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## Lessons in Harmony:

*What Experience in the Atlantic Provinces Shows About the Benefits of a Harmonized Sales Tax*

Michael Smart

***In this issue...***

*Provincial retail sales taxes are remarkably high on business inputs, including purchases of capital goods that spur growth in productivity and employment. Evidence from Eastern provinces with a Harmonized Sales Tax (HST) suggests that harmonizing provincial sales taxes with the federal GST would eliminate most of this distortion, without leading to an increase in consumer prices.*

## *The Study in Brief*

Governments in Canada have recently shown a desire to reduce marginal effective tax rates on capital, with a view to increasing investment and productivity in the economy — and a number of tax reforms have already been proposed and enacted to this end. But one simple change would have the desired effect on investment at very low revenue cost to governments and would lower the compliance costs to taxpayers: that would be to reform the antiquated provincial retail sales taxes (RSTs) to bring their bases into conformity with that of the federal Goods and Services Tax (GST). My estimates show that provincial RSTs are remarkably high on business inputs, including — and perhaps most important — purchases of capital goods. Taxes on capital are especially undesirable because they have long-lasting effects on the economy by limiting the growth of the capital stock and reducing the long-run growth of productivity and employment. Approximately one-quarter of the marginal effective tax rate on capital in Canada is the result of taxes on business inputs. Harmonizing provincial taxes with the GST would eliminate most of this distortion.

To show that the investment effects of the reform would be substantial, I estimate the effects of the 1997 Harmonized Sales Tax (HST) reform on business investment and consumer prices in the Atlantic provinces. In keeping with theory, I find that the reform led to significant increases in machinery and equipment investment, in the short run at least, which should raise the capital stock and labour productivity there in the long run.

A political stumbling block to the reform is that it is thought that harmonization would reduce taxes paid by business and increase the taxes paid by individual consumers. But taxes on business inputs are very likely to be no more than hidden taxes on consumers — since they are shifted forward in the form of higher prices. Examining the effect of the 1997 HST reform again, I show that the pattern of relative price changes there was remarkably close to the estimated changes in tax rates and business costs that resulted from the reform. Thus the tax changes were shifted forward, leaving after-tax consumer prices on average slightly lower than before the reform. On the basis of the evidence, then, I conclude that a similar reform in the provinces that still have a retail sales tax would result in increases, possibly substantial, in capital stocks, while there would be very little change in consumer prices.

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Recent developments in federal-provincial relations in Canada have led to a renewed interest in the possibility of reforming the provincial sales tax systems. At present, five provinces have a retail sales tax (RST), which is collected separately and on a very different basis from the federal Goods and Services Tax (GST), which is a value-added tax on consumption. Four other provinces, in contrast, have value-added taxes that are largely combined with the federal GST.

Conventional wisdom among public finance economists has it that, for a variety of reasons, retail sales taxes are inferior to value-added taxes that raise the same revenue. Those reasons include the narrowness of their base (which distorts relative prices of marketed goods), their susceptibility to tax evasion, and their tendency to cascade through the value-added chain, thereby distorting the relative prices of business inputs, particularly capital goods. Indeed, by one much-cited estimate (Baylor and Beauséjour 2004), the excess burden of the RST tax on capital goods exceeds that of all other major Canadian taxes. This paper goes beyond conventional wisdom and provides quantitative estimates of the likely economic effect of converting provincial RSTs to a value-added base like the GST, with particular emphasis on the effects on business investment and on consumer prices and the distribution of tax burdens resulting from the reform. To obtain those estimates, I compare what actually happened in the four provinces that have already adopted value-added bases (the “harmonizing provinces”)<sup>1</sup> to what happened in the same period in the provinces that kept their RSTs. Thus the asymmetric nature of past sales tax reform in Canada can be viewed as analogous to a “natural experiment” that allows us to control contemporaneous changes in the economic environment that would otherwise confound the analysis. This permits better inferences about cause and effect than previous studies, which have not considered a similar “control group” for the reform.

In the simplest terms, the policy implications of the analysis may be summarized as follows. In Ontario and British Columbia (the two largest provinces that still have RSTs), effective tax rates on business inputs, including capital goods, are remarkably high — indeed, more than 40 percent of RST revenues in Ontario are estimated to come from taxes on business inputs. Eliminating such taxes through harmonization would have substantial effects on business investment. By my estimates, annual investment in machinery and equipment in the harmonizing provinces rose 12.1 percent above trend levels in the years following the 1997 sales-tax reform. Given the high taxes on capital inputs in the remaining provinces, it seems reasonable to expect a similarly large short-run effect of reform on investment in the RST provinces as well.

It is important to emphasize that the increase in investment caused by the HST reform is a short-run phenomenon, as firms have acted to adjust to the new, higher-capital stock that is desired when taxes are lower. Whereas the investment effect is transitory, the effect on capital stock and labour productivity is

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1 The four are Newfoundland and Labrador, Nova Scotia and New Brunswick, which introduced the Harmonized Sales Tax (HST) on the same base as the federal GST in 1997, and Quebec, which during the 1990s introduced the Quebec Sales tax (QST), a value-added tax with a base now quite similar to that of the GST.

presumably long-run and permanent. However, my empirical methodology, discussed below, does not allow these long-run effects to be estimated directly.

The necessary implication of high taxes on business inputs under RSTs is that if reform were to be revenue-neutral, then the taxes paid by consumers on their personal expenditures would rise substantially. The analysis of effective tax rates shows that if the GST base were to be adopted, this would be achieved through the broadening of the base to include new homes and, to a lesser extent, some goods and services, rather than through increases in the headline statutory rate of the provincial sales taxes.

This shift in burdens from business to consumers is usually regarded as a major obstacle to such a reform. But all taxes are ultimately paid by some people, somewhere — and never by businesses. That is, we must distinguish between the “statutory burdens” of a tax — who the tax law says must pay the tax — and the true “economic burdens” of a tax. True economic tax burdens depend on how taxes levied on businesses are shifted forward to consumers through higher prices, or shifted backward to factors of production, like labour, capital, and land, through lower wages and rental prices. Estimating true economic burdens is difficult, but it is the key to understanding the ultimate impact of a tax on consumers and on the distribution of real income in the economy.

To give some sense of the true economic distribution of burdens under the RSTs, I examine the relationship between changes in consumer prices and changes in effective tax rates in the harmonizing provinces in the years following the 1997 reform. Again I use comparisons with the non-reforming provinces to control for economic and especially monetary factors that otherwise affected consumer price inflation at the same time. The results show that the pattern of relative price changes among broad categories of consumer expenditures was quite similar to the pattern of relative changes in taxes and business costs induced by the reform — that is, each 1 percent increase in costs induced by taxes leads to approximately a 1 percent increase (or perhaps more) in the price paid by consumers.

Indeed, overall, consumer prices in the harmonizing provinces fell with the 1997 reform, although prices rose somewhat for shelter and for clothing and footwear, so that the reform was slightly regressive. The pattern of tax changes today would presumably be different if harmonization were extended to the remaining RST provinces, since their current tax systems differ from those replaced in the 1997 reform. What is important is that the results are consistent with the notion that taxes are fully shifted forward (or even “overshifted”) in most sectors, so that the change in statutory burdens would not result in large distributional effects.

The rest of the paper is organized as follows. The second section describes the sales tax systems of the provinces and discusses the presumed deadweight costs of the RSTs. The third section presents an accounting analysis of the changes in revenues and statutory tax burdens resulting from a hypothetical reform in which RST provinces adopted the federal GST base but without changing their tax rates. Estimates of the effect of the 1997 HST tax reform on investment are presented in the fourth section, and on consumer prices in the fifth section. The sixth section concludes my analysis.

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## *Provincial Sales Taxes*

Provincial sales-tax reform began in 1992 with the Quebec Sales Tax, a modified value-added tax system that at first accorded only limited input tax credits to firms. However, input tax credits were gradually expanded, and by 1995 the base of the QST was largely harmonized with that of the federal GST. Further reform followed in 1997 with the introduction of the Harmonized Sales Tax in Newfoundland, Nova Scotia, and New Brunswick. The base of the HST is essentially the same as that of the federal GST, collection of the federal and provincial taxes is unified, and the provincial portion of the rate is 8 percent in all three provinces, replacing the previous RST system, where the effective rates were 11.7 to 12 percent. Traditional RSTs remain in Prince Edward Island, Ontario, Manitoba, Saskatchewan, and British Columbia. Alberta has no direct taxes on consumption.

Provincial RSTs are charged on essentially all purchases of goods that take place at retail points of sale. In contrast, the GST/HST is an invoice-and-credit value-added tax, which taxes sales of most goods and services by registered traders, while according full credit for taxes paid on registered traders' purchases of taxable goods. In practice, the following are the chief differences between the GST and RST bases:

- Unlike the GST, RSTs are paid on many purchases of intermediate inputs by businesses. Indeed, as we shall see, a remarkably high proportion of provincial "retail" sales tax revenues actually comes from the taxation of business inputs.
- Many services, even those consumed as final demand and bought at the "retail" level, are exempt from taxation under the RSTs. The treatment of services is complicated under the GST, with many service sectors receiving tax-exempt status, while international transportation services are in fact zero-rated.<sup>2</sup> Moreover, the input tax rebates paid under the GST to exempt suppliers in the Municipal, Academic, Schools, and Hospitals (MASH) sector makes these services much closer to zero-rated (i.e., tax-free) under the GST.

Consumption of housing is exempt under the RSTs; that is, rent is not taxed, and purchases of owner-occupied housing are untaxed as well. The GST also exempts market rents and implicit rents to owner-occupied housing, but it taxes purchases of new houses, albeit at a reduced rate, especially for properties valued at less than \$450,000.<sup>3</sup>

2 For supplies that are tax-exempt under the GST, no tax is charged on the sale, but no input tax credits may be claimed for taxable inputs that went into its production. For zero-rated supplies, in contrast, no tax is charged but input tax credits may be claimed, so that the transaction is entirely tax-free.

3 There is a 36 percent rebate (implying an effective GST rate of about 4.5 percent when the standard rate was 7 percent) for new houses valued at less than \$350,000, with the marginal rebate progressively decreasing to zero for house values over \$450,000. There is a similar system under the QST, but the starting and ending points are much lower (\$200,000 and \$225,000 respectively).

It is customary among public-finance economists to criticize RSTs because they result in substantial changes in the relative prices of marketed commodities (both RST and value-added tax change the relative price of marketed commodities and non-marketed ones such as leisure). In particular, RSTs exempt many types of consumption, chiefly services and intangibles, from taxation entirely, and for the most part they do so in an arbitrary way that has no policy justification. The resulting changes in relative after-tax prices of various goods and services are likely to lead to large departures from tax neutrality, because some sectors of the economy are artificially favoured at the expense of others. Since different firms and different sectors of the economy rely on purchases of inputs subject to RST to different degrees, the result is unequal increases in costs of production and prices, and further departures from neutrality and competitiveness. According to the Diamond-Mirrlees principle of production efficiency, taxes on business inputs are in general not part of an optimal tax system.<sup>4</sup>

What is related and probably most important is that provincial RSTs tax most capital goods bought by businesses. Taxes on capital are deemed to be especially undesirable because they have long-lasting effects on the economy by limiting the growth of the capital stock and reducing the long-run growth of productivity and employment. Approximately one-quarter of the marginal effective tax rate on capital in Canada is the result of taxes on business inputs (Chen and Mintz 2003). In recent years some provincial governments have devoted much attention and political capital to reducing their “headline” rates of corporate income tax; but it might be simpler and perhaps more effective (though less visible) just to eliminate the RSTs’ implicit tax on capital by moving to value-added taxation.

These problems with the RST base, as emphasized by Dahlby (2005), may be hidden from public view, but they are far from trivial. Using quantitative simulations of the Canadian economy, Baylor and Beauséjour (2004) find that the true economic cost of a dollar in revenue raised by provincial governments through sales taxes on capital is about \$2.30, compared to a mere \$1.13 for consumption taxes like the GST/HST. Since, as reported below, a move from provincial RSTs to a tax with the GST base would reduce taxes on capital by about \$1.5 billion at current rates of taxation, a very rough calculation suggests that the long-run gains for the economy might be as high as \$1.75 billion.<sup>5</sup>

### *Fiscal Consequences of Reform*

These differences mean that a move by the provinces from their current RST bases to any true value-added tax base might have large consequences for government revenues and for the distribution of tax burdens between business and consumers

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4 In contrast, Piggott and Whalley (2001) and others have emphasized that value-added taxes can create additional distortions by favouring businesses in the informal sector since they can evade it more easily than other producers. But, as noted by Keen (2006), the fact remains that real-world invoice-and-credit VAT systems do tax production in the informal sector indirectly by denying input credits to traders that evade the tax on their sales.

5 The Baylor-Beauséjour estimate is valid only for small tax changes, and the benefits from large-scale reform may be somewhat smaller. This calculation excludes the economic benefits of eliminating RST taxes on non-capital business inputs.

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and among sectors of the economy. Just how big the consequences would be, however, is an open question. As a preliminary step, therefore, I report my estimates of the change in tax revenues and statutory tax burdens that would result if the remaining RST provinces were to replace their tax bases with the federal GST base but without changing their tax rates.<sup>6</sup>

The estimates of revenue impacts for Ontario and British Columbia<sup>7</sup> (see Table 1) are based on the actual revenues of the GST and each province's RST in 2002 and on estimates of effective tax rates. The latter are calculated from a detailed reading of each tax code, which is used to attribute revenues to various sectors of the economy by means of weights from the 2002 provincial input-output tables. In short, underlying my calculations are very detailed estimates of the statutory tax burdens of the existing RST and GST tax systems in 2002.<sup>8</sup>

To estimate the effects of reform, suppose that provinces move to the GST base, with the current GST exemptions and rebates for the Municipal, Academic, Schools, and Hospitals (MASH) sector and for financial services,<sup>9</sup> and zero-rating of basic foods and exports (including interprovincial exports, as in the QST).<sup>10</sup> For the 2002 data, the GST statutory rate was 7 percent (although it has since been reduced to 6 percent), while the RST rate in Ontario was 8 percent and in British Columbia 7 percent. The estimated statutory tax burdens are therefore just GST revenues in British Columbia, and eight-sevenths of GST revenues in Ontario.<sup>11</sup> Table 1 presents estimates of the change in statutory tax burdens (revenues collected) from different sectors of the economy under such a reform.

In summary, Table 1 shows:

- (i) Statutory burdens on business would decline substantially with harmonization to the GST base. The revenue changes are largest for current inputs, including construction inputs, but reductions in capital taxes are also substantial. Indeed, revenues from taxing machinery and equipment purchases under the RSTs are between 4 and 6 percent of private investment (including 4.4 percent in Ontario), a large part of the overall tax burden on investment.
- (ii) Effective tax rates on services would, perhaps surprisingly, change little: the reported increase in revenues from taxing services represents about 0.5

6 In Prince Edward Island, where the RST is paid on the GST-inclusive price, the statutory tax rate would rise to keep the effective provincial rate constant.

7 These are the largest provinces to keep RSTs. Estimates for the other provinces can be found in an earlier version of this paper, Smart (2007).

8 Thus the calculations do not incorporate the effects of the various RST reforms made since 2002. In particular, British Columbia has since enhanced the exemptions for business inputs under its RST; the resulting reduction in revenues derived from taxing business inputs would therefore presumably be smaller today than what is reported in Table 1.

9 This does not mean that the GST treatment of these sectors is ideal: for an argument that it is not, see for example Bird and Gendron (2007).

10 For more on the issue of a subnational VAT with differential rates among provinces, see Smart and Bird (2007), Bird and Gendron (2007), and McLure (2005), *inter alia*.

11 My approach assumes that exemptions and rebates for housing and the MASH sector would be the same in percentage terms as under the GST, so that effective tax rates under the hypothetical Ontario 8 percent PVAT would be eight-sevenths of the corresponding GST effective rates.

**Table 1:** *Predicted Changes in Statutory Tax Burden from Sales Tax Reform*

	Ontario			British Columbia		
	PST	PVAT	Difference	PST	PVAT	Difference
	<i>\$ millions</i>					
Consumers						
Goods	5,423	6,675	1,252	1,520	1,873	353
Services	2,568	3,322	754	391	1,114	722
Housing	1	1,817	1,816	2	551	549
Business						
Construction inputs	1,553	0	-1,553	519	0	-519
Other intermediate	2,689	1,173	-1,516	837	321	-516
Capital	1,443	422	-1,021	444	93	-351
Government	424	571	147	155	140	-15
Total	14,101	13,981	-121	3,869	4,092	224

Source: 2002 Input-Output tables and Department of Finance calculations.

percent of the corresponding base in Ontario and 1.4 percent in British Columbia. This reflects the rather low effective tax rates on services under the federal GST, as well as some recent base-broadening reforms in RST provinces that have made parts of the service sector subject to RST. Effective tax rates are low under the GST because of the tax-exempt status accorded many large services industries, including most of the Finance, Insurance, and Housing sectors; the Health sector; and the MASH quasi-governmental sector.<sup>12</sup> Furthermore, many of those service sectors receive large rebates for input taxes under the GST — they are nearly zero-rated rather than tax-exempt — so that the total taxes paid on outputs and use of these sectors are indeed small. In summary, sales-tax harmonization in Canada would result in a much smaller increase in taxes on consumer services than generally believed.

- (iii) Taxes on the housing sector would rise, primarily because GST is paid on sales of new houses (although at a reduced rate). However, under the RSTs, the construction industry also pays one of the highest effective tax rates on business inputs, as evidenced by the large decline in input taxes in Table 1. (As a rough estimate, about half of RST taxes on construction inputs are related to residential buildings, and half to non-residential buildings.) Thus the reforms would lead to reductions in construction costs that would offset much of the new explicit taxes on housing, leaving changes in true tax burdens that were relatively small.<sup>13</sup>

12 Tax-exempt status implies these sectors do pay some tax under the GST, which is included in the business inputs section of the table and netted out from the much larger reduction in input taxes that results when provincial RSTs are removed.

13 Policymakers concerned about this small shift in the tax burden may wish to raise the price threshold (i.e., above \$450,000) for the GST rebate available to new-home buyers.

(iv) Overall provincial revenues would change little — according to these estimates, the reform would be nearly revenue-neutral. The single exception is in Manitoba, where revenues are estimated to decline by \$151 million, or about \$130 per capita in 2002. Of course, these estimates for a single year may be a poor guide to the future, particularly since RSTs rely so heavily on taxation of investment goods, which are one of the most volatile parts of the economy. Note as well that the net revenue impacts in Table 1 are based on the assumption that the RST provinces would adopt exactly the same tax exemptions and rebates for various sectors as exist under the federal GST.<sup>14</sup> In fact, however, the reforming provinces would have considerable freedom to increase their revenues by reducing the rebates available to tax-exempt or favoured sectors — just as the HST provinces did in 1997.

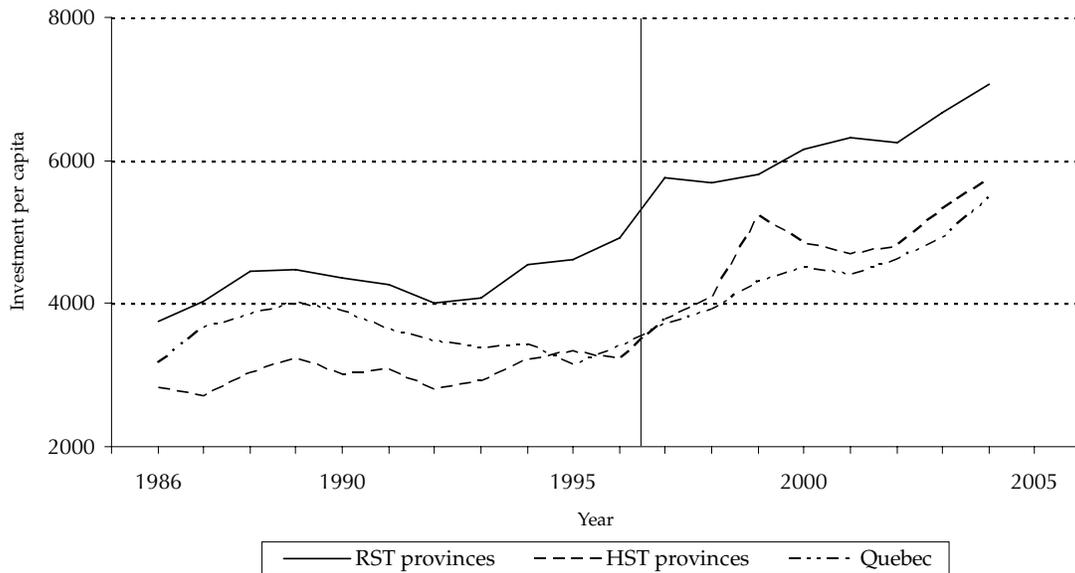
### *Estimating the Effects of Harmonization on Investment*

The foregoing shows that a primary effect of reform in the RST provinces would be to reduce the effective tax rates on capital. To estimate the effect of such a change on investment, I turn to a retrospective analysis of the effects of the introduction of the Harmonized Sales Tax in 1997. Though the previous RSTs of the harmonizing provinces differed from the remaining RSTs in some respects, they too imposed high effective tax rates on some capital goods, with estimated average effective tax rate on machinery and equipment in 1996 ranging from 2.6 percent in manufacturing to 10.4 percent in Construction, and averaging about 4.95 percent. (Estimates of pre-reform effective tax rates are discussed in more detail below and presented in Table 4.) My strategy is therefore to examine changes in various measures of aggregate investment in the harmonizing provinces compared to the RST provinces in the years following the reform.

Figure 1 shows that, in the years before the reform, private investment per capita was considerably lower in the HST provinces than in the others, reflecting the traditionally lower GDP per capita and lower capital per unit of GDP in the Atlantic provinces. However, year-to-year variations in the two investment series for HST and RST provinces are very similar, since both were affected by nationwide economic shocks. That pattern changes dramatically after the 1997 sales-tax reform as investment per capita in the reforming provinces began to rise, particularly compared to investment in the provinces that kept their RSTs. However, the sudden rise in relative investment appears to slow down or even reverse after 1999; this is as expected, since a reduction in the effective tax rate on capital goods should lead to a permanent rise in capital per unit of output but not a permanent rise in investment flows.

A similar pattern appears in the graph of investment per capita for Quebec, although the data in this case are more difficult to interpret. Since value-added taxation was phased in under the QST during the 1990s, there is no clear delineation between pre- and post-reform periods; furthermore, if businesses

<sup>14</sup> This assumption is necessary because the data on the GST present revenues net of the effects of the existing exemptions and rebates.

**Figure 1:** Gross Investment per capita in HST and RST Provinces

- Notes:
1. Data are for business gross fixed-capital formation.
  2. Amounts are in 1997 dollars.
  3. HST provinces are Newfoundland and Labrador, Nova Scotia, and New Brunswick. RST provinces are Prince Edward Island, Ontario, Manitoba, Saskatchewan, and British Columbia. Alberta does not have a sales tax.

Source: Provincial Economic Accounts.

anticipated the phase-in, they may actually have deferred their investments rather than increase them — that would be consistent with the pattern seen on the graph. Lastly, many of the capital assets that tend to be taxed under RSTs are still not eligible for full input tax credits under the QST either, at least for large firms; it may be, therefore, that the QST lies in between a retail sales tax and a value-added tax in terms of its effects on the cost of capital. For this reason, I generally exclude the Quebec data from the empirical analysis.

Of course, the pattern shown in Figure 1 only suggests the possible effects of sales-tax reform, and many other factors may have caused the rise in relative investment rates in HST provinces. For example, the rise may be due to a general rise in economic growth in the HST provinces, rather than in investment per se; it may be due to long-term trends in the HST provinces unrelated to the reform; and it may be due to changes in the relative cost of capital there that have nothing to do with taxes. Certainly, investment in Newfoundland has risen with the development in recent years of the offshore oil sector.

Some of these possibilities are addressed in Table 2, which shows estimates, based on multiple regression, of the effects of HST reform on investment. In each of the regressions, the logarithm of real investment per capita in each of the nine provinces is regressed on the logarithm of real provincial GDP per capita (to

**Table 2:** *Regression-based Estimates of Investment Impacts by Industry*

	Total Investment	Machinery and Equipment	Non-residential Construction	Residential Construction
HST	0.11 [1.48]	0.17** [2.11]	0.26 [1.17]	0.02 [0.25]
Logarithm of GDP	1.34*** [4.57]	1.92*** [5.92]	0.96 [1.26]	0.90** [2.16]
Observations	190	190	190	190
R-squared	0.95	0.95	0.87	0.90

Notes: All specifications include province-specific linear trends and year fixed effects, coefficients not reported. Robust t statistics in brackets.

\* significant at 10 percent; \*\* significant at 5 percent; \*\*\* significant at 1 percent.

Source: Author's calculations.

control for provincial business-cycle effects)<sup>15</sup> and a dummy variable equal to one in years and provinces for which the HST was in place and equal to zero otherwise. All regressions also include estimated fixed effects for each year and separate estimated linear trends for each province, not reported in the table. That is, this approach allows for the possibility that investment was on average higher in Canada after 1997 for reasons unrelated to sales-tax reform and that investment grew faster over the sample period in HST provinces than others for reasons unrelated to sales tax reform. As well, the inclusion of provincial GDP per capita helps to control for the general effects of the oil boom on economic activity in HST provinces. Moreover, the qualitative results of the analysis are robust to excluding Newfoundland and Labrador entirely from the data set.

In the first column of figures in Table 2, the dependent variable is real gross fixed-capital formation per person, as in Figure 1. The estimated coefficient of 0.111 for the HST dummy variable indicates that after the reform, investment per capita in HST provinces rose 11.1 percent higher above the trend than in RST provinces. The difference is significantly different from zero at the 95 percent significance level.<sup>16</sup>

The remaining three columns report estimates of the same regression equation, using narrower components of investment as the dependent variable. In the second column, the dependent variable is real business investment in machinery and equipment — the component most affected by the reform. The effect of HST reform on machinery and equipment investment is larger, at 16.7 percent, than on the total, and significantly different from zero at the 95 percent confidence level. In the third column, the dependent variable is real business investment in non-

15 One potential concern is that provincial GDP includes investment and so may be endogenous. Replacing it with the log of the non-investment component of provincial GDP, however, does not change significantly the coefficients on the HST variable reported below.

16 For the estimates reported below, I calculate estimated standard errors of estimates that are robust to arbitrary heteroskedasticity and contemporaneous correlation among provinces within the HST and RST groupings.

residential buildings per capita; the HST impact here is larger than before but not significantly different from zero. This is not entirely unexpected, since the provincial RSTs that the HST replaced tend to tax machinery and equipment investment more heavily than investment in buildings.<sup>17</sup>

While the results are suggestive, the aggregate investment data may include a number of confounding effects of economic changes in the Atlantic provinces that happened at roughly the same time as the HST reform, and which are therefore not handled adequately by the difference-in-difference strategy. Most notably, offshore oil and gas projects in Newfoundland and Nova Scotia probably boosted investment in that sector for reasons unrelated to sales tax reform, and the introduction of the Atlantic Investment Tax Credit and related provincial credits from 1997 may have had similar effects in manufacturing and processing industries.

In the Appendix, I present more detailed econometric analysis that addresses these and other possible confounding influences. Naturally, the estimates presented there vary, depending on the data used and the industries considered, and so on. In the interests of brevity, I highlight one particular estimate, which shows that private machinery and equipment investment in sectors other than Mining and Oil and Gas rose 12.1 percent in HST provinces, relative to others, in the years following the reform. Thus the data are consistent with the idea that there was a large increase in investment induced by the tax reform. Although the investment effect is surely transitory, it implies a long-run, permanent increase in the capital stock of reforming provinces and so an increase in output and productivity as well.

### *Economic Incidence of Harmonization*

The analysis thus far has focused on the effects of eliminating RST taxes on business inputs, particularly capital goods, by adopting instead a tax with the GST base. But if such a reform were to be revenue-neutral for the RST provinces, the statutory tax burdens on consumer expenditures would necessarily rise. The accounting analysis of statutory burdens under Fiscal Consequences of Reform above implies that this change would be achieved primarily through expansion of the sales tax base (particularly to include purchases of new homes) rather than through changes in tax rates. This shift in statutory burdens is usually regarded as a major obstacle to such a reform.

The question is to what extent shifts in statutory burdens result in shifts in true economic effect, which depends on the extent to which, under existing RSTs, input taxes are shifted forward to consumers in the form of higher prices, or backward to factors of production. The housing sector gives an apt example of the issue: the figures reported above, under Fiscal Consequences of Reform, indicate that in Ontario (in the absence of behavioural responses) the tax reform would result in

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<sup>17</sup> The last column of Table 2 performs a further robustness check of the results, showing that the effect of HST reform on residential investment was negligible — as expected, since taxes in fact rose or were unchanged in this category. This reinforces the idea that the results reported so far reflect the sales tax reform rather than other contemporaneous factors in the economies of HST provinces.

roughly \$1.8 billion annually in new taxes on housing, while reducing taxes on residential and non-residential construction by about \$1.6 billion. It should then be evident that the distributional implications of such a reform depend on the extent to which the reduction in taxes on construction inputs are shifted forward to consumers in the form of lower housing prices and residential rents, or shifted backward to the owners of labour, capital, and land used in the production of housing.

The notion that the economic effects of a tax are independent of whether the tax is imposed on the seller of a good (as under the RST) or on the purchaser (as under the GST) is a fundamental — but largely untested — precept of public finance. However, RSTs apply to only some business inputs, so that the effects of the reform on consumer prices are in principle more complicated than a pure, neutral shift in statutory tax incidence. Furthermore, when firms have market power and consumers are not fully informed about taxes, it may be reasonable to suppose that business markups rise when hidden taxes on business inputs are replaced by explicit taxes on consumers (Chetty, Looney, and Kroft 2006).

To address the economic-incidence question, I again turn to an analysis of the actual effects of the 1997 reform in the HST provinces. In this section, I examine the relationship between changes in consumer prices and changes in effective tax rates in the harmonizing provinces in the years following the 1997 reform, again using comparisons with the non-reforming provinces to control for economic and especially monetary factors that otherwise affected consumer price inflation at the same time.

The empirical strategy of examining changes in consumer prices after the reform was also employed by Murrell and Yu (2000). The present analysis differs from theirs chiefly by incorporating measures of changes in the effective tax rate by expenditure category, and by estimating differences in price changes between HST and RST provinces, in order to control for nationwide factors unrelated to the reform that may have affected price inflation after 1997. One such factor is monetary policy. From July 1997, when the reform took effect, until the latter half of 2000, the bank rate rose from 3.25 to 6 percent — a change that may well have impeded price growth in all provinces.

In some respects, the 1997 reform had a different influence on prices than might be expected from further harmonization in the remaining RST provinces. In the 1997 reform, statutory tax rates fell from 11.7 percent in Nova Scotia and New Brunswick and 12 percent in Newfoundland and Labrador to 8 percent in all three provinces under the HST; the analysis in the third section indicates that harmonization to the GST base would be approximately revenue-neutral if statutory tax rates remained unchanged at 8 percent in Ontario and 7 percent in British Columbia.<sup>18</sup> This might suggest that the tax base in the RST provinces is already broader than it was in the HST provinces before the reform or that provincial revenues declined with the 1997 reform (Blagrove 2005) or both. Furthermore, to the extent that a smaller portion of the value-added chain lies within the HST provinces (which are smaller and have less-developed secondary and tertiary economic sectors) than other provinces, the elimination of taxes on

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18 The same is true for Prince Edward Island, Manitoba, and Saskatchewan, for which revenue data are not reported in the second section.

business inputs there had a smaller effect on business costs than it would in the RST provinces, where embedded input taxes are larger in proportion to consumer expenditures, and elimination of input taxes would “cascade” through the value-added chain and so potentially result in more than proportional reductions in costs. Nevertheless, comparing changes in effective tax rates in the 1997 reform to the corresponding changes in consumer prices allows us to estimate the average degree of “passthrough” of tax changes to price changes. In particular, it lets us test the hypothesis that tax changes are fully shifted forward to consumer prices, as would be consistent with the standard theory.

To make those comparisons, I obtained from Statistics Canada’s Input-Output division estimates of the effective tax rates on consumer purchases of goods and services under all provinces’ RSTs in 1996, and for the reforming provinces in 1998, after the reform. By comparing the tax-rate change to the actual change in tax-inclusive consumer prices in HST provinces relative to non-reforming RST provinces, we can determine the extent to which tax changes were in fact passed forward to consumers.<sup>19</sup>

The results for each broad category of consumer expenditure are reported in the third column of Table 3. The first row shows that overall, CPI prices fell by about 0.3 percent in HST provinces after 1997, compared to the corresponding change in RST provinces. This difference is statistically insignificant but extremely close to the estimated 0.5 percent reduction in taxes under the reform.

Regressions for the eight component expenditure categories tell a similar story. On average, prices in HST provinces declined in relation to RST provinces for five of the eight categories and rose for three. The signs correspond to the sign of the estimated change in the effective tax rate in all categories but one (Transportation, where prices rose despite a decline in taxes), and the magnitudes are generally quite similar.

Particularly notable, perhaps, are the estimated 1.4 percent price increase for Shelter, reflecting the extension of the tax base to include purchases of new houses, and 1.5 percent price increase for Clothing and Footwear, which also likely reflects the broader base of the HST. Since expenditure shares for these categories tend to be larger for low-income households, this suggests the possibility that the reform was regressive in that it raised average prices for low-income households while lowering prices overall. The notion that the federal GST is less progressive than the Manufacturers’ Sales Tax it replaced in 1991 or than an equal-yield expansion of federal income taxes has been a matter of debate since the GST was introduced (see, for example, Ruggeri and Bluck 1990). Differences in the progressivity of the GST and the RSTs should be smaller, since the bases are far more similar. A simple way of measuring the progressivity of the estimated price changes is to consider a hypothetical household that spends 20 percentage points more of its income on the categories for Food, Shelter, and Clothing and Footwear than the shares in the aggregate CPI bundle reported in Table 3; this corresponds roughly to the way Statistics Canada estimates low-income cutoff levels, below which families are often deemed to be poor.<sup>20</sup> Using these weights to aggregate the estimated tax and

19 For further detail on the data and empirical methodology behind Table 3, see Smart (2007).

20 Thus the expenditure shares for Food, Shelter, and Clothing and Footwear rise to 23.6 percent, 37.0 percent, and 8.4 percent respectively, while the other shares are scaled down ....

**Table 3:** *Regression-based Estimates of the Investment Impact of HST Reform on Consumer Prices*

	Expenditure Shares	Estimated Impact of HST Reform		Implied Elasticity
		on Tax Rates	on CPI Prices	
All items	100.0%	-0.5%	-0.3%	-0.6%
Food	16.8	-0.6	-0.7	1.2
Shelter	26.3	1.0	1.4**	1.4
Household Operations and Furnishings	11.1	-1.2	-2.9***	2.4
Clothing and Footwear	6.0	1.6	1.5**	0.9
Transportation	19.4	-0.5	0.8	-1.6
Health and Personal Care	4.6	-0.3	-1.4***	4.7
Recreation, Education, and Reading	12.5	-2.0	-0.4	0.2
Alcohol and Tobacco Products	3.3	-3.4	-3.2*	0.9

Notes: Columns 3 and 4 present difference-in-difference GLS estimates of HST price changes, given panel-specific AR(1) errors. See text for details.

\* significant at 10 percent level; \*\* significant at 5 percent level; \*\*\* significant at 1 percent level.

price changes, we find that on average, effective tax rates were unchanged for low-income households but the corresponding price index rose by 0.24 percent. Thus I conclude that the HST reform had a mild regressive effect. In the absence of similarly detailed information on the pattern of effective tax rates in the RST provinces today, however, we cannot determine whether further harmonization would also be regressive.

Our primary concern remains with the “passthrough elasticity,” that is, with estimating the degree to which tax changes in each category are shifted forward to consumer prices. One estimator of the passthrough elasticity is the ratio of estimated changes in column 3 to those in column 2 of Table 3. Excluding the Transportation sector, where the estimated changes are of the opposite sign, though insignificant, the elasticity estimates range between 0.5 for Recreation, Education and Reading and 2.4 for Household Operations and Furnishings.<sup>21</sup>

In summary, the results show that the pattern of relative price changes among broad categories of consumer expenditures was quite similar to the pattern of relative changes in taxes and business costs induced by the reform. Overall, consumer prices in the harmonizing provinces fell with the reform, although prices rose somewhat for Shelter and for Clothing and Footwear, and this tended to make the reform slightly regressive. The pattern of reform-induced tax changes would presumably differ in the remaining RST provinces, but the results are

*footnote 20 cont'd*

.... proportionately in order that the total will add up to 100 percent. This does not correspond exactly to the definition of the low-income cutoff, which is the income level at which a typical household's expenditures on food, shelter, and clothing exceeds that of the average family with the same demographic characteristics by 20 percentage points.

21 For an alternative, regression-based estimator of the passthrough elasticity, which gives similar results, see Smart (2007).

consistent with the notion that taxes are fully shifted forward (or even overshifted) in most sectors, so that the change in statutory burdens would not have large distributional effects.

## Conclusion

Conventional wisdom among public-finance economists has it that retail sales taxes are inferior to value-added taxes that raise the same revenue — for a variety of reasons, including the narrowness of their base (which distorts relative prices of marketed goods), their susceptibility to tax evasion, and their tendency to cascade through the value-added chain, thus distorting the relative prices of business inputs, particularly capital goods. Indeed, Baylor and Beauséjour (2004) find that the economic cost of the RST tax on capital goods exceeds that of all other major Canadian taxes.

My quantitative estimates — of the likely economic impacts of converting provincial RSTs to a tax with a value-added base like the GST — emphasize the effects on business investment, consumer prices, and the distribution of tax burdens. My results are based on an examination of actual effects of reform in the four provinces that have already adopted value-added bases, and on a comparison of their experience to what happened in the same period in provinces that kept their RSTs.

An examination of detailed revenue data for the RSTs showed that the effective tax rates on business inputs, including capital goods, are remarkably high. Eliminating such taxes through harmonization would cause a substantial increase in business investment. By my preferred estimate, annual machinery and equipment investment in the harmonizing provinces rose 12.2 percent above trend levels in the years following the 1997 sales-tax reform. Given the high taxes on capital inputs in the remaining provinces, it seems reasonable to expect a similarly large short-run effect of reform on investment in the RST provinces as well.

Of course, broadening the base to include new-home purchases, in the context of a revenue-neutral harmonization, would increase the visible taxes paid by some consumers. This shift in statutory burdens is usually regarded as a major obstacle to such a reform. The question, however, is to what extent increases in taxes are reflected in true economic incidence — and that depends on the extent to which input taxes under the existing RSTs are shifted forward to consumers or backward to factors of production.

To determine that, I examined the relationship between changes in consumer prices and changes in effective tax rates in the harmonizing provinces in the years following the 1997 reform, again using comparisons with the non-reforming provinces to control for economic and especially monetary factors that otherwise affected consumer price inflation at the same time. The results showed that the pattern of relative price changes among broad consumer expenditure categories was quite similar to the pattern of relative changes in taxes and business costs induced by the reform. Overall, consumer prices in the harmonizing provinces fell with the reform, although prices rose somewhat for shelter and clothing and footwear, and that fact tended to make the reform slightly regressive. The pattern of reform-induced tax changes would presumably differ in the remaining RST

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provinces, but the results are consistent with the notion that taxes are fully shifted forward (or even overshifted) in most sectors, so that the change in statutory burdens would not have large distributional effects.

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**Appendix:** *Detailed Estimates of Investment Impact*

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In the main text I noted that my main estimates of the investment impact of the reform may be confounded by other economic changes in the Atlantic provinces, such as the sharp expansion in the offshore oil and gas sectors in Newfoundland and Nova Scotia, and the introduction of the Atlantic Investment Tax Credit for manufacturing and processing industries in 1997.

To go further, therefore, I turn to investment data disaggregated to the two-digit industry level from Statistics Canada's Capital and Repair Expenditures survey. Unlike the Provincial Economic Accounts (PEA) data, the Capital Expenditures data are available on a consistent basis only for the 1992-2005 period, and only nominal values of investment expenditures are recorded. I deflate the data with the province-specific implicit price indexes for gross fixed-capital formation derived from the PEA data.

Table A1 presents the average annual investment per capita for each of the six industry groups examined, the two-digit industries for Agriculture, Mining, Construction, and Finance and Insurance, and for two broader aggregates of Wholesale and Retail Trade and Transportation and for Other Services.<sup>22</sup> The first column shows the population-weighted average of provincial total investment per capita in each industry, an indication of the relative importance of each in the aggregates. The remaining two columns report the effective tax rate on capital goods induced by the pre-reform RSTs in the harmonizing provinces. These tax rates were estimated by Statistics Canada on the basis of the 1996 provincial Input-Output tables and a detailed reading of the tax laws of each of the three provinces; they are calculated to include the direct effect of taxes paid on capital inputs as well as the indirect effects of the higher costs in capital-goods-producing industries, assuming full forward shifting of the taxes.

The data show that the highest effective tax rates were for machinery and equipment investment in the Construction sector at a 10.4 percent average effective rate. The rates vary widely among sectors, to a low of 2.6 percent in Manufacturing. Estimated effective tax rates on buildings are above 4 percent in most sectors, which of course reflects, not the direct retail sales taxes on business purchases of structures, but rather the RSTs on construction inputs that are deemed to be "embedded" in their producer prices. For structures, the lowest effective rate is in Mining, presumably because of the large share of imported capital goods in use in the sector.

Table A2 reports further difference-in-difference estimates of the effect of HST reform, based on the alternative data. In the interests of brevity, only the coefficients on the dummy variable for the HST reform are reported; all regressions include controls for log real GDP per capita and year fixed effects and province-specific linear time trends, as before. The first row is the "baseline" specification corresponding most closely to the results for the PEA data; in it, the investment data are for the aggregate of all industries, excluding Public

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22 Other Services includes all other two-digit industries except Public Administration, Education Services, and Health Care and Social Assistance, where investment decisions are likely to reflect factors other than taxes, and which are therefore excluded altogether from the analysis. Indeed, many producers in these sectors are tax-exempt under the HST, so that effective tax rates on investment were in any case largely unaffected by the reform.

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**Table A1:** *Summary Statistics: Investment and Effective Sales Tax Rates by Industry*

	Average Annual Provincial Investment per Capita	Pre-reform Effective Tax Rate on Investment in HST Provinces:	
	1992 \$ per year	Machinery	Buildings
Agriculture	36	5.6	4.2
Mining and Oil and Gas	699	3.9	2.6
Construction	94	10.4	4.9
Manufacturing	604	2.6	4.6
Trade and Transportation	192	8.9	4.4
Finance and Insurance	367	6.1	4.1
Other Services	121	8.6	4.0

Notes: The figures reported are population-weighted averages of provincial per capita investment data, and of the estimated effective tax rates on investment under sales taxes in HST provinces before the reform. These do not correspond to national averages because some provincial observations are missing owing to confidentiality restrictions.

Source: Statistics Canada.

**Table A2:** *Further Estimates of the Investment Impact of HST Reform*

	Total Investment	Machinery and Equipment	Non-residential Construction
Baseline	0.095 [1.68]	.071* [1.86]	0.096 [0.81]
Excluding Mining Sector	0.005 [0.19]	.121** [2.48]	-0.02 [-0.49]
Including Quebec	0.013 [0.32]	.055* [1.82]	-0.043 [-0.55]
Excluding Provincial Trends	.066** [2.40]	.064** [2.08]	0.061 [1.26]

Notes: Robust t statistics in brackets.  
\* significant at 10 percent level; \*\* significant at 5 percent level; \*\*\* significant at 1 percent level.

Source: Author's estimates based on aggregated data from the Statistics Canada Capital and Repair Expenditures survey.

**Table A3:** *Regression-based Estimates of Investment Impact by Sector*

	Machinery	Buildings
Agriculture	0.261** [2.51]	0.443** [2.76]
Construction	0.114 [1.64]	0.135* [2.01]
Manufacturing	0.023 [0.15]	0.794** [2.03]
Trade and Transportation	-0.242*** [-3.46]	-0.492*** [-2.87]
Finance and Insurance	0.057 [0.80]	0.601** [2.18]
Other Services	0.064 [0.52]	-0.022 [-0.18]

Notes: All specifications include controls for provincial log GDP per capita and the user cost of capital based on provincial and federal corporate tax measures, as well as controls for unobserved province-specific linear trends, year, and province-industry fixed effects, coefficients of which are not reported.

\* significant at 10 percent level; \*\* significant at 5 percent level; \*\*\* significant at 1 percent level.

Source: Author's calculations.

Administration. The estimates in this case are similar but smaller, perhaps because of the shorter sample period or differences in definitions, and now only the estimate for the machinery and equipment category is significantly different from zero.

In case the results are confounded by unrelated changes in Oil and Gas capital investments, I next exclude Mining sector investment from the total. The results in the second row show that the significant effect remains for the machinery and equipment category, though the point estimate for buildings is now essentially zero. As a further robustness check, the results in the third row are for the baseline specification, including the Quebec observations, which are treated as part of the treatment group beginning in 1995, the year that widespread input tax credits were available under the QST. Once again, a significant positive effect remains for machinery and equipment. The final row reports results of a "pure" difference-in-difference specification, which excludes the province-specific time trends, which are also broadly similar.

Table A3 addresses the influence of contemporaneous changes in corporate tax systems, changes that may in principle confound my estimates of the impact of HST reform. For these calculations, I obtained estimates of the Hall-Jorgensen user cost of capital (UCC) by industry, province, and year for the 1993-2004 period from the federal Department of Finance<sup>23</sup> for each of our broad industry groups except Mining.<sup>24</sup> The user cost estimates are based on fixed assumptions about the financial structure and financial costs of representative firms; they reflect detailed data on the asset mix of the different industries and the statutory tax rates, capital cost allowances, and investment tax credits in the federal and provincial income

23 For details of the user cost methodology, see Canada (2005).

24 Corporate taxation in the Mining sector is complicated.

tax laws. In fact, an inspection of the user cost data shows that the corporate tax treatment of investment remained largely unchanged over the sample period in all sectors other than Manufacturing, where user costs fell after the introduction of the Atlantic Investment Tax Credit in 1997 and related provincial credits.

To control for such effects, I perform the difference-in-difference regressions for each industry group separately; the log of the estimated user cost of capital is included as an additional control variable. Thus the estimating equation becomes:

$$(1') \text{ LOGINVPC}_{it} = \alpha_i^0 + \alpha_i t + \delta_1 + B \text{ HST}_{it} + \eta \text{ UCC}_{it} + \gamma \text{ LOGGDPPC}_{it} + \varepsilon_{it}$$

where *UCC* is the computed user cost of capital for the relevant industry, province, and year, and is based on federal and provincial corporate income tax considerations alone — excluding the effect of input sales taxes.

The user cost data exclude two years, 1992 and 2005, covered by the investment data. To keep the sample unchanged when the *UCC* is included, the 1993 *UCCs* are simply imputed for the 1992 values, and the 2004 *UCCs* for the 2005 values. Nevertheless, the investment data at the two-digit industry level is missing for some industries, provinces, and years for reasons of confidentiality. This problem is especially pronounced among the reforming provinces, where industrial concentration is presumably higher. As a consequence, the two-digit industry panels are unbalanced, and the years and provinces of the regression sample differ from sector to sector in the rows and columns of Table A3. For this reason, caution must be exercised in comparing estimates for different sectors and asset groups.

Table A3 again reports only the estimated coefficient for the HST reform variable and suppresses the others for brevity. Note, however, that the unreported coefficient estimates for the *UCC* variable are usually very large (implausibly so) and occasionally of the wrong sign, but in most cases do not differ significantly from zero. This is probably because of the stability of the user cost over the sample period, which makes the variables roughly collinear with the unobserved province effects. In short, there is not enough variation within provinces in user cost to allow us to distinguish its effects on investment from other, unobserved factors that explain the persistent differences in per capita investment among the provinces. In any case, the inclusion of *UCC* has only a negligible impact on the estimated effect of the HST reform in all sectors other than Manufacturing. In Manufacturing, the estimated effect of the HST reform is a 20.3 percent increase in machinery and equipment investment when the *UCC* is excluded from the regression, but a mere 2.3 percent when it is included.

Indeed, in most of the six sectors, the estimated effect of HST reform on machinery and equipment investment is small and insignificant. In Agriculture, Fishing, and Forestry, however, machinery investment rose about 26 percent above the trend level after the reform, when the separate impact of *UCC* changes is controlled for. In the Trade and Transportation sector, investment is estimated to have declined significantly after the reform. Aside from Manufacturing, where the estimate reflects the contemporaneous changes in corporate taxes, the smallest point estimate is for the Finance and Insurance sector. In fact, Finance and Insurance is the industry with the smallest change in effective tax rates after the

HST reform, since a substantial portion of the sector is treated as exempt from the GST/HST and therefore does not receive input credits for taxes paid on its inputs.

The estimates for investment in buildings, reported in the second column of the table, are more widely dispersed, and indeed some of the estimates seem implausibly large. The estimate for Manufacturing is a 79 percent increase. The estimates are significantly positive in four sectors and significantly negative in one.

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