The Gap between Accounting Profit and Taxable Income

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This paper reports a statistical analysis of the effective tax rates (ETRs) of more than 500 listed Australian companies to measure the gap between accounting profit and taxable income caused by permanent differences. The results show that companies in three industry groupings benefited substantially from concessional tax treatments of gold-mining income, dividends and capital gains, and had accounting profit consistently higher than taxable income. After controlling for industry effect, the analyses also identify a size effect: large firms had a wider book-tax income gap than small firms.

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1. Introduction

In Australia, two different sets of rules are used to measure profit or net income from a business, especially an incorporated business. Financial accounting rules (which comprise financial accounting concepts, principles, and standards) are used to measure business profit for financial reporting purposes (accounting profit or book income). Tax rules (which comprise income tax legislation, judicial precedents, and administrative rulings) are used to measure taxable income for taxation purposes. The divergence of these two sets of rules raises the issue of alignment.

Time and again, suggestions have been made that accounting principles and standards be adopted in assessment of income tax. Suggestions from the business community and the accounting profession are documented in official reports such as Commonwealth Committee on Taxation (1954) and Taxation Review Committee (1975). In a speech to the Monash University Law School Foundation, Boucher (1991, p. 282), then Commissioner of Taxation, suggested that one possible way to simplify the tax system was to improve accounting standards, then adopt accounting profit (or even consolidated profit of a group of companies) as the basis of income tax assessment. In a recent inquiry into the Australian Taxation Office, the Joint Committee of Public Accounts (1993, paragraph 5.30) of the Commonwealth Parliament recommended a redraft of the major income tax legislation and suggested that "the possible alignment of the taxation law with accounting standards and concepts would be a fundamental change to be considered." Thus, the alignment of tax and financial accounting rules is one possible option open to the federal government in the current tax reform exercise.

Anecdotal evidence suggests that the discrepancy between accounting profit and taxable income (the book-tax income gap) can be substantial in either direction. Unless a comprehensive study is conducted to quantify the book-tax income gap based on a large sample, one cannot estimate whether a book-tax alignment would have a positive or negative impact on government revenue.

Although accounting profit data are available on databases, taxable income data collected by the Australian Tax Office are confidential to the administrators and cannot be accessed by the public. Thus, a direct comparison of accounting profit and taxable income is not possible.[1]

Nevertheless, the discrepancy between the effective tax rate (ETR) of a firm and the nominal or statutory tax rate[2] (STR) provides an indication of the book-tax income gap due to permanent differences.[3]

ETR is the ratio of tax expense (TE) to accounting profit before tax (AP) in the profit and loss statement, i.e

$$. \text{ETR} = \frac{\text{TE}}{\text{AP}} \tag{1}$$

According to Australian accounting standards,[4] tax expense is based on pre-tax accounting profit (AP) adjusted for permanent differences (PD),[5] i.e

$$. \text{TE} = (\text{AP} \pm \text{PD}) \times \text{STR} \tag{2}$$

or,

$$\text{STR} = \frac{\text{TE}}{\text{AP} \pm \text{PD}} \tag{3}$$

A comparison of equations (1) and (3) shows that the discrepancy between ETR and STR is caused by permanent differences.Variation of ETRs across firms is due to variation of permanent differences. If a firm's ETR is lower than the STR, then the firm's accounting profit is greater than its taxable income due to permanent differences, and vice

1. Taxable income may be estimated by a detailed analysis of tax information disclosed in published financial reports of listed companies. However, tax disclosure data of some companies are incomplete. Also, due to resource constraints, building up a database of tax disclosure data for a large sample of companies over a long time period is not feasible.
2. In Australia, companies are taxed at a flat statutory rate regardless of the level of taxable income.
3. The differences between accounting profit and taxable income are classified into two main types: permanent differences and timing differences. Permanent differences arise because certain revenues and expenses included in the determination of accounting profit are never included in the determination of taxable income, or vice versa. Timing differences arise because certain revenues and expenses are included in the determination of accounting profit for one period, but are included in the determination of taxable income for another period.
4. Accounting Standards AAS 3 and AASB 1020 – Accounting for Income Tax (Tax-effect Accounting).
5. Timing differences not brought to account, e.g. losses, are also treated as permanent differences.

versa. If ETRs are not statistically significantly different from the STR, then permanent differences also are not significantly different from zero. Thus, a comparison of ETRs and the STR provides a measure of the book-tax income gap caused by permanent differences.

This paper reports the results of a comprehensive study of the ETRs of listed companies (and listed property trusts) in Australia. The ETRs of 549 firms over the 11-year period 1983-1993 were analysed using regression models to determine if any statistically significant discrepancy between ETRs and STR existed. To explain the variation of ETRs across firms, industry affiliations and firm sizes (using asset sizes and profit levels as two alternative proxies) were included as independent variables in the regression analyses. The paper contributes to the literature by providing empirical evidence of the book-tax income gap to address the alignment issue in Australia.

The remainder of the paper is organised as follows. Section 2 provides a description of the research design. In section 3, the results of statistical analyses are reported. The findings are summarised in section 4.

2. Research Design

The research method employed in the study was statistical analyses of corporate ETRs using multiple linear regression models. The statistical procedures first estimated the parameters of the regression models. These parameters measured the differences between ETRs of firms with different industry affiliations and of different sizes. The parameters were then used to estimate ETRs and to construct confidence intervals to test if there were any statistically significant differences between ETRs and the STR, and if so, in which direction.

2.1 Hypotheses development

To test whether ETRs were significantly different from the STR, and hence whether accounting profits were significantly different from taxable incomes due to permanent differences, the null hypothesis was:

H_0: The ETRs of different firms are not significantly different from the STR regardless of industry affiliation, asset size, and profit level.

To examine the structure of book-tax income gaps across industries and firm sizes, the null hypothesis H0 was broken down into three compo-

nents:

H_{01}: Holding size constant, the ETRs of firms in different industries are not significantly different from the STR.

H_{02}: Holding industry constant, the ETRs of firms of different asset sizes are not significantly different from the STR.

H_{03}: Holding industry constant, the ETRs of firms of different profit levels are not significantly different from the STR.

Theoretically, industry affiliation and firm size should not affect ETRs. However, because tax provisions are not neutral across industries, and because firms of different sizes are better/less able to take advantage of tax provisions and/or are better/less able to manage their earnings,[6] the three null hypotheses were expected to be rejected for some industry groupings and for some size categories.

2.2 Definition of ETR

ETRs in this study were computed from consolidated financial statement data of firms listed on the Australian Stock Exchange (ASX).[7] A firm refers to a group of companies[8] under a common control, i.e. an economic entity. Many listed companies are holding companies which conduct businesses through subsidiaries and receive dividends as their major source of income. Defining 'firm' as a group of companies rather than a single company substantially reduces the ETR-STR gap caused by dividend rebates, because intra-group dividends have been eliminated upon consolidation.

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6. Earnings management is a purposeful intervention in the external financial reporting process with the intent of obtaining some private gain (Schipper 1989).
7. As noted by Spooner (1986), any study of ETRs based on financial statement data is necessarily limited to listed companies whose financial statements are available to the public. The great majority of companies which are closely held and are not required to publish financial information have to be excluded. Hence the sample of firms used in this study is necessarily biased.
8. For the sake of completeness, listed property trusts also were included in the statistical analyses. As expected, their ETRs were found not significantly different from zero.

The ETR for each firm was defined as the ratio of average tax expense to average pre-tax group profit for as many years as data were available on the STATEX financial statement database of the ASX over the 11-year period from 1983 to 1993 (the study period):

$$\text{ETR} = \frac{\text{Average group tax expense}}{\text{Average group profit before tax}} \quad (4)$$

The ETR was computed by dividing average tax expense by average pre-tax profit rather than using the annual tax and profit figures, because using average tax and profit over a number of years corrected to a large extent the distortions of ETRs caused by the carryforward of losses. Under the Australian income tax law, if a company incurred net operating losses, then for tax purposes the losses could be carried forward to offset against future profits. The ETR(s) for the year(s) subsequent to incurrence of losses would be distorted until the losses were fully recouped. Such distortion arose because the government took its share in corporate profits immediately but deferred its contribution to corporate losses until the company earned profits again.[9] Asymmetrical treatment of profits and losses for tax purposes has rendered a time series study of annual ETRs difficult to conduct.[10] Computing ETR based on tax and profit averaged (or aggregated) over a number of years largely avoided such distortions.[11]

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9. The annual ETRs for the six years 1987/88 to 1992/93 (with the same ASX industry classification) have been analysed. The industry and size differences were found to be distorted by a business cycle effect. The six-year period happened to be the trough of a business cycle after the stock market crash in late 1987. In 1987/88, when the economy was still at a peak, the size effect was negative; i.e., larger firms tended to have lower annual ETRs. As the recession crept in, the size effect gradually changed from significantly negative (1987/88) to insignificantly negative (1988/89), then became insignificantly positive (1989/90), and finally became significantly positive (1990/91 to 1992/93). This was so because the ETRs of small firms were distorted downward by carryforward of losses. Large firms tended to be more diversified and were less likely to incur losses in an economic downturn than small firms, so their ETRs tended to be more stable. Further evidence supporting this interpretation is that the statistical significance of industry effect for the three years 1990/91 to 1992/93 (especially 1991/92) declined substantially because the ETRs of many firms in different industries were low due to recoupment of losses.

Although profits of Australian companies were taxed at a flat STR, the STRs applicable to the years in the study period varied.[12] To make inter-firm comparison meaningful, the annual tax expenses were adjusted using a common (benchmark) STR before they were averaged to form the numerator of an ETR. The STR of 39 percent was chosen as the benchmark because it applied to five of the 11 years under study and it was the latest STR for the study period. Tax expenses for different years were adjusted to what would have been the amounts had the STR for all years been 39 percent using the following adjustment ratio:

$$\text{Adjustment ratio} = \frac{\text{Benchmark STR (39 percent)}}{\text{Actual STR applicable to the accounting period}} \quad (5)$$

Thus, the benchmark STR with which the computed ETRs are to be compared is 39 percent.

2.3 Data, industry and size classification

Relevant data of 1,884 firms which had been listed on the ASX for different periods of time during the 11-year period from 1983 to 1993 were extracted from the STATEX financial statement database accessed through Reuter Link.[13] Due to delisting or recent listing, most firms did not have data available for the whole study period. The following

10. Asymmetry of tax treatment of profits and losses may be less problematic in the United States as it is in Australia, because US tax law allows both carryback and carryforward of losses, and so incurrence of losses may result in a refund of prior year taxes.
11. ETRs computed from average tax expense and profits are not completely free from the distortions of carryforward of losses. In some cases, recent losses have reduced the denominators of ETRs, but the impacts of these losses have not been fully reflected in the numerators. To the extent that some losses remain unrecouped for tax purposes, ETRs are exaggerated. An examination of the annual profits and tax figures of 93 firms with computed ETRs in excess of 50 percent shows that seven of them may have unrecouped losses which increase their ETRs. Thus, asymmetrical treatment of profits and losses for tax purposes may have caused an upward bias to the estimated ETRs and their standard errors.
12. The STR varied from 46 percent for the income years 1982/83 to 1985/86, to 49 percent for 1986/87 and 1987/88, and 39 percent for 1988/89 to 1992/93.

data for each firm-year were extracted for the purposes of the study:

- industry code (for industry classification);
- total assets (for size classification);
- balance date (for tax rate adjustment);[14]
- group profit before tax (for computation of ETR, and for size classification), and
- tax expense (for computation of ETR).

The ASX adopted its own industry classification to classify listed companies and trusts. The current industry classification was introduced in November 1987, so only firms with a post-1987 industry code available on the database were included in the sample. Valid data were available for 1,302 firms. The other 582 firms were delisted before 1988.

Firms with valid data then were deleted based on one of the following three criteria: (a) the company was a foreign company; (b) average pre-tax profit was non-positive, or average tax expense was negative,[15] or (c) the computed ETR was equal to or greater than 100 percent. Thirty-two foreign companies (e.g. Philip Morris) were deleted because only a minor portion of their profits was subject to Australian income tax. Six hundred eighty-nine firms with non-positive average profit or negative average tax, or both, were excluded under the second criterion

13. As at 28 February 1995, about 1,180 companies and trusts were listed on the ASX (Australian Stock Exchange 1995).
14. Income tax is computed by applying STR to taxable income derived in each income year. In Australia, income years end on 30 June. For companies whose accounting periods end other than on 30 June, tax administrators have the discretion to set rules to relate an accounting period to an income year, and hence to a particular STR. According to the practice of the Australian Taxation Office, 1 December is the dividing line. If the balance date of a company falls between 1 July and 30 November, the accounting period will take the place of the income year ending on the preceding 30 June. However, if the balance date falls between 1 December and 29 June, the accounting period will take the place of the income year ending on the following 30 June. For instance, if the accounting period of a company ended on 30 September 1988, then the STR applicable was 49 percent. If the balance date was 31 December 1988, then the STR applicable to the accounting period was 39 percent.
15. Firms with zero average pre-tax profits were excluded because ETR could not be computed if the denominator was zero. Firms with zero average tax expense were included because most likely they had benefited from preferential tax treatments.

because the ETR of these firms had little meaning.[16] The last exclusion criterion eliminated extreme values that would dominate the results. Thirty-two firms with ETRs equal to or greater than 100 percent were eliminated.[17] These three exclusion criteria reduced the final sample size to 549 firms with a total of 3,953 firm-years. An ETR was computed for each firm in the final sample.

The industry classification of these companies was based on the latest available post-1987 ASX industry code found on the database. Twenty-three industries were represented. Table 1 shows the distribution of firms in different industries according to ASX classification.[18] Firms were not distributed evenly among industries. Six industries had less than ten firms.

Size classification was based on two separate criteria: average total assets[19] (Model 1) and average pre-tax group profit (Model 2) over the years in the study period for which data were available on the database. The correlation coefficient of average total assets and average pre-tax profit of firms in the final sample was 0.654, so they were not included in the same regression model to avoid the problems of collinearity.

16. In the database, all data fields with missing values were filled with a zero. Of the 689 firms excluded, 96 firms had a zero average profit. Most likely, the profits for these firms were missing from the database. The number of firms with a negative average profit (loss firms) was 569. Due to the asymmetrical treatment of profit and loss in the tax system, loss firms had an effective tax rate (mostly zero) which did not reflect their tax burden had they been profitable. Inclusion of loss firms would result in substantial downward distortion of the ETRs estimated by the regression models, and would render industry and size effects statistically insignificant. However, exclusion of loss firms means that the final sample may suffer from survivorship bias. The remaining 24 firms had a negative average tax expense. Negative tax expenses were caused by reversal of over-provisions for tax in prior year due to management judgment errors; they did not represent any meaningful permanent differences.
17. Several firms with ETRs ranging from 84 percent to 99 percent were further excluded from the regression analyses because their standardised residuals exceeded 3. See footnotes 23 and 24 below for further details. Thus, the final criterion for exclusion of outliers from the models was standardised residual greater than 3, not the arbitrary cutoff point of 100 percent.
18. Industry classification was based on the largest source of a firm's revenue.
19. Total asset figures were missing for seven of the 549 firms. Thus, when total asset rankings were used for size classification, there were only 542 firms in the sample.

Table 1: Industry Distribution of Firms in the Final Sample Based on ASX Industry Classification

Code	Industry	Number of Firms
10	Gold	41
20	Other metals	30
30	Solid fuels	8
40	Oil and gas	14
50	Diversified resources	3
60	Developers and contractors	29
70	Building materials	27
80	Alcohol and tobacco	12
90	Food and household goods	27
100	Chemicals	6
110	Engineering	27
120	Paper and packaging	6
130	Retail	20
140	Transport	8
150	Media	18
160	Banks	14
170	Insurance	10
180	Entrepreneurial investors	7
190	Investment and financial services	90
200	Property trusts	19
210	Miscellaneous services	66
220	Miscellaneous industrials	52
230	Diversified industrials	15
	TOTAL	**549**

In order that the results of this study could be compared with those of the previous ETR studies in the United States (e.g. Zimmerman 1983[20]; Porcano 1986[21]), firms in the final sample were first divided

into four quarters, Size 1 (minimum to lower quartile) to Size 4 (upper quartile to maximum), based on the rankings of (a) average total asset and (b) average profit. Approximately 50 of the largest companies then were split off from Size 4 to form a separate group (Size 5) following Zimmerman (1983). The cutoff points and the number of firms in each of the five size categories are shown in Panels A and B of Table 2 using the rankings of average total assets and average pre-tax profits, respectively.

2.4 Regression models

Ordinary least squares (OLS) regression models with ETR as the dependent variable, and industry and size as two categorical independent variables, were used to analyse the computed ETRs.[22] A dummy variable was set up for each industry or size category. It had the value of 1 if the firm fell into that industry or size category, and 0 if otherwise.

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20. Zimmerman (1983) tested the relationship between firm size and ETR for the 1970-81 period. Companies in the sample first were partitioned into four roughly equal groups (quarters) based on rankings of sales revenue. The first quarter ranges from the minimum value to the lower quartile; the fourth quarter ranges from the upper quartile to the maximum value. Zimmerman split the 50 largest companies from the fourth quarter to form a fifth group. He defined ETR as the ratio of tax currently payable to gross profit and computed the unweighted mean ETR for each category each year. The results show that the 50 firms with the largest sales revenue consistently had higher ETRs than the remaining firms. Explanations such as fixed tax shields, diversification, and foreign tax could not fully account for the results.
21. Porcano (1986) studied the effect of firm size on ETRs to examine whether the US corporate tax structure effectively was progressive, proportional, or regressive. Four different size criteria were used to classify firms into quarters – total assets, sales, pre-tax net income and capital expenditure. ETR was defined as the ratio of current US federal income tax to US pre-tax net income. ETRs for two years, 1982 and 1983, were computed. The ETR for each quarter was a weighted average. The weights were pre-tax income of firms. The results showed that the ETR for US companies was very low and large firms had lower ETRs than small firms, suggesting that the corporate tax rate in the Unites States effectively was regressive. Further analysis indicated that the regressive tax structure was due mainly to heavier use of accelerated depreciation allowances and foreign tax credits by larger firms.

Table 2: Size Distribution of Firms in the Final Sample

PANEL A: Size Based on Average Total Assets

Asset Size	Range of Average Total Assets	Number of Firms*
1 (Smallest)	Up to $22m	136
2	$22m+ to $68m	135
3	$68m+ to $230m	133
4	$230m+ to $1,200m	87
5 (Largest)	$1,200m+	51
TOTAL		**542**

* Total asset figures were missing for seven of the 549 firms.

PANEL B: Size Based on Average Pre-tax Group Profit

Profit Size	Range of Average Pre-tax Profits	Number of Firms
1 (Smallest)	Up to $1m	137
2	$1m+ to $4m	139
3	$4m+ to $15m	136
4	$15m+ to $60m	85
5 (Largest)	$60m+	52
TOTAL		**549**

Each model was represented by the following regression equation:

$$ETR_i = \alpha + \beta_2 I_{2i} + \ldots + \beta_{23} I_{23i} + \gamma_2 S_{2i} + \ldots + \gamma_5 S_{5i} + \varepsilon_i \quad (6)$$

where α is the constant term which estimates the ETR for Industry 1 and Size 1; I_2 to I_{23} are dummy variables for the other 22 industries in

22. Including size variables as continuous variables in the regression analyses would have forced a linear relationship between ETRs and sizes and would have masked such relationship as was found by Zimmerman (1983); i.e., that the 50 largest firms had higher ETRs than the remaining firms.

the ASX classification, and S_2 to S_5 are dummy variables for the other four size categories; i is the index for firm; the β's and γ's are parameters for the industry and size dummy variables, which measure the difference in estimated ETRs between Industry 1 and other industries and between Size 1 and other size categories; and ε represents the error term.

3. Results and Interpretation

3.1 Statistical significance of the models

Table 3 shows the statistical significance of the two regression models and the independent variables. Model 1 included industry and size based on average total assets as independent variables,[23] and Model 2 included industry and size based on average pre-tax profits.[24] Results of diagnostic tests indicated that the standardised residuals were approximately normally distributed. Thus, the reported p-values can be used for hypothesis testing.

The interaction terms of industry and size were not statistically significant, so they were not included in the final models. Without the interaction terms, the models were additive models. The estimated ETR for Industry m and Size n was simply the sum of the constant term, the coefficient of Industry m, and the coefficient of Size n. The mean ETR was 30 percent and the standard deviation was 16 percent.

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23. Seven outliers with standardised residuals greater than 3 were removed to improve the fit of the model. The final number of firms included in Model 1 was 535. These outliers were in different industries and in various size categories. They had ETRs ranging from 84 percent to 99 percent. Sensitivity analysis showed that removal of these outliers did not affect the statistical significance of the regression coefficients, but the size effect was slightly weakened. The coefficients for asset size dummy variables would have been -0.0065, -0.0368, -0.0771 and -0.0686 had the seven outliers been included in the model.
24. Four outliers with standardised residuals greater than 3 were removed to improve the fit, leaving 545 firms in Model 2. These four outliers are among the seven removed from Model 1, and had ETRs ranging from 84 percent to 99 percent. Sensitivity analysis showed that removal of these outliers did not affect the statistical significance of the regression coefficients, but the size effect was slightly weakened. The coefficients for profit size dummy variables would have been -0.0575, -0.0686, -0.0807 and -0.0848 had the four outliers been included in the model.

Table 3: Statistical Significance of Independent Variables

Model and Independent Variable	F-statistic	p-value
Model 1 (Size based on Total Assets)		
Adjusted R^2 = 0.222		
Industry and Asset Size (without interaction terms)	6.85	<0.001
Industry, adjusted for Asset Size	7.74	<0.001
Asset Size, adjusted for Industry	2.84	0.024
Industry alone, ignoring Asset Size	7.57	<0.001
Asset Size alone, ignoring Industry	1.95	0.100
Model 2 (Size based on Pre-tax Profits)		
Adjusted R^2 = 0.224		
Industry and Profit Size (without interaction terms)	7.03	<0.001
Industry, adjusted for Profit Size	7.88	<0.001
Profit Size, adjusted for Industry	3.59	0.007
Industry alone, ignoring Profit Size	7.65	<0.001
Profit Size alone, ignoring Industry	2.30	0.058

The adjusted R^2 was 22.2 percent for Model 1, and 22.4 percent for Model 2. The low percentage of variance accounted for by the models suggested that other variables such as firm specific characteristics also affected firms' ETRs. However, the F-statistic was 6.85 for Model 1, and 7.03 for Model 2, which were significant at less than the 0.001 level.

The results for Model 1 indicate that industry was significantly associated with firms' ETRs, whether industry was fitted alone, or along with firm size (based on total assets) and adjusted for firm size. In each instance the F-statistic was significant at less than the 0.001 level. Firm size (based on total assets) also was significant when fitted along with industry and adjusted for industry; however, it was only marginally significant at the 0.10 level by itself. Similar industry effect and firm size (based on profit) effect were observed for Model 2.

3.2 Industry differences

Tables 4 and 5 summarise the regression results respectively for Models 1 and 2. The estimate for the constant term (15 percent in Table 4; 17 percent in Table 5) is the estimated ETR for Industry 1 (Gold) and Size

1. The estimated coefficients for the dummy variables in Tables 4 and 5 measure the differences in ETRs between the gold-mining industry and other industries holding size constant, and between Size 1 and other size categories holding industry constant. The estimated industry coefficients for the two models are very similar in magnitude and sign.

Table 4: Estimates of Regression Coefficients of Model 1* (Industry and Firm Size by Average Total Asset Rankings**)

	Estimate	Standard Error	t-statistic	p-value
Constant (Gold, Firm Size 1)	0.1500	0.0284	5.28	<.001
Industry Dummy Variable				
Other metals	0.1913	0.0401	4.77	<.001
Solid fuels	0.2767	0.0637	4.34	<.001
Oil and gas	0.2112	0.0509	4.14	<.001
Diversified resources	0.1993	0.0993	2.01	0.045
Developers and contractors	0.2051	0.0401	5.11	<.001
Building materials	0.2528	0.0410	6.17	<.001
Alcohol and tobacco	0.2462	0.0538	4.57	<.001
Food and household goods	0.2029	0.0407	4.98	<.001
Chemicals	0.3453	0.0716	4.82	<.001
Engineering	0.2669	0.0411	6.49	<.001
Paper and packaging	0.1971	0.0722	2.73	0.007
Retail	0.2894	0.0456	6.34	<.001
Transport	0.2584	0.0639	4.04	<.001
Media	0.2609	0.0466	5.59	<.001
Banks	0.2942	0.0574	5.13	<.001
Insurance	0.2223	0.0591	3.76	<.001
Entrepreneurial investors	0.0491	0.0676	0.73	0.468
Investment and financial services	0.1170	0.0315	3.71	<.001
Property trusts	-0.1107	0.0456	-2.43	0.015
Miscellaneous services	0.1960	0.0330	5.93	<.001
Miscellaneous industrials	0.2032	0.0345	5.88	<.001
Diversified industrials	0.2057	0.0505	4.08	<.001

	Estimate	Standard Error	t-statistic	p-value
Firm Size Dummy Variable				
Firm Size 2	-0.0033	0.0201	-0.16	0.869
Firm Size 3	-0.0358	0.0209	-1.71	0.088
Firm Size 4	-0.0678	0.0240	-2.82	0.005
Firm Size 5	-0.0628	0.0317	-1.98	0.048

* Adjusted $R^2 = 0.222$

** Size 1 = Minimum value to lower quartile
Size 2 = Lower quartile to median
Size 3 = Median to upper quartile
Size 4 = Upper quartile to maximum value, excluding top 50
Size 5 = Top 50

Table 5: Estimates of Regression Coefficients of Model 2* (Industry and Firm Size by Average Pre-tax Profit Rankings**)

	Estimate	Standard Error	t-statistic	p-value
Constant (Gold, Firm Size 1)	0.1731	0.0294	5.89	<.001
Industry Dummy Variable				
Other metals	0.1737	0.0408	4.26	<.001
Solid fuels	0.2646	0.0653	4.05	<.001
Oil and gas	0.2111	0.0523	4.04	<.001
Diversified resources	0.1860	0.1020	1.82	0.069
Developers and contractors	0.1988	0.0410	4.85	<.001
Building materials	0.2471	0.0419	5.89	<.001
Alcohol and tobacco	0.2520	0.0555	4.54	<.001
Food and household goods	0.2067	0.0419	4.94	<.001
Chemicals	0.3364	0.0737	4.57	<.001
Engineering	0.2847	0.0418	6.81	<.001
Paper and packaging	0.1946	0.0742	2.62	0.009
Retail	0.2921	0.0470	6.22	<.001
Transport	0.2607	0.0658	3.96	<.001

	Estimate	Standard Error	t-statistic	p-value
Media	0.2698	0.0480	5.62	<.001
Banks	0.2621	0.0531	4.94	<.001
Insurance	0.2156	0.0599	3.60	<.001
Entrepreneurial investors	0.0404	0.0695	0.58	0.561
Investment and financial services	0.1077	0.0322	3.34	<.001
Property trusts	-0.1153	0.0468	-2.46	0.014
Miscellaneous services	0.2153	0.0337	6.39	<.001
Miscellaneous industrials	0.2042	0.0357	5.72	<.001
Diversified industrials	0.1953	0.0523	3.73	<.001
Firm Size Dummy Variable				
Firm Size 2	-0.0542	0.0205	-2.64	0.009
Firm Size 3	-0.0640	0.0213	-3.01	0.003
Firm Size 4	-0.0736	0.0243	-3.02	0.003
Firm Size 5	-0.0795	0.0305	-2.61	0.009

⋆ Adjusted $R^2 = 0.224$

⋆⋆ Size 1 = Minimum value to lower quartile
Size 2 = Lower quartile to median
Size 3 = Median to upper quartile
Size 4 = Upper quartile to maximum value, excluding top 50
Size 5 = Top 50

Estimated ETR and standard error for each industry-size combination from the two models are shown in Tables 6 and 7. A review of Table 6 indicates that in Model 1, for the smallest firms (firm size 1) ETRs ranged from 3.9 percent for Property Trusts to nearly 50 percent for Chemicals. For the 50 largest firms (firm size 5), ETRs ranged from -2.4 percent (Property Trusts) to 43 percent (Chemicals). Results are somewhat similar when firm size is based on pre-tax profits (Model 2, Table 7). The range of estimated ETRs for firm size 1 was 5.8 percent (Property Trusts) to 51 percent (Chemicals); for firm size 5 they ranged from -2.2 percent (Property Trusts) to 43 percent (Chemicals).

Table 6: Estimated ETR from Regression Model 1 (Industry and Size by Average Total Asset Rankings*)

Estimated value followed by standard error (s.e.).

	Asset Size									
	1		2		3		4		5	
Industry		s.e		s.e.		s.e.		s.e.		s.e.
Gold	0.150	0.028	0.147	0.029	0.114	0.029	0.082	0.031	0.087	0.039
Other metals	0.341	0.033	0.338	0.033	0.306	0.033	0.274	0.035	0.279	0.038
Solid fuels	0.427	0.061	0.423	0.060	0.391	0.060	0.359	0.058	0.364	0.064
Oil and gas	0.361	0.046	0.358	0.046	0.325	0.045	0.293	0.046	0.298	0.050
Diversified resources	0.349	0.097	0.346	0.097	0.314	0.097	0.282	0.096	0.287	0.094
Developers and contractors	0.355	0.034	0.352	0.033	0.319	0.032	0.287	0.034	0.292	0.041
Building materials	0.403	0.034	0.400	0.034	0.367	0.033	0.335	0.036	0.340	0.040
Alcohol and tobacco	0.396	0.049	0.393	0.049	0.360	0.048	0.328	0.050	0.333	0.054
Food and household goods	0.353	0.033	0.350	0.034	0.317	0.034	0.285	0.036	0.290	0.040
Chemicals	0.495	0.068	0.492	0.069	0.460	0.067	0.428	0.068	0.433	0.070
Engineering	0.417	0.034	0.414	0.035	0.381	0.034	0.349	0.036	0.354	0.043
Paper and packaging	0.347	0.069	0.344	0.069	0.311	0.067	0.279	0.069	0.284	0.069
Retail	0.439	0.040	0.436	0.039	0.404	0.039	0.372	0.041	0.377	0.046
Transport	0.408	0.060	0.405	0.059	0.373	0.060	0.341	0.061	0.346	0.060
Media	0.411	0.041	0.408	0.040	0.375	0.041	0.343	0.042	0.348	0.045
Banks	0.444	0.053	0.441	0.053	0.408	0.052	0.377	0.053	0.381	0.045
Insurance	0.372	0.055	0.369	0.055	0.337	0.053	0.305	0.055	0.310	0.054
Entrepreneurial investors	0.199	0.064	0.196	0.064	0.163	0.063	0.131	0.063	0.136	0.065
Investment and financial services	0.267	0.020	0.264	0.021	0.231	0.023	0.199	0.026	0.204	0.034
Property trusts	0.039	0.040	0.036	0.040	0.003	0.039	-0.029	0.040	-0.024	0.046
Miscellaneous services	0.346	0.023	0.343	0.024	0.310	0.024	0.278	0.027	0.283	0.034
Miscellaneous industrials	0.353	0.025	0.350	0.026	0.317	0.026	0.285	0.029	0.290	0.037
Diversified industrials	0.356	0.046	0.352	0.046	0.320	0.045	0.288	0.043	0.293	0.049

⋆ Size 1 = Minimum value to lower quartile
Size 2 = Lower quartile to median
Size 3 = Median to upper quartile
Size 4 = Upper quartile to maximum value, excluding top 50
Size 5 = Top 50

Table 7: Estimated ETR from Regression Model 2 (Industry and Size by Average Pre-tax Profit Rankings*)

Estimated value followed by standard error (s.e.).

	Profit Size									
	1		2		3		4		5	
Industry		s.e.		s.e.		s.e.		s.e.		s.e.
Gold	0.173	0.029	0.119	0.030	0.109	0.030	0.100	0.031	0.094	0.037
Other metals	0.347	0.033	0.293	0.035	0.283	0.034	0.273	0.034	0.267	0.038
Solid fuels	0.438	0.061	0.384	0.061	0.374	0.061	0.364	0.062	0.358	0.063
Oil and gas	0.384	0.048	0.330	0.047	0.320	0.047	0.311	0.047	0.305	0.050
Diversified resources	0.359	0.100	0.305	0.100	0.295	0.099	0.286	0.100	0.280	0.097
Developers and contractors	0.372	0.034	0.318	0.035	0.308	0.033	0.298	0.035	0.292	0.041
Building materials	0.420	0.035	0.366	0.035	0.356	0.036	0.347	0.036	0.341	0.040
Alcohol and tobacco	0.425	0.051	0.371	0.051	0.361	0.050	0.352	0.052	0.346	0.053
Food and household goods	0.380	0.035	0.326	0.035	0.316	0.035	0.306	0.037	0.300	0.040
Chemicals	0.509	0.070	0.455	0.071	0.445	0.070	0.436	0.070	0.430	0.072
Engineering	0.458	0.034	0.404	0.035	0.394	0.035	0.384	0.037	0.378	0.042
Paper and packaging	0.368	0.071	0.314	0.071	0.304	0.069	0.294	0.071	0.288	0.071
Retail	0.465	0.041	0.411	0.040	0.401	0.040	0.392	0.043	0.386	0.046
Transport	0.434	0.061	0.380	0.061	0.370	0.062	0.360	0.063	0.354	0.062
Media	0.443	0.043	0.389	0.042	0.379	0.041	0.369	0.044	0.363	0.045
Banks	0.435	0.049	0.381	0.049	0.371	0.047	0.362	0.048	0.356	0.048
Insurance	0.389	0.057	0.334	0.056	0.325	0.056	0.315	0.054	0.309	0.059
Entrepreneurial investors	0.214	0.066	0.159	0.066	0.150	0.064	0.140	0.067	0.134	0.067
Investment and financial services	0.281	0.021	0.227	0.021	0.217	0.023	0.207	0.027	0.201	0.033

Property trusts	0.058	0.041	0.004	0.041	-0.006	0.040	-0.016	0.042	-0.022	0.045
Miscellaneous services	0.388	0.024	0.334	0.024	0.324	0.025	0.315	0.027	0.309	0.034
Miscellaneous industrials	0.377	0.027	0.323	0.026	0.313	0.027	0.304	0.031	0.298	0.036
Diversified industrials	0.368	0.048	0.314	0.048	0.304	0.046	0.295	0.047	0.289	0.046

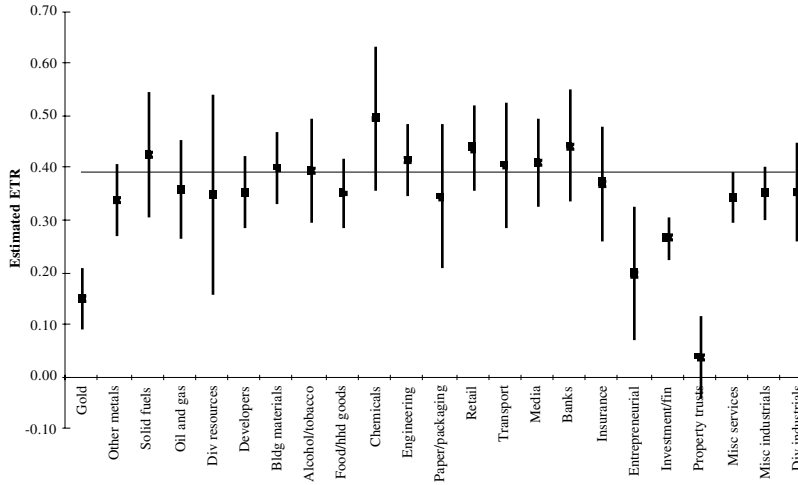
* Size 1 = Minimum value to lower quartile
Size 2 = Lower quartile to median
Size 3 = Median to upper quartile
Size 4 = Upper quartile to maximum value, excluding top 50
Size 5 = Top 50

Thus, in both models, ETRs varied substantially between industries ($p < 0.001$ in Table 3). There was a strong industry effect. To test the null hypothesis H_{01}, 95 percent confidence intervals were constructed using the standard errors in Tables 6 and 7. Figures 1 and 2 show the estimated ETRs and their confidence intervals for different industries for Model 1 (Asset Size 1) and Model 2 (Profit Size 1) respectively. Each vertical line represents the confidence interval for an industry, and the mid-point is the estimated ETR for that industry. The horizontal line shows the benchmark STR of 39 percent.

Four industries (Gold, Entrepreneurial Investors, Investment and Financial Services, and Property Trusts) consistently had ETRs significantly lower than the benchmark STR of 39 percent, regardless of firm size.[25] Also, the ETRs of Property Trusts were not significantly different from zero, regardless of size. Six additional industries[26] had estimated ETRs significantly lower than 39 percent when firm size was large, but not so when firm size was small. Thus, for these 10 industries the hypothesis H_{01} was rejected at the 0.05 significance level. The remaining 13 industries had ETRs not significantly different from the benchmark, regardless of size, i.e. the hypothesis H_{01} could not be rejected for these 13 industries.

25. If the STR falls outside the 95 percent confidence interval of an estimated ETR, then the ETR is significantly different from the STR at the 0.05 significance level.
26. They were Other Metals, Developers and Contractors, Food and Household Goods, Miscellaneous Services, Miscellaneous Industrials, and Diversified Industrials.

Figure 1: Model 1— Asset Size 1 Estimated ETR by Industry with 95% Confidence Interval

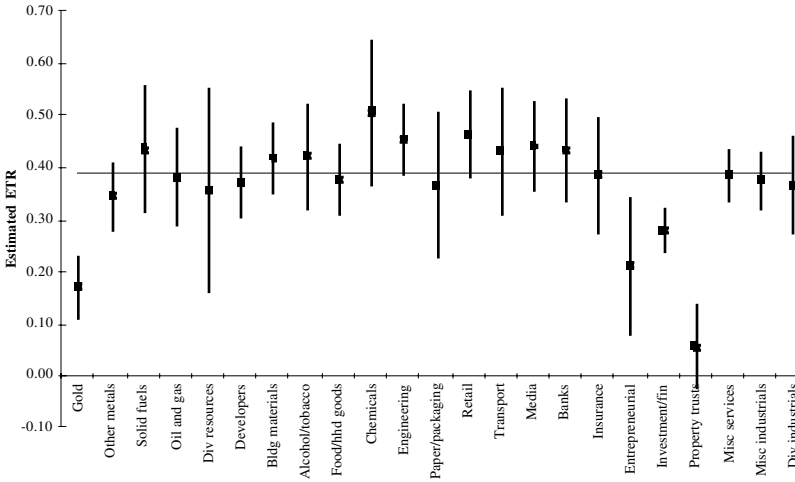


The following observations about the possible causes of industry differences can be made.[27]

- Property trusts had an estimated ETR which was not significantly different from zero. This was so because under the tax law, if a trust distributed all its income, then it was the beneficiaries who were liable to pay tax on the income to which they were entitled.

27. These observations were confirmed by the results of the analysis of tax disclosure data reported by Tran (1998).

Figure 2: Model 2 — Profit Size 1
Estimated ETR by Industry with
95% Confidence Interval



- The gold-mining industry received concessional tax treatment prior to 1991. Up to 31 December 1990, income from working a qualifying gold mining site in Australia was exempt from income tax. The gold mining incentive explains why the industry had ETR significantly below the benchmark STR.
- The main activities of Entrepreneurial Investors were investing in other companies, so the major sources of profits were dividend income and capital gains on disposal of investments. Dividend income effectively was tax free due to dividend rebates. Capital gains from investments acquired before 20 September 1985 were largely untaxed. Capital gains from investments acquired after 19 September 1985 also received preferential tax treatment, e.g. cost base indexation. The concessional treatment of these two types of income explains why the ETR of Entrepreneurial Investors was significantly below the benchmark STR.

- Dividend rebates and concessional treatment of capital gains also accounted for the low estimated ETR for firms in the Investment and Financial Services industry.

3.3 Size differences

In general, the estimated regression coefficients for asset size and profit size dummy variables in Tables 4 and 5 indicate that there was a monotonic negative relationship between ETR and firm size, after controlling for industry differences. The only exception was that in Model 1 the estimated ETR for Asset Size 5 was 0.5 percentage point lower than that for Asset Size 4, but the difference was not statistically significant. A stronger negative size effect was found in Model 2 than in Model 1. This was confirmed by the F-statistics for asset size and profit size in Table 3, adjusted for industry. The p-values were 0.024 and 0.007 respectively for Models 1 and 2. Also, as shown earlier, the number of industries with ETRs significantly less than 39 percent increased with firm size. These results indicate a significant negative relationship between firm size and ETR regardless of whether firm size is based on total assets or pre-tax profit.

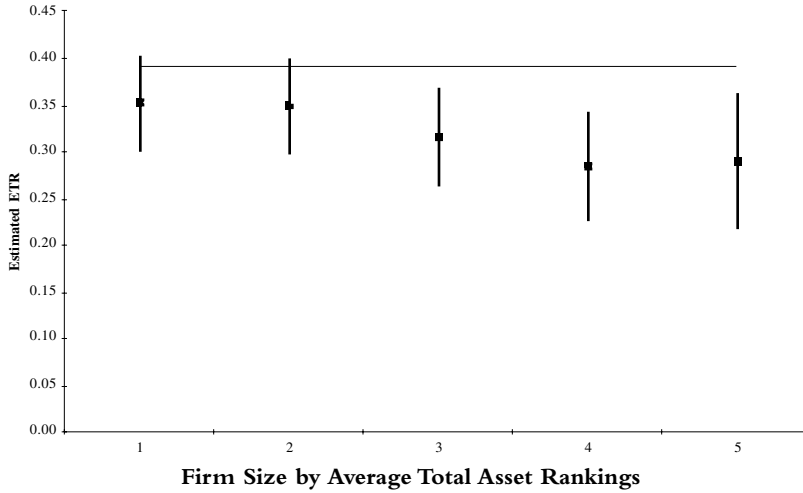
Table 4 shows that, holding industry affiliation constant, the estimated ETR of firms of Asset Size 1 was not significantly different from Asset Size 2. Firms of Asset Size 3 had an ETR that was about 3.6 percentage points below Asset Size 1, but the difference was only marginally significant (i.e. the p-value was between 0.05 and 0.1). The ETRs of Asset Sizes 4 and 5 (which made up the fourth quarter) were more than 6 percentage points below that of Asset Sizes 1 and the differences were statistically significant. The ETR of Asset Size 4 was also significantly lower than that of Asset Size 2 by more than 6 percentage points.

Table 5 shows that firms of Profit Sizes 2 to 5 had significantly lower ETRs than firms of Profit Size 1. The differences ranged from over 5 percentage points for Profit Size 2 to nearly 8 percentage points for Profit Size 5. Although the ETR declined as profit size increased, the differences between Profit Sizes 2 to 5 did not appear to be statistically significant.

The monotonic negative relationship between firm size and estimate ETR indicates that large firms had an effective tax rate lower than small

firms, no matter whether firm size was based on total assets or profits. Thus, corporate income tax in Australia was effectively regressive.[28]

Figure 3: Model 1 — Miscellaneous Industrials Estimated ETR by Firm Size with 95% Confidence Interval



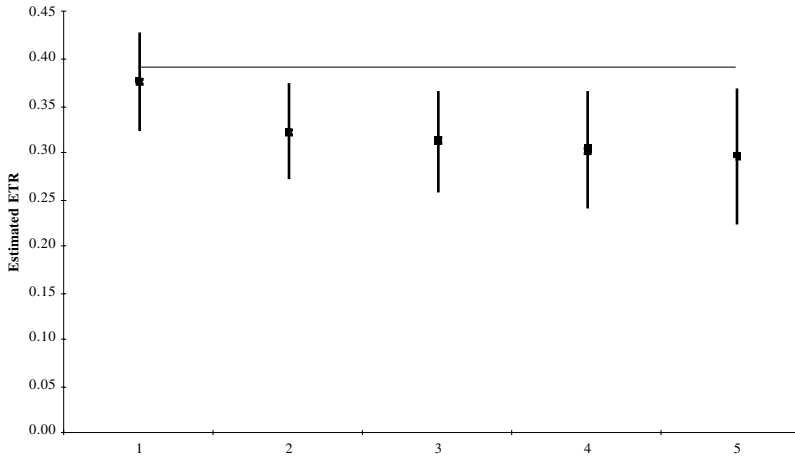
To test the null hypotheses H_{02} and H_{03}, 95 percent confidence intervals were constructed for different firm sizes using the standard errors in Tables 6 and 7. Figures 3 and 4 show the estimated ETRs and their confidence intervals for Miscellaneous Industrials for Models 1 and 2 respectively. Miscellaneous Industrials is one of the six industries that had estimated ETRs significantly lower than the benchmark when firm size was large, but not so when firm size was small. Each vertical line represents the confidence interval for a firm size, and the mid-point is the estimated ETR for that size. The horizontal line shows the benchmark STR of 39 percent.

Figure 3 shows that in Model 1, Miscellaneous Industrials had ETRs significantly lower than the benchmark STR when firm size exceeded

28. This finding is consistent with those of Porcano (1986) in the US context, but not Zimmerman (1983).

the median ranking of average total asset (Asset Sizes 3 to 5), and not so when firm size was below the median ranking (Asset Sizes 1 and 2). For Model 2, Figure 4 shows that Miscellaneous Industrials had ETRs significantly lower than the benchmark STR when firm size exceeded the lower quartile ranking of average profit (Profit Sizes 2 to 5), and not so when firm size was below the lower quartile ranking (Profit Size 1).

Figure 4: Model 2 — Miscellaneous Industrials Estimated ETR by Firm Size with 95% Confidence Interval



Thus, the negative size effect cut in at a smaller size for Model 2 than for Model 1.

Five additional industries, i.e. Other Metals, Developers and Contractors, Food and Household Goods, Miscellaneous Services, and Diversified Industrials, also had estimated ETRs significantly lower than the benchmark when firm size was large.[29] As reported under industry differences, the ETRs of four other industries were consistently below the benchmark regardless of firm size. Thus, for these 10 industry

29. More industries might have shown similar pattern of size effect had the sample sizes of these industries been larger, so that the standard errors of estimation could be reduced (e.g. Diversified Resources, Paper and Packaging).

groupings the evidence suggests that the two hypotheses H02 and H03 were rejected at the 0.05 significance level. The hypotheses could not be rejected for the remaining 13 industries.

Size differences could be due to the fact that large firms had more sophisticated tax departments and had more resources committed to tax planning activities. Therefore, they were better able to organise their activities in optimal tax saving ways, and to influence the political process in their favour.

4. Summary and Conclusions

The key findings of the study are summarised as follows. First, firms in gold-mining and investment industries substantially benefited from concessional tax treatments of particular types of income and had ETRs significantly lower than the ETRs of other industries and the STR. Concessional tax treatments include exemption of gold-mining income, preferential treatment of capital gains, and dividend rebates. Such industry differences and the apparent inequity in the income tax system were mainly due to deliberate government policies. Gold-mining income concession was removed starting from 1991. Capital gain concession is expected to reduce over time as more and more assets change hands and become assets acquired after 19 September 1985, and therefore subject to income tax on disposal. However, dividend rebates are allowed to prevent corporate profits from being taxed more than once, so these rebates will remain available.

Second, after controlling for the industry differences, a size effect also was identified. In addition to firms in the gold-mining and investment industries, large firms in six other industries had ETRs significantly below the benchmark STR, i.e. the accounting earnings of these firms were significantly greater than their taxable incomes due to permanent differences. The analysis of tax disclosure data reported by Tran (1998) provides an insight into the causes of these size differences.

The presence of the ETR-STR gaps suggests that firms in some industries and size categories had taxable incomes significantly smaller than accounting profits due to permanent differences. However, the presence of such book-tax income gaps does not mean that an alignment of tax with financial accounting rules would necessarily result in an increase in the revenue collection of government. If the government

regards the tax incentives and concessions as desirable, they will be provided through other mechanisms, or will become exceptions to financial accounting rules.

Moreover, potential earnings management and distortions in the accounting rule-making process as a result of a complete alignment might well produce the opposite results. Prior research in the United States indicates that firms manage their earnings to achieve favourable tax positions, and that in general, larger firms manage earnings more than smaller firms. Such behaviour would lead to reduced government revenue. If the accounting rule-making bodies yield to pressures to promulgate tax-saving accounting methods, government revenue would further decline.

The causes of the book-tax income gap, including timing differences, and the observed industry and size differences have been further investigated in an analysis of tax disclosure data of 46 firms reported by Tran (1998).

References

Australian Stock Exchange (ASX). 1995. *Yearbook*. Sydney: Australian Stock Exchange Ltd.

Boucher, T. (Commissioner of Taxation). 1991. The simplification debate – Too simplistic? *Taxation in Australia*, November, 277-282.

Commonwealth Committee on Taxation. 1954. *Report to The Treasurer upon Reference No. 16 to The Committee (Ascertainment of Profits of Business)*. Unpublished report dated 14 January 1954.

Joint Committee of Public Accounts, Parliament of the Commonwealth of Australia. 1993. *Report No. 326 An Assessment of Tax – A Report on an Inquiry into the Australian Taxation Office*. Canberra: Australian Government Publishing Service.

Porcano, T. M. 1986. Corporate Tax Rates: Progressive, Proportional, or Regressive. *The Journal of The American Taxation Association*, 7, 17-31.

Schipper, K. 1989. Commentary on Earnings Management. *Accounting Horizons,* December, 91-102.

Spooner, G. M. 1986. Effective Tax Rates from Financial Statements. *National Tax Journal*, 39, 293-306.

Taxation Review Committee. 1975. *Full Report*. Canberra: Australian Government Publishing Service.

Tran, A. V. 1998. Causes of the Book-Tax Income Gap. Australian Tax Forum, 14 (forthcoming).

Zimmerman, J. L. 1983. Taxes and Firm Size. *Journal of Accounting and Economics*, 5, 119-149.