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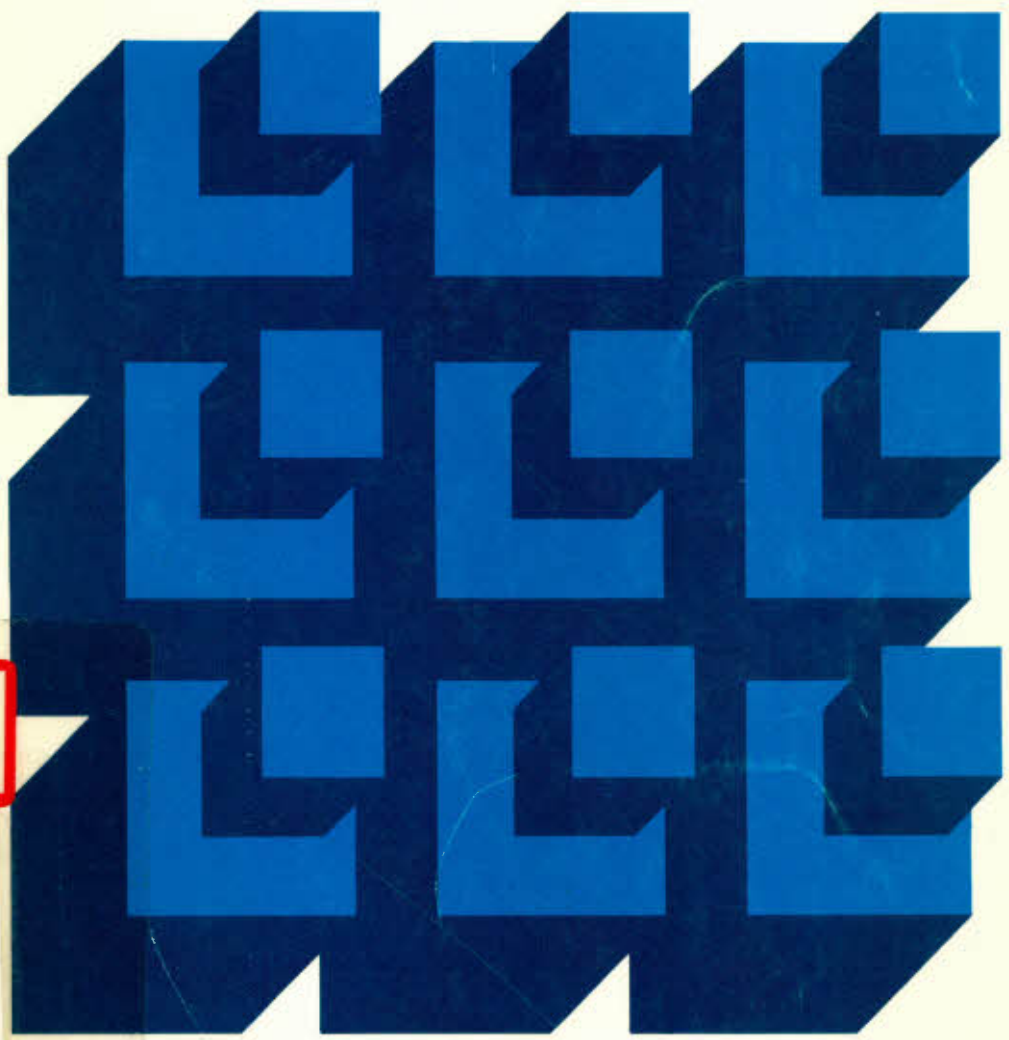

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DISCUSSION PAPER NO. 320

The Welfare Effects of Property Taxation in an Open Economy

by

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and Wayne Thirsk

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RÉSUMÉ

Les auteurs du présent document calculent l'incidence de l'impôt foncier sur le niveau de vie à l'aide d'un modèle d'économie ouverte. Ils examinent, en premier lieu, la possibilité d'exporter le fardeau de l'impôt foncier, en faisant des ajustements aux termes de l'échange et aux taux de location du capital mobile, et se penchent en second lieu sur l'impact déformant de l'impôt. Ils étudient en outre le caractère de pis-aller que présente l'impôt foncier en présence d'une imposition déformatrice du rendement du capital.

Les calculs sont fondés sur les résultats d'un modèle d'équilibre général pour le Canada, partant de données de 1980. Le modèle englobe sept secteurs : deux secteurs d'exportations (à prix fixes et à prix flottants), un secteur d'entreprises non marchandes, un secteur agricole non marchand, l'habitation, les services domestiques et le secteur public. Les importations sont acquises à des prix mondiaux fixes. L'offre de capital est modélisée comme une variable endogène répondant à un prix de location net. Les impôts incorporés au modèle comprennent les impôts sur les sociétés, les impôts fonciers, la taxe à la fabrication, la taxe de vente au détail et l'impôt sur le revenu des particuliers.

L'incidence de l'impôt foncier sur le niveau de vie est répartie comme un effet sur les termes de l'échange et un effet traditionnel de perte de bien-être. L'impôt foncier peut donc, contrairement à la croyance populaire, contribuer à rehausser le niveau de vie.

ABSTRACT

This paper estimates the welfare effects of the property tax in an open economy model. Emphasis is placed on the potential for exporting the burden of the property tax through adjustments in the terms of trade and in the rental rate on mobile capital as well as the distortionary impact of the tax. The second-best nature of the property tax in the presence of distortionary capital taxation is also explored.

Estimates are based on output from a computable general equilibrium model for Canada calibrated to 1980 data. The model incorporates seven sectors: two export sectors comprised of fixed price and flexibly priced exports, a non-traded corporate sector, a non-traded agricultural sector, housing, domestic services and government. Imports are purchased from the rest of the world at a fixed world price. The supply of capital is modelled as responding to an endogenous net rental. Taxes incorporated in the model include corporate taxes, property taxes, manufacturing and retail sales taxes, and personal income taxes.

The welfare effects of property tax changes are split into a terms of trade effect and a traditional deadweight loss effect. The property tax may be welfare improving, contrary to conventional wisdom.

CONTENTS

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FOREWORD

This paper is one of the outputs from Council's three year study of the taxation of capital income -- or of the income derived from savings and investment. The study program had important dimensions in both time and space. The effects of capital taxation on both present and future output and standards of living were scrutinized. Taxes levied by all levels of Canadian government were studied as were the international implications of the taxation of capital income. Another important emphasis in the study program was on the interrelationship among specific measures of capital taxation. Here, general equilibrium and other techniques were used to examine the various measures as an interrelated system. Separate studies were also undertaken of specific measures of capital taxation including the personal and corporate income taxes, sales and transaction taxes, property taxes, and resource taxes.

The present study is concerned with the equity and efficiency of property taxes in a tax system that places different burdens on different uses of capital by industry. To this effect, the authors apply a model of the Canadian economy to simulate the effects of revenue-neutral changes in property and corporate income taxes on national income on the distribution of income among households, on foreign investment, and on the terms of trade of Canada.

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Judith Maxwell
Chairman

I INTRODUCTION

This paper emphasizes two aspects of property taxation which have been overlooked in the rush to vilify this particular tax.[1] Specifically, these are the potential to export the burden of the business property tax to foreigners through changes in the terms of trade or changes in the net return to foreign owned factors employed in Canada and the second-best nature of the residential property tax on owner occupied housing given the differential tax treatment of capital income under the income tax. The arguments contained in the paper add to a burgeoning literature which supports the proposition that the property tax may be welfare improving.[2]

In order to illustrate the arguments we wish to make, numerical estimates of the welfare effects of four property tax experiments are provided, based on output from a computable general equilibrium model for Canada calibrated to 1980 data. First, a general reduction in property tax rates coupled with a revenue preserving increase in the corporate tax rate is examined. Arguments in favour of reduced reliance on the property tax may depend on how the revenue loss is recouped. In this first experiment, the total weight of capital taxation remains the same but the composition of capital taxation is allowed to vary. Secondly, non-residential property taxes are reduced in the context of a revenue-neutral increase in residential property

taxes. Here the weight of property taxation is held constant but the distribution of the tax base is shifted from businesses to households. This is one type of property tax reform that has been widely discussed in the literature. In the third experiment, a revenue neutral switch to uniform property tax rates across sectors is examined. Tax rate equality is another interpretation of the suggestions that have been made for property tax reform, presumably in order to enhance economic welfare. Finally, since property taxes are only one component of capital taxation, the welfare consequences of uniform capital tax rates (property and corporate taxes combined) are the focus of the fourth experiment.

These experiments, conducted in an open economy model, highlight the importance of examining property tax reform in the broader context of the entire tax system. The overall conclusion is that both the potential for exporting the burden of the property tax and the second-best nature of the property tax are significant and worthy of further consideration.

The model incorporates seven sectors: two export sectors comprised of fixed price (traded agricultural products) and flexibly priced (traded corporate output) exports, a corporate sector producing non-traded output, domestic agriculture (non-traded), housing, non-corporate services (non-traded) and a government sector. Imports are purchased from the rest of the world at an exogenously given price. As is common in such models,

imports are treated as imperfect substitutes in consumption for domestic output. Taxes incorporated in the model include corporate taxes, property taxes, manufacturing and retail sales taxes, and personal income taxes.

In the next section, the main arguments which motivate the paper are outlined. The third section describes the simulation model and its calibration. In the fourth section, the way in which the welfare effects of property tax changes can be broken down into a terms of trade effect and a resource allocation effect is outlined. The fifth section presents the simulation results and offers some interpretation. The final section provides a summary and outlines directions for further work in this area.

II THE MAIN ARGUMENTS

The objective of this paper is to highlight the individual contributions of (a) the distortionary impact, (b) the terms of trade effect, and (c) the impact on capital flows between countries in assessing the welfare effects of the property tax (both business and residential). The two main thrusts are (1) the extent to which the burden of the property tax is exported to foreigners and (2) the second-best nature of the property tax in the presence of distortionary capital taxes. The argument we wish to make is that reduced reliance on the property tax would be detrimental to welfare in Canada.

Throughout the discussion, we will abstract from the problems associated with differential property taxes between jurisdictions within Canada. Rather, we model the property tax as a tax on land and capital in the economy as a whole at a uniform rate across jurisdictions.

An important issue concerns the extent to which the non-residential property tax can be shifted to consumers and/or owners of factors of production in other countries; that is, the extent to which the burden of the tax can be exported. Tax exporting can occur as a result of an improvement in the terms of trade or as a result of a reduction in land rents or capital rents paid to foreigners.[3]

Thirsk (1986) has explored the issue of tax exporting with regard to the corporate income tax. There it is argued that the beneficial terms of trade effect associated with increases in the corporate tax will completely swamp any efficiency costs associated with the differential tax treatment of capital; that is, the corporate income tax in Canada is welfare improving. Similar results with regard to the non-residential property tax are reported in Ballentine and Thirsk (1979, p. 272) who argue that "Our evidence on the exporting of burdens to foreigners is sufficiently strong to indicate the importance of further work on this matter."[4]

Another important issue concerns the second-best nature of the residential property tax. Under the income tax, imputed net returns to owner occupied housing are not taxable. Given the corporate income tax and the tax treatment of other investment income under the personal income tax, a distortion is created in favour of investment in owner-occupied housing. Here, that portion of the residential property tax which is on owner-occupied housing (modelled here as a tax on capital) at least partially compensates for this capital market distortion. In a second-best world, the imposition of a property tax may be welfare improving.

This latter point is explored in Devarajan, Fullerton and Musgrave (1980, p. 169). They argue as follows: "The corporate income tax represents a large distortionary tax on the use of

capital by many industries other than the housing/real estate industry. A new high rate of tax on housing output is essentially a tax on capital in housing since this industry is so capital intensive. It tends to equalize the levels of capital tax rates across industries and cause a welfare gain in a second-best world."[5]

Individually, each of these lines of argument promotes the view that the property tax may be welfare improving. Taken together, the conclusion is more pronounced. The argument that the beneficial terms of trade effect associated with increases in the business property tax will swamp the distortionary impact of such an increase is enhanced by the recognition that increases in the residential property tax will be welfare improving in a second best world.

III THE MODEL

The model builds on work by Ballentine and Thirsk (1979). There, a general equilibrium model was specified in the form of a system of differential equations, constituting linear approximations to a set of underlying explicit functional forms. The model was calibrated to a 1969 Canadian data set. Here, a non-linear version of that model is employed (see Damus [1986] for a general description of this class of model), adapted to fit the conventional framework associated with numerical general equilibrium models of the type developed by Shoven and Whalley (1972), incorporating explicit functional forms and using iterative solution techniques. The model is calibrated to a 1980 Canadian data set.

Since models of this type are now reasonably familiar, the model description will be kept brief. There are seven sectors, broken down by type of output. Each of these sectors is listed in Table 1. Domestic corporate output is denoted as sector C, traded corporate output is denoted as sector E (flex-price exports), domestic agriculture is denoted as sector A (food), traded agriculture is denoted as sector F (fixed-price exports), non-corporate services are denoted as sector Z (commerce), housing is denoted as sector H and the government is denoted as sector G.

Table 1

Descriptive Features of the General Equilibrium Model

A.

Commodity Composition

Consumer commodity sector	Mnemonic	Expenditure coverage
domestic corporate output	C	investment, alcohol & tobacco, clothing &
traded corporate output	E	footwear, household furnishings, reading & recreation, travel & transportation
domestic agriculture	A	food products & non-alcoholic beverages
traded agriculture	F	
noncorporate services	Z	restaurants & hotels, personal care services, educational & health services
housing services	H	gross paid and imputed rent
government services	G	public spending
imports	M	

B.

Mobility Assumptions

Factor	Inter-Sectoral	International
Land	imperfectly mobile	immobile
Labour	mobile	immobile
Capital	mobile	imperfectly immobile

Tax Coverage by Sector

Tax on	Nominal taxpaying sector
Land (property)	H, A, F
Capital (property)	All except G
Capital (corporate)	C and E
Commodity purchase	C, A, Z, H, and M

to different deciles in the income distribution. Each consumer is assumed to have a CES utility function.

The government sector is assumed to produce output through a conventional production function using labour and capital as inputs. It is assumed that government sector output yields a separable "government utility". In all experiments, this "government utility" is held constant in the sense that real tax revenue and real government expenditure are held constant.[9]

The base case solution to the model is contained in Table 2. The data portray an initial equilibrium of the economy in 1980. The raw data and assumptions which lie behind this table can be found in Appendix A. Appendix A also contains the main calibration outcomes. The first section of the table shows the allocation of factors across sectors, the corresponding outputs by sector, producer prices, the various factor prices and the exchange rate. Notice that the model has been calibrated such that all producer and net factor prices are unity in the base case solution. The second section of the table shows household demands for each type of output by household group. Consumer prices are given gross of indirect taxes. The third section of the table shows model equivalent tax rates by sector and total revenues from each tax.[10] Most tax rates are rates on net-of-tax income except for personal income tax rates, which are expressed as rates on gross-of-tax income. Finally, the fourth section of the table

Table 2

Model Base Case, Canada, 1980

		Capital	Labour	Land	Output	Producer price
H	Housing	9.954	6.592	3.296	25.551	1
A	Food	4.575	11.774	1.13	19.16	1
Z	Commerce	4.948	16.79	0	22.46001	1
C	Corporate	15.976	52.952	0	76.46603	1
F	Fix-price	2.904	6.656	0.944	12.191	1
E	Flex-price	12.863	29.210	0	48.76499	1
G	Government	54.337	168.239	5.370		

After Tax Rental Price of Capital		1	G.N.P. 264.727
Foreign Capital		7.4	
Exchange Rate		1.008366	
Before-Tax Rents:	Urban	1.612257	
	Farm	1.176991	
	Resources	1.162076	
Nominal Wage		1	
Elasticity of Capital Flows		2.506259	
of Flex-price Export Demand		-2.5	

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	1.178	0.917	0.7134678	1.383189	0.9352121
2	1.559	1.327	1.116691	2.36004	1.118109
3	1.724	1.46	1.456347	3.612631	1.930425
4	2.105	1.64	1.811184	4.651166	2.546929
5	2.329	1.858	2.055015	5.545322	2.946983
6	2.696	2.034	2.262794	6.952231	4.347592
7	2.981	2.222	2.56355	8.750639	5.28873
8	3.272	2.318	2.853871	10.52692	6.426272
9	3.577	2.538	3.301685	12.71965	8.116378
10	4.128	2.846	4.325399	19.96424	13.41654
Sum	25.551	19.16	22.46	76.46603	47.07317

Consumer prices

1	1	1.04951	1.167028	1.108827

04-14-1986 Data file name: C:MODEL80.W Base Case with separable Gvt. utility.

There are three factors of production: capital, labour and land. All three factors are employed in the housing, agricultural and fixed-price export sectors.[6] The remaining sectors employ only capital and labour. Land is thus modelled as a specific factor. Factors are mobile between sectors with the exception of land used in housing. The total supplies of land and labour are assumed to be fixed. Capital is assumed to be imperfectly mobile internationally. It is assumed that services of international capital flow into and out of Canada in response to changes in the net rental of capital in Canada.[7]

The model treats Canada as an "almost" small open economy. Prices of imports and some exports (fixed-price) are exogenously given. However, Canada is assumed to have some monopoly power in flexibly priced exports. The problem of cross-hauling of exports and imports found in the data is resolved by treating net exports as products of separate industries not consumed in Canada. Also, as mentioned above, while capital is internationally mobile, it is not assumed to be perfectly mobile. Thus, tax changes in Canada may alter the rental on capital employed in Canada. The two key elasticities are therefore the foreign demand elasticity for flexibly priced exports and the supply elasticity for international capital service flows.[8]

Production functions are of the nested CES type. A literature search is relied on to furnish plausible estimates of the relevant

parameters. The foreign demand elasticity for flexibly priced exports is -2.5, based on a study by Burgess (1985). The capital supply elasticity is initially set at 2.5, based on a study by Hood et al (1982). The results of Murray (1982) also indicate that the elasticity of supply of capital to Canada is between 1 and 3.

Each commodity sector represents an aggregation of consumers' final demands. Each differs essentially in its treatment under the corporation income tax. Both corporate output (corporate and flexibly price exports) and agriculture (domestic agriculture and fixed price exports) have traded and non-traded components. Using an input-output table, a dollar of expenditure on each category of output can be translated into value-added contributions from twelve one-digit industries in the economy. National accounts data on factor payments by industry are used to relate household expenditures to income receipts received by different factor groups while Thirsk (1985) is the source of the information on tax rates used to determine the corporate and property tax payments in each industry. In all, there are seven producing sectors in the model and five consumer choice categories.

The five consumer choice categories are housing, domestic agriculture, services, domestic corporate output and imports. Consumers are split into ten distinct income groups corresponding

Table 2 (cont'd)

Model Base Case, Canada, 1980

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.099627		
Housing	0.060880	0.0	0.612257	0.000000	0.0	0.309926
Food	0.185792	0.0	0.176991	0.000000	0.0	0.144481
Commerce	0.169564	0.0	0.000000	0.049510	0.0	0.178456
Corporate	0.273410	0.0	0.000000	0.167029	0.0	0.198423
Fix-price	0.370179	0.0	0.162076	0.008367	0.0	0.158058
Flex-price	0.354738	0.0	0.000000	0.008346	0.0	0.165514

Personal Income Tax Rates

Household 1	5.068226E-02	Household 6	0.17825
Household 2	0.1210497	Household 7	0.1700861
Household 3	0.1178396	Household 8	0.1735923
Household 4	0.1344612	Household 9	0.1732065
Household 5	0.1790289	Household 10	0.2056894

Collections:	C.I.T.	12.301	S.S.	0
	Land	2.371	Property	10.387
	Sales	14.393	Subsidies	0
	Imports	4.729001	P.I.T.	39.01

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	1.539	5.495	-3.956	5.114974
Consumer 2	3.544	8.052001	-4.508	7.462771
Consumer 3	7.943	11.069	-3.126001	10.16001
Consumer 4	12.472	13.898	-1.426002	12.7256
Consumer 5	16.394	16.083	0.3110008	14.70135
Consumer 6	21.88	20.039	1.841	18.25377
Consumer 7	26.369	23.971	2.398001	21.76183
Consumer 8	31.453	27.996	3.456999	25.34646
Consumer 9	38.278	33.425	4.852997	30.19607
Consumer 10	60.674	49.689	10.985	44.6059
Total	220.546	209.717	10.82901	
Foreign	7.4	Tax Revenue	83.191	

04-14-1986 Data file name: C:MODEL80.W Base Case with separable Gvt. utility.
Base Case: 02-04-1986 D:RAW80

shows income (before and after personal taxes and transfers), net taxes paid (after allowances for transfers) and utility by household group.

Prices are normalized on nominal GNP in 1980. As always in such models, the choice of numeraire is arbitrary. However, we find that this particular specification highlights the relative price effects associated with tax changes quite nicely.

Also, the role of the exchange rate in what is clearly a real model should be briefly mentioned. In this model, the exchange rate can be thought of as the price in Canadian dollars of foreign produced goods. Given world prices of imports and all other prices, the exchange rate simply adjusts to ensure balance of payments equilibrium. Otherwise, the exchange rate in the model is redundant, serving no allocative role.

Finally, from the third section of Table 2, note that property tax rates tend to be relatively high in sectors in which the corporate tax rate is relatively low, resulting in considerably less dispersion in overall capital tax rates than is present in the separate corporate and property tax rates. Note, too, the significance of property tax revenues in total tax collections. Table 3 shows capital tax rates by sector split into a property tax component and a corporate tax component, then aggregated into an overall capital tax rate. Property tax rates vary from .144 in

Table 3

Effective Capital Tax Rates by Sector*

	Effective property tax rate (t_K)	Effective corporate tax rate (t_C)	Overall effective capital tax rate ($t_K + t_C$)
Corporate (C)	0.198	0.273	0.471
Flex-price (E)	0.166	0.355	0.521
Food (A)	0.144	0.186	0.330
Fix-price (F)	0.158	0.370	0.528
Commerce (Z)	0.178	0.170	0.348
Housing (H)	0.310	0.060	0.370
Mean	0.192	0.236	0.428
Standard deviation	0.055	0.109	0.082
Coefficient of Variation	0.287	0.463	0.190

*Effective tax rates are computed as the ratio of taxes paid to after-tax capital income.

the agricultural sector (A) to .31 in the housing sector (H). Corporate tax rates vary from .06 in the housing sector (H) to .37 in the fix-price export sector (F). Overall capital tax rates vary from .33 in the agricultural sector (A) to .528 in the fix-price export sector (F).

IV THE MEASUREMENT OF WELFARE CHANGE

Aggregate welfare change is measured as the sum of equivalent variations across income groups. It is of interest to break this measure down into a terms of trade effect and a deadweight loss effect. Following Ballentine and Thirsk (1979), the change in the economy's real income resulting from a given tax change can be measured by:

$$\Delta W = (V_E \hat{P}_E + V_F \hat{P}_F - V_M \hat{P}_M - V_K^f \hat{P}_K) + DWL$$

where V_E, V_F, V_M and V_K^f refer, respectively, to the initial value of outputs E (flex-price exports), F (fix-price exports), M (imports) and the initial value of payments made to foreign-owned capital and $\hat{P}_E$, $\hat{P}_F$, $\hat{P}_M$ and $\hat{P}_K$ indicate the tax-induced percentage changes in the prices of E, F, M and in the net return to capital.

The term in brackets represents the terms of trade effect (TTE) associated with a given tax change and captures the possibility of exporting tax burdens to foreigners. The second term on the right hand side, DWL, represents the deadweight loss (gain) associated with a given tax change. Aggregate welfare change is denoted by ΔW.

From this we have:

$$DWL = \Delta W - TTE$$

Calculations for DWL and TTE corresponding to each of the four experiments mentioned above can be found in Appendix B.

Table 4 (cont'd)

Experiment 1: Deviation from Base Case - 1 per cent Tax Change

	C.I.T.	S.S.	Tax Rates Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.000646	0.0	-0.006123	0.0	0.0	-0.003099
Food	0.001972	0.0	-0.001770	0.0	0.0	-0.001445
Commerce	0.001800	0.0	0.000000	0.0	0.0	-0.001785
Corporate	0.002902	0.0	0.000000	0.0	0.0	-0.001984
Fix-price	0.003929	0.0	-0.001621	0.0	0.0	-0.001581
Flex-price	0.003765	0.0	0.000000	0.0	0.0	-0.001655

Personal Income Tax Rates

Household 1	0%	Household 6	0%
Household 2	0%	Household 7	0%
Household 3	0%	Household 8	0%
Household 4	0%	Household 9	0%
Household 5	0%	Household 10	0%

Collections:	C.I.T.	0.119309	S.S.	0
	Land	-0.012152	Property	-0.107107
	Sales	-0.000049	Subsidies	0
	Imports	-0.000091	P.I.T.	0.00002

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	0.006104%	0.008324%	-0.009178%	0.018181%
Consumer 2	0.001442%	0.006149%	0.009834%	0.015282%
Consumer 3	0.000633%	0.003792%	0.011826%	0.00827%
Consumer 4	-0.000641%	0.001587%	0.021065%	0.005341%
Consumer 5	-0.001213%	0.000443%	-0.086472%	0.003746%
Consumer 6	-0.000778%	0.000205%	-0.011398%	0.001038%
Consumer 7	-0.000534%	0.00029%	-0.008675%	-0.000092%
Consumer 8	-0.00029%	0.000397%	-0.005791%	-0.001022%
Consumer 9	-0.00013%	0.000397%	-0.003693%	-0.002388%
Consumer 10	0.001022%	0.001266%	-0.000069%	-0.004501%
Total	0.000092	0.00264	9.155273E-05	
Foreign	-0.180122%	Tax Revenue	-0.000084%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:PROP&CIT.MAR

rise in each of the corporate sectors. Imports also decline. From the last section of Table 4, observe that there is a .18 per cent reduction in the amount of GDP which is paid to foreigners. The results for the 20 per cent case are reported in Table 5 and prove to be qualitatively the same as for the one per cent case. It is interesting to note that the relative magnitudes involved do not appear to be sensitive to the size of the tax change under consideration.

That these experiments result in a net welfare loss suggests that the improvement in the terms of trade (the per cent change in the price of flex-price exports exceeds the per cent change in price of imports) is swamped by the distortionary impact of increased differentials in capital tax rates. From Appendix B, in the 1 per cent case, the terms of trade effect is valued at $11.68 million whereas the distortionary impact is valued at $-13.18 million. In the 20 per cent case, the terms of trade effect is valued at $244.66 million whereas the distortionary impact is valued at $-298.06 million.

Experiment 2. Substitute increased residential property taxes for lower commercial and industrial property taxes.[11] Property tax rates on reproducible capital and land employed outside the housing sector are reduced, and the tax rate on reproducible capital in housing is increased to maintain

V RESULTS

In this section, simulation results are reported for each of the four experiments mentioned earlier.

> Experiment 1. Reduce property taxes on reproducible capital and land and raise the corporate income tax rate so as to maintain total tax revenue. Results are reported for property tax rate reductions of 1 per cent and 20 per cent.

This experiment involves substituting one form of capital taxation (increased corporate tax rates) for another (reduced property tax rates). Both taxes have significant potential for exporting the burden to foreigners. At issue is trading off the potential for exporting the tax burden to foreigners against an increase in the differential in capital tax rates. The summary result is that a 1 per cent reduction in property tax rates yields an equivalent variation of $-1.5 million and a 20 per cent reduction yields an equivalent variation of $-53.4 million. The tax substitution is therefore seen to reduce economic welfare.

Such a tax substitution favours non-corporate production -- housing, domestic agriculture and services. In Table 4, which reports results for the one per cent case, this is reflected in an increase in output in each of these sectors and a reduction in product prices. Correspondingly, output falls and product prices

Table 4

Experiment 1: Deviations from Base Case - 1 % Tax Change

	Capital	Labour	Land	Output	Producer price
Housing	0.120529%	0.060104%	0.000023%	0.079834%	-0.071259%
Food	-0.003647%	0.009445%	0.092926%	0.011078%	-0.008644%
Commerce	0.02179%	0.009178%	0.0	0.012924%	-0.010559%
Corporate	-0.029922%	0.002197%	0.0	-0.007652%	0.007996%
Fix-price	-0.287292%	-0.175903%	-0.111259%	-0.21064%	0.031494%
Flex-price	-0.089325%	0.015472%	0.0	-0.026535%	0.042107%
Government	0.016556%	-0.00116%	0.0	0.000023%	-0.004982%

After Tax Rental Price of Capital		-0.02877%
Foreign Capital		-0.151398%
Exchange Rate		0.031494%
Before-Tax Rents:	Urban	0.194885%
	Farm	-0.145027%
	Resources	-0.134155%
Nominal Wage		0%
Elasticity of Capital Flows of Flex-price Export Demand		0.008337 0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	0.085747%	0.01683%	0.018929%	-0.00145%	-0.27306%
2	0.083649%	0.014702%	0.016914%	-0.003555%	-0.029343%
3	0.081787%	0.012802%	0.0149%	-0.00501%	-0.031342%
4	0.07962%	0.010666%	0.012802%	-0.007614%	-0.033447%
5	0.78621%	0.009689%	0.011719%	-0.008659%	-0.034477%
6	0.07856%	0.009628%	0.011703%	-8.682001E-03%	-0.034508%
7	0.078735%	0.009827%	0.011932%	-0.008484%	-0.034294%
8	0.078941%	0.010048%	0.012085%	-0.008263%	-0.034111%
9	0.079056%	0.01017%	0.01223%	-0.008179%	-0.033989%
10	0.080315%	0.011353%	0.013458%	-0.007019%	-0.032791%
Sum	0.020424	0.002119	0.002915	-0.005793	-0.01572

Consumer prices

-0.071259%	-0.008644%	-0.010559%	0.007996%	0.031494%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:PROP&CIT.MAR

total tax revenue. Results are reported for cuts of 1 per cent and 20 per cent in non-housing property tax rates.

This experiment involves increased reliance on the residential property tax as a source of local government revenue. One implication of such a substitution is the reduction in potential for exporting the property tax burden to foreigners. However, the spread in capital tax rates is reduced. The summary results are that a one per cent reduction in non-residential property tax rates yields an equivalent variation of $+.9 million and a 20 per cent reduction yields an equivalent variation of $+15.15 million.

Table 6 reports the effects of the 1 per cent non-residential property tax reduction. Not surprisingly, housing output falls. The net rental on capital rises. The amount of GDP going to foreigners increases. The results for the 20 per cent case are reported in Table 7 and again prove to be qualitatively the same as for the 1 per cent case.

The interesting implication of these experiments is that although the extent of tax exporting is reduced -- the terms of trade have deteriorated and the amount of GDP paid to foreigners has risen -- the reduction in the spread in overall capital tax rates results in an efficiency gain which dominates the calculation of welfare change. From Appendix B, in the 1 per cent case, the terms of trade effect is valued at $-2.83 million

Table 5

Experiment 1: Deviations from Base Case - 20 per cent Tax Change

	Capital	Labour	Land	Output	Producer price
Housing	2.468941%	1.220261%	0.000023%	1.617279%	-1.417397%
Food	-0.104919%	0.201202%	1.95726%	0.223961%	-0.17112%
Commerce	0.412025%	0.190949%	0	0.256554%	-0.204262%
Corporate	-0.656044%	0.051819%	0	-0.16655%	0.177002%
Fix-price	-5.845352%	-3.651924%	-2.34285%	-4.342468%	0.645699%
Flex-price	-1.84008%	0.31675%	0	-0.554474%	0.869797%
Government	0.354469%	-0.024376%	0	0%	-0.108719%
Total	-0.238853				

After Tax Rental Price of Capital		-0.51808%
Foreign Capital		-3.227692%
Exchange Rate		0.645699%
Before-Tax Rents:	Urban	3.998055%
	Farm	-2.983627%
	Resources	-2.76548%
Nominal Wage		-0.073555%
Budget Share of Public Good		0%
Elasticity of Capital Flows		0.183657
Export Demand Elasticity		0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	1.751877%	0.355484%	0.392136%	-0.028053%	-0.540062%
2	1.703918%	0.308144%	0.344849%	-0.075249%	-0.586983%
3	1.658989%	0.263832%	0.300407%	-0.119385%	-0.630898%
4	1.611015%	0.216522%	0.253151%	-0.166527%	-0.677795%
5	1.587807%	0.193596%	0.23011%	-0.189362%	-0.700546%
6	1.586304%	0.192192%	0.228691%	-0.190788%	-0.70195%
7	1.590607%	0.196396%	0.233009%	-0.186554%	-0.697731%
8	1.594627%	0.20034%	0.236908%	-0.182571%	-0.69384%
9	1.597122%	0.202835%	0.239395%	-0.180199%	-0.691345%
10	1.62336%	0.228676%	0.265274%	-0.154419%	-0.665741%
Sum	0.413226	0.042922	0.057625	-0.127281	-0.319139

Consumer prices

-1.417397%	-0.17112%	-0.204262%	0.177002%	0.645699%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:PROP&CIT.20%

Table 5 (cont'd)

Experiment 1: Deviation from Base Case - 20 per cent Tax Change

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.013325	0.0	-0.122451	0.0	0.0	-0.061985
Food	0.040666	0.0	-0.035398	0.0	0.0	-0.028896
Commerce	0.037114	0.0	0.000000	0.0	0.0	-0.035691
Corporate	0.059843	0.0	0.000000	0.0	0.0	-0.039684
Fix-price	0.081024	0.0	-0.032415	0.0	0.0	-0.031612
Flex-price	0.077644	0.0	0.000000	0.0	0.0	-0.033103

Personal Income Tax Rates

Household 1	0%	Household 6	0%
Household 2	0%	Household 7	0%
Household 3	0%	Household 8	0%
Household 4	0%	Household 9	0%
Household 5	0%	Household 10	0%

Collections:	C.I.T.	2.408427	S.S.	0
	Land	-0.271324	Property	-2.134874
	Sales	-0.000662	Subsidies	0
	Imports	-0.001733	P.I.T.	0.00012

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	0.135017%	0.18557%	0.205231%	0.375504%
Consumer 2	0.030609%	0.136864%	0.220398%	0.312218%
Consumer 3	0.013313%	0.08329%	0.261101%	0.164963%
Consumer 4	-0.014351%	0.034393%	0.460724%	0.099243%
Consumer 5	-0.027557%	0.010208%	-1.980339%	0.062584%
Consumer 6	-0.018509%	0.004341%	-0.267197%	0.011612%
Consumer 7	-0.012665%	0.006172%	-0.200996%	-0.010101%
Consumer 8	-0.007217%	0.007889%	-0.129608%	-0.030502%
Consumer 9	-0.003235%	0.007782%	-0.079155%	-0.056961%
Consumer 10	0.021698%	0.027168%	-0.00309%	-0.101173%
Total	0.000175	0.057518	1.754761E-04	
Foreign	-3.825828%	Tax Revenue	-0.000046%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:PROP&CIT.20%

Table 6

Experiment 2: Deviations from Base Case - 1 per cent Tax Change

	Capital	Labour	Land	Output	Producer price
Housing	-0.09803%	-0.047287%	0.000023%	-0.064575%	0.058701%
Food	0.022438%	0.001526%	-0.005127%	0.007774%	-0.007095%
Commerce	0.024475%	0.004128%	0	0.010208%	-0.009323%
Corporate	0.029861%	0.002197%	0	0.010742%	-0.00985%
Fix-price	0.040604%	0.01812%	0.006126%	0.025269%	-0.006592%
Flex-price	0.024178%	-0.000854%	0	0.009171%	-0.010269%
Government	-0.000359%	0.000046%	0	0.000046%	0.000702%
Total	0.001527				

After Tax Rental Price of Capital		0.001701%
Foreign Capital		0.020638%
Exchange Rate		-0.006599%
Before-Tax Rents:	Urban	-0.156486%
	Farm	0.014366%
	Resources	0.025299%
Nominal Wage		0.000595%
Budget Share of Public Good		0%
Elasticity of Capital Flows		-0.001146
Export Demand Elasticity		0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	-0.064857%	0.007523%	0.009979%	0.010559%	0.006973%
2	-0.06472%	0.007675%	0.010208%	0.010719%	0.007156%
3	-0.064728%	0.007668%	0.010094%	0.010681%	0.007095%
4	-0.064468%	0.007927%	0.010384%	0.010941%	0.007339%
5	-0.064362%	0.008026%	0.010406%	0.011024%	0.007462%
6	-0.064468%	0.007973%	0.010338%	0.010979%	0.007378%
7	-0.06456%	0.007835%	0.0103%	0.010872%	0.007317%
8	-0.064613%	0.007759%	0.010193%	0.010834%	0.007233%
9	-0.064697%	0.007675%	0.010124%	0.010696%	0.007156%
10	-0.064987%	0.007378%	0.009827%	0.010368%	0.006851%
Sum	-0.01652	0.001483	0.002282	0.008192	0.003364

Consumer prices

Housing	Food	Commerce	Corporate	Imports
0.058701%	-0.007095%	-0.009331%	-0.009857%	-0.006559%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:HOUS&COM.MAR

Table 6 (cont'd)

Experiment 2: Deviation from Base Case - 1 per cent Tax Change

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.0	0.0	0.000000	0.0	0.0	0.002317
Food	0.0	0.0	-0.001770	0.0	0.0	-0.000375
Commerce	0.0	0.0	0.000000	0.0	0.0	-0.000464
Corporate	0.0	0.0	0.000000	0.0	0.0	-0.000515
Fix-price	0.0	0.0	-0.001621	0.0	0.0	-0.000411
Flex-price	0.0	0.0	0.000000	0.0	0.0	-0.000430

Personal Income Tax Rates

Household 1	0%	Household 6	0%
Household 2	0%	Household 7	0%
Household 3	0%	Household 8	0%
Household 4	0%	Household 9	0%
Household 5	0%	Household 10	0%

Collections:	C.I.T.	0.002856	S.S.	0
	Land	-0.006112	Property	0.003232
	Sales	0.000136	P.I.T.	0.000018
	Imports	0.000026		

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	-0.000977%	-0.00087%	-0.000832%	-0.006828%
Consumer 2	-0.000168%	-0.000565%	-0.000885%	-0.005035%
Consumer 3	-0.000061%	-0.000366%	-0.001129%	-0.002266%
Consumer 4	0.000153%	-0.000069%	-0.002075%	-0.001572%
Consumer 5	0.000237%	0.000122%	0.006744%	-0.000954%
Consumer 6	0.000175%	0.000107%	0.001038%	-0.000488%
Consumer 7	0.000153%	0.000084%	0.00087%	0.000175%
Consumer 8	0.000092%	0.000038%	0.00061%	0.00074%
Consumer 9	0.000084%	0.000038%	0.000397%	0.001289%
Consumer 10	-0.000114%	-0.000137%	0%	0.0028%
Total	0.000107	-0.00013	1.068115E-04	
Foreign	0.022339%	Tax Revenue	0.000061%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:HOUS&COM.MAR

Table 7

Experiment 2: Deviations from Base Case - 20 per cent Tax Change

	Capital	Labour	Land	Output	Producer price
Housing	-2.243896	-1.096878%	0.000023%	-1.494781%	1.374802%
Food	0.510452%	0.033379%	-0.140968%	0.172386%	-0.16008%
Commerce	0.56364%	0.093224%	0	0.232292%	-0.21447%
Corporate	0.688347%	0.050316%	0	0.24601%	-0.227242%
Fix-price	0.966454%	0.450539%	0.168816%	0.612495%	-0.15004%
Flex-price	0.561607%	-0.012321%	0	0.217392%	-0.236717%
Government	-0.020218%	0.001419%	0	0.000084%	0.015297%
Total	0.037479				

After Tax Rental Price of Capital		0.052704%
Foreign Capital		0.506554%
Exchange Rate		-0.15004%
Before-Tax Rents:	Urban	-3.588943%
	Farm	0.362625%
	Resources	0.558348%
Nominal Wage		0.012802%
Budget Share of Public Good		0%
Elasticity of Capital Flows		-0.027769
Export Demand Elasticity		0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	-1.503738%	0.163139%	0.223198%	0.237358%	0.152054%
2	-1.49968%	0.167213%	0.227356%	0.241432%	0.15625%
3	-1.497971%	0.168968%	0.229057%	0.243172%	0.157944%
4	-1.491203%	0.175858%	0.235924%	0.250031%	0.164757%
5	-1.488533%	0.178574%	0.238632%	0.252739%	0.167488%
6	-1.489387%	0.17778%	0.237747%	0.251915%	0.166641%
7	-1.491455%	0.175652%	0.235725%	0.249825%	0.164581%
8	-1.493004%	0.174072%	0.2341%	0.248314%	0.162972%
9	-1.49583%	0.172493%	0.232483%	0.246635%	0.161385%
10	-1.501694%	0.165215%	0.225281%	0.239334%	0.154137%
Sum	-0.381923	0.033018	0.052168	0.188076	0.075551

Consumer prices

1.374802%	-0.16008%	-0.21447%	-0.227234%	-0.15004%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:HOUS&COM.20%

Table 7 (cont'd)

Experiment 2: Deviation from Base Case - 20 per cent Tax Change

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.0	0.0	0.000000	0.0	0.0	0.053968
Food	0.0	0.0	-0.035398	0.0	0.0	-0.008769
Commerce	0.0	0.0	0.000000	0.0	0.0	-0.010831
Corporate	0.0	0.0	0.000000	0.0	0.0	-0.012043
Fix-price	0.0	0.0	-0.032415	0.0	0.0	-0.009593
Flex-price	0.0	0.0	0.000000	0.0	0.0	-0.010046

Personal Income Tax Rates

Household 1	0%	Household 6	0%
Household 2	0%	Household 7	0%
Household 3	0%	Household 8	0%
Household 4	0%	Household 9	0%
Household 5	0%	Household 10	0%

Collections:	C.I.T.	0.068059	S.S.	0
	Land	-0.133231	Property	0.061959
	Sales	0.002908	P.I.T.	0.000305

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	-0.023392%	-0.027351%	-0.028893%	-0.168518%
Consumer 2	-0.005249%	-0.019661%	-0.030991%	-0.125214%
Consumer 3	-0.002266%	-0.012016%	-0.036804%	-0.057968%
Consumer 4	0.002563%	-0.004456%	-0.065872%	-0.043373%
Consumer 5	0.004829%	-0.000626%	0.287018%	-0.028702%
Consumer 6	0.003288%	0%	0.039162%	-0.013748%
Consumer 7	0.002243%	-0.000458%	0.029266%	0.002304%
Consumer 8	0.001297%	-0.000824%	0.018539%	0.013924%
Consumer 9	0.000633%	-0.000923%	0.011322%	0.028778%
Consumer 10	-0.003708%	-0.004471%	-0.000282%	0.062645%
Total	0.000095	-0.008007	9.536743E-05	
Foreign	0.559525%	Tax Revenue	0.000069%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:HOUS&COM.20%

whereas the distortionary impact is valued at $3.73 million. In the 20 per cent case, the terms of trade effect is valued at $-67.00 million whereas the distortionary impact is valued at $82.15 million.

Experiment 3. Property tax rates on all reproducible capital and land are equalized at 23.1%. The property tax rate itself is adjusted to maintain total tax revenue.

This experiment eliminates sectoral differentials in property tax rates. However, the property tax rate on housing falls while in other sectors, it rises. The spread in overall capital tax rates, particularly comparing housing with other sectors, is increased. Thus, the distortionary impact of capital taxation is exacerbated. The summary result is that such a move would be detrimental to welfare; the amount of equivalent variation is $-157.3 million.

Table 8 reports the results of this experiment. Section 3 of the table indicates that the property tax rate (on both land and reproducible capital) will increase in all sectors except housing where it decreases. However, increased reliance on non-residential property taxes brings with it the potential for a greater degree of tax exporting. The net of tax rental on capital falls. The amount of GDP paid to foreigners falls. Also, the terms of trade improve.

In this experiment, then, the efficiency loss associated with the increase in the spread in overall capital tax rates (in favour of housing) dominates the calculation of welfare change. From Appendix B, the terms of trade effect is valued at $365.51 million whereas the distortionary impact is valued at $-522.81 million. Thus, the negative correlation between corporate tax rates and property tax rates across sectors under the existing system is seen to be a good feature in that it promotes a more even treatment of capital income across sectors.

Experiment 4. Corporate, property and land taxes are levied at a uniform rate of 23.3% in all sectors. Personal income tax rates are adjusted to maintain total tax revenue.

In this experiment, the spread in overall capital tax rates is eliminated. Property taxes (on reproducible capital and land) rise in all sectors except housing where the property tax rate falls. Corporate tax rates rise in housing, domestic agriculture and services and fall in the other three sectors. Personal income tax rates fall across all income groups. These results are reported in the third section of Table 9.

However, the reduction in overall capital tax rates in the corporate and export sectors implies a reduction in the potential to export the tax burden. The net rental on capital falls. At the same time, an inflow of foreign capital is observed. This can

Table 8

Experiment 3: Deviations from Base Case

	Capital	Labour	Land	Output	Producer price
Housing	4.330597%	2.175713%	0.000023%	2.825012%	-2.414825%
Food	-3.856102%	0.007141%	2.897789%	-1.050049%	1.057602%
Commerce	-1.692265%	-0.040283%	0	-0.535751%	0.569794%
Corporate	-0.641899%	0.258911%	0	-0.019142%	0.085403%
Fix-price	-8.212051%	-5.368843%	-3.468689%	-6.250679%	0.683105%
Flex-price	-2.41848%	0.383606%	0	-0.750679%	0.987007%
Government	0.954033%	-0.065369%	0	-0.000076%	-0.294205%
Total	-0.45148				

After Tax Rental Price of Capital		-1.655136%
Foreign Capital		-6.101158%
Exchange Rate		0.683105%
Before-Tax Rents:	Urban	7.08107%
	Farm	-5.321457%
	Resources	-4.106277%
Nominal Wage		-0.199959%
Budget Share of Public Good		0%
Elasticity of Capital Flows		0.357806
Export Demand Elasticity		0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	3.230141%	-0.664894%	-0.134735%	0.397049%	-0.258293%
2	3.097878	-0.792244%	-0.262657%	0.268387%	-0.386101%
3	2.957261%	-0.927467%	-0.398743%	0.131622%	-0.52195%
4	2.821228%	-1.058411%	-0.530312%	-0.000641%	-0.653412%
5	2.755264%	-1.121849%	-0.594208%	-0.064842%	-0.71714%
6	2.741661%	-1.134903%	-0.607338%	-0.078049%	-0.730263%
7	2.748551%	-1.128303%	-0.600616%	-0.07132%	-0.723572%
8	2.754738%	-1.122398%	-0.594704%	-0.065262%	-0.717651%
9	2.756966	-1.120224%	-0.592514%	-0.06321%	-0.715462%
10	2.816864%	-1.062614%	-0.534561%	-0.004959%	-0.657616%
Sum	0.721823	-0.201198	-0.120314	-0.014612	-0.317017

Consumer prices

-2.414825%	1.057602%	0.569794%	0.085403%	0.683105%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: PROPEQU.24%

Table 9 (cont'd)

Experiment 4: Deviation from Base Case

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.172120	0.0	-0.379257	0.0	0.0	-0.076926
Food	0.047208	0.0	0.056009	0.0	0.0	0.088519
Commerce	0.063436	0.0	0.000000	0.0	0.0	0.054544
Corporate	-0.040410	0.0	0.000000	0.0	0.0	0.034577
Fix-price	-0.137179	0.0	0.070924	0.0	0.0	0.074942
Flex-price	-0.121738	0.0	0.000000	0.0	0.0	0.067486

Personal Income Tax Rates

Household 1	-0.07133%	Household 6	-0.0713%
Household 2	-0.0713%	Household 7	-0.07132%
Household 3	-0.07137%	Household 8	-0.07132%
Household 4	-0.07131%	Household 9	-0.07135%
Household 5	-0.07133%	Household 10	-0.07132%

Collections:				
	C.I.T.	-0.48104	S.S.	0
	Land	-0.94177	Property	1.43296
	Sales	0.0144	Subsidies	0
	Imports	0.01036	P.I.T.	-0.03358

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	0.26101%	0.38786%	0.43721%	-0.31046%
Consumer 2	0.04726%	0.28721%	0.47585%	-0.4119%
Consumer 3	0.01189%	0.17228%	0.5798%	-0.2563%
Consumer 4	-0.04482%	0.0737%	1.07787%	-0.28557%
Consumer 5	-0.07178%	0.02351%	-4.9996%	-0.2999%
Consumer 6	-0.5334%	0.01043%	-0.7474%	-0.15833%
Consumer 7	-0.04133%	0.01322%	-0.58669%	-0.07871%
Consumer 8	-0.03014%	0.01685%	-0.41071%	0.00229%
Consumer 9	-0.02204%	0.01627%	-0.28596%	0.07468%
Consumer 10	0.02901%	0.05907%	-0.10696%	0.30746%
Total	-0.03361	0.12184	-3.360748E-02	
Foreign	0.20633%	Tax Revenue	0.00098%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:CAPITAL.23%

be explained by noting that the exchange rate has appreciated. The amount of GDP paid to foreigners rises. Also, the terms of trade deteriorate.

The summary result in this experiment is a relatively large reduction in aggregate welfare; the equivalent variation is $-113.6 million. As expected, the evening out of capital tax rates results in a reduction in the deadweight loss of taxation (an efficiency gain) and the concomitant reduction in capital tax rates in the corporate and export sectors and the resulting deterioration in the terms of trade causes a substantial reduction in the extent of tax exporting, producing a net welfare loss. From Appendix B., the terms of trade effect is valued at $-315.73 million whereas the distortionary impact is valued at $202.13 million.

Table 8 (cont'd)

Experiment 3: Deviation from Base Case

	Tax Rates					
	C.I.T.	S.S.	Land	Sales	Subsidies	Property
Imports				0.0		
Housing	0.0	0.0	-0.378157	0.0	0.0	-0.075800
Food	0.0	0.0	0.057109	0.0	0.0	0.089645
Commerce	0.0	0.0	0.000000	0.0	0.0	0.055670
Corporate	0.0	0.0	0.000000	0.0	0.0	0.035703
Fix-price	0.0	0.0	0.072024	0.0	0.0	0.076068
Flex-price	0.0	0.0	0.000000	0.0	0.0	0.068612

Personal Income Tax Rates

Household 1	0%	Household 6	0%
Household 2	0%	Household 7	0%
Household 3	0%	Household 8	0%
Household 4	0%	Household 9	0%
Household 5	0%	Household 10	0%

Collections:	C.I.T.	-0.446011	S.S.	0
	Land	-0.853178	Property	1.295639
	Sales	0.004014	Subsidies	0
	Imports	0.000238	P.I.T.	0.000309

	Income			Utility
	Before-tax	Disposable	Net taxes	
Consumer 1	0.366928%	0.503288%	0.556351%	0.622269%
Consumer 2	0.08316%	0.37104%	0.597343%	0.455269%
Consumer 3	0.036194%	0.225769%	0.707474%	0.225685%
Consumer 4	-0.039055%	0.093033%	1.248276%	0.090446%
Consumer 5	-0.074905%	0.027481%	-5.369415%	0.011703%
Consumer 6	-0.0504%	0.011589%	-0.725128%	-0.031609%
Consumer 7	-0.034477%	0.01664%	-0.545479%	-0.04306%
Consumer 8	-0.019608%	0.021324%	-0.351128%	-0.051208%
Consumer 9	-0.008858%	0.020981%	-0.214355%	-0.076965%
Consumer 10	0.058899%	0.073776%	-0.008369%	-0.078819%
Total	0.000381	0.155823	3.814697E-04	
Foreign	-7.655319%	Tax Revenue	0.000092%	

04-14-1986 Base Case: C:MODEL80.W Simulation Case: PROPEQU.24%

Table 9

Experiment 4: Deviations from Base Case

	Capital	Labour	Land	Output	Producer price
Housing	-3.12577%	-1.43444%	0.00002%	-2.06606%	1.99651%
Food	-7.0886%	-0.77129%	-2.89424%	-2.9836%	2.87859%
Commerce	-5.1859%	-0.85415%	0	-2.17444%	2.0898%
Corporate	1.44923%	0.36626%	0	0.69775%	-0.57664%
Fix-price	10.19732%	5.52034%	3.46455%	7.00204%	-1.6282%
Flex-price	3.42346%	-0.75148%	0	0.8998%	-1.97971%
Government	0.70947%	-0.04857%	0	0.00005%	-0.22664%
Total	0.09809				

After Tax Rental Price of Capital		-1.10444%
Foreign Capital		1.3254%
Exchange Rate		-1.6282%
Before-Tax Rents:	Urban	-4.86015%
	Farm	2.7217%
	Resources	4.0401%
Nominal Wage		-0.16599%
Budget Share of Public Good		0%
Elasticity of Capital Flows		-0.07175
Export Demand Elasticity		0%

Household Demands

	Housing	Food	Commerce	Corporate	Imports
1	-1.70297%	-2.6296%	-1.80173%	1.09906%	2.28846%
2	-1.80135%	-2.72706%	-1.89999%	0.99783%	2.1861%
3	-1.94048%	-2.86487%	-2.03908%	0.85475%	2.04131%
4	-2.04732%	-2.97073%	-2.14572%	0.74487%	1.93009%
5	-2.0964%	-3.01926%	-2.19478%	0.6944%	1.87907%
6	-2.12437%	-3.047%	-2.22274%	0.66565%	1.85%
7	-2.12918%	-3.05174%	-2.22749%	0.66072%	1.845%
8	-2.13316%	-3.05574%	-2.23154%	0.6566%	1.8408%
9	-2.14091%	-3.0634%	-2.23925%	0.64859%	1.83279%
10	-2.11755%	-3.04027%	-2.21589%	0.6726%	1.85704%
Sum	-0.5281	-0.57184	-0.4886	0.53278	0.88399

Consumer prices

-1.99651%	2.87859%	2.0898%	-0.57664%	-1.6282%

04-14-1986 Base Case: C:MODEL80.W Simulation Case: C:CAPITAL.23%

VI SUMMARY

The objective of this paper was to emphasize the potential for exporting the burden of the property tax to foreigners and the second-best nature of this tax in the presence of the corporate income tax given the exemption from tax of net imputed income on owner-occupied housing under the personal income tax.

The simulation results reported in the text suggest that, at present, the property tax serves an important role in evening out capital tax rates across sectors. This results from the negative correlation between corporate tax rates and the property tax rates across sectors.

The results suggest that the second-best nature of the property tax may be of considerable importance; tax reforms which increase property taxes on housing but not corporate taxes tend to be welfare improving (e.g. experiment 2), tax reforms which decrease property taxes on housing but not corporate taxes tend to be welfare reducing (e.g. experiment 3). Indeed, this second best aspect of capital taxation appears to dominate the tax exporting issue when adjustments are made only in property tax rates.

The results also suggest that tax exporting may be of considerable importance when property tax reform involves adjustments in other taxes, particularly the corporate tax. Tax

reforms which reduce property taxes but compensate through corporate tax increases are welfare diminishing; the differential tax exporting potential associated with corporate taxes is less important than the intersectoral distortion resulting from an increase in the spread in capital tax rates across sectors (e.g. experiment 1). Tax reforms which equalize capital tax rates across sectors will favour the corporate sector of the economy; the lost opportunity to export part of the tax burden to foreigners is mitigated by a decrease in the deadweight loss of taxation when capital tax rates are equalized (e.g. experiment 4).

While there are no strong conclusions which can be drawn from the results of the experiments described in this paper, nonetheless the results are indicative. The potential for exporting the burden of the property tax through changes in commodity prices of exported goods or through changes in the net rental paid on foreign owned factors of production appears to be significant. Further investigation of these two important aspects of property taxation would appear to be warranted.

NOTES

1 For a discussion of both the distributional and efficiency effects of the property tax, see either Thirsk (1982) or Hobson (1986). Kitchen (1985) provides a useful summary.

2 See Devarajan, Fullerton and Musgrave (1980), Ballentine and Thirsk (1979) and Hamilton and Whalley (1985).

3 Here we consider only changes in rents on foreign owned factors employed in Canada. Changes in factor returns in foreign countries resulting from international capital movements are ignored.

4 The estimated rates of tax exporting turn out to vary within a range between 25 and 43 per cent of total tax revenues. See Ballentine and Thirsk (1979, pp. 196-197).

5 Their estimated welfare gain is $500 million in 1973 U.S. dollars.

6 The fixed-price export sector includes agricultural output produced for export.

7 In future work we intend to also model international capital flows as responding to the gross rental on capital in Canada. This corresponds to the procedure followed in Ballentine and Thirsk (1979) and is appropriate in the presence of international tax treaties which provide for a domestic tax credit for corporate taxes paid on foreign investments. If the primary source of foreign capital is through international corporations and if earnings are instantaneously repatriated, then it will be the gross of tax rental on capital which determines international capital flows.

8 The capital service flow function is given by

$$K = c\left[1 - \left(\frac{r}{\pi e}\right)^n\right]$$

where c = a calibrated parameter of the model
r = Canadian rental on capital
π = U.S. rental on capital
e = exchange rate ($ Can per $ U.S.)

and $n < 0$.

The elasticity of supply of international capital is given by

$$\eta = \frac{nx}{x-1}$$

where $x = \left(\frac{r}{\pi e}\right)^n$

9 In other experiments not reported here we have worked with an alternative specification of government in which government sector output enters as an argument in nested household utility functions and is substitutable for private goods consumption. The simulation results are constrained to satisfy the Samuelson condition for the efficient output of pure public goods. The difference between the two approaches is reflected in government output and works itself through the general equilibrium result via the labour intensity of the government sector.

10 The headings "S.S" and "Subsidies" represent social security or labour taxes and output subsidies respectively. These are incorporated in the model software for other experiments not reported here and should be ignored. In this model, indirect subsidies are netted out of indirect taxes and labour taxes are included in personal income taxes.

11 In this experiment, only the tax on reproducible capital in housing is increased, not the tax on land.

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Appendix A

Base Case Data and Assumptions

	Elasticities of factor substitution k,l	land, kl	Value added	Labour income	Net rent
			($ billions)		
Housing	0.3	0.3	25.551	6.592	3.296
Food	0.75	0.6	19.16	11.744	1.13
Commerce	0.6	0.0	22.46	15.79	0.0
Corporate	0.8	0.0	76.466	52.952	0.0
Fix-price	0.85	0.6	12.191	6.656	0.944
Flex-price	0.9	0.0	48.765	29.21	0.0
Government	0.8	0.0	48.412	45.295	0.0

Tax Revenues by Source

	Wage Tax	C.I.T.	Land Tax	Property	Sales Tax	Subsidies
			($ billions)			
Imports					4.729	
Housing	0.0	0.606	2.018	3.085	0.0	0.0
Food	0.0	0.85	0.2	0.661	0.0	0.0
Commerce	0.0	0.839	0.0	0.883	1.112	0.0
Corporate	0.0	4.368	0.0	3.17	12.772	0.0
Fix-price	0.0	1.075	0.153	0.459	0.102	0.0
Flex-price	0.0	4.563	0.0	2.129	0.407	0.0
Government	0.0	0.0	0.0	0.0	0.0	0.0

Household Income and Income Taxes, by Source

	Labour Income	Capital Income	Transfers	Income Tax
		($ billions)		
Consumer 1	0.505	1.034	4.034	0.078
Consumer 2	2.355	1.189	4.937	0.429
Consumer 3	5.72	2.223	4.062	0.936
Consumer 4	10.094	2.378	3.103	1.677
Consumer 5	13.964	2.43	2.624	2.935
Consumer 6	18.002	3.878	2.059	3.9
Consumer 7	21.198	5.171	2.087	4.485
Consumer 8	24.731	6.722	2.003	5.46
Consumer 9	29.61	8.668	1.777	6.63
Consumer 10	42.06	18.614	1.495	12.48

Base Case Data and Assumptions

Decile	Household Expenditure Housing	Food	Commerce	Corporate	Imports
			($ billions)		
1	1.178	0.917	0.7487916	1.189	0.715
2	1.559	1.327	1.171978	2.6	1.123
3	1.724	1.46	1.528451	3.32	1.462
4	2.105	1.64	1.900855	4.069	1.795
5	2.329	1.858	2.156759	5.014	2.164
6	2.696	2.034	2.374825	5.396	2.763
7	2.982	2.222	2.690472	6.151	2.789
8	3.272	2.318	2.995167	6.998	3.122
9	3.578	2.538	3.465153	7.613	3.524
10	4.128	2.846	4.53955	9.845	4.689

Utility Function Elasticity Assumptions

	β	γ	ω
1	1.1	0.1	0.1
2	1.1	0.1	0.1
3	1.1	0.1	0.1
4	1.1	0.1	0.1
5	1.1	0.1	0.1
6	1.1	0.1	0.1
7	1.1	0.1	0.1
8	1.1	0.1	0.1
9	1.1	0.1	0.1
10	1.1	0.1	0.1

Raw data file: 02-04-1986 C:RAW80

Base Case Calibration Results

Expenditure Share Parameters in the Utility Functions (α)

	Housing	Food	Commerce	Corporate	Imports
1	0.2128458	0.1656873	0.1359501	0.2962039	0.1893129
2	0.1921507	0.1635561	0.145149	0.3447503	0.1543939
3	0.1544214	0.1307745	0.1375689	0.3835157	0.1937195
4	0.1501317	0.1169672	0.1362285	0.393162	0.2035107
5	0.1435164	0.1144927	0.1335464	0.4049936	0.203451
6	0.1332881	0.1005594	0.1179782	0.4073664	0.2408078
7	0.1232033	9.180342E-02	0.1116971	0.4284933	0.2448028
8	0.1157176	8.197843E-02	0.1064402	0.441242	0.2546217
9	0.1059636	7.516369E-02	0.1031187	0.4464585	0.2692954
10	8.218502E-02	5.666147E-02	9.081642E-02	0.4710806	0.2992565

Distribution and Scale Parameters in the Production Functions

	Labour	Land	ϕ
Housing	0.155891	2.432907E-02	3.090581
Food	0.7254376	1.864541E-02	2.360428
Commerce	0.8369016	0.0	1.847484
Corporate	0.7523834	0.0	2.012273
Fix-price	0.6345264	3.216032E-02	2.759288
Flex-price	0.6206737	0.0	2.298987
Government	0.9659541	0.0	1.214339

	Transfer shares	Income tax rates	Personal saving	Public good demand price	Gamma
Household 1	0.1431	0.0507	0.7472084	0.0109	0.8567128
Household 2	0.1752	0.1210	0.271022	0.0187	0.8121739
Household 3	0.1441	0.1178	1.574549	0.0343	0.7712791
Household 4	0.1101	0.1345	2.388145	0.0477	0.7355819
Household 5	0.0931	0.1790	2.561241	0.0665	0.7133747
Household 6	0.0731	0.1782	4.775175	0.0911	0.6740346
Household 7	0.0741	0.1701	7.136528	0.1104	0.6386584
Household 8	0.0711	0.1736	9.290834	0.1361	0.6077228
Household 9	0.0631	0.1732	12.70685	0.1681	0.5704114
Household 10	0.0530	0.2057	23.64145	0.3161	0.4889848

Raw data file: 02-04-1985 C:RAW80

Appendix B

Computations of TTE and DWL by Experiment

	EXPERIMENT *			
	1	2	3	4
	($ millions)			
W	-1.5 (-15.4)	0.9 (15.15)	-157.3	-113.6
	(percent)			
P_E	0.042107 (0.869797)	-0.010269 (-0.236717)	0.987007	-1.97971
P_F	0.031494 (0.645699)	-0.006592 (-0.15004)	0.583105	-1.6282
P_M	0.031494 (0.645699)	-0.006599 (-0.15004)	0.683105	-1.6282
P_K	-0.02877 (-0.61808)	0.001701 (0.052704)	-1.655136	-1.10444
	($ millions)			
TTE	11.676664 (244.66052)	-2.8308231 (-66.99791)	365.51208	-315.72533
DWL	-13.176664 (-298.06052)	3.730823 (82.14791)	-522.81208	202.12533

V_E = 48764.99 V_M = 47073.17

V_F = 12191.00 V_K^f = 7400.00

*Numbers in brackets correspond to the 20% tax changes referred to in the text.