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The Vanishing Efficiency Gains Of Debt Repayment

By Tony Myatt and Joe Ruggeri

ABSTRACT

There is currently a debate on how to use the federal government's budget surpluses. Three influential Canadian studies suggest there are large efficiency gains to be had from reducing the debt-to-GDP ratio, and favour continuing the war against the debt through debt repayment. We point out that, even if one accepts uncritically the results of these studies, the results cannot be directly applied to the current policy debate because they estimate the gain from a change in the debt-to-GDP ratio relative to a constant ratio — a comparison usually referred to as a "permanent change." Today's context is one of falling debt-to-GDP ratios even *without debt repayment*. When we place those studies in a context relevant for the current debate, the conclusion is that the potential efficiency gains practically vanish.

I INTRODUCTION

In the 1980s and early 1990s, policy-makers, economists, and the general public expressed concerns over persistently large deficits and the rapid growth of the national debt. In response, the federal government took steps towards fiscal retrenchment through measures that included reductions in transfers to the provinces and increases in tax burdens — overtly for consumption taxes and covertly for income taxes by effectively eliminating inflation-indexing in 1985.

After winning the war on the deficit, the federal government has turned its attention to reducing the public debt. It began by making a commitment to keep "the debt burden going down — steadily, permanently, irrevocably" (Budget in Brief 1988:4), and more recently announced an intention to reduce the federal debt-to-GDP ratio to 25% by 2014 (the Goodale Plan). To achieve this target, it plans to devote part of the budget surplus to debt reduction.

Since balanced budgets are sufficient to shrink the debt-to-GDP ratio as nominal GDP grows over time, the need for accelerating this rate of decline through debt repayment is not overwhelmingly obvious. Yet, there seems to be agreement in the economics profession that debt repayment is a good idea — though, ironically, no consensus as to the reasons why.[1]

The economic implications of reducing the debt-to-GDP ratio have been considered from three main perspectives in the literature: fiscal sustainability, efficiency, and equity.[2] There is general agreement that debt repayment is not needed from a fiscal sustainability perspective, but expert opinion is divided about the other two rationales. For example, in his summary of the literature, Scarth (2004) argues that the efficiency rationale does not justify debt repayment for two reasons: first, we cannot be very precise concerning the optimal size of the government debt — U.S. studies put it anywhere between 66% of GDP to negative 300%, depending on the exact specification of the model; second, there may be only small costs from divergences from this optimal size — again, depending on the model specification. On the other hand, Scarth finds that there are persuasive arguments for accelerated debt reduction on the basis of inter-generational equity.

However, Scarth's view is somewhat of a minority opinion. The majority view is that equity considerations, like all normative questions, are hard for economists to pin down. It is argued that an economist's expertise lies in dealing with questions of efficiency. Moreover, Scarth relies on U.S estimates when he argues that the efficiency rationale does not provide a clear case in favour of accelerated debt repayments. In fact, three influential Canadian studies disagree with Scarth. James (1994), Macklem, Rose and Tetlow (1994), and Dahlby (2004) derived substantial efficiency effects from large reductions in the debt-to-GDP ratio, and favour continuing the war against the debt through debt repayment.

Those three studies provide the focus for our paper. We do not evaluate the validity of the assumptions used in those studies, or the reliability of the results. Instead, we emphasize that, *even if we accepted their results uncritically*, they cannot be applied directly to the current policy debate. This is because they estimate the gain from a change in the debt-to-GDP ratio relative to a constant ratio — a comparison usually referred to as a "permanent change." Today's context is one of falling debt-to-GDP ratios *without continuing the war against the debt* (because balanced budgets are more than sufficient to shrink these ratios as nominal GDP grows). Therefore, the critical magnitude for the current debate is not the efficiency gain from a one-shot, large, and permanent reduction in the

1 Of course, there has been the occasional dissenter from this consensus, e.g., Osberg (2004).

2 Myatt and Ruggeri (2004) argue that *inter-governmental fiscal relations* are an important aspect that has been relatively neglected in the literature.

debt-to-GDP ratio; but rather, the efficiency gain from having a lower debt-to-GDP ratio *than would materialize in the absence of debt repayment*. It is the size of the extra gain from debt repayment that we need to know.

Addressing this question is the focus of this paper. Our contribution is to translate the results of previous studies into a form that is relevant for the current debate. We show that most of the reduction in the debt-to-GDP ratio is driven by the growth in nominal GDP. Levels of debt repayments envisioned in federal policy have only a small additional effect on the decline of this ratio. Therefore, even if we accept uncritically the results from the three Canadian studies, we must conclude that the extra efficiency gains from debt repayments are quite small — indeed, they are tiny compared to the gains stated by the three Canadian studies.

This paper can be seen as complementary to that of Russell (2005) who argues in favour of using the surplus to restore existing social programs and to repair Canada's deteriorating physical infrastructure. In so doing, she argues against using the surplus either to pay down the debt, or to cut taxes. Our paper bolsters one leg of her argument — that there are no significant gains from paying down the debt.

We have emphasized that our conclusions hold *even if* we accept uncritically the results from the three influential Canadian studies. We begin by addressing a number of conceptual issues that help explain why there may be good reasons to critique these studies — reasons that suggest that, even on their own terms (in dealing with large "permanent" changes), they may be overstating the efficiency gains.

II CONCEPTUAL ISSUES

A. Public Investment

A fundamental assumption common to all studies on the efficiency effects of debt reduction is that all government spending is for consumption purposes, with no beneficial impact on productivity and economic growth. This assumption is becoming more unrealistic, for two reasons: (a) public physical capital is essential for economic growth and social development; and (b) economic growth is increasingly fuelled by human capital, and the acquisition of human capital is heavily subsidized by the fiscal system. To evaluate the relevance of this issue, Table 1 presents data on the percentage distribution of consolidated (federal provincial/territorial and local) government spending in 2001.

We notice that a number of government spending categories have large investment components — either by increasing productive capacity, or by providing a stream of benefits over a long period of time. Economists have recognized several categories of investment. For the purpose of this paper, five categories of investment may be identified: natural capital, physical capital, human capital, civic capital, and social capital. Each one of the forms of capital contributes to economic growth and human well-being, by itself or through complex interactions with the other forms of capital, and is affected directly or indirectly by government spending.

For example, spending on transportation and communications is largely in the form of physical capital, which helps the economic performance of the private sector. Components of this type of capital are also found in spending on the environment, education (schools, colleges, and university buildings) and health care (clinics and hospitals). Spending on the environment affects directly natural capital. Spending on education and research establishments is an investment in human capital. Spending on culture and recreation, and some components of health care and social services, may also be considered as investment in human and social capital. Spending on general government and on the protection of persons and property is the foundation of civic capital, which provides the essential elements for the proper functioning of a market economy.

It is well established that the private returns to education are large. Indeed, a huge literature has developed discussing the increase in the earnings differential between those with a university degree and those without. Nevertheless, high

TABLE 1 Percentage Distribution of Consolidated Government Spending by Major Category, 2003–2004

Category	Percent of Program Spending
Transfers to Individuals	18.1
Social Services	11.2
Health Care	21.7
Education	16.6
Protection of Persons and Property	9.0
Transportation and Communications	4.9
General Government Services	3.9
Resource Conservation and Industrial Development	4.6
Recreation and Culture	2.9
Environment	2.7
Foreign Affairs and International Assistance	1.2
Housing	1.1
Labour, Employment and Immigration	0.8
Research Establishments	0.5
Regional Planning and development	0.5
Other Program Spending	0.3

SOURCE Statistics Canada; Cansim Table 3850001

private returns to human capital do not necessarily translate into high social returns. In the 1970s, the filter-theory of education (see, for example, Arrow, 1973) suggested the possibility that education might merely be giving out credentials for pre-existing (but otherwise unobservable) ability. In other words, education might not genuinely create human capital, and the high private returns to education might coexist with zero (or very low) social returns.

Two types of empirical evidence have alleviated these fears. First, cross-country empirical studies on the determinants of economic growth have definitively shown that "countries with a better-educated work force tend to grow faster" (Sala-i-Martin, 1994: 746). And second, empirical studies have shown the existence of substantial social externalities associated with education. According to Davies (2003), the education externalities alone may be equivalent to a rate of return of 8%.

It is for these reasons that the endogenous growth literature emphasizes the importance of human capital. Indeed, this is the general theme of the entire literature. Given this emphasis and the empirical evidence on the importance of human capital to growth, the common assumption that public spending is entirely for consumption purposes may give a significant upward bias to the estimates of efficiency gains from debt reduction.

In our view, if efficiency arguments are used as a guide for public debt policy, we need to simulate realistic options for debt repayment (including the option of no repayment at all) in the context of an endogenous growth model that incorporates a full range of channels of effects, both positive and negative, and acknowledge explicitly that a large portion of government is in the form of investment.

B. Sources of Potential Efficiency Effects:
The debt-to-GDP ratio affects social welfare by affecting the level or growth rate of real output or consumption. How does it have such effects? Economists identify a variety of possible channels. Higher debt can have adverse affects by: increasing the necessity for *distortionary taxation*; reducing *private saving*; increasing *payments to foreigners*; and increasing the *risk premium* on interest rates. Against these adverse effects, there are two possible channels through which more government debt could have beneficial effects. In particular, government debt may improve the *functioning of capital markets* by providing a safe financial investment; and it may be the best way to *fund public investment*. We will discuss each of these channels in turn.

Distortionary Taxation
The public debt carries a direct cost in terms of the interest payments that must be made on the outstanding securities. For a given level of program spending, higher tax rates are needed to pay the interest costs. Whether tax financing imposes costs on society in excess of the revenue collected depends to a large extent on the analytical approach used. As pointed out by Wagner [1997], there are two fundamental approaches to tax analysis: the choice approach and the exchange approach.

The choice approach is used by the three Canadian studies evaluated in this paper. This analyzes the burden of taxation while abstracting from the benefits generated by taxation revenues. Taxation is thought to generate "excess burdens" by distorting the choices of private agents. Essentially, this occurs because most taxes create a wedge between the price buyers pay and the price sellers receive, curtailing mutually beneficial trades. For example, excise taxes alter the relative prices of taxed versus non-taxed goods, leading to a change in the allocation of a given level of

consumer spending. Payroll taxes and general sales taxes affect the choice between work and leisure because they change the net gain from an hour's work, the former by reducing take-home pay and the latter by reducing the real value of a given after-tax wage. Personal income taxes affect both the work-leisure choice, by reducing take-home pay, and the saving rate, by lowering the after-tax rate of return.

Even within the choice framework, it must be recognised that several factors might make the magnitude of the potential distortions quite small. First, taxes might improve efficiency when they are imposed on goods for which there are negative externalities (pollution, for example). Second, if there are constraints on marginal adjustments, the distortionary effect of taxes would be minimal. For example, if work is an all-or-nothing decision, with fixed hours of work, labour supply might be unaffected by income and payroll taxes. More generally, the magnitude of any distortion depends on the strength of the responses to these tax wedges.

The alternative approach places tax analysis within a framework of exchange, in the Wicksellian tradition [Wagner 1988, Buchanan 1976], where taxation is only one side of a transaction which involves also its reason and the benefits generated by the funds raised. When taxation is viewed as part of a transaction, it is no longer a burden, because it is not an arbitrary imposition, but it becomes "the price that allows gains from trade to be exploited" (Wagner 1997:161), and part of "the social contract on which society is taken to operate." Such a conceptual framework was employed by Musgrave [1992:369]. His general conclusion is that "the standing of the deadweight loss (of taxation) should not be accepted as a matter of course. It is not for the economists to stipulate rules for good taxation ad hoc, and without reference to the underlying social contract" [Musgrave 1992:380].

In light of this debate, one should use caution in interpreting the results of studies on the efficiency effects of debt reduction which include measures of distortionary taxation.

Private Savings

The public debt accumulates over time when governments finance part of their expenditures by borrowing instead of taxing. The higher interest payments on this debt imply higher future taxes, which private agents may foresee. If so, they may increase their savings rates to maintain their disposable incomes constant over time (known as the *Ricardian equivalence* assumption). Or, for one reason or another (rational or myopic), they may ignore the increase in debt and keep their savings rates constant.

If agents are forward-looking and Ricardian equivalence holds, the savings absorbed by government borrowing are fully replaced by the increase in the private sector savings rate. In this case, net savings available to the private sector, net investment, and economic growth remain unaffected and the debt generates no real effects. On the other hand, if the saving behaviour of private agents remains unchanged in the face of debt accumulation, an increase in the debt-to-GDP ratio will reduce the *net* saving rate. The channels through which this reduction affects output and consumption depend on the economic framework used.

For example, in the case of a closed economy, domestic saving must equal domestic investment as a condition of equilibrium. Therefore, the fall in the net saving rate will lead to a drop in private investment. In effect, the additional borrowing by the government siphons off some of the private savings, crowding out private investment. If the funds borrowed by the government are used entirely for public consumption, as is often assumed, total investment falls, and the whole process involves a shift from private investment

(which stimulates economic growth) to public consumption (which does not). The argument in an open economy hinges on payments to foreigners, considered next.

Before turning to the small open economy, it should be stressed that treating all government expenditures as consumption not only is a gross misrepresentation of reality, as discussed earlier in this section, but may lead to the misinterpretation of empirical results. If the borrowed funds are used for public investment, future generations will benefit from this investment, and it would be equitable if they paid the higher taxes needed to finance the debt servicing charges. Current generations would act in a rational, forward-looking, and inter-generationally fair manner if they did not raise their saving rate in response to public borrowing. In this case, there would still be crowding out of private investment in a closed economy, and empirically we would detect the lack of Ricardian equivalence. However, there would not be a reduction in total investment, but simply a shift from private to public investment, determined collectively through the political process.

As in the case of distortionary taxation, therefore, one must be careful in interpreting both theoretical conclusions and empirical results from studies on Ricardian equivalence.

Payments to Foreigners

In a small open economy, the reduction in the net savings rate will not affect domestic investment because firms can borrow in international markets at the given world interest rate (assuming no risk premium effects, considered later). Therefore, the public debt will have no effect on domestic output, even in the absence of Ricardian equivalence. However, part of domestically produced output must now be used to pay interest to foreigners. This drives a wedge between output and income, or, more technically, between GDP and GNP. The net result would be a reduction in consumption despite no change in output.

Risk Premium

Persistent high deficits and increasing debt may create uncertainty among investors about the safety of their investments in government bonds. When this uncertainty leads to a downgrade of the government bond rating, the added risk premiums will raise the cost of servicing the debt, putting additional pressures on the fiscal system. The increase in interest costs for the government may also spread to the business sector if investors translate their concerns for the financial health of the government to the future prospects for the economy. The magnitude of the risk premium is affected by the level of the debt and the direction of its change. As pointed out by Macklem, Rose and Tetlow (1994), while a high debt-to-GDP ratio raises the risk premium, a declining trend reduces it.

The two remaining channels are possible avenues through which government debt can have a beneficial impact on the economy.

Improved Functioning of Capital Markets

Government bonds may improve the operation of financial markets by increasing the variety of financial instruments and providing an investment vehicle for risk-averse investors. To the extent that these low-risk financial instruments induce additional savings by attracting risk-averse investors, they may reduce the potential crowding-out effects of government debt by expanding the level of private savings.

Financing Public Investment

Public borrowing is an alternative to taxation for the financing of capital projects. In the United States, for example, this vehicle is used routinely in the financing of school construction. For capital projects with a long life span, it may be

more efficient, and more equitable, to borrow and spread the financing cost over the life of the project, as is done for private sector investment, than to pay for the project immediately through higher tax burdens.

If public investment raises productivity and economic growth, as is the case of human capital, government borrowing may be self-financing and may lead to improvements in social welfare over the long run.

Studies aimed at measuring the efficiency effects of changes in the debt-to-GDP ratio universally ignore the possible beneficial effects of government debt. Excluding the first of these (improved functioning of capital markets) is relatively less significant since investors have the option to tap into the international bond market. However, if debt repayment continues indefinitely, investment opportunities for risk-averse Canadian investors, particularly institutional investors, will shrink, thus forcing them to take higher risks than they desire.

Ignoring the second avenue of beneficial effects — financing public investment — is more serious. This introduces upward bias in estimates of the efficiency benefits of debt reduction because one of the alternatives to debt repayment is improving Canadians' access to human capital acquisition and modernizing public infrastructure.

Finally, it is worth mentioning several asymmetries that are not adequately dealt with in existing studies. Empirical studies in the efficiency effects of the public debt treat increases and decreases in the debt-to-GDP ratio in a symmetric manner. For example, Dahlby [2004] estimated the reduction in real GDP from a doubling of this ratio from 50% to 100%, and used this value to estimate the gain from a reduction of 50 percentage points. This symmetric treatment may not be warranted, for a number of reasons. First, there is a limit to debt repayment as it ends when the debt has been eliminated and the debt-to-GDP ratio falls to zero. No such limit exists in theory for increases in the debt-to-GDP ratio. Second, the risk premium is expected to rise with increases in the debt-to-GDP ratio, perhaps at an accelerating rate after some point. When the risk premium vanishes as this ratio is reduced, there are no more gains in this area from debt repayment.

III THE THREE CANADIAN STUDIES

The main elements of the three Canadian studies reviewed in this paper are identified in Table 2. The first two studies, by James (1994) and Macklem, Rose and Tetlow (1994), both use exogenous growth models, in an open economy framework, with heterogeneous agents. The more recent study, by Dahlby (2004), employs an endogenous growth model, in a closed economy, with a single representative agent. As stated above, all three studies estimate the efficiency effects of a one-shot, permanent change in the debt-to-GDP ratio.

While a detailed description of the three studies is relegated to the appendix, it is worth briefly considering two aspects: the difference between exogenous and endogenous growth models, and between closed versus open economy models. When economic growth is exogenous, changes in the debt-to-GDP ratio may affect the level of output, but not its growth rate. With endogenous growth, changes in the debt-to-GDP ratio may have both level and growth rate effects. The "magic" of compound interest means that even small changes in a growth rate may translate into large future effects. So, in general, models of endogenous growth are more likely to find significant effects of debt on GDP.

With regard to "openness," even though Canada is a small open economy, results obtained from open economy models are not necessarily superior to those based on closed economy models. "Openness" changes the channels through which the effects of debt reduction are transmitted, but may not change the dimensions of those effects. In calculating long-run effects, closed economy models may provide useful benchmarks even for open economies.

Besides differences in model structure, each study performs different policy experiments and presents its results in different terms. To assist a comparison of results, Macklem (2004) took 30 years as an approximation of the long-run, and calculated that a permanent reduction in the debt-to-GDP ratio from 80% to zero would raise the long-run level of consumption by 7.4% according to Macklem, Rose and Tetlow (1994), by 9% according to James (1994), and to 8% according to Dahlby (2004). So the key point is that, despite differences in model structure, once the results are put on a common footing, all three studies contain very similar estimates.

TABLE 2 Main Elements of Studies Reviewed

	James (1994)	Macklem, Rose, & Tetlow (1994)	Dahlby (2004)
Growth Model	Exogenous	Exogenous	Endogenous
Economic Structure	Small Open Economy	Small Open Economy	Closed Economy
Type of Agent	Heterogeneous	Heterogeneous	Representative
Ricardian Equivalence	3 Experiments: #1, 2: Partial, #3: Complete	Partial	Complete
Tax Distortions	Savings, Labour Supply	Labour Supply	Saving
Main Experiment	10% reduction in debt-to-GDP ratio	Increase in debt-to-GDP ratio of 40 percentage points.	Increase in debt-to-GDP ratio of 50 percentage points.
Main Result	Steady-state increase of: 0.1% in GDP 0.2% in C	Steady-state decrease of: 1.2% in GDP 5.2% in C	A reduction in real per capita growth by 0.1 percentage points.

IV WHAT DO WE GET FROM DEBT REPAYMENT?

Three Scenarios

The three studies give us similar estimates of the efficiency effects of a permanent change in the debt-to-GDP ratio. Our task is to translate these results into a form that is relevant to the debate on the benefits and costs of debt repayment. Using the estimates from those three studies as a basis for our calculation does not imply that we accept uncritically those results, especially in light of the discussion in Section II. Through this approach, we can address the following question: even if those estimates were accepted, what kind of efficiency gains could we expect from the federal policy of debt repayment?

Those three studies simulate the effects of large and permanent reductions in the debt-to GDP ratio. In the current context of an automatically declining debt-to-GDP ratio, debt repayment simply changes the timing whereby any predetermined level of this ratio will materialize. Our task, therefore, involves a comparison of the time-profiles showing the fall in the debt-to-GDP ratio when debt repayment occurs, and when it does not. The difference between the two profiles allows us to calculate the "permanent-change equivalent" resulting from accelerated debt repayment.

We performed this operation in three steps. First, we projected the debt-to-GDP ratio in the base case where the federal debt is kept constant over the entire projection period from 2003-04 to 2039-40. Second, we projected this ratio under a particular version of the Goodale plan (called the advanced Goodale plan) where only the Contingency Reserve is used for debt repayment. Third, in what we call the extended Goodale plan, we assumed that half of any federal surplus will be used for debt repayment until the federal debt is eliminated.

Although the announced federal plan for debt repayment is in effect for 10 years, our analysis of its efficiency effects is extended far beyond the end of the plan — specifically to 2040 — for the following reasons. First, the three Canadian studies measure the efficiency effects of a permanent debt reduction over an infinite time horizon. In order to apply their results in a consistent manner, we also need to place our calculation within a long-term framework. Second, in putting the results of the three studies on a common footing, Macklem (2004) took 30 years as an approximation of the long-run. We add another six years to include the year when the difference in the debt-to-GDP ratio starts to fall.

The base case requires only the projection of nominal GDP. We started with the data contained in the November 2004 Economic and Fiscal Update by the federal Minister of Finance. For the period from 2003-04 to 2009-2010, we derived the value of nominal GDP from Table 3.6 (Department of Finance 2004: 77). Starting with the above value in 2009-2010, we applied the growth rate in the Conference Board (August 2004) up to 2014-15, and the Conference Board (February 2004) for the period up to 2019-20. The average annual growth rates of nominal GDP for each of the above three sub-periods are 5.0%, 4.4%, and 4.2%, respectively. Noting that these growth rates are declining over time, we assumed an average annual growth rate of 4.0% for the remaining 20 years of the projection period.

Over the entire period, this projection yields an average annual growth rate of 4.25% for nominal GDP and about 2.25% for real GDP. If we used steady-state growth of 3.0% for real GDP and 2.0% for inflation (middle of the Bank of Canada range), the result would be an annual growth rate of 5.0% in nominal GDP. In this case, the automatic decline in the debt-to-GDP ratio would

TABLE 3 Projections of Federal Debt to GDP Ratios under Alternative Scenarios

		I: Base Case		II: Advanced Goodale		III: Extended Goodale		Ratio Difference	
Fiscal Year Ending March 31	Nominal GDP (billions)	Federal Debt (billions)	Debt/ GDP ratio	Federal Debt (billions)	Debt/ GDP ratio	Federal Debt (billions)	Debt/ GDP ratio	(I) – (II)	(I) –(III)
2004	1220.3	501.5	41.1	501.5	41.1	501.5	41.1	0	0
2005	1292.5	501.5	38.8	498.5	38.6	497.0	38.5	0.23	0.35
2006	1362.8	501.5	36.8	495.5	33.4	494.7	36.3	0.44	0.5
2007	1428.8	501.5	35.1	492.5	34.5	491.7	34.4	0.63	0.69
2008	1497.0	501.5	33.5	489.5	32.7	487.1	32.5	0.8	0.96
2009	1567.0	501.5	32.0	486.5	31.1	480.1	30.6	0.96	1.37
2010	1638.9	501.5	30.6	483.5	29.5	470.9	28.7	1.1	1.87
2011	1711.0	501.5	29.3	480.5	28.1	460.9	26.9	1.23	2.37
2012	1786.3	501.5	28.1	477.5	26.7	450.9	25.2	1.34	2.83
2013	**1864.9**	**501.5**	**26.9**	**474.5**	**25.4**	**440.9**	**23.6**	**1.45**	**3.25**
2014	**1946.9**	**501.5**	**25.8**	**471.5**	**24.2**	**430.9**	**22.1**	**1.54**	**3.63**
2015	**2032.6**	**501.5**	**24.7**	**468.5**	**23.1**	**420.9**	**20.7**	**1.62**	**3.97**
2016	2118.0	501.5	23.7	465.5	21.9	410.9	19.4	1.7	4.28
2017	2206.0	501.5	22.7	462.5	21.0	400.9	18.2	1.77	4.56
2018	2299.6	501.5	21.8	459.5	20.0	390.9	17.0	1.83	4.81
2019	2396.2	501.5	20.9	456.5	19.0	380.9	15.9	1.88	5.03
2020	2496.9	501.5	20.7	453.5	18.2	370.9	14.9	1.92	5.23
2021	2596.7	501.5	19.3	450.5	17.4	360.9	13.9	1.96	5.41
2022	2700.6	501.5	18.6	447.5	16.6	350.9	13.0	2	5.58
2023	2808.6	501.5	17.9	444.5	15.8	340.9	12.1	2.03	5.72
2024	2921.0	501.5	17.2	441.5	15.1	330.9	11.3	2.05	5.84
2025	3037.8	501.5	16.5	438.5	14.4	320.9	10.6	2.07	5.96
2026	3159.3	501.5	15.9	435.5	13.8	310.9	9.8	2.09	6.03
2027	3285.7	501.5	15.3	432.5	13.2	300.9	9.2	2.1	6.11
2028	3417.1	501.5	14.7	429.5	12.6	290.9	8.5	2.11	6.16
2029	3553.8	501.5	14.1	426.5	12.0	280.9	7.9	2.11	6.21
2030	3696.0	501.5	13.6	423.5	11.5	270.9	7.3	2.11	6.24
2031	3843.8	501.5	13.1	420.5	11.0	260.9	6.8	2.11	6.26
2032	3997.5	501.5	12.6	417.5	10.4	250.9	6.3	2.1	6.27
2033	4157.4	501.5	12.1	414.5	10.0	240.9	5.8	2.09	6.27
2034	4323.7	501.5	11.6	411.5	9.5	230.9	5.3	2.08	6.26
2035	4496.7	501.5	11.2	408.5	9.1	220.9	4.9	2.07	6.24
2036	4677.6	501.5	10.7	405.5	8.7	210.9	4.5	2.05	6.21
2037	4863.6	501.5	10.3	402.5	8.3	200.9	4.1	2.04	6.18
2038	5058.2	501.5	9.9	399.5	7.9	190.9	3.8	2.02	6.14
2039	5260.5	501.5	9.5	396.5	7.5	180.0	3.4	2	6.09
2040	5470.9	501.5	9.2	393.5	7.2	170.9	3.1	1.97	6.04

be faster and the estimated efficiency gains from debt repayment would be lower.

We then turned our attention to the first debt repayment scenario, called the advanced Goodale plan. The federal government's target of a 25% federal deficit-to-GDP ratio in 10 years announced in the 2004 Federal Budget does not have attached a specific annual amount of debt repayment. As shown in the fourth column of Table 3, this target is projected to be achieved in 10 years, even without any debt repayment! That the 25% target would be achieved in a few years without debt repayment is a well-known fact and has been documented in other research [for example, Russell (2005)].

This well-known fact shows the overwhelming importance of nominal GDP growth to bringing debt ratios down, and also shows how quickly they can fall when no new debt is created. The recent debt repayments, combined with projected higher growth, have made the original Goodale plan quickly obsolete. The policy issue has now become: which arbitrary portion of the projected federal surpluses should be used for debt repayment?

The November 2004 Economic and Fiscal Update provides some hints, but no specific amount. Table 3.6 (Department of Finance 2004: 77) shows the level of the federal debt, and the debt-to-GDP ratio over the period from 2003-04 to 2009-10 under the alternative assumptions of balanced budgets and debt repayment equal to the Contingency Reserve. The latter case would involve an annual repayment of $3.0 billion, or $30 billion over the 10-year target period. This will be the base for our first alternative scenario that will be compared to the basic case: a debt repayment of $3 billion per year over the entire projection period.

The "Update" also contains indications that the policy of debt repayment may continue past the original 10-year target. The figure on page 19 entitled "Federal Debt-to-GDP Projections" extends the projection period for the annual $3 billion debt repayment to 2015-16. Moreover, in recent years the federal government has applied the entire surplus to debt repayment. The "Update" stresses that "the practice of applying the surplus against the debt is in keeping with Generally Accepted Accounting Principles set by the Public Sector Accounting Board of the Canadian Institute of Chartered Accountants... the year-end surplus must be applied against the federal debt" (Department of Finance 2004: 11-12). One may interpret this statement as an indication that the federal government intends to continue the recent practice of applying the entire surplus to debt repayment. In our second scenario, we take a less aggressive approach to debt repayment by assuming that only half of the projected surplus is allocated to that purpose.

Two options for this scenario may be used. The fall in the level of the federal debt will lower annual interest payments (if interest rates do not rise) and will increase the surplus for a given level of government revenues and program spending. In one option, this recursive effect would be taken into consideration by assuming that half of this change would be allocated to debt repayment. In the second option, savings on interest changes will not be allocated to debt repayment; what is allocated is half of the surplus that would be generated in the absence of debt repayment. We used the later approach because a) it serves the purpose of this study in a simpler manner, and b) it is consistent with the projections included in the November *Economic and Fiscal Update*.

Translating A Faster Rate of Decline into a Permanent Change

The time profiles of the three scenarios are contained in Table 3. Inspection of this table leads to the following observations. First, the federal debt-to-GDP ratio is projected to fall rapidly even

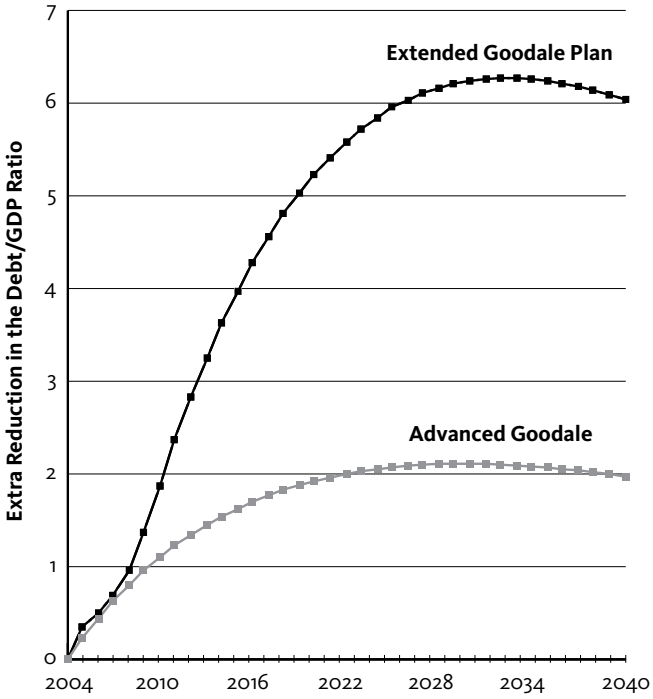
without debt repayment. It falls below the 25% mark in 2014-15 and to 20% in 2019-20, and goes below 10% in 2037-38. Second, when paying down $3 billion per year (the advanced Goodale plan), the 25% mark is passed in 2013-14 — just one year earlier than under no repayment. By the end of the projection period in 2039-40, the debt-to-GDP ratio under this scenario is only two percentage points lower than in the base case. Third, the decline in the debt-to-GDP ratio is faster under the extended Goodale plan because it includes higher levels of debt repayment. The 25% mark is passed in 2012-13, two years earlier than in the base case, and by the end of the projection period the debt-to-GDP ratio is six percentage points lower than in the base case.

This table also shows that, when the debt-to-GDP ratio is declining without debt repayment, the extra reduction due to debt repayment does not follow a simple linear path over time. The second last column of Table 3 shows the difference between the base case and the advanced Goodale plan: it first increases to 2.1 percentage points in 2027-28, and then starts falling. If we extended the projection period indefinitely, it would trace an inverted-U pattern, eventually falling asymptotically to zero over the very long run. It is plotted in Figure 1.

A steeper increase is noticeable for the extended Goodale plan: the extra reduction in the debt-to-GDP ratio, due to the larger annual debt repayments, rises to 6.3 percentage points in 2031-32 and then starts falling at a faster rate than the previous option.

The difference in the debt-to-GDP ratio between the base case and the two alternative scenarios is on average 1.71 percentage points for the advanced Goodale plan and 4.64 percentage points for the extended Goodale plan.[3] It is these averages that represent the "permanent-change equivalent" of the two accelerated debt repayment plans.

FIGURE 1 The "Permanent Change" Equivalents of the "Goodale Plans"



Now, our three Canadian studies suggest that an 80 percentage point permanent reduction in the debt-to-GDP ratio would produce around an 8% increase in steady-state consumption. Therefore, under the advanced Goodale plan, we could expect a 0.17% [(8/80) x 1.7] increase in steady-state consumption, and under the extended Goodale plan a 0.46% [(8/80) x 4.64] increase. These gains are negligible. They would be hard to distinguish from measurement error.

Essentially, no matter how one looks at the efficiency gains — whether in terms of increases in per capita growth rates, or millions of dollars of extra output or consumption — the benefits almost disappear because the actual plans under consideration bring such small permanent change equivalents in debt reduction.

3 These averages may have a slight upward bias because they diminish as the projection period is extended beyond 2039–40.

V SYSTEMATIC BIASES IN THE CALCULATIONS

Correcting for Underestimation of the Efficiency Gain

In assuming Ricardian equivalence, and a vertical labour supply curve, Dahlby (2004) believes that he deliberately biased his model to make it more difficult for him to find significant efficiency gains. Since he still does find significant gains, he believes that his results are stronger. In our case, we are showing that the efficiency gains from accelerated debt repayment are small and insignificant. Therefore, we need to address the possibility that all three Canadian studies underestimated the efficiency gains from permanent debt-to-GDP reductions. For simplicity of discussion, we will focus on the likely underestimate in Dahlby. Could correcting for this underestimation restore a big effect for accelerated debt reduction?

First, consider the assumption of Ricardian equivalence. The presence of Ricardian equivalence has been tested in a variety of studies, and, while the results depend somewhat on the methodology used and the way savings are measured, there is a surprising amount of consensus in the estimates. After reviewing the existing studies, Johnson (2004) concluded that each dollar of deficit financing is associated with an increase of between 50 to 60 cents in private savings.

Dahlby estimates that the total absence of Ricardian equivalence would double the effect of a permanent reduction in the debt-to-GDP ratio derived in his model. So, if we assume a 50% degree of Ricardian equivalence (the lower bound of Johnson's estimates), we end up increasing the gain from a permanent debt-to-GDP reduction by 50%.

Second, consider the assumption that increases in the tax rate have no negative effect on labour supply. The consensus of a very large labour supply literature is that the wage elasticity of desired labour supply is very small — see Killingsworth (1983) or Heckman (1993) or Osberg and Phipps (1993). A common "best guess" from the literature is that the wage elasticity of desired labour supply is about 0.1, but many studies cannot rule out zero or even negative estimates. This suggests that there is no real underestimate coming from Dahlby's assumption of a vertical labour supply schedule.

Nonetheless, we could allow for the possibility of distortionary taxation effects on labour supply. Suppose we allow that it could be about the same as allowing for only partial Ricardian equivalence. Both corrections together would effectively double the estimate of the efficiency gain from a permanent debt reduction. But these changes would not alter our essential point. To repeat, under the advanced Goodale plan we are talking about a permanent reduction in the debt-to-GDP ratio 47 times smaller than that assumed by Macklem (2004); and under the extended Goodale plan, the permanent reduction is more than 17 times smaller. Even if the three Canadian studies underestimated the efficiency gain by 100%, once we translate these gains into magnitudes that are possible under the plans under discussion, they become insignificant.

Bias of a Different Direction

As mentioned earlier, all these studies treat government spending entirely as consumption, which means that government borrowing would benefit only current generations and would impose a burden on future generations. However, as discussed in Section II, a large portion of government spending is investment in any of five categories of capital recognized by economists. This investment is capable of stimulating

economic growth and human development, thus leading to higher living standards in the future. By ignoring the beneficial effects of debt-financed public investment, these studies overestimate the potential efficiency effects of debt reduction. Since these potential gains under the federal policy of debt repayment were found to be negligible, even under the most optimistic estimates of the effects of a large and permanent reduction in the debt-to-GDP ratio, acknowledging that even a portion of government spending is on investment would make these potential gains vanish entirely.

VI CONCLUSIONS

After winning the war on the deficit, the federal government has embarked on a policy of debt repayment aimed at achieving moving targets of the debt-to-GDP ratio. This policy has been grounded on two commonly-held views of the public debt: first, the debt imposes efficiency losses over the long run, thus lowering social welfare; and second, it creates a heavier fiscal burden on future generations. This paper focused on the efficiency argument by reviewing three major Canadian studies on the efficiency effects of a permanent reduction in the debt-to-GDP ratio.

We have shown that the results of those studies cannot be applied directly to the current policy debate on the merits of debt repayment. So we translated their results into a form that is relevant to the debate. This involved comparing the time-profiles of the fall in the debt-to-GDP ratio with and without debt repayment over a 36-year period. The average difference between these profiles gives us the "permanent-change equivalent" from accelerated debt repayment.

We started with the observation that the debt-to-GDP ratio will fall rapidly under conditions of balanced budgets and steady economic growth, and would fall even with deficits that would keep the growth of the public debt below that of nominal GDP. Acknowledging that the federal government's new target of a 25% debt-to-GDP ratio in 10 years will be achieved without the need for debt repayment, we evaluated two additional options: the advanced Goodale plan, which would dedicate only the annual Contingency Reserve to debt repayment; and the extended Goodale plan, which would allocate half of any federal surplus to debt repayment.

Our calculations show that, within the context of a declining debt-to-GDP ratio, these debt repayment options would be equivalent to a permanent reduction in the debt-to-GDP ratio of about 2 and 5 percentage points, respectively. These reductions are a small fraction of the reductions assumed in the studies reviewed in this paper. For example, Macklem (2004) assumed an 80 percentage point reduction in the debt-to-GDP ratio, and Dahlby (2004) assumed a 50 percentage point reduction.

We then transformed the estimated efficiency gains from those large and permanent reductions in the debt-to-GDP ratio into the equivalent levels under the two debt repayment options. In interpreting these results, it should be kept in mind that a) the estimates from the above three studies are based on a particular approach to tax analysis that treats taxes as arbitrary impositions rather than part of transaction involving the imposition of the tax and the use of the funds, and b) those estimates are likely to be overstated because they assume that all government spending is in the form of consumption, thus ignoring the beneficial effects of debt-financed public investment.

Our results indicate that, on the basis of the estimates derived in those three Canadian studies, the potential gains in output and consumption over the long run are minuscule under both debt repayment options. They may disappear altogether, and may even turn negative, when we replace the assumption that government spending is entirely in the form of consumption and incorporate the fact that a large portion of government spending is in the form of investment in natural, physical, human, social, and civic capital.

Focusing on the potential economic distortions generated by the public debt, the studies reviewed address the issue of debt repayment by asking the question: what do we gain from a permanent reduction in the debt-to-GDP ratio? We stress that, in the current Canadian context, debt repayment is part of the issue of how to use the

surpluses generated by a federal fiscal structure which is fiscally unbalanced because the built-in growth of revenues exceeds the built-in growth of expenditures. The portion of the surplus that is allocated to debt repayment is not available for redressing this imbalance through tax reductions or increased public investment, or a combination of the two. In this context, perhaps the question to be addressed in future, and with the use of more comprehensive studies, may have to be re-phrased as: how much will debt repayment cost us?

THREE IMPORTANT DEFINITIONS OF TERMS

Please note the definitions are deliberately simplistic. Whole papers could be written on the various ways in which the following three terms are used in the literature. The precise usage differs between authors, and differences in definition do affect conclusions. So, with that caveat, please note:

Inter-generational equity: refers to the effect of the public debt on the economic position of current and future generations.

Sustainability: refers to the capacity of the economy to bear certain debt loads

Efficiency: refers to the effect of the public debt on resource allocation and economic performance.

APPENDIX **DETAILS OF THE THREE STUDIES REVIEWED IN THIS PAPER**

Dahlby (2004) uses an "AK" model of endogenous growth that incorporates distortionary taxation. The name of the model comes from the production function, which is written as:

(1) Yt = Akt where Yt is total output at time "t" resulting from capital "K," that yields a constant rate of return "A"; "K" includes both human and physical capital, which are treated as perfect substitutes. In order to focus on the effects of debt reduction on capital accumulation, Dahlby assumes a vertical labour supply curve.

The government is assumed to raise revenues through a proportional tax on income (the value of output) and to use these funds to finance government expenditures. All government expenditures are for consumption purposes (not investment), and are a constant proportion of income.

The key to the model is the proportional relationship between output and the capital stock. This makes the growth of real GDP entirely dependent on the share of investment in GDP. Furthermore, since it is a closed economy, domestic investment is fully constrained by domestic saving. In Dahlby's model, Ricardian equivalence is assured by the assumption of forward looking representative agents. Therefore, the adverse effects on growth come from the assumption that the taxation necessary to finance interest payments on the debt is distortionary. However, the distortion is confined to the saving decision because the labour supply is assumed to be fixed.

His results show that doubling the debt-to-GDP ratio from 50% to 100% would reduce the growth rate "by just under one-tenth of a percentage point" (Dahlby 2004: 226). While this may seem small, we must bear in mind that annual growth rates in real per capita terms are often in the range of 1% to 12%, so a change in one-tenth of a percentage point may represent as much as a 10% improvement in the growth rate. Moreover, the magic of compounding means that even small growth gains can have significant effects on standards of living.

To demonstrate this point, Dahlby transformed the change in the growth rate into changes in output levels by calculating the present value of the future output loss. According to his calculations, this loss would amount to $15 billion in 2002. Turning the result around, if the debt-to-GDP ratio was *reduced* permanently by 50 percentage points, and we assumed that gains are losses are symmetric, the output gain over the infinite future would amount to $15 billion in 2002. Alternatively, if the long-term is represented by 30 years, to maintain consistency with the time frame used in the text, if we ignore the time value of money and assume that the gains in 30 years represent 75% of the gains in the infinite future, the gain would be $375 million per year over the next 30 years.

James (1994) used a calibrated, dynamic, overlapping generation model of the Canadian economy placed within the framework of a small open economy with imperfect substitutability between domestic and foreign assets. It assumes that the trend growth of total factor productivity is exogenous — implying that changes in the debt-to-GDP ratio can have only level effects on domestically produced output. He performs a variety of experiments to determine the short-term and long-term effects of having higher taxes today to finance debt repayment, which allows a lower debt burden and lower taxes in the future. His experiment starts with a steady-state ratio of debt-to-GDP of 55% and measures the effects of reducing that rate by 10% to 49.5%.

James allows changes in the public debt to affect output and consumption through three channels: a) partial Ricardian equivalence, b) distortionary taxation, and c) foreign borrowing, which creates a wedge between domestic output and domestic consumption through the payment of interest to foreigners.

In his first experiment, the debt repayment is financed by an increase in the taxation of wages, under full Ricardian equivalence. James's general conclusion is that "initial agent welfare declines significantly...while steady state welfare increases marginally" (James 1994: 292). It takes 67 years for the wage tax to fall below its pre-experiment level, and the reduction is very small (0.3 percentage points). Steady-state increases are 0.1% in the level of GDP and 0.2% in the level of consumption.

In the second experiment, debt repayment is financed through a combination of wage taxes and corporate income taxes, still under full Ricardian equivalence. The steady state effects on the level of GDP and consumption are the same as in the first experiment. In the third experiment, debt reduction is financed through non-distortionary taxation, or a reduction in lump-sum transfers, but this time under incomplete Ricardian equivalence. Compared to the previous two cases, the level effects on GDP and consumption are doubled to 0.2% and 0.4%, respectively.

Macklem, Rose and Tetlow (1994) use a calibrated dynamic macro model to estimate the efficiency effects of a permanent change in the debt-to-GDP ratio and to trace the path from one steady-state to another. Their model has the following main features:

1. Trend growth of total factor productivity is exogenous.
2. The framework is a small open economy with perfect substitutability between domestic and foreign assets.
3. Heterogeneous overlapping generations of utility-maximizing consumers, who exhibit myopic behaviour, are credit constrained, and exhibit only partial Ricardian equivalence.
4. Debt is financed either by lump-sum taxes net of lump-sum transfers (one simulation) or by income taxes that distort the labour-leisure choice.
5. Monetary policy adjusts to fiscal policy by maintaining the target inflation rate; however, monetary policy has only short-run real effects and does not influence steady-state outcomes.
6. In the more general simulation, a change in the public debt affects output and consumption through three channels: a) partial Ricardian equivalence, b) distortionary taxation, and c) foreign borrowing, which creates a wedge between output and consumption through the payment of interest to foreign lenders.

They estimate the short-run and long-run effects on the level of GDP and consumption from raising or lowering the debt-to-GDP ratio by various degrees from the calibrated level of 60%. In their simulations, these effects originate from three sources: incomplete Ricardian equivalence, income taxes on labour income, and risk premiums.

Although they report results for six levels of the debt-to-GDP ratio, as deviations from the base level of 60%, we report only the results for an increase from 60% to 100% to focus on an experiment similar in magnitude to that of Dahlby.

An increase in the debt-to-GDP ratio by 40 percentage points — under incomplete Ricardian equivalence, with non-distortionary taxation and no risk premium — would lead to a steady-state reduction of 0.4% in the level of domestic output and 2.6% in the level of consumption. These reductions rise to 0.7% and 3.0% for GDP and consumption, respectively, when income taxes on

labour income are added. When risk premiums are included, the total effect raises to -1.2% for GDP and -5.2% for consumption.

These results can be translated in the two debt repayment options discussed in this paper by making the appropriate proportional adjustment, remembering that the "permanent reduction equivalent" in the debt-to-GDP ratio is 2 percentage points for the "Advanced Goodale Plan" and 5 percentage points for the "Extended Goodale Plan." These "permanent reduction equivalents" of the two debt repayment options are tiny when compared to the 50 percentage point reduction assumed in Dahlby's experiment.

Tony Myatt is a Professor of Economics at the University of New Brunswick, and the author of over 30 articles in refereed journals.

Joe Ruggeri is the Vaughan Chair in Regional Economics and the Director of the Policy Studies Centre at the University of New Brunswick.

REFERENCES

Arrow, K. J. (1973) "Higher education as a filter." *Journal of Public Economics*, Vol. 2, Issue 3, July, pp. 193-216.

Buchanan, J. (1976), "Taxation in Fiscal Exchange," *Journal of Public Economics*, 6:1`7-29.

Conference Board of Canada (February 2004), *Fiscal Prospects for the Federal and Provincial/ Territorial Governments: Update*, Ottawa.

Conference Board of Canada (August 2004), *Fiscal Prospects for the Federal and Provincial/Territorial Governments: Update*, Ottawa.

Dahlby, B. (2004) "What does the debt cost us?" *Is the Debt War Over?*, Institute for Research on Public Policy, McGill, edited by Christopher Ragan and William Watson, pp. 207-234.

Davies, J. (2003) "Empirical Evidence on Human Capital Externalities." Department of Finance, Government of Canada, Working Paper #2003-11.

Department of Finance (2004), *Economic and Fiscal Update*, Ottawa.

Heckman, J. (1993) "What has been learned about labour supply in the past twenty years?" *American Economic Review*, Papers and Proceedings, Vol. 83, No. 2, May, pp. 116-121.

James, S. (1994) "Debt Reduction with Distorting Taxes and Incomplete Ricardianism: A Computable Dynamic General Equilibrium Analysis." in W. Robson and W. Scarth eds, *Deficit Reduction: What Pain, What Gain?*, Toronto: C.D. Howe Institute, pp. 279-319.

Johnson, D. (2004) "Does the Debt Matter?" *Is the Debt War Over?*, Institute for Research on Public Policy, McGill, edited by Christopher Ragan and William Watson, pp. 173-197.

Killingsworth, M. (1983) *Labour Supply*, Cambridge University Press, Cambridge, 1983.

Macklem, T. (2004) "What does the debt cost us? B Comments", *Is the Debt War Over?*, Institute for Research on Public Policy, McGill, edited by Christopher Ragan and William Watson, pp. 235-242.

Macklem, T., D. Rose and R. Tetlow (1994), "Government Debt and Deficits in Canada: A Macro Simulation Analysis," in W. Robson and W. Scarth eds, *Deficit Reduction: What Pain, What Gain?*, Toronto: C.D. Howe Institute, pp. 231-272.

Musgrave, R. (1992), "Social Contract, Taxation and the Standing of Deadweight Loss," *Journal of Public Economics*, 49:369-81

Osberg, L. (2004) "The Real Issue in the Debt Debate?" *Is the Debt War Over?*, Institute for Research on Public Policy, McGill, edited by Christopher Ragan and William Watson, pp. 335-350.

Osberg, L. and S. Phipps (1993) "Labour supply with quantity constraints: estimates from a large sample of Canadian workers." *Oxford Economic Papers*, Vol. 45, pp. 269-291.

Russell, E. (2005) "What should we do with the Federal budget surplus?" Canadian Centre for Policy Alternatives, *Technical Report #1*, pp. 1-16.

Sala-i-Martin, X. (1994) "Cross-sectional regressions and the empirics of economic growth." *European Economic Review*, Vol. 38, pp. 739-747.

Scarth, W.M. (2004) "What should we do about the debt?" *Is the Debt War Over?*, Institute for Research on Public Policy, McGill, edited by Christopher Ragan and William Watson, pp. 243-265.

Wagner, R. (1988), "The Calculus of Consent: A Wicksellian retrospective," *Public Choice*, 56:153-66.

Wanger, R. (1997), "Choise, Exchange and Public Finance," *American Economic Review*, 87:160-63.

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CANADIAN CENTRE
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CENTRE CANADIEN
de POLITIQUES ALTERNATIVES

410-75 Albert Street, Ottawa, ON K1P 5E7
TEL 613-563-1341 FAX 613-233-1458 EMAIL ccpa@policyalternatives.ca
www.policyalternatives.ca

CAW 567 OTTAWA