited capacity and that the absorptive capacity will have to be watched carefully for future privatizations.

The Leland and Pyle model of retained ownership calls for a positive relationship between firm value relative to some benchmark and retained ownership. In fact, the Leland and Pyle model predicts that firms' market value is increasing in the fraction of retained ownership. Therefore, the model predicts a positive relationship between the firms' actual market value relative to what the value would have been had the fraction of retained ownership been null. Value under null retained ownership is obviously not always observable, and this makes the empirical testing of the model difficult. Ideally, one would attempt to test the positive association between retained ownership and the premium paid by investors given such a proportion of retained ownership is observed. Given that such a premium is not readily computable or observable, we chose to estimate the value of the firm given a null fraction of retained ownership using the book value of equity.[71] Using this estimate, we formulate the following hypothesis to test the applicability of the Leland and Pyle model to privatization:

Hypothesis 4.1   The Leland and Pyle Hypothesis (LP)

In the Leland and Pyle model, the fraction of ownership the government retains for a given privatization has a positive impact on the market value of equity of privatized State-Owned Enterprises. Given this, a positive relationship between the percentage of retained ownership on the part of the government and relative firm value is hypothesized. Relative

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[71] Feltham, Hughes and Simunic [1991] used the same proxy for firm value in the absence of retained ownership. They argue that the book value of equity is a reasonable proxy for the most pessimistic perception of investors with respect to firm value.

firm value is estimated by the ratio of the market value immediately following the issue to the book value of equity.

In Leland and Pyle's model, retained ownership is a choice variable which explains higher firm value. However, it is questionable whether retained ownership could serve as a signal of good future prospects, because given the negative impact of the government on the instruments which the shareholders use to improve efficiency, it is not clear whether shareholders would or would not prefer to be co-owner of the firm with the government. Therefore, retained ownership on the part of the government does not necessarily lead shareholders to revise upwards their expectations with respect to firm value.

On the other hand, the theory of mixed enterprises calls for a negative relationship between retained ownership and firm value. Given the theory of mixed enterprises, we can formulate a hypothesis competing with Hypothesis 4.1. According to this theory, shareholders are lead to think that retained ownership signals a desire on the part of the government to use the firm to pursue socio-political goals.

This theory was developed to explain creation of mixed enterprises given the unavailability of private funding rather than the indirect creation of an ME through partial privatization. Partially privatizing a firm with the intention to continue to pursue socio-political objectives is difficult to explain in the theoretical framework established in Chapter III. Nonetheless, even though it may be due to other causes than what the theory calls for, it is an empirical fact that MEs are created through partial privatization of state-owned firms. The argumentation underlying the theory of mixed enterprises predicts a relation between

retained ownership and firm value which is in the opposite direction of the relationship hypothesized in H4.1. This view is reflected in the following competing hypothesis:

Hypothesis 4.2   The Mixed Enterprise Hypothesis (ME)

In the Theory of Mixed Enterprises, the fraction of ownership the government retains for a given privatization exercise has a negative impact on the market value of equity of privatized State-Owned Enterprises. Given this, a negative relationship between the percentage of retained ownership on the part of the government and relative firm value is hypothesized. Relative firm value is estimated by the ratio of the market value immediately following the issue to the book value of equity.

The same reasoning with respect to the measurement of relative firm value applies to the empirical testing of the mixed enterprise theory. In this case, a "negative premium" (or a discount) is hypothesized to be associated with retained ownership. Investors are willing to pay less for a share of the firm because retained ownership on the part of the government signals a desire to pursue socio-political objectives which conflicts with profit maximization. The problem is that the hypothetical higher value of the privatized firm under no government retained ownership is again not observable.

Finally, the theoretical relationship between retained ownership and the limitations in terms of financial market capacity calls for a positive correlation between firm value as a measure of relative size and the fraction of ownership retained. In such a case, retained ownership depends on the market value of the firm and its relationship to the financial

market's capacity. The fraction of ownership retained should also be negatively correlated with the proportion of the issue which is open to foreign investors.

Hypothesis 4.3   The Market Limitation Hypothesis (ML)

The fraction of ownership the government retains for a given privatization exercise does not play a role in the valuation process of the privatized State-Owned Enterprise. It is due to local market limitations combined with a desire on the part of governments to limit foreign investments. Given this, the following association among variables are hypothesized:

- ***4.3.1:*** *a positive relationship between firm value relative to the capital market size and the percentage of retained ownership on the part of the government,*

- ***4.3.2:*** *a negative relationship between the share of the issue allocated to foreign investors and the share of ownership retained by the government,*

Testing whether market limitations can be associated with retained ownership is a feasible task. One first needs to establish a measure of market absorptive capacity limitations. A positive association between market limitations, restrictions on foreign investments and retained ownership then has to be established. To measure firm value relative to market size, we chose to create a ratio of firm value relative to the sum of all values of firms which list their stock on the local capital market of the country of interest. According to Hypothesis 4.3, a positive relation between this ratio and retained ownership is hypothesized. That is because the greater is firm value relative to market size, as measured

by the ratio, the greater is expected to be the fraction that the government has to retained in order to deal with the market's capacity of absorption

Besides empirical problems, the theoretical arguments in this thesis have been developed so as to favor the market limitation theory. As such, we expect to reject only the null form of Hypothesis 4.3. What plays against the adoption of Leland and Pyle's theory is the fact that retained ownership may represent good news but may also represent bad news, as is expressed through the argumentation underlying the mixed enterprise theory. On the other hand, it was argued that the theory of mixed enterprise has been developed to explain the direct creation of mixed enterprises rather than the indirect creation of a ME through partial privatization.

If the theoretical arguments developed in Chapter III are valid, it is an increase in the relative importance of financial requirements with respect to the achievement of socio-political goals which prompt a privatization decision. Such a turnaround calls for complete privatization whenever possible. Given such an explanation, partial privatization is most likely to occur as a second alternative, which is imposed by market capacity limitations. The results of the empirical tests of the three hypotheses are discussed in the second section of Chapter VII.

Chapter V   The Underpricing of Share Issue Privatization

The underpricing of initial public offerings is a phenomenon which is well documented in the finance literature.[72] Investors in the past have been rewarded by average excess returns for investing in initial public offerings.[73] These returns are usually quite high and realized during the first few days of trading.

In simple terms, underpricing consists of offering shares in a private venture to the public at a price which is below the price which investors would have been willing to pay. As the market re-evaluates the stock, the market price increases and investors who paid the offering price realize a quick gain. This phenomenon is documented in stock exchanges around the world[74] and is found in initial public offerings of firms involved in any industry.

The phenomenon is puzzling because as a result of underpricing, funds are transferred from the entrepreneur to the investors who initially acquire the shares issued in the IPO. Any quick gain realized on the stock price is a sign that the offering price was lower than what investors would have been willing to pay. Therefore, underpricing can be seen as a transfer of wealth from the entrepreneur to the investors who initially acquire the shares issued in the IPO. In general, we can view this transfer as a cost that must be incurred by the entrepreneur in the sale of his shares. The cost is basically due to frictions in financial markets associated with asymmetric information.

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[72] Ibbotson, Sindelar and Ritter [1988] provide a good review of the empirical and theoretical findings with respect to the underpricing problem in IPOs.

[73] Ibbotson [1975] first tested for the presence of underpricing in the new issue markets and found, on average, an 11.4% discount in the offer price which disappeared within weeks in the aftermarket.

[74] Table 5 in Christensen and Sorensen [1991, p.132] provides a list of degrees of underpricing in European countries. Section 5.3 in this chapter reviews a number of studies which document underpricing around the world.

In this chapter, we first briefly review the theoretical and empirical literature that analyzes the underpricing phenomenon. We then attempt to make predictions with respect to the underpricing of a share issue privatization. The question as to whether the tentative explanations of underpricing in IPOs apply to the special case of SIPs is theoretically addressed while taking into considerations the particularities of a privatization. These arguments lead to the hypotheses formulated in the last section of this chapter.

5.1 Models of Underpricing

Before attempting to make any prediction on the existence of underpricing in SIPs, it is useful to briefly review the literature on the underpricing of IPOs. There exists more than one explanation as to why the phenomenon of underpricing exists[75], but only a few explanations survive empirical testing. In this section, we focus on two sets of arguments, which are supported by rigorous theoretical grounds. The first set of arguments developed in the literature relate underpricing to risk. A second set of arguments interpret underpricing as a signal of offering quality.

5.1.1 Underpricing and Ex ante Uncertainty

Rock [1986] argued that underpricing exists to compensate uninformed investors who participate in an IPO because these investors face an adverse selection problem which leads to a "winner's curse". In a typical IPO, the number of shares offered is usually limited. At the announcement of an IPO, Rock assumes that a certain group of investors are willing to incur the

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[75] See Ibbotson, Ritter and Sindelar [1988, pp. 43-44] for a list of potential explanations.

cost of collecting information about the firm in order to precisely assess the value of the firm. These "informed" investors are able to infer the post-issue market price from the information they collect about the future prospects of the IPO firm. They only buy shares in IPOs that are underpriced.

On the other hand, uninformed liquidity traders who wish to invest in IPOs face the risk of getting less than they requested of the shares that increase in price right after the issue. That is because the "good" shares are likely to be over-subscribed given that informed investors are most likely to participate in such an issue in order to realize the gain associated with underpricing. Further, investors are most likely to see their demand for shares that decline in price fully satisfied, because these firms are undersubscribed. Informed investors will not participate in a venture for which the offering price is above what is expected to be the market price immediately following the issue.

Liquidity traders therefore face a situation where seeing their orders of shares fully satisfied is bad news. Without the average underpricing of new issues, liquidity traders would, on average, incur a loss for participating in IPOs. That is because when their orders are fully satisfied, it is a sign that informed traders refused to order any shares because they assume the shares are overpriced. In essence, liquidity traders face an adverse selection situation typically labeled as a "winner's curse".

Rock argues that if nothing is done to mitigate the effects of the winner's curse on liquidity traders, they are likely to avoid the IPO market. Given the winner's curse, liquidity traders bare an uncompensated risk if the issue price equals the expected ex post market price. That is where underpricing comes into play. Underpricing is assumed to compensate liquidity

traders for the risk that they face given the winner's curse. According to Rock, an average excess return of around 20 to 30% on the first day of trading compensates liquidity traders for the risk which is imposed by the winner's curse problem.[76]

5.1.2 Underpricing and Signaling Models

In addition to arguing that underpricing can serve as compensation for risk, another line of reasoning argues that underpricing can be used as a signaling device. Welch's [1989] model is based on the popular belief that issuers attempt to leave a "good taste in investors' mouths" so that future seasoned issues from the same firm can be sold at attractive prices. He takes into consideration the fact that issuing firms are likely to raise more capital at a later date. Welch's main result is that a firm can attempt to signal the quality of the offering using underpricing. If the quality of the offering is discovered with some probability between the unseasoned and the seasoned offering, then there is a cost associated with signaling through higher underpricing for a low quality firm. Since the offering's quality can be revealed, low quality firms must not only support the cost of the signal but also expend the resources to imitate observable real activities and attributes of high quality firms.

According to Welch's model, the gains that high quality firms realize by signaling with underpricing are only collected in subsequent seasoned offerings. Therefore, he predicts that IPO firms are most likely to issue a substantial proportion of ownership shares in issues

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[76] Notice that underpricing does not provide an arbitrage opportunity for the uninformed investors. IPOs are on average underpriced, but individual IPOs can be overpriced Because of the winner's curse problem, the uninformed investors' orders are filled if the stock is overpriced, and only partially filled if the stock is underpriced. Therefore, the uninformed investors can only expect to break even on the order he places.

closely following the IPO. He provides some empirical support for the fact that IPO firms often proceed to seasoned issues soon after the initial issue.

Grinblatt and Hwang [1989] also examine the possibility that underpricing could be used as a signaling device. But in their case, underpricing is combined with ownership retention to signal bi-dimensional information. In the Leland and Pyle's model discussed earlier, the entrepreneur uses ownership retention to signal the mean of future cashflows. This signal allows investors to infer firm value. Grinblatt and Hwang examine the case of an entrepreneur who wishes to signal the mean as well as the variance of future cashflows. In their model, two signals are necessary to communicate efficiently information which is two-dimensional. They further assume that there exists a probability that the offering's quality be revealed before the offering. Given this probability, underpricing is assumed to be too costly for low-quality offerings. This ensures the credibility of underpricing as a signal of the offering's quality.

To summarize, the literature examines two main streams of theoretical reasoning with respect to the underpricing phenomenon. The first stream consists of arguing that underpricing can serve to compensate liquidity traders for undue adverse selection risk. Another stream argues that underpricing is a costly signal used by higher quality offerings which attempt to separate themselves from the pool of lower quality offerings. The purpose of this chapter is to draw on these theoretical analyses to explain why SIPs are also made at a discount.

5.2   Review of the Empirical Literature on Underpricing

Before analyzing the empirical implications of the arguments discussed above for a sample of SIPs, it is useful to summarize the results of previous studies on the underpricing of US and international issues. Several studies have investigated the market price behavior of IPO shares. Research in this area regularly concludes that IPOs are underpriced on average. In fact, average underpricing of new issues on the United States stock markets is so well known that it is now taken as a given. But given the international nature of the sample used in this study[77], it is important to summarize the results of studies which have examined the underpricing phenomenon outside US markets.

The existence of underpricing of new issues as an international phenomenon is confirmed by several researchers. Dawson [1987] calculates excess returns on the initial day of trading for IPOs of the following countries: Hong Kong (13.8%), Singapore (39.4%) and Malaysia (166.6%). McGuiness [1992] also documents underpricing of IPOs on the Hong Kong stock market for a sample of IPOs which took place in the ten year period following 1980. Koh & Walter [1989] find underpricing of new issues on the Singapore market. Jog and Riding [1987] document levels of underpricing comparable to the US for Canadian IPOs which took place between 1971 and 1983.

In Europe, Wessels [1988] documents underpricing on the Amsterdam Stock Market while Christensen and Sorensen [1991] also document underpricing of new issues on the Danish market. Husson and Jacquillat [1988] calculate excess returns due to underpricing on French new issues one to three days after the offering. Uhlir [1988] documents average excess

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[77] See the first section of Chapter VII, where the sample is described.

returns of as high as 21.5% on the first few days of trading for German new issues. He calculates even higher excess returns for Swedish new issues.

On average, new issues offered on any stock market around the world are underpriced. The results of these studies confirm that initial abnormal returns realized by investors on the first few days of trading are comparably high across international markets. Thus, it can be said that underpricing of new issues is a phenomenon which transcends cultural differences. Studying underpricing for an international sample should therefore not create any distortion.

Some studies have also attempted to identify factors that could influence the underpricing of new issues. These studies have mainly been conducted in the US markets. In an empirical study, Beatty and Ritter [1986] investigate the applicability of Rock's model by further developing the reasoning underlying his theory. They examine whether underpricing can be related to the uncertainty prevailing prior to the issue with respect to the market price which will prevail after the issue. The authors label this risk *ex ante uncertainty*. Based on Rock's arguments, Beatty and Ritter argue that liquidity traders are willing to buy shares only if, on average, initial public offerings are underpriced. But given underpricing is related to ex ante uncertainty, the authors argue that an increase in uncertainty with respect to the firm's value is most likely to result in greater underpricing. That is because, other things being equal, investors require greater compensation for an increase in risk.

Beatty and Ritter therefore attempt to come up with some measures of ex ante uncertainty. To measure uncertainty, they first count the number of uses for the proceeds of the issue which are cited in the proxy. The Security Exchange Commission's (SEC) regulations in the United States are such that riskier firms tend to provide more detailed explanations of the

use they intend to make of the proceeds. Therefore, the more uses of the proceeds that are mentioned in the prospectus, the more ex ante uncertainty is assumed to prevail with respect to the firm's future performance. A high count of these uses should therefore be positively related to underpricing.

They also use the inverse of the gross proceeds as a measure of risk. They assume that smaller offerings are more speculative, on average, than larger offerings. Since the inverse of the gross proceeds decreases with the size of the offering, the inverse of the gross proceeds is assumed to be positively related to ex ante uncertainty. Their empirical results support the positive association between their estimates of ex ante uncertainty and the level of underpricing.

Koh and Walter [1989] also attempt to verify empirically the arguments underlying Rock's model. By taking advantage of particularities of the Singapore Stock Market, they are able to directly test Rock's model. [78] They find that rationing is applied more stringently in underpriced than in overpriced issues. This bias in rationing of orders produces an equilibrium offer price with a finite discount sufficient to attract uninformed investors, a finding which supports Rock's model.

There are a number of ways an issuing firm can reduce the level of underpricing, and thus benefit from the higher proceeds which have been empirically documented in the US markets. Beatty [1989] predicts a negative relationship between the hired auditor's reputation and the level of underpricing. [79] The evidence supporting a negative relation between auditor

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[78] The authors can directly test Rock's model because, in the Singapore market, the basis used for rationing is disclosed publicly. This ensures that in the case of oversubscription, the allocation of shares to subscribers is executed fairly. In markets where the basis of allocation is not publicly disclosed (like in the US), the allocation process can be biased. It can therefore be the case that informed investors benefit from biased allocation at the expense of the uninformed.

[79] This test takes advantage of the fact that a firm going public must provide a prospectus that includes audited financial statements. The argument is based on the fact that CPA firms who have invested a lot in reputation

reputation and initial return to investors is, however, not strong. Based on similar arguments, Carter and Manaster [1990] examine the relation between initial returns and the underwriter's reputation. The authors document a significant negative relationship between the underwriter's prestige and initial returns' variance for the initial public offering market.[80]

According to Megginson and Weiss, one final way to limit underpricing consists of obtaining certification from a venture capitalist. Megginson and Weiss' study [1991] provides empirical support for the certification role of venture capitalists who, like underwriters and auditors, have reputation capital at stake. They argue that the value of the reputation capital is greater than the largest possible one time wealth transfer which could be obtained by certifying falsely. Their results demonstrate that venture-capitalist-backed IPOs are significantly younger, have greater median book values of assets and also have a larger percentage of equity in the capital structure. Further, these initial public offerings attract higher quality underwriters and auditors as well as larger institutional following. A majority of venture capitalists retain ownership in the offerings for a long period of time. As a result of backing by venture capitalist, IPOs are significantly less underpriced.

The results of these studies confirm that in the United States, when the entrepreneur finds a way to reduce ex ante uncertainty, underpricing of the issue can be reduced. Greater prestige of the auditor and/or of the underwriter along with venture capitalist certification are assumed to be factors which reduce the ex ante uncertainty associated with the new issue. High prestige firms are assumed to have too much to lose when they agree to support speculative new

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capital have more to lose from incorrect pricing. The hiring of a "high quality" auditor reduces *ex ante* uncertainty for the investor who, in turn, require less underpricing to be compensated for the risk imposed on him.

[80] They further document a significant negative relation between prestige and the magnitude of underpricing.

issues. Hence, obtaining support from these groups alters the speculative nature of the issue. Further, venture capitalist are assumed to have a good knowledge of the firm's future issues and their support is thus assumed to further reduce ex ante uncertainty. These results provide some empirical support to Rock's model which relates underpricing to ex ante uncertainty.

5.3   Particularities of Share Issue Privatization

In the special case of a SIP, the government can be seen as the entrepreneur who sells shares in his venture through public markets. But there are important distinctions between a SIP and a regular IPO. These differences exist in terms of the nature of the issuer and the objectives of the share issue. Distinctions between these factors may influence the interpretation of underpricing. In this section, we provide a summary of these distinctions and discuss their impact on the applicability of the models of underpricing to the special case of SIPs.

The first and most important distinction to be made between the government and a normal entrepreneur is that the government has more than one firm to privatize. In fact, most countries which privatized SOEs and which are included in the empirical study have issued shares in more than one SOE and could still decide to privatize other firms which are currently state-owned. Over the last decade, the British and the French governments have privatized more than ten SOEs through SIPs.[81] Other countries privatized an average of three state owned firms, and some are still looking toward privatization to address economic and political changes.

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[81] See Prosser [1988] for a review of privatizations in France and the United Kingdom.

The distinction is important because governments may attempt to use underpricing in the early privatizations to attract investors in future SIPs. Because of the fact that governments require the participation of investors in future issues, the cost associated with an unsuccessful or overpriced issue is greater for the government than it is for the entrepreneur. Given that a government is likely to need the investors' participation for future privatization, it may be tempted to voluntarily underprice early issues so as to encourage investors' confidence in future SIPs.

The above reasoning is similar to Welch's point, but his argument is not directly applicable to privatization. In Welch's separating equilibrium, underpricing is used to motivate participation in future share issues for the same firm. Governments do proceed to future issues, but most often not for the same firm. As a matter of fact, Welch's argument can be applied to privatization by recognizing that governments may be willing to underprice issues if it intends to privatize more firms in the future. In an attempt to motivate investors to participate in subsequent issues, governments may be willing to let investors realize a quick gain in early issues.

Another factor which distinguishes governments from private entrepreneurs and which may have an influence on underpricing is that governments represent a large number of constituents. Vickers and Yarrow [1991, p.120] argue that: "Generous pricing may be politically attracting both because it reduces the risk of shares being unsold (which could be embarrassing[82]) and because the beneficiaries tend to be more aware of their gains than the losers feel the losses." In their opinion, the losers of underpricing, i.e. the taxpayers in general,

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[82] Prosser [1988, p.35] also argues that underpricing can be used to ensure the success of issues.

are so dispersed that they incur a small loss. A much more limited number of investors incur a large gain associated with underpricing. In that sense, underpricing is politically beneficial.

An objective like wishing to attract the broad public is another important distinction that has to be made between SIPs and regular IPOs. This objective has often been mentioned by the British right wing government which prompted the UK privatization movement in the early eighties. [83] Believing in the capital market's virtues, the right wing government expressed the desire to motivate portfolio diversification by the British population. Privatization has been seen as a way to implement such a diversification, and underpricing of SIPs is often referred to as a means by which the broad public is attracted to invest in the capital markets. This political dimension is absent from regular IPOs.

The fact that government may have to privatize more than one SOE can further place the government in a difficult position with respect to bargaining power. In markets that are not efficient, investors could collude and force the government to underprice in order to guarantee investors' participation. Combined with the fact that governments sometimes privatize because they are in a difficult financial position, the low bargaining power of government could play a role with respect to underpricing. Even though the existence of efficient markets should alleviate the problem, the relatively large size of privatization issues with respect to the size of the capital market in some countries may force the government to underprice in order to attract large institutional investors and ensure the success of the issue.

Given the above arguments, it can be argued that underpricing of SIPs can play a role similar to the role Welch [1989] modeled. Underpricing is not really used as a signal of quality,

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[83] Petrecolla et al. [1993] argue that this objective is also pursued by the Argentinean government. Hensley and White [1993] also note this objective for the Malaysian privatization program.

but still serves as a device which motivates future participation in subsequent SIPs. Underpricing used for such a purpose is more costly only for governments which do not intend to pursue the privatization effort by issuing more shares of ownership at a later date. Since these governments can be assumed to be the exception, we can expect most governments to underprice SIPs.

Recall that in Chapter IV, we argued that retained ownership could not serve as a valid signal in the hands of the government because the government's participation in the ownership of the firm could be interpreted as bad news by investors. This aspect also is a distinction between a regular IPO and a SIP. If retained ownership is not a good signal of future cashflows, it cannot be combined with underpricing to signal bi-dimensional information. The combination of the two signals used to communicate bi-dimensional information is therefore difficult. For this reason, Grinblatt and Hwang's model does not fit well with the current theory of privatization and also has to be discarded.

Consider now the line of argument that relates underpricing to compensation for risk. Bös [1992] argues that Rock's arguments cannot serve to explain the underpricing of privatized SOEs. He maintains that the leaking or the existence of inside (private) information is less likely for a privatized SOE, such that the likelihood of having a group of "informed" investors is diminished.[84] According to Bös, the fact that the government can forbid hostile takeovers by retaining special powers, which apply even after privatization, eliminates the motivation to collect private information with respect to the firm's future prospects.

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[84] See Bös [1992, p.28].

He also argues that a liquidity trader, assumed to be an average "man-on-the-street" in the case of government's divestiture, can never perfectly understand the information published by the issuer because the he lacks the required skills. Therefore, given this lack of skills, "uninformed" investors can never be as informed as the issuer in the case of a privatization. Rock's assumption that uninformed investors know as much as the issuer with respect to the firm's future prospects therefore is violated. The existence of a discrepancy between a group of informed investors and a group of uninformed investors then becomes doubtful for a privatization exercise[85], and the winner's curse problem is not as acute in the case of a SIP as it is for regular IPOs.

Along with Vickers and Yarrow [1991], Bös argues that governments' desire to attract the broad public can explain for the most part any potential underpricing of SOE issues. To be sustained, though, voluntary underpricing has to be coupled with incentives not to re-sell the shares acquired at a discount. Otherwise, the policy would not achieve its goal to encourage long-term share ownership among the general public. Bös mentions that identifying the right incentives to prevent quick re-selling of underpriced shares is an important problem.[86]

Jenkinson and Mayer [1994] argue that underpricing of SIPs can be seen as compensating uninformed investors for ex ante uncertainty. They take a position which is opposed to Bös by arguing that underpricing SIPs is a clear illustration of Rock's model. In the same vein, Galal *et al.* [1992] argued that ex ante uncertainty is even more severe for SOEs than for regular IPOs because the asset transfer in the case of privatization implies a major shift in

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[85] Bös also argues that governments want to attract the broad public more for ideological reasons than because of a fear of under-subscription.

[86] See Bös [1992] pp. 25-6, where the problem is referred to as the "bonus" problem.

the SOE's management philosophy. In their opinion, the severity of ex ante uncertainty should also be considered to explain the underpricing of SOE's issues.

Galal *et al.* illustrate what is the final distinction between a SIP and a regular IPO discussed in this thesis. The privatization of an SOE implies a major shift in the firm's management philosophy. As Beesley and Littlechild [1994] argue, privatization is intended to change motivations of managers toward profit making. For a regular growing firm, a share issue merely is a normal step toward its attainment of stability. Growth opportunities imply the participation of a large number of investors which are willing to share the risk associated with the growing venture.

This is typically not the purpose of the participation by private investors in the case of privatization. Recall that in Chapter III, we argued that it is the combination of a change in the government's priorities combined with a belief that private shareholders have better instruments to implement the shift toward efficiency that prompt privatization. Galal *et al.*'s conclusion that such a shift in the firm's objectives creates uncertainty fits with the theoretical reasoning discussed in Chapter III. Accepting the fact that ex ante uncertainty also exists in the case of a SIP can also provide justification to the underpricing of privatized SOEs.

It can therefore be argued that distinctions exist between a share issue privatization and a regular initial public offering. These distinctions are related to the nature of the issuer as well as to the objectives of the whole share issue. The main objective of a SIP is to transfer the ownership from public to private hands due to a change in government's priorities, as opposed to the usual objectives of an IPO, which are to finance growth and share risks. A secondary objective of SIPs must also be considered. That is, some governments wish to encourage

broadened share ownership among the population and can use SIPs to achieve this objective. In the case of a regular IPO, shares are issued for different reasons and the entrepreneur's objectives remain the same before and after the issue. No political objectives like increasing the spread of share ownership among the population have ever been mentioned to explain why IPOs are underpriced.

It is from the analytical literature on underpricing that we draw our main arguments to explain the underpricing of SIPs. We first argue that underpricing can be used as a device to attract sufficient participation on the part of investors to ensure the success of SIPs. Among these investors, the government also wishes to attract people who are first time investors. When these investors acquire shares through a SIP, they can be assumed to take an undiversified position, and to require a premium in order to be compensated for the risk they take. The shareholders' uncertain ability to operationally implement the change in the firm's objectives also imposes risk on investors who are in an undiversified position. In this situation, underpricing could serve as compensation for risk. The empirical implications described in the last section explore these avenues.

5.4   Empirical Evidence on the Underpricing of SIPs

The results of previous research on SIPs indicate that these share issues also are underpriced on average. Earlier studies have documented underpricing of share issue privatizations. Menyah, Paudyal and Inyangete [1990] extensively discuss the underpricing of companies privatized through IPOs on the London stock exchange. Their results show that the magnitude of underpricing of privatized SOEs exceeds the underpricing of the private

sector issues. Prosser [1988] and, more recently, Jenkinson and Mayer [1994] document underpricing for British and French issues.

Perroti and Guney [1993] assessed the extent to which SIPs are underpriced in several countries. They document underpricing for SIPs which took place in the United Kingdom, France, Spain and Malaysia. Jones *et al.* [1994] also document underpricing for privatization which occurred around the world. Their attempt to explain underpricing shows that the initial return appears to be greater in some industries. A regression aimed at explaining underpricing shows that the coefficient on dummy variables taking the value 1 if the firm belongs to the telecommunication industry or to the oil and gas industry are significantly positive. Underpricing also appears to be negatively related to size and to the amount of shares allocated to foreign investors. The result with respect to firm size is interesting because it points toward a negative relation between underpricing and risk in SIPs, as is the case for IPOs.

Table 5.1 summarizes the results of research which measured the underpricing of SIPs. From the results displayed in the table, it appears as though the underpricing of government share issues must also be taken as a given. In this thesis, an attempt is made to explain underpricing of SIPs in light of the particularities of privatization.

Table 5.1
International survey of underpricing in SIPs

Country	Reference	Type of sample	Sample size	Average Underpricing
France	Prosser [1988]	SIPs	7	15.42%
	Perroti & Guney [1993]	SIPs	11	18.67%
	Jenkinson & Mayer [1994]	SIPs	11	18.54%
Malaysia	Perroti & Guney [1993]	SIPs	13	99.61%
Spain	Perroti & Guney [1993]	SIPs	7	64.43%
United Kingdom	Kay & Thompson [1986]	SIPs	12	20.58%
	Prosser [1988]	SIPs	20	22.20%
	Pint [1990]	SIPs	35	13.54%
	Menyah et al. [1990]	IPOs	13	45.1%
	Perroti & Guney [1993]	SIPs	51	27.4%
	Jenkinson & Mayer [1994]	SIPs	21	14.61%
Across Countries	Jones et al. [1994]	SIPs	107	33.5%

5.5   Empirical Implication

The purpose of this section is to interpret the analytical and empirical evidence on underpricing to come up with a characterization of the extent to which SIPs are underpriced. We first discard the arguments which say that underpricing could serve as a signal of the future prospects for the firm. In Grinblatt and Hwang [1989], the privately known variance is important because the entrepreneur is risk averse and the cost of retained ownership increases with the variance. Hence, to properly interpret the signal about the mean provided by ownership retention, there must be a signal for variance. This argument cannot be applied to SIPs because risk aversion does not seem to apply to governments.

On the other hand, we can use an argument similar to Welch [1989] to explain underpricing. According to this argument, underpricing is a cost voluntarily incurred by the governments and which is used to encourage investors to participate in privatization issues. Vickers and Yarrow's [1991] explanation of underpricing in British SIPs is along the same line. Large participation is required both to avoid the embarrassment related to undersubscription and to motivate share ownership among the general public.

Further, governments facing small or inefficient markets have low bargaining power and may be forced to underprice in order to ensure the participation of institutional investors. As was previously argued, some governments are facing capital markets which are smaller and which might be less efficient than, say, the British markets. If these governments are using privatization to satisfy treasury requirements, they are not in an advantageous bargaining position and have to make sure that the offering is successful. In this situation,

the underpricing of an issue certainly is a recipe which increases the probability of success of a privatization operation, if success is measured in terms of subscription.

Notice that Welch's [1989] and Rock's [1986] argument are not mutually exclusive but can complement each other. We take advantage of this to argue, along Rock's theory, that initial returns can also be used to compensate investors for ex ante uncertainty which imposes risk. Uncertainty prior to the privatization can be assumed to exist. The privatization of an SOE usually implies a major shift in the firm's objectives, and such a turnaround could hardly be assumed to be processed without uncertainty with respect to the future results of the firm. Further, the nature of the firm's objectives if the government retains partial ownership are also not so clear.[87] Investors could doubt that the government does not intend to intervene in the firm's operation in order to promote socio-political objectives. Such a doubt also results in uncertainty. Therefore, investors who, following the acquisition of shares, are in an undiversified position, require compensation. Underpricing is assumed to serve this purpose.

In any event, the underpricing of SIPs is a puzzling phenomenon because as is the case for regular IPOs, the government certainly wishes to maximize the proceeds from the issue. Underpricing is a contradiction to this objective, and a formal argument to explain the underpricing of SIPs has not been provided in the literature. The approach chosen here to explain the underpricing of SIPs is basically inspired by Welch and Rock's model.

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[87] Prosser [1988] describe a number of ways by which the French and British governments can and have intervened in privatized firms' businesses for which they retain a fraction of ownership or a special share, as predicted by Boardman and Vining [1991].

Such explanations of underpricing lead to predictions with respect to the underpricing of SIPs. We predict that, as is found in other studies of government share issues, that SIPs are on average underpriced and that underpricing is positively related to the ex ante uncertainty. As risk increases, investors are likely to require greater compensation to acquire shares. As such, we expect a negative correlation between firm size and underpricing because risk can be assumed to decrease with firm size. We also expect a positive relation between underpricing and other measures of ex ante uncertainty.

It is the combination of all these arguments which lead to the formulation of hypotheses 5.1 and 5.2 :

Hypothesis 5.1

Share Issue Privatizations are on average underpriced.

Hypothesis 5.2

Underpricing of Share Issue Privatizations is an increasing function of the ex ante uncertainty associated with SIPs. As such, underpricing is expected to be positively related to the standard deviation of the stock price during the period of time immediately following the issue and negatively related to the size of the firm of which the shares of ownership are issued.

Even though previous studies have documented underpricing of governments' share issues, it has mainly been done in isolated countries and/or by considering any government

share issues, and thus not considering only those SIP's that are initial public offerings. Hypothesis 5.1 predicts worldwide underpricing of SIPs which qualify as initial share offers.

Hypothesis 5.2 is based on arguments made earlier: the greater the ex ante uncertainty, the greater is expected to be the variance (or standard error) of the stock's price in the period immediately following the issue. That is because riskier stocks have greater price variance. Further, the greater the ex ante uncertainty, the greater is expected to be the compensation required by undiversified investors in order to ensure their participation. Given underpricing is assumed to serve as compensation paid to investor for the risk associated with the issue, a positive relation between ex ante uncertainty and underpricing is hypothesized.

The two variables which are used to proxy for ex ante uncertainty are size and the post issue standard deviation in the stock price. Risk is assumed to decrease with the size of the issue. Even though not very well explained, the assumed decreasing relation between risk and size is fairly common in the literature. In our situation, it can be argued that there is less information available with respect to the future prospects of smaller firms, such that ex ante uncertainty is greater for these firms.[88] Based on a result found by Ritter [1985], Beatty and Ritter also assume that smaller offerings are riskier share issues than larger offerings. Notice that earlier studies often use the net proceeds to measure the size of the issue. In the case of SIPs, we assume that the amount of proceeds can be limited for reasons which are not related to size or risk. As we mentioned earlier, governments may be forced by law, or the local

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[88] Ball and Kothari [1991, p. 721] express a similar argument when they say that earnings announcements are more informative for smaller firms. Presumably, that is because there is less information readily available relative to the future prospects of smaller firms, such that earnings announcement include new information.

market's capacity, to limit the size of the offering. Therefore, we used the firm's market value expressed in US dollars as a measure of size, which is in turn assumed to proxy for risk.

The standard deviation in the stock price is not a perfect measure of ex ante uncertainty either. The main problem with this measure of standard deviation is that it is an ex post measure. Ideally, one would prefer to measure the standard deviation in firm value prior to the issue to proxy for ex ante uncertainty. Unfortunately, firm value data prior to the initial issue is unavailable. Using the post issue standard deviation in the stock price implicitly assumes that uncertainty with respect to the privatized firm's future prospect is not resolved in the 20 day period following the share issue. The validity of our measure of standard deviation as a proxy for ex ante uncertainty relies on the plausibility of this assumption.

To conclude the study of the short term stock price performance of SIPs, Hypotheses 5.1 and 5.2 are empirically tested. The results of these tests are shown in section 7.3 of Chapter VII. In the next chapter, we focus on the expected long term stock performance of privatized SOEs.

Chapter VI   The Long Run Stock Performance of Share Issue Privatizations

The underperformance of IPOs' stock in the long run is another phenomenon that has been discussed in the literature.[89]   In this Chapter, the performance of a stock is defined as being the return earned by investing in a given stock, calculated using the price at which the stock is acquired as the investment base.   Previous IPO studies have compared the average returns earned on a portfolio comprised of IPO firms to the average returns earned on several versions of diversified portfolios.   The result of the comparison confirms that in the long run, the diversified non-IPO portfolios substantially outperform the IPO portfolio.   The purpose of this chapter is to investigate whether this result still applies if the IPO portfolio includes only SIPs, and the diversified non-IPO portfolio includes only firms that are comparable to the firms in the SIPs' portfolio.

At the outset, it could be expected that privatized firms would offer a steady return similar to returns earned on investing in what typically are labeled "blue chips".   After all, SOEs are for the most part large and well established firms that often were owned by governments because their stability was seen as essential to social welfare.[90]   Assuming that these firms will remain stable and earn steady return after privatization does not seem unreasonable.

On the other hand, there exist factors associated with privatization which can create uncertainty with respect to the future prospects of these firms.   Privatization implies a change

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[89] The most important references in this area are Ritter [1991] and Loughran and Ritter [1995]

[90] Beesley and Littlechild [1994] consider the dangers of privatization to social welfare.   According to them, privatization programs should be set so that privatizations which have the least adverse effect on allocative efficiency are accomplished first.

in the objectives pursued and as such, also implies a change in managerial philosophy. As we know, uncertainty implies risk, and investors must be compensated for the risks that they take. Therefore, even though it might seem reasonable to assume that investing in privatized SOEs would earn steady returns similar to those earned by investing in market portfolios, there exists uncertainty associated with privatization that must be taken into consideration. Greater uncertainty makes investment more risky, and since investors must be compensated for risk, returns earned on a portfolio of privatized SOEs are likely to be greater than returns earned on the market portfolio.

There also exists the possibility that the risk associated with the newly privatized firm's future prospects is incorrectly assessed. In this case, the risk premium required by investors to acquire the shares of the privatized firm is likely to be reassessed in the long run. This reassessment could also result in abnormal long run performance.

The results of previous research tend to indicate that in the IPO market, investors are either overoptimistic with respect to the IPO's future prospects or that they underevaluate the systematic risk associated with these future prospects. If overoptimism results in systematic mispricing, then the underperformance of IPOs is due to a market inefficiency. Risk mismeasurement can also affect the long run performance because as the risk premium implicit in the stock price increases, the stock price goes down. As a result, IPOs tend to underperform the market and their peers with respect to stock price performance.

In this chapter, we first review the literature on long run stock price performance of IPOs. We then assess the likelihood that the results of earlier research apply to privatized

SOE while taking into consideration the particularities of SIPs. We conclude by formulating

a hypothesis with respect to the long run stock price performance of SIPs.

6.1 Review of the literature on the Long Term Stock Performance of Initial Public Offerings

The long run stock underperformance of initial public offerings has recently attracted

the attention of the academic community. The most extensive study of the long run stock

performance of IPOs is found in Ritter [1991].[91] In his study, the long run comparative

performance of a group of IPOs is established by comparing the three year performance of a

portfolio formed exclusively of new issues to portfolios made of market indices and matched

firms. Evidence shows that the latter portfolios systematically outperform the IPO portfolio.[92]

Ritter argues that this phenomenon is important since it may not only impact on trading

strategies of investors, but also because it is evidence of bad informational efficiency of the

initial public offering market. Long run underperformance can indicate that investors are

mislead by the information released at the time of the offering. The ensuing revision of

expectations could be the main cause of the lower performance that is documented in the long

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[91] More recently , Loughran and Ritter [1995] extended the research on long run performance of new issues by extending the period covered to 5 years and by including seasoned issues in the study. The results are not different from those documented in the 1991 research, and underperformance seems to subsist after 3 years.
[92] Notice that to compute the performance of his portfolio including only IPO's, Ritter started to compute the cumulative returns after the first few days of trading. The first few days are eliminated so as to exclude the effect of underpricing, which is seen as a different phenomenon by the author. Therefore, all of the results which we discuss in this Chapter with respect to long run stock performance of portfolios formed of IPO's and/or SIP's always exclude returns on the first few days of trading, which are associated to the underpricing phenomenon.

run. In Ritter's paper, this phenomenon is later referred to as "overoptimism" on the part of the individuals investing in the IPO market.

Ritter [1991] examined the stock performance of a portfolio comprised of IPOs over a three year period. After concluding that IPO stocks in general are outperformed by the market as well as by a portfolio constructed by matching each IPO included in the original portfolio to a similar firm which has not been the subject of a recent IPO, he argues that systematic risk mismeasurement, bad luck or the "overoptimism" phenomenon described above could explain long run underperformance of initial public offerings.

To discriminate among these three potential explanations, Ritter analyzed the long run performance of different partitions of his original sample. To assess the likelihood of systematic risk mismeasurement, Ritter analyzed the long run performance of IPOs categorized by size, industry and the firm's age. To verify the overoptimism assumption, he analyzed the long run performance of firms which were issued in periods when initial return (underpricing) is larger. In the IPO market, there exist periods during which the volume of IPOs is higher and initial returns are strongly positive on average. In these periods, the market is said to be hot, and investors are assumed to be particularly overoptimistic about the future prospects of firms which issue shares during hot periods.

Ritter found that smaller firms tend to have the worst aftermarket performance. There also appears to be substantial industry differences among his sample. Financial institutions have the best aftermarket performance. On the other hand, firms belonging to the Oil and Gas industry perform the worst. Eleven out of the fourteen industries with respect to which Ritter created sub-samples underperform the portfolios to which they are compared. Finally, he

documents a strong monotone relation between the age of the firm and long run performance. He concludes that the longer the firm's operating history is prior to the issue, the better is the long run stock performance.

These results lead Ritter to associate the long run performance with systematic risk. The size of the issue, firms' age and industry are factors according to which systematic risk is assumed to vary. For example, Ritter assumes that the size of the issue is negatively associated with the firm's systematic risk. The presence of consistent patterns among the different partitions of the sample lead Ritter to conclude that long run underperformance could be associated with a factor like risk, and is not random.

With respect to the overoptimism hypothesis, Ritter found that firms with higher initial returns also tend to do worse in the long run. Since hot periods are associated with periods during which investors are said to be overoptimistic, Ritter associates long run underperformance to overoptimism on the part of investors. He argues that entrepreneurs can take advantage of hot periods which could last up to two years. They can do so by issuing shares during hot periods, thereby benefiting from higher issue prices. In this situation, long run underperformance is explained by overoptimism on the part of investors, which is a type of market inefficiency.

These results lead Ritter to conclude that among the three alternative explanations of the long run performance of IPOs, he could only reject the one that associates underperformance with bad luck. In the author's opinion, the consistency of underperformance among each sample's partition demonstrates that in general, investors can under-evaluate systematic risk or

that they can be overoptimistic with respect to the future prospects of IPOs. One or the combination of both phenomena explains the long run underperformance of IPOs.

Following Ritter's results, which document long run underperformance, other studies of IPOs try to find alternative explanations for the phenomenon. For example, some authors hypothesize a relationship between earnings management occurring during the issuing process and the long run performance of IPOs. This argument takes advantage of the fact that during the issuing process, issuing firms publish a prospectus in which they reveal, using accounting data, historic performance sometimes accompanied by predictions with respect to future performance. The hypothesized relationship between earnings management and long run performance is based on the assumption that entrepreneurs can use the discretion available within Generally Accepted Accounting Principles (GAAP) to manipulate the accounting of accruals. The accounting of accruals could then be manipulated to present the best profitability picture possible. Notice that if investors are mislead my manipulated accounting figures, then underperformance is again attributable to a type of market inefficiency.

In other words, entrepreneurs can attempt to manipulate earnings through the "flexible" accounting of accruals prior to the offering. If markets are not efficient, this practice could result in investors being mislead. If they are mislead, investors could form overoptimistic expectations at the time of the offering. Reversing later these expectations based on inaccurate information could result in long run underperformance.

In a study which investigates whether managers manipulate the earnings disclosed in the prospectus through the use of accounting accruals, Aharony *et al.* [1993] found only weak support for their hypothesis. Teoh *et al.* [1993] document a positive relation between the

importance of the discretionary accruals which have a positive impact on earnings and subsequent performance. This result provides some support for the hypothesis that entrepreneurs may attempt to manipulate the earnings disclosed in the prospectus in order to mislead investors. The study also establishes that accruals may be manipulated after the IPO date in order to maintain earnings at a certain level. Post-IPO manipulation could be related to a desire on the part of the entrepreneur to maintain trading prices for a certain period after the issue in order to mitigate the probability of law suits.

In a study of non-US IPOs, Uhlir [1988] documents consistent negative financial performance of IPOs for a sample of German IPOs. Unlike Ritter, Uhlir does not provide any comparison between a portfolio formed of IPOs and a matched portfolio comprised of more established German firms.

Levis [1993] performed an analysis similar to Ritter but which covered IPOs that occurred in the United Kingdom between 1980 and 1988. He demonstrates that, in general, Ritter's [1991] results also apply in the United Kingdom. He attributes the long run underperformance of British IPOs to some form of market overoptimism which results in mispricing. In a study of smaller samples, Aggarwal, Leal and Hernandez [1993] also document long run underperformance in various countries across Latin America.

Even though the literature on the long run performance of IPOs is somewhat more scarce than the literature on underpricing, the conclusions drawn from the studies are consistent. From the pioneering work of Ritter, we learn that investors may have the tendency to be overoptimistic with respect to the future prospects of IPOs. Overoptimism could be the cause of the long run underperformance when a correction with respect to the assumed future

prospects of an IPO cause a reversal of expectations. In fact, overoptimism is assumed to cause overpricing and when this overpricing is corrected, underperformance ensues.

Further, the fact that the underperformance appears to be more severe for smaller firms as well as firms which issued shares are during "hot" periods leads to the conclusion that investors may have difficulty estimating the undiversifiable risk associated with newly issued shares. If investors underestimate the risk associated with the stock, they require a lower risk premium and are thus willing to buy the stock at a higher price. If they later realize that the risk associated with the firm's stock is actually greater than they thought, they will require a greater risk premium, and a decline in price will follow.

On the other hand, even though a SIP can be seen as a special case of an IPO, some characteristics of the firms included in Ritter's sample do not apply to a sample restricted to privatized SOEs. For example, Ritter's sample of IPOs includes a large variety of firms of different sizes. The firms included in his sample also are involved in a wide variety of industries. His conclusions are therefore not directly applicable to a sample of SIPs, which does not have the same characteristics.

6.2   Distinctions Between SIPs and IPOs.

The main purpose of this section is to identify the distinctions that exist between a sample of IPOs and a sample of SIPs and to determine whether these distinctions could affect the long run stock performance of the SIP sample. The analysis of these distinctions could allow us to ascertain whether Ritter's conclusion with respect to the long run performance of IPOs is also expected to apply to a sample of SIPs.

6.2.1 Differences in the Sample Composition

In this section, we focus on the differences that exist among the composition of both types of samples. These differences can have the most significant impact on the predictions made with respect to the long run performance. Recall that Ritter concluded that "...underperformance is concentrated among relatively young growth companies...", a category into which only a few SOEs fall.

SOEs are usually large firms operating in mature industries. In fact, SIPs often constitute the largest ever share issue in the stock markets through which the privatizations are processed. This is the case for the share issue of British Telecom in the UK, or more recently, for the share issue of the Canadian railway company Canadian National. Both of these issues have been recognized as the largest IPOs ever occurring in their respective countries.[93] SIPs are therefore most often much larger than young IPOs and, as such, are not expected to exploit growth opportunities as much as IPOs. Further, the industries in which they are involved are typically not growing at the same rate as the industries in which IPOs are involved. For example, the growth of IPOs is most often related to important effort invested in research and development. Industries in which SIPs operate tend to rely less on research and development to ensure growth.[94]

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[93] Privatization deals are often so big that skeptics argue that there might not be enough money in capital markets to absorb the issues. Examples of large share issues are British Telecom (November 1984, 6.4 billions US$) and Nippon Telegraph and Telephone (August 1988, 22.8 billion US$), which were both recognized to be the largest issues ever in their respective countries. The planned privatization of Deutsche Telekom would raise 43 billion US$ and would also be the largest issue ever in Germany. Source: The Wall Street Journal, October 2nd, 1995, Supplement on Privatization.

[94] One good example of a fast growing IPO which occurred relatively recently is Netscape, which exploits the rapidly growing industry of software related to the Internet. For more on this share issue, see Albeson in Barron's, August 14, 1995 (Issue 33), pp.3-4.

Ritter's panel of the most underperforming firms in his sample is characterized by the relatively young age of the firms included. Most underperforming IPOs typically have a shorter operating history than the privatized SOEs. For instance, some of the firms included in Megginson et al.'s sample of SIPs are firms which were nationalized in the sixties or even in previous eras [95] while Ritter's IPOs often have an history of around 5 years. This can be seen as a further distinction between the composition of Ritter's sample and a sample comprised of privatized SOEs.

The set of industries in which privatized SOEs are involved is not as diverse as the set of industries in which IPOs are involved. Prior to the privatization movement of the eighties, most governments typically owned firms that were of national importance or which required too large an initial investment for the private sector to support.[96] Firms perceived as being of national importance are most often firms exploiting the countries' natural resources, as in the oil and gas industry, or firms providing essential services, like water or electric utilities. Firms too large to be supported by the private sector alone include firms operating in the transportation and the telecommunication industries, which require large initial investments. On the other hand, a sample of IPOs is most often formed of firms involved in industries for which the growth opportunities are related to activities such as research and development, and which do not require especially large initial investments.

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[95] For example, in Canada, two of the most recent privatizations, i.e. Air Canada (1988) and Canadian National (CN, 1995), involved firms which have been in operation since 1937 and 1922, respectively. (Source: Prospectuses supporting both issues.)

[96] To that effect, some of the arguments of those who are opposed to privatization are inspired by the fact that privatization often results in the selling of the "crown jewels", i.e. firms which achieved socio-political objectives that are perceived as essential. Part of the debate around privatizing the mail services in the United States is related to the impact privatization might have on such an essential service. See Michael Allen, page R27, The Wall Street Journal, October 2nd 1995, supplement on privatization.

Hence, there are important differences between a sample of SIPs and a sample of IPOs. In general, a sample of SIPs is comprised of well established firms operating in industries which are usually growing at a rate which is lower than the industries in which IPOs are typically involved. SIPs are usually much larger in size. All things considered, besides the uncertainty related to the shift in management philosophy that is imposed through privatization, SIPs represent less risky investments than the typical IPO firms, which are younger, smaller and looking for external capital to finance growth.

On the other hand, there also exist similarities between the two sets of firms. From the previous literature summarized in section 5.4, it appears as though SIPs also are on average underpriced at the time of the issue. This similarity can be important because Ritter relates underpricing to long run performance. He argues that IPOs that are more underpriced also are issued during hot issue periods, and he assumes that during these periods, investors are most likely to be overoptimistic and to mismeasure risk. If the markets in which SIPs are privatized can also become "hot" during certain periods, then SIPs could also be subject to mispricing due to overoptimism if the shares of privatized SOEs are offered during hot periods.

The question that remains to be answered is whether it is the fact that the issue occurs during a hot issue period or the fact that the firm is more or less underpriced that has an influence on long run performance. Ritter argues that overoptimism seems to prevail during hot issue periods, thus attributing long run underperformance more to the timing than to underpricing.

6.2.2 Differences in the Objectives of the Issuer

In section 5.2, the distinctions between a sample of SIPs and of IPOs are discussed in order to investigate the extent to which SIPs are underpriced. To that effect, part of the reasoning that is presented in Chapter V also applies to this section. For example, the fact that a private entrepreneur and a government pursue different objectives through the share issue could certainly have an impact on their future performance.

To illustrate, recall that one reason governments privatize SOEs is to increase the efficiency of their operations. Among other factors, we argued that making compensation contingent on the stock price could permit inducement of more congruent actions and reduce the risk imposed in inducing a given action. Reduced risk results in reduced expected compensation and increased efficiency of the firm's operations.

Shifting the priorities of an SOE from pursuing socio-political objectives to profit maximization is however not inconsistent with long run underperformance. Stock price underperformance and SOEs increased profitability can occur concurrently. For both phenomena to take place simultaneously, investors would have to expect large efficiency gains which are not fully realized in the three years following the issue. Facing this situation, investors would reverse their expectations because even though the actual increase in efficiency could be real, it could be not as large as investors expected. A reversal of expectations would cause a decrease in price ultimately resulting in lower stock performance. That is, investors would have to be overoptimistic with respect to the privatized SOE's future prospects and correct this overoptimism by reversing expectations, thus causing stock price underperformance. Hence, the fact that privatization is usually processed to motivate an

increase in the efficiency of the operations is not inconsistent with long run underperformance if these special conditions are met.

Another objective that has been mentioned by some governments as being related to SIPs is to encourage share ownership among the general public. Long run stock underperformance of a sample of SIPs could be inconsistent with this objective. One aspect of systematic long run stock underperformance of any set of assets is that investors who are encouraged to acquire such assets are consistently earning negative abnormal returns. If the same long run performance that is documented by Ritter on a sample of IPOs also applies to a sample of SIPs, then some governments are encouraging the general public to acquire assets that in fact are lousy investments. In order to motivate the interest of the general public with respect to capital markets, it would be better to encourage citizens to invest in assets other than SIPs.[97]

In that sense, long run underperformance of SIPs could have adverse effects on the objective of increasing the spread of share ownership. First time investors who jump in the stock market by investing in SIPs could feel cheated in the long run because of underperformance, and this could result in citizens foregoing any future opportunities to invest in stock markets. Further, the long run underperformance of early privatizations could discourage more risk averse investors who chose to wait and see the returns earned on early privatizations in order to make the decision to invest in subsequent SIPs. In this case, the poor performance of early privatizations could damage the success of future SIPs. Hence, if

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[97] Notice that when he talks about underperformance, Ritter excludes the large returns earned in the first few days due to underpricing. Underpricing must be considered to correctly assess the returns earned by the investors who chose to invest in SIPs at the date of issue.

governments have an objective of increasing the spread of share ownership among the general public, it certainly would act so as to minimize the long run underperformance of SIPs, because such poor results could have an adverse effect on the degree of achievement of the objective as well as on the success of future SIPs.

6.3   The Consequences of the Distinctions Between SIPs and IPOs

Before concluding this chapter, the differences that exist between the SIP and the IPO market must be analyzed. These differences are substantial enough to justify a re-evaluation of Ritter's arguments with respect to the long run performance. Ritter's arguments are based on particularities of the IPO market which do not necessarily apply when the sample is restricted to include only SIPs. In this section, empirical implications based on the analysis of these distinctions are summarized.

The main conclusions that can be drawn from the above analysis is that the distinctions that exist between a set of firms for which the shares are issued through a SIP and a set of IPOs are important. These differences are in terms of sample composition and in terms of the objectives of the issuer. In this section, the impact of the differences on the long run performance of both samples are analyzed.

In terms of sample composition, Ritter characterizes his sample of initial public offerings on four basic dimensions. These dimensions are the size, the age, the timing of the issue and the stability of the industry in which IPOs are involved. By analyzing the characteristics of the set of privatized SOEs which are studied in the literature, we find that SIPs are at the other end of the spectrum for three of the dimensions which characterize

Ritter's most underperforming sub-sample. Since privatized SOEs are larger firms involved in more mature industries and have been in operation for a longer time than the average IPO, the future prospects of privatized SOEs may be easier to assess. One implication of this difference in sampling is that mispricing and/or incorrect risk assessment is less likely for SIPs, such that long run underperformance is expected to be less severe for this type of stock.

The fact that the objectives underlying a share issue by the government are different than the objectives of entrepreneurs must also be mentioned. It has been argued in the literature that some governments choose to privatize because they want to encourage share ownership among the population. If SIPs underperform in the long run, the general public is most likely to feel cheated by the privatization process. In this situation, the probability of success of future SIPs could be adversely affected by long run underperformance. Therefore, governments wishing to ensure the success of future SIPs may attempt to act strategically when they set their privatization program.

The following is intended to provide an illustration of this strategic behavior. Suppose that there is an information asymmetry between the government and investors with respect to the firm's post-privatization ability to generate cashflows. For example, this asymmetry can be due to a better knowledge of the impact that the pursuit of socio-political objectives has on the profitability of the SOE prior to privatization. Superior information with respect to this impact provides the government, as an owner, with superior information with respect to future profitability when the pursuit of these objectives is dropped.

If such an asymmetry exists, then governments may be tempted to act strategically by privatizing first firms with the greatest potential of profitability improvements under private

hands. This potential is likely to be a function of the impact of dropping the pursuit of socio-political goals, because as is mentioned in Chapter III, the pursuit of these goals is likely to be dropped under private management. If government can more or less precisely assess the impact that dropping these objectives can have on profitability, then it is in a position to select firms that have the greatest potential for profitability improvement.

Of course, this argument only makes sense if we assume that investors have an average expectation across all firms with respect to the impact of privatization on profitability. To that effect, it is important to mention that privatization of SOEs through public offering is a relatively new phenomenon which became important in the mid-eighties.[98] The impact of privatization on the firms' efficiency and/or profitability have been assessed with reasonable precision only in recent research, which emerged at the beginning of the nineties. Prior to this, investors were inexperienced with respect to the impact of privatization and the results of research attempting to assess this impact were not available. It can therefore be reasonably assumed that government could have had better knowledge with respect to the future profitability of privatized SOEs than investors for the case of earlier privatizations. In this case, investors are most likely to make an attempt at assessing the general impact of privatization for any firm and learn about the true effect on profitability across industries by experience.

If the plausibility of these assumptions is admitted, then a situation in which the government could act strategically by using its superior information with respect to the firm's future prospects can exist. The strategy would then consist in privatizing first SOEs for

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[98] Figure 2 provides an illustration of the yearly number of privatizations included in the sample studied in Chapter VII. These privatizations occurred between 1980 and 1994.

which the positive impact of privatization on profitability is above average. It could be argued that by following this kind of strategy, governments reduce the probability of long run underperformance for privatized SOEs. Given this strategy and if the assumption with respect to investors' average expectations is reasonable, investors would revise upwards their expectations with respect to the future prospects of firms privatized early because they would not expect that dropping socio-political objectives could have such a great impact on profitability. Once they realize the importance of the true impact of privatization on profitability, investors revise upwards their expectations, thus causing above average long run performance for "early" SIPs. Governments pursuing a share ownership objective are in a better position to do so when SIPs overperform in the long run, and this is why they might attempt to adopt the above described strategy.

6.4   Empirical Implications

The differences that exist between a set of IPOs and a set of SIPs must be taken into account in order to come up with theoretically based empirical predictions with respect to long run performance. In the absence of differences, one would be lead to predict long run underperformance of SIPs based on Ritter's results. But differences between the two sets of IPOs are substantial and are most likely to have an impact on the long run stock performance of SIPs.

Ritter's argument to explain the long run performance of IPOs is that investors are typically overoptimistic with respect to the future prospects of the firms which underperform the most. Further, they seem to incorrectly assess the risk associated with IPOs. On the other

hand, the composition of a sample of SIPs is most likely to correspond to Ritter's sub-sample which had the least underperformed. Given the differences in the nature of SIPs, incorrect evaluations of the kind going on in IPO markets are less likely for privatized SOEs. The differences with respect to sample composition suggest we can expect better long run stock performance for privatized SOEs than for IPOs.

In terms of differences in the objectives of entrepreneurs and governments, governments, if given the chance, are most likely to follow strategies that reduce the probability of underperformance to a minimum, particularly in early SIPs. Further, under the strategy described in the previous section, long run overperformance of SIPs is not out of the question. This depends on the investors' expectations with respect to privatized SOE's future prospects. If the operating performance of the privatized SOE is such that investors revise upwards their expectations, then the stock issued through a SIP will overperform. Unfortunately, information with respect to the investors' expectation is usually not observed.

In this Chapter, we reviewed the relevant literature which focused on aftermarket performance to come up with a testable hypothesis about the aftermarket performance of SIPs. The previous literature on aftermarket performance has been exclusively focused on IPOs. Because of important differences in terms of sample composition, the discussion leads us to hypothesize that stock price underperformance is not as large for SIPs as for regular IPOs. We formulate Hypothesis 6.1 based on this discussion:

Hypothesis 6.1:

The cumulative stock price return calculated on a portfolio exclusively including shares that were issued through SIPs is not expected to be significantly different from the return earned by the market portfolio or by a portfolio comprised of non-SIP firms that operate in the same industry as the firms included in the SIP portfolio (i.e. a set of matching firms).

Given the above arguments, the alternative hypothesis to 6.1 is that the abnormal returns on a portfolio including only SIPs are hypothesized to be different from zero. Results with respect to statistical testing of Hypothesis 6.1 are discussed in Chapter VII (Section 7.4).

Chapter VII Empirical Methodology and Results

The main purpose of this chapter is to formulate empirically testable hypotheses based on the theory developed in Chapters IV to VI. The hypotheses are then tested on a sample of share issue privatizations. In this chapter, the sample of share issue privatizations is first described. The following sections are devoted to testing the hypotheses concerning retained ownership, underpricing and long run stock performance. For each of these tests, the statistical methodology is described. The results of the tests, which are displayed in summarizing tables, are then discussed.

7.1   Sample Description and Data Sources

The sample used in this thesis is comprised of firms which used to be state-owned and for which shares of ownership have been issued in capital markets. The study covers privatizations which occurred between 1980 and 1995. Very few firms had been privatized through share issues prior to 1980, and the data for these firms are not available. The main source used for sampling purposes is the Jones *et al.* [1994] privatization sample. Their paper provides an extensive list of government share issues which occurred since approximately 1960. Among the government share issues included in their sample, 124 issues qualify as initial public offerings[99] and are used to form our base sample. To determine the completeness of Jones *et al.*'s sample, several issues of business oriented reviews like The Economist, Euromoney and Business Week as well as a the yearly index of the Wall

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[99] To qualify as an Initial Public Offering, shares of the firm's stock cannot have been traded on the market prior to privatization.

Street Journal have been examined. Five more SIPs have been identified in this process.[100]

After having been through this process, we are confident that we have identified most SIPs

which have been covered by the North American business press.

Thirty firms from Jones *et al.*'s sample of government IPOs have to be dropped

because of missing data.[101] The 94 remaining firms are added to the 5 firms identified from

other sources to form our sample of 99 SIPs. Table A.1 lists all firms included in the sample,

along with their country of origin, the industry in which they are mainly involved and the

date at which they were privatized. Statistics for key variables related to retained ownership,

underpricing and long run performance are also provided Table A.1.[102]

To test the hypotheses, data with respect to firms' stock price, accounting data and

some characteristics of the share issues are required. Data with respect to issue

characteristics, like the fraction of ownership retained, the fraction of the issue allocated to

foreign investors and whether the issue included a golden share, have been primarily

collected from prospectuses.[103] When the prospectus is unavailable, the information provided

in Jones *et al.*'s Table 1 is used. Data pertaining to accounting numbers, such as the book

value of equity, is collected from *Datastream International*, a database of equities from

around the world. The database *Disclosure* and the prospectuses are used in some cases to

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[100] These share issues are the French issues TF1 (Business Week, February 16, 1987) and Matra (The Banker, April 1988), Italy's Credito Fondiario (Euromoney, December 1987), the Malaysian International Shipping corp. (Asian Business, August 1990) and Korea Electric Power (Asian Business, August 1990).

[101] These firms are not included in Datastream. Therefore, any data related to stock prices could not be obtained for these firms.

[102] Due to its large size, Table A.1 is shown in Appendix B.

[103] A mail request for prospectuses was sent to most firms included in the sample. Prospectuses for 47 share issues were obtained directly from the companies privatized. The remaining companies either did not respond or had no prospectuses available.

complete the data provided by Datastream.[104] Stock price data is obtained from Datastream International. If offering price data is unavailable from Datastream, price data is obtained from newspapers such as *The Financial Times*, *The London Times* and *The Globe and Mail*.

The market value of each firm's equity is also obtained from Datastream. A firm's market value of equity (firm value) is obtained by multiplying the firm's stock price at the close of the first day of trading by the number of common shares outstanding following the privatization. Datastream also provides the market capitalization of each stock exchange covered by the database. Firm Relative Value (FRV) is calculated by dividing each firm's market value of equity by market capitalization of the exchange in which the stock is traded. This variable is used to evaluate the importance of each privatized firm, relative to the stock market through which the shares are issued.

FRV is also helpful in evaluating a firms' relative size across the sample. For example, when size is measured in absolute terms, Telecom New Zealand is smaller than British Telecom (about one third of the size). But relative to their stock capitalization, Telecom New Zealand is four times the size of British Telecom, while both are in the largest quartile of the sample. In circumstances where size is interpreted relative to the local economy, FRV can provide a more accurate measure of firm size.

The sample described in Table A.1, the sample is split into three categories. Category I refers to the firms for which a complete set of data is available. Seventy-two out of the ninety-nine firms included in the sample belong to this category. The second category is comprised of firms for which the offering price as well as the stock price on the first few days

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[104] Datastream International does not provide accounting data for every firm that the database covers. The book value of equity for these firms is then collected from Disclosure or the prospectus.

of trading is not available. This can happen when the privatization occurred before the phenomenon attracted the interest of the media, such that the offering price could not be obtained from available sources. It can also happen in cases where shares have been issued through a mix of a share issue and a private sale.[105] Category III includes firms where the stock price data is missing for a period of a month or more, immediately following the issue. This occurs for countries that were not covered by Datastream at the time of the issue. All firms, irrespective of their category, are used to test the retained ownership hypotheses (Chapter IV) and the long run stock price performance hypothesis (Chapter VI). Only firms belonging to the first category are used to test underpricing hypotheses (Chapter V).

The remainder of the Chapter is organized as follows. In section 7.2, we test hypotheses 4.1 to 4.3, which are related to retained ownership. In section 7.3, we test hypotheses 5.1 and 5.2, which are related to underpricing. In section 7.4, we test hypothesis 6.1, which is related to the long run stock price performance of privatized SOE's.

We test hypotheses for the whole sample and for four mutually exclusive sub-samples. The first sub-sample, comprised of firms from continental Europe, is dominated by French, German, Italian and Spanish privatizations. These countries show some degree of homogeneity in terms of market size and industry to which privatized firms belong.[106] British privatizations form the second sub-sample. The United Kingdom is the country which has privatized the most firms through SIPs (35). The size of this sub-sample allows reasonably powerful statistical analysis of a single country. Countries from Asian emerging

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[105] Such is the case for TF1, Telecom New Zealand and both Argentinean firms operating in the telecommunication industry. See Petrecolla, Porto and Gerchunoff [1993, p.89] for a description of the Argentinean experience.

[106] For example, most of the banks privatized in our sample originate from continental Europe.

markets (Malaysia, Singapore, Thailand, Taiwan, China and South Korea) form the third sub-sample. These markets are assumed to be smaller and more volatile. All the other countries (mainly Australia, New Zealand, Japan, Canada and South American countries) form the last sub-sample (labeled Other).

In section 7.5, we conclude the statistical analysis by exploring different avenues to further explain the results obtained in sections 7.2 to 7.4. We create different sub-samples using firm size, industry, early versus late privatization and the likelihood of government intervention in the operations of the privatized firm as sampling criteria. Predictions about the impact of these criteria on the dependent variables studied in sections 7.2 to 7.4 are tested.

7.2   Share Issue Privatization and Retained Ownership

The purpose of this section is to summarize the results obtained from testing Hypotheses 4.1 through 4.3. Recall that Hypothesis 4.1 is related to the Leland and Pyle's model and assumes that retained ownership is a signal of favorable future prospects. Hypothesis 4.2 is based on the theory of mixed enterprises according to which investors are willing to pay less for a share of the firm because retained ownership on the part of the government signals a desire to pursue socio-political objectives which conflict with profit maximization. Hypothesis 4.3 relates retained ownership to limited market capacity.

7.2.1   Qualitative Analysis

In order to test these hypotheses, the fraction of ownership retained by governments, the fraction of issue allocated to foreigners, firm value relative to the local market capitalization and

the ratio of market-to-book ratio is used. Market-to-book ratios are computed by dividing a firm's market value of equity by its book value of equity. Retained ownership data is available for 91 of the 99 firms in the sample. Of the 91 firms included in this analysis, governments retained ownership in 50 firms. Prospectuses are available for 14 of the 50 firms in which the government retained some ownership.

A qualitative analysis of the firms in which governments did retain ownership reveals the following facts. In the 14 prospectuses analyzed, we found 6 occurrences of governments clearly stating their intention to sell the shares they retained in the IPO in a future issue. In countries like Canada, Singapore and the Netherlands, governments clearly stated their intention to proceed with a second offering as soon as market conditions would allow for such a move. Empirically, among the 50 occurrences in which a proportion of ownership is retained by governments, a second offering of shares took place for 11 of them. In each of these 11 cases, the second offering occurred within three years of the IPO. For 10 out of these 11 second offerings, government's original share of retained ownership was more than 50%.

Reasons given in the prospectuses for why ownership was retained vary, but the most frequently stated are market limitations, sometimes combined with a reluctance to allow foreign investors to take control of the privatized SOE's activities. In many countries, legislation prohibits full privatization. Some prospectuses make mention of such a limitation. For instance, such is the case for Scandinavian countries like Denmark and Finland. In these countries, governments cannot issue more than 49% of the SOE's shares, retaining at least 51% of the shares.

In prospectuses governing partially privatized SOEs', there is usually a special section labeled "Government's Relationship with the Firm". While this section does not always mention the intention to sell the retained shares in a future offering, it does typically state that the government wishes to act as an investor rather than an owner. Governments often mention in the prospectus their intention to forego the right to intervene in the privatized firm's operations.

This qualitative analysis of prospectuses supports the claim that the theory of mixed enterprises is less likely to apply to a partial privatization. Governments typically commit to forego any opportunity to intervene in the firm's current operations through the prospectus. Therefore, it can be assumed from such a commitment that governments do not intend to use the control over the firm's operations associated with their retained ownership to influence the firm's objectives. However, the question of whether the commitment is credible remains open.

Table 7.1 presents summary statistics on retained ownership in the sample. The average level of retained ownership in privatizations is comparable to samples of regular unseasoned issues which have been studied in the literature. In the privatization sample, retained ownership ranges from 0% to close to 95%, with a mean of 33% and a standard deviation of 33%. In their study of regular IPOs, Feltham, Hughes and Simunic [1991] report a mean fraction of ownership retained of 45% with a standard deviation of around 18%. In regular IPOs, occurrences of no retained ownership are uncommon.

The country where retained ownership is the lowest is the United Kingdom, at 5.62% on average. Emerging markets have the highest retained ownership at 76.5% on average. The F-ratio from a one-way analysis of variance is significant at the 1% level, indicating significant

Table 7.1
Summary Statistics on Retained Ownership.

	# of obs. (n)	Mean	Standard Deviation	Skewness	Minimum	Maximum
Full Sample	91	33.4%	33.2%	0.23	0.00%	94.7%
Split by Country						
Continental Europe	32	48.8%	27.2%	-0.81	0.00%	86.8%
United Kingdom	35	5.62%	15.9%	2.54[***]	0.00%	50.0%
Emerging Markets	10	76.5%	12.2%	0.55	63.0%	94.7%
Other	14	36.7%	31.5%	0.15	0.00%	87.5%
F-Ratio		33.84[***]				
Split by Industry						
Banking	15	40.6%	28.4%	-0.47	0.00%	75.1%
Electric & Water Utility	28	8.68%	22.0%	2.30[***]	0.00%	77.0%
Manufacturing	11	36.8%	36.8%	0.07	0.00%	86.8%
Oil & Gas	13	46.8%	35.7%	-0.42	0.00%	91.1%
Telecommunications	12	49.9%	28.3%	-0.24	0.00%	92.8%
Transportation	12	47.9%	31.6%	-0.63	0.00%	94.7%
F-Ratio		3.09[**]				

**   Significant at the 5% level.
***   Significant at the 1% level.

differences in retained ownership among the four country groups. The breakdown by industry shows that the Telecommunication, Transportation and Oil and Gas[107] companies have the highest proportion of ownership retained by governments. Telecommunication firms are among the largest firms. Most of the firms in the electric and water utility industry are British firms[108], which may explain why they are the least subject to retained ownership. An F-test again shows significant differences in mean retained ownership across the groups.

The distribution of retained ownership in the sample does not appear to be significantly skewed. The distribution of retained ownership in the United Kingdom is significantly skewed. The distribution of retained ownership for public utilities is also significantly skewed, but note that a large proportion of the firms in this group (24 out of 28) are from the United Kingdom.

7.2.2   Hypotheses Testing

The first set of statistical tests is aimed at establishing the nature of the relation between market-to-book ratios and the fraction of ownership retained by governments. Recall that Hypothesis 4.1, based on Leland and Pyle's model, predicts a positive relationship between the two variables while Hypothesis 4.2, based on the theory of mixed enterprises, predicts a negative relation. Hypothesis 4.3 predicts a positive relationship between firm relative value (FRV) and retained ownership. We argued that if the market's capacity is limited, then the

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[107] Notice that the Oil and Gas industry include all firms which operate in fields related to the extraction and transformation of mineral resources.

[108] For the purpose of analyzing retained ownership across industries, we chose a slightly different grouping than for the tests in section 7.5.2. We chose to group water and electric utility together. The United Kingdom is the only country which privatized water utilities. The method chosen to privatize these types of utilities in the UK, consisting of breaking down one large utility in smaller regional firms and retaining no ownership, was the same for both types of utilities.

higher is firm value, the greater the proportion of ownership the government must retain in order to assure a successful issue, other things being equal.

A variable which measures the fraction of the issue that foreign investors (Fraction Allocated to Foreigners, or FAF) are allowed[109] to acquire is also introduced. Hypothesis 4.3 predicts that the greater is the pressure on domestic capital markets, the lower is the proportion of ownership the government must retain. However, government will often preclude foreign participation if there is a desire among the local community to keep the ownership in a privatized SOE among local citizens. Privatization has often been opposed on the basis that letting ownership in the "crown's jewels" go to foreign investors is immoral.[110] However, Hypothesis 4.3 predicts that when these pressures are less, foreign ownership can be used to replace domestic ownership, resulting in less retained ownership. Hence, a negative relation between the fraction of ownership retained and the fraction of the issue allocated to foreign investors is expected. These predictions are summarized in Table 7.2.

The theory does not allow us to make predictions about the sign of the relation between market-to-book and variables other than retained ownership nor does it allow predictions about the sign of the relation between firm relative value and the fraction of the issue allocated to foreign investors. In this latter case, however, one might expect that the larger is the firm in absolute and/or in relative terms, the more a government wishing to privatize is willing to let foreign investors participate in the issue. If the assumption that privatizing governments prefer not to retain any share of ownership in privatized SOEs is correct, then governments facing

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[109] The share of the issue to which foreign investors are entitled is usually clearly mentioned in the prospectus. In cases where the prospectus is missing, fraction of issues allocated to foreigners were obtained from Jones et al.

[110] See Wall Street Journal October 2nd, 1995 supplement on Privatization, especially Peter Gumbel's article (p. R25).

Table 7.2
Predicted Signs of the Correlations

Signs of correlations between variables related to retained ownership under Hypotheses 4.1, 4.2 and 4.3

Variable Names	Fraction of ownership retained	Market-to-Book	Firm Relative Value (FRV)	Fraction of issue allocated to foreign investors (FAF)
Hypothesis 4.1: **Leland and Pyle** Fraction of ownership retained	1.00	+	N.A. (?)	N.A. (?)
Market-to-Book		1.00	N.A. (?)	N.A. (?)
FRV			1.00	N.A. (+)
FAF				1.00
Hypothesis 4.2: **Mixed Enterprises** Fraction of ownership retained	1.00	-	N.A. (?)	N.A. (?)
Market-to-Book		1.00	N.A. (?)	N.A. (?)
FRV			1.00	N.A. (+)
FAF				1.00
Hypothesis 4.3: **Market Size** Fraction of ownership retained	1.00	N.A. (?)	+	-
Market-to-Book		1.00	N.A. (?)	N.A. (?)
FRV			1.00	N.A. (+)
FAF				1.00

local capital markets with limited capacity would see foreign markets as a complement to the limited local market. If this is the case, then the larger the firm, the larger would be the proportion of the issue allocated to foreigners.

On the other hand, the fraction allocated to foreign investors can also depend on the intensity of the desire to keep ownership in the privatized SOE in the hands of the local community. Such an intensity may vary across firms, not depending on size but rather on which firms privatized are perceived as being one of these so called crown jewels. If this desire to keep ownership local is intense, then governments would limit the fraction of the issue which is allocated to foreign investors. Therefore, more than one factor affects the fraction of the issue which is allocated to foreign investors. Accordingly, the relation between FRV and FAF must be interpreted carefully.

To test whether the predictions in Table 7.2 are verified, correlation coefficients between the variables of interests are calculated. Table 7.3 summarizes the results of the correlation computed among these four variables. These results weakly favor Hypothesis 4.1 over 4.2. Market-to-book is significantly positively correlated with the fraction of ownership retained when the full sample is considered. The correlations between the ratio and retained ownership in sub-samples are insignificant. These results support Hypothesis 4.1 for the full sample, but the hypothesis is not supported in sub-samples.

The positive relation between FRV and retained ownership predicted by Hypothesis 4.3 is supported for the full sample and the UK sub-sample. Using a one-sided test, we reject the null of no relation for these two samples with 99% degree of confidence. On the other hand, the hypothesis of a negative relation between the fraction allocated to foreigners and retained

Table 7.3
Pearson Correlations Between Variables Related to Retained Ownership.
t-statistics are in parentheses.

Variable Names	Fraction of ownership retained	Market-to-Book	FRV	FAF
Full Sample (n=91)				
Fraction of ownership retained	1.00	0.2593** (2.32)	0.3598*** (3.42)	0.0721 (0.59)
Market-to-Book		1.00	0.5727*** (5.28)	0.1096 (0.86)
FRV			1.00	0.3439*** (2.86)
FAF				1.00
Cont. Europe (n= 32)				
Fraction of ownership retained	1.00	0.0680 (0.33)	0.2273 (1.27)	-0.0146 (-0.07)
Market-to-Book		1.00	-0.1128 (-0.58)	-0.1744 (-0.70)
FRV			1.00	0.5489*** (2.51)
FAF				1.00
United Kingdom (n=35)				
Fraction of ownership retained	1.00	-0.0937 (-0.55)	0.4817*** (2.86)	-0.1403 (-0.76)
Market-to-Book		1.00	0.1556 (0.91)	-0.3882** (-2.09)
FRV			1.00	-0.0578 (0.27)
FAF				1.00

Table 7.3 (continued)
Pearson Correlations Between Variables Related to Retained Ownership.
t-statistics are in parentheses.

Variable Names	Fraction of ownership retained	Market-to-Book	FRV	FAF
Emrg Markets (n=10)				
Fraction of ownership retained	1.00	0.4724 (1.42)	0.4788 (1.44)	-0.0664 (-0.15)
Market-to-Book		1.00	0.9471*** (2.99)	0.6036 (1.35)
FRV			1.00	-0.1065 (-0.26)
FAF				1.00
Other (n=14)				
Fraction of ownership retained	1.00	0.0968 (0.32)	0.0067 (0.03)	-0.3121 (-0.94)
Market-to-Book		1.00	-0.0696 (-0.24)	-0.1431 (-0.43)
FRV			1.00	0.3788 (1.20)
FAF				1.00

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

ownership is not verified, as every correlation coefficient is insignificant. Notice that the FAF is positively correlated to FRV for the full sample and the European sub-sample, which confirms our initial intuition that governments may be more willing to let foreigners acquire ownership in larger firms.

The significant positive relation between market-to-book and FRV, which prevails mainly in emerging markets, was not predicted. In these markets, investors appear to be willing to pay a larger premium over book value for larger firms. Also notice that in the UK, the results show a negative correlation between market-to-book and the fraction allocated to foreigners. This result may indicate that the foreign investors are not allowed to invest in the "crown jewels", for which the local investors are willing to pay a large premium over book value. Otherwise, it would be surprising to see that restricting the foreign investment (by limiting the number of applicants) is associated with an increase in value when the book value is used as a benchmark.

In terms of limitations, first note that FAF is not available for every observation.[111] Also recall that in Chapter IV, we argue that the premium associated with more or less retained ownership is hard to measure. The market-to-book ratio is only an approximation of this premium, and hence the results summarized in Table 7.3 must be interpreted with care. In fact, the significant correlations obtained but not predicted could be due to the fact that market-to-book does not accurately measure the premium associated with more or less retained ownership. Because we are uncertain about to the ratio's ability to measure the premium associated with more or less retained ownership, we will focus the remainder of the discussion

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[111] The number of observations is equal to 68 overall, and to 22, 30, 6 and 10 for the European, UK, Emerging markets and the Other samples respectively.

on the relation between retained ownership, FRV and FAF, which is summarized by Hypothesis 4.3.

To further characterize these relations, an ordinary least squares (OLS) regression aimed at explaining the variation in the fraction of ownership retained is analyzed. Unlike in previous tests of Leland and Pyle's cross-sectional model[112], the fraction of retained ownership is the dependent variable in this model. In Hypothesis 4.3, retained ownership is assumed to be imposed on governments because firm value is too large to be absorbed by the market. Therefore, the fraction of retained ownership is the dependent variable. The independent variables included in the analysis are the firm relative value and the fraction of the issue which can be acquired by foreign investors. The model to be tested therefore takes the following form:

$$(7.1) \qquad \alpha_i = g_0 + g_1 FRV_i + g_2 FAF_i + u_i$$

where α is the fraction of ownership retained. The g coefficients are estimated using an OLS regression. u_i represents the error terms.

The results of regressions run on the full sample as well as on the sub-samples are summarized in Table 7.4. Because of missing FAF observations, we modify the sub-samples' structure and split the sample in two categories, made up of British firms and non-British (other) firms respectively. The results summarized in the table also provide support for

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[112] See Downes and Heinkel [1982], Clarkson, Dontoh, Richardson and Sefcik [1992] and Feltham, Hughes and Simunic [1991], among others.

Table 7.4
Regression Analysis of Retained Ownership in SIPs

Results of O.L.S. regressions where the dependent variable is the fraction of retained ownership and the independent variables are the firm's relative market value (FRV) and the fraction of the issue which foreign investors were allowed to bid on (FAF). t-statistics are in parentheses.

	Constant	FRV	FAF	R^2
Full Sample (n=68)				
Coefficient Value	0.271[***]	1.88[***]	-0.255	18.7%
t statistic	(4.74)	(3.81)	(-1.20)	
Predicted sign	(?)	(+)	(-)	
United Kingdom (n=30)				
Coefficient Value	0.00676	8.10[***]	-0.126	84.9%
t statistic	(0.317)	(12.19)	(-1.17)	
Predicted sign	(?)	(+)	(-)	
Non United Kingdom (n=38)				
Coefficient Value	0.522[***]	0.820	-0.274	7.97%
t statistic	(7.39)	(1.61)	(-1.30)	
Predicted sign	(?)	(+)	(-)	

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Hypothesis 4.3. Firm relative value appears to play a role in the determination of the fraction of ownership retained. Regression coefficients on FRV are significant at the 1% level for the regressions on the full and UK samples, and positive but insignificant for the Other regression. The coefficients on the fraction allocated to foreign investors are of the predicted sign but not significant.

An analysis of the residuals reveals that the model in (7.1) violates the assumption of homoskedasticity and normality. An analysis of residuals plots reveals that the variance of the residuals is not constant (i.e. there is a heteroskedasticity problem), while the results of a Kolmogorov-Smirnov (K-S) test[113] on the residuals reveal that we reject the null of normality with 99% confidence. One residual was found to be at more than 3 standard deviations from the mean in the regression for British firms.[114] However, the results are not significantly changed if the observation is dropped.

Since the fraction of ownership retained is restricted to lie between 0 and 1, and the retained ownership in the UK sub-sample is frequently 0, the standard OLS assumptions are not met. We estimated the model using TOBIT[115] to account for the fact the observed distribution of retained ownership is truncated. The results of the TOBIT regression are summarized in Table 7.4a. Using the TOBIT model does not change the sign of the coefficient, but the coefficient on FRV in the UK regression becomes insignificant. This result is difficult to explain, but it must be said that censored models like TOBIT may not perform well with small samples. The coefficient on FRV is significant in the non-UK sub-sample and the coefficient

[113] See Jobson [1991], p.61.
[114] The observation is British Gas.
[115] See Greene [1990], pp. 724-733.

on FAF is significantly negative for the entire sample. In section 7.6, we analyze alternative models in which the origin of SIPs is introduced as a dummy variable. This allows us to increase the size of the sample on which we run a TOBIT regression.

The results of the tests summarized above provide relatively strong statistical support for the hypothesis of higher retained ownership in more constrained capital markets. In these markets, governments are forced to retain a larger share of ownership when the firm is large relative to the market. The relation between the extent to which governments exploit foreign markets to sell shares and retained ownership is insignificant.

In section 7.5, we explore other avenues to explain the fraction of ownership retained by governments in privatized SOEs. We discuss the relations that can exist between the fraction of retained ownership and the existence of special shares. We also verify whether governments retained more ownership in privatizations which occurred earlier.

Table 7.4a
Alternative Regression Analysis of Retained Ownership in SIPs

Results of TOBIT regression where the dependent variable is the fraction of retained ownership and the independent variables are the firm's relative market value (FRV) and the fraction of the issue which foreign investors were allowed to bid on (FAF). t-statistics are in parentheses.

	Constant	FRV	FAF
Full Sample (n=68)			
Coefficient Value	0.177	6.20[***]	-1.13[**]
t statistic	(1.10)	(3.96)	(-2.06)
Predicted sign	(?)	(+)	(-)
United Kingdom (n=30)			
Coefficient Value	-0.446	156.07	-48.48
t statistic	(-0.52)	(0.76)	(-0.65)
Predicted sign	(?)	(+)	(-)
Non United Kingdom (n=38)			
Coefficient Value	0.904[***]	3.87[**]	-0.828
t statistic	(4.33)	(2.43)	(-1.57)
Predicted sign	(?)	(+)	(-)

*	Significant at the 10% level.
**	Significant at the 5% level.
***	Significant at the 1% level.

7.3   Underpricing of Share Issue Privatizations

In this section, we first describe how abnormal returns are calculated. For underpricing to exist, abnormal returns measured on the first few days of trading must be positive. We first calculate these initial abnormal returns and the results of these calculations enable us to test Hypothesis 5.1. The relationships between underpricing and the variables measuring risk are then examined. Underpricing has been calculated for 72 of the original sample of 99 firms. Insufficient data does not allow us to consider the remaining 27 firms.

7.3.1   Abnormal Returns Calculations

Raw initial returns are calculated using a traditional return calculation. The offering price is subtracted from the price at the close of day t and that difference is divided by the offering price.[116] The result of this straightforward calculation is the return on stock i at date t. The subscript t takes on the value from 1 to 3, such that three different figures of raw returns are calculated from the close of day 1 to 3 inclusively. The results of these return calculations are referred to as R_{it}, t $=1..3$.[117] Notice that in this sub-section, we do not focus on cumulative daily returns but on returns on stock prices from the offering to the close of day 1, 2 and 3. Initial abnormal returns are calculated using the following equation:

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[116] Notice that Datastream International provides daily adjusted prices. That is, the price is adjusted for dividends and stock splits. Even though this is not expected to occur in the first few days of trading, such information will prove useful when long run performance is analyzed.

[117] Notice that in some cases, the shares were paid for in installments. For example, the electricity firms privatized in the United Kingdom in 1990 were issued at £2.40 a share, but only £1.00 was payable at the time of the issue. The balance was payable in two installments of £0.70 12 and 24 months following the issue. Because the nature of the installments, if any, is not known for every firm included in the sample, we choose to calculate underpricing using the full offering price. This should tend to bias the initial return calculations toward 0.

$$(7.2) \qquad AR_{ijt} = R_{ijt} - \delta_{ijt}$$

R_{ijt} refers to the raw return on security of firm i from country j calculated from the moment of offering to the close of day t, where t is set from 1 to 3 days after the moment of the offering. The country subscript j becomes necessary because the return adjustment is calculated for different countries. δ_{ijt} is a an estimate of expected returns which is calculated according to the three most popular methodologies used in earlier research focusing on abnormal returns. The first methodology consists of calculating a mean return. The mean return of firm i from country j, i.e. δ_{ijt}, is assumed to be equal to the mean return on stock of firm i, calculated over the 50 day period between day 121 and day 170 following the issue.[118]

The second methodology used to calculate δ_{ijt} consists first of estimating the parameters of the "market model" for firm i in country j. These parameters are estimated by regressing the firms daily returns on the firm's country capital market's daily returns (market return Rm_{jt}). This estimation is computed over the same 50 day period as the one used to calculate the firm's mean return:

$$(7.3) \qquad R_{ijt} = \alpha_{ij} + \beta_{ij} Rm_{jt} + \varepsilon_{ijt}$$

where t = 121...170. Next, the estimates of the parameters α and β are used to estimate δ_{ijt}, according to equation 7.4:

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[118] This approach was first adopted by Masulis [1980] for purpose of calculating the effect of capital structure changes on security prices.

$$(7.4) \qquad \delta_{ijt} = \hat{\alpha}_{ij} + \hat{\beta}_{ij} Rm_{jt}$$

where $t = 1...3$.

The third approach consists of setting δ_{ijt} equal to the return on the market index of the stock market of country j at time t (i.e. $\delta_{ijt} = Rm_{jt}$). Using this approach implicitly assumes that the expected return on a stock is the return on the market index on the day of the offering.[119] This provides a contemporaneous adjustment for the return on the stock of privatized firms.

These methods used to estimate the abnormal daily return on a security have some limitations. Usually, in an event study, the expected daily return on a security is calculated over a long period of time prior to the event of interest. Expectations about expected returns are then based on past market performance. The problem with SIPs is the same as in other new issues; they do not have past performance. We are therefore forced to estimate the expected performance at the time of the issue based on the post-issue performance rather than on pre-issue performance. In any case, it must be recognized that each method is subject to some degree of error. However, the magnitude of underpricing is often so large that the adjustment used is insignificant compared to the abnormal return.

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[119] In their study of underpricing in the French stock markets, Husson and Jacquillat [1988] used the same three methodologies. Several studies have used one of the three methodologies alternatively to calculate abnormal initial returns.

After the abnormal returns have been estimated for all the firms in the sample, the next step consists of computing an average abnormal return for all firms included in the sample. This calculation is illustrated in equation 7.5:

$$(7.5) \qquad AAR = \frac{1}{N} \sum_{k=1}^{N} AR_{kt} \qquad t = 1,2,3$$

In equation (7.5), each pair ij from equation (7.4) is assigned a value k such that $k = 1...N$, where N represents the number of firms in the sample.

7.3.2 Hypotheses Testing

To test Hypothesis 5.1, measures of AAR are tested against a null hypothesis of no underpricing in SIPs (AAR=0). Table 7.5 lists the abnormal returns estimates calculated using the three methods described above. AAR[120] are calculated from the offering price to the market price at the close of trading days 1, 2 and 3. We present unadjusted (raw) returns and, for the United Kingdom sub-sample, we also present returns earned on the unadjusted stock price.[121]

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[120] See Table A.1 for firm by firm data on raw returns calculated using the market price at the close of the first day of trading.

[121] One has the choice of calculating the return using offering and post issue price which either include or exclude future installments. The magnitude of the change in price is the same in each case, but calculated return is lower in the former because the denominator is higher if the offering price equals the sum of both initial payment plus future installments. Unadjusted price refers to the price excluding the future installments. Unfortunately, we have been able to obtain the nature of installments for only a certain number of British share issues. Therefore, in order to insure consistency of the results, we consider only underpricing calculated using adjusted price for the remainder of this thesis.

Table 7.5
Underpricing of Share Issues Privatization

The first number in each cell is the average daily return over the corresponding period. t-statistics are in parentheses.

	Underpricing (from offering to day 1)	Underpricing (from offering to day 2)	Underpricing (from offering to day 3)
Full sample (n=72)			
Raw Return	18.19%*** (7.71)	18.52%*** (7.92)	17.26%*** (8.19)
Mean Adjusted	18.16%*** (7.70)	18.50%*** (7.91)	17.24%*** (8.18)
Adjusted using the Market Model	18.26%*** (7.75)	18.61%*** (8.00)	17.31%*** (8.26)
Adjusted using the return on the Market	18.37%*** (7.76)	18.75%*** (7.98)	17.35%*** (8.25)

Table 7.5 (continued)
Underpricing of Share Issues Privatization

The first number in each cell is the average daily return over the corresponding period. t-statistics are in parentheses.

	Underpricing (from offering to day 1)	Underpricing (from offering to day 2)	Underpricing (from offering to day 3)
Cont. Europe (n=21)			
Raw Return	8.88%*** (3.06)	10.78%*** (2.79)	9.37%*** (3.38)
Mean Adjusted	8.89%*** (3.06)	10.79%*** (2.79)	9.38%*** (3.38)
Adjusted using the Market Model	8.92%*** (3.12)	11.04%*** (2.96)	9.51%*** (3.63)
Adjusted using the return on the Market	8.88%*** (3.11)	10.84%*** (2.90)	9.23%*** (3.52)
U. Kingdom (n=35)			
Raw Return	19.25%*** (13.95)	19.17%*** (13.58)	18.52%*** (13.44)
Mean Adjusted	19.25%*** (13.94)	19.17%*** (13.57)	18.51%*** (13.43)
Adjusted using the Market Model	19.33%*** (13.92)	19.09%*** (12.99)	18.41%*** (13.03)
Adjusted using the return on the Market	19.38%*** (13.94)	19.20%*** (13.10)	18.51%*** (13.25)
Raw Return using undajusted price (n=33)	43.51%*** (13.35)	43.34%*** (13.05)	43.30%*** (13.13)

Table 7.5 (continued)
Underpricing of Share Issues Privatization

The first number in each cell is the average daily return over the corresponding period. t-statistics are in parentheses.

	Underpricing (from offering to day 1)	Underpricing (from offering to day 2)	Underpricing (from offering to day 3)
Emrg Markets (n=6)			
Raw Return	49.85%**	46.58%**	44.56%**
	(2.56)	(2.55)	(2.54)
Mean Adjusted	49.84%**	46.57%**	44.54%**
	(2.56)	(2.55)	(2.54)
Adjusted using the Market Model	50.59%**	47.72%**	45.91%**
	(2.63)	(2.67)	(2.67)
Adjusted using the return on the Market	51.13%**	48.67%**	46.82%**
	(2.66)	(2.73)	(2.75)
Other (n=10)			
Raw Return	14.98%**	15.65%**	13.05%**
	(2.48)	(2.62)	(2.79)
Mean Adjusted	14.82%**	15.49%**	12.90%**
	(2.45)	(2.59)	(2.75)
Adjusted using the Market Model	14.75%**	15.38%**	12.70%**
	(2.43)	(2.56)	(2.76)
Adjusted using the return on the Market	15.14%**	15.82%**	(12.68)***
	(2.44)	(2.54)	(2.83)

***	Significant at the 1% level.
**	Significant at the 5% level.

On average, abnormal initial returns are significantly positive, which means that SIPs are generally underpriced. As is shown in the table, this result holds, irrespective of the country of origin, of the method used to compute abnormal returns or of the period over which underpricing is calculated. Therefore, the null hypothesis of no underpricing in SIPs can be rejected with a high degree of confidence.

Initial returns appear to go up on the second day, and then decline on the third day. However, measures of underpricing do not significantly differ over the three days reported in table 7.5. Underpricing appears to be more severe in emerging markets. This larger underpricing can be explained by the greater volatility of emerging markets. Underpricing also appears to be slightly more severe for the sub-sample of firms originating from the UK than in other parts of the world.[122] Recall that the British government formally expressed its desire to spread share ownership among the general public. The United Kingdom is also the country which privatized the most SOEs in the sample (35). Underpricing may therefore be a strategic move on the part of the British government which wishes to encourage investor confidence in future SIPs. Underpricing of British firms could be aimed at maximizing the probability of success of future issues.

Hypothesis 5.2 predicts a positive relationship between underpricing and ex ante uncertainty and losses caused by the winner's curse. But ex ante uncertainty is unobservable. To account for this unobservability, we use two different variables to proxy for ex ante uncertainty. We first assume that the more uncertainty prevailing prior to the issue, the greater is the standard deviation in the stock price immediately following the issue.

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[122] Results of an F-test reported in Table 7.12 show that underpricing calculated using adjusted price significantly differ among the four country sub-groups.

Therefore, we use the standard deviation in stock price calculated over the 20 days[123] following the issue to proxy for ex ante uncertainty, and hypothesize a positive relation between the standard deviation in stock price and underpricing.

We also use a measure of firm size to proxy for ex ante uncertainty. According to Beatty and Ritter [1986], the size of the offering can also be introduced as a proxy measure of risk. The greater is the size of the privatized SOE, the less risk is expected to be passed on to private shareholders. Other things being equal, shareholders should require less compensation for investing in larger firms because these are less risky. Size is measured using the firm's market value of equity. This value is measured in US dollars across the whole sample. Recall that firms' market value of equity is determined by multiplying the first available market price of shares by the number of shares outstanding.

To be consistent with previous studies, we attempt to relate underpricing with firm size by calculating the correlation coefficient between underpricing and the natural log of firm value. Many studies use the natural log of size because the distribution of firm size is positively skewed, i.e. larger firms deviate more from the mean than smaller firms (see Foster [1986, p. 111]). We have the same problem in our sample (significant positive skewness of 8.22). Therefore, using the natural log of size alleviates any problem which could be caused by skewness of the distribution.

Notice that the extent to which the ex post standard deviation of the stock price and firm size are a good representation of ex ante uncertainty can be questioned. To justify their use, we rely on the fact that it has also been used in previous studies, for example, Uhlir [1988] and

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[123] Notice that the 20-day period over which the standard deviation of stock price is calculated starts at the close of the fourth day to avoid the undue impact of underpricing.

Mcguiness [1992]. Further, since ex ante data which could be used to measure uncertainty prior to the issue is not available in the case of SIPs, the standard deviation in the stock price appears to be the best measure of ex ante uncertainty one could think of in the particular case of SIPs.

To measure underpricing, we chose the measure of abnormal returns calculated at the close of the first day of trading using the mean return over 50 days as the estimate of expected returns.[124] Notice that the correlation results are not affected if the period over which underpricing is calculated is changed or if the nature of the adjustment is changed.

Before discussing the results of the correlation analysis, we present the descriptive statistics summarized in Table 7.6. The sub-samples comprised of European and British firms show some degree of homogeneity in terms of the variables of interest. In these two sub-samples, the measures of underpricing, ex post standard deviation and firm size are less dispersed. The privatized firm which has been the most underpriced, Singapore Telecom(117%), belongs to the emerging market sub-sample. The largest privatized firm is Nippon Telegraph and Telephone, which is from the "Other" sub-sample.

Table 7.7 summarizes the expected correlations between each of the variables considered in testing Hypothesis 5.2. Our theory does not provide any explicit prediction about the expected correlation between the standard deviation of the stock price and firm size. Nonetheless, we expect the relationship to be negative, because uncertainty is expected to be less severe for larger firms given these firms are less risky. As such, they are expected to be less speculative in nature.

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[124] In Table 7.5, this corresponds to the underpricing measure which appears in the fourth row, first column for the full sample and each sub-sample.

Table 7.6
Summary Statistics on Underpricing and Risk Proxies.
Underpricing is calculated by subtracting the returns on the market portfolio from raw returns earned at the close of the first day of trading.

	Mean	*Standard Deviation*	*Minimum*	*Maximum*
Full Sample (n=72)				
Underpricing	18.4%	20.1%	-14.0%	117.0%
Ex Post Standard Deviation in Stock Price (20 days)	1.5%	1.3%	0.16%	7.4%
Firm Value ($M)	3,605.70	12,960.81	23.06	121,562.43
Natural Log of Firm Value ($M)	6.95	1.41	3.14	11.71
Cont. Europe (n=21)				
Underpricing	8.88%	13.1%	-14.0%	43.0%
Ex Post Standard Deviation in Stock Price (20 days)	1.44%	1.40%	0.16%	7.3%
Firm Value ($M)	1,820.92	1,994.66	48.51	6,511.12
Natural Log of Firm Value ($M)	6.73	1.40	3.88	8.78
United Kingdom (n=35)				
Underpricing	19.4%	8.2%	0.0%	38.0%
Ex Post Standard Deviation in Stock Price (20 days)	1.08%	0.30%	0.4%	1.7%
Firm Value ($M)	1,510.32	1,999.59	69.05	9,344.39
Natural Log of Firm Value ($M)	6.82	0.98	4.23	9.14

Table 7.6 (continued)
Summary Statistics on Underpricing and Risk Proxies.

Underpricing is calculated by subtracting the returns on the market portfolio from raw returns earned at the close of the first day of trading.

	Mean	*Standard Deviation*	*Minimum*	*Maximum*
Emerging Market (n=6)				
Underpricing	51.13%	47.0%	3.00%	117.0%
Ex Post Standard Deviation in Stock Price (20 days)	3.13%	1.70%	1.24%	6.25%
Firm Value ($M)	5,140.66	10,755.11	23.06	39,639.85
Natural Log of Firm Value ($M)	7.05	1.94	3.14	10.59
Other Countries (n=10)				
Underpricing	15.14%	19.60%	-1.00%	60.0%
Ex Post Standard Deviation in Stock Price (20 days)	2.02%	1.60%	0.72%	7.40%
Firm Value ($M)	10,734.83	30,036.88	106.78	121,562.43
Natural Log of Firm Value ($M)	7.57	1.69	4.67	11.71

Table 7.7
Predicted Signs of the Correlations Between Variables Related to Underpricing

Variable Names	Underpricing	Standard Deviation	Firm Value	Natural Log of Firm Value
Underpricing	1.00	+	-	-
Ex Post Standard Deviation in Stock Price (20 days)		1.00	-	-
Firm Value			1.00	+
Natural Log of Firm Value				1.00

Table 7.8
Pearson Correlations Between Variables Related to Underpricing
t-statistics are in parentheses.

Variable Names	Underpricing	Std Deviation (20 days)	Firm Value	Natural Log of Firm Value
Full Sample (n=72)				
Underpricing	1.00	0.2806** (2.35)	0.3226 (2.72)	0.2910 (2.45)
Ex Post Standard Deviation in Stock Price (20 days)		1.00	0.4792 (4.31)	0.0802 (0.71)
Firm Value			1.00	0.5498*** (5.41)
Natural Log of Firm Value				1.00
Cont. Europe (n=21)				
Underpricing	1.00	0.5714*** (2.52)	0.0048 (0.02)	-0.0251 (-0.11)
Ex Post Standard Deviation in Stock Price (20 days)		1.00	-0.1001 (-0.48)	-0.1127 (-0.54)
Firm Value			1.00	0.8888*** (5.11)
Natural Log of Firm Value				1.00
United Kingdom (n=35)				
Underpricing	1.00	0.3202** (1.97)	-0.1303 (-0.76)	-0.2565* (-1.49)
Ex Post Standard Deviation in Stock Price (20 days)		1.00	-0.3473** (-2.03)	-0.4139*** (-2.42)
Firm Value			1.00	0.8134*** (4.74)
Natural Log of Firm Value				1.00

Table 7.8 (continued)
Pearson Correlations Between Variables Related to Underpricing
t-statistics are in parentheses.

Variable Names	Underpricing	Std Deviation (20 days)	Firm Value	Natural Log of Firm Value
Emerging Markets (n=6)				
Underpricing	1.00	-0.5708 (-1.27)	0.8069 (1.80)	0.7861 (1.76)
Ex Post Standard Deviation in Stock Price (20 days)		1.00	-0.5953[*] (-1.46)	-0.6468[*] (-1.58)
Firm Value			1.00	0.7042[***] (2.44)
Natural Log of Firm Value				1.00
Other Countries (n=10)				
Underpricing	1.00	0.6090[**] (1.84)	0.4829 (1.45)	0.6815 (2.04)
Ex Post Standard Deviation in Stock Price (20 days)		1.00	0.9045[**] (3.50)	0.5536 (2.15)
Firm Value			1.00	0.7483[***] (2.90)
Natural Log of Firm Value				1.00

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Results of the calculation of correlation coefficients between the measure of abnormal initial returns, the standard deviation of the stock price, firm value, and the log of firm value are summarized in Table 7.8. These results support Hypothesis 5.2, which states that abnormal initial returns are positively related to the standard deviation of stock price, which is used to proxy for ex ante uncertainty. The results are not so conclusive when firm size is used to proxy for ex ante uncertainty.

Correlation coefficients between the standard deviation on the stock price estimated in the 20 day period immediately following the issue and underpricing are significantly positive for every sample partition, except for emerging markets where it is insignificant. The relation between firm size and underpricing is however not so clear. The correlation between the measures of firm size and underpricing is significant and in the predicted direction only when the log of firm value is correlated to underpricing of UK SIPs.

The correlation between firms' market value and underpricing for the full sample is significant at the 1% level using a two-sided alternative, but it is not in the predicted direction. When the log of firm value is used, the correlation is not so large, but it is still in the wrong direction. These results can be explained by the particular nature of the sample of SIPs. Privatized SOEs are typically much larger firms than regular IPOs. In this situation, size may not serve as a good proxy for risk, because size does not vary much across the whole sample.[125]

Notice finally that for the UK and emerging market sub-samples, a significant negative relationship is found between firm size and the standard deviation of returns. These coefficients are of the predicted sign. In the full sample and the "Other" sub-sample, the correlation is also

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[125] In section 7.5, we consider FRV as an alternative measure of firm size.

significant, but not in the predicted direction. This provides further support for the conjecture that firm size may not be a good proxy for risk.

Tests of Hypothesis 5.2 reveal (except for the emerging market sub-sample) a positive and significant correlation between underpricing and uncertainty when the ex post standard deviation of the stock price is used to proxy for uncertainty. If the ex post standard deviation in stock price is a valid proxy for ex ante uncertainty, the relationship between ex ante uncertainty and underpricing can be assumed positive. When measures of firm size are used to proxy for ex ante uncertainty, the results are not as conclusive. This could be because firm size does not provide a good characterization of uncertainty in the case of SIPs. In fact, the main limitation of these tests lies in the limited validity of the variables used to proxy for ex ante uncertainty.

We now turn our attention to OLS regressions aimed at explaining the variation in underpricing. To further analyze the underpricing of SIPs, the following OLS regression is estimated:

$$(7.6) \qquad AAR_i = h_0 + h_1 \log[V_i] + h_2 \sigma_i + u_i$$

Again, the measure of underpricing considered here is the return earned on each stock at the close of the first day adjusted for the returns on the market portfolio. To be consistent with the above correlation analysis, we introduce two independent variables which are assumed to proxy for ex ante uncertainty. The variable $log[V_i]$ is the natural log of firm i's value and σ_i is the standard deviation in the stock price. The h coefficients are estimated using an OLS regression. u_i represents the error terms.

Table 7.9
Regression Analysis of Underpricing

Results of regressions where the dependent variable is underpricing calculated using the offering price and the price at the close of the first day of trading, adjusted by subtracting the returns on the market portfolio. The independent variables are the log of the firm's market value estimated at the close of the first day of trading and the standard deviation of the stock price estimated using the first 20 days' closing prices.

		Constant	*Log of F. Value*	*Std Dev.*	R^2
Full Sample	**(n=72)**				
Coefficient Value		-0.148	0.0382[**]	3.91[**]	13.9%
t statistic		(-1.19)	(2.21)	(2.10)	
Predicted sign		(?)	(-)	(+)	
Continental Europe	**(n=21)**				
Coefficient Value		-0.0426	0.00743	5.30[***]	33.1%
t statistic		(-0.27)	(0.36)	(2.98)	
Predicted sign		(?)	(-)	(+)	
United Kingdom	**(n=35)**				
Coefficient Value		0.213	-0.0125	6.12	12.1%
t statistic		(1.63)	(-0.82)	(1.42)	
Predicted sign		(?)	(-)	(+)	
Emerging Markets	**(n=6)**				
Coefficient Value		-0.724	0.170	-1.98	61.9%
t statistic		(-0.56)	(1.52)	(-0.09)	
Predicted sign		(?)	(-)	(+)	
Other Countries	**(n=10)**				
Coefficient Value		-0.354	0.0586	1.88	47.7%
t statistic		(-1.13)	(1.20)	(0.42)	
Predicted sign		(?)	(-)	(+)	

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.9 shows the results of the regression analyses of underpricing. The results are not surprising given our theoretical arguments and the correlation results which were previously obtained. For the full sample, the coefficients on the standard deviation in stock price and on log of firm value are positive and significant at the 5% level. The coefficient on firm value is not of the predicted sign. In continental Europe, only the coefficient on standard deviation is positive and significant (1% level). All other coefficients are insignificant.

In Table 7.8, the log of firm value is significantly correlated with the standard deviation in the stock price for the UK sub-sample. The fact that the coefficient on the standard deviation in the UK regression is not significant can therefore be caused by multicollinearity. Multicollinearity has an increasing effect on the variance of the estimated coefficient and therefore tends to reduce t-values. Recall that in Table 7.8, underpricing was reported to be significantly positively correlated with the standard deviation in the stock price. We would therefore have obtained a significant positive coefficient on the standard deviation of the stock price in the regression if the log of firm value had been left out.

For all these regressions, the analysis of residuals shows no violation of the standard OLS assumptions. The residuals are well behaved and the residuals plots show no sign of heteroskedasticity. The results of K-S tests do not allow us the reject the null hypothesis of a normal distribution, and there are no outlier to report.

To conclude this section, it appears as though SIPs are underpriced on average. This result, predicted in Hypothesis 5.1, may indicate that encouraging investors confidence in future SIPs is seen as an important factor by governments. Further, as predicted by Hypothesis 5.2, a significant positive relation between the standard deviation in stock price and underpricing is

found across the whole sample as well as for all but one sub-sample. If the ex post standard deviation in the stock price can be used to proxy for ex ante uncertainty, then the results confirm the theory that underpricing is not only used to encourage investors' confidence but is also used to compensate investors for risk associated with the winner's curse. Results summarized in Table 7.8 also document a significant and negative relation between firm size and underpricing in UK SIPs. The results of the OLS regressions, summarized in Table 7.9, are consistent with correlation results.

In section 7.5, we explore other avenues to explain underpricing. We identify other risk factors and assess their relation with underpricing. We use FRV instead of firm value, and correlate underpricing to the nature of the industry, the timing of the issue (early versus late privatization) and the likelihood of future government intervention in the firm's operation.

7.4   Long Run Stock Performance of Share Issue Privatizations

7.4.1   Abnormal Returns Calculations

To test the hypothesis about no long run underperformance for SIPs (Hypothesis 6.1), we extend the return calculation presented in the section 7.3. In order to calculate the long run stock performance of a SIP, return calculations are computed for each trading day during the three year period[126] following the issue, using the same methodology as described in the first part of section 7.3. The calculation of daily returns thus consists of subtracting the price at the close of day *t-1* price from day *t* closing price, and dividing the result of the subtraction by the day *t-1* price. The result of this calculation is labeled r_{it}, the return on stock *i* on day *t*.

To compute the abnormal return, daily returns are adjusted in a fashion similar to that used in section 7.3. For every single daily return calculated, a similar measure of market and industry daily returns is subtracted to form the measure of daily abnormal returns for all firms included in the sample:

(7.7.1) $ARM_{it} = r_{it} - r_{mt}$

(7.7.2) $ARI_{it} = r_{it} - r_{gt}$

where r_{mt} is the daily market return calculated on the index of the market on which the firm's shares are issued and r_{gt} is the daily industry return calculated on an industry index. The industry index is comprised of firms which are in the same country and industry as the SIP and

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[126] We chose a three year period to compare our results with those of Ritter [1991]. The sample size drops substantially if the period of time over which returns are analyzed is extended to four or five years.

which are listed on the same stock market. Daily price information for both the market and the industry index are also taken from Datastream International.

The data for the values of the daily market index and the daily industry index is provided by Datastream International and correspond to each firm's daily return. Datastream International provides daily information for the most popular market indices. In markets for which a popular market index does not exist, which is often the case in the emerging markets, Datastream International provides the value of an index which Datastream analysts build. This index is made up of a weighted sum of all firms' stock prices listed on the market. Datastream also provides the value of popular and/or self-built industry indices. Self-built industry indices are comprised of the weighted sum of all stock prices of firms which belong to a particular industry.

The daily values of these indices are used to compute the r_{mt} and r_{gt} adjustments which are referred to in equations 7.7.1 and 7.7.2. The same daily return calculation procedure as for firm specific daily returns is applied to both the daily price information of the market index as well as the industry index. The result of these two daily returns calculations are then subtracted from the firm's daily return to provide ARM and ARI, the two different measures of abnormal daily returns.

It is important to note that Datastream's industry indices are meant to provide investors with historical information about the average returns for all major firms currently operating in a given industry of a given country. Since all major firms must be included, the composition of Datastream's industry indices can vary over the periods analyzed in this thesis. This variation is

necessary to reflect the country's average industry composition, which could vary during the three-year period.

It is also important to mention that the stock price of privatized firms are very likely to be included in the composition of Datastream industry indices. This comes as a direct consequence of the reasons why the index exists. In fact, to come up with a meaningful industry index, Datastream analysts must include in the index composition the stock price information of any firm which has a significant market value in the country in which it operates. Privatized SOEs are most likely to belong to that group.

The fact that privatized firms are likely to be included in the composition of industry indices has to be taken into account in interpreting the results. Depending on the relative importance of the privatized firm's stock price behavior on the behavior of the whole index, this inclusion tends to bring the result of the subtraction computed in equation 7.7.2 closer to zero. Because of the potential inclusion of privatized firms in industry indices, the absolute value of the industry adjusted returns tend to be smaller than if the privatized firms were not included in the index. If we reject Hypothesis 6.1 on the basis of this calculation, then we are certain that the hypothesis would also be rejected if the privatized firm were not included in the index. On the other hand, if we do not reject the hypothesis, then it is unclear whether the hypothesis would be rejected if the privatized firm were not included in the index.

7.4.2 Hypothesis Testing

Average abnormal returns over the 36 month period are calculated following two methodologies. We first compute the cumulative abnormal return for each firm, which consists

of the sum of daily abnormal returns. We also compute returns based on a buy-and-hold strategy, which consists of calculating the returns based on a 3-year holding period. Cumulative returns (CAR, equation 7.8.1) equal the sum of the daily returns for the 36 monthly periods (i.e. t = 3 ...780) and returns based on a buy-and-hold strategy (B&H, equation 7.8.2) are computed for each of the 36 monthly periods:

$$(7.8.1) \qquad CAR_i = \sum_{t=3}^{780} AR_{it}$$

$$(7.8.2) \qquad HAR_i = \left\{ \prod_{t=3}^{780} (1 + r_{it}) - 1 \right\} - \left\{ \prod_{t=3}^{780} (1 + Rm_{it}) - 1 \right\}$$

The calculation is repeated for raw returns ($AR = r$) and for both versions of abnormal returns described in equations 7.7.1 and 7.7.2 ($AR = ARM, ARI$). Table A.1 (see the Appendix B) shows the three different 36-month CAR and B&H results on a firm by firm basis. Average raw and adjusted CARs and B&Hs calculated for each of the 36 monthly periods are shown in Table 7.10 and 7.11, respectively. The sample is broken down in country sub-groups, and the results on the sub-groups are summarized in Tables 7.10a to 7.10d and 7.11a to 7.11d for CARs and B&Hs, respectively.

The tables are divided into 36 rows which provide cumulative and B&H abnormal returns at the end of each of the months over the three year period. The second column in the table states the number of firms for which abnormal returns are calculated in every month. This

number grows in the first few months because, for some firms, Datastream does not provide stock price information until a certain period of time after the issue. When the price is not available for a certain firm in the period immediately following the issue, it is assumed to have a zero cumulative return up to the day the price becomes available on Datastream International. The same reasoning is applied to the market and industry adjustments, such that abnormal cumulative daily returns are always assumed to be non-existent up to the day the price becomes available on Datastream.[127]

An alternative procedure which could have been applied to deal with early stock price unavailability would have been to assume that firms for which the stock price is unavailable earned the average SIP cumulative return over the period for which the price was unavailable. This would increase the abnormal performance of the sample of SIPs because this assumption would have resulted in attributing positive cumulative returns to firms for which the stock price was not available immediately after the issue. The treatment described in the preceding paragraph provides smaller measures of abnormal returns.

The third column lists the average firms' monthly returns. The fourth, fifth and seventh columns list the cumulative monthly average abnormal returns earned, respectively, on the SIPs portfolio, and on the SIPs portfolio using market and industry adjustments. To test whether the average cumulative abnormal returns are different from zero, we performed a two-tailed t-test, and the t statistics obtained are listed in the sixth and eight columns. Under the null hypothesis,

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[127] Notice that this assumption tends to bias the results of the abnormal return calculation toward 0. The analysis has also been done on a sub-sample excluding firms for which price data is not available in early months. The results are not substantially different.

which states that no abnormal returns are expected, the average cumulative abnormal returns are expected to be zero.

The results summarized in Tables 7.10 (which are also plotted in Figure 2 in the Appendix) demonstrate that, on average, privatized SOEs outperform the market in the long run, and that they at least do not underperform industry indices in the long run. Except for months 6 and 7, average cumulative abnormal returns are significantly different from zero when the market adjustment is used to calculate abnormal returns. When the industry adjustment is used, average cumulative returns are significantly different from zero starting at month 27 up to month 36. They are positive for the most part, but do not always significantly differ from zero prior to month 27.

Returns earned using the B&H method, summarized in Table 7.11 are similar to cumulative returns even though they are slightly higher. This positive difference is explained by the compounding effect of calculating returns using equation (7.8.2). One distinction between B&H returns and cumulative returns is found when industry adjusted returns are analyzed. These returns are significantly different from zero only in months 28 and 29 (significant at the 5% level) and in months 14, 15, 27 and 33 (significant at the 10% level).

The results obtained reveal that by systematically investing in SIPs which occurred in the past decade or so and holding their investments for a long period of time, investors would have earned 3-year raw returns close to 68%, which represents a yearly average return of close to 18.8%. As a comparison, investing in market portfolios would have earned investors a yearly average return of 9.2%. Market and industry adjusted returns are lower than raw returns but still significantly greater than 0.

Table 7.10
Long Run Cumulative Returns

Cumulative Abnormal Return earned on a portfolio comprised of privatized firms. t-statistics refer to testing the null hypothesis that returns are not significantly different from zero.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted CAR	Market Adj. CAR		Industry Adj. CAR	
1	87	0.0261	0.0261	0.0196**	1.97	0.0108	1.26
2	87	0.0400	0.0661	0.0404***	2.83	0.0208*	1.67
3	88	0.0184	0.0845	0.0472***	2.59	0.0214	1.35
4	88	-0.0023	0.0822	0.0397*	1.90	0.0109	0.59
5	93	-0.0006	0.0816	0.0435**	2.10	0.0166	0.95
6	92	0.0053	0.0869	0.0338	1.55	0.0061	0.32
7	92	-0.0016	0.0853	0.0267	1.10	-0.0016	-0.09
8	92	0.0157	0.1010	0.0459*	1.70	0.0188	0.87
9	90	-0.0026	0.0984	0.0486*	1.70	0.0206	0.93
10	90	0.0005	0.0989	0.0662**	2.13	0.0249	0.96
11	89	-0.0025	0.0964	0.0690**	2.01	0.0346	1.20
12	89	0.0209	0.1173	0.0828**	2.38	0.0419	1.39
13	89	0.0047	0.1220	0.0900**	2.49	0.0550*	1.75
14	90	0.0169	0.1389	0.0971**	2.56	0.0605*	1.87
15	87	0.0358	0.1747	0.0988***	2.63	0.0633*	1.89
16	86	-0.0280	0.1467	0.0688*	1.76	0.0279	0.81
17	86	0.0534	0.2001	0.1040***	2.75	0.0563*	1.67
18	85	0.0031	0.2032	0.0976**	2.53	0.0403	1.14
19	84	0.0166	0.2198	0.1210***	3.17	0.0606*	1.77
20	83	0.0059	0.2257	0.1175***	2.92	0.0546	1.49
21	84	0.0264	0.2521	0.1297***	3.15	0.0596	1.57
22	84	0.0071	0.2592	0.1093**	2.45	0.0492	1.21
23	84	0.0073	0.2665	0.1140**	2.42	0.0544	1.30
24	83	0.0200	0.2865	0.1292***	2.65	0.0650	1.56
25	85	-0.0018	0.2847	0.1083**	2.21	0.0584	1.40
26	85	0.0227	0.3074	0.1130**	2.28	0.0635	1.50
27	85	0.0336	0.3410	0.1333***	2.77	0.0779*	1.91
28	85	0.0121	0.3531	0.1493***	2.96	0.0857**	1.99
29	85	0.0297	0.3828	0.1657***	3.23	0.1004**	2.31
30	84	0.0199	0.4027	0.1734***	3.27	0.0936**	2.17
31	84	0.0300	0.4327	0.1952***	3.72	0.1002**	2.22
32	82	0.0101	0.4428	0.1960***	3.70	0.0980**	2.16
33	82	0.0222	0.4650	0.2173***	4.02	0.1164**	2.44
34	80	0.0094	0.4744	0.2240***	3.77	0.1051*	1.94
35	80	0.0335	0.5079	0.2539***	4.35	0.1198**	2.38
36	80	0.0134	0.5213	0.2603***	4.41	0.1126**	2.22

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.10a
Long Run Cumulative Returns

Cumulative Abnormal Return earned on a portfolio comprised of firms privatized in Continental Europe.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted CAR	Market Adj. CAR		Industry Adj. CAR	
1	26	0.0104	0.0104	-0.0008	-0.06	0.0042	0.33
2	26	0.0135	0.0239	-0.0104	-0.48	0.0133	0.69
3	27	0.0351	0.0590	0.0146	0.44	0.0307	1.09
4	27	0.0075	0.0665	0.0227	0.48	0.0365	0.87
5	30	-0.0215	0.0450	0.0146	0.32	0.0110	0.27
6	29	-0.0044	0.0406	-0.0059	-0.12	0.0043	0.09
7	29	-0.0012	0.0394	-0.0187	-0.35	0.0047	0.10
8	29	0.0112	0.0506	-0.0099	-0.16	0.0278	0.52
9	28	-0.0200	0.0306	-0.0277	-0.42	0.0137	0.25
10	28	-0.0078	0.0228	-0.0077	-0.11	0.0216	0.35
11	27	0.0107	0.0335	0.0040	0.05	0.0397	0.55
12	27	0.0128	0.0463	-0.0002	0.00	0.0308	0.44
13	28	0.0032	0.0495	0.0068	0.09	0.0529	0.75
14	29	-0.0054	0.0441	-0.0042	-0.05	0.0518	0.72
15	28	0.0344	0.0785	0.0179	0.21	0.0696	0.90
16	27	-0.0363	0.0422	-0.0296	-0.35	0.0174	0.23
17	27	-0.0002	0.0420	-0.0182	-0.23	0.0329	0.47
18	27	0.0030	0.0450	-0.0249	-0.32	0.0144	0.21
19	27	0.0696	0.1146	0.0357	0.43	0.0848	1.16
20	26	0.0105	0.1251	0.0208	0.23	0.0699	0.85
21	26	0.0152	0.1403	0.0288	0.33	0.0710	0.86
22	26	0.0113	0.1516	0.0082	0.09	0.0612	0.71
23	26	-0.0047	0.1469	0.0064	0.77	0.0714	0.77
24	25	0.0350	0.1819	0.0248	0.24	0.1015	1.04
25	27	-0.0187	0.1632	0.0080	0.08	0.0966	1.03
26	27	0.0179	0.1811	0.0146	0.14	0.1095	1.14
27	28	0.0139	0.1950	0.0225	0.23	0.1059	1.12
28	28	0.0297	0.2247	0.0315	0.30	0.1103	1.08
29	28	-0.0128	0.2119	0.0356	0.34	0.1168	1.13
30	28	0.0253	0.2372	0.0519	0.49	0.1182	1.15
31	28	0.0598	0.2970	0.0855	0.78	0.1492	1.39
32	27	0.0136	0.3106	0.0657	0.59	0.1228	1.15
33	27	0.0192	0.3298	0.0867	0.74	0.1565	1.35
34	27	-0.0269	0.3029	0.0939	0.68	0.1488	1.12
35	27	0.0203	0.3232	0.1255	0.96	0.1683	1.36
36	27	0.0219	0.3451	0.1386	1.10	0.1785	1.48

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.10b
Long Run Cumulative Returns

Cumulative Abnormal Return earned on a portfolio comprised of firms privatized in the United Kingdom.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted CAR	Market Adj. CAR		Industry Adj. CAR	
1	35	0.0189	0.0189	0.0133*	1.74	0.0073	1.21
2	35	0.0652	0.0841	0.0539***	3.94	0.0259**	2.68
3	35	0.0217	0.1058	0.0552***	3.66	0.0360**	2.43
4	35	-0.0057	0.1001	0.0391***	2.82	0.0219	1.39
5	35	0.0147	0.1148	0.0580***	3.74	0.0435**	2.34
6	35	0.0166	0.1314	0.0519***	2.77	0.0361**	2.30
7	35	-0.0023	0.1291	0.0528**	2.48	0.0249	1.61
8	35	0.0081	0.1372	0.0681***	2.87	0.0309	1.64
9	35	-0.0024	0.1348	0.0720***	3.10	0.0314*	1.92
10	35	0.0025	0.1373	0.0800***	2.95	0.0284	1.34
11	35	-0.0235	0.1138	0.0686**	2.27	0.0410*	1.93
12	35	0.0294	0.1432	0.1049***	3.23	0.0532**	2.56
13	35	0.0222	0.1654	0.1157***	3.43	0.0597***	2.84
14	35	0.0557	0.2211	0.1510***	4.60	0.0800***	3.66
15	35	0.0146	0.2357	0.1246***	4.24	0.0595***	2.98
16	35	-0.0254	0.2103	0.1042***	3.26	0.0380**	2.00
17	35	0.0814	0.2917	0.1389***	4.50	0.0696***	3.31
18	35	-0.0275	0.2642	0.1125***	3.96	0.0394*	1.86
19	35	-0.0008	0.2634	0.1343***	4.10	0.0487*	1.90
20	35	-0.0130	0.2504	0.1285***	3.76	0.0383	1.44
21	35	0.0529	0.3033	0.1678***	4.16	0.0594*	1.89
22	35	-0.0172	0.2861	0.1308***	3.17	0.0242	0.70
23	35	0.0211	0.3072	0.1259***	3.13	0.0249	0.73
24	35	0.0052	0.3124	0.1314***	3.20	0.0280	0.86
25	35	0.0191	0.3315	0.1239***	3.00	0.0255	0.72
26	35	0.0312	0.3627	0.1295***	3.48	0.0324	1.11
27	35	0.0587	0.4214	0.1666***	4.33	0.0552*	1.85
28	35	-0.0022	0.4192	0.1882***	4.77	0.0643**	2.30
29	35	0.0620	0.4812	0.2159***	5.19	0.1036***	3.17
30	35	0.0131	0.4943	0.2179***	5.33	0.1042***	3.37
31	35	0.0203	0.5146	0.2493***	5.63	0.1141***	3.63
32	35	0.0112	0.5258	0.2590***	5.50	0.1287***	4.08
33	35	0.0463	0.5721	0.2990***	6.54	0.1559***	5.34
34	35	0.0249	0.5970	0.2917***	6.52	0.1471***	5.08
35	35	0.0482	0.6452	0.3260***	7.28	0.1608***	5.09
36	35	0.0247	0.6699	0.3305***	6.66	0.1522***	3.99

*   Significant at the 10% level.
**   Significant at the 5% level.
*** Significant at the 1% level.

Table 7.10c
Long Run Cumulative Returns

Cumulative Abnormal Return earned on a portfolio comprised of firms privatized in Emerging Markets.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted CAR	Market Adj. CAR		Industry Adj. CAR	
1	10	0.0972	0.0972	0.0805	1.50	0.0815	1.39
2	10	0.0480	0.1452	0.1370	1.76	0.0595	0.77
3	10	0.0250	0.1702	0.1608	1.81	0.0207	0.26
4	10	-0.0243	0.1459	0.1205	1.23	-0.0407	-0.52
5	12	0.0156	0.1615	0.1191	1.65	-0.0007	-0.01
6	12	0.0114	0.1729	0.1037	1.58	-0.0348	-0.69
7	12	00102	0.1831	0.0745	1.08	-0.0519	-0.95
8	12	0.0072	0.1903	0.1033	1.36	-0.0333	-0.50
9	12	0.0025	0.1928	0.1121	1.45	0.0067	0.10
10	12	0.0349	0.2277	0.1369	1.51	-0.0020	-0.03
11	12	0.0279	0.2556	0.1660	1.45	0.0104	0.11
12	12	0.0223	0.2779	0.1832	1.54	0.0349	0.35
13	12	-0.0621	0.2158	0.1625	1.24	0.0340	0.30
14	12	0.0065	0.2223	0.1658	1.31	0.0410	0.38
15	11	0.1199	0.3422	0.1962	1.51	0.0811	0.70
16	11	-0.0144	0.3278	0.1753	1.19	0.0436	0.31
17	11	0.0844	0.4122	0.2248	1.53	0.0699	0.47
18	11	0.0235	0.4357	0.2387	1.53	0.0720	0.48
19	10	-0.1107	0.3250	0.1158	0.99	-0.0530	-0.49
20	10	0.0655	0.3905	0.1465	1.31	-0.0309	-0.29
21	11	-0.0747	0.3158	0.0769	0.75	-0.0642	-0.63
22	11	-0.0061	0.3097	0.0377	0.30	-0.0631	-0.70
23	11	-0.0235	0.2862	0.0749	0.62	-0.0508	-0.60
24	11	0.0007	0.2869	0.0714	0.59	-0.0558	-0.69
25	11	0.0005	0.2874	0.0499	0.42	-0.0645	-0.87
26	11	-0.0103	0.2771	0.0366	0.30	-0.0863	-0.96
27	10	0.0979	0.3750	0.0894	0.75	-0.0038	-0.06
28	10	-0.0092	0.3658	0.0871	0.71	0.0084	0.13
29	10	0.0352	0.4010	0.1023	0.80	0.0070	0.11
30	10	0.0111	0.4121	0.0821	0.61	0.0001	0.00
31	10	0.0428	0.4549	0.0943	0.74	0.0065	0.15
32	9	0.0203	0.4752	0.1159	0.82	-0.0064	-0.17
33	9	-0.0160	0.4592	0.1105	0.80	-0.0068	-0.17
34	8	0.0472	0.5064	0.2107*	2.09	-0.0121	-0.25
35	8	-0.0157	0.4907	0.1735	1.48	-0.0457	-0.75
36	8	0.0250	0.5157	0.1825	1.37	-0.0842	-1.55

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.10d
Long Run Cumulative Returns

Cumulative Abnormal Return earned on a portfolio comprised of firms privatized in the other countries.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted CAR	Market Adj. CAR		Industry Adj. CAR	
1	16	0.0231	0.0231	0.0284	0.89	-0.0106	-0.55
2	16	0.0225	0.0456	0.0329	0.96	-0.0024	-0.08
3	16	-0.0180	0.0276	0.0138	0.27	-0.0256	-0.56
4	16	0.0023	0.0299	0.0192	0.37	-0.0243	-0.59
5	16	-0.0122	0.0177	0.0093	0.17	-0.0185	-0.48
6	16	-0.0087	0.0090	0.0137	0.23	-0.0258	-0.73
7	16	-0.0096	-0.0006	0.0161	0.22	-0.0335	-0.77
8	16	0.0470	0.0464	0.0554	0.71	0.0148	0.31
9	15	0.0182	0.0646	0.0855	1.01	0.0195	0.34
10	15	-0.0165	0.0481	0.1153	1.26	0.0448	0.63
11	15	-0.0061	0.0420	0.1092	1.18	0.0302	0.40
12	15	0.0146	0.0566	0.1005	1.07	0.0410	0.45
13	14	0.0211	0.0777	0.1297	1.26	0.0657	0.66
14	14	-0.0196	0.0581	0.1129	0.98	0.0468	0.45
15	13	0.0175	0.0756	0.1211	1.06	0.0446	0.41
16	13	-0.0364	0.0392	0.0878	0.73	0.0095	0.08
17	13	0.0632	0.1024	0.1613	1.45	0.0575	0.53
18	12	0.0663	0.1687	0.2006	1.65	0.0723	0.54
19	12	0.0727	0.2414	0.2785^*	2.12	0.1358	1.00
20	12	-0.0072	0.2342	0.2710^*	1.92	0.1407	0.98
21	12	0.0521	0.2863	0.2856^*	1.87	0.1491	0.98
22	12	0.0814	0.3677	0.3312^*	1.92	0.1989	1.14
23	12	0.0214	0.3891	0.3485^*	1.85	0.1998	1.15
24	12	0.0394	0.4285	0.3930^*	2.00	0.2075	1.24
25	12	-0.0095	0.4190	0.3417	1.63	0.1810	1.07
26	12	0.0391	0.4581	0.3562	1.68	0.1878	1.10
27	12	-0.0395	0.4186	0.3314	1.61	0.1467	0.89
28	12	0.0308	0.4494	0.3622	1.74	0.1555	0.91
29	12	0.0301	0.4795	0.3758	1.75	0.1307	0.78
30	11	0.0441	0.5236	0.4242	1.78	0.0821	0.47
31	11	-0.0257	0.4979	0.3943	1.80	0.0162	0.09
32	11	-0.0214	0.4765	0.3809^*	1.82	0.0249	0.13
33	11	-0.0155	0.4610	0.3656	1.72	-0.0070	-0.04
34	10	0.0219	0.4829	0.3489	1.46	-0.0664	-0.30
35	10	0.0570	0.5399	0.4128	1.67	-0.0225	-0.12
36	10	-0.0586	0.4813	0.4054	1.54	-0.0461	-0.23

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.11
Long Run Buy & Hold Returns

Abnormal Return earned using a holding strategy on a portfolio comprised of privatized firms. t-statistics refer to testing the null hypothesis that returns are not significantly different from zero.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted B&H	Market Adj. B&H		Industry Adj. B&H	
1	87	0.0221	0.0221	0.0163*	1.66	0.0071	0.98
2	87	0.0440	0.0671	0.0410***	2.74	0.0200	1.55
3	88	0.0242	0.0929	0.0522***	2.61	0.0233	1.32
4	88	0.0036	0.0968	0.0500*	1.79	0.0166	0.65
5	93	0.0003	0.0971	0.0526**	2.00	0.0223	0.94
6	92	0.0057	0.1034	0.0436	1.53	0.0113	0.42
7	92	-0.0015	0.1018	0.0333	1.18	0.0002	0.01
8	92	0.0097	0.1125	0.0475	1.50	0.0170	0.69
9	90	-0.0102	0.1012	0.0402	1.30	0.0136	0.62
10	90	0.0025	0.1040	0.0595*	1.78	0.0149	0.58
11	89	0.0005	0.1045	0.0688*	1.78	0.0341	1.05
12	89	0.0252	0.1323	0.0917**	2.15	0.0478	1.33
13	89	0.0029	0.1356	0.0927**	2.02	0.0572	1.46
14	90	0.0250	0.1640	0.1061**	2.20	0.0684*	1.71
15	87	0.0380	0.2082	0.1166**	2.31	0.0740*	1.70
16	86	-0.0175	0.1871	0.0925	1.63	0.0457	0.91
17	86	0.0467	0.2425	0.1239**	2.05	0.0722	1.32
18	85	0.0004	0.2430	0.1155**	2.00	0.0495	0.95
19	84	-0.0117	0.2285	0.1066**	2.39	0.0435	1.13
20	83	0.0055	0.2353	0.1021**	2.07	0.0351	0.81
21	84	0.0270	0.2687	0.1223**	2.31	0.0463	0.99
22	84	0.0129	0.2851	0.1098*	1.79	0.0441	0.82
23	84	0.0002	0.2853	0.1186*	1.83	0.0593	1.08
24	83	0.0166	0.3067	0.1347**	1.99	0.0744	1.35
25	85	0.0106	0.3205	0.1229*	1.83	0.0724	1.36
26	85	0.0236	0.3516	0.1321*	1.89	0.0809	1.49
27	85	0.0320	0.3949	0.1502**	2.30	0.0932*	1.90
28	85	0.0136	0.4139	0.1735**	2.57	0.1026**	2.01
29	85	0.0221	0.4452	0.1994***	2.91	0.1150**	2.24
30	84	0.0219	0.4768	0.2070***	2.82	0.0860	1.50
31	84	0.0185	0.5041	0.2218***	3.20	0.0753	0.96
32	82	0.0135	0.5244	0.2279***	3.28	0.1048	1.54
33	82	0.0194	0.5540	0.2659***	3.81	0.1366*	1.96
34	80	0.0194	0.5842	0.2941***	4.19	0.1007	1.04
35	80	0.0362	0.6415	0.3522***	4.62	0.0923	0.79
36	80	0.0233	0.6798	0.3743***	4.65	0.1022	0.95

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.11a
Long Run Buy & Hold Returns
Abnormal Return earned using a holding strategy on a portfolio comprised of firms privatized in Continental Europe.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted B&H	Market Adj. B&H		Industry Adj. B&H	
1	26	0.0103	0.0103	0.0004	0.03	0.0062	0.47
2	26	0.0141	0.0245	-0.0065	-0.28	0.0151	0.72
3	27	0.0435	0.0691	0.0225	0.56	0.0405	1.12
4	27	0.0308	0.1020	0.0555	0.75	0.0715	1.03
5	30	-0.0222	0.0775	0.0390	0.59	0.0428	0.68
6	29	-0.0028	0.0745	0.0248	0.33	0.0406	0.54
7	29	-0.0045	0.0697	0.0009	0.01	0.0330	0.51
8	29	0.0026	0.0725	-0.0007	-0.01	0.0512	0.77
9	28	-0.0367	0.0331	-0.0492	-0.68	0.0178	0.33
10	28	-0.0106	0.0222	-0.0298	-0.40	0.0257	0.43
11	27	0.0158	0.0383	-0.0028	-0.03	0.0505	0.68
12	27	0.0004	0.0387	-0.0236	-0.29	0.0301	0.44
13	28	-0.0029	0.0357	-0.0349	-0.42	0.0420	0.64
14	29	0.0036	0.0394	-0.0421	-0.49	0.0487	0.79
15	28	0.0478	0.0891	-0.0064	-0.07	0.0777	1.07
16	27	-0.0364	0.0495	-0.0627	-0.79	0.0271	0.48
17	27	-0.0112	0.0377	-0.0654	-0.83	0.0301	0.52
18	27	0.0045	0.0424	-0.0718	-0.91	0.0155	0.27
19	27	0.0431	0.0873	-0.0382	-0.44	0.0633	1.02
20	26	0.0083	0.0963	-0.0551	-0.60	0.0456	0.67
21	26	0.0094	0.1066	-0.0500	-0.55	0.0463	0.64
22	26	0.0136	0.1216	-0.0709	-0.75	0.0331	0.44
23	26	0.0001	0.1217	-0.0603	-0.62	0.0590	0.76
24	25	0.0386	0.1650	-0.0408	-0.40	0.0936	1.16
25	27	0.0024	0.1678	-0.0530	-0.54	0.0935	1.23
26	27	0.0197	0.1908	-0.0455	-0.47	0.1122	1.47
27	28	0.0268	0.2227	-0.0408	-0.43	0.1131	1.45
28	28	0.0340	0.2643	-0.0161	-0.16	0.1298	1.54
29	28	-0.0211	0.2376	-0.0037	-0.04	0.1326	1.51
30	28	0.0243	0.2677	-0.0007	-0.01	0.1401	1.56
31	28	0.0579	0.3411	0.0375	0.32	0.1859*	1.84
32	27	0.0226	0.3714	0.0339	0.29	0.1904*	1.88
33	27	0.0170	0.3947	0.0824	0.67	0.2352**	2.21
34	27	-0.0063	0.3859	0.1089	0.89	0.2522**	2.33
35	27	0.0097	0.3993	0.1378	1.08	0.2665**	2.33
36	27	0.0108	0.4144	0.1371	1.09	0.2605**	2.27

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 7.11b
Long Run Buy & Hold Returns

Abnormal Return earned using a holding strategy on a portfolio comprised of firms privatized in the United Kingdom.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted B&H	Market Adj. B&H		Industry Adj. B&H	
1	35	0.0190	0.0190	0.0134*	1.77	0.0075	1.21
2	35	0.0666	0.0869	0.0566***	3.91	0.0278**	2.64
3	35	0.0229	0.1118	0.0568***	3.64	0.0360**	2.25
4	35	-0.0055	0.1057	0.0386**	2.67	0.0171	0.98
5	35	0.0164	0.1238	0.0612***	3.76	0.0408**	2.05
6	35	0.0201	0.1464	0.0614***	3.41	0.0369**	2.17
7	35	-0.0046	0.1411	0.0603***	2.76	0.0233	1.42
8	35	0.0033	0.1449	0.0700***	2.73	0.0238	1.18
9	35	-0.0019	0.1427	0.0717***	2.98	0.0248	1.39
10	35	0.0004	0.1432	0.0790***	2.74	0.0182	0.82
11	35	-0.0237	0.1161	0.0667**	2.14	0.0352	1.64
12	35	0.0291	0.1486	0.1119***	3.00	0.0552**	2.39
13	35	0.0194	0.1709	0.1195***	3.16	0.0576**	2.50
14	35	0.0525	0.2324	0.1615***	4.13	0.0829***	3.20
15	35	0.0141	0.2498	0.1383***	3.89	0.0613**	2.56
16	35	-0.0222	0.2221	0.1172***	2.99	0.0365	1.59
17	35	0.0717	0.3097	0.1513***	4.12	0.0715***	2.83
18	35	-0.0314	0.2686	0.1132***	3.47	0.0298	1.15
19	35	-0.0008	0.2676	0.1384***	3.75	0.0413	1.42
20	35	-0.0180	0.2448	0.1250***	3.12	0.0224	0.75
21	35	0.0548	0.3130	0.1776***	3.43	0.0480	1.28
22	35	-0.0170	0.2907	0.1350***	2.58	0.0025	0.06
23	35	0.0192	0.3155	0.1289**	2.62	0.0021	0.05
24	35	0.0053	0.3225	0.1329**	2.71	0.0071	0.19
25	35	0.0205	0.3496	0.1291***	2.73	0.0079	0.19
26	35	0.0226	0.3801	0.1277**	2.66	0.0082	0.22
27	35	0.0648	0.4695	0.1898***	3.65	0.0455	1.19
28	35	0.0003	0.4700	0.2177***	3.82	0.0545	1.45
29	35	0.0487	0.5416	0.2543***	4.37	0.1067**	2.46
30	35	0.0115	0.5594	0.2531***	4.36	0.1031**	2.39
31	35	0.0165	0.5851	0.2882***	4.58	0.1159**	2.60
32	35	0.0138	0.6069	0.2984***	4.29	0.1356***	3.15
33	35	0.0445	0.6784	0.3590***	5.32	0.1776***	4.16
34	35	0.0257	0.7215	0.3666***	5.05	0.1699***	3.80
35	35	0.0463	0.8012	0.4355***	5.99	0.1982***	3.89
36	35	0.0379	0.8695	0.4750***	5.94	0.2072***	3.57

*   Significant at the 10% level.

**   Significant at the 5% level.

***   Significant at the 1% level.

Table 7.11c
Long Run Buy & Hold Returns

Abnormal Return earned using a holding strategy on a portfolio comprised of firms privatized in Emerging Markets.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted B&H	Market Adj. B&H		Industry Adj. B&H	
1	10	0.0568	0.0568	0.0402	1.06	0.0366	0.87
2	10	0.0667	0.1273	0.1168	1.42	0.0370	0.48
3	10	0.0236	0.1539	0.1407	1.53	-0.0087	-0.11
4	10	-0.0130	0.1389	0.1045	1.01	-0.0725	-0.94
5	12	0.0176	0.1590	0.1007	1.26	-0.0358	-0.69
6	12	0.0094	0.1699	0.0808	1.08	-0.0857*	-2.05
7	12	0.0128	0.1849	0.0589	0.75	-0.1082**	-2.49
8	12	0.0195	0.2080	0.1112	1.21	-0.0625	-1.11
9	12	-0.0091	0.1970	0.1101	1.24	-0.0266	-0.45
10	12	0.0473	0.2536	0.1545	1.40	-0.0290	-0.36
11	12	0.0468	0.3123	0.2123	1.34	0.0144	0.11
12	12	0.0437	0.3697	0.2556	1.39	0.0659	0.43
13	12	-0.0580	0.2902	0.2283	1.10	0.0627	0.34
14	12	0.0271	0.3251	0.2456	1.14	0.0716	0.37
15	11	0.1272	0.4936	0.3171	1.27	0.1177	0.51
16	11	0.0414	0.5554	0.3692	1.09	0.1439	0.43
17	11	0.0885	0.6930	0.4610	1.21	0.2025	0.54
18	11	0.0184	0.7242	0.4725	1.35	0.1657	0.49
19	10	-0.1808	0.4125	0.1308	0.83	-0.1674	-1.46
20	10	0.0396	0.4685	0.1450	0.95	-0.1425	-1.27
21	11	-0.0407	0.4088	0.0752	0.49	-0.1835	-1.46
22	11	-0.0080	0.3976	0.0193	0.10	-0.1772	-1.46
23	11	-0.1031	0.2535	0.0187	0.11	-0.1458	-1.63
24	11	-0.0175	0.2316	0.0161	0.09	-0.1393	-1.61
25	11	0.0091	0.2428	0.0152	0.09	-0.1452	-1.79
26	11	0.0064	0.2508	0.0192	0.11	-0.1595	-1.69
27	10	0.0806	0.3516	0.0691	0.40	-0.0756	-1.17
28	10	0.0089	0.3636	0.0680	0.39	-0.0702	-1.00
29	10	0.0324	0.4078	0.0971	0.49	-0.0775	-1.00
30	10	0.0337	0.4552	0.1016	0.47	-0.0735	-1.09
31	10	0.0382	0.5108	0.1208	0.56	-0.0636	-0.94
32	9	0.0375	0.5674	0.1633	0.68	-0.0778	-1.12
33	9	-0.0298	0.5207	0.1660	0.75	-0.0729	-1.10
34	8	0.0579	0.6087	0.3281	1.75	-0.0942	-1.42
35	8	0.0091	0.6234	0.3188	1.60	-0.1274	-1.62
36	8	0.0493	0.7035	0.3710	1.50	-0.1664*	-2.03

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

Table 7.11d
Long Run Buy & Hold Returns

Abnormal Return earned using a holding strategy on a portfolio comprised of firms privatized in other countries.

Month from offering	Firms trading	Unadjusted Monthly Return	Unadjusted B&H	Market Adj. B&H		Industry Adj. B&H	
1	16	0.0272	0.0272	0.0345	0.86	-0.0090	-0.48
2	16	0.0301	0.0581	0.0398	1.04	0.0004	0.01
3	16	-0.0042	0.0537	0.0371	0.65	-0.0134	-0.28
4	16	-0.0106	0.0425	0.0316	0.54	-0.0215	-0.46
5	16	-0.0129	0.0290	0.0232	0.38	-0.0129	-0.28
6	16	-0.0150	0.0136	0.0120	0.20	-0.0271	-0.72
7	16	-0.0019	0.0117	0.0135	0.19	-0.0286	-0.66
8	16	0.0304	0.0425	0.0381	0.48	-0.0003	-0.01
9	15	0.0114	0.0544	0.0775	0.89	0.0118	0.19
10	15	-0.0083	0.0457	0.1048	1.18	0.0222	0.30
11	15	-0.0150	0.0300	0.0880	0.98	0.0175	0.21
12	15	0.0416	0.0728	0.1212	1.05	0.0476	0.39
13	14	0.0387	0.1143	0.1642	1.27	0.0822	0.59
14	14	-0.0010	0.1132	0.1550	1.10	0.0705	0.47
15	13	-0.0018	0.1112	0.1535	1.09	0.0631	0.41
16	13	-0.0399	0.0669	0.1141	0.81	0.0258	0.17
17	13	0.0360	0.1053	0.1581	1.25	0.0493	0.35
18	12	0.0661	0.1784	0.2160	1.62	0.0771	0.48
19	12	0.0851	0.2787	0.3196*	1.93	0.1809	0.96
20	12	0.0130	0.2953	0.3363	1.63	0.2121	0.93
21	12	0.0516	0.3622	0.3775	1.69	0.2522	1.06
22	12	0.1157	0.5198	0.5105*	1.84	0.3921	1.36
23	12	0.0401	0.5807	0.5676	1.77	0.4148	1.37
24	12	0.0276	0.6244	0.6145*	1.82	0.4267	1.41
25	12	0.0162	0.6507	0.5996	1.70	0.4123	1.40
26	12	0.0517	0.7360	0.6631	1.78	0.4401	1.44
27	12	-0.0696	0.6152	0.5480	1.64	0.3266	1.22
28	12	0.0161	0.6412	0.5748	1.72	0.3234	1.17
29	12	0.0234	0.6796	0.5984	1.78	0.2583	0.96
30	11	0.0516	0.7662	0.6848	1.77	0.0386	0.11
31	11	-0.0631	0.6548	0.5712	1.78	-0.2094	-0.39
32	11	-0.0317	0.6024	0.5327	1.76	-0.0541	-0.13
33	11	-0.0162	0.5765	0.5021	1.60	-0.0644	-0.15
34	10	0.0274	0.6197	0.5129	1.48	-0.3948	-0.56
35	10	0.0812	0.7513	0.6666	1.67	-0.5728	-0.66
36	10	-0.0216	0.7134	0.6648	1.58	-0.4778	-0.62

*   Significant at the 10% level.
**   Significant at the 5% level.
*** Significant at the 1% level.

The question as to which adjustment provides the better measure of abnormal returns is debatable. In general, the industry adjustment provides a better indication of the average returns which could have been earned by similar firms operating in the same industry. But due to the deficiencies of the industry adjustment which we discussed earlier, average abnormal returns calculated using the market adjustment are probably more reliable.

Table 7.12 presents the 36th period cumulative and B&H returns across sub-samples. Tables 7.10a to 7.10d and 7.11a to 7.11d present the detailed monthly returns earned on each sub-sample portfolio in the usual order. The UK sub-sample (7.10b and 7.11b) shows results that are the most consistent with the full sample. The cumulative and B&H returns are positive and significant for almost every period (even after adjustments). In the other sub-samples, the returns are generally positive but not always significantly different from zero. Notice that in continental Europe, the industry adjusted B&H return is significantly positive in the 36th period. In emerging markets, the industry adjusted B&H return is significantly negative in the 36th period. F-tests indicate that the long term adjusted and unadjusted (raw) returns are not significantly different across the four sub-samples.

Therefore, during the period of this study, investors could earn greater positive returns by investing in a portfolio of SIPs than by investing in the market. This is also true when the industry adjustment is considered, but to a lesser extent. Overall, cumulative returns adjusted using industry indices are significantly positive in later periods. On the basis of these results, we can reject Hypothesis 6.1 at the 95% degree of confidence. Returns earned on the SIPs portfolio are significantly greater than returns earned on the market portfolio or a portfolio comprised of firms operating in the same industry as the privatized SOEs. Notice that these

Table 7.12
Long Run Performance in Sub-Samples

Mean long run performance computed for each of the four country's categories. t-statistics are in parentheses. F-statistics test the null hypothesis of no difference between groups.

Group	Sub-Sample Size	Under-pricing	3-year cumulative Return (Raw)	3-year cumulative Return (ARM)	3-year cumulative Return (ARI)	3-year (B & H) Return (Raw)	3-year (B & H) Return (ARM)	3-year (B & H) Return (ARI)
C.E.	35	8.88%*** (3.11)	34.51%** (2.64)	13.86% (1.10)	17.85% (1.48)	41.44%*** (3.12)	13.71% (1.09)	26.05%** (2.27)
U.K.	35	19.38%*** (13.94)	66.99%*** (12.43)	33.05%*** (6.66)	15.22%*** (3.99)	86.95%*** (9.87)	47.50%*** (5.94)	20.72%*** (3.57)
E.M.	8	51.13%** (2.66)	51.57%* (2.04)	18.25% (1.37)	-8.42% (-1.55)	70.35% (1.84)	37.10% (1.50)	-16.64%* (-2.03)
Oth.	10	15.14%** 2.44	48.13% (1.82)	40.54% (1.54)	-4.61% (-0.23)	71.34% (1.65)	66.48% (1.58)	-47.78% (-0.62)
F-stat		9.49***	1.63	0.99	1.19	1.72	1.80	1.88

*   Significant at the 10% level.
**   Significant at the 5% level.
*** Significant at the 1% level.

results are quite different from those Ritter obtained in his analysis of regular IPOs.[128] The differences that exist between a sample of IPOs and a sample of SIPs, both in terms of the nature and objectives of SIPs, are important enough to result in different long run stock price performance.

The overperformance of SIPs is even larger if we include the returns earned on the first few days of trading. In his analysis of IPOs' long run performance, Ritter argued that overoptimism about the future prospects of IPOs is causing early mispricing which, once corrected, results in underperformance. To show this, the impact of underpricing had to be excluded. Given the results obtained in this section, the long run performance of SIPs cannot be explained along the lines of early overoptimism. In order to accurately assess the extent to which SIPs outperform the market and the industry, the average premium of around 19% due to underpricing can further be added to the results obtained in Tables 7.10 and 7.11. Investors acquiring shares in SIPs have therefore earned a 3-year average return close to 90%.

Ritter argued that the long run underperformance of IPOs could be due to an incorrect systematic risk assessment. Applying this reasoning to SIPs, one would argue that at first, investors tend to over-evaluate the risk associated with the future prospects of privatized SOEs. As investors reassess the risk in the long run, they tend to lower the risk premium required to invest in privatized SOE stocks, which ultimately results in an increase in price and long run overperformance. Ritter's arguments aside, it could also be argued that high returns earned on the SIP portfolio are in fact compensation paid for risk. As is well known from finance theory, return on stock price is an increasing function of the systematic risk associated with the security, as greater risk calls for greater expected compensation through high returns for investors.

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[128] Recall the long run stock performance of regular IPO's underperform a portfolio comprised of market indices or matched firms.

At this point, it is hard to explain why privatized firms would have high systematic risk. Privatized SOEs are usually firms that are quite large and involved in mature industries. Further, these firms often operate as monopolies or are given exclusivity over a given territory. This is the case with most of the telecommunication firms which were privatized and are included in the sample, as well as the public utilities.[129] These firms therefore operate as local monopolies. Finally, recall that privatized firms often were state-owned because government felt some years ago that a firm of national importance was threatened. Government at the time decided to acquire the firm. Privatization often does not alter the relative national importance of a firm. In this case, government is not likely to let the firm go bankrupt, and hence, in some cases, the risk of bankruptcy is absent even after privatization. Taking into consideration all of these arguments, the privatized firms' profitability or survival does not appear to be at risk.

The average beta of the firms included in the sample, computed over a hundred days between day 100 and day 200 following the date of the issue, is 0.7201. Firms having high systematic risk typically have high (above 1 in absolute value) beta measures. This provides support to the above argument that privatized SOEs are not, on average, firms with high systematic risk.

Given that on average privatized firms have betas of less than one, using an expected return model that takes beta into account (e.g. the market model) would most likely lead to even higher long term performance than what is reported in Tables 10 and 11. If SIPs are issued in markets that are efficient, then it seems like there is uncertainty associated with the future profitability of privatized SOEs which the market model does not pick up. If this is the case, then

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[129] See Yarrow [1994] for a discussion of the impact that privatization had on the competition in the electricity supply industry in the United Kingdom.

the results described in Tables 7.10 and 7.11 do not show abnormal returns but rather reflect the fact that the risk adjustment used is incorrect. In that case, it could be assumed that there exists uncertainty related to privatized firm's stock for which investors require compensation. Models like the one used to calculate abnormal returns or the market model fail to take this uncertainty into account and provide biased estimates of expected returns.

Such an uncertainty can be caused by the impact that government regulations might have on the future profitability of privatized firms. In many countries, firms which remain monopolies after the privatization are often subject to regulations regarding the amount of profit they can earn.[130] Investors may be uncertain about the impact that such regulations can have on firms' profitability or they may be uncertain about the extent to which government will enforce the rules. In our situation, long run performance can be explained by the fact that regulation had a less negative impact on firms' profits than investors expected.

Finally, notice that the above results are consistent with the idea of government acting strategically in the setting of privatization programs. We argued that in order to ensure the success of future SIPs and, at the same time, fulfilling an objective of encouraging wider share ownership among the general public, governments should attempt to privatize first SOEs which have the greatest potential gain in terms of profitability. In this case, inexperienced investors would revise upwards their expectations about the privatized firm's future profitability, thus causing above average stock price performance for SIPs. Such an issue is further explored in the next section. We also provide a more detailed analysis of privatized firms' long run performance by characterizing the long returns by criteria like firm size, industry and the likelihood of government intervention in

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[130] In the United Kingdom, for example, regulations often limit the ratio of return on investment which a firm can generate. See Rees [1988].

the firm's operations. This analysis is meant to shed some light on which factors could have an influence on the long run performance of SIPs.

7.5   Sensitivity Analysis

In this section, which is exploratory, we attempt to identify the relations among the dependent variables studied in previous sections and other independent variables. We examine the effect of five variables. One is firm size relative to the market, measured by FRV, and the second is the industry. The third and fourth measure the timing of privatizations relative to the other SIPs included in the sample and relative to the other SIPs in the same country. The fifth variable attempts to measure the likelihood of government intervention in the future operation of the SIPs.

The procedure used to perform this sensitivity analysis is basically the same throughout this section. First, the expected directions of the relations between the dependent variables and the independent variables are discussed. Different sub-samples are then formed, using either quartiles (FRV), categories (industry) or dichotomous variables (timing and government intervention). We compute the mean of the dependent variables for each sub-sample and perform analyses of variance to assess the difference in means across sub-samples. The means for each sub-group and the F-statistic testing the null of no difference between groups are presented in summarizing tables, and the results are discussed. Regression results are analyzed in section 7.6.

7.5.1   Firm Size Relative to the Market

To create sub-samples using the relative size criterion, we sort the sample in ascending order using FRV as the sorting criterion. We then divide the sample into four approximately equally sized sub-groups. Given FRV is available for 98 out of the 99 firms, the second and last

size sub-groups include 24 instead of 25 firms. We are then left with four sub-groups, where Group 1 includes firms with smallest FRV and Group 4 those with the largest FRV.

The relation between FRV and retained ownership is discussed in section 7.2, and is therefore not addressed in this section. Recall that in section 7.3, we argued that, in order to study the relation between risk and underpricing, size measured in absolute terms may not be an accurate proxy for risk. The main reason why risk is assumed to be related to size is because size may be a good proxy for the degree of diversification in a firm. Size measured in absolute terms can however be misleading because it does not take into account the maximum size a firm could get given the limitations imposed by the size of an economy. Therefore, the amount of diversification may be better proxied by the size of the firm relative to the size of the country's economy.

In this section, we consider FRV as an alternative measure of size, and predict the same relation between size and underpricing. Since it can be assumed that larger issues are less speculative in nature, investors could find it less risky to invest in larger firms. Under these circumstances, size would be negatively related to risk. Since underpricing is assumed to increase with risk, we expect a negative relation between underpricing and firm size measured using FRV.

We also argued that when a firm is large relative to market capitalization, underpricing could serve as a device which can ease the flotation of large issues. Under these circumstances, when the firm is large relative to the market size, the government could issue the shares at a price which is even more below the market price than usual. This argument results in a prediction in the opposite direction than the prediction based on the risk argument. Therefore, in order to

establish the relation between underpricing and FRV, we have two competing hypotheses which result in conflicting predictions about the sign of the relation.

The relation between long run performance and relative firm size is more difficult to establish. There seems to exist an empirical regularity that small firms typically perform better than larger firms.[131] Even though this phenomenon is not very well explained, it might also apply to SIPs. If this is the case, we would expect a negative relation between firm size and long run performance, and therefore expect greater long run returns for the quartile of smallest firm.

Results summarized in Table 7.13 support to some extent the long run performance prediction, but do not support any of the predicted relations between underpricing and firm size. For underpricing, the F-statistic is not significant, which shows that there are no significant differences in terms of underpricing across the four size sub-groups. This could be due to the fact that the two predicted relations between FRV and underpricing offset each other. It would also happen if neither hypothesized relation is supported. In section 7.6.2, we test the impact of size (FRV) on underpricing and control for the effect of smaller markets.

There appears to be differences in the adjusted and unadjusted long run performance across the size sub-groups. We also ran an F-test to test the differences in means between the quartile 1 (smallest firms) and quartile 4 (largest firms). Results summarized in the table show that there do not exist significant differences in terms of underpricing and long run underperformance between these two groups.

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[131] See Fama and French [1992, p.432-440].

Table 7.13
Sensitivity Analysis on FRV Quartiles

Mean long run performance computed for each of four equally sized categories formed by sorting the sample using FRV. t-statistics are in parentheses. The first reported F-statistic tests the null hypothesis of no difference between groups and the second F-statistic tests the null hypothesis of no difference between firms in Quartile 1 and firms in Quartile 4.

Quart.	Sub-Sample Size	Fraction of Ownership Retained	Under-pricing	3-year cumulative Return (Raw)	3-year cumulative Return (ARM)	3-year cumulative Return (ARI)	3-year (B & H) Return (Raw)	3-year (B & H) Return (ARM)	3-year (B & H) Return (ARI)
1	25	21.05%*** (3.24)	17.24%*** (7.68)	72.20%*** (8.10)	42.90%*** (5.43)	26.32%*** (3.89)	102.13%*** (5.62)	68.77%*** (4.11)	43.60%*** (2.77)
2	24	15.60%** (2.73)	15.67%*** (6.86)	53.67%*** (7.61)	27.82%*** (4.21)	18.87%*** (2.89)	62.43%*** (6.17)	34.13%*** (3.55)	20.67%** (2.44)
3	25	33.88%*** (5.05)	16.57%*** (3.96)	7.15% (0.39)	-17.36% (-1.04)	-21.42% (-1.33)	15.60% (1.03)	-9.31% (-0.79)	-12.09% (-1.07)
4	24	60.74%*** (12.19)	26.33%** (2.66)	66.56%*** (4.10)	42.43%*** (3.01)	12.18% (1.18)	82.41%*** (3.49)	46.97%** (2.15)	-23.41% (-0.58)
F-stat		11.66***	0.924	5.02***	5.79***	4.22***	4.34***	4.14***	2.06
F-stat	Q1 & Q4	24.17***	1.01	0.10	0.01	1.39	0.45	0.65	2.69

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

The results are consistent with the size effect discussed by Fama and French [1992], in that smaller firms appear to perform better than large firms for the first three sub-groups. On the other hand, the performance of the smallest and largest sub-groups are approximately the same. The results for the relation between the fraction of ownership retained and firm size are consistent with the results obtained in section 7.2, in that retained ownership increases in FRV.

7.5.2 Industry

In this sub-section, we analyze the impact of the industry on underpricing and long run performance.[132] The main reason why underpricing and long run performance could vary across industry can again be related to risk assessments. Privatized SOEs usually operate in mature and stable industries, such that risk is not likely to vary much across industry categories. On the other hand, before the outburst of privatization which occurred in the 1980's, investors did not have the opportunity to invest in the domestic public utilities like Electric and Water utilities and telecommunication firms. As such, investors may have been more uncertain about the future prospects of these firms, due to their lack of experience. The same cannot be said about the other industries, since in most capital markets, stocks of firms operating in the banking, manufacturing, transportation and resources industries have been publicly traded for many years.

The public utility firms described above also distinguish themselves by the fact that they operate in industries where there are important barriers to entry. These firms benefit from existing infra-structure which is very costly to replicate by potential competitors. For example,

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[132] The impact of industry on retained ownership is discussed in section 7.2.

Table 7.14
Sensitivity Analysis by Industry

Mean long run performance computed for each industry. t-statistics are in parentheses. F-statistics test the null hypothesis of no difference between groups.

Ind.	Sub-Sample Size	Under-pricing	3-year cumulative Return (Raw)	3-year cumulative Return (ARM)	3-year cumulative Return (ARI)	3-year (B & H) Return (Raw)	3-year (B & H) Return (ARM)	3-year (B & H) Return (ARI)
Bank	11	9.77%** (2.76)	21.94% (0.78)	-2.03% (-0.07)	2.06% (0.08)	34.84% (1.53)	9.90% (0.47)	15.69% (0.75)
Util.	28	20.78%*** (6.59)	71.32%*** (11.20)	43.50%*** (10.27)	26.02%*** (8.12)	94.97%*** (10.29)	64.03%*** (8.73)	39.72%*** (6.69)
Mfrg	8	22.18%*** (4.20)	10.93% (0.57)	1.92% (0.14)	-1.64% (-0.10)	12.82% (0.63)	-0.21% (-0.02)	-3.48% (-0.21)
O&G	10	7.29% (1.53)	21.61% (1.74)	-4.05% (-0.30)	-4.03% (-0.38)	14.28% (0.91)	-23.25% (-1.73)	-13.26% (-1.00)
Telec.	12	29.99%* (1.94)	77.76%*** (4.23)	52.20%** (2.71)	14.85% (0.87)	107.61%** (3.04)	81.10%** (2.40)	-24.16% (-0.37)
Trsp	11	24.59%** (3.45)	63.22%*** (4.68)	25.94%** (2.55)	2.28% (0.47)	78.11%*** (3.32)	32.11% (1.57)	-1.54% (-0.19)
F-stat		1.96*	3.58***	3.20**	1.15	3.98***	4.75***	1.03

*   Significant at the 10% level.

**   Significant at the 5% level.

*** Significant at the 1% level.

electric utilities benefited from access to existing infra-structure such as power lines, which allowed them to deliver electrical power to residents. Such infra-structure is too costly to duplicate. Since they are less subject to discipline by competitive pressure, the impact that privatization can have on these firms is more uncertain.[133] If uncertainty is greater for these utilities, then we can expect larger underpricing and long run performance due to the existence of a larger risk premium for utilities.

Recall also that public utilities were more subject to regulations. That is due first to the fact that they often remain local monopolies after privatization. Second, they often produce commodities that are seen as being essential. As we argued earlier, overperformance for these firms can be explained by the fact that the regulations did not have an impact on profitability which was as negative as investors originally thought.

The results summarized in table 7.14 tend to support this reasoning for long run performance and, to some extent, for underpricing. Underpricing is weakly significantly different across industry categories, but the results of the F-tests support the notion of differences in long run performance (unadjusted and market adjusted) across industry categories. The long run performance appears to be greater for the public utilities and telecommunication firms. It also appears to be greater in the transportation industry, a result which the above reasoning fails to explain.

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[133] The British government attempted to define correcting measures for the lack of competition in certain industries. For example, in the case of British Telecom, the British government imposed price regulations, among other things. See Beesley and Littlechild [1989].

7.5.3   Early versus Late Privatizations - Across sample

To distinguish late privatizations from those that occurred early, we divide the sample into two categories. As a first step, we distinguish early privatizations from late privatizations by sorting the whole sample using the privatization date as the sorting criterion. We form two equally sized sub-samples using the median privatization as the cut-off point, and assign the value 1 to the late privatizations.

This categorization of timing of privatization allows us to investigate whether the governments acted strategically in setting their privatization programs. Governments wishing to ensure the success of future SIPs and encourage wider share ownership for the general public could take advantage of information asymmetry. They could do so by privatizing earlier firms which the government had reasons to believe would be more successful than others once privatized. If governments acted strategically in such a manner, then, for earlier privatization, we can expect larger underpricing (to encourage participation in future SIPs) and better long run performance. As for retained ownership, we have no reasons to expect a difference among groups formed on a "timing" basis.

The results summarized in Table 7.15 do not support this reasoning. Underpricing does not significantly differ for earlier privatizations. Even though there are weakly significant differences in terms of long run performance for early vs. late privatizations, the differences are in the opposite direction than the one predicted. For the whole sample of SIPs, late privatizations outperform early privatizations when the returns are adjusted by subtracting the returns on the market portfolio or the industry portfolio. Retained ownership is significantly larger for firms privatized earlier.

7.5.4 Early versus Late Privatizations - Within country

In a second kind of timing categorization, we distinguish early versus late privatization in each country. We apply the same procedure as for the whole sample to each country, and assign the value 1 to the later privatization in each country. Since many countries have an odd number of privatizations, we decide to classify the median privatization as an early privatization.[134]

The predictions with respect to the relation between timing within country and the dependent variables are the same as for the other type of timing categorization. We still expect to see earlier privatizations being more underpriced and perform better than later privatization. We still explain the predictions by arguing that governments may be tempted to take advantage of an information asymmetry and privatize firms with greater future prospects earlier.

The results for this kind of timing categorization are also summarized in Table 7.15, and do not support our predictions.[135] When the classification is done within countries, underpricing is not significantly different between the two sub-samples. Late privatizations outperform earlier ones when the returns are unadjusted, or when we consider B&H returns adjusted for industry returns. This is opposite to what we predicted. Retained ownership is not different for the two sub-samples.

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[134] Two alternative classifications were attempted. First, we classified the median privatization as a late privatization. Second, we recorded the median privatization as missing, and computed the mean on the remaining privatizations. Both classification provide the same results.

[135] The table presents the aggregate results. The only country for which the sample size is large enough to allow for a separate test is the United Kingdom. Results obtained in this country are similar to the aggregate results, and are not reported.

Table 7.15
Sensitivity Analysis on Timing

Mean long run performance computed for categories distinguishing between early and late privatizations. The cross-sample categorization distinguishes between early and late privatization across the whole sample. The within-country categorization distinguishes between early and late privatization such that the early half privatization for each country is an early privatization. The cut off is the median privatization. t-statistics are in parentheses. F-statistics test the null hypothesis of no difference between groups.

Group	Sub-Sample Size	Fraction of Ownership Retained	Under-pricing	3-year cumulative Return (Raw)	3-year cumulative Return (ARM)	3-year cumulative Return (ARJ)	3-year (B & H) Return (Raw)	3-year (B & H) Return (ARM)	3-year (B & H) Return (ARJ)
Across Sample									
Early	38	39.29%***(7.42)	14.97%***(5.33)	46.19%***(5.29)	17.12%**(2.18)	2.19%(0.37)	55.13%***(4.28)	19.29%(1.59)	-13.79%(-0.72)
Late	37	18.70%***(3.81)	16.25%***(9.72)	60.15%***(6.25)	36.97%***(4.34)	21.10%**(2.59)	83.21%***(6.93)	57.57%***(5.82)	34.58%***(3.74)
F-ratio		8.11***	0.16	1.15	2.93*	3.52*	2.54	6.01**	5.25**
Within Country									
Early	48	27.10%***(5.86)	16.25%***(8.45)	42.46%***(4.71)	16.95%**(2.02)	3.55%(0.49)	56.36%***(5.04)	28.51%***(2.70)	12.17%(1.37)
Late	27	29.10%***(4.63)	21.92%***(4.02)	71.54%***(10.60)	35.14%***(6.46)	24.47%***(3.55)	91.45%***(8.00)	49.73%***(5.16)	31.02%***(3.95)
F-stat		0.07	1.35	3.97*	1.83	3.01*	3.49*	1.48	1.66

*   Significant at the 10% level.
**   Significant at the 5% level.
*** Significant at the 1% level.

7.5.5   Opportunity for Government's Intervention

In our discussion of the theory of mixed enterprise, we argued that when governments retain ownership in firms, investors may believe that the government may still intervene in the firm's operation in order to promote socio-political objectives. Therefore, the presence of retained ownership may cause increased uncertainty about the firms' future prospects, which in turn causes an increase in total risk. Under these circumstances, we would expect larger long run performance and underpricing when governments retain ownership.

In certain cases, governments retain special shares which allow them to intervene only in certain aspects of the privatized firms' business. For example, in order to block foreigners or other types of investors who might attempt to takeover the ownership of a privatized SOE, governments often retain a special share (also called a Golden share in the United Kingdom) which allows them to block hostile takeovers.[136] Therefore, retained ownership and the special share are interchangeable devices which can be used to intervene in the firms' activities.

To analyze the impact of possible intervention of the government in the privatized firms' activities, we create two sub-samples using a combination of retained ownership and the existence of a special share as a dichotomous variable. For firms in which the government did not retain ownership or a special share, we assume that the government's intervention is less likely. For firms in which the government retained ownership or a special share, government's intervention in the firm's activities is more likely. Since investors are more uncertain about the future prospects of firms for which government intervention is more likely, risk may be greater

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[136] The share also allows governments to appoint directors. See Prosser [1988, p. 46] and Jones *et al.* [1994, p.6] for a complete definition of special shares.

for these firms. Underpricing and long run performance may then be larger, reflecting such an increase in risk.

The results summarized in Table 7.16 support this claim to some extent. There are significant differences in unadjusted long run performance between the two groups, and the group for which governments are more likely to intervene display greater unadjusted long run performance. The two groups do not differ significantly with respect to underpricing.

Table 7.16

Sensitivity Analysis on the Opportunity of Government Intervention

Mean long run performance computed for categories distinguishing between privatizations for which the governments held special (golden) shares or retained ownership and those for which the government can not directly intervene. t-statistics are in parentheses. F-statistics test the null hypothesis of no difference between groups.

Group	Sub-Sample Size	Under-pricing	3-year cumulative Return (Raw)	3-year cumulative Return (ARM)	3-year cumulative Return (ARJ)	3-year (B & H) Return (Raw)	3-year (B & H) Return (ARM)	3-year (B & H) Return (ARJ)
No Gvmnt Part.	28	13.64%*** (3.80)	26.23%* (1.88)	12.51% (0.95)	8.50% (0.70)	39.37%** (2.28)	23.59% (1.47)	22.45% (1.55)
Gvmnt Part.	52	20.74%*** (6.84)	66.07%*** (11.15)	33.31%*** (5.97)	12.75%*** (2.91)	83.39%*** (8.82)	44.88%*** (5.09)	3.63% (0.25)
F-stat		2.02	9.36***	2.89*	0.16	5.93**	1.60	0.69

*	Significant at the 10% level.
**	Significant at the 5% level.
***	Significant at the 1% level.

7.6   Regression Analyses

To conclude the empirical analysis of retained ownership, underpricing and long run performance, we analyze a final set of OLS regressions. Concerning retained ownership and underpricing, we expand the regression analyses performed in earlier sections by including the categorical variables defined in section 7.5. We consider the impact that these variables can have on the appropriate dependent variable both through their impact on the intercept and through their impact on the slope coefficient. As for long run performance, we analyze OLS models which are built according to the arguments expressed in section 7.5.

7.6.1   Retained Ownership

To complement the model developed in equation (7.1), we consider adding two categorical variables. In markets which can absorb one hundred percent of the shares of SOE, if the government wishes to leave the door open to future intervention, it can alternatively choose to retain ownership or a special share. Hence, special shares can be substituted for retained ownership under certain circumstances. The first regression in Table 7.17 therefore includes a dummy variable SS taking the value 1 for privatizations in which the government retained a special share. Given that both devices can be substitutes, we expect a negative coefficient for the dummy variable.

The results summarized in Table 7.4 tend to indicate different results for the United Kingdom sub-sample than for the sample of non-British firms. We further develop the model to include a UK dummy variable taking the value 1 if the firm originates from the United Kingdom. The main reason why the UK is assumed to be in a different category in terms of

privatization is due to the size of its economy. We hypothesize that given a well developed economy, the British capital markets have more capacity of absorption than the other markets in general. As such, we expect that, in a regression analysis of retained ownership, the intercept is less in the United Kingdom. We hypothesize that, in the United Kingdom, firms have to be larger relative to stock markets to be issued with retained ownership, other things being equal. As opposed to other markets, in which governments may be forced to retain ownership due to limited capacity, the British government has more freedom to choose between both devices because of the greater capacity of capital markets. The extent to which a special share is a substitute to retained ownership is therefore increased in the UK, and we expect a stronger negative relation between SS and retained ownership for British SIPs.

To test this, we consider three alternative models including the UK dummy. The first alternative is to use UK as a categorical variable. Since the UK market is assumed to have more capacity, we assumed that other things being equal, the UK government chose to retain less ownership in firms (i.e. a negative coefficient for the UK dummy). The second alternative uses the UK dummy as an interactive term to measure the difference in the coefficients on FRV and SS. We expect the coefficient on UK*FRV to be less than zero, which would show that other things being equal, the slope of the positive relation between FRV and retained ownership is steeper in markets with less capacity than in the UK. The third alternative consists of introducing UK both as a categorical variable and an interactive term. The model takes this general form:

(7.9)

$$\alpha_i = g_0 + g_1 FRV_i + g_2 FAF_i + g_3 SS_i + g_4 UK_i + g_5 UK_i * FRV_i + g_6 UK_i * SS_i + u_i$$

In Model 1, UK is not considered, and hence, the coefficient g_4, g_5 and g_6 are restricted to be zero. In Model 2, the restriction is relaxed for g_4, and it is relaxed for g_5 and g_6 in Model 3. There are no restrictions in Model 4.

The results summarized in Table 7.17 support the majority of our claims. In the first model, the results are unchanged from Table 7.4, and the coefficient on SS is significant and negative. In the two models that include the UK dummy, the coefficients on the dummy are in the predicted direction and significant. For the interactive terms, the coefficient on UK*FRV are significant but not in the predicted direction. When both UK and UK*SS are used simultaneously, the coefficient on the interactive term is insignificant. The coefficients on FRV remain significant and in the predicted direction throughout the analysis. The coefficient on FAF is weakly significant when either the interactive terms or the dummy variable is included, but not when both variables are used simultaneously.

The coefficient on the Special Share dummy becomes insignificant when the UK dummy is introduced. This seems to indicate that in the first regression, the SS dummy is significantly negative mainly because it serves as a proxy for UK. Since the coefficient on the SS dummy is insignificant in more developed models, it does not appear that special shares and retained ownership are used as substitutes.

Table 7.17
Regressions on Retained Ownership

Results of O.L.S. regressions where the dependent variable is the fraction of retained ownership and the independent variables are the firm's relative market value (FRV), the fraction of the issue allocated to foreign investors (FAF), a dummy variable to control for the presence of special (golden) shares (SS) and a dummy taking the value one if the firm is British (UK). Interactive terms (UK*FRV) and (UK*SS) are included to control for potential differences in coefficients for the United Kingdom. t-statistics are in parentheses.

	Constant	FRV	FAF	SS	UK	UK*FRV	UK*SS	R^2
Full Sample (n=47)								
Model 1:								
Coefficient Value	0.423^{***}	1.82^{***}	-0.138	-0.335^{***}	---	---	---	49.2%
t statistic	(5.44)	(4.53)	(-0.07)	(-4.14)				
Pred. Sign	(?)	(+)	(-)	(-)				
Model 2:								
Coefficient Value	0.528^{**}	0.864^{**}	-0.301^{*}	0.001	-0.461^{***}	---	---	69.1%
t statistic	(8.20)	(2.36)	(-1.70)	(0.01)	(-5.27)			
Pred. Sign	(?)	(+)	(-)	(-)	(-)			
Model 3:								
Coefficient Value	0.491^{***}	0.847^{**}	-0.313^{*}	0.046	---	6.75^{*}	-0.495^{***}	68.0%
t statistic	(7.56)	(2.21)	(-1.69)	(0.453)		(2.00)	(-4.84)	
Pred. Sign	(?)	(+)	(-)	(-)		(-)	(-)	
Model 4:								
Coefficient Value	0.528^{***}	0.764^{**}	-0.283	0.012	-0.482^{**}	7.29^{**}	-0.022	72.7%
t statistic	(8.48)	(2.12)	(-1.63)	(0.12)	(2.66)	(2.31)	(-0.10)	
Pred. Sign	(?)	(+)	(-)	(-)	(-)	(-)	(-)	

*　　Significant at the 10% level.
**　　Significant at the 5% level.
***　　Significant at the 1% level.

Table 7.17a
Analysis of Covariance on Retained Ownership

Analysis of covariance to determine if British and non-British governments retained ownership differently, while taking into consideration the concomitant variables FRV, FAF and SS. F-statistic test the null of no difference between the sum of squared residuals (Sum of Square).

Source	Sum of Square	Degrees of Freedom	Mean Square	F-stat
FRV, FAF, SS, UK, UK*FRV, UK*SS	1.2227	39	0.0314	
Incremental Effect (from Model 2)	0.1590	3	0.0530	1.69
FRV, FAF, SS, UK*FRV, UK*SS	1.4323	41	0.0349	
Incremental Effect (from Model 1)	0.8400	2	0.4200	12.03[***]
FRV, FAF, SS, UK	1.3817	42	0.0329	
Incremental Effect (from Model 1)	0.8916	1	0.8916	27.10[***]
FRV, FAF, SS	2.2733	43	0.0529	

*	Significant at the 10% level.
**	Significant at the 5% level.
***	Significant at the 1% level.

An analysis of covariance is performed to assess the impact of introducing UK first as a measure of change in the intercept and second, as a measure of change in the slope coefficient. The results of the analysis of covariance are summarized in Table 7.17a.[137] The residuals from Model 1, Model 2 and Model 4 in Table 7.17 are used to test the incremental impact of changing the intercept and/or the slope coefficients. The F-statistic tests the null of no difference in the mean squared errors. The null of no difference in mean squared errors between Model 1 and Model 2 is rejected at the 1% level. The null of no difference in mean squared error between Model 2 and Model 4 is not rejected. These results indicate that UK has a significant impact on the intercept, but not on the slope coefficients. From this analysis, we conclude that slope coefficients are not significantly different between the two groups, but intercepts are.

The results obtained using the OLS model must be interpreted with care, since an analysis of residual plots show that the homoskedasticity and normality assumptions are violated. As a sensitivity check, we also analyze the results obtained using the TOBIT procedure. Observe that the small sample problem mentioned in section 7.2 is reduced with this new formulation. In section 7.2, sub-sample sizes were small, such that a censored model like TOBIT was not likely to be reliable. With the formulation used in this section, the sample size is increased from 35 to 47, which should help to reduce the small sample problem.

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[137] We follow the procedure discussed in Neter, Wasserman and Kutner [1990; p.861-868].

Table 7.17b
Alternative Regressions on Retained Ownership

Results of TOBIT regressions where the dependent variable is the fraction of retained ownership and the independent variables are the firm's relative market value (FRV), the fraction of the issue which foreign investors were allowed to bid on (FAF), and a dummy variable to control for the presence of special (golden) shares. Interactive terms (UK*FRV) and (UK*SS) are included to control for potential differences in coefficients for the United Kingdom. t-statistics are in parentheses.

	Constant	FRV	FAF	SS	UK	UK*FRV	UK*SS
Full Sample (n=47)							
Model 1:							
Coefficient Value	0.646***	6.84***	-0.953*	-1.22***	---	---	---
t statistic	(3.37)	(4.34)	(-1.80)	(-4.80)			
Pred. Sign	(?)	(+)	(-)	(-)			
Model 2:							
Coefficient Value	0.911***	5.02***	-1.07**	-0.496	-1.43***	---	---
t statistic	(4.43)	(3.04)	(-2.03)	(-1.53)	(-3.80)		
Pred. Sign	(?)	(+)	(-)	(-)	(-)		
Model 3:							
Coefficient Value	0.898***	3.91**	-0.91*	0.190		81.61*	-4.45**
t statistic	(4.41)	(2.33)	(-1.72)	(0.51)		(1.85)	(-2.08)
Pred. Sign	(?)	(+)	(-)	(-)	(-)	(-)	(-)
Model 4:							
Coefficient Value	0.939***	3.82**	-0.935*	0.174	-0.499	105.49	-5.12
t statistic	(4.47)	(2.27)	(-1.77)	(0.46)	(-0.75)	(1.04)	(-1.03)
Pred. Sign	(?)	(+)	(-)	(-)	(-)	(-)	(-)

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

The increase in sample size seems to have increased the consistency of the results between OLS and TOBIT. We note differences in terms of the significance of the interactive term UK*FRV in the last regression, but this is more consistent with our prediction. In the last model, the coefficient on UK becomes insignificant.

7.6.2 Underpricing

We also develop new regression models for underpricing, in which we introduce the risk factors discussed in section 7.5. We also replace the size measure used in section 7.3 (log of firm value) by FRV. Size measured in relative terms is assumed to be a better proxy for size due to the international nature of the sample. In section 7.5, we further argued that size can also have an impact on underpricing when the government wishes to ensure the success of the issue. It can be assumed that in limited markets, larger firms are harder to sell, and governments may wish to underprice more when the firm is large. To test this claim, we introduce an interactive term EMKT*FRV, where EMKT is a dummy variable taking the value one if the shares are issued in emerging markets. These markets are assumed to be less developed than other markets, and governments issuing shares in these markets may be forced to underprice more in order to insure the success of larger issues.

We test another regression in which we include dummy variables which are assumed to proxy for other types of uncertainty. In section 7.5, the possibility of government intervention was assumed to cause uncertainty. We introduce a dummy variable labeled GI, which takes the value 1 if the government retained any share of ownership or a special share. When GI is equal to one, the nature of the future activities of the firm are assumed more uncertain since the

government can intervene to promote socio-political objectives. Underpricing is hypothesized to increase in this situation.

We also argued that investors may be more uncertain about the future of public utilities due to their lack of experience in evaluating the prospects in this industry. We introduce a dummy variable labeled UTILITY, which takes the value 1 if the privatized firm is an electric or water utility or operates in the telecommunication industry. Underpricing is hypothesized to be positively related to this variable. Finally, in order to ensure the success of future SIPs, governments may be tempted to underprice earlier issues more than later issues. The final dummy introduced is the dummy LATE, which takes the value 1 if the privatized firm is a late privatization within its country. Underpricing is hypothesized to be negatively related to this dummy variable. The model takes this general form:

(7.10)

$$AR_i = h_0 + h_1 FRV_i + h_2 \sigma_i + h_3 FRV_i * EMKT_i + h_4 GI_i + h_5 UTILITY_i + h_6 LATE_i + u_i$$

In the first model, the coefficient h_4, h_5 and h_6 are restricted to be zero. In second model, there are no restrictions. The results summarized in table 7.18 again provide mixed support for the claims made above. The coefficients on the alternative measure of size are in the direction which the risk argument predicts, but insignificant. The results are consistent with those obtained in section 7.3, in that the early standard deviation in the stock price is significantly positively related to underpricing. There appears to be a stronger link between relative firm value and underpricing in emerging markets. This is consistent with the story

Table 7.18
Regressions on Underpricing

Results of a regression where the dependent variable is the underpricing realized on the first day of trading adjusted by subtracting the return on the market portfolio. The independent variables are the firm's value relative to market value (FRV), the standard deviation of the stock price estimated over the first 20 days' closing prices, a dummy variable taking the value 1 if the government retained any share of ownership or a special share (GI), a dummy variable taking the value 1 if the firm belongs to the Electric or Water utility industry or the Telecommunication industry (UTILITY) and a dummy variable taking the value 0 for earlier privatization and the value 1 for later privatization (LATE). FRV is multiplied by a dummy variable identifying firms from emerging markets (EMKT) isolate the effect of firms privatized in these markets. t-statistics are in parentheses.

	Const.	FRV	Std Dev.	FRV* EMKT	GI	UTILITY	LATE	R^2
Full Sample (n=71)								
Coefficient Value	0.107***	-0.613	4.34***	2.54***	---	---	---	54.3%
t statistic	(3.95)	(-1.49)	(3.20)	(5.51)				
Predicted Sign	(?)	(-)	(+)	(+)				
Coefficient Value	-0.0307	-0.365	6.73***	2.18***	0.109**	0.0189	0.0449	61.2%
t statistic	(-0.64)	(-0.92)	(4.54)	(4.84)	(2.56)	(0.51)	(1.28)	
Predicted Sign	(?)	(-)	(+)	(+)	(+)	(+)	(-)	

*   Significant at the 10% level.
**   Significant at the 5% level.
***   Significant at the 1% level.

that governments in emerging markets attempt to ensure the success of a large issue by issuing the shares at a lower price.

For the other proxies of uncertainty, the results are significant and in the predicted direction only for the proxy for government's possible intervention. If the possibility of government intervention can be measured by the dummy GI, and if this possibility causes more uncertainty, then such an uncertainty appears to be compensated by more severe underpricing.Utility and earlier privatizations do not appear to have been more underpriced than other SIPs. As they were for the regressions summarized in section 7.3, the residuals are well behaved for the analyses summarized in Table 7.18. Residual plots show no sign of heteroskedasticity, and using a K-S test of normality, we cannot reject the null hypothesis of normality.

7.6.3 Long run performance

Finally, we develop regression models to explain the long run performance of SIPs using the proxies for risk which were defined in section 7.5. The proxies used take the form of dummy variables. We use GI and UTILITY which, for the reasons summarized in the preceding section, are assumed to indicate firms with greater total risk when they take the value one. To test the claim that governments may act strategically by privatizing earlier firms with better future prospects, we introduce the dummy LATE, and expect its coefficient to be negative to account for the fact that we expect earlier privatizations to perform better. To measure the extent to which the size effect described by Fama and French applies to SIPs, we

also introduce the independent variable FRV in the regression. We expect the coefficient to be negative, such that smaller firms would perform better in the long run.

We define four alternative measures of the dependent variable long run performance. We use both cumulative and B&H returns, and regressed the unadjusted measure of long run performance as well as the measure adjusted by subtracting the return on the market portfolio from the raw returns. The model takes this general form:

$$(7.11) \qquad LRP_i = l_0 + l_1 FRV_i + l_2 GI_i + l_2 UTILITY_i + l_4 LATE_i + u_i$$

We do not impose any restriction on the coefficients in this model. The results are summarized in Table 7.19.

The residuals on the long run performance regressions are well behaved, but one outlier is identified.[138] We re-ran the regression excluding the outlier, but the results were not significantly changed and are not reported. The results are consistent for each dependent variable and weakly support our claims. In fact, only the coefficient the UTILITY dummy is of the predicted sign and significant. This supports the notion that investors may find it more risky to invest in public utilities, and thus require compensation for such risk.

The coefficient on FRV is insignificant, which tends to show that a relative size effect does not apply to SIPs. Recall that using a different measure of size, Fama and French found that smaller firms tend to overperform larger firms. However, Fama and French had a larger sample, which allowed them to study sub-samples created using deciles rather than quartiles.

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[138] The outlier is the Hungarian firm Ibusz, which has a large long run underperformance.

Table 7.19
Regressions on Long Run Performance

Results of O.L.S. regressions where the dependent variable is the long run (abnormal) returns earned on investing in portfolios of SIPs and the independent variables are the firm's relative market value (FRV), a dummy variable taking the value 1 if the government retained a special share in the issue or any other share of ownership (GI), a dummy variable taking the value 0 for earlier (within country) privatization (LATE), and a dummy variable taking the value 1 if the firm belongs to the Electric or Water utility industry or the Telecommunication industry (UTILITY).

	Constant	FRV	GI	UTILITY	LATE	R^2
Full Sample (n=63)						
Cumulative Return (Unadjusted)						
Coefficient Value	0.142	0.636	0.229	0.335**	0.073	19.5%
t statistic	(1.03)	(0.47)	(1.51)	(2.43)	(0.50)	
Predicted Sign	(?)	(-)	(+)	(+)	(-)	
Cumulative Return (ARM)						
Coefficient Value	-0.050	-0.046	0.086	0.420***	-0.029	19.7%
t statistic	(-0.39)	(-0.04)	(0.61)	(3.26)	(-0.21)	
Predicted Sign	(?)	(-)	(+)	(+)	(-)	
B & H Return (Unadjusted)						
Coefficient Value	0.323*	-0.564	0.132	0.464**	0.093	16.4%
t statistic	(1.76)	(-0.31)	(0.66)	(2.54)	(0.476)	
Predicted Sign	(?)	(-)	(+)	(+)	(-)	
B & H Return (ARM)						
Coefficient Value	0.162	-1.66	-0.114	0.608***	-0.042	21.2%
t statistic	(0.97)	(-1.01)	(-0.63)	(3.65)	(-0.24)	
Predicted Sign	(?)	(-)	(+)	(+)	(-)	

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

They focused on a sample of American firms, which provided more homogeneity to the study. Hence, they might have been able to capture the effect of size differences in a more complete manner. In any case, the small firms described by Fama and French are likely to be smaller than privatized SOEs. All the firms included in our sample of SIPs would probably have been classified as large firms by Fama and French. The sample used in this study may not be diverse enough to include the small firms which Fama and French isolated.

The insignificance of the coefficient on the variable LATE does not provide support to the hypothesis that government acted strategically and privatized firms with better future prospects earlier. This could show that the information asymmetry which would allow the government to act strategically in such a manner does not exist. In such a case, governments may still privatize SIPs with better future prospects earlier. If there is no information asymmetry, SIPs are priced appropriately, and long run performance is not affected by the government's strategy.

The proxy used to discriminate early vs. late privatizations also has some deficiencies. For example, the proxy does not take into consideration the fact that economic conditions change over time. Early privatizations may in fact outperform late privatizations, but economic conditions, like a recession, may negatively affect the returns earned on investing in early privatizations. In other words, the difference in performance between early and late privatizations may not be assessed in comparable conditions.[139] It could also be argued that we are currently looking at early privatization, which will significantly outperform privatizations

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[139] Note that the measure of long run performance adjusted using the market returns can be assumed to capture this effect to a certain extent.

which are yet to come. This is equivalent to saying that the cut-off used to distinguish earlier privatizations from later privatizations is incorrectly defined.

Finally, the insignificance of the coefficient on GI could be explained if GI does not accurately measure the investors' perceptions of risk. Recall that underpricing was found to be greater for SIPs when GI equaled 1. It can therefore be argued that the possibility of government intervention in the future activities is taken into consideration in the price at the time of the issue. Long run performance will vary only if the likelihood of government intervention changes after the moment of the issue, and GI fails to account for such a variation. Also, a firm in which a government is involved is not likely to become financially distressed or to go bankrupt. Therefore, one could argue that the government's involvement in ownership does in fact decrease risk when the performance of the firm is measured in the long run. Hence, the extent to which risk increases or decreases when the government is involved in the ownership is not clear.

Chapter VIII Conclusion

The purpose of this thesis was to investigate the impact that privatization has on a firm's operating and financial performance. In terms of operating performance, earlier research has shown that private corporations are, on average, more profitable than state-owned firms. Privatized firms also tend to display more favorable financial ratios after the privatization has taken place. In Chapter III, we attempt to provide an explanation for such findings. It is argued that private shareholders may be in a better position to monitor managerial effort than are governments. Further, when privatization is processed through a share issue, shareholders can use the stock price as a new performance measure. This is not only helpful to solve an incentive problem if the stock price reveals new information concerning effort, but also because the stock price reflects more fully the impact of the manager's current action on the future profitability of the firm.

On the financial side, most of the earlier research has been aimed at explaining why governments underprice share issue privatizations. In an attempt to contribute to our understanding of the financial aspects of privatization transactions, factors like the fraction of ownership retained by governments in share issues and the long run stock price performance has supplemented our analysis of underpricing.

In the case of retained ownership, it appears that governments do not attempt to signal future prospects for the privatized firm using retained ownership. If it does so, then the signal is not interpreted by investors in a fashion similar than in the IPO market. On the other hand, retained ownership is found to be negatively related to capital market size, and its relationship

with other factors such as the fraction allocated to foreign investors suggests that it might be limitations in terms of market capacity which explains retained ownership in a SIP. The British government have been found to adopt a different strategy with respect to retained ownership. We hypothesized that such a different strategy is explained by the greater capacity of British markets to absorb large share issues, and we have found support for this hypothesis.

As for the returns earned on share issue privatization, in the short run, underpricing appears to be severe. A positive relation between underpricing and a measure which is assumed to proxy for ex ante uncertainty and losses caused by the winner's curse suggests that governments may use underpricing to compensate investors for risk. Underpricing has also been found more severe for firms in which government retained ownership or a special share. Such a finding is explained by the fact when government retains ownership, the likelihood of its intervention in the future activities of the firm to promote socio-political objectives is increased, and investors require compensation for such an increase. Finally, underpricing also appears to be more severe in markets with limited capacity of absorption. This would tend to show that governments may use underpricing to ease the flotation of larger issues.

In the long run, as opposed to what is documented in the IPO market, share issue privatizations do not underperform market or industry benchmarks. On the contrary, it appears that SIPs significantly overperform these benchmarks. The initial pessimism about the future prospects of privatized SOEs is argued to account for such long run overperformance. We further document larger overperformance for privatized public utilities. We relate overperformance of such firms to compensation for risk. Investors are assumed to require

greater returns to invest in industries for which their lack of experience results in a more uncertain assessment of future prospects.

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Appendix A

Privatization and Multiple Performance Measures

Privatization and Multiple Performance Measures

The purpose of the Appendix is to analyze in more depth the impact that a supplemental measure of performance can have on a firm's profitability. Analytical results obtained in previous studies are adapted to fit the privatization setting on which this thesis focuses.

In Chapter III, the government and the manager agreed on a compensation contract which was based upon the realization of a measure of profit denoted x. For the purpose of this analysis, which is to discuss the impact of a supplemental performance measure, x represents aggregate firm value, y_1 represents the current profit, and y_2 represents the expectation about future profits. The government wishes to maximize x, but this is not contractible information. The following relations hold between the variables:

(A.1) $\qquad E[x|a] = E[y_1 + y_2|a]$

(A.2) $\qquad E[x|y,a] = y_1 + y_2$

Current profit, y_1 , is the basic contractible information available to the government. A supplemental contractible performance measure, such as y_2,, has value to the principal if, in the presence of incentive problems, it provides new information with respect to effort level a. If effort is single dimensional, then performance measures are used to induce effort intensity with as little risk as possible. If effort is multi-dimensional, then multiple

performance measures can help in inducing effort intensity with as little risk as possible and to induce an allocation of effort that is congruent with the principal's goals.

CASE I: Single dimensional of effort

Recall the general setting described in Chapter III. To analyze the impact of a new performance measure, we expand this setting according to the following characterization:

(A.3.1) $A = \left[\underline{a}; \overline{a}\right]$

(A.3.2) $Y_1 = \left[\underline{y_1}; \overline{y_1}\right]$

(A.3.3) $Y_2 = \left[\underline{y_2}; \overline{y_2}\right]$

where Y_1 and Y_2 are the set of all possible values of y_1 and y_2 defined over a continuous interval. Also consider that:

$P(y_1|a)$ is the conditional probability distribution of y_1 given a

$P(y_2|a)$ is the conditional probability distribution of y_2 given a;

$P(y_1, y_2|a)$ is the joint conditional probability distribution of y_1 and y_2 given a.

Under these circumstances, the signal y is said to provide new information with respect to a if, and only if, the following condition holds for at least one value of y_2, denoted y_{2h}:

$$(A.4) \qquad \frac{P(y_{1j}, y_{2h}|a_i) - P(y_{1j}, y_{2h}|a_{i-1})}{P(y_{1j}, y_{2h}|a_i)} \quad \neq \quad \frac{P(y_{1j}|a_i) - P(y_{1j}|a_{i-1})}{P(y_{1j}|a_i)}$$

where a_i is the desired effort level and a_{i-1} is the next lowest effort level. Condition (A.4) · simply ensures that y_1 is not a sufficient statistic for (y_1, y_2) with respect to the realized value of a. Notice that this has to be true only for some value of y_2 in order to have a valuable performance measure.[140]

In the case of a privatization, y_1 can be seen as an accounting profit or cashflow figure which is reported irrespective of whether the firm is state-owned or privately owned. On the other hand, y_2 can be seen as a measure of expected profits established as a function of the stock price. We assume that the stock price is known only if the firm is wholly or partly privatized through a share issue. In essence, the above discussion shows that the existence of a stock price provides a comparative advantage to private shareholders with respect to compensation contract design if Condition A.4 is fulfilled. To take advantage of the new piece of information, private shareholders can design an optimal compensation contract by solving the following problem:

---

[140] Condition (A.3.1) is simply a re-formulation of Holmstrom [1979] definition of an informative supplemental signal. Holmstrom's Proposition 3 confirms that in order to have value, an existing signal cannot be a sufficient statistic for a new signal and therefore, must be such that condition (A.4) is fulfilled.

$$\mathop{MAX}_{\mathbf{z},a} \quad \iint_{Y_1,Y_2} [y_1 + y_2 - z(y_1,y_2)] P(y_1,y_2|a) dy_1 dy_2$$

$$\iint_{Y_1,Y_2} U_m(W(z(y_1,y_2));a)) \, P(y_1,y_2|a) dy_1 dy_2 \geq \overline{U}_m$$

$$\iint_{Y_1,Y_2} U_m(W(z(y_1,y_2));a)) \, P(y_1,y_2|a) dy_1 dy2 \geq \iint_{Y_1,Y_2} U_m(W(z(y_1,y_2));a')) \, P(y_1,y_2|a') dy_1 dy_2$$

$$\forall \, a' \, \in A$$

Constraint (1) in the above problem insures that the contract again provides the manager with the expected utility greater than or equal to his reservation utility; hence, the information makes him no worse off. On the other hand, the presence of a second signal provides new information with respect to the manager's effort choice which permits the principal to reduce the risk borne by the manager. In the extreme case, the combination of the y_1 and y_2 report perfectly reveals a, and the first best solution can be achieved by designing a compensation contract similar to (3.11).

Therefore, for privatization to create value through the use of better designed compensation contracts, we need to assume that a supplemental performance measure like stock price reveals new information with respect to managerial effort. New information reduces the risk premium which has to be paid to the risk averse manager in order to induce optimal effort.

CASE II: Multi-dimensional effort

To focus on improvements congruency of the manager's to shareholders' goals, we introduce multi-dimensional effort. Suppose that:

(A.5) $\tilde{x} = B(\mathbf{a}) + \tilde{\varepsilon}_x$

$$B(\mathbf{a}) = b_1 a_1 + b_2 a_2$$

$$\tilde{\mathbf{y}} = \begin{bmatrix} \mathbf{y}_1 \\ \mathbf{y}_2 \end{bmatrix} = \begin{bmatrix} \mu_{11} & \mu_{12} \\ \mu_{21} & \mu_{22} \end{bmatrix} * \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} + \begin{bmatrix} \tilde{\varepsilon}_1 \\ \tilde{\varepsilon}_2 \end{bmatrix}$$

where the μ's are coefficient which reflect the impact of both types of effort (a_1 and a_2) on the performance measures. $\tilde{\varepsilon}_x$, behave similarly to $\tilde{\varepsilon}_\pi$ that is $\tilde{\varepsilon}_x \sim N(0, \sigma_x^2)$.[141] $\varepsilon = (\varepsilon_1; \varepsilon_2)^t$ is a vector of normally distributed random variables with mean zero and covariance matrix Σ, which is of the form:

$$\Sigma = \begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{21} & \sigma_{22} \end{bmatrix}$$

The representation of the manager's personal cost of effort must also be modified to reflect the multi-dimensional aspect of managerial effort. The cost function is still non-decreasing in **a** and is assumed to be of the form:

---

[141] To simplify, we restrict the analysis to bi-dimensional effort. The analysis could easily be extended to consider multi-dimensional effort, as is done in Feltham and Xie [1994].

$$(A.6) \qquad C(\mathbf{a}) = \frac{1}{2}[a_1^2 + a_2^2]$$

We again exogenously restrict the analysis to linear contracts which, to reflect the availability of more than one performance measure, are now of the form:

$$(A.7) \qquad z(y_1, y_2) = \beta + v_1 y_1 + v_2 y_2$$

In the above analysis, the principal still wishes to maximize the value of x. $V = B(\mathbf{a}) - C(\mathbf{a})$ provides a measure of the principal's expected surplus net of the agent's personal cost. The first best contract induces $\mathbf{a}^*$ such that that the value of V is maximized. The performance measures y_1 and y_2 are similar to those introduced in the case of single dimensional effort. In terms of the manager's effort, a_1 could represent the amount of time spent on increasing current profit (for example monitoring employees' behavior) while a_2 could represent the amount of time spent on increasing long term profit (like insuring equipment is well taken care of). To formalize how gains can be associated with privatization, we assume that the government can only contract on y_1. When the firm is strictly state-owned, stock price is not available as a performance measure, and can therefore not be contracted upon. Feltham and Xie [1994] show that if b_1, $b_2 > 0$, the loss associated with contracting only on y_1 is represented by:

$$(A.8) \qquad L(y_1; y_2) = \frac{1}{2}\left[\frac{r\sigma_1^2}{b_1^2 + r\sigma_1^2}b_1^2 + b_2^2\right]$$

The above result makes intuitive sense; it simply says that the opportunity cost associated with failing to use y_2 as a performance measure is increasing in b_2 and in σ_1. If σ_1 increases, performance measure y_1 is noisy and its use imposes risk on the manager. He will have to be compensated for bearing such risk. The use of a second performance measure y_2 in such a case could reduce the risk premium paid to the manager if y_2 is correlated with y_1,, i.e., reporting y_2 resolves some of the uncertainty associated with the use of y_1. In such a case, the report of y_2 solves an incentive problem related to effort *intensity* in a fashion similar to the improvement described in the analysis of Case I.

If b_2 increases, the impact of a_2 on x is more important. Failing to use y_2 as contractible information results in compensating the manager only for effort a_1 which, as b_2 increases, becomes relatively less important with respect to its impact on x. Under these circumstances, the report of y_2 solves a problem with respect to effort allocation (*goal congruency*), and contracting on y_1 and y_2 insures that the manager's distribution of effort is more congruent with the goals pursued by the shareholders.

Coming back to our earlier illustration, we assumed that under state-ownership, only the accounting profit figure could be contracted upon. It can very well be the case that such a figure is a noisy representation of a firm's current cashflows (thus creating an intensity problem) and that by inducing the manager to concentrate on short term profit, the government induces undesired myopic behavior (i.e. a congruency problem). If privatization results in activating stock price as a second performance measure, then using both the profit figure and the stock price could result in altering one of the two incentive problems, and most

probably both. That is, supplementing y_1 by y_2 in the compensation contract could be useful

in solving both an intensity and a congruency problem.

Appendix B

Sample Description

Table A.1
Sample Description

List of Privatized Companies	Industry	Date Privatized	Date first listed on Datastream (YY/MM/DD)	Fraction of Ownership Retained	Offering Price	First quoted price	Initial Returns	36 month cumulative returns			36 month real returns		
								Raw Return	Market Adjusted	Industry Adjusted	Raw Return	Market Adjusted	Industry Adjusted
Category I: Full Data Availability													
Argentina													
YPF	Oil & Gas	Jun-93	7/07/93	54.70%	19.00	20.60	8.42%	.....	.....	.....	.....	.....	.....
Australia													
COMMONWEALTH BANK	Banking	Jul-91	9/13/91	70.25%	5.40	6.40	18.52%	20.06%	-8.24%	-14.10%	17.19%	-12.48%	-18.03%
GOVERNMENT INSURANCE OFFICE	Banking	Jul-92	7/23/92	0.00%	2.40	2.52	5.00%	.....	.....	.....	.....	.....	.....
Austria													
VERBUND	Electric U.	Nov-88	12/05/88	51.00%	365.00	371.00	1.64%	63.45%	-4.32%	32.18%	34.77%	-47.89%	7.94%
OMV AKTIENGESELLSCHAFT	Oil & Gas	Dec-87	12/02/87	85.00%	423.38	425.78	0.57%	88.33%	-13.77%	32.59%	109.04%	-52.84%	60.65%
Canada													
AIR CANADA	Transport.	Sep-88	10/13/88	57.00%	8	8.13	1.63%	6.88%	0.31%	-0.05%	-9.23%	-9.63%	0.03%
FISHERY PRODUCTS INTNL	MFRG	Apr-87	4/15/87	0.00%	12.5	15.50	24.00%	-87.69%	-85.26%	-114.09%	-65.84%	-59.88%	-90.91%
PETRO-CANADA ENTERPRISES	Oil & Gas	Jun-91	6/26/91	80.50%	13	12.88	-0.92%	8.83%	-10.27%	-10.44%	-5.82%	-25.23%	-25.98%
Chile													
COMP. DE TELEFONOS DE CHILE SA	Telecom.	Jul-90	7/20/90	.....	16.25	15.88	-2.28%	153.78%	128.49%	117.04%	325.06%	299.53%	285.12%
Denmark													
TELE DENMARK	Telecom.	Apr-94	4/28/94	51.00%	310	328.00	5.81%	.....	.....	.....	.....	.....	.....
France													
BANQUE NATIONALE DE PARIS	Banking	Oct-93	10/18/93	40.00%	283.9	277.1	-2.40%	.....	.....	.....	.....	.....	.....
COMPAGNIE DE SAINT-GOBAIN	MFRG	Dec-86	12/23/86	0.00%	310	347.9	12.23%	62.20%	26.71%	36.00%	73.52%	41.54%	55.67%
COMPAGNIE DE SUEZ	Oil & Gas	Oct-87	11/06/87	0.00%	317	261	-17.67%	26.93%	-16.03%	0.22%	15.82%	-30.25%	-6.54%
CREDIT COMMERCIAL DE FRANCE	Banking	Apr-87	5/20/87	0.00%	107	125	16.82%	80.37%	43.01%	51.01%	97.76%	61.00%	72.27%
CREDIT LOCAL DE FRANCE	Banking	Nov-91	12/05/91	50.50%	210	203	-3.33%	77.59%	52.45%	48.16%	97.04%	72.42%	69.46%
MATRA SA	Telecom.	Oct-89	10/27/89	.....	156	163	4.49%	86.90%	85.66%	131.79%	81.41%	87.89%	122.83%
PARIBAS	Banking	Jan-87	2/12/87	0.00%	405	429.8	6.12%	38.61%	8.27%	21.31%	32.26%	4.80%	21.13%
RHONE-POULENC	MFRG	Jan-93	1/26/91	67.00%	94	127.5	35.64%	.....	.....	.....	.....	.....	.....
SOCIETE GENERALE DE FRANCE	MFRG	Jun-87	7/08/87	0.00%	407	432	6.14%	35.59%	4.42%	17.96%	25.46%	-3.24%	15.30%
Germany (West)													
DEUTSCHE BANK AG (DVKB)	Banking	Mar-88	4/05/88	75.10%	155	162	4.52%	6.75%	-39.42%	-28.81%	1.23%	-52.12%	-34.19%
DSL	Banking	Oct-89	10/12/89	52.00%	195	215	10.26%	-0.03%	4.96%	-10.37%	-11.72%	-4.12%	-17.81%
Hungary													
IBUSZ	MFRG	Jun-90	6/21/90	66.60%	1405	2010	43.06%	-209.20%	-225.16%	-213.41%	-91.69%	-106.10%	-89.34%

Table A.1
Sample Description

List of Privatized Companies	Industry	Date Privatized	Date first listed on Datastream (YY/MM/DD)	Fraction of Ownership Retained	Offering Price	First quoted price	Initial Returns	36 month cumulative returns			36 month real returns		
								Raw Return	Market Adjusted	Industry Adjusted	Raw Return	Market Adjusted	Industry Adjusted
Ireland													
GREENCORE	MFRG	Apr-91	4/25/91	49.00%	225	235	4.44%	47.97%	17.89%	30.70%	54.47%	22.21%	38.04%
Italy													
INSTITUTO MOBILIARE ITALIANO	Banking	Jan-94	2/09/94	30.00%	10900	13400	22.94%	-37.21%	-64.11%	-28.58%	.....	.....	.....
INA	Banking	Jun-94	7/06/94	49.00%	2400	2430	1.25%	.....	.....	.....	.....	.....	.....
Japan													
JAPAN RAILROAD EAST	Transport.	Oct-93	10/26/93	50.00%	380000	600000	57.89%	.....	.....	.....	-13.75%	-4.33%	.....
NTT CORPORATION	Telecom.	Feb-87	2/07/87	87.50%	1197000	1600000	33.67%	9.74%	5.46%	3.03%	.....	.....	0.91%
Malaysia													
MALAYSIAN AIRLINE SYSTEM	Transport.	Oct-85	12/16/85	70.00%	1.80	2.52	40.00%	.....	.....	.....	.....	.....	.....
TENAGA NATIONAL	Electric U.	Mar-92	5/28/92	77.00%	4.5	8.75	94.44%	.....	.....	.....	.....	.....	.....
Mexico													
GRUPO FINANCIERO SERFIN	Banking	Dec-93	12/01/93	.....	25.75	26.75	3.88%	113.19%	62.06%	-17.34%	159.52%	112.87%	-44.06%
Netherlands													
DSM N.V.	Oil & Gas	Feb-89	2/03/89	65.70%	105.13	112.92	7.41%	-5.04%	-23.83%	-23.35%	-9.92%	-27.11%	-25.81%
Singapore													
SINGAPORE TELECOM	Telecom.	Oct-93	11/01/93	92.80%	1.9	4.14	117.89%	115.19%	60.39%	8.21%	159.57%	108.44%	17.72%
SINGAPORE AIRLINES, LTD.	Transport.	Nov-85	12/18/85	63.00%	2.368	2.35	-0.76%	.....	.....	.....	.....	.....	.....
South Korea													
KOREA ELECTRIC POWER CORP.	Electric U.	Aug-89	8/10/89	.....	23000	24000	4.35%	-72.04%	-26.94%	-28.10%	-58.37%	-10.44%	-17.08%
Spain													
ARGENTARIA CORP.	Banking	May-93	5/12/93	75.10%	4230	4510	6.62%	.....	.....	.....	.....	.....	.....
REPSOL S.A.	Oil & Gas	May-89	5/10/89	73.40%	1700	2040	20.00%	43.94%	58.17%	12.33%	38.97%	56.05%	13.98%
Thailand													
PTT EXPLORATION AND PRODUC.	Oil & Gas	Jun-93	6/11/93	70.00%	33	47.25	43.18%	.....	.....	.....	.....	.....	.....
United Kingdom													
AMERSHAM INTERNATIONAL PLC	MFRG	Feb-82	2/24/82	0.00%	142	188	32.39%	73.08%	5.16%	-21.89%	94.15%	1.94%	-50.44%
ANGLIAN WATER PLC	Water Utilit	Dec-89	12/11/89	0.00%	240	288.5	20.21%	57.74%	43.97%	21.32%	63.95%	52.27%	24.96%
ASSOCIATED BRITISH PORTS PLC	Transport.	Feb-83	2/14/83	48.50%	14	17.25	23.21%	128.73%	71.23%	15.78%	217.39%	143.18%	24.26%
BAA PLC	Transport.	Jul-87	7/27/87	0.00%	122.5	145.5	18.78%	51.70%	50.30%	43.67%	58.42%	61.59%	56.40%
BRITISH AEROSPACE PLC	Transport.	Feb-81	2/19/81	48.40%	147.65	167.34	13.34%	48.24%	-5.87%	-9.21%	38.83%	-27.80%	-25.26%
BRITISH AIRWAYS PLC	Transport.	Feb-87	2/10/87	0.00%	119.79	161.96	35.20%	32.71%	7.58%	-4.70%	16.57%	-6.07%	-19.89%
BRITISH GAS PLC	Oil & Gas	Dec-86	12/05/86	0.00%	-135	147.75	9.44%	45.25%	5.68%	3.47%	46.53%	4.85%	5.28%

Table A.1
Sample Description

List of Privatized Companies	Industry	Date Privatized	Date first listed on Datastream (YY/MM/DD)	Fraction of Ownership Retained	Offering Price	First quoted price	Initial Returns	36 month cumulative returns			36 month real returns		
								Raw Return	Market Adjusted	Industry Adjusted	Raw Return	Market Adjusted	Industry Adjusted
BRITISH STEEL PLC	Oil & Gas	Dec-88	12/02/88	0.00%	125	127.25	1.80%	-45.52%	-72.00%	-74.06%	-42.24%	-69.56%	-71.13%
BRITISH TELECOM. PLC	Telecom.	Nov-84	11/30/84	49.80%	130	172	32.31%	30.44%	-7.05%	-1.37%	22.09%	-17.14%	-3.48%
CABLE AND WIRELESS PLC	Telecom.	Oct-81	11/04/81	50.00%	28	32.83	17.25%	107.29%	43.75%	3.13%	157.39%	73.42%	3.85%
EAST MIDLANDS ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	272.73	330.11	21.04%	82.88%	38.44%	17.24%	112.05%	59.42%	24.38%
EASTERN ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	240	288	20.00%	88.32%	43.88%	22.68%	124.31%	71.67%	36.64%
ENTERPRISE OIL PLC	Oil & Gas	Jun-84	6/24/84	0.00%	172.19	173.12	0.54%	61.66%	-25.63%	-31.63%	60.21%	-74.22%	-79.24%
LONDON ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	240	282	17.50%	87.73%	43.29%	22.09%	122.70%	70.06%	35.03%
MANWEB PLC	Electric U.	Dec-90	12/10/92	0.00%	240	306	27.50%	90.45%	46.01%	24.81%	128.43%	75.80%	40.76%
MIDLANDS ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	240	284	18.33%	93.40%	48.96%	27.76%	137.68%	85.05%	50.01%
NORTH WEST WATER GROUP PLC	Water U.	Dec-89	12/11/89	0.00%	240	275	14.58%	63.56%	49.79%	27.15%	73.45%	61.77%	34.47%
NORTHERN ELECTRIC PLC	Electric U.	Dec-90	12/10/92	0.00%	240	282.5	17.71%	94.52%	50.07%	28.87%	138.58%	85.95%	50.92%
NORTHUMBIAN WATER GROUP PLC	Water U.	Dec-89	12/11/89	0.00%	240	297	23.75%	69.36%	55.59%	32.95%	85.86%	74.17%	46.87%
NORWEB PLC	Electric U.	Dec-90	12/10/92	0.00%	240	292	21.67%	94.52%	50.08%	28.88%	135.62%	82.99%	47.95%
ROLLS-ROYCE PLC	MFRG	May-87	5/19/87	0.00%	165.66	226.08	36.47%	3.10%	-2.29%	17.58%	-12.93%	-13.71%	7.88%
SCOTTISH HYDRO-ELECTRIC	Electric U.	May-91	6/17/91	0.00%	240	262	9.17%	35.11%	9.60%	2.92%	34.35%	8.05%	0.30%
SCOTTISH POWER	Electric U.	May-91	6/17/91	0.00%	240	255.5	6.46%	42.60%	17.10%	10.42%	45.21%	18.91%	11.15%
SEEBOARD PLC	Water U.	Dec-89	12/11/89	0.00%	120	141	17.50%	97.96%	53.52%	32.32%	146.45%	93.82%	58.79%
SEVERN TRENT PLC	Water U.	Dec-89	12/11/89	0.00%	240	271	12.92%	59.98%	46.21%	23.57%	66.79%	55.10%	27.80%
SOUTH WALES ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	240	304	26.67%	91.05%	46.60%	25.40%	129.93%	77.30%	42.27%
SOUTH WEST WATER PLC	Water U.	Dec-89	12/11/89	0.00%	240	287	19.58%	62.49%	48.72%	26.08%	72.13%	60.44%	33.14%
SOUTH WESTERN ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	240	290	20.83%	89.68%	45.24%	24.04%	126.21%	73.58%	38.54%
SOUTHERN ELECTRIC PLC	Electric U.	Dec-90	12/10/92	0.00%	240	290	20.83%	89.95%	45.51%	24.31%	126.90%	74.27%	39.23%
SOUTHERN WATER PLC	Water U.	Dec-89	12/11/89	0.00%	240	281	17.08%	56.73%	42.96%	20.32%	61.57%	49.88%	22.58%
THAMES WATER PLC	Water U.	Dec-89	12/11/89	0.00%	240	276	15.00%	64.24%	50.47%	27.82%	76.45%	64.76%	37.46%
WELSH WATER PLC	Water U.	Dec-89	12/11/89	0.00%	240	281	17.08%	70.41%	56.64%	34.00%	86.12%	74.44%	47.13%
WESSEX WATER PLC	Water U.	Dec-89	12/11/89	0.00%	117.66	144.13	22.50%	73.44%	59.67%	37.02%	93.20%	81.51%	54.21%
YORKSHIRE ELECTRICITY PLC	Electric U.	Dec-90	12/10/92	0.00%	272.64	340.23	24.79%	85.45%	41.01%	19.81%	119.70%	67.07%	32.03%
YORKSHIRE WATER PLC	Water U.	Dec-89	12/11/89	0.00%	240	289	20.42%	66.44%	52.67%	30.03%	79.24%	67.55%	40.25%

Category II: Data on Underpricing missing

Argentina

TELECOM DE ARGENTINA	Telecom.	Mar-92	4/01/92	0.00%	....	....	....						
TELEFONICA DE ARGENTINA	Telecom.	Dec-91	1/02/92	10.00%	....	....	....	87.28%	118.23%	56.35%	93.18%	133.50%	79.90%

China

BRILLIANCE CHINA AUTOMOTIVE	MFRG	Oct-92	10/09/92	....	....	....	....	....	....	....	....	....	....

Germany (West)

IVG AG	Electric U.	Oct-86	10/13/86	55.00%	....	....	....	121.92%	97.49%	77.34%	202.39%	178.60%	169.18%
VIAG AG	Electric U.	Jun-86	6/11/86	60.00%	....	....	....	75.61%	65.88%	55.26%	93.55%	86.76%	75.34%

Table A.1
Sample Description

List of Privatized Companies	Industry	Date Privatized	Date first listed on Datastream (YY/MM/DD)	Fraction of Ownership Retained	Offering Price	First quoted price	Initial Returns	36 month cumulative returns			36 month real returns		
								Raw Return	Market Adjusted	Industry Adjusted	Raw Return	Market Adjusted	Industry Adjusted
Ghana													
ASHANTI GOLDFIELDS	Oil & Gas	Apr-94	4/26/94	31.30%	....	....	....	....	....	....	....	....	....
Greece													
HELLENIC SUGAR INDUSTRIES	MFRG	Jul-93	9/21/93	70.50%	....	....	....	....	....	....	....	....	....
New Zealand													
AIR NEW ZEALAND LIMITED	Transport.	Oct-89	10/24/89	0.00%	....	....	....	18.34%	47.13%	-6.52%	1.62%	30.01%	-10.67%
TELECOM NEW ZEALAND	Telecom.	Jul-91	7/17/91	46.00%	....	....	....	56.93%	13.46%	-5.61%	60.28%	11.71%	-16.29%
Singapore													
SINGAPORE NATIONAL PRINTERS	Telecom.	Feb-87	2/18/87	63.00%	....	....	....	40.64%	-4.31%	-31.89%	25.00%	-13.25%	-52.06%
Spain													
TELEFONICA	Telecom.	Jun-87	6/12/87	47.00%	....	....	....	9.69%	-5.94%	-2.79%	-6.30%	-17.60%	-0.49%
Taiwan													
CHINA STEEL CORPORATION	Oil & Gas	Apr-91	5/23/91	91.10%	....	....	....	-5.72%	-16.78%	5.80%	47.07%	-46.16%	-22.16%
Turkey													
TELETAS	Telecom.	Mar-88	3/22/88	26.00%	....	....	....	....	....	....	....	....	....
Category III: Underpricing & Stock Price missing in earlier months													
Austria													
AUSTRIAN AIRLINES	Transport.	Jun-87	6/13/88	75.00%	....	....	....	92.13%	-22.66%	-0.67%	130.70%	-73.77%	0.03%
Finland													
OUTOKUMPU	Oil & Gas	May-89	12/13/89	57.00%	....	....	....	-2.53%	74.00%	44.76%	-22.76%	31.97%	18.38%
RAUTARUUKKI	MFRG	Jun-89	10/23/89	86.80%	....	....	....	-23.38%	43.96%	16.39%	-35.48%	14.87%	1.08%
VALMET	MFRG	Aug-88	8/17/90	80.00%	....	....	....	-23.46%	4.74%	4.20%	-30.77%	-5.43%	-4.46%
France													
BIMP	Banking	Apr-87	4/18/89	0.00%	....	....	....	69.95%	50.67%	46.46%	93.58%	73.45%	68.59%
TELEVISION FRANCAISE 1	Telecom.	Jul-87	4/18/89	....	....	....	....	10.21%	-4.16%	-19.69%	-2.11%	-13.10%	-28.47%
Italy													
CREDITO FONDIARIO	Banking	....	1/02/86	....	....	....	....	-37.21%	-64.11%	-28.58%	-40.20%	-61.26%	-27.88%
Malaysia													
MALAYSIAN INTNL SHIPPING	Transport.	2/23/87	1986	....	....	....	....	80.12%	26.71%	-3.94%	86.22%	32.01%	-15.52%
TELEKOM MALAYSIA	Telecom.	Oct-90	11/07/90	76.00%	....	....	....	133.02%	56.76%	0.02%	238.33%	130.96%	0.06%

Table A.1
Sample Description

List of Privatized Companies	Industry	Date Privatized	Date first listed on Datastream (YY/MM/DD)	Fraction of Ownership Retained	Offering Price	First quoted price	Initial Returns	36 month cumulative returns			36 month real returns		
								Raw Return	Market Adjusted	Industry Adjusted	Raw Return	Market Adjusted	Industry Adjusted
Portugal													
BESCL	Banking	Jul-91	9/15/92	60.00%	....	....	....	165.33%	129.11%	144.99%	176.63%	135.49%	156.67%
COMP. DE SEGUROS BONANCA	Banking	Jul-91	7/13/93	40.00%	....	....	....	29.09%	26.10%	6.03%	11.11%	-2.15%	-28.24%
UNICER	MFRG	May-89	10/19/89	51.00%	....	....	....	....	....	....	....	....	....
Singapore													
NEPTUNE ORIENT LINES LTD.	Transport.	Apr-81	1/03/83	67.70%	....	....	....	8.20%	-11.86%	-0.16%	-0.39%	-17.60%	-0.01%
Thailand													
THAI AIRWAYS INTERNATIONAL	Transport.	Mar-92	7/23/92	94.70%	....	....	....	....	....	....	....	....	....

Appendix C

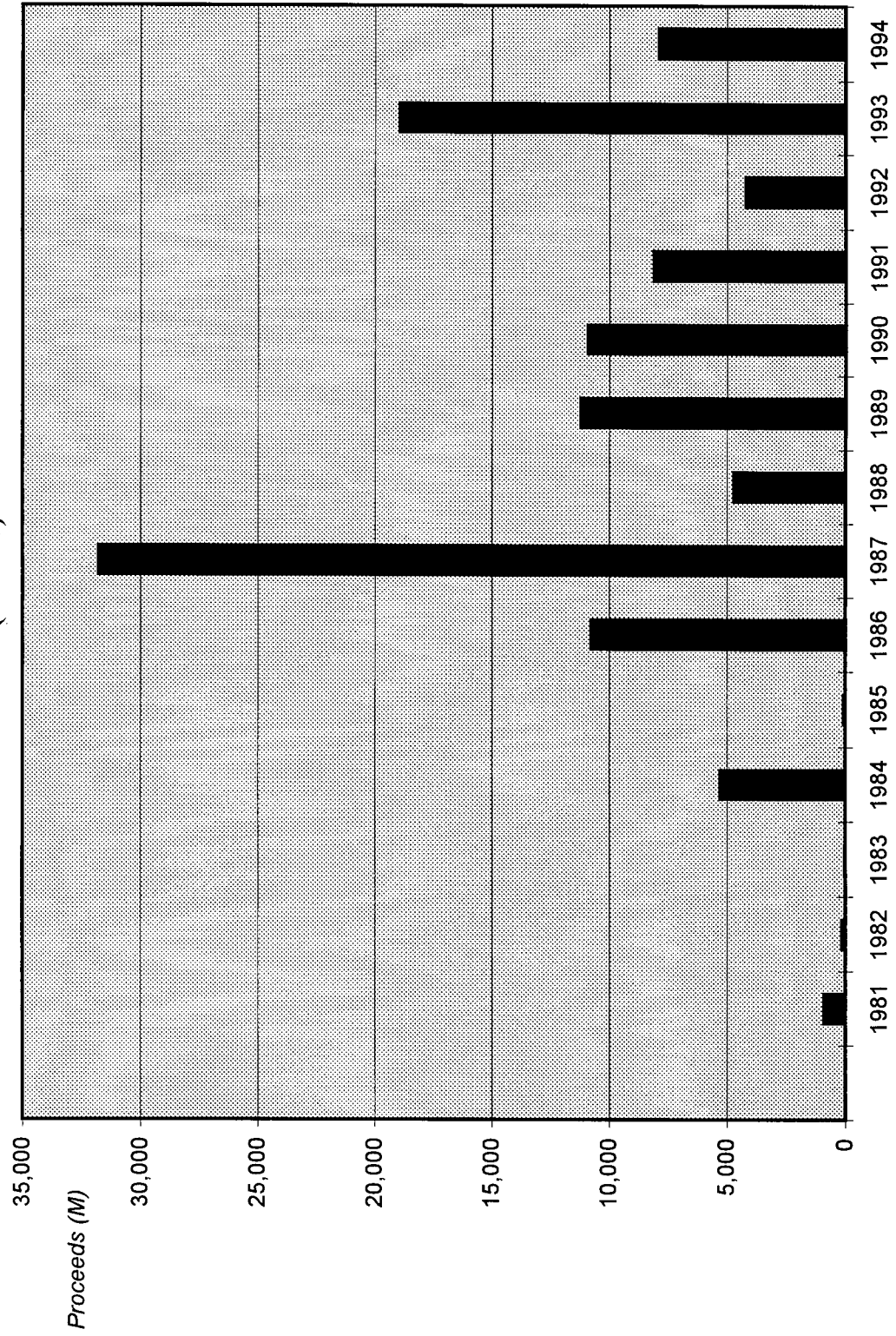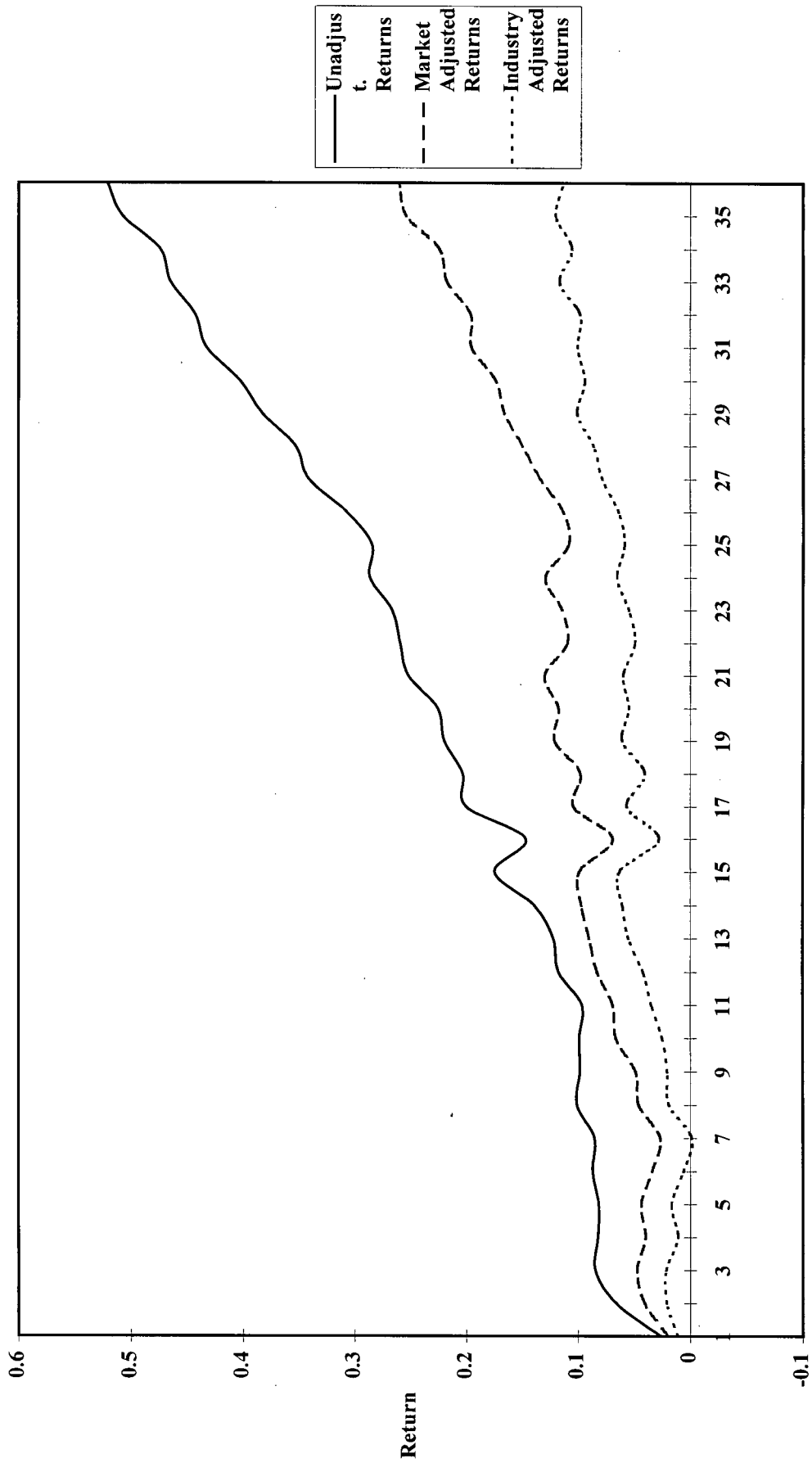**Figures**

FIGURE 1

YEARLY PROCEEDS FROM PRIVATIZATION

(in US$)

Proceeds (M)

FIGURE 2
CUMULATIVE RETURNS

Month Relative to Issue

Return

Unadjust
t.
Returns

Market
Adjusted
Returns

Industry
Adjusted
Returns