PRIVATISING NATIONAL OIL COMPANIES: ASSESSING THE IMPACT ON FIRM PERFORMANCE

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Abstract

This paper is the first detailed empirical study of privatisations in the global oil and gas sector, where questions of resource control have regained widespread attention. Examining 28 global share-issue privatisations from 1977 to 2004, we find compelling evidence that privatisation is associated with significant performance improvements. We can, however, reject the hypothesis that the majority of performance improvement measures can only be implemented *after* a change in ownership; within our sample performance improvements are shown to materialise well before the privatisation date, tend to accrue over time, and actually decrease (in relative terms) within the post-transaction period. The performance improvements found prior to the actual privatisation date are unlikely to be mere accounting constructs, but represent a fair picture of the underlying economic substance. Finally, a number of factors are identified which impact on the degree of performance changes between individual firms.

1   Introduction

The effect of ownership on firm performance has been intensely scrutinised in the economic literature over the past 25 years or so. Whilst the majority of studies suggest that privatisation is associated with improvements in operational and financial performance (for a survey see Megginson & Netter 2001), a number of issues relating to this performance impact of privatisation remain outstanding. For example, there remains uncertainty about the temporal correlation between privatisation-induced performance changes and the actual change in ownership. Whilst the property rights literature and related perspectives suggest that a change in ownership is a prerequisite for fully implementing managerial incentive schemes, Dewenter and Malatesta (2001) find that performance improvements largely occur in the three years leading up to privatisation. Their empirical finding is in line with Yarrow's

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(1986) assessment that the primary goal of privatisation may not be to achieve efficiency gains, but to perpetuate them in the face of changing political circumstances. Furthermore, the interplay of factors such as ownership, control, governance, competition and regulation in determining corporate performance – i.e. *why* and *how* (i.e. through which mediating processes and variables) privatisation impacts on firm performance – has not been fully understood yet, although recent empirical studies have yielded interesting additional results (Boubakri *et al.* 2005; D'Souza *et al.* 2005). We attempt to empirically address these issues through the first comprehensive empirical study of share-issue privatisations in the global oil and gas industry, an industry which has been a key contributor to overall privatisation revenues but where questions of resource control have recently regained widespread attention.

2   Privatisation in the global oil and gas industry

The global oil and gas industry remains one of the "commanding heights" of the economy – in 2004 oil and gas together accounted for 61% of (commercially traded) primary energy sources (BP 2005) and for 11.1% of global trade (WTO 2005) – and in which questions of resource control are often subject to controversial debate. For the purposes of this paper, we define the oil and gas industry to include those companies that generate the majority of their revenues in either exploration and production ('E&P' or 'upstream') of hydrocarbons or in refining and marketing ('R&M' or 'downstream') of oil products. Oil and gas is an almost archetypical global industry trading in largely standardised commodity products and with crude oil prices as a key driver of profitability. Despite the often high volatility of commodity prices it is thus possible to effectively control for common industry "noise" in corporate performance. R&M, however, is in many countries still subject to tight regulation including price controls. Although some private oil and gas companies such as ExxonMobil and Royal

Dutch/Shell can be counted amongst the largest companies in the world[2], more than 90% of the world's oil and gas reserves remain under the control of nation states and their National Oil Companies ('NOCs') (PIW 2004). Despite their economic importance there has been surprisingly little systematic research on NOCs (McPherson 2003), and most accounts of structural inefficiencies at these companies have been largely anecdotal.

The oil and gas sector globally has been, together with utilities and telecommunications, one of the key contributors to privatisation revenues (Megginson 2005), and in fact it is the sale of a minority stake in BP in 1977 which is often considered to have been the starting point of modern-day privatisation programmes.[3] But since the vast majority of global oil and gas is still owned and produced by NOCs, privatisation might still play an important future role in the industry, although the likelihood of this will obviously depend on geopolitical trends as well as prevailing socio-economic ideas and ideologies – the current industry trend certainly is towards more state control rather than privatisation.

3   Time-series analysis of oil and gas SIPs

There are typically two options to privatise a state-owned company: either an asset-sale to an industrial or financial buyer, or a share issue privatisation ('SIP') to the public, usually associated with a listing at a local and/or international stock exchange. This analysis focuses on SIPs for reasons set out in Megginson et al. (1994) and elsewhere. Usually there is no comparable data available to analyse the performance impact of asset sales, so on the one hand SIPs are the only possible transactions for which changes over time can be observed. On the other hand, it is possible to argue that the most important and politically sensitive

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[2] According to the Forbes 2007 list of largest listed companies in the world, four out of the top 10 companies in terms of market capitalization (as of 28 Feb 2007) are oil and gas companies.
[3] Megginson et al.(1994) point out, however, that it was the Adenauer Government in West Germany which in the 1960s launched the first large-scale, ideologically motivated « denationalisation » programme post World War II.

privatisations usually occur in the SIP format and that a sample of SIPs therefore represents a meaningful picture of oil privatisations in general.

3.1 **Data**

We compile a dataset of SIPs in the global oil and gas sector in order to analyse the impact that privatisation has had on the operating and financial performance of the companies involved. We were able to identify a total of 41 oil and gas SIPs based on previous privatisation studies, third party databases such as Thomson Financial SDC, industry reports and a detailed press search by country.[4] Of these 41, 13 had to be discarded due to lack of data availability, lack of sufficient post-privatisation data, the companies being acquired shortly after privatisation, or the sale only constituting a negligible stake listed on the domestic stock exchange (largely employee shares). For the remaining 28 SIPs from 20 different countries extensive accounting and share price data was collected, with the accounting data being sourced from listing prospectuses, annual reports and third party databases such as Mergent and Osiris, and the share price being sourced from Datastream.

22 of the transactions are genuine Initial Public Offerings (IPOs), i.e. the oil and gas firm was not traded on the capital markets before, three companies had already sizeable international listings at the time of the first government sell-down, and a further three companies had small domestic listings already in place at the time of privatisation. Before these initial privatisation offerings, the state owned an average of 88% in the 28 firms. On average a 25% stake in the company was sold in these transactions, resulting in an average retained state ownership of 63%. Only one company was privatised fully in a single transaction. This observation is in line with other authors who find seasoned, multi-tranche offerings over time to be common practice for privatisations (Perotti & Guney 1993; Perotti

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[4] All voucher and all Russian privatisations in oil and gas have been excluded from the analysis, largely for concerns over the transparency of the privatisation process.

1995; Megginson *et al.* 2001). Expressed in 2006 money, the 28 SIPs in the sample raised a total of US$48.6 billion, or an average of US$1.74 billion per transaction (range: US$73 – 5,861 million). In terms of time distribution, 12 out of the 28 offerings have taken place since 2000. This pattern begs the question to what extent privatisation offerings follow the economic/macro cycle and what implications this might have for post-privatisation performance. For the sample the average real terms crude oil price in the three years preceding privatisation is US$30.4 per barrel, whereas in the three years following privatisation it is 7% higher at US$32.5.[5]

For each of the oil and gas SIPs we collect extensive operating and financial data (in local or reported currency), usually for a seven-year period around the privatisation date. Based on this data we calculate a total of 22 empirical proxies for corporate performance, comprising metrics for profitability, efficiency, capital investment, output, employment, financial leverage and dividend payout. The proxies serve to test hypotheses on the performance impact of privatisations as detailed below.

3.2 Univariate performance tests

Based on the review of theory and previous empirical studies, the sample is used to test whether the privatisation of NOCs is empirically associated with (1) increases in profitability, (2) increases in efficiency and labour productivity, (3) increases in capital investment, (4) increases in output, (5) decreases in employment levels, (6) decreases in financial leverage, and (7) increases in dividend payments (see e.g. D'Souza & Megginson 1999).

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[5] For reasons of tax and operational leverage, the earnings sensitivity of oil and gas companies to changes in oil prices depends on the absolute level of prices. For the European integrated oil sector in 2004 (with Brent crude at US$38.3/bbl, UBS Investment Research estimated an earnings sensitivity of 3.1% per US$1 change in oil price (UBS 2006).

Variable	No. of obs	(A) Three-year averages: -3 to -1 vs +1 to +3					(B) Single-year: -3 vs +3		
		Average (median) before	Average (median) after	Change in average (median)	z-statistic (one-sided Wilcx. signed-rank test)	Fraction of firms that change as predicted	Change in average (median)	z-statistic	Fraction of firms that change as predicted
Return on sales	28	0.0973 (0.0468)	0.1253 (0.0787)	0.0280 (0.0319)	-2.778***	71.4%	0.0481 (0.0450)	-3.211***	75.0%
Return on assets	28	0.0595 (0.0433)	0.0882 (0.0666)	0.0287 (0.0233)	-3.234***	71.4%	0.0484 (0.0365)	-3.552***	82.1%
Return on equity	28	0.1412 (0.1175)	0.1839 (0.1607)	0.0427 (0.0432)	-2.095**	64.3%	0.0895 (0.1000)	-2.824***	75.0%
Sales per employee	25	0.8777 (0.8477)	1.1569 (1.1292)	0.2792 (0.2815)	-3.054***	84.0%	0.4284 (0.5266)	-3.592***	80.0%
Profit per employee	24	0.6717 (0.5929)	1.2243 (1.1206)	0.5526 (0.5277)	-3.486***	83.3%	1.8761 (1.0347)	-3.969***	91.7%
Output per employee	24	0.8956 (0.9016)	1.0796 (1.0739)	0.1840 (0.1723)	-3.200***	75.0%	0.2679 (0.2638)	-3.600***	83.3%
F&D costs per boe	10	2.7736 (1.5003)	1.5437 (1.6038)	-1.2298 (0.1035)	0.459	55.6%	-2.1182 (0.3898)	-0.255	44.4%
Production cost per boe	14	1.0635 (1.0505)	1.0851 (0.9513)	0.0217 (-0.0992)	-0.157	61.5%	0.0117 (-0.1182)	0.094	61.5%
Reserve replacement	14	1.5079 (1.3539)	1.5741 (1.3272)	0.0662 (-0.0267)	-0.220	46.2%	-0.7010 (-0.0574)	0.847	46.2%
Capex	28	0.9679 (0.8783)	1.4392 (1.3114)	0.4713 (0.4331)	-3.985***	78.6%	0.6978 (0.5813)	-3.894***	85.7%
Capex / sales	28	0.1990 (0.1306)	0.1810 (0.1287)	-0.0180 (-0.0020)	0.273	53.6%	-0.0478 (0.0155)	1.093	42.9%
Capex / assets	28	0.1071 (0.1032)	0.1222 (0.1163)	0.0151 (0.0131)	-2.049**	67.9%	0.0147 (0.0214)	-1.571*	64.3%
Sales	28	0.8763 (0.8559)	1.1977 (1.1268)	0.3214 (0.2709)	-3.234***	75.0%	0.4714 (0.3920)	-3.165***	71.4%
Physical Output	26	0.8847 (0.9351)	1.1323 (1.0604)	0.2477 (0.1253)	-4.076***	92.3%	0.3579 (0.1974)	-4.178***	92.3%
Employment	25	62,139 (17,536)	55,239 (13,942)	-6,899 (-3,595)	1.063	48.0%	-8,819 (-6,134)	1.009	52.0%
Rel. employment	25	1.1350 (1.0144)	1.0538 (1.0111)	-0.0812 (-0.0034)	-0.229	48.0%	-0.1896 (-0.0036)	-0.202	52.0%
Employees / assets	25	1.2598 (1.1936)	0.8560 (0.8052)	-0.4038 (-0.3884)	4.157***	92.0%	-0.6500 (-0.5680)	4.372***	100.0%
Debt / equity	28	0.8722 (0.6767)	0.5621 (0.5177)	-0.3101 (-0.1590)	1.548*	64.3%	-0.3772 (-0.1004)	1.435*	60.7%
Debt / debt+equity	28	0.3636 (0.3894)	0.3144 (0.3388)	-0.0492 (-0.0506)	1.617*	64.3%	-0.0571 (-0.0416)	1.366*	60.7%
Debt / EBITDA	27	1.7429 (1.1747)	1.2994 (1.3507)	-0.4435 (0.1760)	1.778**	59.3%	-0.4300 (-0.0582)	1.441*	59.3%
Dividends / sales	28	0.0356 (0.0089)	0.0573 (0.0226)	0.0217 (0.0137)	-2.619***	71.4%	0.0334 (0.0236)	-3.256***	75.0%
Dividends / profit	26	0.3523 (0.3105)	0.4007 (0.4072)	0.0485 (0.0967)	-1.562*	65.4%	0.1019 (0.1641)	-2.070**	69.2%

Table 1 (A) and (B): Results of univariate tests for (A) periods –3 to –1 versus +1 to +3 around privatisation, and (B) for period –3 versus +3.

Notes: For sales, sales per employee, income per employee, F&D costs, production costs and capex the nominal monetary values are deflated using CPI data from the IMF's International Financial Statistics. Also, all per-employee metrics as well as F&D costs, production costs, capex, sales, physical output, relative employment and employees over assets are "normalised" to the value of 1.0 in the year of privatisation, with other years accordingly expressed relative to unity in this year 0.
* / ** / *** : Denotes significance at the 10-percent / 5-percent / 1-percent level, respectively.

For each firm we calculate the mean and median of the 22 empirical proxies for the pre-privatisation (-3 to –1 years) and post-privatisation (+1 to +3 years) periods, which are reported in Table 1(A). We employ a non-parametric test, a one-sided Wilcoxon signed-rank test, to test whether the median difference in variable values is zero. We also calculate the percentage of companies for which the change in the performance variable is in the predicted direction. The univariate tests provide compelling evidence that privatisation of NOCs is indeed associated with higher firm profitability, (commercial) efficiency, capital investment, output and dividend payments, as well as with lower financial leverage and employment.

Profitability. All three measures of profitability show very significant (at the 1% level) improvements, and on our preferred measure, return on sales (ratio of two flow measures from the income statement), 71% of companies improve their profitability. Since state-owned companies are often charged to pursue non-commercial/social objectives, privatisation would be expected to increase the focus on profitability and this result can not necessarily serve as evidence of improved efficiency. [6]

Efficiency. All per-employee metrics have increased at the 1% significance level, including our preferred measures of output per employee. Our second choice of indicator in this category, production cost per barrel, shows some improvement at the median level, but not statistically significant. Rather than through the reduction of non-personnel operating costs, efficiency improvements thus seem to materialise through a combination of higher physical output, cuts in employment, and possibly cuts in more or less well defined "overhead costs", e.g. non-commercial activities, which enable a redirection of parts of the budget towards operating assets.

Capital investment. As capital expenditure is usually a result of mid- to long-term financial and investment planning, particularly in the oil and gas industry with its significant project lead times, we see capex over assets as our preferred measure and conclude that privatised NOCs indeed increase their capital expenditures. Where detailed disclosure was available, we have excluded corporate acquisitions from capital expenditures, so in theory most of this expenditure should only be reflected in the operating results beyond the three-year horizon applied in this study. However, where disclosure is poor acquisitions might have

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[6] The appropriate measurement of performance changes has been the subject of some debate, since often used metrics such as profitability cannot fully distinguish between changes in technical efficiency and changes in corporate objectives (Bozec *et al.* 2006). Boardman & Vining (1989) concede that it is difficult to refute the idea that lower profits are the result of social output in case those posited benefits are *external* to the SOE. If they are *internal*, however, e.g. in the form of excess employment, such benefits are likely to be achieved only at a deadweight loss.

been part of the capital expenditure line in the accounts, and such expenditure then could have an immediate impact on metrics such as physical output.

Output. A stunning 92% of firms manage to increase their physical output throughout the privatisation process, leading to highly significant improvements both in the output and the monetary sales variables.

Employment. Often the most controversial aspect of privatisations, previous studies often found conflicting and non-significant evidence as to the direction and magnitude of employment changes (Megginson & Netter 2001). The companies in our sample reduce their average headcount by 6,900 or 11% of staff, but this reduction is – at least statistically – not significant. Also, 52% of firms actually increase their headcount, so the average overall reduction is only due to a small number of firms with disproportionate reductions in headcount. The highly significant reduction in the ratio of employees over assets shows that the privatised NOCs manage to operate their assets with much higher labour productivity.

Financial leverage and dividend payout. The results show a statistically significant de-leveraging of privatised NOCs as well as increases in dividend payout ratio, in line with theoretical arguments and previous study results. It is worth pointing out that a number of selling governments actively reduce the retained earnings account of their NOCs prior to privatisation, so the dividend result might even be biased downwards compared to the "steady state" under state ownership.

3.3   **Performance trends over time**

Moving beyond the pre- versus post-privatisation averages over three years, we now consider the year-by-year evolution of performance metrics over the seven-year timeframe. A visual inspection of performance changes within our sample (see Annex 1) makes it is difficult to pinpoint a single step change for most measures. In order to confirm the results of

the visual inspection, we investigate the time trends of performance and efficiency by estimating the following panel data model:

$$PERF_{it} = \alpha_i + \beta_{1i}\,POST_{it} + \beta_{2i}\,YEAR_{it} + \beta_{3i}\,POST*YEAR_{it} + \gamma_i\,OIL_{it} + \varepsilon_{it}\,,$$

whereas PERF is the relevant performance metric, POST is a dummy variable for the years post privatisation (i.e. years +1 to +3), YEAR is a discrete variable, ranging from 1 (for observations in year −3) to 7 (for observations in year +3). POST*YEAR is a slope dummy variable and OIL is a control variable for the oil price in real terms. This model documents the performance effect of privatisation from three different perspectives: the coefficients of POST captures differences in the (average) performance levels before and after privatization, the coefficients of YEAR indicate the year-on-year performance trends, and POST*YEAR evidences any changes in such performance trends that take place after the privatisation transaction. A positive coefficient in POST*YEAR thus indicates that the performance trend further increases after privatization (or decreases less, if the YEAR coefficient is negative).

Tests for serial correlation and heteroscedasticity suggested the need to employ feasible generalized least squares (FGLS) rather than OLS. FGLS estimates the model through OLS and then uses residuals from this regression to estimate the covariance matrix of the errors, which is then uses to transform the data to satisfy the Gauss-Markov assumptions (Beck 2006). It has been shown, however, that test statistics based on FGLS can be problematic unless there are substantially more time points than there are cross-sectional units (Beck & Katz 1995). We therefore also use OLS with panel-corrected standard errors (PCSE).

		Independent variables				No. of observations
		POST	YEAR	POST*YEAR	OilPrice	
Return on sales	(i) FGLS	0.0628	0.0144	-0.0159	0.0013	184
		(0.0255)	(0.0029)	(0.0053)	(0.0003)	
		2.47**	4.96***	-2.98***	4.12***	
	(ii) PCSE	0.0699	0.0163	-0.0183	0.0018	184
		(0.0171)	(0.0016)	(0.0035)	(0.0005)	
		4.10***	10.27***	-5.18***	4.05***	
Return on assets	(i) FGLS	0.0473	0.0143	-0.0137	0.0014	181
		(0.0192)	(0.0022)	(0.0040)	(0.0002)	
		2.47**	6.47***	-3.43***	6.03***	
	(ii) PCSE	0.0520	0.0150	-0.0149	0.0015	181
		(0.0201)	(0.0021)	(0.0042)	(0.0003)	
		2.58***	7.18***	-3.56***	5.31***	
Output per employee	(i) FGLS	0.0703	0.0460	-0.0162	0.0003	155
		(0.0534)	(0.0062)	(0.0111)	(0.0006)	
		1.32	7.39***	-1.46	0.53	
	(ii) PCSE	0.1325	0.0585	-0.0324	0.0004	155
		(0.0503)	(0.0045)	(0.0107)	(0.0016)	
		2.63***	13.08***	-3.02***	0.23	
Capex / assets	(i) FGLS	-0.0071	0.0002	0.0035	0.0000	178
		(0.0261)	(0.0029)	(0.0054)	(0.0002)	
		-0.27	0.08	0.65	-0.14	
	(ii) PCSE	0.0371	0.0041	-0.0064	0.0006	178
		(0.0188)	(0.0032)	(0.0042)	(0.0005)	
		1.97**	1.30	-1.52	1.34	
Employment / assets	(i) FGLS	-0.4126	-0.1383	0.0932	-0.0059	158
		(0.1085)	(0.0123)	(0.0224)	(0.0009)	
		-3.80***	-11.27***	4.16***	-6.21***	
	(ii) PCSE	-0.5163	-0.1511	0.1229	-0.0063	158
		(0.1009)	(0.0131)	(0.0242)	(0.0022)	
		-5.12***	-11.53***	5.08***	-2.81***	
Debt / equity	(i) FGLS	-0.4714	-0.1048	0.1100	-0.0011	179
		(0.1849)	(0.0214)	(0.0384)	(0.0018)	
		-2.55**	-4.91***	2.87***	-0.60	
	(ii) PCSE	-0.6699	-0.1284	0.1513	-0.0051	179
		(0.1745)	(0.0179)	(0.0359)	(0.0024)	
		-3.84***	-7.17***	4.21***	-2.18**	
Dividends / net income	(i) FGLS	0.0188	0.0130	0.0060	-0.0030	178
		(0.1188)	(0.0131)	(0.0240)	(0.0009)	
		0.16	1.00	0.25	-3.47***	
	(ii) PCSE	-0.1069	-0.0141	0.0381	-0.0037	178
		(0.1234)	(0.0085)	(0.0245)	(0.0011)	
		-0.87	-1.66*	1.55	-3.40***	

Table 2: Results of panel data model for performance trends

Notes: Panel data regression results are reported as estimated with (i) feasible generalised least squares (FGLS) and (ii) OLS with panel-corrected standard errors (PCSE). Results show coefficients, standard errors (in parentheses) and significance levels.
* / ** / *** : Denotes significance at the 10-percent / 5-percent / 1-percent level, respectively.

Looking at the PSCE model results, the coefficients for change in performance levels point in the expected direction and are statistically significant (dividend payout is an exception). Importantly, the generally high significance of the time trend indicates that performance improvements associated with privatisation do not usually materialise in a one-off step-up effect; rather, the benefits of privatisation already occur in anticipation of the privatisation, i.e. long before the actual privatisation date, and they accrue over time. Moreover, the performance trend after the privatisation date is not one of accelerating improvement (as might have been expected), but in most cases shows a pattern of slowing

down. It is thus possible to conclude that the majority of factors, which drive performance changes in the context of a privatisation, are already in place at the time of the change in ownership.

These results also make it necessary to, at least partially, reconsider the most suitable methodology for univariate testing. Using three-year averages (or more generally, before and after-event averages) had been the choice of Megginson et al. (1994) and the majority of authors conducting univariate tests have been following this methodological lead, if only to make results comparable. Table 1(A) thus also reported the results of three-year averages. The finding that performance improvements from privatization accrue and even improve over time, however, implies that such averaging will underestimate the true extent of before-after performance changes. We therefore also test for the difference between the point observations in year –3 and year +3 and report the significance of these differences in Table 1(B).[7] As could be expected, the changes in a number of key metrics (such as profitability, per-employee efficiency, physical output, employees over assets, and dividend payout) are even more pronounced and statistically significant. Although the impact on other variables such as production costs, capital expenditure, employment and capital structure are less obvious or, at times, ambiguous, it is thus possible to conclude that, given the time pattern of performance changes associated with privatization, averaging the periods before and after the offering will underestimate the true extent of such changes.

4   Stock-return analysis

Since the above results on changes in performance levels and trends are largely based on accounting data, the possibility of earnings management has to be considered. Managers could accelerate the recognition of income and delay the recognition of expense prior to the

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[7] Where no full seven-year performance data is available, we use the earliest and latest year available for the comparison.

offer, in order to maximise privatisation revenues. Dewenter and Malatesta (2001) note that governments may also encourage or even engage in such earnings management before privatisation. Under the 'disappointment hypothesis', managed accruals before the offering should result in both subsequent underperformance on accounting measures *and* downward revisions in share price (Soffer 2001). DuCharme et al. (2001) investigate earnings measurement in the context of IPOs and find that pre-IPO abnormal accruals are positively related to initial firm value and are significantly negatively related to subsequent firm stock returns. In contrast to studies on IPOs of private companies, previous studies on the share performance of privatised companies (e.g. Boardman & Laurin 2000; Megginson *et al.* 2000) suggest that these stocks outperform in the long-run (Choi *et al.* 2006). We calculate abnormal stock returns for our sample of oil and gas privatisations in order to check whether pre-privatisation performance improvements might be temporary accounting constructs. We calculate buy-and-hold abnormal returns ('BHAR', as defined by Barber and Lyon (1997)) over one-, three- and five-year periods, i.e. we subtract the contemporaneous return on an index from the return on each privatised firm's shares. As benchmark indices we use one the one hand the Datastream Total Market Index for each country, and on the other hand the Datastream Global Oil and Gas Index. Both straight and value-weighted performance averages are calculated to take into account the possibility of outperformance of smaller stocks. We also calculate share returns both including and excluding the initial offer return, but since the issue of underpricing of IPOs is not the focal point of this paper, we will limit our analysis to the data excluding initial offer returns.

	Initial offer return	Absolute return (%)			Rel. to country index (%)			Rel. to Global O&G index (%)		
		1y	3y	5y	1y	3y	5y	1y	3y	5y
Simple averages, buy-and-hold returns, excluding IPO return on 1st day of trading										
Mean	20.8%	20.4%	93.1%	160.6%	-5.9%	23.2%	60.7%	5.9%	54.3%	84.6%
Std dev.	36.3%	47.7%	154.3%	161.3%	49.4%	130.5%	159.8%	47.1%	152.5%	143.3%
Median	5.6%	8.3%	50.9%	131.9%	-7.4%	15.4%	43.8%	3.0%	8.6%	26.5%
Min	-8.8%	-32.0%	-58.1%	-69.6%	-172.6%	-78.0%	-122.7%	-51.9%	-110.6%	-130.8%
Max	136.1%	215.8%	670.5%	565.7%	135.9%	567.8%	605.2%	207.1%	636.0%	494.0%
Weighted averages (by market cap at end of 1st day of trading, in inflation-adjusted US$)										
Wgt.avg.	6.0%	12.4%	45.4%	132.2%	-8.3%	-6.5%	18.8%	0.6%	21.3%	65.4%

Table 3:   BHAR (excluding initial offer return)

Within the first year, there is some evidence of stock underperformance of privatisation offers relative to country indices, but this is neither consistent across benchmarks (there is an outperformance relative to the industry index, suggesting that the industry as a whole underperformed in these particular years relative to country indices) nor across time (over the longer run oil and gas SIPs substantially outperform both their respective country indices and the industry index). Taken together with the continued (accounting based) performance improvements after privatisation, there is no reason to reject the assumption that pre-privatisation accounting changes are a fair reflection of underlying economic realities.

5   Determinants of performance changes

It was shown that privatisation in the oil and gas industry is convincingly associated with improvements in the operating and financial performance of firms, but the spread of individual firm results around the average outcome is quite large, so a better understanding of *how* the process of privatisation is impacting on firm performance is therefore highly desirable. Amongst recent studies, Boubakri et al. (2005) show that for developing countries, the macro-economic/institutional environment and – to a lesser extent – the effectiveness of corporate governance have an impact on performance changes at the individual firm. The relinquishment of government control also matters. For developed countries, D'Souza et al. (2005) find that firm-level factors generally have a higher significance in explaining performance changes than the institutional setting. Based on these studies and supplementary

literature review we identify a range of possible variables, which can be grouped into four broader categories:

Mechanics of the transaction: Dummy variable ('DV') for existing listing of the company; percentage of secondary shares offered relative to primary shares; DV for UK/US registration and listing of shares in addition to domestic market; DV for firms with follow-on privatisations within three years.

Non-governance-related firm characteristics: firm size; DV for operational focus on either E&P or R&M, or integrated oil and gas company.

Firm-level governance characteristics: retained ownership level of the state; DV for relinquishment of state voting control; DV for change in either CEO or the majority of the Board prior to privatisation; DV for company restructuring in the three years prior to privatisation; DV for significant firm-level regulation by domestic government; DV for ongoing liberalisation/deregulation at time of privatisation.

Country-level governance characteristics: GDP per capita; change in GDP growth rate; DV for countries with English Common Law tradition; the La Porta et al. (1998) Shareholder Protection Index; the Government Effectiveness Index by the World Bank (WDI) (see Kaufmann *et al.* 2006)); stock market development, measured by the ratio of the market capitalization of the privatised firm over the total market capitalization of the domestic stock market.

Using these variables, univariate tests are performed on (largely binary) sub-samples. All dummy variables are already of a binary nature, and for index variables we rank the sample and divide it into an upper an a lower half. For each of the subgroups pre- vs. post-privatisation means and medians are calculated and the Wilcoxon signed-rank procedure applied. We also calculate Kruskal-Wallis test statistics to identify significant differences

between the respective sub-samples, the results of which can be summarised as follows: As could have been expected, the percentage of secondary shares is shown to be significant for changes in financial leverage, the variable for follow-on offerings shows significance for both leverage and capital expenditure. Firm size has no significant impact on any of the performance changes, but the operational mix (E&P or R&M focus) has a substantial impact on changes in profitability and physical output. Relinquishment of state control seems to play no major role other than for changes in physical output. Restructured companies and companies that undergo regulatory liberalisation tend to have greater negative changes in employment levels, highly regulated firms reduce their leverage significantly more when privatised. Companies from high-income countries tend to experience stronger improvements in profitability, whereas companies from countries with higher changes in GDP growth increase their capital expenditure significantly more. Interestingly, changes in profitability are significantly higher for firms from countries with less effective government and less developed capital markets. When government effectives is low, privatised firms also tend to increase capital expenditures more rapidly.

6   Conclusion

In this paper we have analysed the impact that privatisation – the first divestment of government shares to the public – has on the performance of National Oil Companies. Examining 28 global share-issue privatisations, we find compelling evidence that privatisation is associated with significant performance improvements. We can reject the hypothesis that change in ownership is a *temporal* prerequisite for the implementation of most performance-improvement measures; within our sample performance improvements are shown to materialise well before the privatisation date, tend to accrue over time, and actually decrease (in relative terms) within the post-transaction period. Whilst there is no reason to

doubt the *causal* relationship between ownership change and performance improvement, there is more work required on the mechanisms and processes through which the two are connected. The performance improvements found prior to the actual privatisation date are unlikely to be mere accounting constructs, but represent a fair picture of the underlying economic substance. Finally, a number of factors are identified which impact on the degree of performance changes between individual firms; more sophisticated analyses will be conducted to explore this important issue.
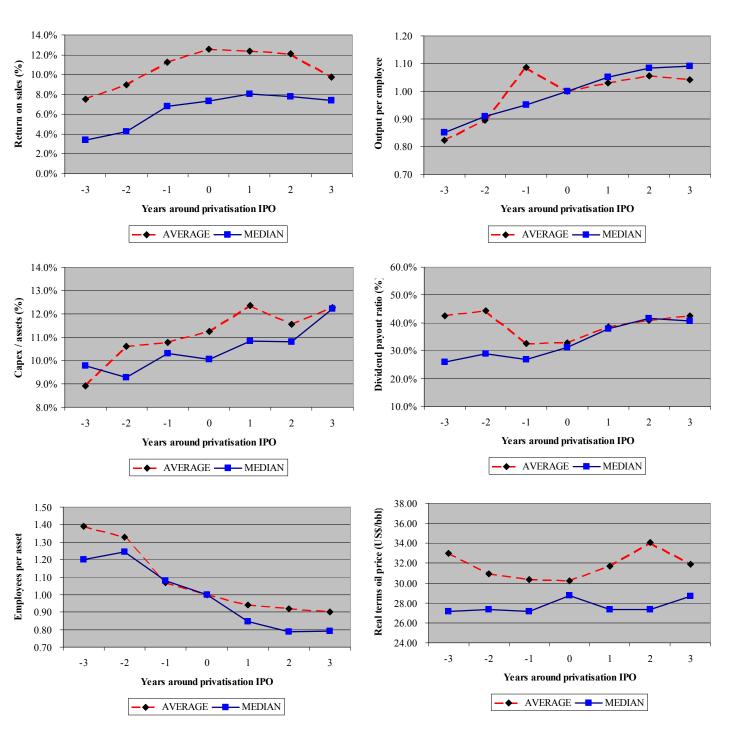
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Annex 1: "Visual inspection" of time trends of performance