

The macroeconomic and distributional effects of reduced smoking prevalence in New South Wales

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The macroeconomic and distributional effects of reduced smoking prevalence in New South Wales

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Executive summary

Reducing smoking in NSW would significantly reduce output, employment and profits in tobacco industry itself, but would have very little overall impact on aggregate NSW output or employment. At the same time a reduction in smoking could constitute a significant step towards reducing the impact of poverty in the State. These are the main conclusions of this research study examining the economic impact of reduced smoking in NSW.

Proposals to implement policies aimed at reducing the prevalence of smoking in the Australian community are often met by counter-arguments put forward by tobacco industry interests asserting that reduced smoking would have damaging effects upon the Australian economy and workforce. On the other hand, there is a significant international economic literature suggesting that, after account is taken of the reallocated expenditures resulting from the money freed as a result of the smoking cessation, any resulting economic harm would in fact be much lower than claimed by the industry. Indeed, it is perfectly possible that positive economic benefits could result.

This issue is an empirical question which can only be resolved by quantitative analysis simulating the economic impacts of reduced smoking prevalence. The present study reports the results of such an analysis of the economic impact of reducing smoking prevalence in NSW. It examines the impact on output, employment and various other macroeconomic variables in New South Wales of a reduction in smoking prevalence in New South Wales.

The report presents simulation results on the basis of seven different scenarios with different combinations of assumptions concerning the reallocation of smoking expenditures and the government's budgetary response to reductions in tobacco tax revenue. Four scenarios, designated the *Expenditure Reallocation scenarios*, assume that the released smoking expenditures are reallocated to other forms of spending.

A further three scenarios, designated the *Tobacco Industry scenarios*, assume that the released smoking expenditures are neither reallocated to other components of spending nor saved, a totally unrealistic assumption. The latter scenarios are analysed solely in order to provide the basis for comparison between the results of tobacco industry research and more reasonable scenarios.

The results of the research can be summarised as follows:

1. Aggregate effects on NSW employment and Gross State Product

The table below summarises the aggregate impact over five years of the prevalence reduction according to the Expenditure Reallocation scenarios.

Scenario	Change in total NSW output (per cent)	Change in total NSW employment (number)	Change in total NSW employment (per cent)
Expenditure Reallocation 1	0.001	-908	-0.034
Expenditure Reallocation 2	-0.006	-513	-0.019
Expenditure Reallocation 3	0.003	-799	-0.030
Expenditure Reallocation 4	-0.004	-407	-0.015

Scenario 3, which assumes that governments respond to a decline in tobacco tax revenues by reducing government expenditures, is considered to be the most politically plausible of the above scenarios. However, scenario 4, in which the governmental response is to increase income tax revenue, is the scenario which minimizes job losses.

Two important conclusions can be drawn from analysis of these results:

1. The effects upon aggregate NSW output and employment of a 25 per cent decline in NSW smoking prevalence would clearly be minor; and
2. Whether these minor changes were positive or negative would depend upon which scenario was adopted.

It is possible, therefore, to conclude with great confidence that the aggregate effects upon the NSW economy of a decline in NSW smoking prevalence would be largely neutral in their effects on output and employment. There would certainly not be the important negative effects (except in the tobacco industry itself) that industry interests have claimed. Normal growth in national output and employment would easily absorb any negative economic impacts of a decline in smoking.

It would be possible to simulate other governmental responses to the budgetary decline caused by reduced smoking. However, it is clear that the major conclusion of this study, that the macroeconomic impact of reduced smoking would be minor, would remain unaffected.

2. NSW sectoral impacts on output, employment, revenue and profits

The only NSW industry which would be a significant loser would be tobacco products. The only other NSW industries which would unequivocally lose, though to a minor degree, on any of the four Expenditure Reallocation scenarios would be paper, printing and publishing; property and business services, government administration; and education. Even the impact on the NSW tobacco products industry would be relatively small since the assumed reduction in smoking prevalence is for NSW alone, not for other Australian States or the export market. For those industries adversely affected, any slack created by any reductions in output or employment would almost certainly be easily taken up by the effects of economic growth in the Australian economy over the period.

In some industries the issue of whether the economic outcome of reduced tobacco consumption is positive or negative depends upon the nature of the assumed scenarios, though in all cases the effects are minor. For the majority of sectors the economic effects would be unequivocally positive, though small.

Industries experiencing increases in output and employment would also be likely to experience increases in revenue, profits and rates of return. Similarly, industries of declining output and employment would be likely to suffer declines in these three variables. Without access to specific information about demand and cost conditions in the various industries it is not possible to be more specific about the likely outcomes.

Tobacco industry-sponsored studies tend to ignore certain economic activities associated with tobacco consumption, in particular the provision of health care services for those made ill either by their own smoking or by the smoking of others. There is considerable evidence that public resources available for the provision of health care services in NSW are constrained and that demand for these services currently exceeds supply. Thus, a reduction in that part of health care demand which is related to smoking-attributable diseases would enable a reallocation of health resources to other sectors of health, rather than a reduction in the total resources devoted to the provision of health care in NSW. The performance of the NSW health care sector would improve rather than there being a decline in the output of, and employment in, the health sector.

3. The impact on NSW and Federal budgets

At the State level, apart from any public expenditure costs incurred by NSW in achieving reduced smoking prevalence, the budgetary impact of reduced smoking will be very minor. At the Federal level, the direction of the budgetary outcome depends on the scenario adopted. In the case of the two Expenditure Reallocation scenarios in which the predicted change in output

is negative, indirect tax revenue will fall and this will reduce the federal budget surplus (or increase the deficit). In the two Expenditure Reallocation scenarios where the change in output is positive, this will increase indirect tax revenue and increase the federal surplus (or reduce the deficit).

4. The balance of payments impact

The small falls in output predicted in two Expenditure Reallocation scenarios will reduce imports and so improve the current account (reduce the deficit). The small increases in output predicted by the other two Expenditure Reallocation scenarios will increase imports and so cause a deterioration in the current account. The estimated change in the current account varies from a decrease in the deficit of \$153.6m in the worst case Tobacco Industry scenario to an increase in the deficit of only \$5.0m in the best case Expenditure Reallocation scenario.

5. The impact on NSW households

The proportion of the incomes of smoking households spent on tobacco falls very significantly as household income rises. The poorest smoking households spent in 1998/9 an average of over 18 per cent of their income on tobacco while smoking households in the top income quintile spent only 3 per cent of their total income on tobacco.

In households where smoking ceased, substantial benefits would accrue in terms of the weekly funds released for alternative purchases. Added to these would be the benefits of improved health and life expectancy resulting from smoking cessation. Relative to household income, the greatest benefits, in terms of additional available expenditure, would accrue to the poorest 20 per cent of households.

6. Public policy implications

As the economic impacts of reduced smoking prevalence have been shown to be close to neutral they are not an issue which should be taken into account in the framing of public health policy. Similarly, complaints by the tobacco industry that raising tobacco taxes in order to discourage smoking would have a detrimental impact on the poor are shown to be baseless, since it is the poorest households who would stand to gain the most from reduced smoking. The Federal Government has an important role to play in using higher tobacco taxes to achieve a reduction in smoking prevalence.

1. Introduction

An important objective of public health policy is to reduce rates of smoking, as most tobacco-attributable diseases are costly yet preventable. Proposals to implement policies aimed at reducing the prevalence of smoking in the Australian community are often met by counter-arguments put forward by tobacco industry interests, who assert that to reduce smoking would have damaging effects upon the Australian economy and employment in the Australian workforce. Reduced smoking would, it is argued, destroy many jobs in the tobacco industry and associated industries. At the same time, as a result of the decline in the tobacco industry and the flow-on effects of this decline to other industries, there would be significant falls in the values of Australian national income and output.

On the other hand, there exists a significant international literature suggesting that, after account is taken of the reallocated expenditures resulting from the money freed as a result of the smoking cessation, any resulting economic harm would in fact be much lower than claimed by the industry. Indeed, some international studies have indicated that positive economic benefits ensue, in terms of higher national income and a greater number of jobs.

This issue is an empirical question which can only be settled by quantitative analysis simulating the economic impacts of reduced smoking prevalence. The present study reports the results of such an analysis of the economic impact upon NSW of a reduction in smoking prevalence in NSW.

2. The research objectives

The overall aim of the project is to provide quantitative information on the size and incidence of the economic impact upon NSW which would result from a one percentage point reduction in NSW smoking prevalence per annum over five years and over 10 years as a result of the release of consumption and production resources into alternative uses.

Specific objectives are:

1. to identify which sectors of the economy would be disadvantaged by a lower prevalence of smoking, and by how much;
2. to identify which sectors of the economy would benefit from a lower prevalence of smoking, and by how much;
3. to estimate – to the extent possible using available data – the effects on the following key social and economic indicators that would result from the above changes in NSW smoking prevalence and the consequent release of resources into alternative uses:
 - The distribution of disposable income in NSW, with particular emphasis on lower socio-economic households;
 - Federal and NSW State Government budgets;
 - Employment in major sectors of the NSW economy;
 - The national balance of payments; and
 - The NSW gross state product;
4. to review the broad impact of the reduction in smoking prevalence on major economic sectors, indicating the probable direction and broad impact on revenue, profit and return on investment.

3. Background to the study

Tobacco industry groups in Australia and in many other countries have employed consultants to estimate the macroeconomic contribution of tobacco-related activities, particularly to national output and employment (see Jacobs *et al*, 2000). These studies almost all estimate the contribution of all production stages of the industry from tobacco growing through manufacturing to the distribution and retail sale of tobacco products. Some estimate the flow-on effects of the industry to other industries which, for example, supply inputs to the tobacco industry.

An example of this type of approach appears in a recent study by PricewaterhouseCoopers (2001), which was commissioned by Australia's three major tobacco manufacturers/distributors (Philip Morris, British American Tobacco and Imperial Tobacco). It estimates that the Australian tobacco industry in 1999/2000 produced value-added (the contribution to gross domestic product) of \$6,251m. in tobacco industry output, with flow-on effects to other industries of a further \$21,297m., giving a total estimated impact of \$27,549m. (4.4 per cent of Gross Domestic Product). PricewaterhouseCoopers include indirect taxes in all these figures, which inflates the apparent contribution of the industry. In fact, indirect taxes, mainly excise taxes on tobacco products, represented 81.4 per cent of the estimated value added contribution of the tobacco industry (PricewaterhouseCoopers, 2001, p.6). The study also estimates that the industry created 311 full-time equivalent (FTE) jobs in tobacco growing, 3,270 in tobacco manufacturing, 18,460 in retailing and distribution, and a flow-on of 35,643 in other industries, giving a total of 57,684 FTE jobs.

Earlier, ACIL Economics and Policy (1994), in a study commissioned by the Tobacco Institute of Australia, had estimated the value added in 1992/93 by the tobacco industry (growing and manufacturing) to be \$3,425m. It included in its calculation tobacco product taxes (88 per cent of total value added) but excluded tobacco distribution and retailing, saying that their relative importance was small. Also excluded were what it called "second round activities", industries supplying inputs to the tobacco industry whose value added was estimated by PricewaterhouseCoopers (2001), on the grounds that "including these activities as part of the tobacco smoking industry would constitute double counting since they would already be included in GDP in other industries" (ACIL Economics and Policy, 1994, p.35).

The Australian Bureau of Statistics, in its publication *Australian System of National Accounts: Concepts, Sources and Methods* offers the following definition of gross value added. "Gross value added is defined as the value of output at basic prices minus the value of intermediate consumption at purchasers' prices. The term is used to describe gross product by industry and by sector. Basic prices valuation of output removes the distortion caused by variations in the incidence of commodity taxes and subsidies across the output of individual industries." (Australian Bureau of Statistics, 2000, p.457) This quotation makes clear the fact that the ABS excludes product taxes from its definition of value added.

The results of these types of studies are used by the tobacco industry to argue that public policies designed to reduce tobacco consumption would have damaging economic effects through the resulting reductions in employment and national output.

The problem with this type of conclusion is that these studies estimate only the *gross* output and employment generated by the industry. They take no account of the fact that a reduction in spending on tobacco would inevitably be accompanied by an increase in spending on alternative goods and services and/or an increase in saving. If gross estimates are used to estimate the potential economic losses resulting from reduced smoking, there is an implicit and totally untenable assumption that reduced spending on smoking will lead to neither increased alternative spending nor increased saving. The use of gross estimates results in serious overestimation of the economic harm resulting from reduced smoking. Indeed, there is no *a priori* reason to believe that the economic impact would necessarily be harmful. It is perfectly possible, as international studies have shown, that the change might result in higher national income and employment.

Occasionally, studies conducted for the tobacco industry acknowledge that alternative spending patterns would generate compensating employment. “In the most telling example of this, buried in chapter V of volume 1 of the detailed technical report prepared by analysts at Chase Econometrics (1985) is the acknowledgment that money not spent on tobacco products would be reallocated to other spending and that nationwide (combining tobacco and nontobacco states), the economic results with and without tobacco ‘would be substantially the same’. The report authors explicitly observed that compensatory responses to the absence of tobacco spending ‘that would occur automatically within the Chase Econometrics Macroeconomic Model ... were constrained from taking place within [the firm’s] analysis’” (Chaloupka and Warner, 1999 p.44).

In recent years several international academic studies have attempted to estimate the economic impact of the reduction or elimination of smoking, taking into account the redistribution of resources freed as a result of reduced expenditure on tobacco. Table 1, based on Table 13.4 in Jacobs *et al* (2000), summarises the results of some recent studies adopting this approach in estimating the impact on developed economies at a similar level of affluence to Australia.

Table 1: International studies of the impact on employment of reduced smoking

Place	Study	Tobacco demand assumption	Outcome
Scotland	McNicoll and Boyle (1992)	Elimination of domestic consumption expenditures in 1989	Net gain of 7,869 jobs in 1989
Michigan	Warner and Fulton (1994)	Two scenarios 1993-2000: 1. Elimination of domestic consumption expenditures 2. Doubling rate of decline in consumption	Net gain of 5,600 jobs in 1992, an additional 1,500 jobs by 2005
U.S.A.	Warner <i>et al</i> (1996)	Two scenarios 1992-2005: 1. Elimination of domestic consumption expenditures 2. Doubling rate of decline in consumption	Net gain of 47 jobs in 1993 and 133,000 by 2000, 19,719 net jobs with doubled rate of consumption decline
U.K.	Buck <i>et al</i> (1995)	40 per cent decline in domestic consumption expenditures in 1990	Net gain of 115,688 EFT jobs in 1990
Canada	Irvine and Sims (1997)	20 per cent decline in domestic demand for cigarettes in 1995	Net loss of 6,120 jobs in 1995
South Africa	van der Merwe (1998)	Elimination of domestic consumption expenditures	Net gain of 50,236 jobs in 1995

Only one of the above studies predicts a decline in employment and even that decline is, in national terms, minor. All others predict job gains. No studies of this type have been conducted in Australia, although the Industry Commission published an inquiry into the tobacco growing and manufacturing industries in 1994 (Industry Commission, 1994), and the aim of the present study is to remedy this deficiency.

In appraising the tobacco industry arguments concerning the importance of tobacco to a country’s economy, Warner and Fulton (1995, p.181) produce a further criticism that “the industry ignores a wealth of economic activity associated with tobacco product consumption, including the provision of healthcare services for those made ill by tobacco, the earlier use of the services of morticians, the need for more cleaning of clothes soiled by tobacco smoke, greater consumption of air filtration systems and so on. Logically these are economic activities for which the tobacco industry should claim credit”.

4. General methodological issues

Any study attempting to quantify the economic impact of tobacco control policies must compare the current actual situation with some alternative hypothetical (or counterfactual) situation in which certain changes, both policy and behavioural, are assumed to have taken place. These necessary assumptions are of three types:

1. **The extent of the reduction in tobacco consumption.** This assumed reduction can range from a small percentage reduction in smoking to its complete elimination. Since there appear to be no grounds for believing that it would be possible in Australia in the foreseeable future to eliminate smoking completely, the simulation of a reduction in smoking, rather than its complete elimination, is the most appropriate tobacco demand assumption;
2. **The alternative expenditure pattern resulting from a reduction in smoking expenditure.** Macroeconomic models generally assume that a given proportion of income will be saved and that this is invariant to the pattern of consumption expenditures. An implication is that the money freed up as a result of reduced smoking is likely to be fully spent on other goods and services rather than some proportion being saved. However, a question remains as to how the money freed as a result of the reduction in smoking will be spent. Some behavioral possibilities are that households who quit smoking:
 - Spend the money freed in the same proportions as those of their non-tobacco expenditures;
 - Spend the money freed according to the expenditure patterns of non-smoking households; or
 - adopt new expenditure patterns different from either of the above.
3. **The budgetary response of governments to a change in tobacco tax revenue.** In examining how governments might respond to changes in tobacco tax revenues, an important issue to be determined is how the reduction in smoking has been achieved. If it has resulted from higher rates of tobacco tax, and given the fact that the price elasticity of the demand for tobacco is almost universally less than unity (that is, a given percentage increase in price will lead to a smaller percentage decrease in the quantity demanded of tobacco) (see Chaloupka *et al*, 2000) tobacco tax revenue will actually rise. If the smoking reduction has been achieved by non-tax means the government's budgetary position will have declined, as a result of both reduced tax revenue (the tax rate on tobacco almost certainly being higher than on the alternative expenditures) and possible increased public expenditures, for example on anti-smoking programs and regulatory policies. If there were to be a budgetary deterioration, governments could respond by one, or a combination, of the following:
 - Increases in non-tobacco taxes, for example personal income taxes;
 - Reductions in non tobacco-related public expenditures; and
 - An increase in the budget deficit (or a reduction in the surplus), with consequent interest rate effects.

All three responses will have contractionary effects, although these effects will not be identical. Different assumed governmental responses to possible budgetary deterioration will lead to different outcomes for national employment and output.

It is not possible to be definitive about the nature of any of the three types of responses discussed above. Thus, the approach of this study is to simulate the effects of various plausible combinations of budgetary responses and to compare the results of these simulations.

5. Methodology of this study

This section of the report provides an outline of the methodology used in this study. Full details of the methodology are presented in Appendix B.

The project examines the impact on output, employment and various other macroeconomic variables in NSW of a reduction in smoking prevalence in NSW of one percentage point per year over five-year and ten-year time horizons, commencing in 2002-03. In this study, this assumed reduction in prevalence has been modelled as a 25% reduction in NSW household consumption expenditure on tobacco products in 2007-08 (a reduction of \$794.4m in purchasers' prices) and a 50% reduction in 2012-13 (a reduction of \$1,588.8m in purchasers' prices). There are three distinct components to the project.

First, expenditure patterns are estimated from the *1998-99 Household Expenditure Survey* (HES) for non-smoking and smoking households in New South Wales (where inclusion in the 'smoking household' category is determined by non-zero expenditure on tobacco products by at least one member of the household in the survey period).

Second, based on assumptions about the redistribution of expenditures following a reduction in smoking prevalence in New South Wales, the resulting changes in expenditure are incorporated into an input-output framework for 2002-03 (based on the *1996-97 Input-Output Tables* for Australia) to forecast the Australia-wide changes in output and employment associated with the new pattern of expenditure.

Third, estimates of the changes in output and employment for New South Wales are derived in a two-stage process. In the first stage, a number of industries are identified as "local" industries, in the sense that changes in expenditure on an industry's output in a particular region (in this case, New South Wales) are assumed to have their entire impact within the region. That is, we assume that there is no interstate trade in the output of such industries. Thus, for local industries, the absolute changes in output and employment in New South Wales will be the estimated Australia-wide changes generated from the input-output analysis. The local industries used in this study are those identified in the NSW Tourism Commission (1989) report *The Economic Impacts of Tourism* – these include, *inter alia*, industries such as soft drinks and cordials, residential construction, wholesale and retail trade, and education. In the second stage, the estimated percentage changes in output and employment for non-local industries (that is, national industries) in New South Wales are assumed to be equal to the estimated Australia-wide changes.

Analysis of the expenditure patterns of non-smoking and smoking households in NSW, derived from the 1998-99 HES, indicates that these households have different expenditure patterns, although it is not possible, for technical reasons, to indicate whether these differences are statistically significant. Table 2 below presents estimates from the HES of the expenditure patterns of smoking, non-smoking and former smoking households in NSW. Non-smoking households are defined as households that spend no money on smoking. Where households spend any money on smoking they are categorized as smoking households. The expenditure patterns of former smoking households are derived by allocating proportionately the forgone smoking expenditure to the other expenditure categories so that total expenditure remains unaltered.

Table 2: NSW household expenditures by smoking and non-smoking households, 1998/9, percentages of total expenditure

Expenditure category	NSW non-smoking households (% of total expenditure)	NSW smoking households (% of total expenditure)	NSW former smoking households (% of total expenditure)	All NSW households (% of total expenditure)
Food	12.88	12.97	13.84	12.89
Alcohol	1.80	2.82	3.01	2.15
Tobacco products	0.00	6.28	0.00	2.17
Clothing and footwear	4.04	3.54	3.78	3.86
Housing	32.48	26.03	27.77	30.37
Furnishings and household equipment	6.46	7.18	7.66	6.70
Health	4.18	3.02	3.23	3.77
Transport	13.34	13.30	14.19	13.30
Communications	2.24	2.46	2.63	2.31
Recreation and culture	6.99	6.77	7.23	6.90
Education services	1.67	1.53	1.63	1.62
Hotels, cafes and restaurants	3.93	4.01	4.28	3.95
Miscellaneous goods and services	10.00	10.08	10.76	10.01
Total	100.00	100.00	100.00	100.00
Average annual household expenditure	\$45,084	\$49,816	\$49,816	\$46,702

Source: Australian Bureau of Statistics, Household Expenditure Survey 1998-99 (unpublished data) and authors' calculations.

The above table indicates that the mean expenditure of non-smoking households is relatively higher on clothing and footwear, housing, health, and education; relatively lower on alcohol and furnishings and household equipment; and, largely similar on the other expenditure categories. This suggests that changes in the composition of Household Final Consumption Expenditure would result from a fall in smoking prevalence. It is assumed that these differences in non-smoking/smoking expenditure patterns derived from the 1998/99 HES are maintained in 2002/03 and over the time horizon of this study.

Expenditure on tobacco products in N.S.W as reported in the 1998/99 HES was \$1,295m.; the corresponding figure from the Household Final Consumption Expenditure estimates in the *Australian National Accounts 2002/03* (5204.0) is \$2,405m. This means that only 53.8 per cent of actual expenditure on tobacco products in 1998/99 was reported in the HES. This tendency to under-report tobacco expenditure (as well as alcohol expenditure) is noted in the *Australian Consumer Price Index: Concepts, Sources and Methods 2003* (6461.0) thus "The 1998/99 HES has tobacco expenditure at around two-thirds and alcohol expenditure at a little over half of their respective national accounts estimates." (paragraph 6.13, p 51), though our estimates in this study suggest an even higher level of under-reporting. Adjustments have been made to relative expenditure shares for the under-reporting of expenditure on tobacco and alcohol; however, the estimates of the reduction in tobacco expenditure in NSW in 2007/08 and 2012/13 (\$794.4m and \$1,588.8m respectively) are based on the actual figure for tobacco expenditure from the *Australian National Accounts 2002/03*.

The input-output analytical framework employed in this study combines data at the industry level relating to the production of intermediate goods and services (that is, goods and services used in the production of other goods and services) with data relating to final demand for goods and services (household consumption expenditure, gross fixed capital expenditure, exports, etc.) and value added in the production process (in the form of wages and gross

profits). The data are presented in the form of a matrix, with industries and value added in the columns and industries and the components of final demand in the rows. The *1996-97 Input-Output Tables* for Australia (5209.0) include a 35-industry table and a more finely disaggregated 106-industry table. For any industry (for example, tobacco products, clothing, road transport) the elements in the row corresponding with that industry show sales of that industry's output to other industries and to final users; by contrast, the elements in that industry's column show purchases by that industry of other industries' output and also value added by that industry.

The inter-industry component of the input-output table (the part of the table dealing with sales and purchases of intermediate goods and services) can be algebraically manipulated to generate a matrix of total requirements coefficients. Total requirements coefficients show the amount by which any industry's output will increase (decrease) following a \$1 increase (decrease) in final demand for that industry's output. For example, if households increase their demand for textile products by \$1, the textile industry will increase output by \$1 (the direct effect). In order to increase its output, the textile industry will increase its demand for intermediate inputs from other industries, and their output will also increase. As other industries increase production, they too will increase demand for intermediate goods including textiles, leading to a further increase in demand for textile production, etc (the indirect effect). Thus the final increase in the textile industry's output following a \$1 increase in final demand will exceed \$1 – the total effect of the initial change in final demand and its repercussion effects is shown for each industry in the matrix of total requirements coefficients. It is the input-output table in this form that is used to generate the results in this study.

One important feature of input-output tables that needs to be kept in mind in interpreting the results of this study is that all outputs are measured in basic prices (that is, factory door prices before inclusion of margins for distribution, wholesale and retail trade, etc and addition of net indirect taxes). Output is said to be measured at market prices when margins and net indirect taxes are included – estimates of Gross Domestic Product and other national accounting aggregates are normally measured at market prices.

Consumption expenditures, and the other components of final demand for goods and services, are measured at purchasers' prices and have been converted to basic prices (that is, purchasers' prices less net indirect taxes on production and expenditure and distributors' margins) because the valuation of transactions in input-output tables is at basic prices.

The *1996-97 Input-Output Tables* are the latest input-output tables that are available for Australia. Their use in this study involves the standard assumptions that the input-output coefficients are stable over time and that there is sufficient excess productive capacity and unemployed labour to allow any induced changes in production to occur. The version of the input-output table employed in this project is the 106 industries table; this permits the highest possible level of disaggregation in the results.

The new final demand vector includes not only the changes in Household Final Consumption Expenditure outlined above, but also any changes in government expenditure following the changes in indirect taxation revenue caused by the reduced expenditure on tobacco products. As with consumption expenditure, several scenarios are possible. Any shortfall in forecast taxation revenue can be met by a reduction in government expenditure on goods and services or by an increase in taxation of goods and services or of income.

We report below the simulation results on the basis of seven different scenarios with different combinations of assumptions concerning the reallocation of smoking expenditures and the government's budgetary response to reductions in tobacco tax revenue. Four scenarios, designated the *Expenditure Reallocation (ER) scenarios*, assume that the released smoking expenditures are reallocated to other forms of spending. A further three scenarios, designated the *Tobacco Industry (TI) scenarios*, assume that the released smoking expenditures are not reallocated to other components of spending. The latter scenarios are analysed solely in order to provide the basis for comparison between the results of tobacco industry research and more reasonable scenarios.

Full details of the seven scenarios are as follows:

Expenditure Reallocation scenarios

ER1 — households that quit smoking are assumed to spend the money freed according to the expenditure patterns of non-smoking households, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure;

ER2 — households that quit smoking are assumed to spend the money freed according to the expenditure patterns of non-smoking households, and the impact on net indirect taxation revenue is met by an equal increase in income tax;

ER3 — households that quit smoking are assumed to spend the money freed according to their proportions of non-tobacco expenditures, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure; and,

ER4 — households that quit smoking are assumed to spend the money freed according to their proportions of non-tobacco expenditures, and the impact on net indirect taxation revenue is met by an equal increase in income tax.

Tobacco Industry scenarios

T11 — the released expenditure is neither reallocated to other components of spending nor saved, and government spending is not reduced to offset the reduction in net indirect taxation;

T12 — the released expenditure is neither reallocated to other components of spending nor saved, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure; and,

T13 — the released expenditure is neither reallocated to other components of spending nor saved, and the impact on net indirect taxation revenue is met by an equal increase in income tax.

A further scenario which might be considered is a reduction in NSW smoking prevalence induced by an increase in excise taxes. In this case, the reduction in net indirect tax revenue associated with the scenarios above would be ameliorated by the increase in the rate of excise tax. Indeed, depending on the value of the price elasticity of demand for tobacco products, it may be that net indirect tax revenue would rise.

However, in order to isolate the economic impact solely on NSW of a change in NSW smoking prevalence it is necessary to make the conventional *ceteris paribus* (all other things being equal) assumption. In this case, this means that it must be assumed that the policies leading to the postulated reduction in NSW smoking prevalence have, at the same time, no impact on smoking prevalence in the other Australian States. Thus, it is not possible to simulate the economic effects on NSW of a reduction in prevalence achieved by an increase, imposed solely in NSW, of the federal tobacco excise, since the Australian Government lacks the constitutional power to impose discriminatory taxes on individual States. As a result of the 1997 High Court decisions in the *Ha and Lim v NSW* and *Walter Hammond and Associates Pty. Ltd. v NSW* cases, the individual States lack any constitutional power to apply taxes to tobacco (or indeed to any other product).

The *ceteris paribus* assumption is a necessary methodological provision in order to identify solely the economic impact on NSW. In practice, anti-smoking policies in one State may well have an impact on smoking prevalence in other States as well. For example, the sponsorship by state Quit campaigns of sporting teams may well (particularly through the Australia-wide televising of sports events) have external benefits for other States.

In generating the percentage changes in total output for the 106 industries in the input-output table, it has been assumed that there is no economic growth or inflation over the five-year

period 2002/03 to 2007/08. The same assumption is made for the ten year period. This means that the reported percentage changes (positive and negative) reflect *only* the consequences of the reduction in tobacco expenditures on Household Final Consumption Expenditure together with any changes in final demand caused by household expenditure reallocations and the budgetary response of the government to the induced reduction in indirect tax collections. That is, the level and composition of Total Final Demand are assumed to vary in the periods under study only as a result of the direct and indirect effects of reduced smoking prevalence. Thus the results reported here arise only from the reduction in smoking prevalence and are not affected by the impacts of economic growth or inflation.

Given that corrections are made for these other impacts, the ten year period changes turn out simply to be twice the five year changes.

As Warner and Fulton (1995) point out, tobacco industry-sponsored studies tend to ignore certain economic activities associated with tobacco consumption, in particular the provision of health care services for those made ill either by their own smoking or by the smoking of others. It is unlikely that the tobacco industry would wish to draw attention to the results of the use of their product. There is, however, a different reason for not addressing the economic impact of these activities in the present study.

A high proportion of NSW health care, particularly in hospitals and nursing homes is publicly provided and/or publicly funded. There is considerable evidence that public resources available for the provision of health care services are constrained and that demand for these services exceeds supply under present charging arrangements. Thus, a reduction in that part of health care demand which is related to smoking-attributable diseases would enable a reallocation of health resources to other sectors of health, rather than a reduction in total resources devoted to the provision of health care in NSW. The performance of the NSW health care sector would improve, rather than there being a decline in the output of, and employment in, the health sector.

6. The estimated economic impacts of reduced smoking prevalence

The following tables present estimates of the various economic impacts upon NSW industry and NSW households of a 25 percent reduction in NSW smoking prevalence over 5 years and of a 50 per cent reduction in NSW smoking prevalence over 10 years. The results are presented for four so-called Expenditure Reallocation (ER) scenarios and three Tobacco Industry (TI) scenarios. The Tobacco Industry scenarios are presented only for the purposes of comparison but, for the reasons presented earlier, no credence should be assigned to these types of estimates.

The estimates are presented on the basis of several possible scenarios and have been calculated on the basis of the best available data. In addition, both the HES and the input-output data, the two fundamental information sources for research exercises of this kind, are four years or more out of date. For this reason care should be taken not to assign undue significance to the particular estimated values for changes in industry output or employment. We are, however, confident about the general orders of magnitude of the results and about the directions of change (for example, increases or decreases in output). Given that the ER and TI simulations are made using the same data, the comparison between the two types of estimates is highly significant.

As indicated above, in generating the estimates of changes in total output and employment it was assumed that there was no economic growth or inflation over the periods under study. Thus the results presented below arise only from the reduction in smoking prevalence and are not distorted by the impacts of economic growth or inflation. In practice, any reductions in output or employment would almost certainly be masked (except in the case of the tobacco industry itself) by the effects of economic growth in the Australian economy over the period, which would take up any slack created by the decline in smoking.

The estimates represent the effects of the reduction in smoking prevalence over the entire period under review.

Results are presented for five year and ten year periods. However the research methodology assumes stability of the input-output coefficients and the longer is the period under study the more vulnerable this assumption becomes. It is thus our view that attention should be paid mainly to the five year estimates rather than the ten year estimates. The latter are, in any case, simply twice those of the shorter period.

6.1 Aggregate effects on NSW employment and Gross State Product

Table 3 and Table 4 present summaries of the estimated impacts upon industry employment and output over the five and ten year periods respectively. A 35 industry breakdown of these results is presented in subsequent tables, with an even more detailed 86 industry breakdown of output changes being presented in Appendix A. It should be noted that the output changes are presented in percentage terms, while the employment figures represent changes in both actual numbers of full time equivalent employment and in percentages of total sectoral employment. Estimates of changes in employment in the tobacco products industry are presented in order to indicate that all scenarios, whether ER or TI, produce consistent estimates for employment in the tobacco industry itself.

Table 3: Summary of changes in total NSW output and employment resulting from a 25 per cent reduction in NSW smoking prevalence, 2002/3 to 2007/8, various scenarios

Scenario	Output (per cent)	Total employment (number)	Total employment (per cent)	Tobacco products employment (number)
Expenditure Reallocation 1	0.001	-908	-0.034	-103
Expenditure Reallocation 2	-0.006	-513	-0.019	-105
Expenditure Reallocation 3	0.003	-799	-0.030	-103
Expenditure Reallocation 4	-0.004	-407	-0.015	-105
Tobacco Industry 1	-0.033	-1,016	-0.038	-103
Tobacco Industry 2	-0.095	-3,709	-0.137	-103
Tobacco Industry 3	-0.103	-3,252	-0.120	-105

The ER scenarios indicate that any change in NSW output resulting from a decline in smoking would be very minor – the estimates range from -0.006 per cent to +0.003 per cent over the full five year period. All ER scenarios indicate small declines in employment, ranging from 0.015 per cent to 0.034 per cent over the five years. To put these estimates in perspective, Australian gross domestic product (measured in constant prices) rose by 2.6 per cent in the year to September quarter 2003 and employment rose by 2.1 per cent in the same period. The estimates presented here are calculated on the basis that everything else is held constant, so that the effects of reduced smoking are isolated. In reality, normal growth in output and employment would easily absorb the very minor economic effects of reduced smoking.

All TI scenarios produce negative outcomes because of the totally unrealistic assumption that there would be no reallocation of expenditure and yet no increase in saving. However, the table shows that even the TI scenarios produce relatively minor falls in NSW aggregate and employment – a maximum aggregate decline in NSW output of 0.103 per cent and in employment of 3,709 full-time jobs.

In the current political climate there is a strong presumption by both major political parties in Australia that income taxes should not be increased, so that any budgetary decline is more likely to be met by reductions in government expenditure. It is our view that the most plausible assumption about alternative expenditure patterns resulting from reduced smoking is that the

money freed will be spent according to the households' proportions of non-tobacco expenditures. Thus it would appear that ER3 is the most plausible of the seven scenarios. On the other hand, the government response to reduced tobacco tax revenue which would minimise job losses would be to increase income taxes – that is scenario ER4.

Since the objective of this study was to estimate the economic impact on NSW of a decrease in NSW smoking prevalence, it was not possible, for the reasons discussed earlier, to simulate the impact of reduced smoking prevalence achieved by an increase in tobacco excise. In a national (rather than State) study of the economic impact of reduced smoking it would however, be possible to simulate such an excise increase. In this case the Federal Government's need to respond to reduced tax revenues by either reducing government expenditure or increasing income taxes would, at the very least, be reduced compared with the scenarios examined here. Thus, in such a policy implemented nationally, the percentage loss of employment from a given reduction in smoking prevalence could be significantly less than for policies implemented by individual States. Indeed, it is perfectly possible that an increase in employment might result.

Two important conclusions can be drawn from analysis of the more realistic ER scenarios:

1. The effects upon aggregate NSW output and employment of a 25 per cent decline in NSW smoking prevalence would clearly be minor; and
2. Whether the changes in output were positive or negative would depend upon the nature of the scenario simulated.

It is possible, therefore, to state with great confidence the important conclusion that the aggregate effects upon the NSW economy of a decline in NSW smoking prevalence would be largely neutral in their effects on output and employment. There would certainly not be the important negative effects that tobacco industry interests have claimed.

There are refinements of the four ER scenarios which could be simulated. For example, the ER scenarios which assume the governmental response of a reduction in public expenditure assume that this reduction is proportionate across-the-board. Another possibility would be to assume that certain sectors (for example, health) were insulated from the expenditure cuts. Where the scenarios assume a tax response, different tax mixes could be simulated. It is clear, however, that these alternative scenarios would have only a marginal impact on the macroeconomic outcomes. The major conclusion of this study, that the macroeconomic impact of reduced smoking would be minor, would remain unaffected.

Table 4 presents a summary of estimates of economic change over a ten year period. Attention is once again drawn to our warning that caution should be exercised in using the longer term estimates, although the broad conclusions drawn in relation to the five year analysis would clearly still hold.

Table 4: Summary of changes in total NSW output and employment resulting from a 50 per cent reduction in NSW smoking prevalence, 2002/3 to 2012/13, various scenarios

Scenario	Output (per cent)	Total employment (number)	Total employment (per cent)	Tobacco products employment (number)
Expenditure Reallocation 1	0.002	-1,815	-0.067	-206
Expenditure Reallocation 2	-0.012	-1,026	-0.038	-209
Expenditure Reallocation 3	0.006	-1,598	-0.059	-206
Expenditure Reallocation 4	-0.008	-815	-0.030	-209
Tobacco Industry 1	-0.065	-2,032	-0.075	-206
Tobacco Industry 2	-0.189	-7,418	-0.274	-206
Tobacco Industry 3	-0.206	-6,503	-0.240	-210

6.2 Sectoral impacts on NSW employment, output, revenue and profit

The next four tables show a 35 industry breakdown of the results over a five year period for the four ER scenarios and the three TI scenarios. The 35 industry breakdown is derived from the estimated changes for 106 industries. The smaller set of industries (corresponding with the 35 industries in the 1996-97 *Input-Output Tables*) has been used to facilitate presentation and discussion of the results. The full set of results for the five year analysis is reported in Appendix A.

Table 9 classifies the 35 industries according to whether they would be gainers or losers from the decline in smoking prevalence according to ER scenarios.

Table 5: Percentage changes in NSW sectoral outputs resulting from a 25 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 35 industry classification, Expenditure Reallocation scenarios

Industry Classification	ER1 %	ER2 %	ER3 %	ER4 %
Agriculture, hunting and trapping	0.022	-0.026	0.029	-0.018
Forestry and fishing	0.015	0.000	0.021	0.006
Mining	0.015	0.005	0.016	0.006
Meat and dairy products	0.097	0.031	0.106	0.040
Other food products	0.141	0.052	0.152	0.064
Beverages (alcoholic and non-alcoholic)	0.138	0.031	0.193	0.087
Tobacco products	-6.990	-7.095	-6.990	-7.094
Textiles	0.076	0.020	0.083	0.028
Clothing and footwear	0.105	0.033	0.099	0.028
Wood and wood products	0.015	0.006	0.016	0.007
Paper, printing and publishing	-0.012	-0.037	-0.007	-0.031
Petroleum and coal products	0.043	0.012	0.048	0.016
Chemicals	-0.018	-0.003	-0.015	0.001
Rubber and plastic products	0.033	0.007	0.042	0.015
Non-metallic mineral products	0.018	0.012	0.019	0.013
Basic metals and products	0.016	0.007	0.018	0.009
Fabricated metal products	0.024	0.011	0.028	0.014
Transport equipment	0.043	0.018	0.047	0.022
Other machinery and equipment	0.010	0.002	0.013	0.005
Miscellaneous manufacturing	0.030	0.001	0.037	0.008
Electricity, gas and water	0.080	0.042	0.070	0.032
Construction	-0.019	0.003	-0.020	0.002
Wholesale trade	0.017	-0.022	0.024	-0.015
Retail trade	0.080	-0.070	0.092	-0.057
Repairs	0.115	0.024	0.125	0.034
Accommodation, cafes and restaurants	-0.007	-0.093	0.001	-0.085
Transport and storage	0.003	0.002	0.008	0.007
Communication services	0.035	-0.008	0.048	0.005
Finance and insurance	0.072	0.003	0.077	0.009
Property and business services	-0.013	-0.023	-0.009	-0.019
Government administration	-0.306	-0.001	-0.303	0.000
Education	-0.239	0.000	-0.237	0.000
Health and community services	-0.212	0.003	-0.222	-0.009
Cultural and recreational services	0.008	-0.031	0.013	-0.025
Personal and other services	-0.061	-0.002	-0.053	0.006
Total NSW	0.001	-0.006	0.003	-0.004

Table 6: Percentage changes in NSW sectoral outputs resulting from a 25 percent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 35 industry classification, Tobacco Industry scenarios

Industry Classification	T11 %	T12 %	T13 %
Agriculture, hunting and trapping	-0.053	-0.062	-0.117
Forestry and fishing	-0.028	-0.080	-0.097
Mining	-0.007	-0.021	-0.032
Meat and dairy products	-0.012	-0.017	-0.094
Other food products	-0.007	-0.012	-0.114
Beverages (alcoholic and non-alcoholic)	-0.017	-0.026	-0.149
Tobacco products	-6.990	-6.990	-7.112
Textiles	-0.030	-0.053	-0.112
Clothing and footwear	-0.005	-0.023	-0.105
Wood and wood products	-0.011	-0.033	-0.043
Paper, printing and publishing	-0.049	-0.100	-0.128
Petroleum and coal products	-0.017	-0.043	-0.080
Chemicals	-0.021	-0.094	-0.076
Rubber and plastic products	-0.023	-0.062	-0.093
Non-metallic mineral products	-0.005	-0.027	-0.034
Basic metals and products	-0.005	-0.022	-0.032
Fabricated metal products	-0.010	-0.039	-0.054
Transport equipment	-0.005	-0.024	-0.053
Other machinery and equipment	-0.008	-0.034	-0.043
Miscellaneous manufacturing	-0.011	-0.033	-0.066
Electricity, gas and water	-0.018	-0.054	-0.099
Construction	-0.001	-0.032	-0.007
Wholesale trade	-0.048	-0.080	-0.126
Retail trade	-0.114	-0.115	-0.288
Repairs	-0.030	-0.059	-0.164
Accommodation, cafes and restaurants	-0.085	-0.117	-0.217
Transport and storage	-0.022	-0.077	-0.078
Communication services	-0.030	-0.091	-0.142
Finance and insurance	-0.022	-0.062	-0.142
Property and business services	-0.045	-0.111	-0.122
Government administration	-0.003	-0.366	-0.012
Education	-0.002	-0.333	-0.056
Health and community services	-0.003	-0.325	-0.076
Cultural and recreational services	-0.024	-0.107	-0.152
Personal and other services	-0.008	-0.192	-0.124
Total NSW	-0.033	-0.095	-0.103

Under the ER scenarios there is a mix of gainers and losers although, with the exception of the Tobacco Products industry, all the changes, positive or negative, would be small.

The tobacco industry is estimated to lose approximately seven per cent of output on all ER scenarios. This percentage might, at first glance, appear small given that it is in response to a 25 per cent reduction in smoking prevalence. However, in this study the assumed reduction in smoking prevalence is for NSW alone. The NSW tobacco industry exports to other Australian States (as well as overseas). In addition, some of the impact of the decline in NSW prevalence will be exported to other States and other countries which supply, directly or indirectly, to the NSW smoking market.

The following two tables present the estimated impact on sectoral employment of the five year prevalence reduction. The conclusions in relation to employment are the same as those in

relation to output. Some industries gain and some lose under the ER scenarios, although the only significant loser is the tobacco industry, with a decline of around 105 jobs. As indicated above, the slack created by any reductions in output or employment in specific industries would be easily taken up by the effects of economic growth in the Australian economy over the period.

The tables also present, for the purposes of comparison, data on total full-time equivalent (FTE) employment in each of the 35 sectors. FTE employment is calculated by the Australian Bureau of Statistics as the number in full-time employment plus half the number in part-time employment.

Table 7: Changes in NSW sectoral employment resulting from a 25 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 35 industry classification, Expenditure Reallocation scenarios

Industry Classification	ER1 (number)	ER2 (number)	ER3 (number)	ER4 (number)	2002/3 NSW total FTE (number)
Agriculture, hunting and trapping	18	-21	24	-14	81,125
Forestry and fishing	1	0	1	0	6,388
Mining	2	1	3	1	16,625
Meat and dairy product	18	6	20	7	18,863
Other food products	40	15	43	18	28,163
Beverages (alcoholic and non-alcoholic)	9	2	13	6	6,688
Tobacco products	-103	-105	-103	-105	1,475
Textiles	5	1	6	2	7,138
Clothing and footwear	15	5	15	4	14,713
Wood and wood products	3	1	3	1	20,600
Paper, printing and publishing	-6	-17	-3	-14	45,800
Petroleum and coal products	1	0	1	0	2,950
Chemicals	-5	-1	-4	0	26,813
Rubber and plastic products	4	1	5	2	11,900
Non-metallic mineral products	3	2	3	2	14,650
Basic metals and products	4	2	5	3	27,950
Fabricated metal products	8	4	9	5	31,875
Transport equipment	8	3	9	4	18,300
Other machinery and equipment	4	1	6	2	46,163
Miscellaneous manufacturing	6	0	8	2	21,050
Electricity, gas and water	21	11	18	8	26,013
Construction	-43	6	-44	5	225,350
Wholesale trade	26	-33	35	-23	148,925
Retail trade	239	-208	275	-168	298,063
Repairs	71	15	77	21	61,913
Accommodation, cafes and restaurants	-8	-112	1	-102	120,275
Transport and storage	4	3	11	10	138,200
Communication services	21	-5	28	3	58,300
Finance and insurance	101	5	108	12	139,638
Property and business services	-46	-79	-33	-65	346,088
Government administration	-336	-1	-332	0	109,763
Education	-412	0	-409	-1	172,263
Health and community services	-529	7	-555	-23	249,638
Cultural and recreational services	5	-21	9	-17	67,600
Personal and other services	-58	-2	-50	6	95,000
Total NSW	-908	-513	-799	-407	2,706,250
Total change as per cent of NSW FTE	-0.034	-0.019	-0.030	-0.015	

Table 8: Changes in NSW sectoral employment resulting from a 25 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 35 industry classification, Tobacco Industry scenarios

Industry Classification	T11 (number)	T12 (number)	T13 (number)	2002/3 NSW total FTE (number)
Agriculture, hunting and trapping	-43	-50	-95	81,125
Forestry and fishing	-2	-5	-6	6,388
Mining	-1	-3	-5	16,625
Meat and dairy products	-2	-3	-18	18,863
Other food products	-2	-3	-32	28,163
Beverages (alcoholic and non-alcoholic)	-1	-2	-10	6,688
Tobacco products	-103	-103	-105	1,475
Textiles	-2	-4	-8	7,138
Clothing and footwear	-1	-3	-16	14,713
Wood and wood products	-2	-7	-9	20,600
Paper, printing and publishing	-22	-46	-58	45,800
Petroleum and coal products	-1	-1	-2	2,950
Chemicals	-6	-25	-20	26,813
Rubber and plastic products	-3	-7	-11	11,900
Non-metallic mineral products	-1	-4	-5	14,650
Basic metals and products	-1	-6	-9	27,950
Fabricated metal products	-3	-12	-17	31,875
Transport equipment	-1	-4	-10	18,300
Other machinery and equipment	-4	-16	-20	46,163
Miscellaneous manufacturing	-2	-7	-14	21,050
Electricity, gas and water	-5	-14	-26	26,013
Construction	-3	-72	-15	225,350
Wholesale trade	-72	-120	-187	148,925
Retail trade	-339	-342	-860	298,063
Repairs	-19	-36	-102	61,913
Accommodation, cafes and restaurants	-102	-141	-261	120,275
Transport and storage	-30	-106	-107	138,200
Communication services	-18	-53	-83	58,300
Finance and insurance	-31	-87	-198	139,638
Property and business services	-157	-384	-422	346,088
Government administration	-3	-401	-14	109,763
Education	-4	-573	-96	172,263
Health and community services	-7	-811	-191	249,638
Cultural and recreational services	-16	-72	-103	67,600
Personal and other services	-8	-183	-117	95,000
Total NSW	-1,016	-3,709	-3,252	2,706,250
Total change as per cent of NSW FTE	-0.038	-0.137	-0.120	

According to the Tobacco Industry scenarios, analysed in Table 6 and Table 8, all industries lose from a decline in smoking prevalence. However on the more realistic Expenditure Reallocation scenarios analysed in Table 5 and Table 7 there are gainers and losers, in terms of both output and employment. Table 9 below presents a summary of which industries gain under all ER scenarios, which industries lose under all ER scenarios and for which industries the outcome depends upon the ER scenario adopted.

Table 9: Classification of 35 NSW industries according to the results of the Expenditure Reallocation simulations

Increased output and employment	Reduced output and employment	Outcome dependent on simulation scenario
Forestry and fishing	Tobacco products	Agriculture, hunting and trapping
Mining	Paper, printing and publishing	Chemicals
Meat and dairy products	Property and business services	Construction
Other food products	Government administration	Wholesale trade
Beverages (alcoholic and non-alcoholic)	Education	Retail trade
Textiles		Accommodation, cafes and restaurants
Clothing and footwear		Communication services
Wood and wood products		Health and community services
Petroleum and coal products		Cultural and recreational services
Rubber and plastic products		Personal and other services
Non-metallic mineral products		
Basic metals and products		
Fabricated metal products		
Transport equipment		
Other machinery and equipment		
Miscellaneous manufacturing		
Electricity, gas and water		
Repairs		
Transport and storage		
Finance and insurance		

Although the sector *accommodation, cafes and restaurants* is classified as having an outcome dependent on the simulation scenario, the single positive outcome represents a very small benefit.

It should be noted that the policy simulated here is a reduction in prevalence. There is no reason to believe that the outcome would be the same as that for smoking bans in restaurants, clubs etc which other studies have examined. In addition the category includes *accommodation* and it proved impossible to disaggregate this group further.

The relatively large negative impact on government administration, health and community services, and education industries under scenarios ER1 and ER3 is a direct consequence of the assumption made in these scenarios regarding the response of the government to the reduction in indirect taxes following the reduction in smoking prevalence. Public expenditure on government administration, health and community services, and education is a significant proportion of government final consumption expenditure; a proportionate reduction in all categories of government consumption expenditure will, therefore, have a relatively large impact on these three expenditure categories. Further, these three industries are relatively labour-intensive so that they will exhibit relatively greater employment changes than for most other industries for any given output change. This explains why although scenarios ER1 and ER3 generate small output gains, as compared with the small output losses generated in scenarios ER2 and ER4, nevertheless give rise to larger reductions in employment.

Those industries which Table 9 indicates would experience increases in output and employment would also be likely to experience increases in revenue, profits and rates of return. Similarly, industries of declining output and employment would be likely to suffer declines in these variables. Without access to specific information about demand and cost conditions in the various industries (for example, whether they had spare capacity which could be utilized to meet the demand increase) it is not possible to be more specific about the likely outcomes.

The following four tables present estimates for the output and employment effects of a 50 per cent decline in NSW smoking prevalence over ten years.

Table 10: Percentage changes in NSW sectoral outputs resulting from a 50 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2012/3, 35 industry classification, Expenditure Reallocation scenarios

Industry Classification	ER1 %	ER2 %	ER3 %	ER4 %
Agriculture, hunting and trapping	0.044	-0.051	0.059	-0.036
Forestry and fishing	0.030	0.000	0.042	0.013
Mining	0.030	0.011	0.032	0.012
Meat and dairy products	0.195	0.062	0.211	0.079
Other food products	0.281	0.105	0.303	0.129
Beverages (alcoholic and non-alcoholic)	0.276	0.062	0.386	0.175
Tobacco products	-13.980	-14.191	-13.980	-14.189
Textiles	0.152	0.041	0.166	0.056
Clothing and footwear	0.209	0.066	0.198	0.057
Wood and wood products	0.030	0.012	0.033	0.014
Paper, printing and publishing	-0.025	-0.073	-0.015	-0.063
Petroleum and coal products	0.086	0.023	0.095	0.033
Chemicals	-0.037	-0.005	-0.029	0.002
Rubber and plastic products	0.067	0.013	0.083	0.030
Non-metallic mineral products	0.035	0.023	0.038	0.026
Basic metals and products	0.031	0.014	0.036	0.019
Fabricated metal products	0.049	0.022	0.055	0.029
Transport equipment	0.086	0.035	0.094	0.044
Other machinery and equipment	0.019	0.004	0.025	0.010
Miscellaneous manufacturing	0.061	0.003	0.073	0.016
Electricity, gas and water	0.161	0.083	0.141	0.064
Construction	-0.038	0.006	-0.039	0.004
Wholesale trade	0.034	-0.044	0.047	-0.031
Retail trade	0.160	-0.140	0.184	-0.113
Repairs	0.230	0.047	0.249	0.069
Accommodation, cafes and restaurants	-0.014	-0.187	0.002	-0.169
Transport and storage	0.006	0.004	0.015	0.014
Communication services	0.071	-0.016	0.096	0.009
Finance and insurance	0.145	0.007	0.154	0.018
Property and business services	-0.027	-0.045	-0.019	-0.038
Government administration	-0.612	-0.002	-0.606	0.000
Education	-0.478	0.000	-0.475	-0.001
Health and community services	-0.424	0.006	-0.444	-0.019
Cultural and recreational services	0.016	-0.061	0.026	-0.051
Personal and other services	-0.122	-0.003	-0.105	0.013
Total NSW	0.002	-0.012	0.006	-0.008

Table 11, Percentage changes in NSW sectoral outputs resulting from a 50 percent reduction in NSW smoking prevalence over the period 2002/3 to 2012/3, 35 industry classification, Tobacco Industry scenarios

Industry Classification	T11 %	T12 %	T13 %
Agriculture, hunting and trapping	-0.107	-0.123	-0.234
Forestry and fishing	-0.056	-0.160	-0.194
Mining	-0.014	-0.041	-0.064
Meat and dairy products	-0.025	-0.034	-0.188
Other food products	-0.015	-0.023	-0.227
Beverages (alcoholic and non-alcoholic)	-0.033	-0.052	-0.299
Tobacco products	-13.980	-13.980	-14.224
Textiles	-0.059	-0.106	-0.224
Clothing and footwear	-0.010	-0.046	-0.211
Wood and wood products	-0.023	-0.065	-0.086
Paper, printing and publishing	-0.097	-0.199	-0.255
Petroleum and coal products	-0.034	-0.087	-0.159
Chemicals	-0.041	-0.188	-0.152
Rubber and plastic products	-0.047	-0.124	-0.186
Non-metallic mineral products	-0.011	-0.054	-0.068
Basic metals and products	-0.010	-0.045	-0.064
Fabricated metal products	-0.020	-0.077	-0.108
Transport equipment	-0.011	-0.048	-0.107
Other machinery and equipment	-0.015	-0.068	-0.086
Miscellaneous manufacturing	-0.023	-0.066	-0.133
Electricity, gas and water	-0.037	-0.108	-0.198
Construction	-0.003	-0.064	-0.014
Wholesale trade	-0.097	-0.161	-0.252
Retail trade	-0.227	-0.230	-0.577
Repairs	-0.060	-0.117	-0.328
Accommodation, cafes and restaurants	-0.170	-0.234	-0.434
Transport and storage	-0.043	-0.154	-0.155
Communication services	-0.061	-0.182	-0.283
Finance and insurance	-0.044	-0.125	-0.284
Property and business services	-0.091	-0.222	-0.244
Government administration	-0.006	-0.731	-0.025
Education	-0.004	-0.665	-0.112
Health and community services	-0.005	-0.650	-0.153
Cultural and recreational services	-0.048	-0.214	-0.304
Personal and other services	-0.016	-0.385	-0.247
Total NSW	-0.065	-0.189	-0.206

Table 12: Changes in NSW sectoral employment resulting from a 50 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2012/3, 35 industry classification, Expenditure Reallocation scenarios

Industry Classification	ER1 (number)	ER2 (number)	ER3 (number)	ER4 (number)	2002/3 Total FTE (number)
Agriculture, hunting and trapping	36	-42	48	-29	81,125
Forestry and fishing	2	0	3	1	6,388
Mining	5	2	5	2	16,625
Meat and dairy products	37	12	40	15	18,863
Other food products	79	30	85	36	28,163
Beverages (alcoholic and non-alcoholic)	18	4	26	12	6,688
Tobacco products	-206	-209	-206	-209	1,475
Textiles	11	3	12	4	7,138
Clothing and footwear	31	10	29	8	14,713
Wood and wood products	6	2	7	3	20,600
Paper, printing and publishing	-11	-34	-7	-29	45,800
Petroleum and coal products	3	1	3	1	2,950
Chemicals	-10	-1	-8	1	26,813
Rubber and plastic products	8	2	10	4	11,900
Non-metallic mineral products	5	3	6	4	14,650
Basic metals and products	9	4	10	5	27,950
Fabricated metal products	16	7	18	9	31,875
Transport equipment	16	6	17	8	18,300
Other machinery and equipment	9	2	12	5	46,163
Miscellaneous manufacturing	13	1	15	3	21,050
Electricity, gas and water	42	22	37	17	26,013
Construction	-86	13	-88	9	225,350
Wholesale trade	51	-66	71	-45	148,925
Retail trade	478	-417	550	-337	298,063
Repairs	142	29	154	42	61,913
Accommodation, cafes and restaurants	-17	-225	2	-204	120,275
Transport and storage	8	6	21	19	138,200
Communication services	41	-10	56	5	58,300
Finance and insurance	202	10	215	24	139,638
Property and business services	-92	-157	-65	-130	346,088
Government administration	-672	-2	-665	0	109,763
Education	-824	0	-818	-1	172,263
Health and community services	-1,059	14	-1,109	-46	249,638
Cultural and recreational services	11	-41	18	-34	67,600
Personal and other services	-116	-3	-100	12	95,000
Total NSW	-1,815	-1,026	-1,598	-815	2,706,250
Total change as per cent of NSW FTE	-0.067	-0.038	-0.059	-0.030	

Table 13: Changes in NSW sectoral employment resulting from a 50 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2012/3, 35 industry classification, Tobacco Industry scenarios

Industry Classification	T11 (number)	T12 (number)	T13 (number)	2002/3 Total FTE (number)
Agriculture, hunting and trapping	-87	-100	-190	81,125
Forestry and fishing	-4	-10	-12	6,388
Mining	-2	-7	-11	16,625
Meat and dairy products	-5	-6	-35	18,863
Other food products	-4	-7	-64	28,163
Beverages (alcoholic and non-alcoholic)	-2	-3	-20	6,688
Tobacco products	-206	-206	-210	1,475
Textiles	-4	-8	-16	7,138
Clothing and footwear	-1	-7	-31	14,713
Wood and wood products	-5	-13	-18	20,600
Paper, printing and publishing	-45	-91	-117	45,800
Petroleum and coal products	-1	-3	-5	2,950
Chemicals	-11	-50	-41	26,813
Rubber and plastic products	-6	-15	-22	11,900
Non-metallic mineral products	-2	-8	-10	14,650
Basic metals and products	-3	-12	-18	27,950
Fabricated metal products	-7	-25	-34	31,875
Transport equipment	-2	-9	-20	18,300
Other machinery and equipment	-7	-31	-39	46,163
Miscellaneous manufacturing	-5	-14	-28	21,050
Electricity, gas and water	-10	-28	-51	26,013
Construction	-6	-144	-31	225,350
Wholesale trade	-144	-239	-375	148,925
Retail trade	-678	-685	-1,720	298,063
Repairs	-37	-72	-203	61,913
Accommodation, cafes and restaurants	-205	-281	-522	120,275
Transport and storage	-60	-212	-215	138,200
Communication services	-36	-106	-165	58,300
Finance and insurance	-61	-174	-397	139,638
Property and business services	-313	-768	-843	346,088
Government administration	-7	-803	-27	109,763
Education	-8	-1,146	-193	172,263
Health and community services	-14	-1,622	-382	249,638
Cultural and recreational services	-32	-145	-205	67,600
Personal and other services	-15	-366	-235	95,000
Total NSW	-2,032	-7,418	-6,503	2,706,250
Total change as per cent of NSW FTE	-0.075	-0.274	-0.240	

6.3 The impact on Federal and NSW budgets

All of the scenarios considered above assume that the fall in smoking prevalence reduces expenditure on tobacco products in NSW by \$794.4m over five years and \$1,588.8m over ten years at market prices. This will, in turn, reduce net indirect taxes by \$567.8m and \$1,135.5m respectively and this will impact on the federal budget (increasing the deficit or reducing the surplus). To put these figures into context, \$567.8m. represents 0.3 per cent of total estimated federal tax revenue in 2003-04 and 5.8 per cent of the estimated increase in total federal revenue between 2003-04 and 2004-05 (see Federal Treasury, 2003).

Scenario TI1 assumes no response from the government to this deterioration in their budgetary position and so, in this scenario, the federal budget will have a larger deficit/smaller surplus of \$567.8m in 2007-08 and \$1,135.5 in 2012-13.

Scenarios TI2, TI3, and the four Expenditure Reallocation scenarios assume that the federal government responds to the fall in net indirect taxes either by reducing government expenditure by the fall in net indirect taxes, or by increasing income tax by the fall in net indirect taxes (after adjusting, in both cases, for any further changes in net indirect taxation in the expenditure reallocation scenarios). That is, the first round effect on the federal budget is neutral. However, to the extent that total output changes in these scenarios, there will be an impact on the federal budget because of the resulting change in indirect tax collections. Thus if, as is the case in scenarios TI2, TI3, ER2 and ER4, the change in output is negative, indirect tax revenue will fall and this will increase the deficit/reduce the surplus. In the case of scenarios ER1 and ER3, the change in output is positive and this will increase indirect tax revenue and reduce the deficit/increase the budget surplus.

At the State level, apart from any public expenditure costs incurred by NSW in achieving reduced smoking prevalence, the budgetary impact upon the State will be very minor. Tobacco excises are federal taxes and so have no impact on the NSW budget. During the extended transition period into the new federal-state financial arrangements under the GST, any changes in GST revenue effectively accrue to the Federal Government (see Collins, 2000). Given the severely limited taxing powers of the States, the only NSW taxes whose revenues could be significantly affected by reduced smoking are payroll and gambling taxes. However, the Expenditure Reallocation scenario outcomes, which affect neither output nor employment to a significant extent, indicate that such revenue effects would be extremely minor.

6.4 The balance of payments impact

Exports of goods and services are assumed to be unchanged by the reduction in smoking prevalence and the subsequent induced changes in output in the seven scenarios considered. Imports, on the other hand, are assumed to be a constant proportion of output. Therefore an induced fall in output (scenarios TI1, TI2, TI3, ER2 and ER4) will reduce imports and improve the current account (reduce the deficit); an induced increase in output (scenarios ER1 and ER3) will increase imports and cause a deterioration in the current account (increase the deficit). The estimated change in the current account varies from a reduction in the deficit of \$153.6m for scenario TI3 (which generated the largest fall in output) to an increase in the deficit of \$5.0m for scenario ER3 (which generated the largest increase in output).

6.5 The impact on NSW households

An economic argument frequently put forward by the tobacco industry is that it is inappropriate to implement higher rates of tobacco tax in order to reduce smoking prevalence because tobacco taxation is regressive – that is, poor households will be hit proportionately much harder by the tax than more affluent households. It is certainly true that poorer households pay a higher proportion of their income in the form of tobacco tax, although more affluent households still pay higher absolute amounts than the poorest households (see Table 14 below).

One of the objectives of this study is to consider the important issue of the economic impact of reduced smoking prevalence on households, especially those in lower socio-economic groups. These impacts are dependent to a very considerable extent on the means by which the prevalence reduction is achieved. Two broad types of policies can be applied:

1. Increased tobacco tax. There will be two types of consequences from such an increase:

- **Continuing smokers** will pay higher tax-inclusive prices for their cigarettes. Given, as discussed earlier, that the price elasticity of demand for cigarettes is less than unity, total tax revenue will rise even when tobacco consumption falls. There is some evidence (see, for example, Chaloupka *et al*, 2000) that the tobacco price elasticity is higher for families in lower socio-economic groups – that is, that their demand is more responsive to price increases than households in general – and this will moderate to some extent this tax effect. However, continuing smokers, while paying higher prices, will not experience any health benefits from the tax change. Without knowing full details of the tax measures by which the simulated reduction in smoking prevalence has been achieved it is not possible to make an estimate of the net effect of the tax changes on households containing continuing smokers.
- **Quitting smokers** will eliminate their tobacco expenditure, including the tax component. They will also experience longer term health benefits.

2. Non-tax measures. These are measures that involve increased expenditures by governments or NGOs, such as public health education campaigns, controls over tobacco sales to minors, and the banning of cigarette advertising and sponsorship. In this case quitting smokers will gain longer term health benefits, while neither quitting smokers nor continuing smokers will suffer tax increases (except possible minor ones resulting from the need to fund anti-smoking expenditure measures).

Information about tobacco expenditures classified by household income is provided by the Household Expenditure Survey (HES) (Australian Bureau of Statistics, 6533.0 and unpublished data). Table 14 provides information from the latest HES on household tobacco expenditures in 1998/9, classified by quintiles of smoking households ranked by their total gross household income from all sources. Thus, the lowest quintile represents the poorest 20 per cent of smoking households, etc. Column 2 shows the weekly household income range for each quintile in 1998/9 and Column 3 shows the average income of households in each quintile. Column 4 shows the HES estimates of average weekly expenditure on tobacco by NSW smoking households, adjusted to take account of the under-reporting (discussed above) of tobacco expenditures in the HES. Column 5 presents these expenditures expressed as percentages of average income of NSW smoking households. Households reporting negative incomes have been excluded from these estimates.

Table 14: Expenditure on tobacco by tobacco purchasing households in NSW, as a percentage of gross household income from all sources, 1998/9

Quintile (20 per cent)	Income range	Average income	Average adjusted tobacco expenditure	Adjusted expenditure on tobacco as a proportion of household income
	\$ p.w.	\$ p.w.	\$ p.w.	%
Lowest	0-374	236.44	43.90	18.57
Second	375-659	506.03	64.91	12.83
Third	660-1,006	802.88	58.91	7.34
Fourth	1,007-1,539	1,241.25	70.46	5.68
Highest	1,540 & over	2,054.58	63.64	3.10

Sources: Household Expenditure Survey 1998-99, unpublished data; and authors' calculations.

Table 14 shows that the proportion of the incomes of smoking households spent on tobacco falls very significantly as household income rises. The poorest smoking households spent in 1998/9 an average of over 18 per cent of their income on tobacco while smoking households in the top income quintile spent only 3 per cent of their total income on tobacco.

The above table relates only to *households* purchasing tobacco. There are no comparable data available on the incomes and expenditures of *individual smokers*.

Table 15 below presents data on the distributions of smoking and non-smoking households in NSW according to household income as reported in the Household Expenditure Survey. It can be seen that the highest percentages of non-smoking households occur in the two lowest income quintiles.

Table 15: Proportions of smoking and non-smoking households in NSW, classified by household income quartile, 1998-99

Quintile (20 per cent)	Non-smoking households	Smoking households
Lowest	73.2%	26.8%
Second	69.2%	30.8%
Third	63.8%	36.2%
Fourth	66.6%	33.4%
Highest	64.6%	35.4%
All NSW households	67.6%	32.4%
Number of households	1,601,746	769,257

Source: Household Expenditure Survey 1998-99, unpublished data.

Table 16 presents estimates of the potential benefits of smoking cessation to households classified by income quintile. It shows in Column 2 the estimated average tobacco expenditures by smoking household income quintile in 2002/3, derived from the 1998/9 HES data and national accounts estimates of the increase in tobacco expenditure in NSW between 1998/9 and 2002/3. Column 3 presents the estimated average weekly household savings, in 2002/3 prices, at the end of the five year prevalence reduction period, and Column 4 shows the average weekly savings at the end of the ten year period.

Table 16: Estimated average tobacco expenditures by tobacco purchasing households by quintile, 2002/3, and estimated reductions in average tobacco expenditure at end of five years and ten years

(1) Quintile (20 per cent)	(2) Average adjusted tobacco expenditure \$ p.w.	(3) Average weekly savings at end of 5 years \$ p.w.	(4) Average weekly savings at end of 10 years \$ p.w.
Lowest	57.99	14.50	28.99
Second	85.74	21.44	42.87
Third	77.82	19.45	38.91
Fourth	93.08	23.27	46.54
Highest	84.08	21.02	42.04

Sources: Household Expenditure Survey 1998-99, unpublished data; and authors' calculations.

The five year savings range from \$14.50 p.w. to \$23 p.w. and the ten year savings from \$29 p.w. to \$46.50 p.w. Note that these savings represent the average for all households, including those where smoking continues. The average potential cessation benefits per household are represented by the expenditure figures in Column 2. The longer term benefits of improved health and life expectancy should be added to these savings.

It is clear that the potential benefits accruing to households, particularly in the lower socio-economic groups, as a result of smoking cessation are very significant.

7. The policy implications of this study

The public policy implications of this study are relatively straightforward. Since the economic impacts of reduced smoking prevalence would be close to neutral they are not an issue which should be taken into account in the framing of public health policy. Similarly, complaints by the tobacco industry that raising tobacco taxes to discourage smoking would have a detrimental impact on the poor are shown to be baseless, since it is the poorest households who would stand to gain the most from reduced smoking. It is true that non-tax measures would have less economic impact on the poor than tobacco tax increases. However, tax increases have been shown in the literature to be the easiest and most effective way to discourage smoking and should certainly be used as one of the weapons in the anti-smoking armoury. For constitutional reasons, tobacco taxes can only be implemented by the Federal Government which, therefore, has an important role to play in reducing smoking prevalence.

In summary, tobacco industry assertions about the possible adverse economic consequences of public policy measures aimed at discouraging smoking are seen to be without foundation and thus irrelevant in the framing of public health policies. It is apparent that there is no impediment relating to the economic impact on industries other than tobacco in pursuing public policies designed to reduce smoking. In fact, there will be positive economic benefits in a number of sectors, not least in the health care sector.

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Appendix A: Estimated output changes on an 86 industry classification

This appendix presents more detailed estimates of changes in output in 86 NSW industries resulting from a 25 per cent reduction in NSW smoking prevalence.

As a reminder, full details of the seven scenarios used in the simulations are as follows:

Expenditure Reallocation scenarios

- **ER1** — households that quit smoking are assumed to spend the money freed according to the expenditure patterns of non-smoking households, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure;
- **ER2** — households that quit smoking are assumed to spend the money freed according to the expenditure patterns of non-smoking households, and the impact on net indirect taxation revenue is met by an equal increase in income tax;
- **ER3** — households that quit smoking are assumed to spend the money freed according to their proportions of non-tobacco expenditures, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure; and,
- **ER4** — households that quit smoking are assumed to spend the money freed according to their proportions of non-tobacco expenditures, and the impact on net indirect taxation revenue is met by an equal increase in income tax.

Tobacco Institute scenarios

- **TI1** — the released expenditure is neither reallocated to other components of spending nor saved, and government spending is not reduced to offset the reduction in net indirect taxation;
- **TI2** — the released expenditure is neither reallocated to other components of spending nor saved, and the impact on net indirect taxation revenue is met by an equal decrease in government expenditure distributed proportionally across the components of Government Final Consumption Expenditure; and,
- **TI3** — the released expenditure is neither reallocated to other components of spending nor saved, and the impact on net indirect taxation revenue is met by an equal increase in income tax.

As noted in the report, all of the output projections utilised the 106 industry input-output table. The projections were aggregated to 35 industries and the corresponding employment effects estimated; it is these results that are tabulated in the body of the report. A more disaggregated set of results is presented in this appendix. However, because there is not a one-to-one correspondence between the industrial classes in the input-output table and the employment data at the 3-digit industry level (ABS, 6291.0.55.001, Datacube E06), it is not possible to report output and employment results for all 106 industries. After exclusion of the *Ownership of Dwellings* industry and aggregation of some industries there are 86 industries for which output and employment results can be estimated. The *Ownership of Dwellings* industry is not included in these results because its output is comprised only of gross rent of dwellings (actual and imputed) and as a consequence there is no employment associated with this industry.

Table 17 presents shows the 86 industries for which output and employment results are reported and the corresponding 105 industries from the input-output table.

Table 18 presents estimates of percentage changes in NSW sectoral outputs for all ER and TI scenarios on an 86 industry classification, for a 25 per cent reduction in NSW smoking prevalence. Table 19 presents estimates of employment changes for the 86 NSW industries on the same basis.

Table 17: Reconciliation of labour force and input-output industrial classifications

86 Industries		105 Industries (excl. Ownership of Dwellings)	
Sheep; Grains; Beef cattle		Sheep Grains Beef cattle	
Dairy cattle		Dairy cattle	
Pigs		Pigs	
Poultry		Poultry	
Other agriculture		Other agriculture	
Services to agriculture; hunting and trapping	L*	Services to agriculture; hunting and trapping	L*
Forestry and logging		Forestry and logging	
Commercial fishing		Commercial fishing	
Coal; oil and gas		Coal; oil and gas	
Iron ores; Non-ferrous metal ores		Iron ores Non-ferrous metal ores	
Other mining		Other mining	
Services to mining		Services to mining	
Meat and meat products		Meat and meat products	
Dairy products		Dairy products	
Fruit and vegetable products		Fruit and vegetable products	
Oils and fats		Oils and fats	
Flour mill products and cereal foods		Flour mill products and cereal foods	
Bakery products	L	Bakery products	L
Confectionery; Other food products		Confectionery Other food products	
Soft drinks, cordials and syrups; Beer and malt; Wine and spirits	L*	Soft drinks, cordials and syrups Beer and malt Wine and spirits	L
Tobacco products		Tobacco products	
Textile fibres, yarns and woven fabrics		Textile fibres, yarns and woven fabrics	
Textile products		Textile products	
Knitting mill products		Knitting mill products	
Clothing		Clothing	
Footwear		Footwear	
Leather and leather products		Leather and leather products	
Sawmill products		Sawmill products	
Other wood products		Other wood products	
Pulp, paper and paperboard; Paper containers and products		Pulp, paper and paperboard Paper containers and products	
Printing and services to printing		Printing and services to printing	
Publishing; recorded media and publishing		Publishing; recorded media and publishing	
Petroleum and coal products		Petroleum and coal products	
Basic chemicals		Basic chemicals	

Table 17: (cont.)

86 Industries		105 Industries (excl. Ownership of Dwellings)	
Other Chemical Product Manufacturing		Paints Medicinal and pharmaceutical products, pesticides Soap and detergents Cosmetics and toiletry preparations Other chemical products	
Rubber products		Rubber products	
Plastic products		Plastic products	
Glass and glass products		Glass and glass products	
Ceramic products		Ceramic products	
Cement, lime and concrete slurry; Plaster and other concrete products	L*	Cement, lime and concrete slurry Plaster and other concrete products	L*
Other non-metallic mineral products		Other non-metallic mineral products	
Iron and steel		Iron and steel	
Basic non-ferrous metal and products		Basic non-ferrous metal and products	
Structural metal products		Structural metal products	
Sheet metal products		Sheet metal products	
Fabricated metal products		Fabricated metal products	
Motor vehicles and parts; other transport equipment		Motor vehicles and parts; other transport equipment	
Ships and boats; Railway equipment; Aircraft		Ships and boats Railway equipment Aircraft	
Photographic and scientific equipment		Photographic and scientific equipment	
Electronic equipment		Electronic equipment	
Household appliances; Other electrical equipment		Household appliances Other electrical equipment	
Agricultural, mining and construction equipment; other machinery and equipment		Agricultural, mining and construction equipment Other machinery and equipment	
Prefabricated buildings		Prefabricated buildings	
Furniture		Furniture	
Other manufacturing		Other manufacturing	
Electricity supply		Electricity supply	
Gas supply		Gas supply	
Water supply; sewerage and drainage services	L	Water supply; sewerage and drainage services	L
Residential building; Other construction	L	Residential building Other construction	L
Wholesale trade	L	Wholesale trade	L
Retail trade	L	Retail trade	L
Mechanical repairs; Other repairs	L	Mechanical repairs Other repairs	L
Accommodation, cafes and restaurants	L	Accommodation, cafes and restaurants	L
Road transport		Road transport	

Table 17: (cont.)

86 Industries		105 Industries (excl. Ownership of Dwellings)	
Rail, pipeline and other transport		Rail, pipeline and other transport	
Water transport		Water transport	
Air and space transport		Air and space transport	
Services to transport; storage		Services to transport; storage	
Communication services	L	Communication services	L
Banking; Non-bank finance	L	Banking Non-bank finance	L
Insurance	L	Insurance	L
Services to finance, investment and insurance	L	Services to finance, investment and insurance	L
Other property services	L	Other property services	L
Scientific research, technical and computer services		Scientific research, technical and computer services	
Legal, accounting, marketing and business management services	L	Legal, accounting, marketing and business management services	L
Other business services	L	Other business services	L
Government administration		Government administration	
Defence		Defence	
Education	L	Education	L
Health services	L	Health services	L
Community services	L	Community services	L
Motion picture, radio and television services	L	Motion picture, radio and television services	L
Libraries, museums and the arts	L	Libraries, museums and the arts	L
Sport, gambling and recreational services	L	Sport, gambling and recreational services	L
Personal services	L	Personal services	L
Other services	L	Other services	L

Note: L indicates a Local industry
 L* indicates that an industry within an industry group is a Local industry

Table 18: Percentage changes in NSW sectoral outputs resulting from a 25 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 86 industry classification, various scenarios

Industry Classification	ER1 %	ER2 %	ER3 %	ER4 %	T11 %	T12 %	T13 %
Sheep, grains, beef cattle	0.040	0.008	0.046	0.014	-0.010	-0.016	-0.053
Dairy cattle	0.107	0.041	0.116	0.050	-0.007	-0.011	-0.088
Pigs	0.084	0.022	0.092	0.030	-0.015	-0.020	-0.093
Poultry	0.112	0.037	0.121	0.047	-0.012	-0.016	-0.103
Other agriculture	-0.043	-0.112	-0.032	-0.100	-0.147	-0.158	-0.237
Services to agriculture; hunting and trapping	0.009	-0.016	0.013	-0.012	-0.035	-0.055	-0.084
Forestry and logging	-0.074	-0.028	-0.071	-0.025	-0.041	-0.133	-0.080
Commercial fishing	0.071	0.018	0.080	0.027	-0.020	-0.046	-0.107
Coal; oil and gas	0.027	0.009	0.028	0.010	-0.011	-0.028	-0.049
Iron ores; Non-ferrous metal ores	0.004	0.002	0.005	0.002	-0.002	-0.007	-0.010
Other mining	0.007	0.003	0.009	0.004	-0.008	-0.031	-0.037
Services to mining	0.000	0.003	0.000	0.003	-0.003	-0.019	-0.015
Meat and meat products	0.084	0.022	0.092	0.030	-0.015	-0.020	-0.093
Dairy products	0.116	0.044	0.126	0.054	-0.008	-0.012	-0.096
Fruit and vegetable products	0.176	0.074	0.189	0.088	-0.003	-0.004	-0.122
Oils and fats	0.120	0.046	0.131	0.057	-0.011	-0.026	-0.112
Flour mill products and cereal foods	0.121	0.040	0.132	0.051	-0.015	-0.019	-0.113
Bakery products	0.233	0.095	0.252	0.114	-0.009	-0.014	-0.175
Confectionery; Other food products	0.117	0.041	0.126	0.050	-0.006	-0.009	-0.097
Soft drinks, cordials and syrups; Beer and malt; Wine and spirits	0.138	0.031	0.193	0.087	-0.017	-0.026	-0.149
Tobacco products	-6.990	-7.095	-6.990	-7.094	-6.990	-6.990	-7.112
Textile fibres, yarns and woven fabrics	0.042	-0.008	0.045	-0.005	-0.038	-0.057	-0.115
Textile products	0.054	0.008	0.067	0.021	-0.027	-0.056	-0.110
Knitting mill products	0.113	0.041	0.110	0.039	-0.005	-0.033	-0.116
Clothing	0.117	0.040	0.110	0.034	-0.005	-0.026	-0.115
Footwear	0.115	0.037	0.108	0.031	-0.008	-0.029	-0.119
Leather and leather products	0.056	0.008	0.058	0.010	-0.003	-0.009	-0.065
Sawmill products	0.011	0.003	0.012	0.005	-0.008	-0.023	-0.032
Other wood products	0.018	0.008	0.019	0.009	-0.013	-0.039	-0.051
Pulp, paper and paperboard; Paper containers and products	-0.047	-0.074	-0.040	-0.067	-0.091	-0.138	-0.169

Table 18: (cont.)

Industry Classification	ER1 %	ER2 %	ER3 %	ER4 %	T11 %	T12 %	T13 %
Printing and services to printing	-0.010	-0.021	-0.005	-0.016	-0.035	-0.097	-0.110
Publishing; recorded media and publishing	0.017	-0.016	0.021	-0.012	-0.022	-0.067	-0.105
Petroleum and coal products	0.043	0.012	0.048	0.016	-0.017	-0.043	-0.080
Basic chemicals	0.018	-0.006	0.022	-0.001	-0.027	-0.059	-0.086
Other chemical product manufacturing	-0.052	0.000	-0.049	0.003	-0.014	-0.128	-0.067
Rubber products	0.004	0.009	0.009	0.014	-0.014	-0.076	-0.070
Plastic products	0.044	0.006	0.054	0.015	-0.027	-0.057	-0.102
Glass and glass products	0.047	0.015	0.056	0.024	-0.013	-0.034	-0.071
Ceramic products	0.033	0.015	0.036	0.019	-0.003	-0.012	-0.032
Cement, lime and concrete slurry; Plaster and other concrete products	-0.001	0.009	-0.003	0.007	-0.009	-0.031	-0.020
Other non-metallic mineral products	0.022	0.011	0.021	0.011	-0.007	-0.026	-0.038
Iron and steel	0.021	0.010	0.024	0.013	-0.006	-0.028	-0.041
Basic non-ferrous metal and products	0.009	0.004	0.010	0.006	-0.004	-0.016	-0.021
Structural metal products	0.011	0.009	0.010	0.009	-0.006	-0.033	-0.035
Sheet metal products	0.064	0.022	0.074	0.032	-0.011	-0.030	-0.079
Fabricated metal products	0.017	0.007	0.021	0.011	-0.013	-0.047	-0.059
Motor vehicles and parts; other transport equipment	0.060	0.021	0.064	0.026	-0.005	-0.012	-0.058
Ships and boats; railway equipment; aircraft	-0.031	0.003	-0.028	0.005	-0.006	-0.075	-0.036
Photographic and scientific equipment	-0.019	0.001	-0.018	0.002	-0.006	-0.071	-0.048
Electronic equipment	0.004	-0.004	0.005	-0.002	-0.007	-0.031	-0.040
Household appliances; Other electrical equipment	0.040	0.014	0.047	0.021	-0.009	-0.032	-0.062
Agricultural, mining and construction equip.; other machinery and equip.	0.002	0.001	0.004	0.003	-0.007	-0.030	-0.031
Prefabricated buildings	0.005	0.003	0.005	0.003	-0.004	-0.017	-0.019
Furniture	0.031	0.016	0.040	0.025	-0.004	-0.026	-0.044
Other manufacturing	0.034	-0.020	0.038	-0.015	-0.023	-0.046	-0.107
Electricity supply	0.070	0.036	0.062	0.028	-0.018	-0.056	-0.095
Gas supply	0.074	0.032	0.068	0.025	-0.020	-0.044	-0.094
Water supply; sewerage and drainage services	0.109	0.059	0.094	0.045	-0.018	-0.053	-0.110
Residential building; other construction	-0.019	0.003	-0.020	0.002	-0.001	-0.032	-0.007
Wholesale trade	0.017	-0.022	0.024	-0.015	-0.048	-0.080	-0.126

Table 18: (cont.)

Industry Classification	ER1 %	ER2 %	ER3 %	ER4 %	T11 %	T12 %	T13 %
Retail trade	0.080	-0.070	0.092	-0.057	-0.114	-0.115	-0.288
Mechanical repairs; Other repairs	0.115	0.024	0.125	0.034	-0.030	-0.059	-0.164
Accommodation, cafes and restaurants	-0.007	-0.093	0.001	-0.085	-0.085	-0.117	-0.217
Road transport	0.017	-0.003	0.023	0.003	-0.029	-0.065	-0.088
Rail, pipeline and other transport	0.019	0.012	0.021	0.014	-0.013	-0.055	-0.063
Water transport	0.066	0.026	0.072	0.031	-0.007	-0.024	-0.071
Air and space transport	0.039	0.013	0.045	0.018	-0.015	-0.048	-0.079
Services to transport; storage	-0.060	-0.008	-0.055	-0.004	-0.024	-0.130	-0.071
Communication services	0.035	-0.008	0.048	0.005	-0.030	-0.091	-0.142
Banking; non-bank finance	0.074	0.008	0.076	0.011	-0.024	-0.066	-0.142
Insurance	0.090	-0.005	0.099	0.005	-0.020	-0.039	-0.149
Services to finance, investment and insurance	0.046	0.001	0.051	0.007	-0.020	-0.081	-0.132
Other property services	0.024	-0.007	0.027	-0.004	-0.035	-0.077	-0.113
Scientific research, technical and computer services	-0.061	-0.015	-0.058	-0.012	-0.027	-0.123	-0.069
Legal, accounting, marketing and business management services	-0.011	-0.037	-0.006	-0.031	-0.061	-0.123	-0.153
Other business services	-0.041	-0.041	-0.036	-0.036	-0.062	-0.148	-0.148
Government administration	-0.294	-0.001	-0.290	0.000	-0.004	-0.354	-0.015
Defence	-0.352	0.000	-0.349	0.000	0.000	-0.408	-0.001
Education	-0.239	0.000	-0.237	0.000	-0.002	-0.333	-0.056
Health services	-0.219	0.004	-0.231	-0.010	-0.003	-0.333	-0.075
Community services	-0.148	-0.008	-0.140	-0.002	-0.002	-0.254	-0.093
Motion picture, radio and television services	-0.035	-0.024	-0.030	-0.019	-0.037	-0.135	-0.123
Libraries, museums and the arts	-0.108	-0.015	-0.101	-0.010	-0.013	-0.215	-0.108
Sport, gambling and recreational services	0.074	-0.040	0.078	-0.035	-0.020	-0.052	-0.184
Personal services	0.103	-0.002	0.112	0.009	-0.006	-0.049	-0.170
Other services	-0.130	-0.002	-0.122	0.005	-0.009	-0.253	-0.104

Table 19: Changes in NSW full time equivalent employment resulting from a 25 per cent reduction in NSW smoking prevalence over the period 2002/3 to 2007/8, 86 industry classification, various scenarios

Industry Classification	ER1 No.	ER2 No.	ER3 No.	ER4 No.	T11 No.	T12 No.	T13 No.
Sheep, grains, beef cattle	17	4	20	6	-4	-7	-23
Dairy cattle	5	2	6	2	0	-1	-4
Pigs	2	1	2	1	0	-1	-2
Poultry	5	2	5	2	-1	-1	-4
Other agriculture	-8	-22	-6	-20	-29	-31	-46
Services to agriculture; hunting and trapping	1	-1	1	-1	-2	-4	-6
Forestry and logging	-2	-1	-2	-1	-1	-3	-2
Commercial fishing	3	1	3	1	-1	-2	-4
Coal; oil and gas	3	1	3	1	-1	-3	-5
Iron ores; Non-ferrous metal ores	0	0	0	0	0	0	0
Other mining	0	0	0	0	0	-1	-1
Services to mining	0	0	0	0	0	0	0
Meat and meat products	13	3	14	5	-2	-3	-14
Dairy products	4	1	4	2	0	0	-3
Fruit and vegetable products	6	2	6	3	0	0	-4
Oils and fats	1	0	1	1	0	0	-1
Flour mill products and cereal foods	6	2	7	3	-1	-1	-6
Bakery products	23	9	25	11	-1	-1	-17
Confectionery; Other food products	10	4	11	4	-1	-1	-9
Soft drinks, cordials and syrups; Beer and malt; Wine and spirits	9	2	13	6	-1	-2	-10
Tobacco products	-103	-105	-103	-105	-103	-103	-105
Textile fibres, yarns and woven fabrics	1	0	1	0	-1	-1	-2
Textile products	3	0	3	1	-1	-3	-5
Knitting mill products	1	0	1	0	0	0	-1
Clothing	15	5	14	4	-1	-3	-15
Footwear	2	1	2	0	0	0	-2
Leather and leather products	0	0	0	0	0	0	0
Sawmill products	1	0	1	0	0	-1	-1
Other wood products	3	1	3	1	-2	-6	-8
Pulp, paper and paperboard; Paper containers and products	-2	-4	-2	-3	-5	-7	-9

Table 19: (cont.)

Industry Classification	ER1 No.	ER2 No.	ER3 No.	ER4 No.	T11 No.	T12 No.	T13 No.
Printing and services to printing	-2	-5	-1	-4	-8	-21	-24
Publishing; recorded media and publishing	3	-3	4	-2	-4	-12	-20
Petroleum and coal products	1	0	1	0	-1	-1	-2
Basic chemicals	1	0	1	0	-1	-2	-3
Other chemical product manufacturing	-12	0	-11	1	-3	-29	-15
Rubber products	0	0	0	0	0	-1	-1
Plastic products	5	1	6	2	-3	-6	-11
Glass and glass products	1	0	2	1	0	-1	-2
Ceramic products	1	0	1	0	0	0	-1
Cement, lime and concrete slurry; Plaster and other concrete products	0	1	0	0	-1	-2	-1
Other non-metallic mineral products	1	0	1	0	0	-1	-1
Iron and steel	4	2	4	2	-1	-5	-7
Basic non-ferrous metal and products	1	0	1	1	0	-2	-2
Structural metal products	1	1	1	1	-1	-3	-3
Sheet metal products	3	1	3	1	0	-1	-3
Fabricated metal products	3	1	4	2	-3	-9	-11
Motor vehicles and parts; other transport equipment	6	2	7	3	-1	-1	-6
Ships and boats; railway equipment; aircraft	-2	0	-2	0	0	-6	-3
Photographic and scientific equipment	-1	0	-1	0	0	-3	-2
Electronic equipment	0	0	1	0	-1	-4	-5
Household appliances; Other electrical equipment	5	2	6	3	-1	-4	-8
Agricultural, mining and construction equip.; other machinery and equip.	0	0	1	0	-1	-5	-5
Prefabricated buildings	0	0	0	0	0	0	0
Furniture	5	3	7	4	-1	-4	-7
Other manufacturing	1	-1	1	-1	-1	-2	-4
Electricity supply	11	6	10	5	-3	-9	-16
Gas supply	1	1	1	0	0	-1	-2
Water supply; sewerage and drainage services	9	5	7	4	-1	-4	-9
Residential building; Other construction	-43	6	-44	5	-3	-72	-15
Wholesale trade	26	-33	35	-23	-72	-120	-187

Table 19: (cont.)

Industry Classification	ER1 No.	ER2 No.	ER3 No.	ER4 No.	T11 No.	T12 No.	T13 No.
Retail trade	239	-208	275	-168	-339	-342	-860
Mechanical repairs; Other repairs	71	15	77	21	-19	-36	-102
Accommodation, cafes and restaurants	-8	-112	1	-102	-102	-141	-261
Road transport	11	-2	15	2	-19	-43	-59
Rail, pipeline and other transport	3	2	4	3	-2	-10	-11
Water transport	2	1	2	1	0	-1	-2
Air and space transport	8	2	9	4	-3	-9	-15
Services to transport; storage	-20	-3	-18	-1	-8	-43	-23
Communication services	21	-5	28	3	-18	-53	-83
Banking; non-bank finance	49	6	51	8	-16	-44	-95
Insurance	26	-1	28	1	-6	-11	-43
Services to finance, investment and insurance	21	1	23	3	-9	-36	-59
Other property services	11	-3	12	-2	-16	-35	-52
Scientific research, technical and computer services	-65	-16	-62	-12	-29	-131	-74
Legal, accounting, marketing and business management services	-12	-38	-7	-33	-64	-129	-160
Other business services	-36	-37	-32	-32	-55	-130	-131
Government administration	-306	-1	-302	0	-4	-369	-16
Defence	-20	0	-20	0	0	-23	0
Education	-412	0	-409	-1	-4	-573	-96
Health services	-419	8	-442	-19	-5	-636	-143
Community services	-86	-5	-82	-1	-1	-149	-54
Motion picture, radio and television services	-7	-5	-6	-4	-8	-28	-26
Libraries, museums and the arts	-21	-3	-20	-2	-2	-42	-21
Sport, gambling and recreational services	20	-11	21	-9	-5	-14	-50
Personal services	47	-1	51	4	-3	-22	-77
Other services	-64	-1	-60	3	-4	-125	-51

Appendix B: The methodology in detail

The simulations in this report are derived from a static input-output model. In particular, the total requirements coefficients matrix for 106 industries from the *1996-97 Input-Output Tables* for Australia (ABS 5209.0) is combined with vectors of final demand and its components for 2002/03. This is the latest input-output table that is available for Australia – its use involves the standard assumption that the input-output coefficients are stable over time. McNicoll and Boyle (1992) note that to the extent that the assumption of stability is not correct there will be some degree of error in the forecasts, but that there is theoretical and empirical evidence that these errors are likely to be small. It is further assumed that economic activity is wholly demand-determined and that there is sufficient excess productive capacity and unemployed labour to allow any induced changes in production to occur. In the counterfactuals considered here, we assume no change in final demand or its components over the period under consideration, apart from the reduced expenditure on tobacco products, any reallocated consumer spending, and the impact on final demand of the government's response to any fall in its taxation revenue. Thus, we assume that there is no economic growth or inflation over the period under consideration and that, as consequence, any forecast changes in output will be a result only of the changes above. The associated forecasts of changes in employment by industry assume that output-labour ratios are stable.

In this report, a 25 per cent reduction in smoking prevalence in NSW over five years is modeled as a 25 per cent reduction in expenditure on tobacco products (and a 50 per cent reduction in prevalence over ten years as a 50 per cent reduction in expenditure). NSW household expenditure on tobacco products in 2002/03 was \$3,177.58m; the assumed reduction in prevalence will reduce household expenditure on tobacco products by \$794.4m in 2007/08 and by \$1,588.8m in 2012/13 (in 2002/03 prices). The expenditure reallocation scenarios in this report assume that this released expenditure is reallocated to other categories of household final consumption expenditure; by contrast, the tobacco industry scenarios assume no offsetting increases in household final consumption expenditure.

To determine the pattern of reallocated household expenditures the *1998-99 Household Expenditure Survey* (HES) has been employed to generate expenditure patterns for non-smoking and smoking households in New South Wales. Households are classified as 'smoking households' if there is expenditure on tobacco products by at least one member of the household in the survey period. The HES Confidentialised Unit Record File contains a sample of 6,892 household records for Australia (corresponding to a population of 7,121,800 households); the New South Wales sub-sample contains 2,037 households (corresponding to a population of 2,371,000 households).

Expenditures on over 600 products in the HES are grouped into thirteen expenditure categories. The HES expenditure categories, however, are not consistent with the twelve Household Final Consumption Expenditure (HFCE) categories in the Australian National Accounts. In order to estimate the effect on economic activity of the expenditure reallocations in the input-output model, the HES data had to be made consistent with the HFCE categories. We have developed a concordance between the HES categories (at the ten-digit level of commodity classification) and the HFCE categories. Following reclassification of the HES data to HFCE categories, the estimated expenditures of non-smoking and smoking households in NSW were adjusted for:

- imputed rent on owner-occupied housing;
- under-reporting of alcohol consumption; and,
- under-reporting of tobacco consumption.

The resulting expenditure patterns are shown in Table 2 in the body of this report. This table also shows the expenditure pattern of NSW former smoking households – this pattern is derived by assuming that households that quit smoking reallocate their expenditure so as to maintain the relative proportions of non-tobacco expenditures.

In the input-output model, we assume that the expenditure released by the reduced prevalence of smoking in NSW is reallocated according to either:

- the expenditure patterns of non-smoking households; or,
- the expenditure patterns of former smoking households.

This expenditure reallocation will affect the HFCE categories measured in purchasers' prices. A two-stage process was followed to incorporate these changes in expenditure into the input-output model. First, unpublished data supplied by the ABS was employed to disaggregate the vector of HFCE in the input-output table into the thirteen categories in Table 2 (the twelve standard HFCE categories, with the Alcohol and Tobacco Products category further subdivided). This enabled the estimation of the revised expenditures at purchasers' prices for each of the HFCE categories. Second, these revised expenditures were converted to basic prices. In undertaking this conversion it was assumed that, for each HFCE category, the ratio of distributors' trading margins to expenditure in producers' prices in 2002/03 was the same as in 1996/97. The determination of net indirect taxation by HFCE category was rendered more difficult by the introduction of the GST in 2000/01. We have employed the empirical results in Scutella (1997) and Creedy (2002) together with Costello (1998) to estimate net indirect taxes in 2002/03.

Aggregation across the HFCE categories generated a new HFCE vector at basic prices for each of the assumed expenditure reallocation scenarios.

The expenditure reallocation scenarios assume that total HFCE at purchasers' prices will be unchanged following the reduction in household expenditure on tobacco products. However, because tobacco products are highly taxed relative to other categories of HFCE, the switch from tobacco expenditure to other consumer goods will result in a net fall in government revenue from indirect taxes. We have assumed that the government responds to the fall in indirect tax revenue by:

- an equi-proportional decrease in Government Final Consumption Expenditure (GFCE); or,
- an increase in personal income tax;

sufficient to make up the initial shortfall in indirect taxation revenue. This will not necessarily generate a revenue-neutral outcome since it is only concerned with the first-round effect.

The increase in personal income tax will reduce disposable income and HFCE, leading to further adjustments to the HFCE vector. To estimate the fall in HFCE generated by the income tax increase, we have assumed that the marginal propensity to consume (MPC) is equal to the average propensity to consume and that the average of the HFCE to gross household disposable income ratio over the period 1997/98 to 2002/03 may be taken to be the expected value of the mean MPC. This estimate is 0.9014 and is used in the scenarios involving income tax increases.

Seven scenarios are simulated in the input-output model:

Four expenditure reallocation (ER) scenarios:

ER1 — decreased expenditure on tobacco products matched by equal increase in HFCE determined by the expenditure patterns of non-smoking households. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE) met by an equi-proportional decrease in the components of GFCE;

ER2 — decreased expenditure on tobacco products matched by equal increase in HFCE determined by the expenditure patterns of non-smoking households. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE plus the decrease in indirect taxes on decreased HFCE) met by an equal increase in income tax;

ER3 — decreased expenditure on tobacco products matched by equal increase in HFCE determined by the expenditure patterns of former smoking households. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE) is met by an equi-proportional decrease in the components of GFCE; and,

ER4 — decreased expenditure on tobacco products matched by equal increase in HFCE determined by the expenditure patterns of former smoking households. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE plus the decrease in indirect taxes on decreased HFCE) met by an equal increase in income tax.

Three tobacco industry (TI) scenarios:

TI1 — decreased expenditure on tobacco products not reallocated to other components of HFCE. Government spending/taxation not reduced/increased to offset reduction in net indirect taxation;

TI2 — decreased expenditure on tobacco products not reallocated to other components of HFCE. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE) met by an equi-proportional decrease in the components of GFCE; and,

TI3 — decreased expenditure on tobacco products not reallocated to other components of HFCE. Decrease in net indirect taxation revenue (equal to the decrease in indirect taxes on tobacco products less the increase in indirect taxes on increased HFCE plus the decrease in indirect taxes on decreased HFCE) met by an equal increase in income tax.

Each of these scenarios will generate a new total final demand vector resulting from changes to the HFCE vector (ER2, ER4, TI1 and TI3), or to both the HFCE and GFCE vectors (ER1, ER3 and TI2).

The new level of total output (total final demand plus intermediate output) for each scenario was estimated by:

$$Q_i = (I - A)^{-1} \cdot Y_i$$

where Q is total output, $(I - A)^{-1}$ is the total requirements coefficients matrix for 106 industries (the Leontief inverse), Y is total final demand, $i = ER1, \dots TI3$.

The percentage change for each of the seven scenarios is calculated with reference to a no-change scenario in which the final demand vector is the actual final demand for 2002/03 (and, given the assumption of zero output growth, actual final demand in 2007/08).

To estimate the employment effects of the changes in total output, we followed the approach of Buck *et al* (1995). Industry-level employment data for the base year was used in conjunction with total output for that industry to establish industry-level employment-output ratios. These ratios are assumed stable over the relevant period. This means that employment will grow at the same rate as total output. Buck *et al* point out that if industries respond differently to output changes judged to be temporary as opposed to permanent, then this may change the full-time/part-time composition of the workforce and the assumption of a static employment-output ratio would not be valid and employment growth would diverge from output growth.

The input-output framework employed here also assumes that imports will grow at the same rate as total output so that a positive rate of growth of total output will be associated with rising imports and, given the assumption of a constant level of exports, a deteriorating current account. Equally, a negative rate of growth of total output will be associated with falling imports and an improving current account. If, however, capacity constraints prevented output from increasing at the required rate then some of the excess demand for intermediate or final

goods would spill-over into imports. The ratio of imports to output might also change if exchange rate changes occurred.

Four of the six studies surveyed in Table 1 in the report utilised static input-output models. One of these, McNicoll and Boyle (1992), extended the standard Leontief inverse by including the household sector as an 'industry' which purchases goods and services (HFCE) and sells labour services. Household income is then endogenous rather than exogenous and generates further economic activity. That is, the McNicoll and Boyle approach introduces Keynesian-type multipliers into the input-output framework. To the extent that these multiplier effects are quantitatively significant, failure to incorporate them will understate the output change, positive or negative. The data required on labour incomes that are necessary to undertake a McNicoll and Boyle-type extension of our analysis are not currently available at the required level of disaggregation.

The two previous stages in the study generated estimates of output and employment change by industrial sector for Australia based on a reduction of smoking prevalence in New South Wales. The third stage of the study is to produce the associated output and employment changes for New South Wales. The standard approach used to generate regional estimates in the absence of regional input-output tables is the approach of Leontief, W. *et al* (1965). The regional effects are generated from a national input-output model and the approach is very economical in its data requirements. However, Leontief *et al* is concerned with the regional effects of a national change – specifically the impact of defence cuts in the USA, accompanied by compensating increase in non-defence expenditures – on 19 distinct US regions. It is not clear that this is also the appropriate approach when analysing the effects in one region of a change in demand in the same region.

The starting point of Leontief *et al* is the national input-output results for the changes under consideration. They then classify all industries in the input-output table as either national or local – the output of 'national' industries is traded between regions while the output of 'local' industries does not enter into trade between regions. In the Leontief *et al* framework an industry is either national or local; in our study the same industry can be local or national depending on which component of final demand is being changed. Thus, for local industries, the absolute changes in output and employment in New South Wales will be the estimated Australia-wide changes generated from the input-output analysis. The local industries used in this study are those identified in the NSW Tourism Commission (1989) report *The Economic Impacts of Tourism* – these include, *inter alia*, industries such as soft drinks and cordials, residential construction, wholesale and retail trade, and education. The full set of local industries is shown in Appendix A. In the second stage, the estimated percentage changes in output and employment for non-local industries (that is, national industries) in New South Wales are assumed to be equal to the estimated Australia-wide changes.

