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# Effects of Petroleum Product Excises on Agriculture

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## 1. Introduction

Since the 1920s the Commonwealth Government has levied an excise on Australian refined automotive petrol, together with customs duty at an equivalent rate on imported petrol. With the increased use of diesel in motor vehicles the excise and customs duty equivalents were extended to automotive diesel in 1957.<sup>1</sup>

Petroleum product excises are levied in specific rate terms. Until 1983 the specific rate was subject to *ad hoc* adjustment in government budgets. Since then excises have been fully indexed at six monthly intervals to movements in the consumer price index. That is, a designated nominal rate is now reasonably steady in real terms. The designated rate has since early 1986 been subject to frequent adjustment. The catalyst for these recent adjustments was the dramatic fall in the world price of crude oil over the late 1985 to early 1986 period resulting in turn in a large reduction in government revenue from the crude oil levy. The Government responded initially to offset 75 per cent of its expected revenue loss with a 51 per cent across the board increase in petroleum product excises.<sup>2</sup> In line with further changes in world crude oil prices, crude oil excises were adjusted downwards in April, May, July and August 1986. For each of these adjustments, excises on petroleum products were raised further to fully offset, on a first round basis, the loss to government revenue from the crude oil levy.<sup>3</sup>

The initial government justification for petroleum product excises was as a means of funding road construction and maintenance. While a component is still hypothecated for this purpose, the central justification for the excises is now clearly that of general revenue raising.

The interest of the farm sector in petroleum product excises relates to excises levied on automotive petrol and automotive diesel. Agricultural users, together with some mining and other off-road users of automotive diesel are entitled to an excise exemption in the form of a rebate on excise paid. Under present arrangements whereby specific rates of excise are in effect determined by movements in crude oil prices, and

hence the revenue collected from the crude oil levy, the specific excise has risen considerably as has the value of the rebate to farmers. Given the general revenue-raising goal of petroleum product excises, the rebate to farmers should be viewed as a form of assistance to that sector. Farmers continue however to pay excise at the full rate on their on-farm use of automotive petrol.

In considering the effects of petroleum product excises on farmers it is important to distinguish between the direct and indirect effects. Direct effects represent the effects on farm costs of the excise component (net of rebates) of direct farm purchases of petroleum products. These effects can be readily identified. They are discussed further in section 2.

As well as their direct usage of petroleum products, farmers use petroleum products indirectly in the form of the petroleum product content of other purchased inputs. One such input particularly intensive in its use of petroleum products is road transport services purchased to move inputs to the farm and farm products to the point of sale. Petroleum products are also key inputs in the production of chemical products which are used extensively in agriculture.

The final incidence of petroleum product excises on the farm and other sectors, in terms of the extent to which these sectors end up paying for the excises in the form of reduced output and profitability, will depend on several further factors in addition to the extent of direct and indirect usage. They include the extent to which each sector can pass on the excises in the form of higher product prices and the extent to which such price increases are allowed to flow into money wages. Also important is the form of fiscal offset (expenditure reduction or alternative tax) that might be envisaged by the Government in the

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1. Excises were also imposed on aviation fuels in 1957, on liquid petroleum gas (LPG) in 1974 (removed in 1980) and on fuel oil, heating and household kerosene in 1983.

2. In March 1986 following the reduction in world crude oil prices the Government reduced the import parity price of Bass Strait crude oil from \$43.71 to \$27.09 per barrel. As a result government revenue from the crude oil levy was estimated to fall by \$1 680m in 1986-87, equivalent to 2.6 per cent of estimated Commonwealth Government outlays for that year.

3. For an analysis of the economy-wide effects of adjusting the rate of petroleum product excise according to movements in world crude oil prices, and hence revenue collected from the crude oil levy, together with an assessment of the effects of alternative policy responses, see Mannion *et al* (1987).

event of petroleum product excises being removed.

A consideration of the final incidence and effects of petroleum product taxes on the farm sector is contained in section 3. This is done with the aid of a detailed economy-wide model of petroleum products production and sales developed to assist the Industries Assistance Commission in its recent report on certain taxation measures for petroleum products.<sup>4</sup>

## 2. Petroleum Products and Farm Costs

Direct expenditure on petroleum products accounts for about 3 per cent of total costs for the agricultural sector.<sup>5</sup> Of this direct use, automotive diesel accounts for about 61 per cent and petrol about 28 per cent. The primary industries are all relatively intensive direct users of petroleum products. However, the impact of petroleum products on total farm costs cannot be gauged solely by the direct cost share. Other inputs into agricultural activities also contain a fuel component which must be taken into account. For example, chemical fertilisers have a large petroleum product component and are used intensively within the agricultural sector. Thus, if the prices of petroleum products rise then the cost of fertiliser production will rise and this may be passed on in the form of higher fertiliser prices. Direct use on its own is therefore only a partial indicator of petroleum product use; a more correct indicator would incorporate such indirect use embodied in other inputs.

The input-output tables of The Australian Bureau of Statistics (ABS) provide a detailed breakdown of petroleum products use by industry. These tables contain the inter-industry links through which the indirect use of petroleum products occur. From these tables, direct requirement coefficients are obtained. These represent the direct dollar expenditure by industry on petroleum products to produce \$100 of output; that is the direct cost share of petroleum products in output value.<sup>6</sup> The total requirement of petroleum products to produce that output which also includes the petroleum products embodied in other inputs (that is, used indirectly) is represented by total requirements coefficients. As will become apparent, it is possible for an industry to have a relatively low direct requirement but a high total (direct plus indirect) requirement. Indirect use of petroleum products is given by total requirements less direct requirements.

Table 1 provides details of the direct, total and indirect requirement coefficients associated with

*Table 1: Requirement Coefficients for Petroleum Products by Input-Output Industries within the Agricultural Sector: 1980-81<sup>a</sup>*

Input-Output Industry	Requirement Coefficient		
	Direct	Indirect	Total
Sheep	3.0	1.2	4.2
Cereal grains	5.3	1.2	6.5
Meat cattle	4.1	1.7	5.8
Milk cattle and pigs	1.5	1.3	2.8
Poultry	0.1	1.5	1.6
Other agriculture	2.2	0.9	3.1
Services to agriculture	2.8	0.7	3.5
Total agriculture	3.3	1.3	4.6
Forestry, fishing and hunting	7.5	1.2	8.7
Mining	2.1	1.3	3.4
Transport, communications	6.0	1.0	7.0
Chemicals	4.0	1.1	5.1

Source: ABS (1987)

the use of petroleum products as an input in agricultural industries as distinguished in the ABS input-output tables.

Petroleum products are treated as a single homogeneous commodity in Table 1. Each industry uses a different fuel input mix. However, for the purpose of providing a general overview of the relative importance of variations in petroleum product prices to the agricultural sector this assumption of commodity homogeneity is maintained.

All the primary sector industries are high direct users of petroleum products but their indirect requirements are modest. Forestry, fishing and hunting has the greatest intensity of use being exceeded only by the transport and communications industry. The agricultural industries generally have much higher direct than indirect requirements for petroleum products. The exception is poultry which has a low direct requirement but a relatively high indirect requirement.

In contrast, the overall pattern of use of petroleum products in the manufacturing sector is the reverse of the primary sector. In manufacturing direct usage is generally low while indirect

4. IAC (1986).

5. Total costs consist of material costs plus labour costs and returns to fixed capital, working capital and land. The ratio of material costs to output value can vary considerably between industries. For example, in agriculture material costs represent about 29 per cent of output value compared with 56 per cent in textiles, clothing and footwear. The cost share of petroleum products as a percentage of output value is therefore considerably lower than the cost share in material costs. In agriculture, petroleum product costs represent 3 per cent of total output value and 11 per cent of material costs.

6. Output value is equated with total costs.

usage is high.

Comparison of total requirements coefficients indicates that, ignoring the abilities of industries to pass on costs, the primary sector may be only marginally disadvantaged relative to the manufacturing sector by increases in petroleum product prices. Forestry and fishing appear to be subject to far greater fuel cost pressures than other primary sector industries and the manufacturing sector as a whole. However, this conclusion must be qualified by the lesser ability of the agricultural sector to pass on any cost increases. In general, the price of Australian agricultural outputs is more or less set on world markets. Any variation in production costs must therefore be absorbed by farming profits.

The agricultural sector is a heavy user of distillate on which it receives a full rebate on excise paid. Just as direct use of petroleum products is only a partial indicator of their intensity of use in agricultural production, it is also a mistake to consider only the direct incidence of fuel excises when considering their impact on the farming sector. As inputs into agriculture embody a fuel component they also embody an excise component. Fuel excise is passed down the production chain. The downstream industries accumulate the excise burden initially borne by upstream industries. However, in general, the excise is not fully passed on. The less trade-exposed an industry is and the less responsive is the output of the industry to variations in output price, the greater the proportion of the tax passed on. Table 2 provides details of the incidence of excise on the farm sector based on that sector's direct and indirect usage of different types of petroleum products. It is constructed on the premise that all excises are fully passed on. Thus, it is likely to overstate the total excise burden

actually incurred. Nevertheless, it provides a more comprehensive and accurate picture of the excise burden on the agricultural sector than the direct burden alone provides. Note also that the information in Table 2 does not capture excises levied on fuel used to transport agricultural outputs from the farm gate to the point of domestic sale or export.

While the above discussion has extended the analysis of petroleum product use and the final incidence of excise beyond the direct or first round effects, the total and indirect requirements coefficients do not capture many other influences which are present in the economy. As we have already seen, almost all sectors of the economy use some petroleum products as inputs into their productive processes. The price responsiveness of each of these sector (or industry) demands for fuel is dependent upon many underlying factors including the importance of petroleum products as an input in production, the ability to substitute other inputs for petroleum products; the responsiveness of the supply to final product price changes; the ability to substitute between different intermediate goods or sources (such as different modes of transport) and the responsiveness of the demand for the good eventually produced.

Differences in one or more of these factors can lead to different effects for different user industries. Tracing these effects is complex and requires a more comprehensive and detailed framework than that provided by input-output accounts.

### 3. Effects of Petroleum Product Excises on Agriculture

In this section we address the effects of petroleum product excises on the level and distribution of economic activity in the economy with special reference to the agricultural sector. To provide a convincing analysis of these effects requires a framework of analysis incorporating the following features:

- (i) Different rates of excise on different petroleum products with different rates according to end use. This feature is required to capture the different rates of excise currently applying to various petroleum products and rebates on excise paid to selected users of some products (*e.g.* the use of automotive diesel by farmers).
- (ii) A treatment of the supply characteristics of each category of petroleum product, from both domestic and imported sources and their sales disposition to using industries,

Table 2: Direct, Total and Indirect Incidence of Petroleum Product Excise on Agriculture (\$m)

	Excise Incidence*		
	Direct	Indirect	Total
Automotive petrol	106.7	35.8	142.5
Aviation gasoline	0.0	0.5	0.5
Aviation turbine fuel	0.0	0.7	0.7
Kerosene	1.4	0.3	1.7
Heating oil	0.0	0.1	0.1
Automotive diesel	0.0	20.0	20.0
Industrial diesel	0.0	0.7	0.7
Fuel oil	0.0	1.4	1.4
Other	0.3	1.9	2.2

\* Based on August 1987 Excise rates.

Source: Derived from ABS input-output information for 1978-79 combined with August 1987 rates of petroleum product excise.

households and exports. This input-output information captures the direct and indirect petroleum product linkages throughout the economy.

- (iii) A treatment of the prospects of users to change their consumption of petroleum products in response to excise-induced changes in the relative prices between different categories of petroleum products and between these products and other goods.
- (iv) A treatment of the direct and indirect net revenue implications for the Government sector of changes in excises and the various alternatives for maintaining the budgetary position of the Government sector. Because excises on petroleum products are levied principally to raise government revenue, and because of their significant contribution to total government revenue, a study of their effects should impose the concept of Government sector budget neutrality. To achieve this might involve an additional tax to replace petroleum product excises and/or a reduction in government outlays.

In its recent inquiry into taxation measures for petroleum products, the Industries Assistance Commission developed an economy-wide framework with the above characteristics. This framework, a special purpose version of the ORANI model of the Australian economy, distinguishes the production of ten categories of petroleum products and the sales pattern of imported and domestic components to about 30 categories of using industries, household consumption and exports.

### 3.1 Projections from the model of the effects of petroleum product excises

The model was used by the Commission to provide comparative-static projections<sup>7</sup> of the effects of changes in petroleum product excises including their complete removal. These projections are conditional on the underlying data base on inter-industry linkages, parameter values, and the economic environment in which the changes and specified policy responses are envisaged to take place. For example, the effects of changes in petroleum product excises which impinge heavily on the consumer price index through petrol prices at the pump will be different if real wage rigidity is assumed in the labour market (*i.e.* money wages fully indexed to the consumer price index) than if money wages are assumed fixed.

Our concern here is with the short term effects

assuming that capital employed in each sector of the economy is in fixed supply.<sup>8</sup> In this environment industries respond to a change in their profitability by altering their employment of labour. Short term effects register as a set of adjustment pressures reflecting changes in relative rates of profitability of capital in each industry. The calendar time interpretation of this short term is about two years.

The level and composition of real aggregate absorption (comprising real consumption, investment and government expenditure) is assumed exogenous. Changes in these aggregates are set to zero in projections analysing the petroleum product excise changes. Hence the effects of these changes on domestic prices and international competitiveness can therefore be determined while abstracting from changes in absorption.

Finally, no labour market supply constraints are assumed. Employers are able to obtain their desired labour at the going wage rate. Money wages are fully indexed to movements in the consumer price index resulting from the changes under analysis. That is, real wage rigidity is assumed. Given the important first round effects that petroleum product prices exert on the consumer price index this assumption is of considerable importance.

Table 3 contains projections of the effects in the short term of removing excises on petroleum products under two alternative assumptions concerning how the government might preserve its net revenue position. Under assumption (a), the government simply reduces its expenditure on goods and services by a sufficient amount. Under assumption (b), the government levies a uniform tax on final consumption of all categories of goods and services (including petroleum products) distinguished in the model. The results refer to the effects of petroleum excises at the rates which existed in September 1986<sup>9</sup>. As was noted in section 1 there is a good deal of volatility in these

7. That is, the projections compare the structure of the economy as represented by the model under the petroleum product excise arrangements existing prior to the change with the structure of the economy under the alternative excises arrangements. The projections abstract from all other policy changes or outside disturbances to the economy.

8. The fixed capital stock assumption implies upward sloping industry supply curves with steeper supply curves for industries with higher capital intensities in primary factor costs.

9. These rates, expressed as a percentage of the maximum wholesale price, are as follows: automotive petrol (70); automotive diesel (72); industrial and marine diesel fuel (62); aviation gasoline (37); aviation turbine fuel (44); lighting kerosene and heating oil (11); and fuel oil (17).

*Table 3: Projections of the Short Term Effects<sup>a</sup> of the Removal of Taxes on Petroleum Products under Alternative Assumptions Concerning the Achievement of Net Revenue Neutrality of the Government Sector.*

	(a) Reduction in government expenditure				(b) Uniform tax on final consumption			
	Remove all petroleum product taxes (1)	Uniform decrease in government expenditure (2)	Net effect (3) = (1) + (2)	Set uniform taxes on final consumption to achieve nominal revenue neutrality (4)	Net effect (Nominal revenue neutrality) (5) = (1) + (4)	Set uniform taxes on final consumption to achieve real revenue neutrality (6)	Net effect (Real revenue neutrality) (7) = (1) + (6)	
<b>AGGREGATE EFFECTS</b>								
Real GDP	1.4	-0.8	0.6	-1.5	-0.1	-3.6	-2.3	
Aggregate employment	1.9	-1.4	0.5	-2.2	-0.3	-5.0	-3.1	
Real wage	..	..	..	..	..	..	..	
Consumer Price Index	-4.6	-1.1	-5.7	6.3	1.7	14.4	9.8	
Exports	6.5	1.6	8.1	-6.7	-0.2	-15.6	-9.1	
Imports	-1.4	-1.0	-2.4	1.8	0.4	3.9	2.5	
Balance of trade	1.3	0.4	1.7	-1.4	-0.1	-3.2	-1.9	
Nominal government revenue	-7.6	-1.4	-9.0	7.6	0.0	17.4	9.8	
Real government revenue <sup>b</sup>	-3.0	-0.3	-3.3 <sup>c</sup>	1.3	-1.7	3.0	0.0	
<b>ACTIVITY EFFECTS</b>								
Agriculture	3.0	0.7	3.7	-3.3	-0.3	-7.7	-4.7	
Forestry and logging	1.2	-0.7	0.5	-1.4	-0.2	-3.2	-2.0	
Fishing and hunting	3.1	0.6	3.7	-3.2	-0.1	-7.4	-4.3	
Mining export	4.2	0.9	5.1	-4.8	-0.6	-11.0	-6.8	
Food export	7.5	1.6	9.1	-7.7	-0.2	-17.7	-9.8	
<b>REAL NET VALUE OF OUTPUT</b>								
Agriculture	9.1	2.2	11.3	-8.8	0.3	-21.8	-12.7	
Forestry and logging	1.6	0.9	2.5	-0.9	0.7	-3.4	-1.8	
Fishing and hunting	3.8	1.5	4.3	-4.0	-0.2	-9.3	-5.5	
Mining export	14.6	4.6	19.2	-15.3	-0.7	-35.6	-21.0	
Food export	24.5	4.2	28.7	-12.0	12.5	-27.6	-3.1	

<sup>a</sup> All projections are percentage changes except for the balance of trade which is in base percent (1978-79) billions of dollars. The projections are changes from the levels received in the absence of changes in taxes on petroleum products.

<sup>b</sup> Defined is nominal revenue of the government sector (Commonwealth, State and local) deflated by movements in the consumer price index.

<sup>c</sup> This decrease in real government revenue together with the uniform decrease in real government expenditure on goods and services leaves the government's net budgetary position unchanged.

Source: Industries Assistance Commission's model of petroleum production and sales.

rates which in effect now depend on world crude oil prices in Australian dollars and movements in the consumer price index.

In the results of column 1 the net revenue constraint on the government sector is not imposed. Because of this they provide only a partial picture of the effects of petroleum product excises. These results are dominated by the effects of removing the tax on automotive petrol which accounts for a high proportion of total fuel sales and has a high tax component (*ad valorem* equivalent of almost 70 per cent). Removing the excises lowers the price paid by industry users and consumers of fuel. Under the assumption of full wage indexation the initial reduction in the purchase price of petroleum products is magnified throughout the economy. The rate of increase in the consumer price index falls by 4.6 percentage points. (That is, assuming an inflation rate of say about 8 per cent then the removal of excises would lead, after about two years, to a reduction in the inflation rate to about 3.4 per cent.) This provides a boost to the international competitiveness of domestic industries, particularly those which are export oriented. The agricultural sector's ability to expand in the short run is limited by its relatively greater fixed factor (capital, land, owner-operator) intensity. The short term benefit to agriculture of the removal of excises on petroleum products is therefore experienced mainly as an increase in real income rather than as an improvement in its activity level. The real net value of agricultural production increases by 9.1 per cent compared with a 3.0 per cent expansion in agricultural output.

The problem for the government in removing petroleum excises is that its revenue falls substantially in both nominal and real terms. The results in column 2 refer to the effects of a uniform decrease in government expenditure of a sufficient amount to leave the government's real net revenue position unchanged. The net effect is shown in column 3. By offsetting the revenue loss in this way the improvement in international competitiveness apparent in column 1 is reinforced. This further enhances the activity levels of industries such as agriculture which are highly exposed to international trade. The effects are unfavourable for industries where government consumption expenditure represents a significant proportion of their sales.

The results in the remaining columns show that, assuming full indexation of wages to consumer prices, recouping the lost excise revenue by increasing taxes on final consumption has adverse

effects on agricultural and other trade related activities in the short term. Under full wage indexation the increase in the general price level arising from the imposition of a uniform tax on household consumption exceeds the reduction in prices associated with the removal of the fuel excises. The domestic price level effects of petroleum product excises on intermediate usage are constrained by competition from international trade. Export oriented and import competing industries are limited in their ability to pass on either the direct or indirect cost effects of the fuel excises in the form of higher prices for their outputs. The excises are also spread over both current production and capital creating activities. Only consumption goods enter into the calculation of the consumer price index. Under full wage indexation, the first round effects are magnified and transmitted throughout the economy.

Because of the consumer price index effects of taxes on final consumption the size of the uniform tax will differ, as will the effects on economic activity, according to whether real or nominal government revenue neutrality is achieved. This is illustrated in columns 5 and 7. The net effect (columns 5 and 7) is that the cost structure of the economy is worsened with adverse consequences for industries such as agriculture which are closely connected to international trade.

### 3.2 Effects of the Diesel Fuel Rebate

Since the introduction of the Diesel Fuel Rebate Scheme in 1982 all diesel fuel is sold at a price inclusive of excise. Certain categories of off-road users—agriculture, mining operations, forestry and fishing, hospitals, aged persons and nursing homes—are able to claim a rebate on excises paid.<sup>10</sup> Since November 1985 the rate of rebate has been dependent on the category of user with agriculture, forestry and fishing being eligible for a full rebate.<sup>11</sup> The Government's policy since March 1986 of increasing petroleum product excises to compensate for declining revenue from the crude oil levy, by ensuring that previously eligible users retain full exemption from the excise increases has substantially increased the value of the rebate to eligible users. For example, removal of the rebate (as of 1 August 1987) would lead to

10. Previous arrangements allowing certain users of diesel to be exempted from at least a proportion of the excise date back to 1957. See Industries Assistance Commission (1986) for details.

11. The rebate for mining operations is equivalent to 86 per cent of excises paid while the rebate for eligible premises is 75 per cent.

a first round increase in the price of diesel to agricultural users of about 66 per cent. The direct cost share of diesel in the value of production (total costs where costs equal material input costs and returns to land, labour and capital employed) for the agricultural sector as a whole is about 2 per cent. A 66 per cent increase in the price of diesel to agricultural users therefore implies a direct first round increase in the agricultural sector's costs of 1.3 per cent. For forestry, logging and fishing activities expenditure on diesel fuel represents about 6 per cent of their total costs, hence the first round effects on costs are likely to be about three times that for agriculture.

Projections of the short term effects on key macroeconomic aggregates and directly affected industries of the removal of the diesel fuel rebate (of the level existing at 1 August 1987) are shown in Table 4. Output and real net value of production (real value added) are all projected to decline for directly affected industries. The agricultural and mining export industries are the most exposed to international trade and consequently record the greatest output reductions of 0.7 per cent and reductions in real net income of over 2 per cent. The projected loss in real income for agriculture is almost double the direct cost impost of the additional diesel excise. In contrast, forestry and logging is marginally affected as a major proportion of the output of this industry is sold to the domestic oriented construction sector which also is only marginally affected by the rebate removal.

At the aggregate level there is a small deterioration in the trade balance from the reduced export earnings and hence a small contraction in real GDP and employment demand. Offsetting this is a slight improvement in government revenue. If the government were to maintain revenue neutrality there would be scope for a small reduction in taxes elsewhere, the effects of which could be favourable for the agricultural and other export oriented sectors.

Since the rationale for petroleum excises is to raise revenue for the government, the rebate provisions on diesel excise to farmers should be viewed as a form of assistance to the agricultural sector. Nevertheless, while our analysis in Table 4 shows that the level of assistance provided is significant in farm income terms it represents only about one-eighth of the cost to the agricultural sector (in farm income terms) of tariffs to manufacturing industries.

#### 4. Conclusion

Petroleum products are used pervasively

*Table 4: Short Term Projections of the Effects of Removing the Diesel Fuel Rebate*

Variable	Percentage Change
<b>Aggregate effects</b>	
Real GDP	-0.1
Aggregate employment	-0.2
Consumer price index	0.0
Exports	-0.7
Imports	0.0
Balance of trade (per cent of GDP)	-0.1
Nominal Government revenue	0.5
Real Government revenue	0.5
<b>Activity effects</b>	
Agriculture	-0.6
Forestry and logging	-0.3
Fishing and hunting	-0.5
Mining export	-0.6
Food export	-0.6
<b>Industry real net value of production</b>	
Agriculture	-2.3
Forestry and logging	-0.3
Fishing and hunting	-0.6
Mining export	-2.1

Source: Industries Assistance Commission's model of petroleum products production and sales.

throughout the economy as both inputs to production and as a significant item of consumer expenditure. To establish the effects of excises levied on these products on the economic performance of using industries such as agriculture is a complex task. Key factors which need to be taken into account in this exercise are:

- (i) the direct usage of petroleum products by agriculture and hence excise incurred on direct usage after taking into account specific rebates;
- (ii) indirect usage in the petroleum products component embodied in purchased inputs and in services required to shift agricultural production from the farm to the point of domestic sale or point of export;
- (iii) the extent to which the first round effects of excises on domestic prices are indexed into money wages and hence back into prices and so on;
- (iv) the ability of using industries in the economy to pass on the cost increases imposed by petroleum excises in the form of higher product selling prices; and
- (v) the economic effects of alternative arrangements imposed by government to preserve its net revenue position in the absence of petroleum product taxes.

Our analysis of the effects of petroleum product excises on agriculture, conducted with the assistance of an economy-wide model of petroleum products production and sales which



takes into account the above factors, indicates the following:

- Excise paid on direct usage of petroleum products is of little significance to agricultural performance, in part due to the full rebate on usage of distillate;
- Ignoring the government's budgetary constraint, excises on petroleum products severely affect the profitability of the farm sector. The reason is agriculture's indirect usage of excisable petroleum products embodied in other purchased inputs and in the transport services required to shift farm production to the point of sale or export coupled with the inability of export-oriented agriculture to pass on excise-indexed costs in the form of higher product prices;
- If however it is assumed that the government must preserve its net revenue position after petroleum product taxes are eliminated, then the net effect on agriculture depends very much on the method whereby the government makes up the revenue shortfall;
- If the revenue shortfall is made up by reducing government outlays on goods and services then the boost to international competitiveness of removing petroleum product excises is enhanced;
- If the shortfall is made up by a uniform tax on household consumption then, under the assumption of full indexation of money wages to the consumer price index, the boost to international competitiveness from removing the excises is offset by the domestic inflationary impact of the consumption tax;
- With the rapid escalation of excises on distillate in recent years, and the government rationale for this escalation being revenue raising, the rebate on on-farm use of excise by farmers should be seen as a measure of assistance to that sector;
- Removal of this assistance is projected to lead to a reduction in the real net income of the agricultural sector of about two per cent.

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