Review of REVENUE FORECASTING

March 2006

Department of Treasury and Finance
Government of Western Australia

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Summary of Acronyms

BSC	=	Budget Steering Committee
DOIR	=	Department of Industry and Resources
DTF	=	Department of Treasury and Finance
EBU	=	Economic Business Unit
ERC	=	Expenditure Review Committee
OSR	=	Office of State Revenue
SFD	=	State Final Demand

Introduction

Background to the Review

The Review of Revenue Forecasting was undertaken by the Department of Treasury and Finance's (DTF's) Revenue and Intergovernmental Relations Division.

The purpose of the review was to examine past forecasting performance and the scope for improvement following a period of substantial under-estimation of Western Australia's budget revenues. The original Terms of Reference for the Review are appended, and extend beyond the methodological aspects of forecasting to resourcing, governance and communication processes.[1]

The Review process was broadly consistent with Government Guidelines for Public Sector Reviews and Evaluations issued in December 2005 (notwithstanding that the Review had been largely completed by then). Although initiated and conducted mainly 'in-house', the review process was vetted by the DTF's Internal Audit Branch and included extensive stakeholder consultation and peer and external review.

Stakeholders consulted as part of the Review included staff from the Office of the Premier and the Office of the Treasurer, the Under Treasurer, Executive Director (Economic), Acting Executive Director (Finance), the Office of State Revenue Executive, officers from the Department of Industry and Resources and staff within the Economic and Finance business units.

The peer reviewers were the Victorian, Queensland and Commonwealth Treasuries.[2] BDO Consultants (WA) Pty Ltd was also engaged to provide external review of the draft report. Their extremely valuable input is gratefully acknowledged.

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1 Although a good deal of overlap between these aspects of revenue forecasting emerged during the course of the Review.

2 The choice of the three peer review jurisdictions reflected the unique perspectives that each would be able to bring to bear – one with an economy quite different to Western Australia's (Victoria), another with an economy with some similarities to Western Australia (Queensland) and the other offering a different perspective in terms of the different nature of the revenue bases required to be forecast but common issues involved (Commonwealth).

A number of the Review's recommendations have already been implemented, and influenced the revenue forecasts in the 2005-06 Mid-year Financial Projections Statement. Other recommendations, including those involving additional research, will be implemented over time. Where significant methodology changes are involved, implementation will generally only occur once the relative performance of new methodologies has been rigorously assessed.

Context of the Revenue Forecasts

In the context of overall State budget management, the revenue forecasts provide crucial information to support Government decisions on sustainable policy settings and new policy initiatives.

Revenues are inherently more variable and less within the Government's control than expenses. It is likely that this is especially so in Western Australia because of the export and resource orientation of the State's economy and its associated exposure to volatile commodity prices.

Even relatively small percentage errors in the revenue forecasts can have a large impact on budget surpluses (a key source of infrastructure funding). State debt can quickly spiral if surpluses are eroded, making it difficult for the State to meet its fiscal targets, and thereby retain its AAA credit rating status.

Accordingly, 'best practice' forecasting methods and processes, including to cater for risks, are considered to be of the utmost priority.

Executive Summary

Track Record

Stage one of the Review involved an examination of Western Australia's revenue forecasting performance, both over time and relative to other States (although limited in the latter case to the last five years).

A consistent pattern of under-estimation of revenues was evident. However, the degree of under-estimation increased markedly in 2003-04 and 2004-05 (and was large by any standards in those years) as growth in the Western Australian economy generally, and in the resources sector and property market in particular, gathered pace (significantly exceeding economic growth forecasts).

The largest forecasting variances were for property market stamp duties (reflecting the failure of forecast 'turning points' to materialise), GST revenue grants (reflecting under-estimation by the Commonwealth and lags in receiving updated Commonwealth estimates), and mining royalties (reflecting large, unforeseen growth in the oil price and other commodity prices).

Over the five-year period, similarly large budget forecasting variances were experienced in all States, with these appearing to be greatest at the peak of the property market cycle in each State. There was some evidence that Western Australia was a little slower than other States to respond to under-estimation of revenues in updating its forecasts during the budget year.

Data and resource constraints inhibited benchmarking against other States over a longer period, or against private sector forecasters. A longer term time series for Western Australia (appended) shows a significant bias towards (but not an exclusive record of) under-estimation.

Forecasting Processes, Issues & Improvements

While no panaceas were identified, reflecting the inherent difficulty of predicting future economic activity and other revenue base 'drivers', significant improvements in the forecasts should be possible over time through:

- increased consultation on the forecasts and/or revenue base drivers both within the Department and with external 'experts';
- adopting a more systematic, robust approach to identifying and modelling long term 'drivers' of revenue growth (including increased integration of the revenue forecasts with the economic forecasts);
- improving the detail, user-friendliness and timeliness of documentation of the forecasting assumptions, risk factors (noting any risks that the approved forecasts assume will crystallise), and scenarios;
- an ongoing program of research on specific forecasting issues;
- clearer identification of roles and responsibilities in the forecasting process;
- enhanced prioritisation and resourcing of the forecasting function, including quality assurance;
- a continuous program of monitoring, review and refinement of forecasting methods and processes;
- improved 'knowledge management', including maintenance and updating of databases and documentation of forecasting methods and processes for ready access by staff involved in forecasting activities; and
- disseminating information on when key forecasting 'events' would occur during the year, and apprising key stakeholders in a more timely fashion of emerging variances from, or risks to, the existing forecasts.

One 'rules-based' change to forecasting methods proposed in this report that will have a direct impact on the revenue estimates is the adoption, from the time of the 2006-07 Budget, of futures market prices for the oil price estimates.

The recommendations in the report recognise that there are differences in circumstances in Western Australia compared to other jurisdictions, and dangers in switching to new methods or processes without thorough prior evaluation.

Summary of Recommendations

Methodology

1. *For the largest and most volatile revenue sources, namely stamp duty on property conveyances and mining royalties, more regular formal consultation should be held with external experts. More specifically, revenue monitoring and forecasting staff should meet twice-yearly with:*

    - *property and finance industry representatives on the outlook for Western Australia's property market, timed to be approximately mid-way between (and supplementary to) the existing Economic Consultative Group meetings (a twice yearly consultation exercise with representatives from across industry); and*

    - *senior officers of the Department of Industry and Resources (DOIR), together with representatives from selected mining companies, on the outlook for the resources sector and to agree on proposed mining projects that are sufficiently committed to include in the estimates (e.g. following DOIR's twice yearly survey of mining company expectations).*

2. *An updated historical analysis of the correlation between movements in key economic indicators and growth in State taxes should be conducted as soon as possible, to test the ongoing validity of the currently assumed linkages in the forward estimates, and to help identify any indicators that correlate better to State tax growth.*

3. *For the 2006-07 Budget, progressivity factors (in addition to the current economic growth factors) should be introduced into the forecasts of growth in State taxes with sliding tax scales, particularly payroll tax and conveyance duty (to the extent that payrolls and property price growth is forecast).*

4. *Over the next two years, taxation forecasting models should be progressively reviewed, with the aim of trialling new methods for producing 'baseline' forecasts that (to the extent practicable):*

    - *forecast the price and volume components of tax bases separately and incorporate a value distribution for the tax bases (to model tax bases and the impact of progressive tax scales more robustly);*
    - *incorporate a more robust and transparent basis for informing the revenue forecasts with the economic forecasts (using statistical/econometric techniques);*
    - *especially for volatile tax bases, separately identify the transient/cyclical and longer-run components (again using statistical/econometric techniques); and*
    - *incorporate a global/top-down tax forecasting approach (based on economy-wide performance) as a cross-check against the aggregation of individual tax forecasts.*

    The baseline forecasts will be supplemented by other analysis (e.g. examination of recent trends and contextual information) to inform any judgement-based adjustments that may be necessary.

5. *Taxation forecasting models (including assumed linkages with economic indicators) should be reviewed at least every three years (on a staged basis to smooth resource requirements), and refined and recalibrated in light of actual forecasting performance.*

6. *An Office of State Revenue (OSR) data extraction analyst should be engaged for up to 12 months to explore and establish processes for providing additional data for estimating the impact of policy changes on State tax revenues, and for monitoring and forecasting State tax revenues more generally. This will require additional resourcing for the OSR.*

    - *In addition, the potential for further data provision from State agencies (e.g. the Valuer General's Office) to assist with the forecasting of tax revenues should be explored (particularly to support the new methods described in Recommendation 4), and processes established to access such data.*

7. *The preparation of States' forecasts of national GST revenue should be supported, together with monitoring the track record of these estimates as a potential alternative to the Commonwealth's earlier Mid-year Economic and Fiscal Outlook estimates, for State budget purposes. Western Australia should also monitor monthly GST collections on an integrated basis with State tax collections.*

8. *There should be continued research to improve the modelling of Western Australia's GST share in the out-years. This could include refining the existing approach to include a larger number of factors and developments (e.g. property market activity) in each State. An alternative approach based on States' relative aggregate economic performance should also be further explored.*

9. *Futures market prices should be adopted for the oil price assumptions in the 'base-line' petroleum revenue estimates, from the time of the 2006-07 Budget.*

   - *There should also be continued research on price forecasting methods for oil and other commodities (particularly iron ore) where forecast uncertainty is high and the potential impact on revenue estimates is significant.*

10. *Requests for modelling of variations to key royalty forecasting parameters, and advice of revised royalties forecasting assumptions, should be communicated between the DTF and DOIR in writing at Director level.*

Resourcing

11. *The structure and resourcing of forecasting activity should be reviewed, and resourcing increased, for compatibility with the importance placed on it by key stakeholders. It should allow for an ongoing programme of research on key forecasting issues, ensure that succession and skills/knowledge transfer arrangements are in place for staff involved in forecasting, and ensure that the governance enhancements and other recommendations in this report can be implemented.*

Governance

12. *Roles, responsibilities and reporting relationships for revenue forecasting and monitoring within the DTF and among agencies should be formalised, along with a hierarchical review process within each area with forecasting responsibilities.*

    - *Formalisation of roles and responsibilities should also extend to other agencies involved in the forecasting process (eg. government agencies providing estimates for individual taxes, mining royalties, specific purposes payments and revenue from the sale of goods and services).*

13. *A cross-DTF forum for monitoring and sharing information on revenue forecasting research and revenue trends should be established, including representation from the OSR.*

14. *A DTF-wide review panel should be established to assess the consistency of the assumptions used in the Department's forecasts (including the expense forecasts).*

15. *The economic and revenue forecasting areas in the DTF should remain separate (recognising the synergies between revenue forecasting and revenue policy work), but work cooperatively to utilise skills and resources that could benefit both areas.*

16. *Where forecasts are prepared by other agencies (including public corporations), the DTF's accountability for the overall integrity of the revenue forecasts should be explicitly recognised. In this regard, the DTF should also enhance its quality assurance of external inputs into the budget revenue estimates, including:*

    - *public corporations' estimates of payments to the State (including through increased consultation with forecasting officers in the corporations and testing of assumptions against industry body expectations);*
    - *State Government agency estimates of specific purpose payments (including by reconciling against Commonwealth estimates);*
    - *State Government agency estimates of revenue from the sale of goods and services; and*
    - *the mining revenue forecasts, such as through increased officer level consultation on forecasting issues and Ministerial level discussions on DOIR's resourcing priorities (while recognising that this has not been a major source of forecasting error to date).*

17. *While recognising the synergies in the current arrangements, in view of DTF's overall accountability for the budget estimates and the increasingly large budget impact of mining royalties, the pending functional review of the DOIR should consider where the royalty forecasting function best sits.*

18. *Revenue forecast justification papers (covering taxes, mining revenues, GST revenues and public corporations revenues) should be prepared for the Budget Steering Committee (BSC) for the Budget and mid-year review well in advance of the final cut-off date for revenue estimates, focussing on:*

    - *key assumptions, methods, data sources and contextual considerations that are proposed for the revenue forecasts;*
    - *revenue heads where uncertainty is greatest and the largest forecasting errors have previously occurred;*
    - *the 'most likely outcome' revenue forecasts, based on available data at the time of the paper's preparation; and*
    - *identification and quantification of risks and scenarios.*

On an exceptions basis, further papers should be prepared and circulated a week in advance of BSC meetings, incorporating any new data or other information requiring revisions to the estimates or identified risks. The forecasting process would remain independent of government, but communication with government would be enhanced.

19. *The timing of the economic forecasts, and internal Divisional deadlines for forecasting activities generally, need to be sensitive to the deadlines for the justification papers (and related papers), leaving sufficient time for quality assurance processes (but without compromising the capacity to incorporate the latest available data).*

20. *The preparation of revenue forecasts should be predicated on the assumption that risks to the budget bottom-line are best managed by Government budgeting for higher surpluses, rather than through conservative revenue estimates.*

21. *The Director, Revenue and Intergovernmental Relations, and/or other officers with primary accountability for the revenue forecasts, should attend BSC meetings when the justification papers or proposed forecast revisions are being considered, to provide any additional explanation or support that may be required (and to receive feedback on BSC's needs).*

22. *Decisions by BSC to vary any of the justification paper proposals, or revenue forecasts generally, should be documented. Papers provided to BSC would note the impact of past BSC decisions.*

23. *Revenue forecasting should be a DTF Outcome Based Management output, with associated performance targets and reporting.*

24. *Revenue forecasting models, model reviews and model changes should be fully documented, and databases holding the data used in the estimates and details of actual forecasting performance should be fit for purpose and maintained and updated regularly.*

25. *A detailed variance report on actual collections versus budget estimates should be prepared immediately after the final collections for the preceding financial year become known, highlighting any issues/lessons for future forecasting practices.*

Communication

26. *Timely advice that includes the 'story' underlying the revenue forecasts, and risk scenarios, should be provided to the Treasurer in advance of ERC deliberations.*

27. *To help provide early warning of any emerging revenue variances and reduce the potential for 'surprises':*

    - *a calendar of key forecasting events should be circulated to keep stakeholders informed of forthcoming significant forecasting points; and*

- *a 'risk log' of actual and potential developments in revenues should be maintained by the DTF for use in the regular meetings with the Treasurer and Treasurer's Office.*

Implementation of Recommendations

28. *Action plans should be developed for each recommendation in this report as appropriate, and incorporated in the Individual Performance Plans (part of the DTF's Performance Management System) of staff involved in forecasting activities.*

29. *The implementation and effectiveness of the recommendations of this Review should be reviewed in two years time.*

Forecasting Track Record

General Government Operating Revenue

The following table shows Western Australia's budget revenue forecast errors over the period 2000-01 to 2004-05. There was a marked deterioration in 2003-04 and 2004-05, as the State economy and property market gathered strength.

Table 1

BUDGET FORECASTING ERROR – TOTAL OPERATING REVENUE – WESTERN AUSTRALIA

	2000-01	2001-02	2002-03	2003-04	2004-05	Average
Percentage Errors (Actual vs Budget)						
Taxation	6.9	6.1	6.1	16.3	15.4	10.1
Current Grants and Subsidies[1]	0.5	6.1	3.8	3.8	6.8	4.2
Capital Grants	1.4	-6.3	-1.7	6.1	-5.4	-1.2
Sales of Goods and Services	13.2	3.5	9.0	1.3	9.6	7.3
Interest Income	65.8	-10.3	-1.8	34.7	20.3	21.8
Revenue from Public Corporations	13.3	-1.8	3.6	15.4	15.9	9.4
Mining Royalties (including NWS payments)	37.7	-5.0	14.5	1.2	26.2	14.9
Other Revenue	-8.2	17.4	8.3	15.7	24.3	11.5
Total Operating Revenue	**7.7**	**2.9**	**5.7**	**8.3**	**11.8**	**7.3**
Contribution to Operating Revenue Forecast Error (percentage points)						
Taxation	1.9	1.5	1.7	4.9	4.5	2.9
Current Grants and Subsidies	0.2	1.6	1.6	1.6	3.0	1.6
Capital Grants	0.0	-0.2	0.0	0.1	-0.2	0.0
Sales of Goods and Services	1.0	0.3	0.7	0.1	0.7	0.6
Interest Income	0.6	-0.1	0.0	0.3	0.2	0.2
Revenue from Public Corporations	0.9	-0.1	0.2	0.9	0.8	0.5
Mining Royalties (including NWS payments)	3.2	-0.5	1.3	0.1	2.2	1.3
Other Revenue	-0.2	0.3	0.2	0.3	0.6	0.2
Total Operating Revenue	**7.7**	**2.9**	**5.7**	**8.3**	**11.8**	**7.3**

1. Current grants and subsidies excludes North West Shelf (NWS) petroleum royalty payments received from the Commonwealth as a grant. These payments are included in mining royalties.

In terms of the impact on total operating revenue forecasts, the under-estimation of State taxation revenues over the period considered is the most conspicuous feature of the data. Forecast errors for Commonwealth grants and mining royalties also had a significant impact. Collectively, these three revenue heads contributed between seventy and ninety per cent of the operating revenue forecast error in each year.

In the following sections, Western Australia's performance is compared with the other States.[3] Further detail on the relative forecasting performance of the States is provided in Appendix A, while Appendix B shows Western Australia's budget forecasting errors for some key revenue aggregates over a longer (18 year) period (on a cash basis and reflecting the budget definitions used in each year).

Taxation Revenue

The following table compares average forecast errors by State over the period 2000-01 to 2004-05.

Table 2

BUDGET FORECASTING ERROR – TAXATION – INTERSTATE COMPARISON

Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Taxation Revenue	10.1	6.7	6.8	10.4	9.9	13.2	9.5
Conveyance Duty	32.4	28.3	31.4	36.3	57.1	60.7	41.0
Taxation Revenue net of:							
– Conveyance Duty	4.2	2.9	2.0	4.5	2.5	7.1	3.8
– Conveyance Duty and Gambling Taxes	4.2	3.1	3.6	4.7	4.8	7.8	4.7

Western Australia's performance is comparable with that of other jurisdictions over this period, particularly when less volatile gambling taxes, which represent a larger proportion of other jurisdictions' total taxation revenues, are omitted from the analysis. The main source of forecast error for all jurisdictions is conveyance duty, and no State has an enviable forecasting record for this tax.

[3] Where possible, estimates and actual out-turns are taken from GFS general government operating revenue statistics reported in State budgets, mid-year reviews, and annual financial reports. However, due to differences in the reporting of some revenue categories across States it has been necessary to occasionally use information from other sources. All averages in the following tables are absolute averages (i.e. whether an over or underestimate occurred does not effect the average).

Year-by-year comparisons (presented in Appendix A) show that the conveyance duty forecast error, and therefore total taxation revenue forecast error, fell in 2004-05 for most States other than Western Australia. Smaller forecast errors in most jurisdictions were largely due to the slow-down in Eastern States property markets. In New South Wales, conveyance duty (including vendor transfer duty) was around 15% **lower** than the 2004-05 Budget estimate (a turn-around from the 16% under-estimation in 2003-04).

While Western Australia has a comparable forecasting record to other States for the original Budget estimates of taxation revenue, its relative performance deteriorates for both the mid-year review revised forecasts and the estimated out-turn for the year.[4] However, some other jurisdictions have later publication dates for their mid-year review and estimated out-turn, and therefore additional information on which to base their updated forecasts for the budget year.

Table 3

FORECASTING ERROR IN UPDATED ESTIMATES – TAXATION – INTERSTATE COMPARISON

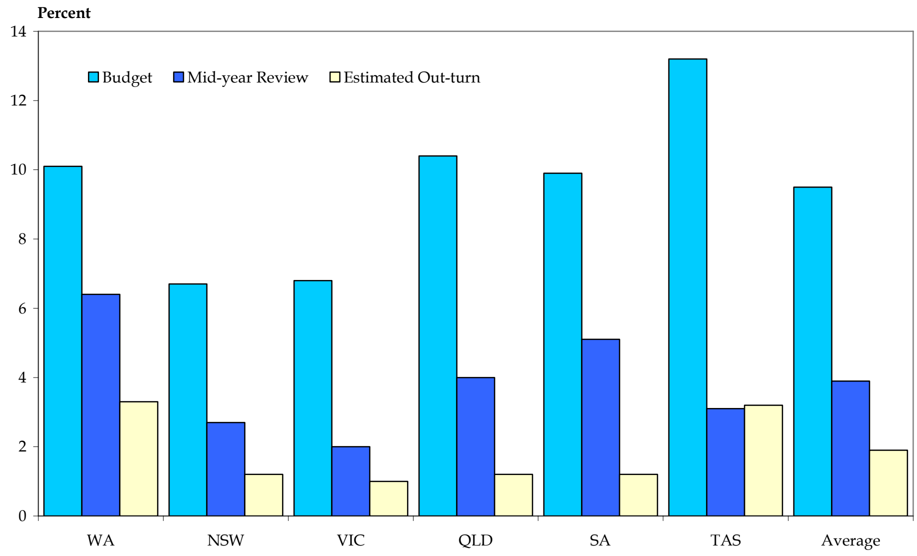
Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Mid-year Review	6.4	2.7	2.0	4.0	5.1	3.1	3.9
Estimated Out-turn	3.3	1.2	1.0	1.2	1.3	3.2	1.9

The budget, mid-year and estimated out-turn tax revenue forecasting performance of the States is summarised in the following chart.

4 The estimated out-turn is published in the budget papers for the following year.

Chart 1

AVERAGE TAXATION REVENUE FORECAST ERRORS – 2000-01 TO 2004-05



Commonwealth Grants

The following table compares average budget forecast errors over the period 2000-01 to 2004-05 for estimates of current grants and subsidies received from the Commonwealth (including GST grants).[5]

Table 4

BUDGET FORECASTING ERROR – GRANTS – INTERSTATE COMPARISON

Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Current Grants and Subsidies	4.2	3.7	3.0	5.4	4.3	5.0	4.3
GST Revenue & BBA	2.4	2.5	2.2	3.4	2.2	3.7	2.7

5 Current grants and subsidies from the Commonwealth are comprised of GST revenue, budget balancing assistance (payable mainly in the early years of the GST funding arrangements), National Competition Policy (NCP) payments and specific purpose payments.

Budget balancing assistance (BBA) and GST grants are considered together, as the level of budget balancing assistance is directly (and negatively) correlated with the level of GST grants for each State.[6] Forecast errors are similar across States, in part reflecting the common reliance on Commonwealth forecasts of GST revenues.

The following table compares the average forecast errors for mid-year review and estimated out-turn estimates of current grants and subsidies for the current year.

Table 5

FORECASTING ERROR IN UPDATED ESTIMATES – GRANTS - INTERSTATE COMPARISON

Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Mid-year Review	2.2	1.0	2.1	2.9	2.4	7.9	3.1
Estimated Out-turn	2.2	1.3	0.9	0.6	0.5	2.5	1.3

Notably, both New South Wales and Queensland tended to release their Budgets well after the release of the Commonwealth budget. This enabled them to use much more up to date Commonwealth estimates of grants.

Mining Royalties

The following table compares average mining royalty budget, mid-year review, and estimated out-turn forecast errors across jurisdictions over the period 2000-01 to 2004-05. Western Australia's average budget forecast error (16.9%) is moderately higher than the average of other States (14.3%), most of which have much smaller resource revenue bases.

[6] In general, where BBA is paid, the combined level of BBA and GST grants is based on the net estimated revenues forgone by States under the GST funding arrangements.

Table 6

BUDGET FORECASTING ERROR – MINING ROYALTIES – INTERSTATE COMPARISON

Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Budget	16.9	9.1	12.9	14.4	13.7	21.3	14.7
Mid-year Review	6.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Estimated Out-turn	1.2	5.3	16.2	2.7	n.a.	n.a.	6.3

Revenue From Public Corporations

Company tax and local government rate equivalents are paid to the State by public corporations such as Western Power, the Water Corporation and the port authorities to ensure competitive neutrality with private sector businesses. These corporations also pay dividends to the State in the same way as private corporations pay dividends to their shareholders.

The following table compares average budget and updated forecast errors for dividend revenue and tax equivalent payment estimates over the period 2000-01 to 2004-05.

Table 7

BUDGET FORECASTING ERROR – PUBLIC CORP REVENUES – INTERSTATE COMPARISON

Average 2000-01 to 2004-05	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
Budget	10.0	5.3	29.9	14.6	15.0	10.5	11.4
Mid-year Review	6.7	6.0	n.a.	n.a.	n.a.	1.7	4.8
Estimated Out-turn	5.0	5.7	7.5	11.3	n.a.	n.a.	7.4

Western Australia's average budget forecast error is below the average of other States. However, it is difficult to draw conclusions as other jurisdictions' public corporations have a different mix of activities and dividend payout rates, and because actual dividend payouts potentially reflect policy decisions made only during the forecast year.

Analysis of Reasons for Forecasting Variances in 2003-04 and 2004-05

This section of the Review provides further details and analysis of Western Australia's forecasting performance in 2003-04 and 2004-05, focusing especially on the reasons behind the particularly large variances that occurred in those years.

General Government Operating Revenue

There was a general pattern of substantial under-estimation of general government operating revenues in 2003-04 and 2004-05, with State taxation being the largest source of variance followed by Commonwealth grants, mining royalties (in 2004-05) and revenue from public corporations.

Table 8

UNDER-ESTIMATION OF GENERAL GOVERNMENT OPERATING REVENUE

	Budget $m (%)	Mid-year Revision $m (%)	Estimated Out-turn $m (%)
2003-04			
Taxation	579 (16.3)	294 (7.7)	238 (6.1)
Current Grants and Subsidies[a]	189 (3.8)	126 (2.5)	145 (2.9)
Revenue from Public Corporations	101 (15.4)	81 (12.0)	76 (11.1)
Mining Royalties[b]	12 (1.2)	54 (5.6)	9 (0.9)
Other	98 (6.4)	149 (10.0)	29 (1.8)
Total	980 (8.3)	704 (5.8)	487 (4.0)
2004-05			
Taxation	575 (15.4)	422 (10.8)	184 (4.5)
Current Grants and Subsidies[a]	380 (6.8)	146 (2.5)	106 (1.8)
Revenue from Public Corporations	104 (15.9)	65 (9.4)	63 (9.0)
Mining Royalties[b]	281 (26.2)	62 (4.8)	28 (2.1)
Other	164 (9.8)	60 (3.4)	53 (3.0)
Total	1,503 (11.8)	755 (5.6)	434 (3.1)

a. Excluding North West Shelf petroleum royalties.

b. Including North West Shelf petroleum royalties.

Taxation Revenue

The following table shows the variance between forecasts and actual out-turns for each head of tax for which there was a significant error. It is noticeable that forecast errors were largely due to the under-estimation of conveyance duty. The analysis indicates that errors in forecasting year-on-year growth were typically compounded by under-estimates of the previous year's actual out-turns at the time the budget estimates were finalised.

Table 9

UNDER-ESTIMATION OF TAXATION REVENUE

	Budget $m (%)	Mid-year Revision $m (%)	Estimated Out-turn $m (%)
2003-04			
Payroll Tax	79 (7.5)	37 (3.4)	11 (1.0)
Conveyance Duty	365 (43.3)	145 (13.7)	115 (10.5)
Motor Vehicle Duty	43 (18.7)	32 (13.3)	32 (13.3)
Mortgage Duty	20 (21.1)	13 (12.7)	8 (7.5)
Other[a]	72 (5.5)	67 (5.1)	72 (5.5)
Total	579 (16.3)	294 (7.7)	238 (4.0)
2004-05			
Payroll Tax[b]	66 (5.5)	28 (2.4)	9 (0.7)
Conveyance Duty[c]	436 (51.5)	251 (26.0)	108 (9.7)
Motor Vehicle Duty	55 (21.7)	45 (17.0)	15 (4.8)
Mortgage Duty	45 (47.4)	31 (28.4)	19 (15.7)
Other	95 (7.1)	67 (4.9)	33 (2.4)
Total[d]	696 (18.6)	422 (10.8)	184 (4.5)

a. Includes taxes forecast by other agencies (eg. motor vehicle licence fees, racing and gaming taxes, and the Emergency Services Levy).

b. The budget error abstracts from a $57 million policy change during 2004-05.

c. The budget error abstracts from a $64 million policy change during 2004-05.

d. The budget error abstracts from a $121 million policy change during 2004-05

Payroll Tax

While the reasons for the payroll tax budget forecasting errors are not fully understood, the following contributory factors have been identified.

- Under-estimation in the Budget economic forecasts of the combined level of wages and employment growth, compared with actual outcomes (see also later in this section).
- Growth in the payroll tax base as smaller employers' wage bills crossed the exemption threshold, and the increase in the average payroll tax rate for other employees as payrolls increased (i.e. bracket creep).
- Employment growth during 2003-04 (but not 2004-05) being concentrated in industries with a higher propensity to pay payroll tax (reflecting the average size of payrolls in these industries).
- Growth in compliance related payroll tax revenue in 2003-04.

Conveyance Duty

The budget estimates for conveyance duty assumed reductions in property market activity relative to the then estimated out-turns for the previous year. The budget forecasting errors reflected:

- substantial under-estimation of conveyance duty out-turns for the previous year (used as the base for the budget year);
- much stronger than forecast property market activity;
- bracket creep impacts from rising prices; and
- higher than expected revenue from large, one-off commercial conveyances (including $80 million from the sale of the Dampier-Bunbury gas pipeline in 2004-05).

Motor Vehicle Stamp Duty

The budget estimates for motor vehicle stamp duty assumed low growth (2-3%) in motor vehicle sales. In fact, sales grew strongly in both years. Other factors contributing to the budget errors were:

- for the 2004-05 budget, the underestimation of the previous year's out-turn (used as the base for estimating 2004-05); and
- lack of allowance for the steeply progressive stamp duty rate scale (relevant in the event of either price increases or a shift in the overall sales distribution towards higher value vehicles).

Mortgage Duty

Mortgage duty revenue moves closely with conveyance duty revenue due to the shared property market drivers. Hence the failure of the anticipated slow-downs in property market activity in 2003-04 and 2004-05 to materialise also led to mortgage duty collections exceeding the Budget estimates.

Economic Growth Forecasts

As will be highlighted in the section on Forecasting Process and Issues, the taxation forecasts currently depend to a significant extent on forecast growth in key economic indicators. Errors in either the assumed linkages between these economic indicators and the taxation revenue bases, or in the actual versus forecast growth in the economic indicators, is a general source of variance for the taxation estimates.

Table 10

PERFORMANCE OF ECONOMIC INDICATOR PERCENTAGE GROWTH ESTIMATES

	2000-01	2001-02	2002-03	2003-04	2004-05
State final demand					
Budget (nominal)	5.0	7.25	5.5	6.5	4.5
Actual (nominal)	3.4	7.3	8.7	9.5	9.1
Difference (percentage points)	-1.6	0.05	3.2	3.0	4.6
Employment					
Budget	2.5	1.25	2.25	2.25	2.25
Actual	1.6	1.1	2.5	1.7	4.2
Difference (percentage points)	-0.9	-0.15	0.25	-0.55	1.95
Wages					
Budget	3.5	4.75	3.5	4.0	3.75
Actual	6.5	5.2	4.8	5.9	5.7
Difference (percentage points)	3.0	0.5	1.3	1.9	2.0

The table highlights that wages and economic growth (as measured by State Final Demand (SFD)), substantially exceeded budget expectations in recent years, contributing to the forecast errors for payroll tax and stamp duties in particular (although it should be noted that underlying growth in stamp duty revenue has significantly outpaced even actual growth in SFD, in most cases).

Commonwealth Grants

The following table summarises the errors in the forecasts of Commonwealth grants.

Table 11

UNDER-ESTIMATION OF CURRENT GRANTS AND SUBSIDIES

	Budget $m (%)	Mid-Year Revision $m (%)	Estimated Out-turn $m (%)
2003-04			
GST Revenue	212 (7.2)	76 (2.6)	78 (2.6)
Budget Balancing Assistance	-61 (100.0)	0	0
Competition Payments	-41 (-54.7)	0 (0)	0 (0)
Specific Purpose Payments	75 (3.8)	49 (2.5)	55 (2.8)
Total	185 (3.8)	125 (2.5)	133 (2.6)
2004-05			
GST Revenue	150 (4.3)	7 (0.2)	7 (0.2)
Budget Balancing Assistance	0	0	0
Competition Payments	19 (55.9)	19 (55.9)	0 (0)
Specific Purpose Payments	211 (10.3)	122 (5.9)	100 (4.9)
Total	380 (6.8)	146 (2.6)	106 (1.9)

GST revenue

Western Australia's estimates were based on the latest Commonwealth published estimates of national GST collections (in its Budget or Mid-Year Economic and Fiscal Outlook) at the time the State estimates were finalised.[7] These estimates often significantly under-stated actual collections.

Budget balancing assistance (BBA)

The higher than forecast GST revenues for 2003-04 resulted in no BBA being paid to Western Australia in 2003-04 (BBA was the 'top up' assistance required to help ensure that States were no worse off under the GST Agreement with the Commonwealth).

National Competition Policy (NCP) payments

The $41 million budget over-estimate for 2003-04 was due to the Federal Treasurer's announcement in December 2003 of the first payment penalties to be imposed on Western Australia since NCP payments began in 1997-98.

[7] The State budget estimates were based on the Commonwealth's Mid-Year Economic and Fiscal Outlook, while the State mid-year revisions were based on the Commonwealth's Budget.

By contrast, the 2004-05 budget under-estimate largely reflects the recoupment of some of the penalties applied in 2003-04.

Specific Purpose Payments (SPPs)

Budget estimates are obtained from the relevant agencies, and typically understate actual revenues. SPP data are collated outside the Department of Treasury and Finance. While outside the original terms of reference for this review, it was decided during the course of the review that DTF would explore options for addressing the under-estimation of SPPs (which has averaged $130 million per annum over the last four years).

Changing the way in which SPPs are estimated will also impact on the consolidated expense estimates, as when agencies spend or on-pass SPPs received from the Commonwealth it is shown as an expense in their financial statements.

Mining Royalties

Mining royalties in 2003-04 exceeded the budget estimate by $12 million. As such, the mining royalty forecast error did not make a significant contribution to the total operating revenue forecast error for the year. However, this was largely due to a higher than expected $A/$US exchange rate offsetting higher than expected volumes and prices for commodities (including oil prices).

The main source of the $281 million budget error for 2004-05 was the failure to forecast the continued rapid increase in oil prices over 2004-05. This contributed around $160 million in additional petroleum royalties. A further $71 million in iron ore royalties was contributed by the un-budgeted 71.5% increase in contract iron ore prices for Japanese Fiscal Year 2005-06 (commencing 1 April 2005).

Revenue from Public Corporations

Higher than forecast revenue from public corporations mainly reflected higher than forecast developers’ contributions to the Water Corporation and Western Power (related to Western Australia’s strong property market), and higher than expected electricity demand for Western Power.

Forecasting Process, Issues and Improvements

The following sections discuss current methodologies, resourcing, governance and communication of the revenue forecasts, together with opportunities for improvement - including opportunities identified in, or arising from, stakeholder and peer review feedback.

Methodology (including Data)

Taxation Revenue

Current Practice

The current or 'base year' estimates for most State taxes are reviewed and (where appropriate) updated on an ongoing basis, incorporating trends in actual monthly collections (supplied by the Office of State Revenue (OSR) and adjusted for any one-off factors or known seasonality), and monitoring of relevant data releases.

Estimates for the forthcoming budget year and the forward estimates period (the three years after the budget year) are generally derived by growing the current year estimates (adjusted as necessary for the full year impact of any rate or base changes) by escalation factors based on assumed relationships between growth in key economic indicators (e.g. SFD, employment and wages) and each head of revenue. The following table summarises the current factors for the major taxes.

Table 12

TAXATION REVENUE – ECONOMIC FORECASTING LINKS

	Budget and/or Forward Estimates Escalation Factors
Payroll Tax	100% of forecast wage and employment growth.
Conveyance Duty (post budget years)	100% of forecast nominal SFD growth
Insurance Duty	75% of forecast nominal SFD growth
Motor Vehicle Duty	75% of forecast nominal SFD growth
Mortgage Duty (post budget years)	100% of forecast nominal SFD growth
Other Stamp Duties	100% of forecast nominal SFD growth
Land Tax (post budget years)	Long-term average growth rate in unimproved land values (7% per annum is currently assumed and is based on the long-term average growth rate of the Perth median residential lot price).

Budget year forecasts for conveyance duty, mortgage duty and land tax are assessed using differing methods (see below).

Economic parameter growth forecasts are prepared/updated on a six monthly basis (for the budget and mid-year review) using the DTF Economic Model, which is a vector auto-regression model. The model forecasts are assessed for reasonableness and internal consistency, and adjusted as appropriate based on informed judgement.

External consultation on the economic forecasts is conducted through the EBU's Economic Advisory Group, comprising a broad cross-section of business peak-body representatives (individuals are sometimes also consulted separately on the tax revenue forecasts). Over the medium term (third and fourth years of the projections period), growth in economic aggregates is assumed to revert to long-term rates of growth (i.e. the annual average rate for the past 10 to 15 years).

Cut off dates are determined for the publication of the revenue estimates in the annual State Budget and mid-year review.

The budget year estimate of conveyance duty reflects judgement about cyclical patterns and turning points, informed by recent trends, economic growth projections generally, published market commentaries and some external consultation. The estimates for conveyance duty also include a separate component for 'specials', which are defined for this purpose as large transactions generating assessments of more than $1 million each.

Mortgage duty growth in the budget and forward estimates years is assumed to track conveyance duty closely.

In the case of land tax, budget year estimates can be modelled by the OSR using sufficiently up-to-date information on land values, supplied by the Valuer General's Office, to minimise any budget error. Growth across the forward estimates is assumed to be 7% per annum, consistent with long run average growth in land values (typically, the land tax scale has been amended as part of the Budget to limit growth to this level).

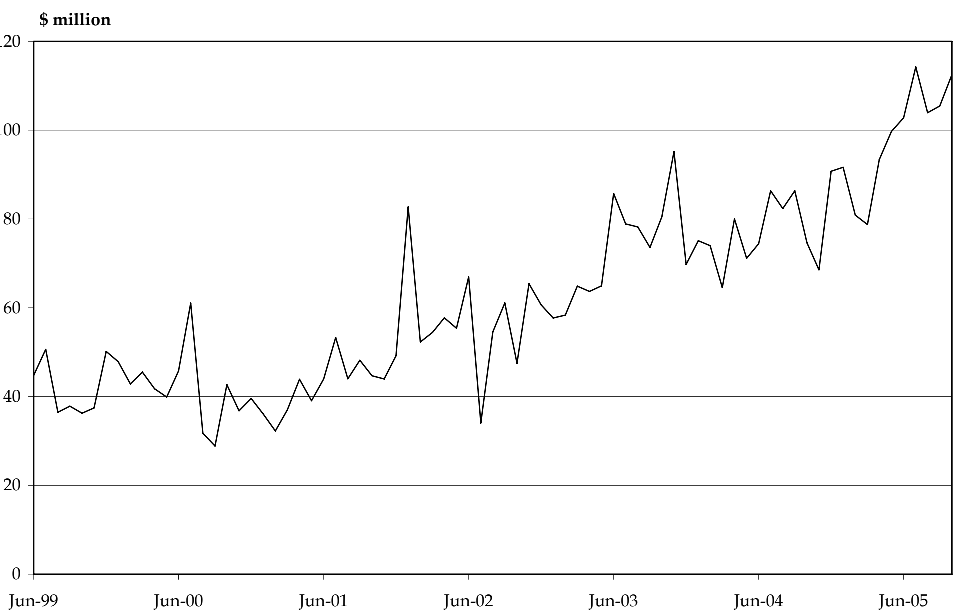
There are currently no provisions for bracket creep in taxes with progressive rate structures, such as conveyance duty, payroll tax, land tax and motor vehicle stamp duty (although this has been of little practical consequence for the land tax forecasts, and little growth has been observed recently in motor vehicle prices).

Analysis

It is clear from the discussion of the causes of forecast errors in 2003-04 and 2004-05 that underestimates of conveyance duty and (therefore) total taxation revenue have reflected the failure of forecast turning points in property market activity to occur. Strong underlying growth has continued unabated for an extended period, averaging 27.3% per annum since 2001-02.

Chart 2

MONTHLY UNDERLYING CONVEYANCE DUTY REVENUE[a]



[a] Underlying conveyance duty excludes the impact of tax rate and base changes, and duty on large commercial property transfers.

Peer reviewers noted that most States had recently been through a period of believing 'this is the peak year', only to discover otherwise. Nonetheless, it was considered that a prudent set of forecasts would generally incorporate turning points for historically volatile and cyclical revenue bases.

In this context, and for informing judgements used in forecasting more generally, stakeholders generally concurred that increased use of expert views, including through more regular consultation with property market leaders, would be valuable. Peer reviewers cautioned against too much reliance on such views, as opposed to 'monitoring of the facts' (e.g. data on auction results), and noted that financial institutions may be a source of more independent/objective advice.

It was concluded that more external expert consultation would be beneficial, not as the primary basis for forecasts, but in the provision of timely, anecdotal information that could be used in testing the forecasts, and helping to identify risks and 'paint scenarios'. Keeping a track record of expert views, as part of a broader program of ongoing review of methods, was also considered important.

These findings are reflected in **Recommendation 1**.[8]

The incremental, escalation-based process used to derive budget and/or forward estimates of taxation revenue was compared to and found to be broadly consistent with, Access Economics' approach in its State and Territory Budget Monitor. 'Base plus growth' was also used in at least some other jurisdictions. A key issue for any forecaster under this approach is the validity of the assumed relationship between the tax base and the growth variable.

Peer reviewers emphasised the need not just for one-off reviews of the assumed relationships, but for an ongoing program of monitoring, reviewing and revising as appropriate. Their feedback also indicated a move to greater sophistication in revenue forecasting methods in other jurisdictions, including to more robustly integrate the revenue forecasts with the economic forecasts and to estimate long-term or 'underlying' revenue collections independently of current year collections.

In particular, important issues raised in peer discussions included the following.

- The value of separately forecasting the price and volume components of tax bases, to recognise the different influences on these components and facilitate provision for the impact of sliding tax scales (bracket creep).

[8] Recommendation 1 also reflects a need for more consultation on the outlook for the mining industry, with similar objectives, as well as to agree on proposed mining projects that are sufficiently committed to include in the revenue estimates (see discussion on Mining Royalties below).

- The benefits of statistical/econometric analysis in:
  - assisting the measurement of the relationship between tax bases and economic variables (e.g. using historical time series data to estimate the coefficients of assumed relationships, and testing the validity of these assumed relationships);
  - potentially better identifying the longer-term components of revenue collections (as opposed to transient/cyclical components), thereby making more transparent assumptions about what stage of the cycle the economy or market is currently at, and where the turning points may be; and
  - identifying and abstracting from abnormal base year data, including identifying departures from historical relationship 'norms' (e.g. between underlying conveyance duty and home affordability) that may provide information on the sustainability of existing revenue levels and trends.
- Constraints on statistical/econometric analysis — a full theoretical rationale to guide the development of models may not always be available and historical datasets may be of insufficient quality (particularly for smaller States) or length to accurately measure coefficients. Furthermore, accurate revenue forecasts will not result if the explanatory variables cannot be accurately forecast.

The continuing need for judgement to resolve tensions between model forecasts and indications provided by recent collections data or other contextual information (such as property market 'sentiment'). There were different views about the importance of tempering model results with judgement, but this is considered a particularly important issue in Western Australia, where the mining/export orientation of the economy creates additional volatility.

- The potential value of 'top-down' modelling of tax revenues to check the overall consistency of the outcomes from individual modelling of taxes.

Overall, a greater role for statistical and econometric-type approaches appears warranted, to make the forecasting process more systematic and transparent and thereby potentially improve long term forecasting performance.

These approaches could help provide baseline forecasts, with other analysis (including examination of recent trends and sounding out the market) informing judgement-based adjustments (should these be considered necessary).

One practical way forward was considered to be to trial an enhanced, statistical/econometric modelling based approach to appropriate State taxes over the next year or two. Conveyance duty may be particularly suitable for this analysis, partly because it has consistently proved to be the most problematic tax to forecast, but also on the basis that:

- distinctions between volume and price are clearly important (e.g. stock shortages may restrict the level of transactions but contribute to price increases and associated bracket creep); and
- peer reviewers suggested too much dependence in Western Australia's current approach on SFD, with the number of households, average weekly earnings and home affordability appealing as possible parameters in a model of the long term or 'underlying' conveyance duty base (at least for the residential component of the base).

These findings are reflected in **Recommendations 2–5**, which also recognise the need to thoroughly examine and test new methods before they are adopted. They are consistent with feedback from key stakeholders, who accepted that forecasting inevitably requires the use of judgement, but considered it important that the 'art' element of forecasting be underpinned by a strong, defensible analytical base.

Discussions were also held with the OSR on the possibility of augmenting datasets, particularly as its revenue collection systems moved 'on-line'. Reflecting the Office's primary focus on State tax administration, a dearth of data for robustly estimating the impact of policy changes (also a potentially significant source of forecasting error) and informing the revenue estimates more generally, was a long-standing issue.

- Specific examples include a lack of detailed information on the composition, and movements in the components, of the payroll tax base and the major stamp duties.
  - From 1 July 2006, it will become mandatory for larger employers to lodge payroll tax returns on-line, including *inter alia* a breakdown between wages and other employee benefits.
- It was noted that the Valuer General's Office was another source of data on property–related transactions, and that this data may currently be under-utilised for stamp duty monitoring and forecasting purposes.

These findings are reflected in **Recommendation 6**.

Commonwealth GST Revenue Grants

Current Practice

Estimates of national GST revenue and of Western Australia's share of the national GST pool are both critical inputs into the forecasts of GST grants.

Western Australia, like all other States, has used the Commonwealth's published estimates of national GST revenues for forecasting purposes.

Western Australia's share of national GST collections reflects per capita relativities recommended by the Commonwealth Grants Commission. Budget year shares of the GST for each State are released by the Commonwealth Grants Commission before the budget year estimates are finalised. However, forecasts of grant shares are required over the forward estimates period.

In Western Australia, these are obtained by adjusting the budget year shares to take account of forecast changes in (primarily) royalties from iron ore and North West Shelf petroleum production (where increases relative to other States will reduce Western Australia's share of the GST in future years).

Analysis

The use of the Commonwealth's national GST estimates was a significant source of revenue forecast error in 2003-04 and 2004-05. The timing of Western Australia's budget often means that the State relies on dated Commonwealth Mid-Year Economic and Fiscal Outlook forecasts (usually published in November or December, up to five months before the cut off date for the State budget).

Improving the estimates of national GST collections will require either the release of more timely GST estimates to the States by the Commonwealth, or the development of a States' GST forecasting capacity. Through the States' Heads of Treasuries forum, Queensland has been leading work (in consultation with the Commonwealth Treasury) on the latter. At a minimum, States' estimates should help assess the level of risk associated with still using dated Commonwealth GST estimates.

Even pending the outcome of the States' Heads of Treasuries work, it was noted that there was scope in Western Australia for closer monitoring of actual monthly GST collections supplied by the Commonwealth Treasury, for early signs of emerging variances from the budget forecasts of the national GST pool. This could be done by integrating GST budget and collections information into an existing monthly analytical report on State tax collections.

These findings are reflected in **Recommendation 7**.

The Grants Commission's relativities are based on annually updated, rolling averages of five years' data on the relative cost of providing services in each State, and each State's relative capacity to raise revenues. The methods for calculating the relativities are fully reviewed by the Grants Commission every five or six years, which can result in significant changes (e.g. the Grants Commission's 2004 review increased Western Australia's annual funding share by over $200 million).

A full predictive model for the out-years would require assessing Western Australia relative to all other States in each spending and revenue area across the spectrum of States' budget activities. Notwithstanding the lags in the Grants Commission's calculations (e.g. relativities for 2007-08 will be based on data for the five years to 2005-06), sufficient comparative data is usually not available to do this with any degree of reliability.

The modelling difficulties are compounded by changes in data sources and (occasionally) methods made by the Grants Commission in its annual updates, while the major five to six yearly reviews have unpredictable outcomes.

Furthermore, it is apparent that there is no single, settled forecasting method in other States.

An examination of Western Australia's out-year forecasts of GST relativities since 2000-01 indicates that these forecasts have consistently understated actual relativity outcomes. This partly reflects the tendency to concentrate on predicting factors (e.g. growth in North West Shelf royalties) that are likely to have an **adverse** impact on our future relativities, as well as the tendency to avoid excessive increases in out-year relativities that can follow in some cases from a mechanical application of the five year rolling average (where the latest data year is generally assumed to be representative of future years).

Thus, one finding from this review is that there should be a balanced approach to predicting positive and negative impacts on Western Australia's future GST relativities (e.g. recent increases in Queensland's coal royalties will be a positive impact).

In addition, although past attempts to develop a predictive model based on aggregate States' economic performance have not shown encouraging results, it was considered that there may be scope to revisit this work.

These findings are reflected in **Recommendation 8.**

Recommendation 8 is considered to carry added importance in view of the threat to Western Australia's future GST share posed by the State's current stand-out economic performance and revenue growth, and the need to advise Government on the sustainability of its overall revenue position.

Mining Royalties

Current Practice

Generally speaking, estimates of mining royalties, including North West Shelf petroleum royalties, are produced by the Department of Industry and Resources (DOIR), based on its price forecasts (apart from oil, iron ore and the exchange rate) and the production volume expectations of major producers. The DOIR surveys producers twice a year regarding their expectations (covering the budget and forward estimates period).

The DOIR's role reflects its responsibility for administration of the State's royalty regime and the industry knowledge and contacts it establishes as a consequence. It has recently developed and implemented a new forecasting model to accommodate volume, commodity price and other inputs.

However, the DTF has taken primary responsibility for determining several important parameters for the mining royalty estimates, being the exchange rate (most mineral export contracts are written in $US terms, but royalties are based on $A revenues), average oil price and (more recently) contracted iron ore prices in each forecast year. The oil price (rather than DOIR's modelling approach) has been the major source of forecast error over the review period.

The $A/$US exchange rate assumption for the entire forecast period is based on the six or eight-week average of the actual exchange rate immediately preceding the forecast date. This rules-based approach to forecasting the exchange rate reflects an assessment that future exchange rates are inherently unpredictable and that recent exchange rates are the best guide to future exchange rates.

In contrast, the oil price assumptions for the budget year and forward estimates period have relied heavily on the use of informed judgement. Assumptions about the underlying long-term price and the time path of the actual oil price tracking back to the long-term average have largely reflected other analysts' published forecasts and wider monitoring of oil and LNG market trends.

Analysis

As in the case of volatile State taxes such as conveyance duty, stakeholder feedback confirmed the value of seeking more 'expert' views on the commodity price outlook, and to agree on proposed mining projects that are sufficiently committed to include in the estimates (see Recommendation 1). In addition, it was noted that the current use of judgement in setting the oil price assumptions could be considered to reduce the transparency of the royalty forecasts.

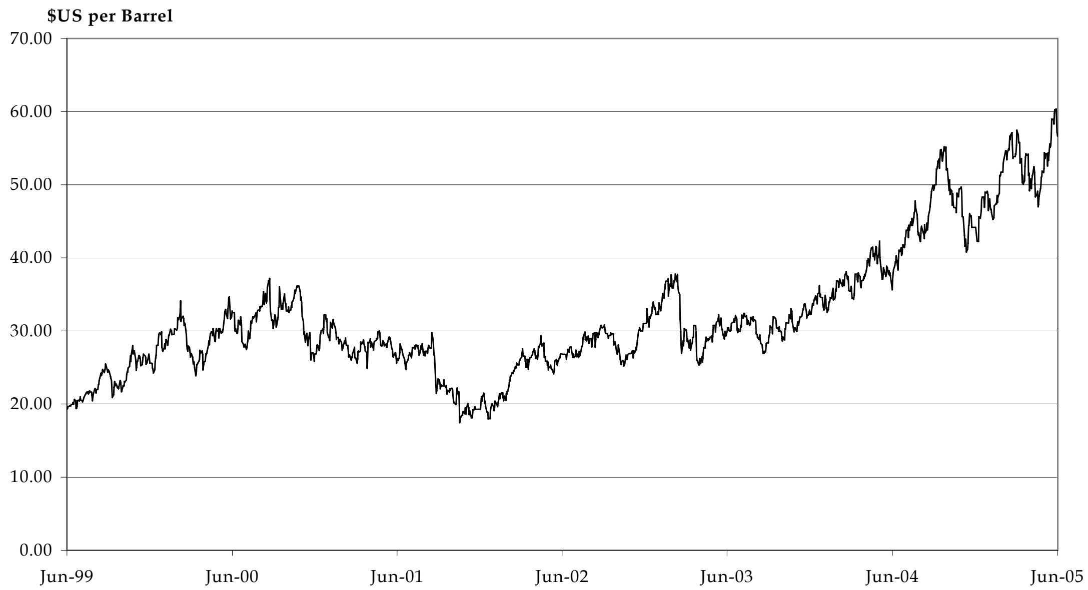
Exploring a rules-based approach for setting the oil price assumptions (as is used for the exchange rate) was considered to have merit. At the very least, this could be used to fix 'base line' estimates, against which departures would need to be justified.

It is understood that at least some major petroleum companies use futures market oil prices for their own budgeting purposes (while adopting long term average oil prices for the purposes of evaluating potential new projects), and that the 'depth' of the market is improving. Furthermore, this method would reflect judgements by oil market experts, and has been adopted by the Commonwealth Treasury (the only other jurisdiction with a significant fiscal exposure to the oil price).

The particularly risk-averse approach to forecasting the oil price in recent years was considered to reflect the history of large movements in the price (which increased from an average of around $US15/barrel in 1998/99 to well over $US60/barrel at times during 2005) and the large impact on State revenues. It should be noted, however, that the budget sensitivity to the oil price is declining as LNG production expands and linkages between contracted LNG prices and the oil price diminish.

Chart 3

DAILY WEST TEXAS INTERMEDIATE SPOT PRICES



The DTF is partnering the University of Western Australia in an Australian Research Council 'linkage grant' project, which, among other things, will assist further evaluation of the oil price forecasting options and their consequences. Issues include the different futures prices available, the volatility they may introduce to the petroleum royalty forecasts, and the strength of the rationale for using the futures market for oil price but not exchange rate forecasts (which reflects the different circumstances of the oil and exchange rate markets).[9]

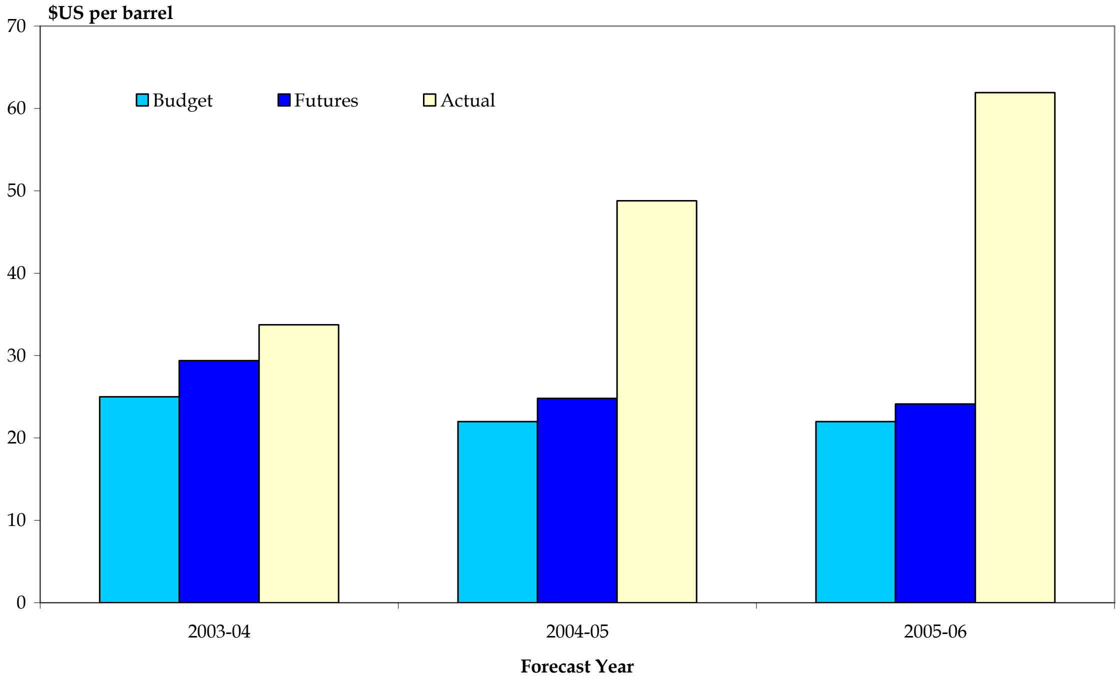
Notably, counter-factual analysis of oil price futures over the last few years indicate that they did not 'predict' the large increase that subsequently occurred in actual prices. Nonetheless, in most years they would have produced modestly more accurate forecasts than the budget forecasts (substantially more so in the case of the 2005-06 Budget), which were generally based on the lower end of the OPEC 'target range' and a range of published external forecasts.

The following chart shows the relative performance of the futures market in forecasting oil prices at around the time of the 2003-04 State Budget, for the three years ended 2005-06. Further historical analysis is included in Appendix C.

[9] Spot prices for financial assets (including the exchange rate) and commodities held as a store of value (such as gold) fully reflect all available information about the future. In commodity markets such as oil, practical restrictions on the types of transactions that market participants can enter into (in particular a lack of scope for short selling), means that forward prices have some predictive content.

Chart 4

BUDGET VERSUS FUTURES MARKET PERFORMANCE IN FORECASTING OIL PRICES – 2003-04



On balance, a move to adopt futures market prices for oil for the purposes of the 2006-07 Budget and beyond is favoured (implying significantly higher 'base-case' oil price assumptions in the forward estimates period than previously published), subject to ongoing research.

It was noted that iron ore prices have become an increasingly significant forecasting variable. This was considered to justify further research, such as on the extent to which spot iron ore prices and steel prices are potential predictors of future iron ore price negotiation outcomes for contracted iron ore volumes, and possibly on the track record of external forecasters such as ABARE (used for some commodity price forecasts by the Commonwealth Treasury).

These findings are reflected in **Recommendation 9**.

Scope was also identified for a closer working relationship between the DTF and DOIR on forecasting issues, including analysis of the twice-yearly survey of mining company expectations. This analysis requires, among other things, judgement to be exercised on which new projects or project expansions are sufficiently 'approved and committed' to be included in the forward estimates. Typically, a risk-averse approach is taken on new projects in particular.

The benefit of more resources for quality assurance is discussed further under Governance. Recommendation 1 also addresses consultation on the status of new mining projects.

It was also suggested that the DTF consider working with the DOIR to develop its own 'scenario analysis' capacity (e.g. to estimate the impact on the royalty forecasts of varying the assumptions about future commodity prices). This could help counter occasional tensions arising from the DOIR's focus on royalties administration and the DTF's sometimes urgent need for royalties revenue modelling information.

However, given the ongoing updating of the DOIR's model to reflect actual royalty collections and new information from mining companies (and to avoid the risk of inconsistencies emerging in forecasts held by the two Departments), it was concluded that these occasional tensions might be better addressed by maintaining a closer working relationship with the DOIR and formalising the communication of modelling requirements (and any revised forecasting assumptions) from the DTF to the DOIR.

These finding are reflected in **Recommendation 10**.

More generally, it was noted that the DOIR's role in the mining revenue estimates was just one example of revenue forecast inputs to the budget process being prepared by other agencies (other examples included public corporation revenues, specific purpose grants from the Commonwealth and State agency goods and services revenues - see also below). This raised general issues of resourcing and governance, which are addressed later in this report.

Revenue From Public Corporations

Each public corporation is currently responsible for the provision of a full set of financial forecasts, including tax equivalent revenues and dividend payments to government over the budget and forward estimates period.

The DTF is responsible for scrutinising the financial forecasts. However, the major influence the DTF has on the forecasts relates to the approval or rejection of policy decisions with State budget consequences, rather than parameter effects (e.g. Western Power's assumptions underpinning its sales forecasts). Resource constraints were quoted as inhibiting closer scrutiny.

Notably, the Water Corporation and Western Power in particular derive substantial revenues from developer contributions, which are influenced by property market activity. Inconsistencies had been seen in practice between the assumptions underlying the property tax forecasts and revenues from public corporations, in this area.

The more general issue of potential inconsistencies and quality assurance of forecasts prepared by other agencies, as an input to the overall budget process, is addressed under Governance.

Other Revenues

Although mainly out-of-scope of this Review, it was noted during the stakeholder surveys that State Government agency estimates of specific purpose payments from the Commonwealth and revenue from the sale of goods and services were the source of significant forecasting errors (invariably under-estimates), and currently the subject of little oversight or scrutiny by the DTF. This is discussed further under Governance.

Recommendations

1. *For the largest and most volatile revenue sources, namely stamp duty on property conveyances and mining royalties, more regular formal consultation should be held with external experts. More specifically, revenue monitoring and forecasting staff should meet twice-yearly with:*

   - *property and finance industry representatives on the outlook for Western Australia's property market, timed to be approximately mid-way between (and supplementary to) the existing Economic Consultative Group meetings (a twice yearly consultative exercise with representatives from across industry); and*

   - *senior officers of the Department of Industry and Resources (DOIR), together with representatives from selected mining companies on the outlook for the resources sector and to agree on proposed mining projects that are sufficiently committed to include in the estimates (e.g. following DOIR's twice yearly survey of mining company expectations).*

2. *An updated historical analysis of the correlation between movements in key economic indicators and growth in State taxes should be conducted as soon as possible, to test the ongoing validity of the currently assumed linkages in the forward estimates, and to help identify any indicators that correlate better to State tax growth.*

3. *For the 2006-07 Budget, progressivity factors (in addition to the current economic growth factors) should be introduced into the forecasts of growth in State taxes with sliding tax scales, particularly payroll tax and conveyance duty (to the extent that payrolls and property price growth is forecast).*

4. *Over the next two years, taxation forecasting models should be progressively reviewed, with the aim of trialling new methods for producing 'baseline' forecasts that (to the extent practicable):*

   - *forecast the price and volume components of tax bases separately and incorporate a value distribution for the tax bases (to model tax bases and the impact of progressive tax scales more robustly);*

   - *incorporate a more robust and transparent basis for informing the revenue forecasts with the economic forecasts (using statistical/econometric techniques);*

- *especially for volatile tax bases, separately identify the transient/cyclical and longer-run components (again using statistical/econometric techniques); and*
- *incorporate a global/top-down tax forecasting approach (based on economy-wide performance) as a cross-check against the aggregation of individual tax forecasts.*

The baseline forecasts will be supplemented by other analysis (e.g. examination of recent trends and contextual information) to inform any judgement-based adjustments that may be necessary.

5. *Taxation forecasting models (including assumed linkages with economic indicators) should be reviewed at least every three years (on a staged basis to smooth resource requirements), and refined and recalibrated in light of actual forecasting performance.*

6. *An Office of State Revenue data extraction analyst should be engaged for up to 12 months to explore and establish processes for providing additional data for estimating the impact of policy changes on State tax revenues, and for monitoring and forecasting State tax revenues more generally. This will require additional resourcing for the Office.*
   - *In addition, the potential for further data provision from State agencies (e.g. the Valuer General's Office) to assist with the forecasting of tax revenues should be explored (particularly to support the new methods described in Recommendation 4), and processes established to access such data.*

7. *The preparation of States' forecasts of national GST revenue should be supported, together with monitoring the track record of these estimates as a potential alternative to the Commonwealth's earlier Mid-year Economic and Fiscal Outlook estimates, for State budget purposes. Western Australia should also monitor monthly GST collections on an integrated basis with State tax collections.*

8. *There should be continued research to improve the modelling of Western Australia's GST share in the out-years. This could include refining the existing approach to include a larger number of factors and developments (e.g. property market activity) in each State. An alternative approach based on States' relative aggregate economic performance should also be further explored.*

9. *Futures market prices should be adopted for the oil price assumptions in the 'base-line' petroleum revenue estimates, from the time of the 2006-07 Budget.*
   - *There should also be continued research on price forecasting methods for oil and other commodities (particularly iron ore) where forecast uncertainty is high and the potential impact on revenue estimates is significant.*

10. *Requests for modelling of variations to key royalty forecasting parameters, and advice of revised royalties forecasting assumptions, should be communicated between the DTF and DOIR in writing at Director level.*

Resourcing

Current Practice

The major revenue forecasting activities that the DTF currently resources relate to taxation revenue, Commonwealth grants and, to a significantly lesser extent, mining royalties. The Revenue and Intergovernmental Relations Division (consisting of two branches) is primarily responsible for these forecasts.

Revenue forecasting reports are coordinated by a senior officer in the Revenue Policy branch, who also takes primary responsibility for tax forecasting. A more junior officer in Revenue Policy assists in relation to mining royalties. Two senior officers in the Intergovernmental branch share responsibility for monitoring national GST pool estimates and estimating Western Australia's future relativity (including modelling the future impact of current growth in own-source revenues relative to other States).

In all cases, these officers also have substantial other work commitments, including the provision of policy advice on State revenue issues (albeit that there are some synergies between these responsibilities).

As noted, much of the forecasting work for mining royalties is undertaken by the the DOIR, with the DTF primarily responsible for setting the exchange rate and oil and iron ore price assumptions, as well as performing a 'quality assurance' function.

Analysis

The current resourcing of revenue forecasting within the DTF (including staff numbers, skills and experience) was seen as adequate to support existing practices. However, there was a strong consensus among officers involved in forecasting that meeting other core work demands often meant that potentially valuable additional research and monitoring work, as well as an appropriate level of checking, could not be performed.

Notably, key external stakeholders placed a very high priority on the DTF's revenue forecasting responsibilities. This did not appear to be adequately reflected in the current structure and allocation of resources to forecasting work, particularly when compared to the peer review jurisdictions, which (particularly in the case of the Commonwealth and Victorian Treasuries) appeared to employ larger teams of staff, including members who were dedicated to forecasting work.

- While improvements in the accuracy of the revenue forecasts could not necessarily be proven, it seemed clear that the more systematic approach that the additional resourcing in those jurisdictions (each of which had undertaken formal reviews of their forecasting practices in recent years) facilitated would have at least longer-term pay-offs.

To ensure that resources were not syphoned away to other lower priority responsibilities or tasks, a fresh look at the DTF's internal organisation of forecasting activities was considered necessary. Notwithstanding this, to implement the recommendations in this Review effectively, an overall increase in resources, possibly supplemented by additional training on econometric skills, was also considered necessary.

In particular, a substantial increase in resources for the implementation phase would be required over the next year, with a smaller additional resourcing requirement on an on-going basis.

These findings are reflected in **Recommendation 11**.

In addition, stakeholders emphasised the importance of continued adequate resourcing by the DOIR of the forecasting of mineral prices and production quantities, particularly as the DOIR's royalty branch currently saw its primary responsibility as administration of royalties rather than forecasting. This is addressed further under Governance.

Recommendation

11. *The structure and resourcing of forecasting activity should be reviewed, and resourcing increased, for compatibility with the importance placed on it by key stakeholders. It should allow for an ongoing programme of research on key forecasting issues, ensure that succession and skills/knowledge transfer arrangements are in place for staff involved in forecasting, and ensure that the governance enhancements and other recommendations in this report can be implemented.*

Governance

Current Practice

Vetting of forecasts prepared by the DTF initially occurs informally through each Division's and branch's own internal reporting and quality control processes. As noted in preceding sections, to varying degrees the DTF also 'sub-contracts' the monitoring and forecasting work for certain other revenues to other agencies, while retaining at least a quality assurance role.

The economic parameter forecasts used in the State tax estimates are prepared in a Division separate to Revenue and Intergovernmental Relations, but still part of the EBU reporting to the same Executive Director.

The Director Revenue and Intergovernmental Relations reviews revenue update reports (including in consultation with the Executive Director) before they are forwarded to the Director Fiscal Strategy (who heads a Division in a business unit separate to Economic) for incorporation in updates of the overall budget position.

Formal budget updates, including revenue revisions, are considered and approved by the DTF's Budget Steering Committee (BSC), comprising the Corporate Executive plus the Director Fiscal Strategy and a Director, Agency Resources. Once approved, the Treasurer and the ERC are advised of the revenue estimates/projections (which reflect the Department's independent assessment of the revenue outlook).

Analysis

There was a view that roles, responsibilities and reporting relationships within the revenue forecasting process were a little too ad hoc. In addition, only limited consultation on the forecasts was identified as occurring across the individual branches and Divisions in the DTF. As a result, current practices did not always ensure the consistency of the assumptions underlying the Department's forecasts of revenues, economic variables and expenses.

As noted by one peer reviewer, identifying inconsistencies might also point to duplication of effort and scope for at least some resource savings.

Similarly, some stakeholders expressed concern that the dissemination and discussion of information relevant to the revenue forecasts was restricted to a handful of officers in each branch. A lack of broader discussion could mean that the reasoning behind the forecasts was not subject to critique by other officers whose positions may give them access to different information, a different perspective or a capacity to contribute to research on specific issues.

Another related source of concern for some stakeholders was a perceived tendency to rely heavily on particular individuals during the preparation of forecasts. Aside from the risk this could create to the continuity of forecasting activity (see Recommendation 11), heavy reliance on individuals could contribute to individual judgements that inform the forecasts going largely untested.

These findings are addressed in **Recommendations 12-14.** These recommendations were considered appropriate notwithstanding the observation from some stakeholders that avoiding an excessive reliance on particular individuals in the forecasting process needed to be balanced against the need for 'expert' forecasters (equally, it was noted that wider discussion of the forecasts needed to be balanced against the sensitive and confidential nature of revenue forecasts before they are published).

The separation or integration of the revenue and economic forecasting teams also arose in a governance context in peer review discussions. Placing revenue forecasting staff in the Economic group rather than the Revenue Policy group would recognise common skill sets if an increasingly econometric approach to the revenue estimates were taken. However, the current assignment of revenue forecasting work reflects the existence of synergies between revenue forecasting and tax and royalty policy work (including in relation to costing policy proposals).

An on-balance judgement is reflected in **Recommendation 15**.

In relation to specific purpose grants, public corporations revenues, agency revenues from the sale of goods and services and mining royalties, it was concluded in peer review discussions that the DTF retained 'ownership' of the forecasts to the extent that it was responsible for the overall budget process, and therefore needed to ensure that it had adequate quality assurance systems and resourcing in place.

The Functional Review of the Western Australian public sector conducted during the Government's first term recommended that royalty collection and administration functions (excluding policy functions) performed by the DOIR be transferred to the OSR. Following a study commissioned by the Under-Treasurer and Director-General of the DOIR it was decided to keep these functions within the DOIR (mainly due to the synergies between royalty policy work and royalty administration, and the benefits of the close working relationship between the DOIR's royalty staff and other areas of the DOIR).

The reasons identified for not transferring royalty functions from the DOIR to the OSR may also apply to any narrower proposal to transfer the royalty forecasting function from DOIR to DTF. Nonetheless, this could be considered further in the course of the forthcoming functional review of the DOIR.[10]

These issues are addressed in **Recommendation 16 -17**.

BSC members play a critical governance role in the forecasting process, ultimately 'signing off' on the estimates provided to the Government. Several BSC members interviewed as part of the Review requested that justification papers for the revenue updates be prepared further in advance of BSC deliberations. More graphical analysis was sought (to support the 'story' underlying the estimates), as was more opportunity to question the basis for the forecasts.

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10 Departmental functional reviews are intended to identify opportunities to enhance portfolio coordination by examining the efficiency and effectiveness of an agency's programs and functions.

On the other hand, officers involved in the preparation of forecasts expressed concern that current governance practices did not necessarily encourage the provision of completely objective advice to the BSC. In particular, there was a perception of an aversion to large forecast revisions, possibly helping to explain Western Australia's relatively slow response to emerging under-estimates of revenue.

BSC members did not necessarily share these perceptions. Furthermore, the perceptions may in part reflect the relatively short time available for BSC members to consider advice (although it seemed clear that some stability in the forecasts was considered desirable), and the large degree of judgement incorporated in the forecasts (as well as the observed variances). Nonetheless, perceptions alone could be sufficient to alter a forecaster's outlook and advice.

At least some forecasting staff identified with findings in other published reports of a common tendency for forecasters to engage in 'smoothing', resulting in a succession of revisions in the same direction. Loungani (2000)[11] speculated that this could be because forecasters are fearful that 'jumpy' forecasts will be treated as inconsistency by their managers (he also noted that behavioural psychology studies indicate that people tend to hold on to their views for too long).

In meeting BSC's requirement for increased timeliness of justification papers, it was noted that there may need to be closer coordination between the preparation of the economic forecasts and the preparation of the revenue forecasts. At the same time, it would be important to leave sufficient 'space' for quality assurance processes and (as emphasised by the independent reviewer) still retain capacity to incorporate the latest available information.

Justification papers and approval processes for the revenue estimates were also discussed extensively with the peer reviewers.

One view was that the need for detailed justification papers, which were resource intensive to prepare, could be a function of the degree of judgement incorporated in the forecasts, and that more sophisticated model specification for revenues could reduce the need for judgement (with the focus then being more on agreeing the core models or methods rather than the estimates per se). At the same time it was recognised that a great deal of judgement would usually be required to at least finalise the revenue estimates.

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11 Prakash Loungani (2000), "How Accurate are Private Sector Forecasts – Cross Country Evidence from Consensus Forecasts of Output Growth", International Monetary Fund Working Paper 00/77, Washington D.C.

Peer reviewers were generally agreed that revenue forecasters should submit their best estimates to the Executive approval stage (the BSC or its equivalent), albeit with risk factors and scenarios articulated and quantified to the extent possible. Any conservatism (e.g. to incorporate an assumption that a risk will crystallise) should be injected at the approval stage, and also be clearly documented. Senior forecasting officers should be involved in BSC's deliberations.

It was considered important that the revenue forecasts retain their independence from the Government, although (as addressed in the next section) there was scope for improving communication with the Government. There was also a view that revenue risk was best managed by budgeting for higher surpluses, rather than through conservative revenue forecasts.

These issues and on-balance findings are addressed in **Recommendations 18 – 22**.

Other specific governance issues that arose in the peer review discussions were the need to recognise forecasting outputs in DTF's Outcome Based Management reporting[12] (reflecting the importance placed by stakeholders on these outputs), and to maintain clear, comprehensive, up-to-date and accessible documentation (or databases) for forecasting staff on methods, data (including updated benchmarking data on forecasting performance) and processes ('knowledge management'). These findings are reflected in **Recommendations 23-24.**

A final finding on governance, namely the preparation of a variance report to round out the process of ongoing monitoring, review and refinement of methods and processes, as also raised in earlier sections of this report, is incorporated in **Recommendation 25**.

Recommendations

12. *Roles, responsibilities and reporting relationships for revenue forecasting and monitoring within the DTF and among agencies should be formalised, along with a hierarchical review process within each area with forecasting responsibilities.*

    - *Formalisation of roles and responsibilities should also extend to other agencies involved in the forecasting process (eg. government agencies providing estimates for individual taxes, mining royalties, specific purposes payments and revenue from the sale of goods and services).*

13. *A cross-DTF forum for monitoring and sharing information on revenue forecasting research and revenue trends should be established, including representation from the OSR.*

14. *A DTF-wide review panel should be established to assess the consistency of the assumptions used in the Department's forecasts (including the expense forecasts).*

12 Including Key Performance Indicators that force the annual review of forecasting performance.

15. *The economic and revenue forecasting areas in the DTF should remain separate (recognising the synergies between revenue forecasting and revenue policy work), but work cooperatively to utilise skills and resources that could benefit both areas.*

16. *Where forecasts are prepared by other agencies (including public corporations), the DTF's accountability for the overall integrity of the revenue forecasts should be explicitly recognised. In this regard, the DTF should also enhance its quality assurance of external inputs into the budget revenue estimates, including:*

    - *public corporations' estimates of payments to the State (including through increased consultation with forecasting officers in the corporations and testing of assumptions against industry body expectations);*
    - *State Government agency estimates of specific purpose payments (including by reconciling against Commonwealth estimates);*
    - *State Government agency estimates of revenue from the sale of goods and services; and*
    - *the mining revenue forecasts, such as through increased officer level consultation on forecasting issues and Ministerial level discussions on DOIR's resourcing priorities (while recognising that this has not been a major source of forecasting error to date).*

17. *While recognising the synergies in the current arrangements, in view of DTF's overall accountability for the budget estimates and the increasingly large budget impact of mining royalties, the pending functional review of the DOIR should consider where the royalty forecasting function best sits.*

18. *Revenue forecast justification papers (covering taxes, mining revenues, GST revenues and public corporations revenues) should be prepared for the Budget Steering Committee (BSC) for the Budget and mid-year review well in advance of the final cut-off date for revenue estimates, focussing on:*

    - *key assumptions, methods, data sources and contextual considerations that are proposed for the revenue forecasts;*
    - *revenue heads where uncertainty is greatest and the largest forecasting errors have previously occurred;*
    - *the 'most likely outcome' revenue forecasts, based on available data at the time of the paper's preparation; and*
    - *identification and quantification of risks and scenarios.*

    On an exceptions basis, further papers should be prepared and circulated a week in advance of BSC meetings, incorporating any new data or other information requiring revisions to the estimates or identified risks. The forecasting process would remain independent of government, but communication with government would be enhanced.

19. *The timing of the economic forecasts, and internal Divisional deadlines for forecasting activities generally, need to be sensitive to the deadlines for the justification papers (and related papers), leaving sufficient time for quality assurance processes (but without compromising the capacity to incorporate the latest available data).*

20. *The preparation of revenue forecasts should be predicated on the assumption that risks to the budget bottom-line are best managed by Government budgeting for higher surpluses, rather than through conservative revenue forecasts.*

21. *The Director, Revenue and Intergovernmental Relations, and/or other officers with primary accountability for the revenue forecasts, should attend BSC meetings when the justification papers or proposed forecast revisions are being considered, to provide any additional explanation or support that may be required (and to receive feedback on BSC's needs).*

22. *Decisions by BSC to vary any of the justification paper proposals, or revenue forecasts generally, should be documented. Papers provided to BSC would note the impact of past BSC decisions.*

23. *Revenue forecasting should be a DTF Outcome Based Management output, with associated performance targets and reporting.*

24. *Revenue forecasting models, model reviews and model changes should be fully documented, and databases holding the data used in the estimates and details of actual forecasting performance should be fit for purpose and maintained and updated regularly.*

25. *A detailed variance report on actual collections versus budget estimates should be prepared immediately after the final collections for the preceding financial year become known, highlighting any issues/lessons for future forecasting practices.*

Communication

Current Practice

The revenue forecasts, along with other impacts on the budget, are reviewed according to a schedule (frequently revised) provided by the DTF's Fiscal Strategy Division. The Treasurer is informed of revenue revisions, for his information, ahead of the ERC being advised, usually as part of the general budget position update. The ERC includes the Premier and several other Ministers, as well as the Treasurer.

Analysis

Providing timely forecasts, and avoiding 'surprises', including through the provision of more regular advice or early warnings of emerging large forecasting discrepancies, was emphasised by key stakeholders (including the Premier's Office). The provision of more detailed explanations or supporting 'stories' to the Treasurer's Office was also raised in a stakeholder discussion.

A need to improve communication more generally was also identified. In particular, greater emphasis needed to be placed on providing advance warning to the BSC, the Treasurer's Office and ERC of events that have a significant bearing on the revenue forecasts (e.g. the twice yearly survey of mining producers' expectations and the annual iron ore price negotiations).

Peer reviewers observed a desire in their jurisdictions to avoid too many revisions to the estimates (also experienced in Western Australia). Typically, revenue estimates were updated only three-five times a year (with only two or three updates published). However, this could be balanced by maintenance of a 'risk log', which could be used in regular briefings for key stakeholders.

These findings are reflected in **Recommendations 26-27**.

Recommendations

26. *Timely advice that includes the 'story' underlying the revenue forecasts, and risk scenarios, should be provided to the Treasurer in advance of ERC deliberations.*

27. *To help provide early warning of any emerging revenue variances and reduce the potential for 'surprises':*

    - *a calendar of key forecasting events should be circulated to keep stakeholders informed of forthcoming significant forecasting points; and*

    - *a 'risk log' of actual and potential developments in revenues should be maintained by the DTF for use in the regular meetings with the Treasurer and Treasurer's Office.*

Implementation of Recommendations

It was noted that many of the Recommendations in this Review would require the development of detailed action plans or strong management follow-up to ensure that they were effectively implemented or to reduce the risk of 'backsliding'. Subject to resourcing, some prioritisation of the approved recommendations may also be necessary.

There should also be a requirement to review the implementation and effectiveness of the Review (and identify any further opportunities for improving the quality of the Department's revenue forecasting work) after two years.

These findings are reflected in **Recommendations 28-29**.

Recommendations

28. *Action plans should be developed for each recommendation in this report as appropriate, and incorporated in the Individual Performance Plans (part of the DTF's Performance Management System) of staff involved in the forecasting process.*
29. *The implementation and effectiveness of the Review's recommendations should be reviewed in two years' time.*

Appendix A

Interstate Comparison of Budget Forecasting Errors

Table 1

TAXATION REVENUE

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	6.9	7.4	4.9	1.6	8.5	6.4	5.9
2001-02	6.1	9.3	12.2	8.7	10.5	11.4	9.7
2002-03	6.1	10.1	7.5	14.0	11.4	15.7	10.8
2003-04	16.3	5.7	8.0	17.9	13.9	19.1	13.5
2004-05	15.4	-1.2	1.4	9.7	4.9	13.3	7.2
AVERAGE	**10.1**	**6.7**	**6.8**	**10.4**	**9.9**	**13.2**	**9.5**

Table 2

CONVEYANCE DUTY

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	22.6	29.8	23.5	2.6	32.3	35.7	24.4
2001-02	24.4	45.1	63.9	55.5	78.6	51.2	53.1
2002-03	27.8	35.2	33.1	52.7	81.4	87.7	53.0
2003-04	43.4	16.1	31.8	50.0	69.4	98.1	51.5
2004-05	44.0	-15.4	4.5	20.7	24.0	30.6	18.0
AVERAGE	**32.4**	**28.3**	**31.4**	**36.3**	**57.1**	**60.7**	**41.0**

Table 3

TAXATION REVENUE EXCLUDING CONVEYANCE DUTY

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	3.7	3.7	2.1	1.3	4.1	3.9	3.1
2001-02	1.9	1.5	3.3	0.2	1.1	6.8	2.5
2002-03	0.5	3.4	1.7	5.3	0.8	7.4	3.2
2003-04	7.9	2.5	2.2	9.0	5.0	8.4	5.8
2004-05	7.0	3.5	0.5	6.3	1.3	8.9	4.6
AVERAGE	**4.2**	**2.9**	**2.0**	**4.5**	**2.5**	**7.1**	**3.8**

Table 4

TAXATION REVENUE EXCLUDING CONVEYANCE DUTY AND GAMBLING TAXES

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	3.7	4.2	4.4	0.7	10.6	5.1	4.8
2001-02	2.0	2.1	4.3	0.7	5.1	7.5	3.6
2002-03	0.4	3.9	4.5	5.2	0.7	7.3	3.7
2003-04	7.8	2.8	4.3	9.5	5.8	8.6	6.5
2004-05	7.0	2.6	0.7	7.4	1.6	10.2	4.9
AVERAGE	**4.2**	**3.1**	**3.6**	**4.7**	**4.8**	**7.8**	**4.7**

Table 5

CURRENT GRANTS AND SUBSIDIES

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	0.5	6.9	1.0	3.6	7.7	2.3	3.7
2001-02	6.1	3.5	4.9	6.4	5.7	4.8	5.2
2002-03	3.8	3.3	2.9	7.4	1.5	5.3	4.0
2003-04	3.8	1.9	3.4	5.8	3.7	6.9	4.2
2004-05	6.8	2.9	2.7	3.8	2.8	5.8	4.2
AVERAGE	**4.2**	**3.7**	**3.0**	**5.4**	**4.3**	**5.0**	**4.3**

Table 6

ROYALTIES

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	37.7	n.a.	n.a.	24.3	-23.4	-0.6	9.5
2001-02	-5.0	9.8	6.4	10.5	-18.2	-25.2	-3.6
2002-03	14.5	4.4	7.7	-17.7	-7.5	-38.0	-6.1
2003-04	1.2	-2.1	-3.8	-5.1	1.1	n.a.	-1.7
2004-05	26.2	20.0	-33.5	14.6	18.5	n.a.	9.2
AVERAGE	**16.9**	**9.1**	**12.9**	**14.4**	**13.7**	**21.3**	**6.0**

Table 7

PUBLIC CORPORATIONS

	WA %	NSW %	VIC %	QLD %	SA %	TAS %	Average %
2000-01	13.3	-6.3	2.5	-18.4	n.a.	n.a.	-2.2
2001-02	-1.8	7.0	-9.9	-16.1	-45.7	-2.9	-11.6
2002-03	3.6	4.3	51.3	-4.4	6.5	17.7	13.2
2003-04	15.4	4.8	42.5	20.4	2.9	8.6	15.8
2004-05	15.9	-4.2	43.1	13.5	5.0	12.9	14.4
AVERAGE	**10.0**	**5.3**	**29.9**	**14.6**	**15.0**	**10.5**	**11.4**

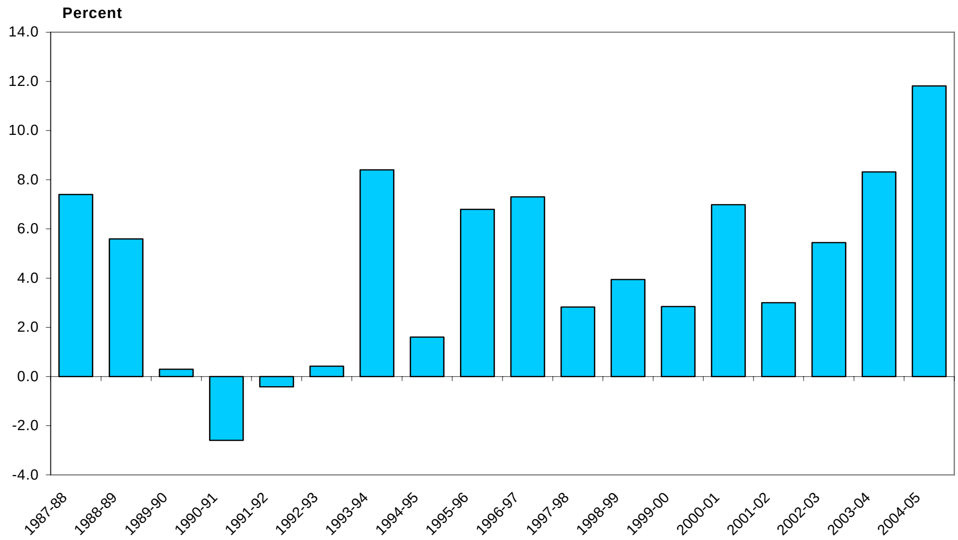
Appendix B

Long-run Budget Forecasting Errors in Western Australia

The following charts show actual versus budget forecasting errors (for the budget year) in Western Australia for some key revenue aggregates and items over the period 1987-88 to 1999-2000, on a cash basis and reflecting the budget definitions used in each year. Data for 2000-01 to 2004-05 are on an accrual Government Finance Statistics (GFS) basis.

Chart 1

BUDGET FORECAST ERRORS – TOTAL REVENUE – WESTERN AUSTRALIAA



[a] Forecast errors have been adjusted to exclude the impact of asset privatisations, including the sale of BankWest in 1995-96, the sale of the Dampier to Bunbury Natural Gas Pipeline in 1997-98 and the sale of AlintaGas and Westrail Freight in 2000-01.

Chart 2

BUDGET FORECAST ERRORS – TAXATION REVENUE – WESTERN AUSTRALIA

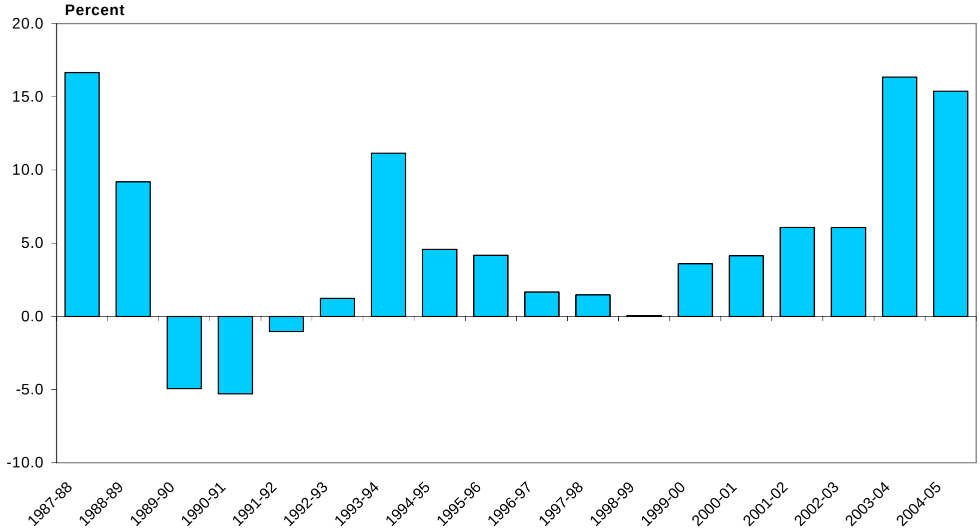


Chart 3

BUDGET FORECAST ERRORS – CONVEYANCE DUTY – WESTERN AUSTRALIA

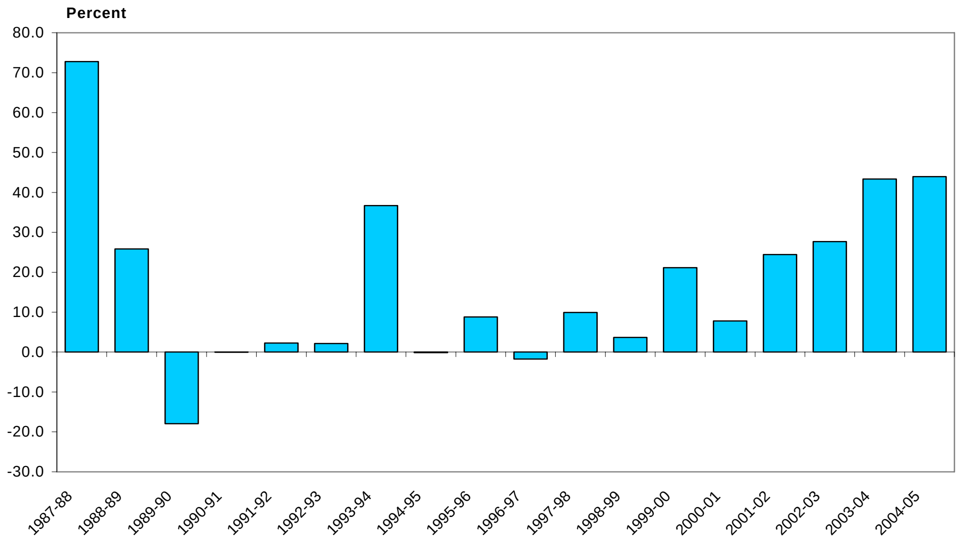
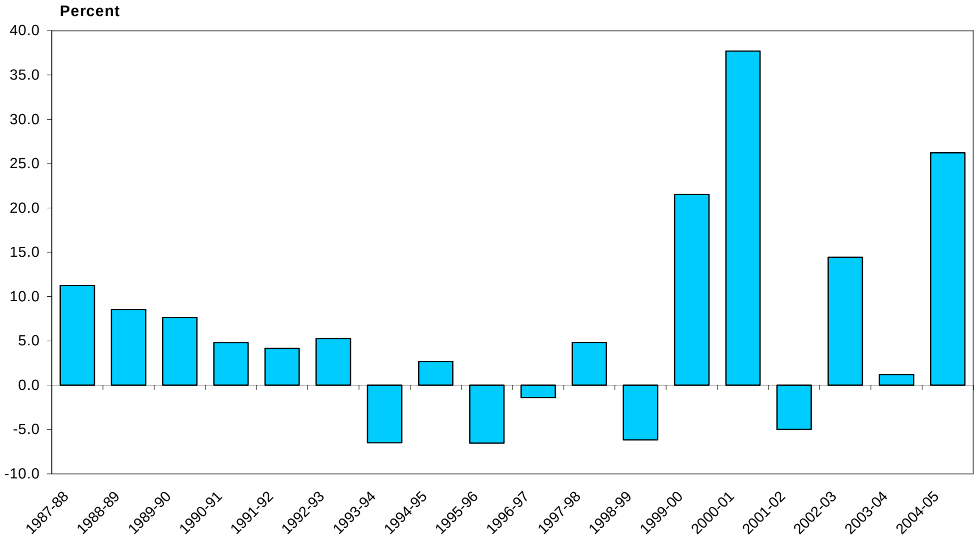


Chart 4

BUDGET FORECAST ERRORS – MINING ROYALTIES – WESTERN AUSTRALIA



Appendix C

Budget vs Futures Market Performance in Forecasting Oil Prices

BUDGET VERSUS FUTURES MARKET PERFORMANCE IN FORECASTING OIL PRICES ($US/BBL)[a, b]

		Budget Year	+2	+3
1999-2000	**Actual**	**26.0**	**30.1**	**23.7**
	Budget	15.0	15.0	15.0
	Futures	14.7	14.9	15.2
2000-01	**Actual**	**30.1**	**23.7**	**29.9**
	Budget	22.0	19.0	19.0
	Futures	26.4	21.9	20.6
2001-02	**Actual**	**23.7**	**29.9**	**33.7**
	Budget	25.0	21.0	19.0
	Futures	25.9	23.7	22.8
2002-03	**Actual**	**29.9**	**33.7**	**48.8**
	Budget	23.0	20.0	20.0
	Futures	24.3	23.1	22.5
2003-04	**Actual**	**33.7**	**48.8**	**61.9**
	Budget	25.0	22.0	22.0
	Futures	29.4	24.8	24.1
2004-05	**Actual**	**48.8**	**61.9**	**n.a.**
	Budget	27.0	24.0	22.0
	Futures	34.2	30.5	29.4
2005-06	**Actual[c]**	**61.9**	**n.a.**	**n.a.**
	Budget	40.0	30.0	30.0
	Futures (Budget)	54.9	53.0	49.8
	MYR	55.0	45.0	40.0
	Futures (MYR)	60.3	60.2	58.7

a. Due to limitations in the data available for this analysis futures market forecasts for the fourth year of the estimates periods have not been included.

b. Futures market forecasts are a 30-day average of daily closing prices to 1 April in each year (which is broadly consistent with the cut-off date for a May budget). In the case of 2001-02, when the budget was delivered in mid-September, a 30-day average to 15 August is used to derive the forecasts. The futures market forecast for the 2005-06 MYR is the 30-day average to 5 December 2006.

c. The actual average spot price for forecast years corresponding to 2005-06 ($US61.90/bbl) is the average spot price from 1 July 2005 to 20 January 2006.

Appendix D

Terms of Reference

Official general government sector revenue forecasts published by the State Government for 2003-04 (as part of the 2003-04 Budget, 2003-04 Mid Year Review and 2004-05 Budget) were significantly understated compared to the actual outcome for 2003-04. Significant under-estimation of 2004-05 revenues is also becoming apparent. Accordingly, a review is to be undertaken of the Department of Treasury and Finance's (DTF's) forecasting process in key revenue areas.

This is the first such review of DTF's revenue forecasting process in recent years.

Objective

The objective of the review is to improve DTF's forecasting performance in key revenue areas, and to improve the Government's understanding of its revenue outlook in these key areas.

Scope

This review will examine the revenue areas where forecasting responsibility primarily lies with the Economic Business Unit, comprising taxation, royalties, revenue from public corporations,[13] GST revenue grants/budget balancing assistance and National Competition Policy payments.

Revenues forecast by the Economic Business Unit comprise around 70% of total budget revenues.

[13] Responsibility for some public corporations lies with Agency Resources. These contribute a relatively small proportion of public corporations revenue, and will not be reviewed.

Other revenue areas (sales of goods and services, other Commonwealth grants, interest revenue and 'other' revenues) will not be reviewed, as the forecasting responsibility for these revenues primarily lies with other agencies and other areas of DTF, and in many cases do not impact on the budget bottom line.

Issues to be Examined

The review will consider forecasts for the pre-budget, budget and forward estimates years, and encompass the following (and other relevant matters that are identified in the course of the review).

Track Record and Variance Analysis

1. The track record of Western Australia's published revenue forecasts, including a comparison with the other States/Territories.

2. Major reasons for the differences in Western Australia between forecasts and actual outcomes for 2003-04 (and possibly earlier years).

3. Reasons why the 2003-04 forecasts had particularly large errors.

Forecasting Methods, Data and Influences

4. The in-principle soundness of the forecasting methodology used by the Economic Business Unit, including:

   - comparisons with other jurisdictions' methods;
   - the capacity of the methodology to identify and quantify key drivers (both short term and long term),[14] turning points and risk factors;[15]
   - the methods for dealing with identified risk factors, including consistency of approach[16] and the balance of risk reflected in the forecasts;
   - the capacity of the methodology to reflect the latest developments, including the methods for monitoring forecasts against progressive actual receipts;
   - the role of judgement, independent forecasts and independent expert views;

[14] For example, in the case of property market stamp duty, drivers may include interest rates, unemployment rates, population growth, household formation, inter-state price differentials, pent-up demand and economic growth generally.

[15] Risk factors include, for example, uncertainties in growth of key drivers or timing of turning points.

[16] For example, whether the level of conservatism is consistent across the different components of the revenue estimates (e.g. mining royalties vs. conveyance duties), and consistent over time.

- data constraints; and
- cultural issues and sensitivities.

Resourcing

5. The expertise and experience of staff involved in the forecasting process, and the effect of resource constraints on the development and implementation of methods.

Governance

6. Approval processes, including the role of the Budget Steering Committee, and checks and balances generally (including any role for 'justification papers').

Communications

7. Regularity of updates and communications with the Government.

External Input

Opportunities for external input to the review will be sought (including from other jurisdictions).

Timing

The review requires sufficient time to be comprehensive, produce quality outcomes and allow peer review. Accordingly, it is envisaged that the outcome of the review will not be fully reflected in revenue forecasting processes until the lead-up to the 2006-07 budget. However, it is expected that progressive improvements in revenue forecasting processes could be made as findings emerge during the course of the review.

To help facilitate progressive improvements, the review will report in stages:

- A reporting date of 14 March 2005 for:
  - a summary of existing forecasting methods and practices; and
  - a 'first stage' analysis of items 1-3 (track record and variance analysis), excluding forward estimates.
- A reporting date of 18 April 2005 for the full analysis of items 1-3 (track record and variance analysis).
- A reporting date of 1 August 2005 for items 4-7 (forecasting methods, data and influences; resourcing; governance; and communications).
- A reporting date of 7 November 2005 for a fully peer-reviewed report.

Reporting

A report will be provided to the Executive Director (Economic), who may then take relevant findings to the Budget Steering Committee.

Proposed Process

The option of using an external consultant to undertake the review was considered (to enhance the independence of the review), but it was decided on balance that a better option would be a peer-reviewed internal review. This decision reflects the large amount of specialist in-house knowledge required to conduct the review, and that it would be difficult to obtain the services of senior officers in other jurisdictions (who are likely to be the best qualified to undertake the review externally) for an extended period.

Accordingly, it is proposed that:

- the review will be, initially, internal to the Economic Business Unit;
- peer review will be sought from two State Treasuries (Victoria and Queensland) and the Commonwealth Treasury (in relation to the more general issues raised by the review); and
- following on from the peer reviews, an in depth face-to-face discussion will be sought with one of the State peer reviewers.

Internal Audit has been consulted on the terms of reference and proposed review process.