Price Regulation in Australia: How consistent has it been?*

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Abstract

We assemble a database consisting of fifty-two regulatory decisions made by seven different regulators across five different industries. We examine how the proportion of firms' revenue requirements that were disallowed by the regulator vary by regulator, industry and time. Despite the differences in the implementation of price regulation across industries and across jurisdictions in Australia, outcomes are surprisingly consistent. For example, we show that it is not possible to reject the hypothesis that the regulatory outcomes in South Australia, New South Wales, the Australian Capital Territory and Victoria are similar despite the different regulatory approaches undertaken in these jurisdictions.

Keywords: price regulation, energy, water, consistency

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I. Introduction

In Australia, a national-level regulator and a variety of state-level regulators undertake price regulation. None of these regulators use exactly the same process for generating the maximum allowable revenue that a business can charge. Using a database we assemble of 254 observations on 52 regulatory decisions spanning five industries—electricity and gas distribution and transmission and water—we address the following question: Does the absence of a common set of regulatory rules lead to different regulatory outcomes across industries and across jurisdictions?

Indeed, one of the justifications for the recent establishment of the Australian Energy Regulator has been the worry that the diversity of regulatory approaches has led to inconsistent outcomes. However, while the concern with the diversity of approaches is widespread[1], this is the first paper, to our knowledge, which addresses whether any inconsistency arises from this diversity of approaches.

In this paper we pursue an exploratory analysis of the patterns of regulatory decisions across jurisdictions and industries in Australia. Given the exploratory nature of our investigation, our approach is non-structural. We compare regulatory decisions, expressed by the proportion of firms' revenue requirement claims disallowed by the regulator when determining the maximum revenue, across regulator, industry and time period. We do not specify a model of the regulatory decision-making process, but take an econometric approach which will allow us to address the research question of regulatory consistency.

Our approach will serve, we hope, as a useful step towards development of more complete structural models of regulatory decisions. Any such model must be able to account for the stylized facts. For example, we find evidence that, despite differences in the implementation of price regulation across jurisdictions and across industries, it is not possible to reject the hypothesis that the regulatory outcomes in South Australia, New South Wales, the Australian Capital Territory (ACT) and Victoria are similar.[2] We also provide evidence that the Queensland and Western Australia regulators are consistent with one another, but are associated with regulatory outcomes that seem tougher than those of the regulators in the other jurisdictions, after controlling for industry and time period. These results have important implications for the development of theory aimed at explaining how different regulators make decisions.

We would like to be able to assess how the regulatory decisions taken by the federal regulator, the Australian Competition and Consumer Commission (ACCC), relate to those taken by the state regulators. The difficulty in conducting this assessment is the lack of overlap in the industries being regulated. We provide lower and upper bounds that are consistent with both the notion that the ACCC is tougher and that it is less tough than state regulators.

While we provide evidence that price regulation has been reasonably consistent across industries and jurisdictions (with some exceptions), our analysis is silent on how effective this regulation has been. This is an important theme for future research.[3]

Our paper is similar in nature to Hagerman and Ratchford (1978) in that we also advance a fact-finding approach with the aim of informing the development of theory. It also fits with a recent, albeit small, literature that aims to explain the variability of regulatory outcomes. Examples include Lehman and Weisman (2000), de Figueiredo and Edwards (2004), and Edwards and Waverman (2004).

This paper is organised as follows. In the next section we provide background on the regulatory environment in Australia and a brief description of the institutional framework of the industries we analyse. Section 3 contains the conceptual framework and a description of our empirical strategy. Section 4 describes the database that we assembled while Section 5 contains our empirical results. In that section we address our main hypotheses, undertake some robustness checking of our results and investigate whether the nature of ownership of regulated firms can explain the variability of our endogenous variable. Section 6 concludes.

II. Background

(i) Regulation

The Productivity Commission (2004a) estimates the total value of government-owned assets in water (including sewerage and irrigation), electricity, rail, ports and urban transport at approximately $125 billion. If one adds the value of total assets of the telecommunications and gas industries and the value of total assets in these industries under private ownership, it is possible to conclude that the total value of assets in the energy, water, telecommunications and transport industries add up to over $150 billion.

These industries underwent significant changes in the 1990s along the lines prescribed by the Hilmer report. These changes included privatisation, corporatisation, and vertical separation of government owned enterprises. The separation of natural monopoly components from segments where competition could be introduced was accomplished either by actual separation or by the requirements of firms to unbundle the goods and services they provide. The natural monopoly segments were re-regulated with the introduction of industry-specific access regimes and the establishment of independent regulators. Competitive segments were subjected to industry-specific regulatory frameworks and competition law.[4]

Price regulation of the natural monopoly elements of these industries usually takes the form of maximum prices that these businesses are allowed to charge for the services they provide.[5] Who sets these maximum prices and how they are set depends very much on the industry. For example, the ACCC sets the maximum prices that can be charged by electricity and gas transmission businesses.[6] Economic regulators in the states and territories set the maximum prices to be charged by gas and electricity distribution and water businesses.

In Australia, the dominant regulatory practice is such that maximum prices are not set directly. Instead, regulators determine the efficient costs to provide a particular service (usually in a forward looking manner—for example, for the next five years) and this generates the maximum allowable revenue that a business can generate. This model is known as the building blocks approach to price regulation. Very significantly, these efficient costs include the costs on and of capital, in addition to operational expenditures.

Based on the maximum allowable revenue, prices of individual services are then calculated by using, for example, forecasted demand or the quantities observed in previous periods. That is, prices are linked to costs through the maximum allowable revenue and the demand function. Although general principles for setting prices are similar across different jurisdictions and industries, there remains scope for significant differences on how these principles are implemented.

For example, the allowed rate of return, which is embedded in the determination of efficient capital costs, varies quite considerably across jurisdictions and industries.[7] Other examples that illustrate the scope for variation in the implementation of price regulation include the existence of efficiency carryover mechanisms in some jurisdictions and for some industries[8], different rights of appeal across industries, and whether maximum prices are determined by a revenue cap or a weighted average price cap.

One could take this diversity of approaches to price regulation across jurisdictions and across industries as a prima facie case of regulatory mayhem. As we discuss below, the evidence indicates that this conclusion would be premature.

(ii) Institutional Framework

The institutional arrangements that have prevailed since the deregulation of the network utility sectors have seen regulatory responsibilities spread between State, Territory and national regulators. Even within industries, different segments of the supply chain have been regulated by different regulators and at different jurisdictional levels. The remainder of this section will describe the different regulatory frameworks that apply for the industry sectors covered in this study.

Electricity

The responsibility for electricity regulation in Australia has been divided amongst State, Territory and national regulators since the introduction of deregulation. As part of the deregulation process a National Electricity Market (NEM) was developed. This market comprises Queensland, New South Wales, Australian Capital Territory, Victoria and South Australia. Jurisdictions in the NEM are required to regulate the electricity industry according to an industry access code developed under Part IIIA of the *Trade Practices Act* 1974; the National Electricity Code (NEC).

Price regulation for transmission networks is conducted according to Part C of the NEC, while Part E prescribes the rules for distribution pricing. Price regulation under the NEC is focused on an incentive based mechanism that applies a CPI-X approach. The regulation of electricity transmission companies in NEM jurisdictions is currently conducted by the ACCC. Distribution companies are regulated via the relevant State or Territory based economic regulator.

While the ACCC regulates electricity transmission under the NEC, there is sufficient scope within the NEC to allow the ACCC to interpret regulatory pricing components as it wishes. Therefore, consistent with the introductory explanation to Chapter 6 of the NEC, the ACCC has developed a Statement of Regulatory Intent.

Section 6.11(e) of the NEC allows State-based regulators to develop alternative pricing principles to those set out in Part E of the NEC. As a result, the form of regulation has developed differently amongst State-based regulators. For example, while the NSW regulator has applied a revenue cap regime, the Victorian regulator has applied a price cap regime. In addition, other incentive based mechanisms of the regulatory regime can also vary. For instance, Victoria is currently the only jurisdiction to apply a service incentive scheme and an efficiency carryover mechanism. These instruments are designed to promote efficiency by allowing the businesses to hold onto efficiency benefits achieved while also setting service quality targets to ensure that an appropriate level of service is maintained.

For those jurisdictions that are outside the NEM, State-based regulation applies for both transmission and distribution regulation. Increasingly, non-NEM states are moving towards regulatory regimes similar to the NEM style of price control.

Gas

Gas industry regulation in Australia is conducted under the National Third Party Access Regime for Natural Gas Pipelines (the Gas Access Regime). This regime applies to third party access to natural gas transmission and distribution pipelines. Underpinning the Gas Access Regime is the National Third Party Access Code for Natural Gas Pipeline Systems (the Gas Code). Unlike for electricity, the Gas Access Regime operates in each State and Territory through the corresponding gas law. Except in Western Australia, transmission pipeline access arrangements are the responsibility of the ACCC, while distribution pipelines are the responsibility of State or Territory based economic regulators. As a result, differences in interpretation of the Gas Code can arise over time.

Water

Water regulation in Australia is conducted on a State and Territory basis with different jurisdictional arrangements applying between States and Territories. There has been a trend recently for water-pricing regulatory frameworks to move towards a user-pays system to reflect scarcity. Water pricing decisions usually consider bulk water, storm water, wastewater as well as general water supply services. Water price regulation is conducted under specific State and Territory based water legislation with regulatory powers provided through the legislation specific to the regulator.

III. The Analytical framework and the empirical strategy

Our aim is to examine the consistency of regulatory decisions across jurisdictions and across industries. In particular, we want to explore the relationship between firms' revenue requirements and the regulator's allowable revenue determination as a function of variables such as the nature of the industry, the regulator, and the time period.

That is, we are mainly interested in the difference between *Y*—defined as a firm's revenue requirements measured in dollars—and *MAR*—the maximum allowable revenue. We define the following unit-free variable:

$$y_t = \frac{Y_t - MAR_t}{Y_t} \quad (1)$$

where t indexes time. Note that in principle we have $0 < y_t < 1$ as in one extreme the regulator can set the maximum allowable revenue to exactly cover the firm's revenue requirement claims making $y_t = 0$.[9] At the other extreme, the regulator sets the maximum allowable revenue to zero making $y_t = 1$.[10]

y, the fraction of firms' revenue requirement claims that are disallowed by the regulator, is what we aim to explain. The interpretation of y is not trivial. For example, if regulators had access to an *efficiometer*, a clever machine that measures precisely the extent to which firms' claims are efficient, then y could be interpreted as a measure of firm's deviation from the efficiency frontier; a higher y indicating a more inefficient firm. By the same token, in the absence of an *efficiometer* and if firms' behaviour across industries were the same, then y can be interpreted as a measure of the toughness of the regulator, a higher y indicating a tougher regulator. In our approach, we control for the possibility that the behaviour of firms in gas distribution is different from the behaviour of firms in gas transmission or electricity or water. We also control for the possibility that different regulators behave differently and we allow their behaviour to change over time.

That is, we estimate the following equation:

$$y_{irt} = \alpha + RD_r^{'}\beta + ID_i^{'}\gamma + TD_t^{'}\delta + \varepsilon_{irt}, \quad (2)$$

where subscripts *irt* indicate, respectively, the industry, regulator and time of the decision, *RD* are dummy variables indicating which regulator took the decision, *ID* are dummy variables representing the industry to which the decision applies, and *TD* are dummy variables representing the time period. α, β, δ, and γ are parameters to be estimated while ε_{irt} is a random term. We allow for correlation in ε_{irt} in our estimation strategy. The model may be viewed as a three-way error component model. Our approach can also be viewed as a flexible, non-parametric model where we group the data into cells by time period, regulator and industry. We then calculate means for each cell, which we can use to make cross-cell comparisons. The regression framework allows us to easily conduct hypothesis tests for pairs and groups of cells.

IV. Data

The data we use is presented as the revenue requirement of the business compared to the revenue determination of the regulator. The data is presented on a financial year basis over the corresponding regulatory period.[11] The method used to obtain the data was to search the websites of all Australian utility regulators for their pricing determinations. Therefore, the data is limited to those decisions where the regulator has provided the information on both the proposal and the determination on the Internet. [12]

The data contain information on firm revenue requirement and allowable revenue set by the regulator for 254 annual observations on 52 separate projects (decisions). The average decision/project covers 5 years.[13] Tables 1 and 2 summarise the data. The raw data suggests that the Western Australia regulator behaves quite differently, based upon *y*, than the other regulators. There also appears to be a similarity between gas and electricity within distribution and transmission but a clear distinction between transmission and distribution. When we graph *y* against time, no particular pattern.[14]

Figure 1 is a non-parametric kernel estimate of the density of *y*. We note the bimodality in the distribution of *y*, which we explore below. Before we present our empirical results, it is worth commenting on some peculiarities of the data. Firstly, in four ACCC decisions (two in electricity transmission and two in gas transmission), the firm's claim covered an entire year but the allowable revenue only covered half of the year (ElectraNet, 2002; SPI Powernet, 2002; Epic Moomba to Adelaide, 2000; EAPL Moomba to Sydney, 2003). To include these years, we multiplied the allowable revenue by two and used the firm's annual cost claim. Omitting these half-year observations has only the most trivial effect on the results presented below.

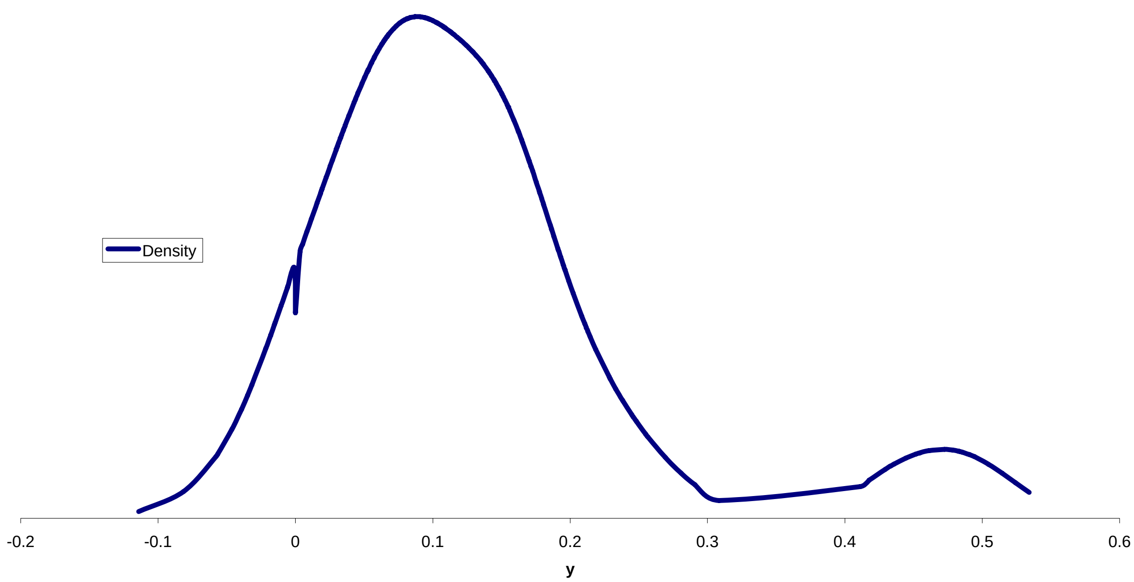
Table 1. Observations (decisions) by regulator and industry

	Regulator						
Industry	ACCC	Vic	NSW	QLD	WA	SA	ACT
Electricity Transmission	49(8)	0	0	0	0	0	0
Electricity Distribution	0	20(4)	30(6)	10(2)	0	0	10(2)
Gas Distribution	0	35(7)	14(3)	12(2)	5(1)	4(1)	10(2)
Gas Transmission	28(6)	0	0	0	10(2)	0	0
Water	0	0	13(5)	4(1)	0	0	0

Table 2. Mean of *y* by regulator and industry

Industry	ACCC	Vic	NSW	QLD	WA	SA	ACT	
Electricity Transmission	.195							**.195**
Electricity Distribution		.146	.080	.017			.093	**.092**
Gas Distribution		.096	.115	.088	.054	.146	.137	**.103**
Gas Transmission	.139				.448			**.221**
Water			.041	-.040				**.022**
	.175	**.114**	**.080**	**.041**	**.317**	**.146**	**.115**	**.130**

Figure 1: Density estimate of y



There were five decisions which we hesitated to include either because the firm reported multiple claims and we were unsure which claim(s) formed the basis of the regulator's decision or because we had other doubts about the data quality. These decisions are: Gladstone Area Water Authority (QCA), TXU (Esc-Victoria), Australian Inland (IPART), Energex (QCA), and Ergon (QCA).[15] The estimation results presented below include these decisions (based upon our best guess of which revenue requirement claims to use). We also dropped these decisions and re-estimated our models, but none of the coefficients change sign or significance.

An additional peculiarity of the data is that there are no observations on *y* between .31 and .4. There are 20 observations above .4. They are generated by three projects[16] that created the bi-modality in the data as observed in Figure 1. We will later present hypothesis tests of our main hypothesis using only the state-regulation data from Gas Distribution, Water and Electricity Distribution (See Table 5). This effectively estimates the model only on a subset of the data in the first mode, which appears to be roughly normally distributed. It is worth noting that this does not affect our results.

To summarise, the results presented below include all the decisions from our database. If we omit any or all of the peculiar data, as described above, our estimates do not change in any significant way.

V. Results

We now present and discuss our initial results. The second column in Table 3 reports the results of estimating equation 2 by Ordinary Least Squares (OLS) regression. Note that water is the omitted industry dummy and the ACCC the omitted regulatory agency. Therefore, the coefficients on the variables have to be interpreted as relative to the omitted dummies. A positive coefficient implies a less favourable treatment of firms' claims vis-à-vis the omitted categories[17].

The third column of Table 3 corrects for the fact that our data consists of 254 observations from 52 different regulatory decisions and as such the individual observations are not independent. While the standard errors change by a factor of two or three in some cases, these do not generate any substantive differences in the significance of coefficients between the two columns.

Both regressions include time dummies. We group years 2009—2012 (5 observations on two projects) and use this as the omitted category. All of the time dummies for 1997 through 2008 are negative and significant. If we include separate time dummies for 2009, 2010, and 2011, they are—unsurprisingly—not significantly different from zero, further confirming our decision to group these dummies.

The results reported in Table 3 suggest that gas and electricity distribution are treated similarly despite being regulated by different regulators at the various states and territories. By the same token, gas and electricity transmission seem to be treated similarly. These three statements are confirmed by formal hypothesis tests.

Another striking feature of the results from Table 3 is the similarity between the coefficients of the various state and territory regulators. This suggests that despite the many differences in approaches to the regulation of gas and electricity distribution and water across states and territories, their behaviour might be nevertheless consistent with each other. Below we pursue this similarity more formally.

The clustered standard errors generally make the estimates for the dummy variables for state regulators and the gas industry more precise, while making the industry dummies for the electricity less precise. One could apply a formal diagnostic test to see if these standard errors are different from the OLS standard errors, but given the strong structure introduced by the repeated observations on decisions, we adopt the clustered standard errors in what follows.

Table 3. Coefficient estimates of 1.2

	OLS Regression	OLS Regression with clustered standard errors
Industry		
Electricity Transmission	.511** (.061)	.511** (.064)
Electricity Distribution	.067** (.026)	.067* (.029)
Gas Distribution	.076** (.028)	.076** (.030)
Gas Transmission	.471** (.057)	.471** (.031)
Regulatory Agency		
Victoria	.372** (.054)	.372** (.038)
NSW	.358**	.358**

	(.056)	(.036)
Queensland	.306** (.056)	.306** (.047)
Western Australia	.306** (.034)	.306** (.025)
South Australia	.395** (.070)	.395** (.024)
ACT	.366** (.057)	.366** (.034)
R-squared	50.5%	50.5%
Sample size	254	254

** Significant at 5% level

* Significant at 10% level

Finally, note that the positive coefficients on all dummy variables for state regulators would suggest that their decisions are less generous than that of the ACCC, the omitted variable. However, to understand this relationship one needs to take into account that the ACCC regulates gas and electricity transmission and the coefficients on these variables were substantially higher than the coefficients on the gas and electricity distribution variables. It is also important to note (see Table 1) that all electricity transmission decisions included in our database were taken by the ACCC whereas gas transmission decisions were taken both by the ACCC (six decisions) and the Western Australian regulator (two decisions).

(i) Testing regulatory consistency

Using the above regression results, it is straightforward to test whether the different state-based regulatory outcomes are consistent with one another. There are two ways in which we approach this question. The first is to consider pair-wise tests between the coefficients for the different state regulators. The second is to consider testing the equality of similar-appearing groups of states/territories.

In Table 4 we present the p-values from the tests of pair-wise comparisons across states and territories. The p-values tell us the exact size of the test of equality. The tests of Table 4 use the standard errors, which are corrected for clustering. We also present the p-value for the test of joint equality between South Australia, New South Wales, Victoria, and the ACT. We cannot reject the consistency of these four regulators. Nor can we reject the consistency between Queensland and Western Australia.

Table 4: Test of equality of state/territory coefficients

	VIC	**NSW**	**QLD**	**WA**	**SA**	**ACT**
VIC		.69	.13	.02**	.47	.84
NSW			.17	.07*	.20	.81
QLD				.99	.04**	.13
WA					.00**	.02**
SA						.26
Test of equality of SA, VIC, NSW and ACT						.55

p-values of test of coefficient equality
**different at the 5% level

The state-by-state comparisons also lend support to there being two groups—one formed of Queensland and Western Australia and the other by the remaining jurisdictions. When we use the standard errors from the standard OLS regression, we get a strong rejection of the equality of Queensland compared individually to New South Wales, Victoria, and the ACT. When we use the standard errors corrected for clustering we get p-values between .13 and .16. At the 10% level, if we applied a one-sided test that the Queensland is associated with a higher *y* than the ACT, South Australia, New South Wales, and Victorian regulators, we would conclude that this is indeed the case.

(ii) Diagnostic testing and robustness checks

As a diagnostic test, we consider the possibility that these results are sensitive to outliers. Recall that our hypothesis tests are essentially mean comparisons of different cells. In order to test the sensitivity to outliers, we re-estimate the model using quantile regression, which provides median comparisons of different cells. The coefficient values are slightly lower than in Table 3 (not surprising given the positive skewness in Figure 1) but the substantive results of the hypothesis tests of Table 4 are unchanged.

Western Australia is the only state that regulates gas transmission and it may be that the coefficient for Western Australia is heavily influenced by these observations. Therefore, to verify the validity of the above conclusions, we re-estimate the model using only the observations involving electricity and gas distribution and water. These are the main industries regulated by states (see Table 1) and the industries where for each industry there are at least two states involved in regulation.

In Table 5, we present the p-values from the tests of state-by-state equality and the grouped equality of South Australia, New South Wales, Victoria, and the ACT. (Regression results available from the authors.) Our tentative conclusions that Queensland and Western Australia are consistent with one another, but associated with lower *y*s than the other jurisdictions (who are consistent with one another) is sharpened.

The difficulty in assessing whether the ACCC is associated with higher or lower *y*s than the state regulator is the lack of overlap in the industries being regulated.[18] Holding year constant, electricity transmission regulated by ACCC has an average value of *y* predicted from the model of .405. (Without the constant and year effects, both of which are negative). Electricity distribution regulated by NSW has a predicted value of *y* of .332. The difference is significant, but we are econometrically unable to split the difference into that due to the regulator and that due to the fact that the industry being regulated is different.[19] The coefficients in Table 3, by omitting ACCC, attribute all of the difference to the industry and none to the regulator.

Table 5: Test of equality of state/territory coefficients
(Excluding gas transmission from industries considered)

	VIC	NSW	QLD	WA	SA	ACT
VIC		.90	.13	.01**	.56	.56
NSW			.099*	.02**	.42	.42
QLD				.90	.046**	.03**
WA					.00**	.00**
SA						.96
Test of equality of SA, VIC, NSW and ACT						.82

p-values of test of coefficient equality
**different at the 5% level

In Table 6, we present the polar opposite case, where all the difference is attributed to the regulator and none to the industry. We impose common coefficients on NSW, ACT, and Victoria (confirmed by a test of equality). That is, we estimate:

$$y_{irt} = \alpha + RD_r^{'}\beta + TD_t^{'}\delta + \varepsilon_{irt}, \qquad (3)$$

If we test the hypothesis of equality of the coefficient on the NSW/ACT/Victoria group against the ACCC, we reject the null in favour of the alternative that the ACCC is tougher at the 10% level (p-value is .07). Likewise the ACCC is tougher than Queensland. There appears to be no difference between the ACCC and South Australia, although it's notable that there are few observations for South Australia.

Table 6. Coefficient estimates of (1.3)

	OLS Regression with clustered standard errors
Regulatory Agency	
Victoria/ACT/ New South Wales (grouped)	-.065* (.036)
South Australia	-.019 (.030)
Western Australia	.152 (.116)
Queensland	-.125** (.047)

Both the ACCC and Western Australia appear tougher than the other states, although this may be driven by differences between the regulation of gas transmission (only done by Western Australia and the ACCC) and other industries. These differences are evident in the means presented in Table 2. Again, we have no statistical way of separating out these differences.

(iii) Private vs. Public Ownership

A common view is that privately owned firms might play the regulatory game more aggressively, by overstating their costs, than publicly owned companies. The underlying reason is that as shareholders individuals might be more profit-driven than the government. A contrary view suggests that private companies might actually be less capable of overstating their costs given that they are subjected to more public scrutiny (e.g., by their many shareholders) than their public counterparts.

To pursue this issue we split our sample according to the nature of ownership (public vs. private). Tables 7 and 8 summarise the data. There is a small difference between regulatory decisions across privately and publicly owned companies.

Table 7. Observations (decisions) by private/public and industry

	Regulator						
Industry	ACCC	Vic	NSW	QLD	WA	SA	ACT
Private	65 (11)	35 (7)	48 (12)	20 (4)	15(3)	0	20(4)
Public	12 (3)	20 (4)	9 (2)	6 (1)	0	4(1)	0

Table 8. Mean of y by regulator and private/public

Industry	ACCC	Vic	NSW	QLD	WA	SA	ACT	
Public	.131	.146	.097	.172		.146		**.137**
Private	.183	.096	.076	.001	.317		.115	**.128**
	.175	**.114**	**.080**	**.041**	**.317**	**.146**	**.115**	**.130**

To investigate whether this difference in the descriptive statistics has any effect on our substantive results or increases the explanatory power of our model, we re-estimate equations (2) and (3) incorporating this new categorical variable. The private variable is negative and significant in equation (2)—consistent with the lower *y* for privately owned firms in the descriptive statistics. Inclusion of the private variable only seems to affect the results for South Australia—principally by increasing the standard error on the coefficient. The significant differences between South Australia and Queensland and South Australia and Western Australia become marginally insignificant. However, we continue to find that South Australia can be grouped with Victoria, New South Wales and the ACT. In every other respect our substantive conclusions remain the same. In equation (3), the private variable is insignificant.

VI. Discussions and Conclusion

The issue of regulatory consistency — the notion that regulatory decisions should not favour particular industries or firms in particular jurisdictions—has been raised as one of the rationales for the establishment of the new Australian Energy Regulator. This is not surprising given the different approaches to the implementation of price regulation in electricity and gas distribution and transmission across jurisdictions. Similarly, a national water policy, involving possibly a more consistent regulatory framework across jurisdictions, is again a high priority in the political agenda.

In this paper we provide evidence that despite the differences in the implementation of price regulation across industries and across jurisdictions in Australia, there is a considerable degree of consistency in regulatory decisions as measured by the proportion of the firms' revenue requirement claims that were disallowed by the regulator when determining the maximum revenue. We discuss several points arising from our exploration.

Firstly, our results suggest that when we control for different regulators and different time periods, regulatory decisions are reasonably consistent across the electricity and gas distribution industries. The apparent lack of consistency between transmission and distribution has to be taken more cautiously given that the ACCC is the only regulator for electricity transmission in our sample and so it is impossible to statistically separate the regulator and industry effects.

Secondly, it is not possible to reject the hypothesis that the regulatory outcomes in South Australia, New South Wales, the ACT and Victoria are similar. We also provide evidence that the Queensland and Western Australia regulators are consistent with one another, but are associated with regulatory outcomes that seem tougher than those of the other state regulators. This empirical evidence highlights an important topic for further theoretical investigation: the mechanism by which this consistency in price regulation has been achieved. Furthermore, we find the nature of ownership of regulated companies does not affect the conclusions stated above. Private ownership has only a small negative effect on the percentage of cost claims that firms are allowed to recover and this effect is insignificant when we consider only the state-level regulators. This again has important theoretical implications as it suggests that models that rely on the nature of ownership to explain the behaviour of regulators and regulated firms might not be appropriate.

Finally, we would like to be able to assess how the regulatory decisions taken by the federal regulator, the ACCC, relate to those taken by the state regulators. The difficulty in conducting this assessment is the lack of overlap in the industries being regulated. We provide some lower and upper bounds that are consistent with both the notion that the ACCC is tougher and that it is less tough than state regulators.

The implicit assumption we make when interpreting our results is that any gaming behaviour by firms (in overstating their costs), which is attributable only to a particular industry, is captured by the industry-specific dummies. Regulator dummies likewise also capture any gaming behaviour specific to certain regulators. Thus, our interpretation remains valid in the presence of gaming behaviour, provided that this behaviour is roughly constant across one of our included categories.

It is our hope that the stylized facts we have presented here, which contribute to the on-going debate in Australia about regulation, will also stimulate further research on the determinants of regulatory decision-making and its application across different industries by different regulators.

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Endnotes

[1] See, for example, the recent review of Australian National Competition Policy (Productivity Commission, 2005) and the review of Australia's export infrastructure (Exports and Infrastructure Taskforce, 2005).

[2] The legislative instruments establishing independent regulatory agencies in the various jurisdictions often cite national and cross-jurisdiction regulatory consistency as explicit objectives.

[3] The recent review of the Australian Gas Access Regime (Productivity Commission, 2004b) provided an opportunity for an evaluation of regulatory outcomes.

[4] For example, the electricity industry, previously characterised by vertically integrated firms, was restructured and divided into generation, transmission, distribution and retail businesses. The natural monopoly elements of the industry, distribution and transmission, were subjected to price regulation and, in principle, the other two elements of the industry, generation and retail, were de-regulated with the requirement that generators sell and retailers buy their electricity through the electricity spot market (the pool). The practice, however, is more complex. Retail prices remain regulated despite introduction of full retail contestability in many jurisdictions. Similarly, there are services associated with the distribution of electricity (e.g., remote meter reading) that might not be natural monopolies. In the same vein, new (and existing) transmission links might not be natural monopolies in as much as they can compete with existing links.

[5] In this discussion we ignore service regulation—the requirement to provide minimum service standards.

[6] With the exception of some significant gas transmission pipelines inside the Western Australian state boundary and electricity transmission in Western Australia and the Northern Territory.

[7] NECG (2003) compares rates of return in regulatory decisions in Australia and overseas.

[8] To illustrate how these mechanisms work, consider a five-year regulatory period. In many jurisdictions, if a firm spends less than its allowable efficient costs say in the fourth year of the regulatory period, then the firm can retain the additional profits for only one more year, with the new prices being set at the lower efficient cost. This of course might lead a firm to postpone process innovations that reduce costs until the beginning of the new regulatory period. An efficiency carryover mechanism instead allows the firm to carry over the cost savings for the next five years.

[9] In practice it is possible to observe $y_t < 0$. This can be the result, for example, of the regulator allowing the firm to anticipate to period *t* certain expenses that would be incurred at a later date.

[10] $y_t = 0.5$ indicates that for this particular year and this particular decision, the firm was allowed to recover fifty per cent of the costs it claimed. Similarly, $y_t = 0.3$ indicates that for this particular year and this particular decision, the firm was allowed to recover seventy per cent of the costs it claimed.

11 Those decisions that are made on a calendar year basis are presented as the earliest financial year that corresponds to the calendar year to provide simplicity.

[12] In most cases the business proposed revenue requirement and the regulators maximum allowable revenue determination were found in the regulator's Final Decision report for that business or industry. In some instances the businesses proposed revenue requirements were not available in the Final Decision. When this was the case, the business's initial submission was used to obtain the data.

[13] The database and the STATA code for reproducing the results are available at www.acore.org.au. Full regression results from section 5.3 can be reproduced using this code and are available from the authors.

[14] This graph is available from the authors. In the regressions where we include time dummies, discussed below, we find a small negative effect for observations early in the sample period.

[15] In the Energex and Ergon decisions, there were several different proposals by the firm. In the case of the other three decisions, we have an anomalous situation where the sum of the maximum allowable revenue over the entire regulatory period exceeds the firm's claims. There are possible explanations for this. For example, it is possible that demand might have been underestimated in the original firm's submission and that the regulator's decision process revealed this.

[16] MTC (Electricity Transmission, ACCC, October 2003); Goldfield Gas Pipeline (Gas Transmission, Offgar, April 2001); and Dampier to Bunbury (Gas Transmission, Offgar, May 2003).

[17] While changing the omitted categories will change the estimated coefficient values and may change the individual significance of the coefficients, the hypothesis tests of Tables 4 and 5 and the discussion of predicted values below are invariant to changing the omitted categories.

[18] The significant, positive coefficients on the state regulators in table 3 indicate that the ACCC is less tough than the state regulators. But the large significant coefficients on gas and electricity transmission

(mostly regulated by ACCC in the case of the former and only by ACCC in the case of the latter) may be interpreted to mean that the ACCC is tougher.

[19] There are no examples of state-regulated electricity transmission (or ACCC regulated electricity or gas distribution or water) that would allow us to split this difference into these two pieces.