could result in lower $^3He/^4He$ ratios in the SCLM compared to the upper mantle.

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Managerial quality, firm performance, technical efficiency and productivity in New Zealand

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The objective of this thesis is to investigate the effect of managerial quality and business environment on the ownership–performance, technical efficiency and productivity nexus of firms in New Zealand (NZ). Despite the growing number of theoretical and empirical studies examining the determinants of firm performance and productivity, managerial quality has traditionally been ignored. Since the global financial crisis, there has been renewed interest in investigating the factors influencing firm performance and productivity growth to enable managers to position their firms to be competitive in the growing and unpredictable global marketplace. Leibenstein's x-efficiency theory provides a sound theoretical basis for incorporating the role of managerial quality into modelling technical efficiency, productivity and firm performance. This thesis is the first attempt to extend the traditional model of efficiency, productivity and firm performance by incorporating managerial quality using Leibenstein's x-efficiency framework to explain NZ's underperformance, despite its policies and institutional quality being close to or at best practice under Organisation for Economic Co-operation and Development (OECD) guidelines. To achieve the objectives and provide sound policy recommendations, three empirical studies were conducted to present new empirical evidence in the NZ context.

The first study used a meta-analytical framework to examine the effects of managerial quality on the ownership structure–firm performance nexus in OECD countries. A meta-analysis of data from 46 studies on OECD countries found that heterogeneity in the effects of ownership structure on firm performance may be explained by variations

in managerial quality in different ownership and country contexts. The results indicate that 91% of the 99% between-study variation in effect sizes of the ownership–performance relationship was attributable to differences in the quality of manager-related efforts. Methodological heterogeneity — related to differences in estimation techniques and measurements — explained only 1.29%, of which no more than 0.8% was caused by sampling error. This finding highlights the importance of accounting for the influence of managerial quality on firm performance in specific ownership and country contexts.

The second study investigated the effects of managerial quality on technical efficiency and firm productivity in NZ from the perspective of x-efficiency theory using stochastic frontier modelling and a longitudinal microdata set (2001–2012) from NZ. The results suggest that, on average, management is operating at a point well below the estimated x-efficient frontier in NZ. The rate of total factor productivity (TFP) growth for firms may have been double had managerial quality been more x-efficient and conformed to better practice frontier growth. Improvements in managerial quality may also enhance the rate of change in efficiency and technology, leading to greater TFP growth. These results stress the need to incorporate managerial quality as a determinant of TFP growth in productivity estimates to better explain NZ's productivity underperformance.

The third study utilised NZ longitudinal microdata to explore the moderating role of exogenous business environment determinants of technical efficiency on the managerial quality–TFP nexus in NZ. The empirical results indicate that improved external factors (industry competition, internationalisation and tariff trade liberalisation) did not enhance productivity growth as much as they should have because of managerial inefficiency. Closing this inefficiency gap by improving management quality may correct the underuse of resources by NZ firms by 40% and reduce NZ's 35 percentage point productivity gap relative to the simple average of the highest 17 OECD countries by up to 28 percentage points. Further, if managerial quality had been more x-efficient under conditions of improved external business factors, the rate of TFP growth could have been approximately 20% above the OECD average as predicted by the OECD framework.

This thesis makes three major contributions. First, the empirical findings provide new evidence to show that systematic variations in managerial quality under different ownership structures are key drivers of firm performance by affecting x-efficiency. This result helps to clarify the determinants of measured differences in firm performance across studies and countries. Second, using a frontier–counterfactual x-efficiency approach and comprehensive micro-level data from NZ, this thesis shows that managerial quality contributes to x-inefficiency, thus influencing technical efficiency change and productivity performance in NZ. Third, by accounting for the external business environment, this thesis provides insights into how managerial quality may explain NZ's x-inefficiency and productivity underperformance. The overall policy implication is the need for government intervention in the marketplace to create a vibrant business environment and establish frameworks for monitoring and developing managerial quality to enhance firms' technical efficiency, productivity and performance in NZ.

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