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Betting Operations Tax Revenue Options

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Executive Summary

In 2017, South Australia pioneered a new Betting Operations Tax on wagering services providers (WSPs). While South Australia had previously taxed WSPs who were licensed in South Australia, the new BOT collects taxes from WSPs wherever they are located, with the tax liability based on all wagering by South Australian residents wherever the betting event is located. Most Australian States have now followed South Australia and introduced BOT's of their own. Only Tasmania and the Northern Territory remain without a BOT, and Tasmania recently announced that it will introduce one in 2020.

At present South Australia's BOT rate is set at 15 per cent of net wagering revenue (NWR) subject to a $150,000 threshold. Some other States have lower BOT rates and higher thresholds.

The South Australian racing codes have made representations to the South Australian Government that they have been adversely affected by the BOT. It is alleged that the BOT has depressed betting on South Australian events and thus the product fees that are paid to the South Australian codes. Thoroughbred Racing SA has argued that net wagering revenue from these events has been diminished both by the dampening effect of the tax on betting activity and because it has sparked retaliatory action by interstate WSPs.

Thoroughbred Racing SA has presented the South Australian Government with modelling work carried out by Responsible Wagering Australia (RWA), an industry body representing the large WSPs. That modelling work suggests that if South Australia cut its BOT rate from 15 per cent to 10 per cent there would be a small reduction in BOT revenues in 2019/20 but in the following two years revenues would actually be boosted. The RWA modelling also considers reducing the rate from 15 per cent to 8 per cent and reaches a similar conclusion: a small loss of BOT revenue in 2019/20 but stronger revenues in the following two years.

We have been engaged by the Department of Treasury and Finance to provide independent modelling and advice on the estimated impact on Government tax collections from non-SA TAB WSP's of a reduction in the betting operations tax from 15 per cent to 10 per cent and 8 per cent. In providing this advice, we are required to consider the robustness and reliability of the modelling of a reduction in the rate of the betting operations tax undertaken by RWA. In support of this we are required to consider the assumptions underlying the modelling, including long term impacts within a competitive market place. We are instructed, where possible, to draw on relevant sources of information on the impact of changes in tax rates on overall revenue collections and to set out the basis for the assumptions underlying our independent modelling.

Our view is that RWA's projections of the impact of BOT rate cuts on BOT revenues are too optimistic. RWA is relying on large increases in wagering activity in response to the modelled tax cuts. Some rough reckoning illustrates our point. In the case of non-SA TAB WSPs, RWA projects that a reduction in the tax rate from 15 per cent to 10 per cent would lead to a 16 per cent increase in BOT revenues. This would require a 74 per cent increase in net wagering revenue. Yet based on our estimates this cut in the BOT rate reduces the price of wagering services by about 8 per cent. It is hard to believe that a price reduction of that order could produce such a large increase in net wagering revenue. In our own modelling in Section 5 we investigate the RWA claims more rigorously, and we find that demand elasticities of 7 or more are required to produce the same projections as RWA. This is beyond the bounds of plausibility.

To further investigate the impacts of BOT rate changes, we set out a model of the market for wagering services in South Australia, and we use it to project the impact of BOT rate reductions on BOT revenues and other revenues from wagering at non-SA TAB WSPs. We identify plausible assumptions for a number of key parameters that affect the market outcome, these being the share of net wagering revenues going to product fees, customers' own-price elasticity of demand for wagering services and the industry aggregate elasticity of supply. We enter these parameters into the model, and thus we make projections of the tax revenue impact of reducing the BOT rate to 10 per cent or 8 per cent.

To provide a common starting point for our projections, we adopt as our baseline the RWA estimates of BOT collections if the BOT rate is held at 15 per cent. Thus we produce our own projections of tax revenues under 10 per cent and 8 per cent scenarios, which we can then compare with RWA, knowing that the differences between our estimates and theirs relate only to assumptions about how customers respond to tax rate changes. Our use of the RWA scenario as a baseline is motivated by the goal of comparability; we do not endorse RWA's projections under the 15 per cent tax rate and they appear to us to be pessimistic. It is possible to modify our analysis to incorporate a more optimistic baseline scenario, and this would lead to modest changes in the scale of the estimated impacts of BOT rate reductions, but the broad conclusions would be unchanged.

Inevitably there are uncertainties with projections of the impact of tax rate changes. A key aspect of this of uncertainty is how wagering customers' betting outlays will change as a result of the changes in the price of betting. These behavioural responses to price changes are captured by a parameter known as the 'elasticity of demand', which indicates how responsive customers' betting activity is to the price of betting. We reviewed the literature for evidence on the value of the elasticity of demand for wagering, and we came to the conclusion that the most plausible demand elasticity is about 1.0—customers reduce their betting activity by 1 per cent in response to a 1 per cent increase in betting prices. Therefore, in our modelling our 'most likely' projections use an elasticity of 1.0. We also prepared projections using a less responsive 'low' elasticity assumption (0.3) and a more responsive 'high' elasticity assumption (3.0).

If the BOT rate is reduced to 10 per cent, the most likely outcome for BOT revenues from non-SA TAB WSPs in 2021/22 is $8.3 million. This is $6.2 million less than RWA's estimate of $14.5 million. In our projections, the SA Government would sacrifice tax revenue of $4.2 million as a result of cutting the BOT rate. This is in stark contrast to RWA's projections, which imply a $2.0 million gain in tax revenue. The story is similar for cutting the BOT rate to 8 per cent: in our most likely scenario the South Australian Government's BOT revenues from non-SA TAB WSPs in 2021/22 are $5.8 million lower than they would be with a 15 per cent tax rate, which is quite different from the RWA projection of a revenue gain.

Because there are uncertainties about the true value of the elasticity of demand, we also considered an assumption that is more sympathetic to the view put forward by RWA. We produced projections with a high demand elasticity of 3.0, an elasticity which on our assessment of the evidence is too high to be plausible. But even with this very high elasticity, we still find that cutting the BOT rate to 10 per cent or to 8 per cent leads to a loss of tax revenue for the South Australian Government—losses of $2.7 million and $4.2 million respectively. Our conclusion is that the RWA claims that tax revenues from non-SA TAB WSPs will increase in response to cutting the BOT rate to 10 per cent or 8 per cent, are implausible.

We have also modelled the impact of tax rate changes on product fees received from non-SA TAB WSPs by the South Australian codes. Our central scenario embodies the assumption of a unit demand elasticity, and this directly implies that changing the BOT rate has no impact on the product fee income to the SA codes from non-SA TAB WSPs. While we believe that the best estimate of demand elasticity is about 1.0, there are uncertainties. If the demand elasticity was 3.0—which we regard as implausibly high—then cutting the BOT rate from 15 per cent to 10 per cent would boost product fees from non-SA TAB WSPs to the South Australian codes in 2021/22 by $0.3 million but at cost to the South Australian Government of $2.7 million in BOT revenues. With the high elasticity assumption, reducing the BOT rate to 8 per cent would lead to a $0.4 million boost to product fees from non-SA TAB WSPs to South Australian codes in 2021/22 but with a $4.2 million loss of BOT revenues.

In conclusion, our results are in stark contrast to RWA's results. We find that the most likely consequence of reducing the BOT rate is to reduce South Australia's BOT collections from non-SA TAB WSPs quite substantially in every year. If the BOT rate were reduced to 10 per cent, the most likely scenario in 2021/22 is that tax revenue would be $6.2 million lower than the RWA estimate, and $4.2 million less than it will be if the tax rate is maintained at its current level of 15 per cent. If the BOT rate were cut to 8 per cent, the most likely scenario is a $5.8 million loss of tax revenue. The RWA argument that a BOT rate reduction would boost South Australian Government BOT revenues implies that everybody can win from a BOT rate reduction. But on the available evidence RWA's position is simply not plausible.

1. Introduction

1.1 Background to the Betting Operations Tax (BOT)

South Australia introduced a new betting operations tax (BOT) with effect from 1st July 2017. The effect of the change was to shift the tax base for South Australian wagering taxation from a point of registration basis (for the wagering services provider) to a point of consumption base. This was important because with a point of registration base the tax base is highly mobile, whereas with a point of consumption base it is much less mobile.

Under the new BOT, all wagering service providers (WSPs), wherever they are located, are liable for tax of 15 per cent on net state wagering revenues (NWR) received from persons residing in South Australia above a tax free threshold of $150,000 per annum. The SA TAB, on-course and other WSPs (e.g. online operators) are all liable for the tax.

Previously, South Australia had collected wagering taxes from WSPs which were licensed in South Australia, and other jurisdictions had similar arrangements. But over time most Australian WSPs had transferred or established their registrations in the Northern Territory, where the tax regime was very favourable. As a result, South Australian tax revenues from wagering had almost dried up (Livingstone 2017).

Most other Australian jurisdictions have followed South Australia’s lead, setting up consumption-based wagering taxes of their own. Tasmania and the Northern Territory are the exceptions (Department of Treasury and Finance 2019), but Tasmania has recently announced that it will introduce a BOT from 1 January 2020 (Tasmanian Government 2019, p. 115). Table 1.1 shows the arrangements in those jurisdictions that have adopted BOT.

Table 1.1 BOT structure in Australian jurisdictions

Jurisdiction	SA	ACT	NSW	QLD	VIC	WA
Commencement	1 Jul 2017	1 Jan 2019	1 Jan 2019	1 Oct 2018	1 Jan 2019	1 Jan 2019
Rate	15%	15%	10%	15%	8%	15%
Tax -threshold	$150,000	$150,000	$1 million	$300,000	$1 million	$150,000

Source: Department of Treasury and Finance (2019).

Net wagering revenues received by WSPs from customers and are in effect payments for wagering services. The payments by customers go directly to WSPs which must pay Betting Operations Tax to the South Australian Government, pay ‘product fees’ to the racing codes for the right to bet on their events, make Goods and Services Tax (GST) payments to the Australian Government, and cover the costs of their own operations and profits.[1]

The SA TAB is required to pay a product fee based on NWR on any racing events to South Australian racing, regardless of where the event is located. The product fee paid to South Australian racing is equal to 46 per cent of NWR minus any product fee that SA TAB pays interstate. So if, for instance, the product fee on a Victorian race was 17 per cent then SA TAB would pay 17 per cent of its NWR on that event to the Victorian owner and 29 per cent to South Australian racing.[2] The product fees payable by other WSPs are determined by the racing codes and typically are much lower. On average they may be in the vicinity of 17 per cent in South Australia.[3]

It should be noted that the base for product fees to South Australian codes is all bets on South Australian events regardless of where the customer resides. In contrast, South Australia’s BOT is levied on South Australian customers regardless of where the events that they bet on are located. There are no data that give a definitive description of the distribution of South Australian customers’ bets across jurisdictions. Department of Treasury and Finance indicated that as a guide it could be assumed that about 10 per cent of the NWR paid by South Australian customers on racing relates to events in South Australia, while the distribution for other sports is unknown.

The largest single supplier of wagering services in South Australia is the SA TAB, which recently has had a roughly 50 per cent share of total NWR. No other provider accounts for more than 25 per cent of the market. Using unpublished market share data from Department of Treasury and Finance for 2017/18 we calculated a Herfindahl-Hirschman Index (HHI) value of 3,400 for the South Australian wagering services industry in

1 These product fees are usually referred to within South Australia as ‘betting operations contributions’ (or ‘BOC’). Outside South Australia they are typically called ‘Race Fields Fees’.
2 The broad details of these arrangements were put in place when SA TAB was privatised.
3 In some cases the product fee may be a percentage of gross wagering revenue rather than NWR, and codes may set different product fees for different events, typically setting premium rates on high profile events.

2017/18.[4] The HHI is a measure of market concentration—i.e. the extent to which one or a few providers have large market share or many providers have small market shares. The (US) Department of Justice and Federal Trade Commission (2010) rate a market as 'highly concentrated' if its HHI exceeds 2,500, and on this basis the South Australian wagering market would be described as highly concentrated. Market concentration is just one indicator of the vulnerability of a market to anti-competitive behaviour and is not of itself conclusive. However, the evidence suggests that the wagering services industry in South Australia should be seen as prone to anticompetitive pricing behaviour which could lead to pricing above long run marginal cost.

1.2 Industry concerns with BOT

Thoroughbred Racing SA's (TRSA) 2019–20 budget submission included modelling prepared by Responsible Wagering Australia (RWA) concerning the impact of a reduction in the rate of the betting operations tax. The modelling indicated that the Government would receive more revenue under the betting operations tax if the tax rate was reduced to 10 per cent or 8 per cent than it would if the tax rate were kept at 15 per cent.

TRSA is also concerned that major WSPs have staged a punitive campaign against the South Australian codes as a backdoor means of retaliating against the South Australian Government for introducing BOT, and it believes that reducing South Australia's BOT would help bring this campaign to an end.

1.3 About this study

Department of Treasury and Finance (DTF) has engaged the South Australian Centre for Economic Studies (SACES) to investigate these issues. The Department has advised that:

> 'The initial view of the Department of Treasury and Finance is that the modelling used in the submission from TRSA assumes a very high price elasticity of consumers and/or wagering providers in an open and competitive market place.'

Accordingly, our brief is to provide independent modelling and advice on the estimated impact on Government tax collections from non-SA TAB WSP's of a reduction in the betting operations tax from 15 per cent to 10 per cent or 8 per cent. In providing this advice, we are required to consider the robustness and reliability of the modelling of a reduction in the rate of the betting operations tax undertaken by RWA. In support of this we are required to consider the assumptions underlying the modelling, including long term impacts within a competitive market place. We are instructed, where possible, to draw on relevant sources of information on the impact of changes in tax rates on overall revenue collections and to set out the basis for the assumptions underlying our independent modelling.

The structure of this report is as follows. Section 2 reviews the RWA modelling work. Section 3 sets out a model of the market for wagering services in South Australia. Prices, quantities and net wagering revenue are determined in the market and the net wagering revenue is then distributed between the South Australian Government, racing codes and WSPs according to prices, product fees and tax rates. Section 4 sets out parameter assumptions for the modelling work including a discussion of the evidence on demand and supply elasticities. Section 5 presents our modelling results, including a comparison of our projections of BOT revenues with those published by RWA.

[4] The HHI is calculated by squaring all market shares (in percentage terms) and adding them up.

2. Review of Responsible Wagering Australia Model

Thoroughbred Racing SA (2019) argues that it has been harmed by the introduction of BOT. As a result it is seeking a reduction in the BOT rate from 15 per cent to 10 per cent, and also direct financial support from South Australian Government. In this report we are concerned only with changes to the BOT rate.

In its 2019/20 budget submission to the South Australian Government, Thoroughbred Racing SA presents financial modelling of a BOT rate cut that was prepared by Responsible Wagering Australia (RWA). RWA lists six members on its website, all WSPs, these being:

- Bet 365;
- Bet Easy;
- Sportsbet.com.au;
- Betfair Exchange;
- Unibet; and
- Ladbrokes.

These WSPs collectively account for the majority of non-SA TAB wagering activity in Australia.

The modelling by RWA leads TRSA to report that

> ‘A reduction in the POC tax rate to 10% will generate wagering growth that will deliver a return to the State Government equal to or better than that which would be achieved at a 15% tax rate ($158.03 million vs $157.29 million over five years)’ [p. 4].

TRSA also goes on to say that

> ‘The modelling provided over a three-year forecast period demonstrates that a 33% reduction of the POC tax rate from 15% to 10% will not equate to the same reduction in tax revenue. In fact, a reduction in the POC tax rate to 10% will generate wagering growth that will deliver a return to the State Government equal to or better than that which would be achieved at a 15% tax rate ($158.03 million vs $157.29 million over five years).
>
> ‘Furthermore, the modelling demonstrates that a reduction in the POC tax rate would result in increased activity on SA racing and have the flow-on effect of increasing the BOC revenue collected by the codes. Based on information provided by the RWA members, it is anticipated a 10% POC tax rate will drive an uplift in BOC revenue for the thoroughbred code of $2.235 million per annum.’ [p. 18]

Table 2.1 presents RWA’s projections of South Australian BOT collections under the existing 15 per cent tax rate, and under alternative tax rates of 10 per cent and 8 per cent. Changes in tax rates are assumed to impact on revenues in the second half of 2018/19, in 2019/20, 2020/21 and 2021/22. There are no impacts in 2017/18 or in the first half of 2018/19 as these periods are now in the past.

Our brief is to model the impact of reductions in the BOT rate on tax collections from non-SA TAB WSPs. The RWA modelling indicates that with a 10 per cent BOT rate, BOT revenues from non-SA TAB WSPs would be $3.1 million lower in 2019/20 than under a 15 per cent BOT rate, but by 2021/22 they would be $2.0 million higher. And if the BOT rate were cut to 8 per cent, according to RWA, BOT revenues would in 2021/22 be $0.6 million higher than they would be with a 15 per cent BOT. Thus the non-SA TAB data tell a story similar to that presented by TRSA—according to RWA modelling, cutting the BOT rate from 15 per cent to 10 per cent or 8 per cent will in time lead to higher tax collections than would be achieved with a 15 per cent BOT rate.

RWA’s scenario for a maintained 15 per cent tax rate—which we takes as a baseline for our own modelling—is rather pessimistic. It implies a reduction in NWR of roughly one-fifth over the 3 years 2018/19 to 2021/22. We would expect household incomes to rise by something of the order of 10 per cent over this period, and the RWA numbers therefore imply a substantial reduction in the share of South Australian’s budgets going to wagering. Budget shares are of course not necessarily stable over time, but we are not aware of anything that provides solid support for such a pessimistic outlook.

RWA’s estimates of the impact of BOT rate cuts on tax collections seem optimistic to us. Some rough reckoning illustrates the point. In the case of non-SA TAB WSPs, RWA projects that a reduction in the tax rate from 15 per cent to 10 per cent would lead to a 16 per cent increase in BOT revenues. This would require a 74 per cent increase in net wagering revenue. Yet based on our estimates this cut in the BOT rate reduces the price of wagering services by about 8 per cent. It is hard to believe that a price reduction of that order could produce such a large increase in net wagering revenue. In our own modelling in Section 5, we find that demand elasticities of 7 or more are required to produce the same projections as RWA, and this is beyond the bounds of plausibility.

Table 2.1 Responsible Wagering Australia projections of BOT collections, $million

	15% BOT rate value	10% BOT rate [(a)] value	Difference from 15% BOT rate	8% BOT rate[(a)] value	Difference from 15% BOT rate
SA TAB					
2017/18	18.2	18.2	0.0	18.2	0.0
2018/19	16.8	16.8	0.0	16.8	0.0
2019/20	16.0	16.8	0.8	18.2	2.2
2020/21	15.2	16.8	1.6	18.2	3.0
2021/22	14.4	16.8	2.4	18.2	3.8
5-year total	80.6	85.4	4.9	89.6	9.0
RWA members					
2017/18	14.9	14.9	0.0	14.9	0.0
2018/19	14.3	12.1	-2.1	11.3	-3.0
2019/20	12.8	10.4	-2.4	8.7	-4.1
2020/21	11.6	11.5	-0.1	10.0	-1.5
2021/22	10.4	12.6	2.2	11.6	1.2
5-year total	64.0	61.6	-2.4	56.5	-7.4
Other operators					
2017/18	2.9	2.9	0.0	2.9	0.0
2018/19	2.9	2.4	-0.5	2.2	-0.7
2019/20	2.6	1.9	-0.7	1.5	-1.1
2020/21	2.3	1.9	-0.4	1.5	-0.8
2021/22	2.1	1.9	-0.2	1.5	-0.6
5-year total	12.8	11.1	-1.7	9.7	-3.1
Total non-SA TAB					
2017/18	17.8	17.8	0.0	17.8	0.0
2018/19	17.1	14.6	-2.6	13.5	-3.6
2019/20	15.4	12.3	-3.1	10.3	-5.2
2020/21	13.9	13.4	-0.5	11.6	-2.3
2021/22	12.5	14.5	2.0	13.1	0.6
5-year total	76.7	72.6	-4.1	66.2	-10.5
Total					
2017/18	36.0	36.0	0.0	36.0	0.0
2018/19	34.0	31.4	-2.6	30.3	-3.6
2019/20	31.4	29.2	-2.2	28.5	-2.9
2020/21	29.1	30.2	1.1	29.8	0.7
2021/22	26.9	31.3	4.4	31.3	4.4
5-year total	157.3	158.0	0.7	155.8	-1.5

Note: (a) With a reduction in the BOT rate assumed to take effect 1st January 2019.
Source: Thoroughbred Racing SA (2019) and SACES estimates.

3. A Model of the Wagering Market and Tax Collections

3.1 Market equilibrium

The betting operations tax is levied on the net wagering revenue (NWR) of wagering service providers (WSPs). We can conceive of the NWR as comprising quantity and price components with

$$NWR = Q \times p_G$$

where Q is the quantity or volume of wagering services provided to customers and p_G is the gross price per unit of wagering services as paid by the customer.[5] The decomposition can be applied at the detailed market level—e.g. South Australians' wagering on harness races—or to an aggregate market. In this study we apply it to South Australian customers' wagering in aggregate.

The net price p_N received by each WSP is given by

$$p_N = (1 - f - v - t)p_G \qquad (1)$$

where f is the rate at which product fees must be paid on net wagering revenue, v is the GST rate payable on net wagering revenue, t is the ad valorem BOT rate on net wagering revenue and p_G is the gross price paid by the customer.

The market demand for wagering services depends on the gross price p_G and can be written as

$$D = D(p_G)$$

whereas the supply of wagering services depends on the net price p_N and can be written as

$$S = S(p_N).$$

A market equilibrium exists when the market price p_G is set so that the quantities demanded and supplied are equal at the market price. We use asterisks to denote equilibrium quantities and designate the equilibrium as (Q^*, p_G^*) where Q^* is the quantity demanded and supplied at the market equilibrium. Thus in equilibrium

$$Q^* = D(p_G^*) = S(p_N^*). \qquad (2)$$

3.2 Price elasticities

The (own) price elasticity of demand for wagering services at some given gross price p_G is equal to the proportional change in quantity demanded in response to a small proportional change in the gross price, i.e.

$$\varepsilon_D(p_G) = \frac{dD/D(p_G)}{dp_G/p_G} = \frac{dD}{dp_G}\frac{p_G}{D(p_G)}. \qquad (3)$$

Similarly the (own) price elasticity of supply of wagering services at some net price p_N is equal to the proportional change in quantity supplied in response to a small proportional change in the net price, i.e.

$$\varepsilon_S(P_N) = \frac{dS/S(p_N)}{dp_N/p_N} = \frac{dS}{dp_N}\frac{p_N}{S(p_N)}. \qquad (4)$$

The arguments to the elasticity functions are included to allow for the general case in which demand and supply elasticities may vary along demand and supply curves. But it is common to set out models on the assumption that elasticities are constant across price levels, in which case the arguments to the elasticities and the demand and supply functions in the expressions above can be dropped. In this report we assume that elasticities are constant and hereafter we omit the arguments and simply write the elasticities as ε_D and ε_S.

[5] This representation is somewhat contrived. WSPs do not market their products as "one unit of net wagering at a price p_G". Instead, in fixed-price markets they offer gamblers odds on event outcomes. And with "tote" or parimutuel products WSPs sell units in a prize pool the size of which is determined by formula, with the pool then distributed to winning bettors according to their share of the total number of winning units in the pool. However, in each of these cases we can still identify the value of net wagering revenue, and the price-quantity decomposition employed in our model allows us to use standard economic analysis. Something akin to our approach is explicit or implicit in the economics literature relating to the demand for gambling that is discussed in this paper.

3.3 Tax revenue impacts of tax rate changes

it can be shown—Appendix A—that with constant elasticities of demand and supply the equilibrium gross price is given by

$$p_G^* = A(1 - f - v - t)^{-1/k}, \qquad (5)$$

where A is a constant depending on the units in which we measure the volume of wagering services. Therefore the ratio of the equilibrium gross price at the BOT rate t_1 to the equilibrium gross price at BOT rate t_0 is

$$\frac{p_G^*(t_1)}{p_G^*(t_0)} = \left(\frac{1 - f - v - t_1}{1 - f - v - t_0}\right)^{-1/k}. \qquad (6)$$

The equilibrium quantity is given by

$$Q^* = B(1 - f - v - t)^{-\varepsilon_D/k},$$

where B is a constant depending on the units in which we measure the volume of wagering services, and it follows that the ratio of equilibrium quantities under BOT rates t_1 and t_0 is given by

$$\frac{Q^*(t_1)}{Q^*(t_0)} = \left(\frac{1 - f - v - t_1}{1 - f - v - t_0}\right)^{-\varepsilon_D/k}. \qquad (7)$$

We can then calculate the ratio of NWRs under BOT rates t_1 and t_0 as

$$\frac{NWR(t_1)}{NWR(t_0)} = \frac{p_G^*(t_1)}{p_G^*(t_0)}\frac{Q^*(t_1)}{Q^*(t_0)}, \qquad (8)$$

and if we know the NWR at BOT rate t_0 we can easily calculate the NWR that will emerge at BOT rate t_1. BOT revenues under the different BOT rates can then be calculated by applying the relevant tax rates to the corresponding NWRs. Product fees, GST and the component of NWR retained by WSPs can also be calculated in a similar way.

3.4 Treatment of GST

In the model specified here, BOT and product fees are levied on NWR gross of GST, and this is reflected in the pricing equation (1). As a consequence, the GST rate appears in the equations which identify the ratios of equilibrium gross prices and quantities at different BOT rates—(6) and (7).

If BOT and product fees were collected on NWR net of GST then the pricing equation (1) would modify to

$$p_N = (1 - f - t)(1 - v)p_G.$$

In this case the ratios of equilibrium gross prices and quantities at different BOT rates are independent of the GST rate—see Appendix A.4. Therefore the ratios of net BOT revenues at BOT rates t_1 and t_0 are also independent of the GST rate in this scenario.

3.5 Modelling implications of a departure from competitive assumptions

The discussion in Section 1 set out reasons why one might reasonably conclude that there is less than perfect competition in the supply of wagering services in South Australia. But the question of whether or not the market conditions are competitive is in fact irrelevant to the modelling of the revenue impacts of tax rate changes. The reason for this is that while a monopolist sets the market price higher than would be seen in a competitive market and transacts a lower volume of services, it still operates on the demand curve. And in our modelling of changes in tax rates, the changes in tax rates lead to movements along the demand curve. These movements will be the same regardless whether the starting point price and quantity—e.g. what we see with a 15 per cent BOT rate—is an outcome of perfect competition or monopolistic pricing (or something in between). The shape of the demand curve is independent of the degree of competition within the market—i.e. it is the same under perfect competition and monopoly—and it is driven instead by factors extrinsic to the wagering services market such as underlying consumer preferences, income levels and the prices of expenditure items that are alternatives to wagering.

4. Parameter Assumptions

4.1 Baseline assumptions

The baseline for our modelling work is the RWA projections of South Australian BOT revenues from non-SA TAB WSPs under the current 15 per cent tax rate (Thoroughbred Racing SA, 2019) to 2021/22. These projections are shown in Table 4.1 for RWA-member WSPs and other non-SA TAB WSPs. Table 4.1 also shows our calculation of the imputed value of NWR for each of these groups.[6]

The RWA 15 per cent scenario shows declining BOT revenues and by implication declining NWR. We do not endorse the RWA projections under the 15 per cent BOT rate and indeed we suspect that they are pessimistic as they imply a large fall in NWR over the next three years. The reason that we use them is that they allow the most direct possible comparison of our own projections of revenues under alternative scenarios for the BOT rate with the projections made by RWA.

Table 4.1 RWA projections of SA BOT revenues at a 15 per cent BOT rate and implied NWR

	RWA members	Other non-SA TAB WSPs	Total non-SA TAB
BOT revenues ($ million)			
2017/18	14.9	2.9	17.8
2018/19	14.3	2.9	17.2
2019/20	12.8	2.6	15.4
2020/21	11.6	2.3	13.9
2021/22	10.4	2.1	12.5
Implied value of net wagering revenue ($ million)			
2017/18	99.5	19.2	118.7
2018/19	95.1	19.2	114.3
2019/20	85.5	17.3	102.8
2020/21	77.0	15.5	92.5
2021/22	69.3	14.0	83.3

Source: Thoroughbred Racing SA (2019), SACES calculations.

We have assumed that the producer price of wagering services will rise as follows over the projection period: 2.0 per cent in each of 2018/19 and 2019/20, and 2.5 per cent per annum thereafter.

4.2 Product fees

We do not have the data necessary for a precise calculation of the product fee rate applying to South Australian customers' wagering. Department of Treasury and Finance believes that a reasonable assumption is that the product fees charged by the South Australian codes to non-SA TAB WSPs average about 17 per cent. South Australian customers also bet on interstate fields, and we assume that product fees apply at the same rate on interstate events.

There are no data that give a definitive indication of the distribution of South Australian customers' bets across jurisdictions. Department of Treasury and Finance has suggested that as a guide it could be assumed that about 10 per cent of the NWR paid by South Australian customers for racing relates to events in South Australia, while the distribution for other sports is unknown.

We have used the following assumptions regarding product fees in our modelling:

- a 10 per cent share of NWR from South Australian customers' relates to events owned by South Australian codes;
- 17 per cent of South Australian customers' NWR at non-SA TAB WSPs on South Australian events goes to South Australian codes and none goes interstate; and
- none of South Australian customers' NWR at other WSPs on non-South Australian events goes to South Australian codes and 17 per cent goes interstate.

We explore the implications of alternative product fee assumptions in our sensitivity testing.

6 The imputed values are calculated by dividing the value of BOT revenues by the tax rate of 0.15. This calculation ignores the existence of the $150,000 NWR threshold for BOT. Including it may modify the estimates of all WSPs' NWR by up to $3 million per annum, but would have minimal impact on the BOT projections under alternative tax scenarios.

4.3 Goods and Services Tax

We have used a GST rate of 10 per cent for our modelling. The GST rate is a mark-up on a pre-GST price, whereas our GST parameter v is a proportion of the gross, or marked-up, price. Thus $v = 0.1/1.1 \approx 0.091$.

4.4 Demand elasticities

To identify estimates of demand elasticities we carried out a review of the economic literature. We sought in particular studies that seek to estimate own price elasticities in the wagering sector. Much of the literature is quite dated. To the extent that consumer preferences are stable through time elasticities may also be stable, which would mitigate any problems using 'old' estimates.

Many of the papers that present elasticity estimates are focussed on horse wagering in the US and the UK. Across the literature, estimated elasticities appear to be consistently greater than 1 in absolute value across the studies. Suits (1979) estimated the price elasticities of horse wagering for 24 US states from 1949 to 1971 and found elasticities between 1.6 and 1.7. Other US studies estimating elasticities from data across varying time periods found similar magnitudes, between 1.3 to 1.9 (Gruen,1976; Ali and Thalheimer, 1992;1997; Morgan and Vasche,1982; 1979). Elasticity magnitudes also appear similar in the UK bookmaker betting market, with Paton et al (2004) and Paton and Vaughan Williams (2005) estimating elasticities of about 1.2 to 1.6. The largest elasticity estimates from our literature search were both based in the US, with Simmons and Sharpe (1987) estimating elasticities between 2.8 to 3.9 while Thalheimer and Ali (1995) estimated 2.9 to 3.1, but they appear as outliers within our literature search. Because these estimates relate to horse racing, there is a potential for substitution to wagers on other events—harness racing, dogs—when the price of wagering on horses changes. Thus we would expect these elasticities to be of larger magnitude than the elasticities of demand for wagering in its entirety.

In a recent study outside the US or the UK, Feess and Schumacher (2013) estimated elasticities of New Zealand's wagering market and consistently found elasticities well below 1 across different empirical estimation specifications, ranging between 0.1 and 0.7. They argue that the divergence in their findings compared to earlier studies were attributed to the difference in institutional tax framework between the US and NZ market. In the US, tax is administered on the total amount wagered and bookmakers would not benefit from lowering take-out rates even if elasticities are above one. In contrast, lower elasticities are found in New Zealand's unregulated wagering market which is operated by a monopolist (i.e. New Zealand Racing Board, NZRB) who are free to set its own take-out rate while taxes are administered on revenues rather than total wagered. Hence, the tax influences the after-tax revenues but not the revenue maximising take-out rate and thus, analysing prices allows for a direct inference from elasticity to profit maximising behaviour.

The most recent study found in our search was Frontier Economics' (2014) report commissioned by the UK HM Revenue & Customs. Frontier was asked to produce price elasticity estimates for specific sectors in the UK gambling market, updating earlier work by Paton and Vaughan Williams (2005), for use in policy development related to the gambling market. In their study, they produced own price and cross elasticities by product type using econometric modelling and further assess their modelled estimates relative to evidence in the literature to settle on 'final preferred' elasticity estimates. They consider a number of gambling products, and of particular interest to us are terrestrial betting (i.e. bets made in licensed premises, Tote pools, betting on horse/dog racing), remote betting (i.e. online and phone based betting) and 'pools' (football and other pools betting). Only own price elasticities were reported by the study as they found inconsistent or no evidence of cross price effects in their econometric modelling (i.e. insignificant coefficients).

Table 4.2 summarises the relevant findings from Frontier. Only terrestrial betting had statistically significant elasticity coefficients from their econometric modelling, with estimated values in the short run of -0.46 and in the long run -0.79. Frontier then selected 'final preferred' estimates by comparing their modelled elasticities and findings in the literature—particularly for products with no statistically significant coefficients. For terrestrial betting, their preferred estimate of the elasticity of demand was -1. A unit elasticity is a natural prior assumption, was not refuted by their statistical modelling, and is also broadly consistent with the estimate of -1.18 in the preceding 2005 study. For remote betting, their modelled long run estimate was -0.12, with a wide confidence interval of +0.31 to -0.54 (and as such not significantly different from zero). They preferred an estimate of -0.5 on that basis that that their modelling was at risk of bias towards zero. For pools, the elasticity coefficient was estimated without much precision and therefore they retained the estimate of -0.485 from the 2005 study.

Table 4.2 Frontier Economics' estimated own price elasticities for selected products

	Econometric Estimate		
Product Type	**Short Run**	**Long Run**	**Preferred Elasticity**
Terrestrial Betting	-0.46	-0.79	-1.00
Remote Betting	+0.18 *	+0.36 *	-0.49
Pools	-0.05 *	-0.12 *	-0.50

Note: * Statistically insignificant coefficient.
Source: Frontier Economics (2014).

On the basis of these findings, we believe an elasticity of -1.0 is a reasonable assumption for the elasticity of demand for wagering services in South Australia. We use this as the 'central case' in our modelling. We also present projections using a 'low' elasticity of -0.3 and a 'high' elasticity of 3.0. We believe that it is unlikely that the demand elasticity lies outside this range.

4.5 Supply elasticities

Supply elasticities are driven by the industry cost curve. If $C(Q)$ is the cost curve—the cost curve shows production costs including a normal rate of return as a function of the level of output—then the supply curve under perfect competition is given by

$$p_G(Q) = \frac{1}{1 - f - v - t}\frac{dC(Q)}{dQ}$$

and the slope of the supply curve depends entirely on whether marginal cost dC/dQ is increasing, constant or decreasing. We are not aware of any attempt to estimate supply elasticities for the wagering sector in Australia.

Considering the question from first principles, we note that there is wide variation in the size of off-course participants in the industry. This suggests that operations may be viable at different scale of operation and that long run marginal costs may not differ greatly across WSPs with different scales of operation. Moreover, there is free entry and exit to the industry.

Based on these considerations we assume that while the industry is characterised by monopolistically competitive suppliers the industry supply curve is perfectly elastic and accordingly we assume $\varepsilon_S = \infty$ in our modelling.

We explore the implications of alternative supply elasticity assumptions in our sensitivity testing.

5. Financial Impacts Under Alternative BOT Rates

In this section we provide estimates of tax revenues from non-SA TAB WSPs under alternative tax rate scenarios.

Using the model outlined in Section 3 (and Appendix A), we have estimated the impact of tax rate reductions against the baseline estimate which we take from RWA. The baseline has a 15 per cent tax rate, and we consider as alternatives a 10 per cent tax rate and an 8 per cent tax rate, as canvassed by Thoroughbred Racing SA (2019). Our central projection uses a unit elasticity of demand, but we also consider elasticities with absolute magnitudes of 0.3 and 3.0.[7]

Table 5.1 shows our estimates of the volume of wagering services and the price of wagering services for non-SA TAB WSPs under alternative demand elasticity assumptions. We assume that supply elasticities are infinite.

Gross prices to consumers fall by about 8 per cent if the tax rate is reduced from 15 per cent to 10 per cent, and the result is the same regardless of the demand elasticity scenario. Intuition might lead one to expect that the reduction in the BOT rate from 15 per cent to 10 per cent would lead to a roughly 5 per cent decrease in gross prices. But there is an additional impact in that product fees also depend on gross prices. The reduction in the tax rate shrinks the product fees payable and this leads to a further reduction in gross prices. If the tax rate is reduced from 15 to 8 per cent a larger reduction in gross prices—11 per cent—is induced.

The quantity responses to tax rate reductions differ significantly according to the demand elasticity scenario. Changes in the tax rates lead to changes in gross prices, as outlined in the previous paragraph, and these price changes will affect the quantity of wagering services that customers buy. With a unit demand elasticity, quantities increase by just enough to offset the impact of lower gross prices and thus to preserve the net wagering expenditure of consumers. With low elasticities, the quantity responses from a tax cut are smaller, and with high elasticities they are larger. Reducing the tax rate from 15 per cent to 10 per cent on non-SA TAB WSPs, we see that there is an 8 per cent increase in the quantity of wagering services when the demand elasticity is 1.0, only a 2 per cent increase if the elasticity is 0.3, but a 28 per cent increase under the 'high' elasticity assumption of 3.0.

Table 5.2 summarises the financial outcomes under these different scenarios for wagering at non-SA TAB WSPs. The top block shows impacts on net wagering revenues (which by definition are equivalent to customers' net wagering expenditures). The subsequent blocks in Table 5.2 break down the NWR expenditures according to which stakeholders ultimately receive the revenues.

The net wagering revenue projections show that when demand is unit elastic, reducing the BOT rate to 10 per cent or to 8 per cent has no impact on NWR. With the low elasticity of 0.3, reducing the tax rate to 10 per cent leads to a $4.6 million reduction in NWR by 2021/22 while a rate reduction to 8 per cent leads to a $6.3 million reduction in NWR. With the high elasticity of 3.0, decreasing the tax rate from 15 per cent to 10 per cent increases NWR by $15 million in 2021/22, and decreasing it to 8 per cent produces a $21 million boost to NWR.

Under each of the scenarios considered here, reducing tax rates reduces South Australian Government BOT revenues. From Table 5.2, tax revenues in 2021/22 under unit elastic demand are reduced by $4.2 million if the tax rate is reduced to 10 per cent and by $5.8 million if it is reduced to 8 per cent. We regard this as the most plausible elasticity assumption, and the modelling here clearly indicates that South Australian Government does not gain revenue from cutting the BOT rate, in contradiction to the predictions presented by Thoroughbred Racing SA. The outcome for South Australian Government revenues is even more adverse with the low demand elasticity. And even if we take the high demand elasticity of 3.0—which we believe is implausibly high—there are still net losses of tax revenue of $2.7 million (with a 10 per cent BOT) or $4.2 million (with an 8 per cent BOT) in 2021/22. These results reject the argument that cutting the BOT rate would increase BOT revenues for the South Australian Government.

Table 5.3 compares the results of our modelling with the RWA modelling. Because we adopted RWA's 15 per cent BOT rate scenario as our baseline, our projections are identical to theirs for a 15 per cent tax rate. But in the 10 per cent BOT rate scenario we produce significantly lower projections of tax revenues than RWA. With a unit demand elasticity we estimate BOT revenues of $8.3 million in 2021/22, which is $6.2 million less than RWA's estimate of $14.5 million. With a higher elasticity assumption, the difference between RWA's estimate and ours is smaller, but still substantial. To reconcile with RWA's projections of non-SA TAB WSP revenues

[7] All the own-price elasticities of demand herein are negative, but we will typically speak of their absolute magnitudes.

for 2021/22 under both the 10 per cent and 8 per cent BOT rate scenarios, the elasticity of demand would need to be at least 7, which is far outside the range of plausible values.

Our model allows us to predict impacts on product fees collected from non-SA TAB WSPs by the South Australian codes from South Australian customers' wagering. These impacts depend on the rates and structure of product fees and also on the distribution of South Australian customers' wagering activity, and our assumptions are as outlined in Section 4.2. Table 5.2 shows the impacts. In the unit elastic demand scenario, reductions in tax rates have no impact on the product fees collected from South Australian customers by the South Australian codes. Under the low elasticity scenario, cutting the BOT rate has a negative impact on product fees. Under the high elasticity scenario—which uses an implausibly large elasticity of 3.0—cutting the BOT rate from 15 per cent to 10 per cent would boost product fees to the South Australian codes by $0.3 million in 2021/22 but at cost to the South Australian Government of $2.7 million in BOT revenues. Reducing the BOT rate to 8 per cent would lead to a $0.4 million boost to product fees in 2021/22 but with a $4.2 million loss of BOT revenues.

Table 5.2 also shows how the changes in NWR are distributed across key stakeholders, these being the South Australian Government, South Australian and out-of-State codes, GST revenue from wagering and non-SA TAB WSPs. With a unit elastic demand, the effects in 2021/22 from cutting the BOT rate from 15 to 10 per cent would be: NWR unchanged, reduce BOT collections by $4.2 million, product fees to the South Australian codes unchanged, product fees interstate unchanged, GST revenues from South Australian wagering unchanged and net revenues of WSPs up by $4.2 million. In the high elasticity scenario, if the BOT rate is cut from 15 per cent to 10 per cent the effects in 2021/22 would be: increase NWR by $15 million, reduce BOT collections by $2.7 million, increase product fees to the South Australian codes by $0.3 million, increase product fees interstate by $2.3 million, increase GST revenues from South Australian wagering by $1.3 million and increase the net revenues of WSPs by $14 million.[8]

Table 5.4 shows how the projections of BOT revenues are affected by using alternative parameter assumptions. These sensitivity tests use 3-year total BOT revenues for 2019/20 to 2021/22. What we learn from these sensitivity tests is that:

- If the assumed product fee rate is moderately higher or lower—we considered 24 per cent and 10 per cent product fee rates as alternatives to our central case of 17 per cent—the broad conclusion of our analysis is unchanged. At the lower product fee rate, the projected loss of tax revenue is a bit larger. For instance with a demand elasticity of 3 the tax revenue lost at a 10 per cent product fee rate is $9.5 million, compared with $9.0 million lost in our central case. And with a 24 per cent product fee rate the tax loss would be a bit smaller at $8.3 million. But these are differences of degree; the key lesson is that even with significantly different assumptions about product fee rates it remains the case that there are substantial negative impacts to SA Government BOT revenues from non-SA TABS WSPs if the BOT rate is reduced.
- If supply is less than perfectly elastic the key conclusion of our analysis still stands: Cutting the BOT rate reduces tax revenues, even for the polar case where the elasticity of supply is zero. With a demand elasticity of 0.3 and a BOT of 8 per cent, the tax revenue lost is projected to be $21 million when supply is perfectly elastic, whereas if the elasticity is zero then the revenue loss is almost the same at $20 million. In the high demand elasticity scenario, the tax revenues lost are larger when the supply elasticity is less-than-perfectly elastic. What this means is that the difference between RWA's projections and ours cannot be explained by making allowance for less-than-perfectly-elastic supply.

Thus the conclusion that the South Australian Government will lose BOT revenues from cutting the BOT rate is robust to alternative assumptions on non-SA TAB product fees and supply elasticities.

Table 5.5 shows how the projections of product fees paid by non-SA TAB WSPs to the South Australian codes are affected by using alternative parameter assumptions. Under the assumption of a unit demand elasticity, our projections are insensitive to parameter assumptions on non-SA TAB product fees and supply elasticities. But this is implied by the unit demand elasticity, for it means that changes in the tax rate do not affect net wagering revenues, and therefore product fees are unaffected by changes in tax rates. If we consider the case of high demand elasticity and reducing the BOT rate from 15 per cent to 10 per cent, then in our Central Case the product fees to South Australian codes are about $0.8 million higher for the three years 2019/20 to 2021/22.

[8] Roughly speaking we would expect changes in customers' net wagering expenditures to be associated with dollar-for-dollar offsetting reductions in other expenditures. As a consequence changes in GST revenues from wagering will tend to be roughly offset by reductions in GST revenues from other expenditures. Therefore the GST impacts in this table should not be taken to indicate the overall impact on Commonwealth GST collections from BOT rate changes.

The sensitivity analysis tells us that:

- If we use an average product fee of 10 per cent, the impact of cutting the BOT rate would be to boost product fee income by $0.4 million (i.e. smaller boost than in the central case). On the other hand, with a product fee of 24 per cent, the boost to income would be $1.2 million (i.e. a larger boost than in the central case).
- If we assume less-than-perfectly-elastic supply, the impact on product fees to South Australian codes is smaller. Indeed, with a supply elasticity of zero, cutting the BOT rate would have no impact on product fees. The reason is that under zero supply elasticity a cut in the BOT rate has no impact on net wagering revenues.

In conclusion, the central case shows that cutting the tax rate to 10 per cent or 8 per cent boosts product fees from non-SA TAB WSPs by something of the order of $1 million. The impact is larger the higher is the product fee. And if we move away from our central assumption of perfectly elastic supply to imperfectly elastic supply the impact on product fee income from tax rate cuts is smaller.

Table 5.1 Modelling assumptions, quantities and prices

		Demand Elasticity= -1				Demand Elasticity= -0.3				Demand Elasticity= -3			
	Base 15% BOT	**10% BOT**	**8% BOT**	**Ratio 10% to 15%**	**Ratio 8% to 15%**	**10% BOT**	**8% BOT**	**Ratio 10% to 15%**	**Ratio 8% to 15%**	**10% BOT**	**8% BOT**	**Ratio 10% to 15%**	**Ratio 8% to 15%**
Assumptions													
Demand elasticity		-1.00	-1.00			-0.30	-0.30			-3.00	-3.00		
Supply elasticity		infinity	infinity			infinity	infinity			infinity	infinity		
k		1.00	1.00			1.00	1.00			1.00	1.00		
Tax rate	0.15	0.15	0.15			0.15	0.15			0.15	0.15		
Product fee rate for non-SA TAB WSPs	0.17	0.17	0.17			0.17	0.17			0.17	0.17		
Effective GST	0.10	0.10	0.10			0.10	0.10			0.10	0.10		
Proportion of wagering on SA events	0.10	0.10	0.10			0.10	0.10			0.10	0.10		
Non-SA TAB WSPs													
Net wagering quantity	***units***	***units***	***units***	***ratio***	***ratio***	***units***	***units***	***ratio***	***ratio***	***units***	***units***	***ratio***	***ratio***
2017/18	118.7	128.8	132.8	1.08	1.12	121.7	122.8	1.02	1.03	151.6	166.3	1.28	1.40
2018/19	112.0	121.5	125.3	1.08	1.12	114.8	115.9	1.02	1.03	143.0	156.9	1.28	1.40
2019/20	98.8	107.2	110.5	1.08	1.12	101.3	102.2	1.02	1.03	126.2	138.4	1.28	1.40
2020/21	86.8	94.1	97.1	1.08	1.12	88.9	89.7	1.02	1.03	110.8	121.5	1.28	1.40
2021/22	76.2	82.6	85.2	1.08	1.12	78.1	78.8	1.02	1.03	97.3	106.7	1.28	1.40
Price relative to 2017/18 under 15% BOT	***index***	***index***	***index***	***ratio***	***ratio***	***index***	***index***	***ratio***	***ratio***	***index***	***index***	***ratio***	***ratio***
2017/18	1.00	0.92	0.89	0.92	0.89	0.92	0.89	0.92	0.89	0.92	0.89	0.92	0.89
2018/19	1.02	0.94	0.91	0.92	0.89	0.94	0.91	0.92	0.89	0.94	0.91	0.92	0.89
2019/20	1.04	0.96	0.93	0.92	0.89	0.96	0.93	0.92	0.89	0.96	0.93	0.92	0.89
2020/21	1.07	0.98	0.95	0.92	0.89	0.98	0.95	0.92	0.89	0.98	0.95	0.92	0.89
2021/22	1.09	1.01	0.98	0.92	0.89	1.01	0.98	0.92	0.89	1.01	0.98	0.92	0.89

Source: SACES calculations.

Table 5.2 Non-SA TAB net wagering revenue and its distribution, $ million

		Demand Elasticity= -1				Demand Elasticity= -0.3				Demand Elasticity= -3			
	Base 15% BOT	10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%
Net wagering revenue													
2019/20	102.8	102.8	102.8	0.0	0.0	97.1	95.0	-5.7	-7.8	121.0	128.7	18.2	25.9
2020/21	92.5	92.5	92.5	0.0	0.0	87.4	85.5	-5.1	-7.0	108.9	115.8	16.4	23.3
2021/22	83.3	83.3	83.3	0.0	0.0	78.7	77.0	-4.6	-6.3	98.0	104.2	14.7	21.0
3-year total	278.6	278.6	278.6	0.0	0.0	263.2	257.5	-15.4	-21.1	327.9	348.7	49.3	70.1
Tax revenue													
2019/20	15.4	10.3	8.2	-5.1	-7.2	9.7	7.6	-5.7	-7.8	12.1	10.3	-3.3	-5.1
2020/21	13.9	9.3	7.4	-4.6	-6.5	8.7	6.8	-5.1	-7.0	10.9	9.3	-3.0	-4.6
2021/22	12.5	8.3	6.7	-4.2	-5.8	7.9	6.2	-4.6	-6.3	9.8	8.3	-2.7	-4.2
3-year total	41.8	27.9	22.3	-13.9	-19.5	26.3	20.6	-15.5	-21.2	32.8	27.9	-9.0	-13.9
Product fees to SA codes													
2019/20	1.7	1.7	1.7	0.0	0.0	1.7	1.6	-0.1	-0.1	2.1	2.2	0.3	0.4
2020/21	1.6	1.6	1.6	0.0	0.0	1.5	1.5	-0.1	-0.1	1.9	2.0	0.3	0.4
2021/22	1.4	1.4	1.4	0.0	0.0	1.3	1.3	-0.1	-0.1	1.7	1.8	0.3	0.4
3-year total	4.7	4.7	4.7	0.0	0.0	4.5	4.4	-0.3	-0.4	5.6	5.9	0.8	1.2
Product fees outside SA													
2019/20	15.7	15.7	15.7	0.0	0.0	14.9	14.5	-0.9	-1.2	18.5	19.7	2.8	4.0
2020/21	14.2	14.2	14.2	0.0	0.0	13.4	13.1	-0.8	-1.1	16.7	17.7	2.5	3.6
2021/22	12.7	12.7	12.7	0.0	0.0	12.0	11.8	-0.7	-1.0	15.0	15.9	2.3	3.2
3-year total	42.6	42.6	42.6	0.0	0.0	40.3	39.4	-2.4	-3.2	50.2	53.4	7.5	10.7
GST revenue from wagering													
2019/20	9.3	9.3	9.3	0.0	0.0	8.8	8.6	-0.5	-0.7	11.0	11.7	1.7	2.4
2020/21	8.4	8.4	8.4	0.0	0.0	7.9	7.8	-0.5	-0.6	9.9	10.5	1.5	2.1
2021/22	7.6	7.6	7.6	0.0	0.0	7.2	7.0	-0.4	-0.6	8.9	9.5	1.3	1.9
3-year total	25.3	25.3	25.3	0.0	0.0	23.9	23.4	-1.4	-1.9	29.8	31.7	4.5	6.4
WSP net revenue													
2019/20	60.6	65.7	67.8	5.1	7.2	62.1	62.6	1.5	2.1	77.3	84.8	16.8	24.3
2020/21	54.5	59.1	61.0	4.6	6.5	55.9	56.4	1.3	1.9	69.6	76.3	15.1	21.8
2021/22	49.1	53.2	54.9	4.2	5.8	50.3	50.7	1.2	1.7	62.6	68.7	13.6	19.6
3-year total	164.1	178.1	183.6	13.9	19.5	168.2	169.7	4.1	5.6	209.6	229.9	45.4	65.7

Source: SACES calculations.

Table 5.3 Projections of Non-SA TAB BOT revenues, RWA and SACES, $ million

		SACES Estimate			Difference: SACES - TRSA		
	TRSA estimate	Demand Elasticity = -1	Demand Elasticity = -0.3	Demand Elasticity = -3	Demand Elasticity = -1	Demand Elasticity = -0.3	Demand Elasticity = -3
15% BOT rate							
2019/20	15.4	15.4	15.4	15.4	0.0	0.0	0.0
2020/21	13.9	13.9	13.9	13.9	0.0	0.0	0.0
2021/22	12.5	12.5	12.5	12.5	0.0	0.0	0.0
3-year total	41.8	41.8	41.8	41.8	0.0	0.0	0.0
10% BOT rate							
2019/20	12.3	10.3	9.7	12.1	-2.1	-2.6	-0.2
2020/21	13.4	9.3	8.7	10.9	-4.1	-4.6	-2.5
2021/22	14.5	8.3	7.9	9.8	-6.2	-6.7	-4.7
3-year total	40.3	27.9	26.3	32.8	-12.4	-13.9	-7.5
8% BOT rate							
2019/20	10.3	8.2	7.6	10.3	-2.0	-2.7	0.0
2020/21	11.6	7.4	6.8	9.3	-4.2	-4.7	-2.3
2021/22	13.1	6.7	6.2	8.3	-6.4	-6.9	-4.7
3-year total	34.9	22.3	20.6	27.9	-12.6	-14.3	-7.0

Source: TRSA (2019) and SACES calculations.

Table 5.4 Projections of 3 year totals of Non-SA TAB BOT revenues under alternative assumptions, $ millions

Assumption	Base 15% BOT	Demand Elasticity= -1 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	Demand Elasticity= -0.3 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	Demand Elasticity= -3 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%
Central Case	**41.8**	**27.9**	**22.3**	**-13.9**	**-19.5**	**26.3**	**20.6**	**-15.5**	**-21.2**	**32.8**	**27.9**	**-9.0**	**-13.9**
Non-SA TAB product fees													
17%	41.8	27.9	22.3	-13.9	-19.5	26.3	20.6	-15.5	-21.2	32.8	27.9	-9.0	-13.9
10%	41.8	27.9	22.3	-13.9	-19.5	26.5	20.8	-15.3	-21.0	32.2	27.3	-9.5	-14.5
24%	41.8	27.9	22.3	-13.9	-19.5	26.1	20.4	-15.7	-21.4	33.5	28.7	-8.3	-13.1
Supply Elasticity													
∞	41.8	27.9	22.3	-13.9	-19.5	26.3	20.6	-15.5	-21.2	32.8	27.9	-9.0	-13.9
10	41.8	27.9	22.3	-13.9	-19.5	26.4	20.7	-15.4	-21.1	31.6	26.5	-10.2	-15.3
0	41.8	27.9	22.3	-13.9	-19.5	27.9	22.3	-13.9	-19.5	27.9	22.3	-13.9	-19.5

Source: SACES calculations.

Table 5.5 Projections of 3 year totals of Product Fees for South Australian Codes under alternative assumptions, $ millions

Assumption	Base 15% BOT	Demand Elasticity= -1 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	Demand Elasticity= -0.3 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%	Demand Elasticity= -3 10% BOT	8% BOT	Difference 10% to 15%	Difference 8% to 15%
Central Case	4.7	4.7	4.7	0.0	0.0	4.5	4.4	-0.3	-0.4	5.6	5.9	0.8	1.2
Non-SA TAB product fees													
17%	4.7	4.7	4.7	0.0	0.0	4.5	4.4	-0.3	-0.4	5.6	5.9	0.8	1.2
10%	2.8	2.8	2.8	0.0	0.0	2.6	2.6	-0.1	-0.2	3.2	3.4	0.4	0.6
24%	6.7	6.7	6.7	0.0	0.0	6.3	6.1	-0.4	-0.6	8.0	8.6	1.4	1.9
Supply Elasticity													
∞	4.7	4.7	4.7	0.0	0.0	4.5	4.4	-0.3	-0.4	5.6	5.9	0.8	1.2
10	4.7	4.7	4.7	0.0	0.0	4.5	4.4	-0.3	-0.3	5.4	5.6	0.6	0.9
0	4.7	4.7	4.7	0.0	0.0	4.7	4.7	0.0	0.0	4.7	4.7	0.0	0.0

Source: SACES calculations.

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Appendix A

Model of the impact of the BOT rate

A.1 Equilibrium conditions

We draw on two conditions that must hold in a market equilibrium. Firstly, we have the 'market clearing condition'

$$D(p_G^*) - S(p_N^*) = 0, \tag{A1}$$

Secondly, following (1), we have the 'distributive identity'

$$p_N^* = (1 - f - v - t)p_G^*, \tag{A2}$$

which relates gross and net prices.

A.2 Impact of tax rate change on equilibrium price

We now consider the implications of changing the tax rate t while preserving market equilibrium. If we make a small change dt to the tax rate while observing the market equilibrium condition (A1) then we obtain

$$D'(p_G^*)\frac{dp_G^*}{dt} - S'(p_N^*)\frac{dp_N^*}{dt} = 0,$$

and then after differentiating (A2) we substitute for dp_N^*/dt and obtain

$$D'(p_G^*)\frac{dp_G^*}{dt} - S'(p_N^*)\left((1 - f - v - t)\frac{dp_G^*}{dt} - p_G^*\right) = 0.$$

We rearrange this to

$$\frac{dp_G^*}{dt} = -\frac{S'(p_N^*)p_G^*}{D'(p_G^*) - S'(p_N^*)(1 - f - v - t)}$$

and then we rewrite this expression in terms of the own-price demand and supply elasticities $\varepsilon_D(p_G^*)$ and $\varepsilon_S(p_N^*)$ defined in (3) and (4). This leads to the result

$$\begin{aligned}\frac{dp_G^*}{dt} &= -\frac{\varepsilon_S(p_N^*)\frac{Q^*}{p_N^*}p_G^*}{\varepsilon_D(p_G^*)\frac{Q^*}{p_G^*} - \varepsilon_S(p_N^*)\frac{Q^*}{p_N^*}(1 - f - v - t)} \\ &= -\frac{\varepsilon_S(p_N^*)\frac{Q^*}{p_G^*}\frac{p_G^*}{1-f-v-t}}{\varepsilon_D(p_G^*)\frac{Q^*}{p_G^*} - \varepsilon_S(p_N^*)\frac{Q^*}{p_G^*}} \\ &= -\frac{\varepsilon_S(p_N^*)}{\varepsilon_D(p_G^*) - \varepsilon_S(p_N^*)}\frac{p_G^*}{1 - f - v - t}.\end{aligned} \tag{A3}$$

In this general expression, the elasticities are allowed to vary across prices and thus quantities. But in empirical applications it is almost universally assumed that elasticities are constant along demand and supply curves. From now on we will assume constant elasticities and accordingly we will also drop the arguments to the elasticities (i.e. we will refer to ε_D rather than $\varepsilon_D(p_G^*)$ and similarly for supply elasticity). If we define

$$k = \frac{\varepsilon_S - \varepsilon_D}{\varepsilon_S}, \tag{A4}$$

then from (A3) we obtain

$$\left.\frac{dp_G^*}{dt}\right|_{k=constant} = \frac{1}{k}\frac{p_G^*}{1-f-v-t}. \qquad \text{(A5)}$$

We assume hereafter that $\varepsilon_D < 0$. That being so, when $\varepsilon_S = \infty$—i.e. highly elastic supply meaning that a small change in the net price induces a very large quantity response from suppliers—then $k = 1$. For $0 < \varepsilon_S < \infty$ we have $k > 1$ and as $\varepsilon_S \to 0$ then $k \to \infty$—i.e. k gets larger as the supply elasticity shrinks towards zero. We note in addition that k takes values in the range $[1, \infty]$.

A.3 Impact of tax rate changes on prices and quantities

Solving the differential equation (A5) gives the result

$$p_G^* = A(1-f-v-t)^{-1/k}. \qquad \text{(A6)}$$

where A is a constant specific to the parameters of the market. Therefore the proportional change in price when the tax rate changes from t_0 to t_1 will be given by

$$\frac{p_G^*(t_1)}{p_G^*(t_0)} = \left(\frac{1-f-v-t_1}{1-f-v-t_0}\right)^{-1/k}. \qquad \text{(A7)}$$

The impact of a small change in the tax rate on the quantity of net wagering supplied and demanded is given by

$$\frac{dQ^*}{dt} = \frac{dD}{dp_G^*}\frac{dp_G^*}{dt}$$

and using (2), the formula for elasticity of demand, and (A5) we obtain

$$\frac{dQ^*}{dt} = \varepsilon_D \frac{D}{p_G^*}\frac{dp_G^*}{dt}$$
$$= \varepsilon_D \frac{1}{k}\frac{Q^*}{1-f-v-t}.$$

This differential equation has the general solution

$$Q^* = B(1-f-v-t)^{-\varepsilon_D/k} \qquad \text{(A8)}$$

where B is a constant specific to the parameters of the market. Therefore the proportional change in quantity supplied and demanded when the tax rate changes from t_0 to t_1 will be given by

$$\frac{Q^*(t_1)}{Q^*(t_0)} = \left(\frac{1-f-v-t_1}{1-f-v-t_0}\right)^{-\varepsilon_D/k}. \qquad \text{(A9)}$$

A.4 Alternative GST treatment

If BOT and product fees were levied on prices net of GST, then equation (1) would become

$$p_N = (1-f-t)(1-v)p_G$$

and in this case the equilibrium gross price equation (5) would be modified to

$$p_G^* = A((1-f-t)(1-v))^{-1/k}.$$

Equation (6), which gives the ratio of the equilibrium gross prices at BOT rates t_1 and t_0, would be modified to

$$\frac{p_G^*(t_1)}{p_G^*(t_0)} = \left(\frac{(1-f-t_1)(1-v)}{(1-f-t_0)(1-v)}\right)^{-1/k} = \left(\frac{1-f-t_1}{1-f-t_0}\right)^{-1/k}.$$

Thus we see that while equilibrium gross prices continue to be affected by the GST rate, the ratio of equilibrium gross prices is independent of it.

In a similar fashion we find that equation (7), the expression for the ratio of equilibrium quantities, modifies to

$$\frac{Q^*(t_1)}{Q^*(t_0)} = \left(\frac{1-f-t_1}{1-f-t_0}\right)^{-\varepsilon_D/k}.$$

While equilibrium quantities are affected by the GST rate, the ratio of equilibrium quantities at different BOT rates are independent of it.

It follows that the ratio of the NWRs under tax rates t_1 and t_0, as calculated in (8), are also independent of the GST rate.