

MODELLING THE REGIONAL CONSEQUENCES OF COMMONWEALTH POLICY - THE CASE OF THE FRINGE BENEFITS TAX¹

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ABSTRACT A multi-regional computable general equilibrium model is used to investigate both the economy-wide and regional consequences of the fringe benefits tax in the long-run. The model is a hybrid “top-down” / “bottom-up” model: economic activity is modelled in two regions (Western Australia and the Rest of Australia) with results at the national level being an aggregation of the results for these two regions. Top-down modelling is then undertaken of sub-state regions within Western Australia. However, a significant share of the economic activity of one sub-state region - the Pilbara - is modelled within the bottom-up component of the model. The paper focuses on results at three regional levels: national, state, and sub-state. It is found that this Commonwealth policy, despite having relatively uninteresting consequences at the macroeconomic level, nevertheless has a significant impact on the distribution of economic activity across the country. Two features of the modelling are important in elucidating the regional consequences of the Commonwealth policy: the modelling of the policy responses at the state government level, and detailed modelling of regional cost and sales differences.

1. INTRODUCTION

The major focus of much modelling of changes to Commonwealth fiscal policy has been on its effects on macroeconomic aggregates, prices, and income distribution. However, Commonwealth policy can also have significant implications for the distribution of economic activity among Australia's regions - even in cases where the macroeconomic consequences of the policy are negligible. In this paper the multi-regional computable general equilibrium model FEDERAL-WA is used to investigate both the economy-wide and regional consequences of the fringe benefits tax (FBT) under a long-run environment.

FEDERAL-WA is large and detailed, making it impractical to provide a detailed description of its structure here. A full description of the theoretical structure of FEDERAL is contained in Madden (1992). For a full description of the Western Australian implementation of the model see Giesecke, Madden and Pant (1998). Broadly, the FEDERAL WA model can be described as a hybrid “top-down” / “bottom-up” model. The bottom-up component models economic activity within and between two regions (Western Australia and the Rest of Australia) within an explicit comparative-static optimising framework. Results at the national level are

¹ I wish to thank John Madden for his valuable suggestions and advice in the preparation of this paper.

then calculated as an aggregation of the results for these two regions. Top-down modelling using an ORANI/ORES-style² regional extension is then undertaken of sub-state regions within Western Australia. However, a significant share of the economic activity of one sub-state region - the Pilbara - is modelled within the bottom-up component of the model. The Pilbara provides an interesting case study in the regional consequences of this particular Commonwealth policy. A number of industry sectors within the region pay relatively high proportions of their labour costs in FBT, due primarily to their remoteness from urban centres. Local industry has long claimed that the tax is an important impediment to the development of the region.

2. THE DATABASE

A number of modifications were made to the existing FEDERAL WA database for this study. A summary of these modifications is provided below, while full details are available in Giesecke (1999)³.

First, considerable aggregation of the original database was undertaken. The original multi-regional input-output database features 104 industries and commodities. This level of industrial and commodity disaggregation was not considered necessary for the present study. Instead, an aggregated version of the database containing 43 industries and commodities was constructed. The aggregated database retained individual modelling of those industry sectors (particularly the mining sectors) that represent a significant share of the economic activity in the Pilbara region.

Second, the database year (1993/94) straddles an important change in the operation of the FBT (See Carmody, 1998). Since the focus of this paper is the impact of the current FBT arrangements, it was important to recast the values for FBT collections in the FEDERAL-WA database so that they reflect the amount of FBT that would have been collected in 1993/94 had the current FBT arrangements prevailed throughout that year. This change necessitated some re-allocation of value-added by regional industry among the sub-components of the costs of labour and capital to reflect the incidence of the new arrangements.

Finally, five new industries, located only in the Pilbara region, were introduced to the bottom-up core of the model by disaggregating them from the relevant Western Australian industries within which they were subsumed in the original database. These five industries were: Pilbara coal, oil and gas mining; Pilbara iron ore mining; Pilbara other mining; Pilbara services to mining; and Pilbara agricultural and mining machinery manufacturing. These industries were chosen based on an understanding that FBT payments represented for them an above-average proportion of costs relative to the corresponding industry for Western Australia as a whole. The theoretical structure of the model was then modified to

² See Dixon, Parmenter, Sutton and Vincent (1982).

³ Available from the author on request

ensure that the output of each Pilbara industry competed with the same commodity sourced from the rest of Western Australia, the rest of Australia, and overseas.

3. RESULTS

3.1 Introduction

The simulations reported in this study have been undertaken under a long-run closure of the model. The long-run implications of removing the FBT and replacing it with a higher rate of income tax are explored in Diagram 1. The left-hand panel represents the economy-wide labour market in the long-run. The supply of labour is assumed to be exogenously given at L_s . Initially, it is assumed that the only tax levied is a FBT, and the labour demand curve D_0^* is drawn for a given level of fringe benefits and a given fringe benefits tax rate. The take-home wage of workers is initially w_0 . The labour market faced by any individual firm, j , is assumed to be given by the right-hand panel. Each firm is assumed to be sufficiently small that it can hire any amount of labour at the going wage rate, w_0 , and have a negligible impact on the price of labour. Hence the firm's labour supply curve is initially given by L_0^{sj} . If the FBT is removed, then the economy-wide labour demand curve shifts to D_1^* , and the take-home pay of workers increases to w_1 . The labour supply curve for any individual firm shifts up accordingly. While the economy-wide labour demand curve shifts up in line with the average rate of fringe benefits tax, the size of the vertical shift faced by any individual firm will depend on the importance of fringe benefits in its labour compensation package. For a firm paying a level of fringe benefits that corresponds with the

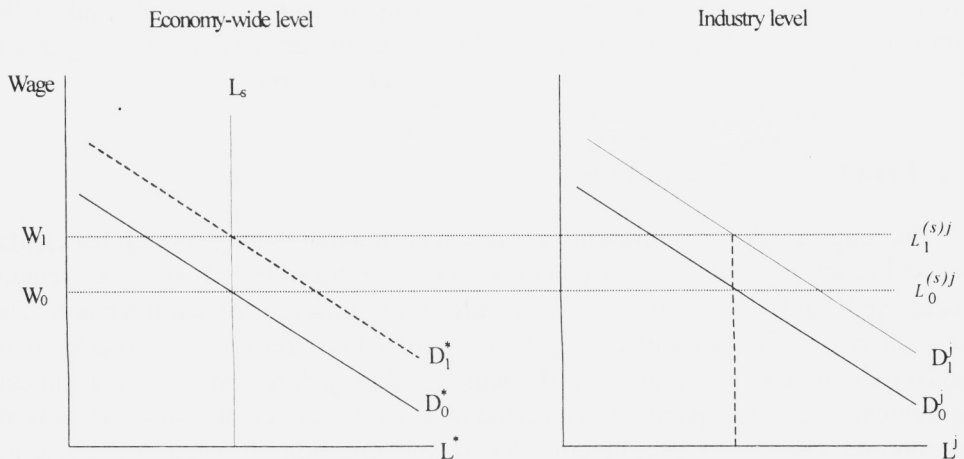


Diagram 1: Long-run Economy-wide and Industrial Consequences of the FBT

economy-wide average, its labour demand curve will shift up to D_1^j , and the level of employment and activity in the firm will remain unchanged. However firms paying their workers above average levels of fringe benefits will experience a greater vertical shift in their labour demand schedules - hence these firms will increase their employment following the elimination of the FBT. Firms paying below average levels of fringe benefits will experience a vertical shift in their labour demand schedules which is less than that depicted in the right-hand panel - hence these firms will decrease their employment.

These conclusions are not reversed when the fringe benefits tax is replaced by a revenue neutral income tax. In the left-hand panel, which depicts the economy-wide situation, the levying of a revenue-neutral income tax reduces the post-tax wage to w_0 . In the right-hand panel, which depicts the industry-level situation, firms continue to face the pre-tax wage of w_1 , and their labour demands continue to be given by the demand schedules D_1^j . Hence their demands for labour are not changed from those that arise when the FBT is removed. Workers however must pay the new income tax, and so their post-tax wage is again given by w_0 on average.

This simple analysis suggests that firms that pay an above average share of their remuneration in fringe-benefits will increase their demand for labour should the fringe benefits tax be replaced by a revenue-neutral income tax. More generally, any revenue neutral change in the fringe benefits tax regime will tend to lower the costs of employing workers for some industries, and raise it for others. Turning to regions, any region which has an above average proportion of its activity accounted for by firms paying above average rates of fringe benefits tax will experience an increase in economic activity following a revenue-neutral change in the fringe benefits tax regime, all other things being equal. Both Western Australia and the Pilbara region fit this description, and so we shall find in the simulations reported below that the level of economic activity in these regions is particularly sensitive to changes in the fringe benefits tax regime.

3.2 FEDERAL WA Model Closure

The long-run closure represents a solution period that is long enough for capital stocks in each regional industry to adjust such that rates of return on capital remain unchanged, and for the real wage to adjust to achieve full employment. The solution period is also sufficiently long enough for inter-regional migration to adjust to maintain a given number of unemployed in each region. The long-run can be thought of as corresponding to a period of around six to eight years, and so is an appropriate closure to use in considering the question of what the enduring economic outcomes of the fringe benefits tax have been. A more detailed discussion of the long-run closure that has been employed is presented below.

(i) Employment

Employment at the national level is exogenous, and the economy-wide real wage rate adjusts to maintain the exogenously determined level of full employment. This is a conventional assumption in Australian CGE studies, and reflects an assumption that the level of national employment in the long run is determined independently of any mechanisms that are in the model. The factors that determine long-run labour supply - the population growth rate, the participation rate, and the unemployment rate - are assumed to be the product of demographic factors, household preferences, or policy and institutional settings that are exogenous to the model.

(ii) Inter-regional migration

The number of unemployed in each region is set exogenous, and regional labour forces are endogenous: that is, inter-regional migration operates to maintain a given number of unemployed in each region.

(iii) External liabilities

In the long run it is assumed that the government has either a target level or growth path for the country's net external liabilities, and that this target will be pursued independently of any changes in the fringe benefits tax policy. Hence, if changes in the fringe benefits tax regime were to bring about changes in the balance of trade, it is assumed that these will be neutralised by a change in some policy instrument. Specifically, the exogenous balance of trade target is achieved by setting endogenous a model variable that indexes real economy-wide private investment spending with real economy-wide consumption spending. This effectively sets endogenous the level of real economy-wide private investment spending, and ensures that it attains that level required to maintain a given balance of trade deficit. This closure can be rationalised by assuming both that the government pursues an interest rate policy to target the balance of trade, and that this interest rate policy operates primarily on investment to the exclusion of the other elements of domestic absorption.

(iv) Government liabilities

It is assumed that both the Commonwealth Government and both state governments have either a target level or target growth path for their levels of net indebtedness, and that they pursue these targets independently of any changes that might be made to the fringe benefits tax regime. Put another way, it is assumed that the change in the fringe benefits tax policy does not also lead to a change in the stance of fiscal policy at any level of government, in either a contractionary or expansionary way, relative to how that stance would have been in the absence of the policy change. Hence, if the change in the fringe benefits tax rate raises (lowers) the borrowing requirement of a level of government, then that government must raise (lower) the effective rate of some tax instrument. Specifically, the exogenous status of the real Commonwealth borrowing requirement is supported by setting endogenous the average rate of income tax. The exogenous status of the

borrowing requirements of the two state governments is supported by setting endogenous the average rate of payroll tax in each jurisdiction.

The Impact of the Fringe Benefits Tax

Table 1 presents a summary of the simulation results. The first column of results contains a selection of results for the Commonwealth's elimination of the fringe benefits tax, economy-wide. The results in this column assume that the borrowing requirements of all levels of government are free to vary, and that the foreign currency value of the nation's balance of trade is also free to vary. The remaining columns examine the consequences of altering these assumptions, and are discussed later in the paper.

The Commonwealth's nominal borrowing requirement increases by almost \$2 billion. This aggregate result obscures a number of changes in the composition of the Commonwealth's budget. Receipts from the fringe benefits tax are falling by approximately \$2.6 billion. However, almost half of this is recouped through an increase in PAYE tax receipts, which increase by approximately \$1.3 billion. Receipts from other income taxes increase by \$100 million, and receipts from sales taxes increase by \$157 million. In total, despite relinquishing \$2.6 billion in FBT receipts, the Commonwealth's aggregate receipts fall by only just over \$1 billion. At the same time, nominal outlays increase by almost \$1 billion. This is largely due to increasing aggregate nominal economic activity at the national level, against which the various Commonwealth outlays are indexed.

Table 1. Long-run Consequences of the Fringe Benefits Tax

Variable	Commonwealth		State			Total
	FBT	PAYE	WA	RoA	Investment	
GDP Deflator	0.85	-0.50	0.01	-0.02	0.00	0.33
GDP Real	0.11	-0.04	0.00	0.00	0.00	0.07
Real Consumption	0.79	-0.67	0.00	-0.03	0.00	0.10
Balance of Trade	-1862	1779	-7	74	16	0
Real Investment	0.79	-0.67	0.00	-0.03	-0.02	0.08
Real Borrowing Requirements						
Commonwealth (\$m)	1,861	-1,886	-4	29	1	0
Western Australia (\$m)	44	-47	10	-7	0	0
Rest of Australia (\$m)	14	75	7	-96	0	0
Real GSP						
Western Australia	-0.60	0.98	0.13	0.14	0.01	0.66
Rest of Australia	0.20	-0.17	-0.02	-0.02	0.00	0.00
Sub- regional GRP Impacts						
Pilbara	0.44	3.69	0.21	0.30	0.03	4.67
South Eastern Region	-1.45	1.78	0.16	0.18	0.01	0.68
Perth	-0.62	0.71	0.12	0.12	0.01	0.34

The increase in PAYE receipts is an interesting result. This can be traced to two immediate causes: an increase in the consumer price index of approximately 0.68 per cent, and an increase in the real consumer wage of approximately 1.84 per cent. The real wage increases for a number of reasons. The most important of these is that the long-run incidence of the FBT falls entirely on labour. Hence the removal of the tax alone is sufficient to boost real consumer wages by approximately 1.3 per cent. In addition, the removal of the FBT favours the expansion of the more capital-intensive sectors of the economy. This leads to a long-run increase in the capital / labour ratio, and with it, the real wage. This also increases the real consumer wage. The increase in real consumer wages leads to an increase in real consumption spending of 0.79 per cent. This is a significant demand side stimulus, and with a fixed national labour supply, adds to the positive pressure on the real producer and real consumer wages.

The increase in the size of the capital stock leads to a small increase in the level of national GDP. However, the increase in GDP is not adequate to meet the increase in domestic absorption that the removal of the FBT generates. Hence, the domestic price level must increase to generate an appreciation of the real exchange rate. Hence the GDP deflator increases by 0.85 per cent, and the balance of trade deficit expands to \$1.8 billion.

Turning to the state level results, one can see that the immediate impact of this policy on economic activity in Western Australian is negative. This is because of the relatively higher exposure of this state to the traded goods sector. Net exports represent twenty five per cent of Western Australia's gross regional product, and so the rise in the domestic price level hits this State particularly hard.

However turning to the sub-regional results, one can see clearly how the impact of a national shock can be attenuated by regional cost differences. Gross regional product in the Pilbara expands by almost half a percent.

The mining industries in the Pilbara pay relatively high rates of FBT (9% of total labour costs) compared with the Australian average (1.3% of total labour costs). Hence, the direct effect of the cost advantage that these firms receive when the FBT is eliminated out-weighs the indirect effect on their costs of the increase in the average real wage.

The South Eastern region has a similar share of employment in mining as does the Pilbara (approximately 39% as compared to 50% for the Pilbara). However, unlike the treatment of the Pilbara in the model, the South Eastern region has been modelled in a purely top-down fashion. Hence, the model results cannot reflect any real world FBT cost differences between the South Eastern mining industries and those of Western Australia as a whole. Consequently, the high exposure of this region to foreign trade leads to a relatively large contraction in its economic activity as the real exchange rate appreciates.

The PAYE Tax Impact

Following the removal of the FBT, the Commonwealth Government has the task of closing an increase in its borrowing requirement of approximately \$2

billion. It has been assumed in these simulations that the instrument used by the Commonwealth Government is the PAYE tax rate. Given the other shocks to the model, a 3.85 per cent increase in the average rate of this tax is sufficient to raise the revenue necessary to ensure that there is no change in the Commonwealth's real long-run borrowing requirement. The increase in the average rate of income tax acts to reduce the Commonwealth's borrowing requirement in two ways. First, it raises approximately \$1.6 billion in extra tax from labour income. However approximately \$200 million of revenue is lost from other income taxes and sales taxes due to the reduction in aggregate activity that the increase in the income tax rate induces. Approximately another \$500 million is saved on the outlays side of the budget. This is because, in general, Commonwealth outlays are indexed to various indicators of nominal activity. Since these are declining, so too does aggregate nominal Commonwealth outlays.

The increase in the average rate of income tax causes a reduction in household disposable income, and therefore a reduction in household real consumption spending - real consumption spending falls by 0.67 per cent. Economy-wide real private investment spending falls by the same amount, because of the assumption that these two components of real absorption move together.

With the remaining components of aggregate demand, other than the balance of trade, fixed, and with real gross domestic product largely given by the assumption of fixed labour supplies and exogenous rates of return, the balance of trade surplus must improve when real consumption and real investment fall. The expansion in the export and import competing industries results in an increase in economic activity in both Western Australia and sub-regions such as the Pilbara and the South Eastern regions that have a high concentration of trade-exposed industries.

Real gross Western Australian product is projected to be 0.98 per cent higher than it would otherwise have been. The expansion in activity in Western Australia is at the expense of activity in the Rest of Australia: real gross state product in the latter region is projected to be 0.17 per cent lower than it would otherwise have been.

The state results reflect, in large part, the relatively higher share of trade exposed industries in aggregate economic activity in Western Australia. Results for Western Australia are dominated by the expansion of these industries. These industries also expand in the Rest of Australia. However there they represent a smaller share of activity, and so the impact of the fall in domestic absorption dominates. Most industries in the non-traded goods sector contract in the rest of Australia, and with them, aggregate economic activity in the region.

The same story emerges at the sub-regional level. However, unlike the results for the FBT rate cut in the first column of Table 1, cost shares play little role in the results in the second column. Both the Pilbara and the South Eastern region expand due to their high exposure to the traded goods sector. However, the Pilbara is somewhat more trade exposed - having both a higher share of economic activity in endogenous export industries, and a higher share of its output being sold in

foreign markets. Hence, activity in this region expands relative to that in the South Eastern Region. The results for Perth track those for Western Australia as a whole.

Taken together, the change in the composition of Commonwealth taxes, away from FBT and towards income taxes, leaves the economy-wide capital / labour ratio slightly higher - up by 0.14 per cent. This leaves the real wage and hence real consumption also higher. Real consumption is up by 0.13 per cent. Real aggregate investment expenditure is indexed to real consumption spending, so that too increases by 0.13 per cent. The increase in domestic absorption exceeds the increase in real gross domestic product, and so the foreign currency balance of trade deficit expands, by \$82 million. Activity in Western Australia is left higher by the budget-neutral elimination of the FBT. This is because the state is insulated to some degree from the impact of the increase in the real wage when the FBT is initially eliminated, by the fact that on average the FBT is a relatively more important element of production costs for Western Australian industries. As discussed earlier, an important determinant of the impact of the elimination of the FBT on individual industries is the share of the tax in the total labour bill of the industry. Those industries that pay above average rates of FBT experience a reduction in their labour costs that exceeds the economy-wide increase in the real wage that is a corollary of the elimination of the FBT. If these industries also sell their output to price sensitive agents (such as foreigners and households in particular) then they will expand.

State Fiscal Adjustments

In the absence of any change in the stance of fiscal policy by either regional government, the real borrowing requirement of the Western Australian government would fall by approximately \$2 million, and that of the Rest of Australia would increase by approximately \$89 million.

However it is assumed that in the long-run the two governments adjust their average rates of payroll tax to ensure that their real borrowing requirements remain unchanged relative to what they would otherwise have been.

This requires the rest of Australian government to increase its average rate of payroll tax by approximately 1.9 per cent. This causes the price of labour to firms in the rest of Australia to rise, and so employment and output contract in that region. With the economy-wide level of employment fixed, labour moves to Western Australia and that region's economy expands as price sensitive domestic agents and foreign buyers substitute towards the now relatively cheaper Western Australian sourced commodities.

The expansion in economic activity that occurs in Western Australia following the increase in the average rate of payroll tax in the rest of Australia causes the borrowing requirement of the Western Australian government to fall by approximately \$7 million.

Following the fiscal adjustments of the Commonwealth and Rest of Australian governments, the Western Australian government is left with a surplus of approximately \$10 million. It is assumed to disburse this *via* a reduction in the

average rate of payroll tax of 2.9 per cent. The fiscal adjustment of the Western Australian government reinforces the effects of the fiscal adjustment by the Rest of Australian Government. The price of labour to Western Australian firms falls, causing a further increase in employment and economic activity in Western Australia.

From the perspective of the total impact of this policy, the State government level policy adjustments are not unimportant at the regional level. Approximately one half of the gross regional product result for Western Australia is due to the payroll tax adjustments of both regional governments. The payroll tax adjustments of both regional governments also have a major impact on the level of economic activity in Western Australian sub-regions - particularly the more trade-exposed regions such as the Pilbara and the South East. For example, the level of economic activity in the Pilbara is approximately 0.5 per cent higher than it would otherwise have been. This represents approximately 10% of the total impact of the policy on the real gross product of the region.

Balance of Trade Adjustment

Following the fiscal adjustments by all levels of government, a small deficit on the foreign currency balance of trade remains. This is removed *via* a small reduction (0.02 per cent) in the level of real investment spending, which allows an expansion in the volume of exports. This has a positive impact on the relative level of economic activity in the more trade-exposed regions of Western Australia and the Pilbara. As was the case reported in the results for the PAYE tax adjustment, the sub-regional results are influenced by industry composition effects rather than cost differences. The Pilbara expands relative to the other major trade-exposed region - South Eastern - both because it is somewhat more trade exposed than the latter region, and because it sells a higher share of its output to foreign markets.

4. CONCLUSIONS

The macroeconomic impacts of the fringe benefits tax are relatively minor: in its absence there is a very small increase in real GDP as the more capital-intensive sectors of the economy expand, and hence a small rise in the share of domestic absorption accounted for by private consumption and investment.

In contrast to the national results, the regional consequences of the budget-neutral elimination of the fringe benefits tax are dramatic. Western Australian real gross state product is projected to be higher by two-thirds of a per cent. A little over half of this expansion can be attributed to the budget-neutral change in the Commonwealth tax mix. This causes the Western Australian economy to expand, despite the uninteresting economy-wide impacts, because the fringe benefits tax is a relatively important element of production costs for industries in that state. The impact on Western Australian activity is reinforced by the fiscal response of the state governments in both Western Australia and the rest of Australia. A little under half of the total expansion in the level of economic activity in Western

Australia is due to adjustments to the average rates of payroll tax in each of these two regions.

The top-down decomposition theory of the model produces results for nine Western Australian statistical divisions. We focused on a particular sub-region of Western Australia - the Pilbara - and introduced a number of specific Pilbara industries to the bottom-up model to improve the modelling of industry cost and sales structures in that region. Under the scenario investigated, the real gross regional product of that region is approximately 4.7 per cent higher in the long run. The significant impact of the fringe benefits tax on that region is due to its industrial structure being heavily weighted towards trade-exposed mining industries that also pay relatively large proportions of their labour costs in terms of fringe benefits tax.

The introduction of bottom-up modelling of a significant proportion of activity in the Pilbara was central to the elucidation of the consequences of the FBT for that region. In contrast, the real gross regional product of the South Eastern region, which is almost as mining intensive as the Pilbara, but received only a top-down treatment in the regional extension, is projected to expand by only 0.7 per cent.

The results highlight that even a Commonwealth policy with apparently negligible or uninteresting macroeconomic consequences at the national level can nonetheless have important implications for the spatial distribution of aggregate economic activity. These regional implications may not be fully captured by a routine top-down decomposition of national results. In this paper, the bottom-up modelling of economic activity within two regions allowed the impacts of the policy reactions of the state government level to be investigated. It also allowed the implications of regional differences in costs and sales patterns to be reflected in the results. Finally, the addition of explicit bottom-up modelling of the structure of a significant share of the industrial activity in a single sub-state region (the Pilbara) was an important means of clarifying the implications of the policy change for that region.

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