

Using DEA to investigate bank safety and soundness – which approach works best?

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Relevance of research

- New Zealand dependence on public disclosure as basis for banking supervision – no formal deposit protection arrangements prior to October 2008
- Quarterly publication of income statement and balance sheet

Grifell-Tatjé & Lovell (1999) report sources of profit change, including....

- Change in input or output prices
- Technical change
- Change in x-efficiency
- Economies or diseconomies of scale with changes in volume
- Changes in product or resource mix

Focus on profit change

- Use DEA of panel data, rather than the Malmquist Index
- Explore relationship with accounting data
- Use CCR, profit and (non-oriented) slacks-based models

Use variant of intermediation/profit approaches

Inputs

Interest expense

Non-interest expense

Shareholders' equity

Bad and doubtful debt
expense

Outputs

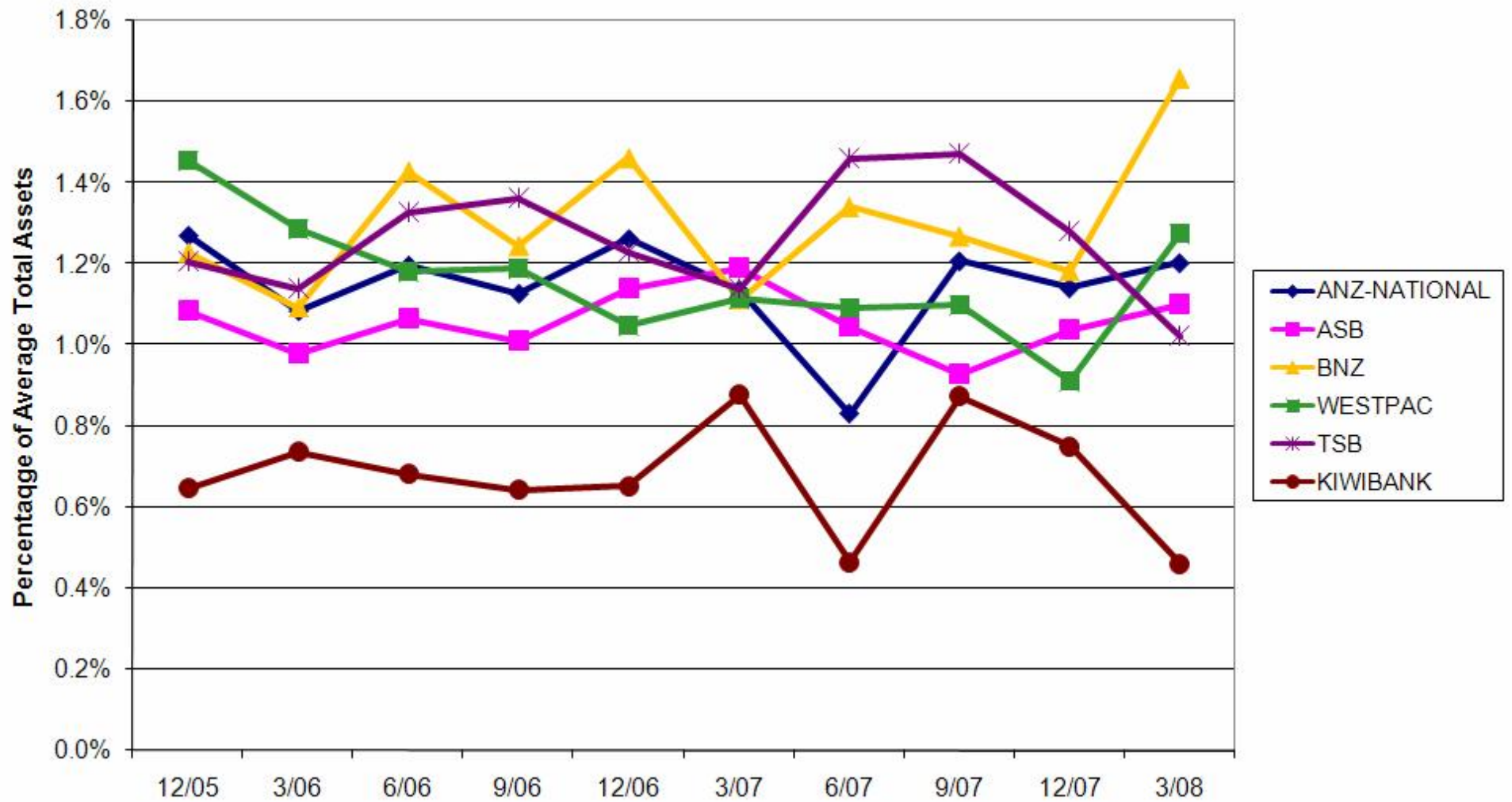
Interest income

Non-interest income

Data set comprises

- 6 banks for 10 quarters (following the adoption of IFRS)
- Reasonable similarity in the business these banks undertake
- No concerns raised by results from super-efficiency model

TRENDS IN RETURN ON ASSETS



Efficiency scores – CCR Model

Quarter	ANZ	ASB	BNZ	Westpac	TSB	Kiwibank
Dec 05	0.988	0.967	0.958	1.000	1.000	1.000
March 06	0.931	0.962	0.954	1.000	1.000	1.000
June 06	1.000	0.981	1.000	0.975	0.987	0.976
Sept 06	0.966	0.974	0.961	0.984	0.991	1.000
Dec 06	0.939	1.000	1.000	0.976	0.985	0.981
March 07	0.978	1.000	0.948	0.981	0.973	1.000
June 07	0.929	0.997	0.990	0.981	1.000	1.000
Sept 07	0.967	0.982	0.964	0.958	1.000	1.000
Dec 07	0.959	1.000	0.972	0.950	0.973	0.962
March 08	0.979	1.000	0.944	1.000	0.960	1.000
Average	0.964	0.986	0.969	0.981	0.987	0.992

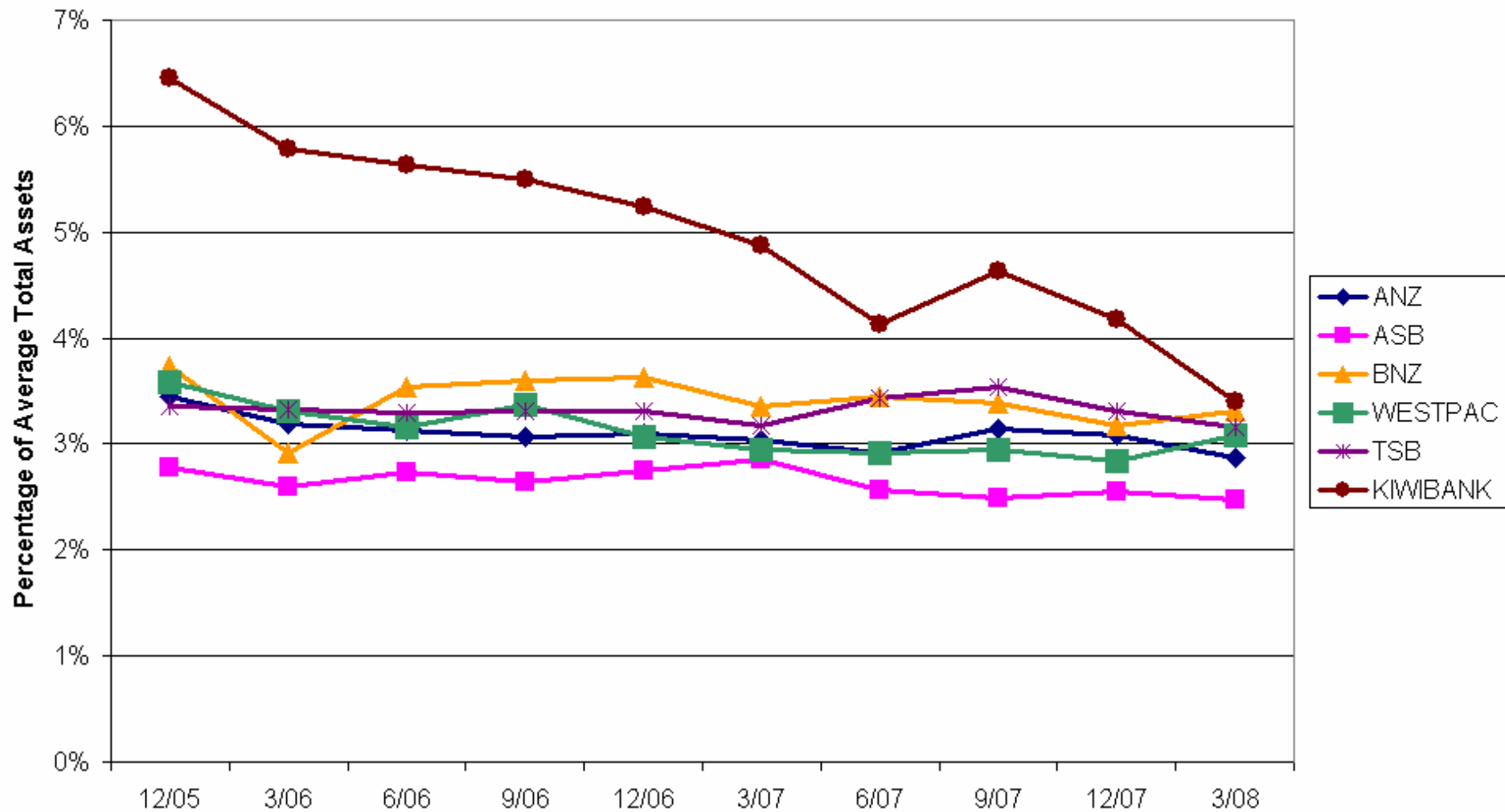
Efficiency scores – profit model

Quarter	ANZ	ASB	BNZ	Westpac	TSB	Kiwibank
Dec 05	1.000	0.928	0.862	1.000	0.998	1.000
March 06	0.888	0.890	0.810	1.000	0.982	1.000
June 06	1.000	0.926	1.000	0.947	0.987	0.961
Sept 06	0.856	0.994	0.907	0.936	0.896	1.000
Dec 06	0.876	1.000	1.000	0.917	0.990	0.930
March 07	0.933	1.000	0.857	0.972	0.983	1.000
June 07	0.912	1.000	0.973	0.949	1.000	0.764
Sept 07	0.895	0.940	0.883	0.944	1.000	1.000
Dec 07	0.971	1.000	0.832	0.889	1.000	0.887
March 08	0.893	1.000	0.838	1.000	0.963	0.800
Average	0.922	0.968	0.896	0.955	0.980	0.934

Efficiency scores – slacks-based model

Quarter	ANZ	ASB	BNZ	Westpac	TSB	Kiwibank
Dec 05	0.847	0.740	0.727	1.000	1.000	1.000
March 06	0.605	0.677	0.626	1.000	1.000	1.000
June 06	1.000	0.888	1.000	0.769	0.818	0.828
Sept 06	0.581	0.719	0.735	0.862	0.842	1.000
Dec 06	0.578	1.000	1.000	0.727	0.648	0.844
March 07	0.684	1.000	0.673	0.820	0.538	1.000
June 07	0.598	0.948	0.839	0.874	1.000	1.000
Sept 07	0.694	0.728	0.767	0.873	1.000	1.000
Dec 07	0.687	1.000	0.739	0.770	0.566	0.784
March 08	0.689	1.000	0.690	1.000	0.273	1.000
Average	0.696	0.870	0.780	0.870	0.769	0.946

TRENDS IN GROSS INCOME



Issues

- The treatment of bad and doubtful debt expense, which becomes the major source of inefficiency
- We therefore re-run the model with bad and doubtful debt expense omitted

Figure 4: bad and doubtful debt expense omitted

Quarter	ANZ	ASB	BNZ	Westpac	TSB	Kiwibank
Dec 05	0.723	0.723	0.847	1.000	1.000	1.000
March 06	0.700	0.674	0.678	1.000	1.000	0.967
June 06	0.631	0.721	1.000	0.887	0.867	0.939
Sept 06	0.708	0.657	0.843	0.890	0.889	0.928
Dec 06	0.665	0.739	1.000	0.826	0.744	0.929
March 07	0.710	1.000	0.781	0.869	0.663	1.000
June 07	0.636	0.799	0.850	0.798	1.000	0.815
Sept 07	0.681	0.630	0.777	0.797	1.000	0.905
Dec 07	0.684	0.775	0.711	0.719	0.581	0.877
March 08	0.693	1.000	0.735	1.000	0.342	0.702
Average	0.683	0.772	0.822	0.879	0.809	0.906

Summary and conclusion

- No evidence for scale effects
- The slack-based model provides the most useful results
- The model can be tested on further quarters' data