

The Short-Run Performance of IPOs of Privately- and Publicly-Owned Firms: International Evidence*

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This article compares the initial returns of privatization initial public offerings (IPOs) to those of privately-owned enterprises and investigates the determinants of short-run performance of privatization IPOs, using a sample of 185 privatization IPOs from 30 countries over the period from 1981 to 1997. The evidence indicates that there is a general tendency for privatizations to be underpriced to a greater degree than the initial public offerings of privately-owned enterprises. In addition to comparing privatization IPOs to private IPOs, the cross-sectional determinants of privatization initial returns are analyzed. The empirical results strongly support the theoretical models of Perotti (1995) and Biais and Perotti (1997). The degree of underpricing at the initial public offering is positively related to the stake sold at initial public offerings and to the degree of uncertainty in ex ante value of newly-privatized firms (JEL G32).

Keywords: initial public offerings, initial return, policy uncertainty, privatization

I. Introduction

In recent years, there has been a great surge of privatization equity offerings to the capital market around the world. This is in line with the

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implications of theory of property rights which suggests that state-owned enterprises (SOEs) tend to be less efficient and less profitable than privately-owned enterprises (POEs). It is believed that public ownership weakens the relationships between marginal utility and firm profit and, thereby, adversely affects the efficiency of the firm.

Interestingly enough, these privatization programs around the world have some common features. First, governments sell off the SOEs through organized capital markets at significantly discounted fixed prices. Jenkinson and Mayer (1988) and Menyah and Paudyal (1996) have shown that underpricing on U.K. privatization sales is greater than that on IPOs in the private sector. Second, the governments retain large stakes in privatized firms long after having transferred ownership to the private sector. These features of privatization, however, cannot be fully explained by the theory of property rights and/or the information asymmetry theory.

Traditional theory of information asymmetry predicts that the privatizing governments will choose a complete sale of the firm with moderate underpricing. According to the theory of information asymmetry, the degree of underpricing is positively related to the informational asymmetry over asset value. Since the privatized SOEs are typically large and well known with a long track record as compared to most private IPOs, which are for new or little-known companies, the privatization IPOs (PIPOs) are subject to less business risk, and hence should be far less underpriced. Moreover, utilities whose revenues, at given rate, are fairly predictable should not have been sold at a substantial discount as happened in the U.K. and in other countries.

In a recent study, Perotti (1995) argues that the puzzling characteristics of privatization can be explained if we consider the policy uncertainty, which rarely affects the value of POEs. Based on the government's inability to commit to future policy and the resulting uncertainty for investors, Perotti (1995) develops a model explaining the empirical puzzles of the partial, gradual sales and underpricing in privatization. It is shown in Perotti (1995) that a partial sale and its underpricing are signals of commitment, and gradual sales are the signs of government's willingness to bear residual risk. In another paper, Biais and Perotti (1997) show that, by allocating underpriced shares to favored constituencies (i.e., median-income voters), privatizing governments can alleviate investors' worries about future government

interference. If this is the case, the number of shares sold at privatization IPOs and the associated underpricing will increase with the income inequality of the country.

This article examines a sample of 185 PIPOs from 30 countries over the period from 1981 to 1997. The initial-offer prices in privatizations of SOEs are analyzed and compared to the initial prices in IPOs of privately-owned companies (private IPOs). This comparison leads to a conclusion that privatization IPOs are, in general, underpriced to a greater degree than private IPOs. In addition to comparing PIPOs to private IPOs, an analysis of the cross-sectional determinants of privatization initial returns is provided. The empirical results strongly support the theoretical models of Perotti (1995) and Biais and Perotti (1997).

The article is organized as follows. Section I describes how short-term performance of PIPOs can be explained by theories of information asymmetry. Sample selection criteria and data are described in section III. Section IV presents evidence on the signaling hypothesis, market capacity hypothesis, and determinants of privatization IPO returns. Section V concludes the paper.

II. Theory of Information Asymmetry and PIPO Underpricing

Perotti (1995) presents a simple rationale for the phenomena of unusually high initial returns of PIPOs, reported by Jenkinson and Mayer (1988) and Perotti and Guney (1993), based on governments' inability to commit a future policy, and the resulting uncertainty for investors. Theory of property rights suggests that public ownership makes it difficult for the government to commit a policy toward the firm because it is unable to resist pressure for an ex post reallocation of the firm value to stakeholders such as insiders and suppliers. Once the firm is privatized, however, private owner's residual right of control reduces the government's ability to interfere. Thus privatization may serve to enhance policy commitment.

However, government's interference over the allocation of firm value cannot be completely eliminated by privatization. Even after the sale, a government still maintains power to reallocate firm value through arm's-length policy changes such as re-regulation, taxation, changes in

regulated rates, entry deregulation, and so forth. Because the possibility of policy changes reduces the share prices of privatized SOEs, any government, if it is to maximize proceeds from the privatization, will announce its intent of no interference. In the absence of a reliable signal, however, only a policy maintained over some time can eliminate the perceived risk.

As Yarrow (1986) suggests, a committed government may take costly action to signal its intent. Perotti (1995) shows that the structure of the sale may be used to assure investors: a partial sale and its underpricing are signals of commitment. Gradual sales imply that the government is willing to bear residual risk, a signal that it does not intend to redistribute value of the newly-privatized firms through a future policy change. This assertion is consistent with Leland and Pyle (1977), who show that a partial sale by an informed seller is a reliable signal of high value, and with Grinblatt and Hwang (1989), who show that underpricing also may be used as a signal. Choi (1998) shows that Perotti's (1995) signaling model can be obtained from the framework employed by Grinblatt and Hwang (1989). Further, Biais and Perotti (1997) show that a right-wing or market-oriented government's optimal privatization policy is to underprice shares in fixed-price offers and then ration the shares to median-income voters. This ownership structure then works to make privatization feasible as well as to resist interference or any other policy change that would compromise the equity stake of the median-income voters. The implications of Perotti (1995) and Biais and Perotti (1997) will be tested in section III.

III. The Sample and the Degree of Underpricing

A. *The Sample*

The initial sample includes 457 candidate PIPOs from 53 countries that took place between 1977 and 1997. The main sources of data are the privatization database, *Privatization International, Security Data Corporation*, Jones et al. (1999), and Dewenter and Malatesta (1997). Data collected for each PIPO are the name of the firm, its industry classification, issuing country, offer date, issue size, initial return, percentage of the firm's capital in the initial offer, and percentage of offer allocated to employees and to foreigners. For those transactions

representing IPOs, daily stock price data and relevant country stock market indices are collected from *Datastream International*. However, the availability of relevant information reduced sample size to 185 PIPOs from 30 countries. Table 1 presents the descriptive statistics of PIPOs.

Privatization returns are calculated over one day following the offer date (initial returns), and 21 trading-day daily returns in the aftermarket. Specifically, returns are calculated as follows:

$$r_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}},$$

where $P_{i,t}$ = closing stock price of company i on day t following initial trade ($t=1, \dots, 21$)

Initial returns are notably high for firms in Asian countries while South American firms have lower initial returns. Western European firms generally exhibit low to moderate initial returns with the exception of Spanish and U.K. firms. Philippine and Pakistani firms have the highest initial returns, although the limited sample size of just one case each does not warrant any premature conclusion. Initial returns are 76.3% for Korea, 56.2% for Malaysia, 39.4% for Singapore, 39.8% for Taiwan, and 51.0% for Thailand. Gains from privatization are low for firms in Argentina (19.8%), Canada (7.6%), Germany (6.0%), and the Netherlands (5.2%), and moderate for Australia (16.6%), Indonesia (16.6%), and Italy (16.1%). Privatizations have taken place in massive scales in the U.K., France, and Japan with sizable initial returns. Investors in the U.K., France, and Japan earned initial returns of 36.3%, 18.5%, and 21.1%, respectively, in privatization.

B. Tests of Differences in Mean Initial Returns for PIPO vs. Private IPOs¹

In this subsection the initial returns to investors in privatizations IPOs are compared to those of private IPOs. Information on private IPOs is

1. The authors thank Paul Malatesta for many helpful comments on the test results reported in this section.

TABLE 1. Sample Description

	Sample Period	Sample Size	Initial Return (%)	Stake Sold at IPO (%)	Proceeds in Millions of U.S. Dollars
Argentina	1991-94	5	19.8	27.5	5,733
Austria	1988-95	8	5	34.8	1,391
Australia	1991-97	7	16.6	69.5	13,215
Belgium	1996	1	2.9	16.6	104
Brazil	1997	1	3.4	8.3	8
Canada	1986-96	10	7.6	64.1	5,250
Denmark	1993-94	3	4.9	41.4	3,563
Finland	1988-95	5	50.8	20.6	834
France	1986-97	21	18.5	61.7	32,663
Germany	1988-96	4	6	36.4	14,887
Ghana	1994	1	12.5	25	375
Greece	1993-96	2	15.9	13.8	559
India	1997	1	18.4	13.2	448
Indonesia	1994-96	4	16.6	28.5	3,271
Italy	1994-97	5	16.1	39	8,718
Japan	1986-96	4	21.1	45.6	34,665
Jamaica	1986-91	2	23.8	38.1	20
Korea	1988-94	3	76.3	22.3	5,764
Malaysia	1984-95	14	56.2	26.5	3,752
Netherlands	1986-94	3	5.2	26.8	4,709
Morocco	1993-96	3	2.5	33	103
New Zealand	1991-92	2	30.6	33.7	908
Norway	1990-95	4	8.1	42.4	637
Pakistan	1994	1	117.5	12	997
Philippines	1994	1	133.4	20	340
Portugal	1989-97	5	22	33.1	3,973
Singapore	1990-94	6	39.4	28.6	4,162
Spain	1987-97	8	41.3	43.8	3,627
Taiwan	1991-96	4	39.8	12.3	408
Thailand	1989-97	7	51	27.7	887
U.K.	1981-96	39	36.3	92.7	61,054
Venezuela	1996	1	13	31.2	1,026
Full sample	1981-97	185	31.7	33.8	218,155

Note: Initial Returns are calculated using the formula $(\text{Closing price} - \text{Offer price}) \div (\text{Offer price})$. Initial Returns and proceeds of State-Owned Enterprises are obtained from Jones *et al.* (1999), Dewenter and Malatesta (1997), and *Privatisation International*. Stake Sold represents the percent of the firm's capital in the initial offer.

taken from Loughran *et al.* (1994), who summarize recent international empirical research on IPOs. Details on private IPO samples are given

in table 2. It is assumed that the average initial returns reported in Loughran *et al.* (1994) for the private IPOs represent true population mean initial returns for the respective countries. Following Dewenter and Malatesta (1997), measurement errors of the averages are ignored as they appear negligible due to the large sample sizes from which the averages are computed.

To test the hypothesis that the mean initial returns in privatization IPOs equals the mean initial returns in private IPOs, the test statistics developed by Dewenter and Malatesta (1997) are employed in this study. They have developed the country-specific test statistics, T_c and the statistics for the joint test across the whole ample, T , as follows:

$$T_c = \frac{\sum_i (r_{i,c} - \bar{r}_c)}{\sqrt{N_c \sigma_c^2}},$$

and

$$T = \frac{\sum_c \sum_i (r_{i,c} - \bar{r}_c)}{\sqrt{\sum_c N_c \sigma_c^2}},$$

where:

- $r_{i,c}$ = the private IPO return of firm i in country c
- \bar{r}_c = the average private IPO return for country c
- N_c = the number of PIPOs for country c
- σ_c^2 = sample variance of $(r_{i,c} - \bar{r}_c)$

Under the null hypothesis, the statistic T_c has t -distribution with $(N-1)$ degrees of freedom, and T is asymptotically normally distributed. We test the hypothesis for each country in the sample separately, and for all 17 countries jointly.

Table 2 presents the results of the hypothesis tests. The T -statistics for the joint test across the whole sample is 2.45. Thus, the null hypothesis of the equal mean initial returns in PIPOs and private IPOs is rejected. From this test result, it is concluded that initial returns in PIPOs are significantly higher than the initial returns in private IPOs.

TABLE 2. Tests of Difference in Mean Initial Returns for Privatization IPOs Versus Private IPOs

Country	Privately-Held Enterprises			State-Owned Enterprises			Comparison	
	Sample Period	Sample Size	Initial Return	Sample Period	Sample Size	Initial Return	Difference	<i>t</i> -statistic
Australia	1976-89	266	11.9	1991-97	7	16.6	4.7	.96
Canada	1971-92	258	5.4	1986-96	10	7.6	2.2	.73
Finland	1984-92	85	9.6	1988-95	5	50.8	41.2	.93
France	1983-92	187	4.2	1986-97	21	18.5	14.3	2.88 ^b
Germany	1978-92	170	10.9	1988-96	4	6	-4.9	-.59
Italy	1985-91	75	27.1	1994-97	5	16.1	-11	-1.73
Japan	1970-91	472	32.5	1986-96	3	21.1	-11.4	-0.67
Korea	1980-91	347	78.1	1988-94	3	76.3	-1.8	-0.12
Malaysia	1980-91	132	80.3	1984-95	14	56.2	-24.1	-3.07 ^c
Netherlands	1982-91	372	7.2	1986-94	3	5.2	-2	-1.02
New Zealand	1979-91	149	28.8	1991-92	2	30.6	1.8	.16
Portugal	1986-87	62	54.4	1989-97	5	22	-32.4	-2.56 ^a
Singapore	1973-87	66	27	1990-94	6	39.4	12.4	1.52
Spain	1985-90	71	35	1987-97	8	41.3	6.3	.44
Taiwan	1971-90	168	45	1991-96	4	39.8	-5.2	-.09
Thailand	1988-89	32	58.1	1989-97	7	51	-7.1	-.33
U.K.	1959-90	2,133	12	1981-96	39	36.3	24.3	8.08 ^c
Full Sample	1959-92	4,596	24.6	1981-97	147	31	6.4	2.45 ^b

Note: Initial Returns are calculated using the formula (Closing price – Offer price) ÷ (Offer price). Sample Period and Initial Returns of Privately-Held Enterprises are taken from Loughran *et al.* (1994). Initial returns of State-Owned Enterprises are from Jones *et al.* (1999), Dewenter and Malatesta (1997), and *Privatisation International*. The superscripts a, b, and c denote significance at the 10, 5, and 1 percent levels, respectively, for two-tailed tests.

This evidence supports the traditional view that governments around the world tend to underprice initial offers to a greater degree than do the issuers of private IPOs.²

This result, however, is in sharp contrast with Dewenter and Malatesta (1997), who have shown that there exists no statistically significant difference between initial returns of PIPOs and private IPOs. Separate test results for each country are in line with Dewenter and Malatesta (1997) except for Canada and France. The test for France reveals significantly higher initial returns in PIPOs ($t = 2.88$), while Dewenter and Malatesta (1997) report that the difference is statistically insignificant ($t = 1.77$). The sample for France with 21 cases in this study is larger than the sample of only 10 cases used by Dewenter and Malatesta (1997). In the case of Canada, more extensive data on private IPOs are collected in this article. The sample includes 258 companies, with the average initial return of 5.4 percent for private IPOs while Dewenter and Malatesta's (1997) sample size is 100, with the average initial return of 9.3 percent. With the extended sample, the test statistics for Canada turn out to be statistically insignificant.

The test for the U.K. indicates greater initial return in privatizations. The relevant test statistic is 8.08. On the other hand, the tests for Malaysia ($t = -3.072$) and Portugal ($t = -2.56$) indicate that privatization in those countries yield lower initial returns than private IPOs. Test results for other countries are statistically insignificant.

IV. Analysis of Short-run Performance of PIPOs

A. Tests of the Signaling Model

The signaling model of Perotti (1995) suggests that stake sold (percentage of the firm's capital in the initial offer) is positively related to the initial return of the privatized SOE. Taking the derivative of Perotti's (1995) offer price schedule (Proposition 2) with respect to stake sold confirms this point. Perotti (1995) argues that postponing part of the sale indicates a willingness on the part of government to bear the

2. When the sample period was matched to that of Loughran et al. (1994), the sample was reduced to 77 PIPOs from 9 countries. However, the relevant test statistics is 4.16, which does not alter the original test result in this study.

cost of redistribution, a signal that the government has no intention to redistribute value of newly-privatized firms to other favorable constituencies through policy changes. The larger the stake sold, the higher the potential risk of policy change and, hence, deeper underpricing is necessary to ensure successful privatization.

To empirically test this implication, the initial returns are regressed on stake sold by the government.³ To control the effect of industry characteristics, a dummy variable for utility is added in the second regression. Test results are reported in table 3.

Panel 1 of table 3 indicates that the signaling hypothesis is supported at 10 percent significance level ($t = 1.78$), and the sign is consistent with the model prediction. The positive relation between the initial return (degree of underpricing) and the stake sold indicates that underpricing is less severe in partial sales because a partial sale of shares in the first period signals the assurance of the government not to interfere. Adding the utility dummy variable to the regression changes the result significantly. The signaling variable stake sold becomes statistically insignificant while the coefficient of utility dummy has a statistically significant positive sign. This result again is consistent with Perotti (1995). Utility companies, which are subject to a higher degree of potential redistribution, tend to be privatized with larger underpricing and, hence, higher initial returns.

The sample is divided into two sets for earlier and later periods to examine reputation-building effects. The cut-off date is the median offer date of July 2, 1991. The test result for earlier PIPOs confirms the findings in panel 1 that there exists a positive relation between initial returns and stakes sold in PIPOs. Regression result for the later period, however, does not exhibit any significant relation, and the regression coefficient for stake sold even has a wrong sign. The test result in panel 2 confirms the general observation that privatization initial returns were high in the early years, but have fallen recently. This is because the privatizing governments have built their reputations slowly and steadily over the years and, as a result, they are able to privatize SOEs with lower underpricing. This seems consistent with the British evidence on

3. Before testing the hypotheses, Cook and Weisberg (1982)'s R-student value was calculated to detect outliers. Any observation whose R-student value is greater than 5 is considered as an outlier and is deleted from the data set.

TABLE 3. Regressions for Initial Returns on Stake Sold and Utility Dummy

Regressor	Coefficient Estimates	
A. Full sample		
Constant	19.0758 (5.32) ^c	17.2091 (4.77) ^c
Stake Sold	.1044 (1.78) ^a	.067 -1.12
Utility		10.2464 (2.52) ^b
Adjusted R ²	.0121	.0412
N	178	178
B. Sample Classified by IPO Date		
	Earlier Period	Later Period
Constant	14.041 (2.98) ^c	26.5156 (4.77) ^c
Stake Sold	.135 (1.94) ^a	-.194 (-1.42)
Utility	15.121 (3.13) ^c	3.378 (.54)
Adjusted R ²	.1754	.0126
N	89	89

Note: The dependent variables, Initial Returns, are calculated as (Closing price– Offer price) ÷ (Offer price). Initial Returns are regressed on Stake Sold, which is measured by percentage of the firm’s capital in the initial offer, and the Utility Dummy variable. Utility equals one for privatizations of firms in the utility industry, and zero otherwise. In panel 2, the data set is divided into earlier and later data sets based on the median of the offer date (July 2, 1991). Coefficients are estimated by ordinary least square-regression. The *t*-statistics are given in parentheses. N indicates sample size. The superscripts a, b, and c denote significance at the 10, 5, and 1 percent levels, respectively, for two-tailed tests.

privatization programs. British government had sold smaller stakes at deeper discounts in individual SOEs in its earlier privatization stage. And the complete sales with moderate underpricing became common in its recent privatization program, presumably when its intent to allow free rein to market forces had been established.

Perotti (1995) also argues that the degree of underpricing is positively related to the policy uncertainty. If the market is efficient, a discount will be required for the policy uncertainty, and the degree of underpricing should be positively related to the ex ante volatility (or

risk measure). Ritter (1984) used standard deviation of 20 daily returns in the aftermarket as a proxy of ex ante risk. The same risk measure as used in Ritter (1984) is employed here and the risk measure is divided by standard deviation of daily market return of the country for the same period to control the differences in market stability of each nation. This variable is used, the return uncertainty, as a proxy for the policy uncertainty. In another study, Biais and Perotti (1997) have shown that a right wing or market-oriented government's optimal privatization policy is to underprice shares in fixed-price offers and then ration the shares to median-income voters. The underpricing necessary to induce median-income citizens will increase with a country's income inequality. To test this hypothesis, this study employs the income distribution index of median class, obtained from the *World Development Report* (1994), as a measure of income inequality. The income distribution index represents the share of income earned by the second and third quintiles of the population for 30 different countries in the sample. Biais and Perotti's (1997) assertion is supported if a negative sign for the income distribution index is observed. In sum, the effect of policy uncertainty on initial return is tested using two proxy variables, the return uncertainty and income distribution index. Table 4 presents the test results.

The tests show that there exists a statistically significant relationship between the future uncertainty and initial returns of the PIPOs. Policy uncertainty, as measured by return uncertainty and income distribution index, tends to be statistically significantly related to the degree of underpricing. It is interesting to compare this result with the studies that examined private IPOs. Ritter (1984) has found no relationship between initial returns and value uncertainty of the private IPOs. Jog and Riding (1987) also reported that underpricing is not related to issue-specific measure of risk such as variance or beta. Unlike privatizing SOEs, POEs are not as much affected by policy uncertainty. Findings of Ritter (1984) and Jog and Riding (1987) reflect this fact.

Again, the sample is divided into earlier and later sets according to the PIPO dates, using the median offer date of July 2, 1991, as the cut-off date. The results in panel 2 of table 4 confirm the earlier findings that there exists a positive relation between initial returns and proxies of policy uncertainty. The explanatory power of regression using the earlier sample is more convincing, while that of the later sample is not.

TABLE 4. Regressions for Initial Returns on Policy Uncertainty

Regressor	Coefficient Estimates		
A. Full sample			
Constant	18.002 (5.85) ^c	16.648 (4.95) ^c	33.28 (4.77) ^c
Return Uncertainty	2.174 (2.93) ^c	2.047 (2.74) ^c	1.891 (2.58) ^b
Income Distribution			-.265 (-2.73) ^c
Utility Dummy		5.194 -1.23	5.473 -1.31
Adjusted R^2	.0484	.0516	.0914
N	150	150	150
B. Sample Classified by IPO Date			
	Earlier Period	Later Period	
Constant	52.425 (4.33) ^c	30.089 (2.46) ^b	
Return Uncertainty	1.089 1.47	2.143 -.88	
Income Distribution	-.503 (-3.01) ^c	-.225 (-1.56)	
Utility Dummy	11.899 (2.32) ^b	.019 (.000)	
Adjusted R^2	.1963	.0306	
N	72	78	

Note: Initial Returns are regressed on Return Uncertainty, Income Distribution, and Utility Dummy. The explanatory variable Return Uncertainty is a standard deviation of 20 daily returns in the aftermarket, divided by the standard deviation of 20 daily market returns for the same period. The market return data are from *Datastream International*. Income distribution data, the measure of income inequality of respective countries, are taken from *World Development Report* (1994). In panel 2, the whole sample is divided into earlier and later data sets based on the median of offer date (July 2, 1991). Coefficients are estimated by ordinary least-square regression. The t -statistics are given in parentheses. N indicates sample size. The superscripts a, b, and c denote significance at the 10, 5, and 1 percent levels, respectively, for two-tailed tests.

This is an indication that the policy uncertainty was more prevalent in the earlier stage of privatization programs.

The coefficients for utility dummies, although they have the right signs, are not statistically significant except in the earlier PIPO sample. These results also indicate that uncertainty in the regulation of utilities

contributes to uncertainty in the value of offers and to underpricing. It appears that the deliberate choice of stakes sold together with the degree of underpricing is especially prominent in the utility whose value is highly sensitive to public policy choices. These results are consistent with the assertion in D'Souza and Megginson (1999). They argue that governments have become extremely adept at manipulating offers pricing and controlling allocation in terms of these offers to achieve political and economic objectives. Governments launching privatization programs in the earlier period were selling smaller stakes at a discount when uncertainty over future regulatory behavior was greatest. As the governments gain credibility over time, they are selling larger stakes at moderate underpricing. In sum, the evidence lends support to the implication of the signaling model that the governments have deliberately underpriced the PIPOs to yield unusually high returns for SOEs, especially for those in the utility industry.

B. Tests of the Market Capacity Hypothesis

It has long been argued that the capital market is not large enough to absorb privatization offers.⁴ This line of reasoning, the market capacity hypothesis, suggests that the partial and underpriced sale of PIPO is unavoidable because the offer size of PIPO is immense compared to the market capitalization of the domestic capital market.⁵ If the market capacity hypothesis holds, coefficient of offer size, which is calibrated by market capitalization of domestic capital market of the country, will be positive. Larger offer size means deeper underpricing (and higher initial returns). When the tranche is open to foreign investors, however, underpricing becomes less severe, resulting in lower initial returns. When foreign investors are allowed to purchase deeply discounted privatization shares, the offer transfers wealth to foreigners. Thus, a wide foreign participation would lower the initial returns in general. Foreign participation also enlarges the market base and, hence, privatizing government may not have to underprice PIPO shares so

4. Perotti and Gunev (1993) compare the reputation-building hypothesis to the market-capacity hypothesis as an alternative explanation. The reputation-building hypothesis deals with the credibility of issuer, the government, over time.

5. For a more detailed explanation of the market-capacity hypotheses, refer to Perotti and Gunev (1993) and the privatization special issue of *Euromoney*, February 1996.

TABLE 5. Regressions for Initial Returns on Offer Size and Foreign Tranche

Regressor	Coefficient Estimates		
Constant	24.69 (11.84) ^c	20.136 (8.31) ^c	24.893 (9.42) ^c
Offer Size	-.028 (-.38)	-.084 (-1.11)	.002 (-.03)
Foreign Tranche			-.321 (-3.94) ^c
Utility		13.513 (3.41) ^c	15.067 (3.89) ^c
Adjusted R^2	-.0051	.0553	.1344
N	168	168	164

Note: Initial Returns are regressed on Offer Size, Income Distribution and Utility dummy. The explanatory variable Offer Size is defined as the proceeds of each privatization IPO, divided by market capitalization of domestic capital market of the country. Foreign Tranche equals the proportion of offer allocated to foreigners at initial offer. Utility dummy equals one for privatizations of firms in utility industry, and zero otherwise. Coefficients are estimated by ordinary least square regression. N indicates sample size. The t -statistics are given in parentheses. The superscripts a, b, and c denote significance at the 10, 5, and 1 percent levels, respectively, for two-tailed tests.

much to push through the offer in the market. To test these hypotheses, regressions of initial returns are run on the offer size and foreign tranche.

Test results presented in table 5 show that market capacity hypothesis does not hold. Offer size is not systematically related to the degree of underpricing. The existence of foreign tranche, on the other hand, significantly reduces the initial return and the sign of the regression coefficient is consistent with the prediction of market capacity hypothesis. The explanatory power of the regression equation becomes substantially improved when the utility dummy is added in the regression analysis.

C. Cross-sectional Determinants of Initial Returns of SOEs

To investigate the determinants of initial privatization returns, cross-sectional multivariate regression analyses are employed. The analysis in the previous sections identified several factors influencing the initial returns in PIPOs. In addition to these variables, the binding constraints, which are basically institutional restrictions on the pricing formula,

should be considered. These binding constraints may have contributed to the unusually high average initial returns in such countries as Japan, Korea, Malaysia, Singapore, and Taiwan. These countries impose institutional restrictions on the pricing to use a formula specified by the regulators. Loughran *et al.* (1994) point out that initial returns of each market are systematically related to institutional restrictions imposed on the market. The U.K. dummy is also included in the regression equation to detect the effect of privatization as a means of reform policy.⁶ This type of multivariate regression permits us to further refine tests by controlling several factors affecting the initial returns of PIPOs.

Two sets of regression results are presented in table 6. The findings are consistent with results reported earlier and support the predictions of the signaling model. The estimated coefficients on stake sold have predicted signs (positive), although statistically insignificant. There exists a statistically significant relationship between the future uncertainty and initial returns of the PIPOs. The proxies of policy uncertainty e.g., return uncertainty and income distribution index, are statistically significantly related to the degree of underpricing with the predicted signs of the models of Perotti (1995) and Biais and Perotti (1997). The coefficient of offer size, on the other hand, is not significant and, hence, the market capacity hypothesis is not supported. The evidence also confirms the implication of a signaling model that firms whose values are highly sensitive to public policy choices tend to be privatized with smaller initial sales and larger underpricing. The privatizing governments design their privatization program to build a reputation over time, especially for utilities.

V. Conclusion

There has been a general tendency for governments around the world to underprice the privatization IPOs to a greater degree than their counterparts of private IPOs. This phenomenon has widely been observed by researchers and practitioners alike. With an extended

6. See Jones *et al.* (1999) for an excellent summary for the uniqueness of the U.K. privatization program.

TABLE 6. Cross-sectional Determinants of Initial Return

Regressor	Coefficient Estimates	
Constant	38.507 (5.22) ^c	30.637 (4.12) ^c
Stake Sold	.066 (-1.01)	.021 (-0.28)
Return Uncertainty	1.325 (1.86) ^a	1.245 (-1.18)
Income Distribution	-.307 (-2.86) ^c	-.294 (-2.9) ^c
Offer Size	.01 -.14	.035 -.5
Foreign Tranche	-.306 (-3.83) ^c	-.204 (-2.57) ^b
Utility	8.809 (2.13) ^b	7.542 (1.83) ^a
Binding Constraints	18.568	(4.29) ^c
U.K.		12.703 (2.00) ^b
Adjusted <i>R</i> ²	.1771	.2699
<i>N</i>	142	142

Note: Initial Returns are calculated using the formula (Closing price - Offer price) ÷ (Offer price). Stake Sold means percentage of the firm's capital in the initial offer. Return Uncertainty is standard deviation of 20 daily returns in the aftermarket, divided by the standard deviation of 20 daily market returns for the same period. Data on Income Distribution are taken from *World Development Report* (1994), as a measure of income inequality of respective countries in the sample. Offer Size is defined as the proceeds of each privatization IPO divided by market capitalization of domestic capital market of the country. Foreign Tranche equals percent of offer allocated to foreigners at initial offer. Utility equals one for privatizations of firms in utility industry, and zero otherwise. Binding Constraint equals one if the country imposes institutional restrictions on the pricing formula, and zero otherwise. The U.K. dummy equals one if the sample is from United Kingdom, and zero otherwise. Coefficients are estimated by ordinary least square regressions. The *t*-statistics are given in parentheses. *N* indicates the sample size. The superscripts a, b, and c denote significance at the 10, 5, and 1 percent levels, respectively, for two-tailed tests.

sample, this study also found a significant difference between the initial returns of PIPOs and those of private IPOs, confirming this general phenomena. These results, however, cannot be fully explained by traditional information asymmetry theory.

The signaling model of Perotti (1995) and Biais and Perotti (1997)

offers an alternative explanation for the unusually high short-run performance of privatization IPOs. Due to the policy uncertainty, underpricing is necessary to induce private investors. A partial sale and underpricing are signals of a government's intent not to interfere. And allocating underpriced shares to favored constituencies (middle-income voters) reassures investors that a government will not reallocate future firm values to other constituencies through policy changes. Thus income inequality in the country causes greater underpricing.

This study employs signaling variables such as stakes sold by the government, return uncertainty, and income distribution index, together with other variables such as offer size and foreign tranche, to examine the determinants of the short-run performance of privatization IPOs. The test results support the implications of the signaling model. Higher returns of PIPOs are associated with larger stakes sold, higher ex ante risk measure (the standard deviation of returns), greater income inequality (lower middle-class income), and smaller foreign tranche. Binding constraint, the imposition of institutional restrictions on the pricing formula, also contributes to the high initial return of PIPOs.

High initial return on privatization IPOs may be a result of deliberately chosen behavior by the government. Significant underpricing may induce excess demand, requiring rationing, thereby encouraging diffuse ownership by favoring domestic retail investors, as Biais and Perotti (1997) indicate. Holmstrom and Tirole (1993) show that diffuse shareholding will lead to greater noise trading, encouraging more information collecting by speculators. Thus the share price will be more informative, permitting more efficient contracting with managers. Moreover, sizable underpricing of privatization IPOs, as Shleifer and Vishny (1994) pointed out, may be used as a good defense against hostile takeover attempts. Diverse ownership makes it infeasible or very expensive to assemble a large block of shares for a takeover attempt. Thus PIPO at significant underpricing seems to be an appropriate vehicle to accomplish various objectives of privatization. Share ownership distribution in a country, therefore, may be an important factor explaining the performance of privatization IPOs.

Other important issues, however, are not addressed in this paper, which are left for future research. For example, long-term performance of the PIPOs is another issue of interest. Choi (1998) and Megginson *et al.* (1998) report that, in the long run, the PIPOs significantly

outperform the market return of each nation, while private IPOs underperform the market. These results indicate that the privatization shares appear to be a good investment alternative for the investors. Jones *et al.* (1999) provide an explanation of the long-run over-performance of PIPOs. They argue that the investors would be in doubt about the success of the privatization program at the time of issue, and they are unwilling to pay full share price, because the privatized SOEs may not escape from government interference. Further research will have to determine whether the long-run over-performance of PIPOs holds up in the risk-return framework.

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