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The Influence of Ownership Structure on Risk Management: Evidence from New Zealand State Owned Enterprises

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Abstract

This paper examines how recent theories on risk management apply to government owned organizations. We argue that, compared to publicly listed firms, government owned organizations have a lower need for risk management since stakeholders are likely to rely on implicit guarantees arising from government ownership. We test this proposition empirically and find that government owned organizations make less use of financial derivatives to reduce the costs of financial distress and agency conflicts. In general our findings provide strong support for the modern theories of risk management.

1. Introduction

In recent years a substantial theoretical literature has developed, showing that risk management can add value to a firm. Empirical studies have generally supported these conceptual arguments.[1] Both the theoretical and empirical studies of risk management focus exclusively on publicly owned firms. This paper extends the literature in two ways. First, we discuss the relevance of risk management theories for government owned enterprises. Second, we provide empirical evidence on the use of financial derivatives by government owned enterprises and compare this with the use of derivatives by listed firms.

There have been several recent instances of misuse of derivatives by government, municipal and not-for-profit organizations (e.g., London Borough of Hammersmith and Fulham, Odessa Community College, and Orange County).[2] As a result the use of financial derivatives in government organizations has been questioned. Should government organizations, with a well-diversified owner that has an almost unlimited ability to raise capital, use financial derivatives to hedge their activities?

In this study we analyze the use of financial derivatives by New Zealand state owned enterprises (SOEs) and compare their use of derivatives with firms listed on the New Zealand Stock Exchange. The SOEs are

wholly owned by the New Zealand government, but have to make decisions on a commercial basis with the ultimate objective of maximizing shareholder value. Contrary to other government organizations, SOEs are to achieve their goals as decentralized units without direct political influence.[3] We argue that in this environment, risk management can create value for state owned enterprises. However, the need for risk management is lower than for publicly owned firms because stakeholders in state owned enterprises are likely to rely on implicit guarantees arising from government ownership. Thus, the extent of derivatives use by state owned enterprises to reduce costs of financial distress and costs of agency conflicts is expected to be lower than for comparable publicly owned firms. We test this proposition empirically and find evidence consistent with this hypothesis. Furthermore, we find strong support for the view that firms use derivatives to reduce the costs of financial distress, and agency costs and to increase the present value of tax losses.

The structure of the paper is as follows. The next section briefly discusses the financial deregulation in New Zealand during the 1980s that led to the formation of state owned enterprises.[4] Section II also outlines the accounting policy rules concerning the disclosure of financial instruments. Section III discusses the incentives to hedge for listed firms and state owned enterprises. Section IV discusses the data and the variable measurement. Section V reports the results. Finally, Section VI presents the conclusions.

II. Institutional Background

A. New Zealand's Corporatization Program

In the early 1980s, a variety of New Zealand government organizations provided goods and services to the public. These organizations varied in both the types of services offered to the public (e.g., banking, air travel, shipping, forestry, insurance, coal mining, computing services) and organizational form (e.g., government departments, autonomous agencies, statutory corporations and mixed corporations). The general consensus was that government organizations performed poorly in comparison with the private sector. In response, the New Zealand government, in 1986, established a number of government owned corporations with full commercial trading objectives.[5] These organizations, called state owned enterprises (SOEs), are limited liability companies formed under the Companies Act 1955.

"Corporatization" is the term that has been given to the process of transforming government trading entities into corporations. It involves separating the commercial activities from social welfare concerns and incorporating them as an SOE. The objective of the new corporation is to be removed from direct political influence and to be monitored according to normal commercial standards. The statutory objective of every SOE is to be a successful business and to be as profitable and efficient as comparable businesses that are not government owned. SOEs are therefore legally obligated to make decisions on a commercial basis. They are to maximize the return on the government assets under their control (i.e., to maximize the value of the shareholder's wealth of the decentralized unit).

While the process of corporatization does not change ownership, there are important changes to the governance structure. For example, SOEs are managed by boards of external (i.e., non-political) directors. Typically the directors are chosen from boards of private sector firms. Management is responsible for the day to day performance and operations, but the accountability provisions in the legislation enable the shareholding ministers to hold the board responsible for maximizing the value of the government's investment.

Nine SOEs were created in April 1987 and as of December 1995 the government's financial statements revealed an ownership in 16 SOEs. The SOE model was also adopted by local (municipal) governments which corporatized ports, electric supply authorities and airport facilities. Corporatization of SOEs was an intermediate step preceding privatization, either through full listing on the New Zealand Stock Exchange or through acquisition of the SOE by a private firm. For example, Government Computer Services, remained an SOE for six years before being sold to U.S. computer services firm, Electronic Data Services. Telecom, New Zealand's largest firm, was an SOE before it was listed on the New Zealand Stock Exchange.

B. Financial Reporting Regime

To reinforce a commercial culture within government departments and SOEs, full accrual accounting and compliance with accounting standards issued by the New Zealand Society of Accountants was adopted. Furthermore, while most countries have separate private and public sector accounting standards, the New Zealand Society of Accountants developed a single conceptual framework and set of financial reporting standards to apply to both government and publicly owned organizations.

Data on the use of derivative financial instruments are available in the audited financial statements of New Zealand firms. Financial Reporting Standard No 31, *Disclosure of Information About Financial Instruments*, requires aggregate disclosures of the contract value and fair value of recognized and off-balance sheet financial instruments for financial reports covering periods ending on or after December 31, 1993.

To summarize, New Zealand has a group of corporate organizations that are owned by the government but are required to act commercially. We analyze the use of derivatives of this group of firms and use firms currently listed on the New Zealand Stock Exchange as a control sample. For both groups of firms, financial statements based on a common set of accounting standards are available.

III. Incentives for Hedging

Under the assumptions of Modigliani and Miller (1958) hedging activities can only result in an increase in firm value if there are certain market imperfections. In this section we discuss these imperfections and compare the rationale for hedging for publicly owned firms and SOEs. For each of the incentives for hedging, Table 1 presents the predicted signs of the coefficients we use as proxy variables in our empirical model.

A. Taxes

If a firm's effective tax schedule is convex, then expected taxes can be reduced by hedging (Smith and Stulz, 1985). New Zealand does not have a progressive corporate tax schedule, neither are tax concessions available.

Table 1. *Variables Used as Proxy for Reasons to Hedge*

Imperfection	*Proxy Variable*	*Expected Sign*
Convex tax schedule	Tax loss carry forward	+
Financial distress	Leverage	+
	Interest coverage	–
	Size	+/–
Undiversified stakeholders	Management shareholding	+
Inefficient investment	Asset growth/Cash flow	+
	Liquidity	–
	Dividend payout	+
Other	Overseas sales	+

However, many firms have tax losses carried forward. Since the effective tax schedule of these firms is convex, they are more likely to use derivative instruments. Hedging reduces the variability of the taxable income thereby increasing the present value of tax losses.

As both private firms and SOEs strive to maximize shareholder value, the tax loss argument is equally valid for both. Of course, at a national level, there is no reason for an SOE to minimize the present value of taxes as the SOEs gain is completely offset by the loss of another government department. However SOEs operate as decentralized units striving to maximize the value of the assets under their direct control.

B. Costs of Financial Distress

Hedging reduces the variability of cash flows or firm value and lowers the probability of financial distress. The benefits of hedging therefore increase if a firm faces higher costs of financial distress and a higher probability of financial distress.

We argue that hedging in order to reduce expected costs of financial distress is likely to be more important for publicly owned firms than for SOEs. The main reason is that the probability of financial distress for an SOE is very low because of implicit government guarantees. For instance, Megginson, Nash and Randenborgh (1994) show that immediately after privatization, firms reduce debt levels. They interpret this as a result of an increase in borrowing costs arising from the state's withdrawal of debt guarantees. Another reason to expect a lower probability of financial distress for SOEs is that they often operate in less than fully competitive markets and are able to (partially) pass on losses to customers.

C. Managerial Motives and Other Stakeholders

Smith and Stulz (1985) argue that hedging can create value if stakeholders such as managers, employees and customers are unable to fully diversify the risks inherent in their claim on the firm. These parties will require compensation for bearing non-diversifiable risk. Reducing the variability of firm value by hedging might lower the compensation for non-diversifiable risk and can therefore increase the value of the firm.

The undiversified stakeholder argument is less applicable to SOEs than to publicly owned firms. Stakeholders in SOEs bear little risk since they rely on the implicit guarantees arising from government ownership. Furthermore, managers of SOEs do not have equity holdings in the firm.[6] We

hypothesize that the incentive to use financial instruments in order to reduce non-diversifiable risk is lower for SOEs than for publicly owned firms.

D. Inefficient Investment

Froot, Scharfstein and Stein (1993) provide a rationale for risk management based on the assumption that the cost of internal financing is lower than the cost of external financing. Given this pecking order of financing choices, they show that the purpose of risk management is to ensure that the firm has enough internal wealth (cash) to make value-increasing investments in each future state of the world without relying on external financing. Based on the arguments in Froot et al. (1993) and Bessembinder (1991), an increased use of derivatives is predicted for publicly owned firms with high leverage and valuable growth options.

For SOEs the only source of external financing is the debt market since, for political reasons, the government is reluctant to infuse new capital into the SOE. Debt financing by SOEs is unlikely to result in the same additional deadweight costs of external financing faced by listed firms. As we argue, the costs of financial distress and risk-related agency conflicts between the shareholder and the other stakeholders are limited for SOEs. Note, however, that even though the real marginal costs of external financing for SOEs are small, external financing can still be costly from the perspective of management. External financing forces management to disseminate more information and introduces a new layer of monitoring. We therefore argue that SOEs are likely to use financial derivatives aimed at reducing the frequency of new debt issues and, in the worst case, a new infusion of funds by shareholders.

E. Other Factors

We include the ratio of foreign sales to total sales as explanatory variable in our model given the evidence in Allayannis and Ofek (1996) that this ratio is positively related to the use of derivatives. We also include the payout ratio and the level of liquidity based on Nance, Smith and Smithson (1993) who argue that firms with higher payout ratios might face more serious agency conflicts between shareholders and fixed claimholders. Hedging increases the probability that enough funds will be available in the future to pay the fixed claimholders and might therefore reduce these agency conflicts. Furthermore, firms with more liquid assets are less

likely to engage in risk management because they have a larger financial buffer.

As argued above, fixed claimholders in an SOE will be less concerned about a future lack of liquidity because of implicit government guarantees. Accordingly, for an SOE a low level of liquidity and a high dividend payout do not necessarily reflect the existence of a costly conflict which calls for the implementation of a risk management program.

IV. Sample and Variable Measurement

Our sample consists of all firms listed on the New Zealand Stock Exchange in 1994 and all State Owned Enterprises in New Zealand for which financial data were available for that year. Our sample excludes firms in the financial services sector and foreign firms. The sample consists of 116 listed firms and 33 SOEs. The SOEs ranged across 10 industries, including electrical generation and transmission (4 corporations), ports (4), communications (3), construction (2), airports (2), rail, mining, property, computer services, and water supply. This section describes how we measure derivatives use and then we discuss each of the independent variables.

A. Derivatives Use

The ideal measure of derivative use is the hedge ratio of the outstanding contracts executed to manage risk exposures. Since this information is unavailable, we measure hedging activity by the fair value of the derivatives outstanding at balance date scaled by the book value of total assets.[7] We define the fair value as the absolute value of the net gain or loss on all derivatives (forwards, futures, swaps and options) outstanding at balance date. Berkman and Bradbury (1996) argue that the fair value provides an unbiased estimate of the extent to which a firm engages in risk management that can be used in a cross-sectional model of derivatives use.

Table 2 gives descriptive statistics of the financial derivatives held at fiscal year end by the firms in our sample. Panels A to D present an analysis of the notional and fair values of derivatives held and panel E presents an analysis of the types of derivatives held. For listed firms the fair values range from zero to 6.9 per cent of the book value of total assets. The mean is 0.3 per cent for the whole sample and 0.5 per cent for those firms that held derivatives at balance date. The contract amounts range from zero to more than 100 per cent of total assets, with a mean of 10 per

Table 2. *Descriptive Statistics of Derivatives Held at Fiscal Year End*

Panels A to D contain descriptive statistics of the fair value and contract value of derivative instruments held scaled by the book value of total assets of the firm. Panel E describes the types of derivatives.

Panel A: All sample firms listed on the NZSE (N = 116)

	Mean	*Std Dev*	*Minimum*	*Maximum*
Fair value	0.003	0.008	0.000	0.069
Contract value	0.104	0.195	0.000	1.074

Panel B: Firms with derivative instruments listed on the NZSE (N = 54)

	Mean	*Std Dev*	*Minimum*	*Maximum*
Fair value	0.005	0.012	0.000	0.069
Contract value	0.228	0.236	0.001	1.074

Panel C: All state owned enterprises (N=33)

	Mean	*Std Dev*	*Minimum*	*Maximum*
Fair value	0.001	0.003	0.000	0.012
Contract value	0.096	0.182	0.000	0.828

Panel D: State owned enterprises with derivative instruments (N = 13)

	Mean	*Std Dev*	*Minimum*	*Maximum*
Fair value	0.003	0.004	0.000	0.012
Contract value	0.276	0.245	0.002	0.828

Panel E: Types of derivatives held at fiscal year end

	SOEs	*Listed firms*
No derivatives held	60%	53%
Interest rate only	9%	9%
Both interest and foreign currency	19%	13%
Foreign currency only	12%	22%
Commodity derivatives only	0%	3%

cent for the whole sample and a mean of 23 per cent for only those firms that held derivative instruments. For the SOEs the fair values range from zero to 1.2 per cent of total assets. The mean is 0.1 per cent for the whole sample and 0.3 per cent for those firms that held derivatives at balance

date. The contract amounts range from zero to 83 per cent of total assets, with a mean of nearly 10 per cent for the whole sample and a mean of 28 per cent for only those firms that held derivative instruments.

Panel E of Table 2 indicates that a marginally smaller proportion of SOEs use derivatives (40 per cent) than listed firms (47 per cent). A larger proportion of SOEs use interest rate derivatives (28 per cent) compared to listed firms (22 per cent). Whereas the proportion of listed firms using foreign currency derivatives (35 per cent) is greater than SOEs (31 per cent).

B. Independent Variables

Table 3 reports descriptive statistics for the independent variables used in our study. We use interest cover and leverage as proxies for the probability of financial distress since these ratios are typically employed in debt covenants to define states of financial distress. Interest cover is defined as the log of earnings before interest and tax over the interest expense. We set earnings before interest and taxes equal to 1 if it is negative and set interest equal to 1 if the firm has no debt. Leverage is measured as the book value of debt over the total assets of the firm. Warner (1977) and Ang, Chua and McConnell (1982) show that direct costs of financial distress as a proportion of firm value decrease in firm size. Thus we would expect firm size to be negatively related to the use of derivatives. Note, however, that firm size is likely to be positively related to the use of derivatives given that larger firms have more sophisticated treasury practices and given the existence of scale economies in transaction costs in derivatives markets. Table 3 shows that SOEs are significantly larger than listed firms. SOEs also have lower interest cover and lower leverage than listed firms, but these differences are not significant at conventional levels. The statistical difference between SOEs and publicly listed firms for each variable is assessed using a nonparametric Mann-Whitney U test. Parametric t tests yields similar results.

Of the listed firms 38 per cent have tax losses carried forward. For SOEs this number is 33 per cent. Berkman and Bradbury (1996) argue that firms are likely to use derivatives only to reduce the volatility of next year's assessable income regardless of the total value of tax losses available. Hedging for periods greater than one year might reduce the volatility of future taxable income but is likely to increase liquidity risk. Furthermore, financial instruments are marked to market every year for tax purposes in New Zealand. Hedging for terms longer than one year might therefore result in an unwanted increase in the variability of the after-tax

Table 3. *Descriptive Statistics of Independent Variables*

The sample contains 116 firms listed on the New Zealand Stock Exchange in 1994 and 33 SOEs for which financial data are available. For firms with losses carried forward the tax loss variable equals 1 and 0 otherwise. Total assets reported in the table is the log of the total assets. Interest cover is defined as the log of the earnings before interest and tax over the interest expense. Leverage is measured as the book value of debt over total assets. Managerial share ownership is defined as the proportion of shares held by directors. The expected asset growth is measured as the log of the ratio of the current year's change in net tangible assets plus depreciation to net income plus depreciation. Liquidity is defined as the log of current assets minus inventory over current liabilities. Dividend payout is calculated as the sum of the dividend payments in 1994 divided by earnings. The proportion of overseas sales to total sales is measured using audited geographical segment data. For each of the variables the difference in the median between the sample of publicly owned firms and SOEs is tested by a nonparametric Mann-Whitney U test. The table reports on the related p-value.

	Listed firms (N = 116)				*SOEs (N = 33)*				
Variable	*Mean*	*Std Dev.*	*Minimum*	*Maximum*	*Mean*	*Std Dev*	*Minimum*	*Maximum*	*Difference p-value*
Tax loss	0.379	0.487	0.000	1.000	0.333	0.479	0.000	1.000	0.631
Total assets	11.082	1.826	7.090	16.460	11.845	1.530	8.594	15.844	0.030
Interest cover	0.960	3.672	–11.175	9.914	0.052	3.835	–8.494	6.372	0.548
Leverage	0.202	0.187	0.000	0.955	0.200	0.175	0.000	0.672	0.939
Managerial share ownership	0.311	0.311	0.000	1.000	0.000	0.000	0.000	0.000	0.001
Asset growth/cash flow	–0.797	5.023	–14.183	11.093	–0.224	4.433	–10.082	9.973	0.554
Liquidity	0.124	1.349	–3.338	6.037	–0.281	0.679	–2.024	1.234	0.098
Dividend Payout	0.373	0.397	0.000	2.043	0.532	0.540	0.000	2.137	0.065
Overseas Sales	0.118	0.233	0.000	0.999	0.000	0.000	0.000	0.000	0.001

cash flows. To reflect this we use a dummy variable which equals 1 for firms with a tax loss and 0 otherwise.

Froot et al. (1993) argue that risk management should ensure that firms have the cash they need to make value increasing investments without relying on relatively expensive external financing. To proxy for this ability we use the ratio of the current year's investment expenditure to operating cash flow. We measure the current year's investment as the change in tangible assets plus depreciation and estimate operating cash flow by adding depreciation to net income. A ratio lower than one indicates the firm generates sufficient operating cash flow to finance investment, without the need to resort to external sources of finance. Table 3 shows that this ratio is smaller for listed firms than for SOEs. Other proxies for growth options such as the earnings to price ratio and the book to market ratio could not be used since there are no share prices for SOEs.

From Table 3 we also observe that SOEs have a higher dividend payout and that liquidity (measured as the log of current assets minus inventory over current liabilities) is lower for SOEs. Both observations are consistent with government ministers requiring SOEs to distribute free cash flow to limit agency problems.

V. Results

In this section we test whether the use of derivatives is consistent with the theoretical arguments put forward in Section III. Hedging activity is measured as the fair value of the contracts outstanding at balance date scaled by total assets. Note that we face an econometric problem because a large number of firms do not use derivatives. Our dependent variable is therefore left-censored which requires the use of a Tobit model.

Based on the arguments in Section III we hypothesize that the parameter estimates of variables proxying for financial distress and agency conflicts will be closer to zero for SOEs than for listed firms. For tax losses, the ability to finance new projects and firm size there is no reason to expect a difference between SOEs and listed firms. To test these hypotheses we allow the slope coefficients of the explanatory variables for SOEs to be different by using product dummy variables. More specifically:

$$FIN_i = \alpha_0 + \alpha_1 D_i + \Sigma_{j=1}^{9}\beta_j E_{ji} + \Sigma_{h=1}^{7}\gamma_h (D_i E_{hi}) + \varepsilon_i \qquad (1)$$

Where:

FIN_i = Fair value of derivatives held at balance date scaled by total assets for firm i,

D_i = Dummy variable set equal to 1 if firm i is an SOE and 0 otherwise,

E_i = The set of j (1 to 9) explanatory variables for publicly listed firms (see Table 1) and the set of h (1 to 7) explanatory variables for SOEs.

Note that α_1 measures the difference in the intercept for SOEs and γ_1 to γ_7 (the product dummy coefficients) measure the difference in the slope coefficients for SOEs. Also note that managerial ownership and the proportion of overseas sales are excluded from the SOE part of the Tobit model since both variables are zero for all SOEs.

Table 4 reports the results of the Tobit regressions. The first set of regression estimates are the intercept and parameters for the explanatory variables. The second set of estimates in the table are the differences in the coefficients for SOEs. The p-values in the table are based on one-tailed tests if the hypotheses predict the sign of the coefficient, otherwise two-tailed tests are used.[8]

The first set of explanatory variables in Table 4 provide strong support for the recent theories of risk management. The use of derivatives increases with leverage, size, the existence of tax losses and the payout ratio. The corporate use of derivatives decreases with interest coverage and liquidity. There is no relation between the foreign sales ratio and the percentage of managerial ownership and the use of derivatives. The results in Table 4 do not materially change when we control for industry effects by inclusion of industry dummies.

The second set of explanatory variables (the product dummy variables) account for differences in slope coefficients between SOEs and listed companies. The product dummy coefficients that proxy for agency conflicts and costs of financial distress are closer to zero (i.e., have opposite signs) than the listed company coefficients. The product dummy coefficients for interest cover, liquidity and dividend payout have the predicted sign and are significant at the 5% or 10% level in both models. The coefficient for leverage has the predicted sign, but is not significant.

Overall, our results support the hypothesis that, compared to listed firms, SOEs exhibit lower use of derivative instruments to reduce costs of financial distress and agency costs. It should be pointed out, however, that although the use of derivatives by publicly owned firms and government owned SOEs is in line with risk management theories, our model does not directly address the question whether firms use derivatives to hedge or speculate.[9]

Table 4. *Tobit Estimates of the Determinants of the Corporate Use of Derivatives*

The sample contains 116 firms listed on the New Zealand Stock Exchange in 1994 and 33 SOEs for which financial data are available. For firms with losses carried forward the tax loss variable equals 1 and 0 otherwise. Total assets reported in the table is the log of the total assets. Interest cover is defined as the log of the earnings before interest and tax over the interest expense. Leverage is measured as the book value of debt over total assets. Managerial share ownership is defined as the proportion of shares held by directors. The expected asset growth is measured as the log of the ratio of the current year's change in net tangible assets plus depreciation to net income plus depreciation. Liquidity is defined as the log of current assets minus inventory over current liabilities. Dividend payout is calculated as the sum of the dividend payments in 1994 divided by earnings. The proportion of overseas sales to total sales is measured using audited geographical segment data. For the listed firms the industry dummies are based on the New Zealand Stock Exchange industry classification. Model 2 reports the results including the industry dummy variables.

		Model 1		*Model 2*	
Variable	*Predicted Sign*	*Coefficient Estimate*	*p-value*	*Coefficient Estimate*	*p-value*
Intercept		–0.026	0.004	–0.044	0.000
Tax loss	+	0.006	0.010	0.009	0.000
Total assets	+	0.001	0.041	0.003	0.001
Interest cover	–	–0.001	0.007	–0.001	0.000
Leverage	+	0.016	0.011	0.013	0.003
Management ownership	+	0.000	0.482	0.001	0.372
Asset growth/cash flow	+	0.000	0.538	0.000	0.254
Liquidity	–	–0.003	0.013	–0.003	0.016
Dividend payout	+	0.005	0.103	0.003	0.156
Overseas sales	+	–0.002	0.661	–0.010	0.972
Difference for SOE coefficients					
Intercept	?	–0.040	0.183	–0.039	0.225
Tax loss	?	0.002	0.703	–0.003	0.597
Total assets	?	0.003	0.208	0.004	0.181
Interest cover	+	0.002	0.049	0.003	0.016
Leverage	–	–0.004	0.405	–0.001	0.472
Asset growth/cash flow	?	0.000	0.680	–0.001	0.237
Liquidity	+	0.008	0.079	0.007	0.106
Dividend payout	–	–0.010	0.093	–0.012	0.036
Industry dummies		No		Yes	

VI. Conclusion

In this paper we discuss how recent finance theories of hedging apply to state owned enterprises. We find no evidence of excessive use of derivatives by SOEs. We conclude that SOEs are less likely to use financial derivatives because debtholders and other stakeholders will rely on implicit government guarantees which reduces the need for active financial risk management.

Our empirical results provide strong support for recent theories of risk management. Listed firms use derivatives to reduce the expected costs of financial distress, uncertainty of expected taxable income, and agency costs. We find that SOEs make less use of derivatives which is consistent with the hypothesis that SOEs have lower expected costs of financial distress and the absence of an agency conflict between the bondholders and the shareholder.

Notes

1. For theoretical papers in this area see Stulz (1984), Smith and Stulz (1985), Bessembinder (1991), DeMarzo and Duffie (1991) and Froot, Scharfstein and Stein (1993). Empirical evidence on risk management is reported in Nance, Smith and Smithson (1993), Allayannis and Ofek (1996) Berkman and Bradbury (1996), Geczy, Minton and Schrand (1997), Mian (1996) and Tufano (1996).

2. The case involving London Borough of Hammersmith and Fulham, the first serious fiasco in the swaps market, is particularly relevant. This case concerned nearly 600 swap transactions involving a notional £6.2 billion executed between 1987 and 1989. In April 1991 the House of Lords held that all the swap transactions (regardless of whether they were speculative or not) were illegal.

3. The term "state owned enterprises" is often used in the literature to refer to all forms of government owned organizations. However in New Zealand, as discussed in the next section, it relates to a specific statutory form of government organization. We therefore use the term "government owned organization" as a general description and reserve "state owned enterprises" for the specific New Zealand description. "Mixed" organizations arise when the stock ownership is held part in private hands and part in public hands (see Boardman and Vining, 1989).

4. For two recent studies which examine the effect of government ownership on performance and provide comprehensive literature reviews, see Boardman and Vining (1989) and Megginson, Nash and Van Randenborgh (1994).

5. For a fuller description of the New Zealand reform program refer to Duncan and Bollard (1992) and Evans et al. (1996).

6. Note that even without equity participation, SOE managers still have a proportion of their wealth aligned with the success of the SOE in terms of salaries, bonuses, and reputation. There is no evidence to suggest that these issues are of more importance to managers of SOEs than to managers of publicly owned firms.

7. Berkman and Bradbury (1996) scale by the market value of the firm. Since the market value of SOEs is not available we scale by the book value of total assets. The results reported in the paper do not distinguish between interest rate and foreign exchange derivatives. The average fair value of foreign exchange derivatives is much larger than the average fair

value of interest rate derivatives. The main conclusions in the paper do not change when we exclude the fair value of interest rate derivatives from the analysis.

8. Tufano (1996) argues that since larger firms have greater flexibility in their choice of risk management strategies, one might expect that firm size is related to the variance of the residuals in the Tobit model. Our model uses *ln*(total assets), which eliminates this source of heteroscedasticity. Subsequent analysis reveals no significant relation between the squared residuals and the independent variables.

9. For empirical evidence on this issue see Geczy, Minton and Schrand (1997) and Allayannis and Ofek (1996).

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