Tax Breaks & Tax Averaging:

Longitudinal Insights into the Incidence of Deferred Income Plans

By

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ABSTRACT

Registered pension plans and registered retirement savings plans, which together will be referred to as "deferred income plans" (or DIPs), have been a well-entrenched feature of Canada's retirement income and tax policy systems for many decades. Despite their widespread use by Canadians, DIPs are often portrayed in policy discourse as operating primarily, or disproportionately, to benefit the rich. This characterization finds considerable support in the existing empirical tax-expenditure literature, which, without exception, finds that DIPs are highly regressive, and provide relatively concentrated benefits to only the top of the income distribution.

There are fundamental questions as to whether DIPs should be considered tax expenditures, or rather a structural component of the tax system. However, even putting this issue aside, the existing literature's evaluation of DIP benefits is seriously inadequate. Existing studies either exhibit severe methodological shortcomings, or rely on data that are almost thirty years old and do not reflect the current DIP system or current saving behaviour.

This dissertation provides a much needed update to the literature, by evaluating the benefits resulting from individuals' DIP saving from 1991 to 2001. This study employs superior methodology and much better data than most of the existing literature.

This study finds that, rather than primarily benefiting high-income Canadians, DIPs offer relatively concentrated benefits to all individuals with average or greater earnings. DIP benefits are at least as concentrated as income for each of the top three earnings quintiles, and these individuals receive comparable benefits per dollar saved in DIPs. DIP benefits are regressive, relative to either income, or income taxes, between the first and third quintiles. Between the third and fifth quintiles, DIP benefits are relatively proportionate to income, and progressive relative to income taxes. Disaggregating the top quintile reveals that, furthermore, DIP benefits are much more highly concentrated in the second-highest decile than the top decile.

Extending the measurement of DIP benefits to include the impact of DIP saving not only on personal income taxes, but also on selected entitlements under the broader tax and transfer system, reduces total DIP benefits by some 15%, but does not appreciably change their distribution.

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1.0 INTRODUCTION

Deferred income plans, notably registered pension plans (RPPs), and registered retirement savings plans (RRSPs), are relatively prominent and long-standing features of the retirement income policy and tax policy frameworks facing Canadians. Deferred income plans (DIPs) are primarily characterized by their unique treatment under the Income Tax Act – within prescribed limits, contributions to RPPs and RRSPs are deductible from income, capital income accruing on those contributions is not taxed on an ongoing basis, and all withdrawals from these plans are added to an individual's income for tax purposes, i.e., contributions plus accrued capital income are fully taxable upon withdrawal. It should be noted that DIP saving is a function of employer choices, as well as those of individuals. While contributions to RRSPs are largely a matter of individual choice, RPPs are almost always sponsored by employers. If an employer has an RPP, employee participation is almost always compulsory. Employer contributions to RPPs were made deductible when the Income War Tax Act was first introduced in 1917, and employee contributions became deductible in 1919 (Statistics Canada, 1996). RRSPs were introduced quite a bit later, in 1957. DIPs are generally associated with saving specifically for retirement. Indeed, RPPs are almost exclusively used for retirement income purposes; this was reinforced in the 1980s and 1990s as pension benefit standard reform swept across Canada, requiring almost immediate vesting of pension benefits. Individuals now rarely have access to their RPP saving before retirement, and at that time their benefits typically

must be in the form of a life annuity. RRSPs, despite the fact that the second "R" stands for "retirement", are much more flexible saving instruments and can be withdrawn from at any time or age without penalty, although RRSP withdrawals generally must begin by the time an individual reaches age 69.

Canada's public pension system, notably the Old Age Security (OAS) and Guaranteed Income Supplement (GIS) programs, and the Canada Pension Plan (CPP), provides relatively modest benefits that keep virtually all Canadians age 65 or older out of poverty. However, when they retire, the benefits provided by the public pension system do not provide adequate replacement of consumption for many Canadians who have had average or above average earnings during their working life. Individuals wishing higher retirement consumption must save for their retirement by accumulating additional assets. Typically, the most effective ways to do this are to save using RPPs and RRSPs, and to accumulate equity in a principal residence. In this context, the retirement income policy system can be viewed as a pyramid, with public pensions serving as the foundation source for retirement income, deferred income plans (and perhaps equity in a principal residence) as the middle of the pyramid, and other forms of individual saving as the top of the pyramid. An additional metaphor used in the literature is that of a structure supported by multiple pillars, each performing different roles, but all critical to the whole. The most significant components of Canada's retirement income policy system are described in section 2.

The other particularly important context in which to view deferred income plans is as an element of tax policy. Deferred income plans are one of several aspects of the

income tax system that, for many Canadians, go a long way towards transforming the income tax into a tax on consumption rather than a tax on income. One of the main differences between income and consumption taxes is their treatment of savings. An income tax taxes all income when received, regardless of its source or use. No distinction is made between income consumed and income saved. In addition, any capital income that is subsequently created or earned by savings is also taxed on an ongoing basis by an income tax. A consumption tax, on the other hand, will tax savings and capital income when they are finally consumed, rather than when they are initially earned, or alternatively, with "tax-prepaid" consumption tax treatment, will tax income as it is initially saved, but exempt from taxation any capital income that is subsequently generated by these savings. Income saved through DIPs receives consumption tax treatment – it is taxed only once, upon withdrawal.

DIP use by Canadians is widespread. In any given year from 1991 to 1998, between 46 and 49% of taxfilers made a contribution to an RRSP, and/or accrued a benefit under an RPP (Moore, 2001). In the period from 1991 to 1999, fully 73% of taxfilers contributed to an RRSP, or accrued an RPP benefit, in at least one year (Moore, 2002). Furthermore, DIPs are easily the most significant financial assets owned by Canadian individuals and families. It is estimated that in 1999, in aggregate, Canadians had DIP savings with a market value of some one trillion dollars (Statistics Canada, 2001). This figure is comprised of the actual balances of individuals' RRSPs, plus the estimated present value of individuals' entitlements under RPPs. DIP savings constituted some 69% of Canadians' total financial assets, and 29% of their total assets. The only asset in the

same league was Canadians' principal residences, which had an estimated market value of some $1.1 trillion dollars in 1999, against which roughly $300 billion in mortgage liabilities was owed.

As another indication of the significance of these programs, in the Department of Finance's most recent tax expenditure report, it is estimated that these programs or tax provisions "cost" the federal public purse some $13.4 billion in foregone tax revenue in 2004 (Department of Finance, 2004). That figure increases to roughly $20 billion if the foregone revenue of provincial governments is included.

The academic and policy literature that is relevant to DIPs is extensive and diverse. Much of it is useful in providing a broad context for DIPs, while some of it addresses DIPs much more specifically. The literature on the microeconomics of saving behaviour would certainly be included. The voluminous normative literature on the merits of income versus consumption as the ideal tax base is very relevant. There is a broad, multidisciplinary literature on retirement income policy. The general outlines of these broader literatures and their relevance to DIPs will be discussed in order to provide important context for DIPs. No attempt will be made to exhaustively canvass these enormous literatures.

There is also a more limited, narrow literature that is more specifically relevant to DIPs and this research; it will be more comprehensively reviewed. There is a limited theoretical literature concerning how individuals will use DIPs in the context of a progressive annual income tax system. A substantial empirical literature addresses the question of whether, or to what extent, tax incentives such as DIPs actually increase total

saving rather than merely divert it from other forms of saving. There is a modest theoretical and empirical literature looking at the behavioural response of individuals to changes in the parameters of their DIP choices, i.e., responses to changes in marginal tax rates or to the introduction of a carry-forward provision for DIP contribution limits, for example. There is also a significant theoretical and empirical literature on tax expenditures, some of it with specific application to the distributional impacts of DIPs. The existing empirical tax expenditure literature characterizes DIPs as delivering benefits that are substantially more concentrated at the top of the income distribution than relevant standards of comparison, such as income or income tax liabilities, and portrays them as being decidedly and consistently regressive.

This study is rooted primarily in the empirical tax expenditure literature. The study develops a framework for identifying and measuring the benefits received by those saving in DIPs from 1991 to 2001. This framework is then used to estimate the size and composition of these benefits, and their distribution across the population.

This study takes advantage of the longitudinal data available through custom data retrievals from Statistics Canada's Longitudinal Administrative Databank (the LAD). The LAD is a random 20% longitudinal sample of Canadian individuals filing tax returns (i.e., the T1 Family File). If an individual is selected, then the rest of his family is also selected. The data are primarily the administrative and financial information submitted by individuals in their tax returns. Data are currently available for the years 1982 to 2001, although specific variables are not necessarily available for all of these years.

This research uses a benefit measurement framework that is superior to that used in most of the existing literature. Much of the existing literature fails to properly identify the benefits associated with DIP use. The paper also uses meaningful counterfactuals against which to measure the benefits of DIPs. Most of the literature is quite weak in this regard, using counterfactuals that are difficult to justify or that are completely absent.

The data developed through this research are superior to those used in the existing literature. Most of the literature that examines the benefit incidence of DIPs is limited to analysis based on a single snapshot of annual cross-sectional data. In contrast, this research takes advantage of longitudinal data to observe an individual's characteristics, such as earnings or income, and his or her interactions with DIPs, over more than a decade. These data allow individuals to be ranked according to permanent earnings, rather than relying on annual earnings, which reflect considerable year-to-year variation. Age or life-cycle earnings effects are controlled for by analyzing individuals within the context of their age cohort. Longitudinal data provide a much better indication of permanent behaviour, i.e., it is possible to examine the longitudinal intensity and consistency of individuals' DIP saving, rather than make judgements based upon what may be purely transitory behaviour. On a related point, the study finds that individuals' taxation circumstances and entitlements under various programs are very fluid; outcomes in any given year may be a poor indicator of longer-term outcomes. Longitudinal data can help differentiate between transitory and more typical circumstances.

Tax averaging, the transfer of income between tax brackets through time, is a crucial component of the benefits that individuals may receive from DIPs.

This dissertation provides the first empirical insights in the literature into some of the actual tax-averaging outcomes associated with DIP use. The use of longitudinal data, coupled with the development and application of personal income tax calculators, permits the tracking and comparison of the marginal personal income tax rates applying to individuals' DIP contributions and DIP withdrawals over the 1991 to 2001 period.

In addition to DIPs' impact on personal income taxes, the changes in taxable income caused by DIP saving and withdrawals simultaneously impact individuals' entitlements under numerous other programs. This is because many programs' entitlements are directly tied to various definitions of individual or family income. Typically, program entitlements are reduced (or clawed back) as net income rises; these benefit reductions operate much like taxes. The literature often refers to "marginal effective tax rates" when incorporating the impact of these entitlement reductions into marginal tax rates. This study also examines the distributional impact of DIPs on individuals' entitlements under a number of significant programs that provide income-tested benefits. These programs include elderly benefit programs (GIS, OAS, and GAINS), various federal and Ontario child benefit programs, and several miscellaneous programs (the GST credit, and the Ontario Property and Sales tax credit).

This research also provides the first benefit incidence analysis that fully reflects the impact of the 1990 DIP reform; the existing literature is quite dated in this regard. The analysis is also more comprehensive than most of the literature in that it includes saving done through both RRSPs and RPPs, and incorporates the impact of pre-retirement RRSP withdrawals into the analysis. The current literature almost exclusively examines

RRSP contributions in isolation, with some attention paid to employee RPP contributions. It ignores the value of employer contributions to RPPs, and the impact of RRSP withdrawals before retirement age.

The findings of this research strongly challenge those of the existing applied tax expenditure literature. This study finds that the benefits from DIPs are substantially less concentrated at the top of the earnings distribution than is suggested by the existing literature or than is asserted by policy analysts or policy advocates who are highly critical of the distributive properties of DIPs. The study finds that for the most representative age cohort, DIP benefits are at least as concentrated as income for each the top three quintiles of the earnings distribution, and that individuals in these earnings groups receive reasonably similar benefits per dollar saved in DIPs. DIP benefits can be considered relatively proportionate to income, or progressive relative to income tax liabilities, over the top half of the earnings distribution. It also finds that, relative to either income or income tax liabilities, DIP benefits are much more concentrated in the second-highest earnings group than in the highest earning group. The study also confirms that DIPs appear to provide low and regressive benefits, using any measure, to the lowest two earnings quintiles, particularly the bottom quintile. In the context of the broader retirement income system, this may not be overly troubling, as many other programs concentrate their efforts on providing retirement benefits to this part of the earnings distribution.

Extending the DIP benefit framework to incorporate the impact of DIP saving on individuals' entitlements under various income-tested programs reveals that the clawbacks associated with these programs reduce the overall benefits provided by DIP saving by

roughly 15%. However, these clawbacks do not perceptibly change the distribution of DIP benefits across earnings groups; they are quite neutral in that regard. This is an unexpected finding, given that most of these clawbacks have effect over very specific income ranges, and cumulative clawback rates on specific low-income ranges can be very large, 30-50% or more. One key to these results seems to be that, on average, even in the subgroups most affected by these clawbacks, interactions with the clawbacks are partial and sporadic over time. Another factor is likely that many of the clawbacks are based on family income, and the lowest earnings groups, which are based on individual earnings, will include low-earning individuals, such as stay-at-home spouses, from higher income families. The latter are much less likely to be affected by clawbacks targeted at low-income families.

Of particular significance is the fact that the lowest earnings group appears to largely avoid the punitive effects of the GIS clawback by withdrawing its DIP saving in the short-term, rather than waiting until retirement age, when the GIS clawback would likely apply.

This research has also examined the distributional impact of DIPs by taking a different approach. While the empirical results mentioned above measure DIP benefits in isolation, relative to a comprehensive annual income tax counterfactual, it is also meaningful to compare the distributional impact of DIPs as compared to other policy instruments that could be used to pursue similar policy goals. The benefit incidence of DIPs has been compared to that of tax-prepaid savings plans (TPSPs). An adjustment has been made to ensure that the two scenarios are revenue neutral by returning the difference

in tax revenues to individuals according to their share of income tax liabilities. TPSPs are an alternate form of tax-preferred saving. Contributions to TPSPs do not receive a deduction, nor are withdrawals from TPSPs taxable. Like DIPs, no income tax is paid on annual capital income accruing within the plan. The research finds that DIPs and a revenue-neutral TPSP scenario (or counterfactual) result in broadly similar distributional outcomes, quite similar to the findings described above. However, at the margin, DIPs deliver significantly greater benefits to the middle of the earnings distribution, and notably smaller benefits to the bottom two quintiles and the top decile.

2.0 INSTITUTIONAL OVERVIEW: THE RETIREMENT INCOME POLICY SYSTEM

In its broadest sense, the retirement income policy system includes all policies that function to provide income support to the elderly in one form or another. This easily includes dozens of expenditure programs, tax provisions, subsidized services and the like provided by the federal, provincial and local levels of government. Only the most dominant components of federal retirement income policy will be considered here – the public pension programs and DIPs. The intent is to briefly flesh out the role that DIPs play within the broader retirement income policy system.

The retirement income system that has developed in Canada is very much a mixed system of public and private provision. This is a reflection of the broad diversity of values and ideas associated with aging and pensions, and particularly of the conflict between competing norms of individual versus collective responsibility for retirement consumption. The system is comprised of a number of different sub-systems, some emphasizing public provision, some private provision, and each having a particular function or functions in the context of the overall system. The analogies of a pyramid, or of a structure supported by multiple pillars, are often used in the literature to illustrate the idea of a broad retirement system comprised of a series of functionally distinct components.

The division between the roles for the public and private sector in the overall Canadian retirement income policy system can be largely captured by two basic concepts: the idea of a minimum standard of living for the elderly, and the concept of income or

consumption replacement, or continuity of consumption. Governments directly provide a minimum basic income for the elderly. For the most part, "consumption smoothing" between work and retirement beyond this is the responsibility of the individual (and perhaps his or her employer).

Through OAS, GIS, and the CPP (and various tax provisions), the federal government provides a minimum level of income for the elderly, to ensure that they are not destitute. In 2003, having met a ten-year residency requirement, and in the absence of any other source of income, a single elderly Canadian was entitled to $11,977 from OAS and GIS; an elderly couple was entitled to $19,419. If an individual had accrued a full benefit under the CPP, the maximum income from all public pension sources, including the CPP, was $16,778 for an individual and $24,218 for a couple (assuming that only one member in a couple has accrued a CPP pension). Again, these were maximums – while OAS and GIS are flat-rate pensions, CPP pensions vary widely, according to labour force attachment and level of earnings; in June 2003, the average CPP retirement pension benefit paid was only 55% of the maximum. All figures are derived from HRDC (2003a) and HRDC (2003b). These figures reflect federal programs only; they do not include supplements paid by provincial governments.

CPP benefits are tied directly to lifetime earnings; CPP, therefore, does play an income replacement role, albeit a modest one. In fact, the combined public pension income from all three programs is compressed into such a narrow range that the income replacement role performed by the CPP, at the margin, isn't very significant for many people. The CPP, on average, increases the marginal annual income of CPP pensioners by

less than $2,500. This result is a function of a combination of the CPP's low pensionable earnings ceiling (currently about $40,000), its low maximum benefit rate (25% of earnings), and the impact of the income-tested GIS, which competes with the CPP for much of the same "retirement income space". In fact, when the impact of the flat-rate old age supplements provided by many provincial governments, and their associated clawbacks, is incorporated into the analysis, large numbers of Canadians do not receive a single penny of marginal income from their CPP benefits (Courchene, 1994).

The minimum income floor provided by public pensions simultaneously provides a certain level of income replacement. For example, in 2003, federal public pensions provided some $14,200 of annual retirement income to someone earning half of the average industrial wage (AIW) over their working life, a replacement ratio of roughly 75%. In contrast, federal public pensions replaced 44% of the earnings of someone making the AIW, 29% of someone making 1.5 times the AIW, and only 22% of someone earning twice the AIW in their working years. Clearly, public pensions provide a sufficient amount of continuity between working and retirement consumption only for those Canadians with very low pre-retirement income.

Most Canadians wishing to avoid large drops in their consumption upon retirement must supplement their public pension income with some form of private savings, such as DIPs. This, perhaps in addition to equity in a principal residence, corresponds to the notion of the "third pillar" of the retirement income system in much of the literature, or the middle of the retirement income pyramid. Sometimes occupational RPPs are considered the "third

pillar", and all forms of strictly individual saving are considered as a separate "fourth pillar".

The government effectively mandates the provision of a retirement income floor for the elderly through the direct provision of public pensions. Consumption smoothing beyond this is not mandated by the government, but it seems fair to say that the government encourages it, in at least a relative sense, by providing tax-effective means to save through DIPs in particular, and through other measures such as the tax treatment of principal residences. One can debate whether DIPs provide preferential or merely neutral tax treatment to savings; many informed observers would argue that such consumption tax treatment merely removes the penalties associated with saving under an annual income tax. This is discussed in detail in section 3.2. It is clear that one of the policy goals of Canada's retirement income policy is that individuals have at least the opportunity to save sufficient amounts to provide effective consumption smoothing between their working life and retirement, through the use of DIPs.

There was a major reform to the DIP system (performed through amendments to the Income Tax Act and its regulations) effective in 1990. The main thrust of this reform was to improve the horizontal equity of the DIP system by giving individuals comparable access to tax-assisted DIP saving (comparable DIP "contribution room" or saving limits). Previous to this reform, individuals accruing pension entitlements in defined benefit pension plans enjoyed substantially larger DIP saving limits than did individuals saving through other types of DIPS, i.e., defined contribution pension plans or RRSPs. Another significant element of the reform was the introduction of the RRSP carryforward;

any DIP contribution room not utilized in a given year may now be carried forward indefinitely, permitting considerable flexibility in the timing of savings. Before the reform, any DIP contribution room not used in any given year was often lost forever. This was not the case for individuals who were members of a defined benefit RPP that offered members the option of purchasing pension credits for past service; they were able to recapture past DIP contribution room, albeit often with significant restrictions on their ability to deduct their past-service RPP contributions for tax purposes. The reform also introduced a comprehensive DIP limit, covering both RRSP and RPP saving. Under the previous system, because the RRSP and RPP limits were so loosely connected, individuals with some control over their RPP arrangements had the ability to "double dip", effectively taking full advantage of both the RPP limits and the RRSP limits. The comprehensive and longitudinal nature of the new DIP limits prevents this.

Access to saving through DIPs is directly linked to earnings, as is necessary for a program aimed directly at earnings replacement. The DIP limits are based on supporting the accumulation of enough lifetime saving to allow a retirement income that replaces roughly 70% of an individual's pre-retirement earnings. The limits are based on an estimate that on average, saving 18% of annual earnings over a 35-year working life will fund an annual private retirement pension equal to 70% of "final average earnings". These limits are further capped at a maximum annual dollar amount (as of 2004, $15,500) to restrict the DIP access of the highest earners (effectively the top roughly 5% of the earnings distribution, those with annual earnings exceeding $86,111). This latter cap is aimed at limiting DIP access to funding the equivalent of a private pension of $60,000 per

year in retirement. The 2004 and 2005 federal budgets proposed increasing the maximum annual dollar DIP saving limits to $22,000 by 2010, albeit still subject to a maximum of 18% of annual earnings. This is a significant increase. However, the context is that this new proposed limit is quite comparable to what was originally enacted in the 1990 reform, which legislated DIP limits to increase to $15,500 by 1995 and to be indexed thereafter by the rate of increase in the average wage. What happened instead was that DIP limits were frozen in nominal terms at $13,500 for a decade, as the federal government fought to eliminate the deficit and responded to perceptions that DIPs are highly regressive.

Individuals who find that their saving is constrained by the DIP limits, either because they are particularly heavy savers (strong preferences for future consumption) or because they have very high earnings, can save outside the DIP framework, perhaps utilizing capital gains and other "preferential" tax treatment to avoid the confiscatory real tax rates imposed by the default tax treatment of capital income by Canada's income tax system. The corresponding analogy to such saving would be the top of the retirement income pyramid.

3.0 LITERATURE REVIEW

3.1 Microeconomics of Saving

The first body of literature to be discussed is the literature on the microeconomics of individual saving behaviour. The centrepiece of this theory is the life-cycle theory of consumption and saving, most closely associated with Modigliani (1954). This theory suggests that rather than making current consumption decisions based on current income, individuals maximize their welfare by planning their consumption and saving over long time horizons, such as their entire lifetime. The theory suggests that individuals will smooth their consumption over time, as they prefer a relatively consistent standard of living.

Cross-sectional data suggest that an average full-time worker's real earnings tend to be "hump-shaped" over his life-cycle; earnings are relatively low during early working-life (or schooling), and rise steadily as he accumulates work experience and human capital. On average, earnings appear to peak at age 45 to 50, and then drop modestly until retirement age, at which time they either drop dramatically or disappear altogether (Saint-Pierre, 1996). The life-cycle theory predicts that faced with this uneven pattern of earnings or income over their life-cycle, individuals will smooth their consumption by saving or reducing debt in periods where their income is high relative to their average lifetime income, and dissaving (or borrowing) in periods when their income is low relative to their average lifetime income. Most attention has been paid to the implications of this theory for

savings for retirement, when earnings tend to be low or nil. Other studies have examined individual consumption smoothing over shorter time periods, such as a year, or the business cycle (Browning and Crossley, 2000).

Other microeconomic theories of saving are probably best considered complements or even extensions to the core or pure life-cycle consumption theory. These theories attribute some of individuals' saving behaviour to general precautionary motives (uncertainty about future earnings, due to possible job loss, sickness or disability), uncertainty about one's lifespan, uncertainty about possible major health expenses, to the desire to leave bequests to their children, to consumption constraints in old age, and to the funding of large future expenses such as the education of their children (Mintz and Wilson, 1996). The development of at least some of these theoretical extensions has been motivated, at least in part, by a recognition that there is considerable (although still controversial) empirical evidence suggesting that many retired people continue to save, or at least do not dissave to the extent predicted by the pure life-cycle consumption theory (Burbidge and Davies, 1994a) (Bernheim, 1987) (Borsch-Supan and Stahl, 1992).
It is worth noting that the data available to test hypotheses about individual saving behaviour have generally been relatively poor, and much of the controversy in the literature reflects disputes over data and methodological issues as much as theoretical issues.

Clearly these microeconomic theories of saving, particularly the core life-cycle theory, are directly relevant to deferred income plans. Both RPPs and RRSPs are specifically "earmarked" for replacing consumption after retirement, i.e., smoothing consumption between pre-retirement and retirement, in that they are explicitly identified as

retirement savings plans. Saving done through RPPs is most closely tied to the life-cycle theory, as the use of RPP saving is generally restricted to providing a life annuity to an individual upon retirement. RRSPs are much more flexible as a general saving instrument, and can also be used for purposes described by the other theories in the literature – it is clear that a substantial amount of RRSP saving is withdrawn by individuals well before retirement age, for example. Much of this RRSP withdrawal may reflect pre-retirement consumption smoothing, which is also consistent with pure life-cycle theory, albeit not where its emphasis is typically placed.

3.2 Public Finance Theory: Income versus Consumption Taxes

There is a very extensive and long-standing public finance literature emanating from the economics discipline, with particular emphasis on the taxation side of public finance. One of the main topics dealt with at length in this literature, going back hundreds of years, is the question of what is the best tax system. One aspect of this question is the choice of tax base, an aspect that is clearly relevant to DIPs.

The normative criteria against which alternative taxes, including alternative tax bases, are most typically judged in the literature are equity, efficiency, and simplicity. Equity corresponds to fairness in the distribution of the tax burden amongst individuals. A "good" tax system should be fair. Two separate dimensions of equity are examined, horizontal equity and vertical equity. In most of the literature, equity is generally assessed relative to some measure of economic capacity, or "ability to pay". The choice of tax base

is clearly closely tied to judgements about the most appropriate measure of "ability to pay". Horizontal equity requires that individuals with equal "ability to pay" pay equal amounts of tax. The basic concept of horizontal equity is relatively uncontroversial.

Vertical equity requires that individuals with unequal "ability to pay", pay correspondingly unequal amounts of tax, i.e., someone with a greater capacity should pay more in taxes. This vertical equity principle, as stated, begs the more meaningful question of precisely how tax liability should vary with "ability to pay". Taxes are generally classified on this dimension as being regressive, proportional, or progressive, depending on whether the average tax rate falls, stays constant, or increases with "ability to pay". In addition, redistribution is intrinsic to the question of vertical equity; a proportional tax will leave the after-tax distribution of "ability to pay" unchanged from its pre-tax distribution. A progressive tax system will make its distribution more egalitarian, while a regressive tax will increase the inequality of its distribution. It is generally now accepted that vertical equity standards are intrinsically a value judgement, and that the "economist qua economist has little or nothing to contribute" (Head, 1993, p.28) to the question of how progressive, or not, the tax system should be (considering vertical equity in isolation; economists can certainly shed light on some of the tradeoffs between vertical equity and efficiency, for example).

Another criterion with which to judge a tax is efficiency. Taxes should ideally be economically efficient, or allocatively neutral. What this means is that a tax system should minimize the impact it has on economic activity through its alteration of the incentives and relative prices facing individuals and firms in their roles as economic agents. In the

absence of market failure or externalities, whenever private decisions or behaviour are driven by tax considerations instead of by intrinsic economic worthiness, total social welfare is reduced, as scarce resources are diverted from high value to lower value uses.

The last "classic" criterion is that a tax system should be simple. This will assist in maintaining the transparency of the tax system, so that taxpayers are aware of the tax implications of their behaviour. It will also minimize the compliance costs of taxpayers, and the administration and enforcement costs of the government.

One of the most fundamental choices in designing a tax system is the choice of tax base. Possible tax bases include wealth, income, consumption (also referred to as expenditure), and wages, among others. For many years, from at least the 1940s to perhaps the mid-1970s, "comprehensive income", measured on an annual basis, was widely accepted in the public finance literature as being the most appropriate tax base, i.e., as best reflecting ability to pay and as capturing what was seen as the most appropriate balance between the criteria of horizontal and vertical equity, efficiency, and simplicity. The criteria of equity, particularly vertical equity, seemed to be given particular prominence in this consensus.

The concept of "comprehensive income" is generally defined as current consumption plus all real additions to net worth. All types of income, no matter what the source or the use, would be taxed in the same way. Comprehensive income is often referred to as "Haig-Simons income", reflecting the important contributions made in its development by Haig (1921) and Simons (1938). This view, of comprehensive annual

income as the ideal tax base, was strongly reflected in the 1967 Carter Commission's recommendations for tax reform in Canada (Canada, 1967).

This widespread consensus in the literature on the ideal tax base started to unravel in the 1970s, and has largely fallen apart since then. Comprehensive annual income taxation still has its proponents. However, many other tax economists are convinced that consumption, particularly as implemented by the "personal expenditure tax" concept advanced by Fisher (1937) and Kaldor (1955), is a more attractive tax base than comprehensive annual income. Prior to this work, consumption taxes were generally thought of in terms of commodity taxes, such as sales taxes or excise taxes, which generally have regressive equity implications. Fisher and Kaldor developed a model for a personal tax on consumption – the personal expenditure tax – that could have any vertical equity properties desired through a rate schedule that varied with expenditure. It would be implemented much like the personal income tax. The tax base would be consumption, measured indirectly as the residual between income and saving, and was seen by many as having attractive efficiency and equity characteristics. This point of view was reflected in two major tax reform documents, comparable in scale and prestige to Canada's Carter Commission, produced in the United States (United States Department of the Treasury, 1977) and the United Kingdom (Institute for Fiscal Studies, 1978) during this period. Both of these recommended a movement to expenditure taxation from income taxation.

The 1970s and 1980s brought an increased prominence in the literature to issues of economic efficiency. On this criteria, income taxes were seen as distorting behaviour by driving a significant tax wedge between consumers' marginal time preferences and the

economy's rate of transformation between current and future consumption, through their taxation of both saving and the return to saving. Consumption taxes, on the other hand, do not distort saving or consumption-timing decisions; consumers can exchange current consumption for future consumption at the market rate of return. It seems quite clear that consumption taxes are more efficient in this sense. However, both income and consumption taxes distort individuals' choices between leisure and labour. Some of the literature suggests that consumption taxes distort the choice between labour and leisure more than income taxes (Boadway and Bruce, 1985). This would suggest that whether comprehensive annual income or consumption is a more efficient tax base overall becomes an empirical question depending on how sensitive or "price-elastic" consumers are in their choices between present and future consumption, as compared to their choice between work and leisure. There is little consensus in the literature on the size of these elasticities. This lack suggests that no definitive statement may be made about the relative overall efficiency of income and consumption taxes. Other models, surveyed in Bernheim (1999), using specifications for consumption taxes which allow the taxation of the consumption of existing capital, or which incorporate the "dynamic efficiency" benefits of increased saving, suggest unambiguous increases in social welfare from replacing income taxes with consumption taxes.

More definitive statements may be made about the superiority of the consumption tax base in terms of horizontal equity. Given two individuals with identical lifetime income or consumption opportunities (i.e., having the same present value of lifetime income or consumption), but with different saving (or consumption-timing) preferences,

an income tax will tax the saver more heavily than the non-saver. This is because savings will be taxed when initially earned, and the ongoing return on capital accruing on those savings will also be taxed. The result will be that the saver will pay higher lifetime taxes and have a lower present value of lifetime consumption than the non-saver. In contrast, the present value of taxes paid by savers and non-savers would be equal under a consumption tax, regardless of the timing of their consumption. That is, a consumption tax is "horizontally equitable" between savers and non-savers.

It is in the dimension of vertical equity that most criticism has been levied at consumption taxes. Consumption taxes have often been considered regressive. Some of this concern has been addressed by the development of the concept of the personal expenditure tax, which permits the application of progressive rate schedules. Critics also point out that individual saving as a percentage of income typically rises with income, and argue that a consumption tax base, which exempts current saving from the tax base, benefits high-income individuals over low-income individuals, i.e., is regressive, on this basis.

Advocates of consumption taxes note that this is only true in the short term; all saving, plus all accrued returns to saving, will enter the tax base and be fully taxed when consumed. Under a consumption tax, there is no long-term tax advantage received by savers compared to non-savers. Many argue that lifetime consumption is a better indicator of economic welfare and ability to pay than current income, and that tax equity should be measured and judged accordingly. Indeed, as discussed in Davies and St-Hilaire (1987),

and Beach, Boadway and Bruce (1988), the present value of an individual's income and consumption is often considered equivalent over the measurement period of their lifetime, depending on the tax treatment of bequests. Lifetime income and lifetime consumption are the same in most formulations.

Supporters of annual income taxes respond that, at least for many people, annual income is a better measure of ability to pay than lifetime consumption. Some people may effectively face a lifetime budget constraint. However, the imperfections and limitations of capital markets mean that the consumption of other people, particularly those with low current incomes, is often constrained by current income. This would make current income a better reflection of their ability to pay than lifetime consumption or income (Musgrave, Musgrave and Bird, 1987). In addition, individuals face substantially different borrowing rates, depending on their perceived credit worthiness; this would tend to further disadvantage low-income individuals in a tax system based on lifetime ability to pay.

It has also been argued that the assets built up by saving (i.e., wealth), in addition to having a utility represented by future consumption, may have a separate "wealth-holding utility", typically identified in terms of prestige, influence, security and social power, that could possibly justify a tax on saving on vertical equity grounds (Head, 1993). There is a literature on the taxation of wealth, which will not be explored further here, except to note that such benefits are typically associated with large accumulations of wealth, rather than with the life-cycle or retirement saving most closely identified with DIPs.

Typically, consumption tax advocates have argued that overall equity is best served by, first, utilizing a consumption tax base to achieve horizontal equity between people with equivalent lifetime consumption choices but different saving or consumption path preferences. Any vertical equity objectives should then be pursued separately through an appropriate rate schedule, rather than muddling around with the tax base (Mintz and Wilson, 1996).

There is not really any consensus in the literature as to whether a comprehensive annual income tax or a consumption tax should be preferred on the criterion of simplicity. There are considerable practical difficulties and limitations in implementing either of them in a "pure" or ideal form. These obstacles are reflected in actual tax systems that are far from the theoretical ideal. Just as one important example of many, either tax base should ideally include the value of leisure, which, as a matter of practicality, is never included in the tax base. The consumption tax does solve many of the complexities found with the income tax regarding the measurement and taxation of capital income, particularly real capital income and the tax treatment of durables. However, the annual measurement period underlying the comprehensive income tax, if nothing else, is simple, well-defined, and very pragmatic, whereas the forward-looking multi-period or lifetime perspective implicit to the consumption tax presents its own sets of practical complexities and implementation challenges.

The public finance literature discussed clearly provides a crucial perspective for understanding DIPs. Within prescribed limits, DIPs allow taxpayers to save on a consumption tax basis – income saved through DIPs is deducted from income for tax

purposes; such savings (plus any accrued capital income) are subsequently added back to income for tax purposes when they are withdrawn. Personal consumption or expenditure taxes have been part of the mainstream public finance literature for more than twenty years, and many observers argue that their efficiency and equity properties are superior to those of the comprehensive annual income tax. DIPs, along with the tax treatment of principal residences, effectively move the Canadian income tax system two steps towards being a tax on expenditure (consumption) rather than on income. It is also interesting to consider timing issues; the Canadian income tax system's "neutral" or "preferential" treatment of savings done through DIPs, depending on one's perspective, is long-standing, and considerably predates the time that personal consumption taxation started being well-received in much of the public finance literature.

3.3 Retirement Income Policy

The literature dealing with public pensions and broader retirement income policy is diverse and extensive. It encompasses quite a few academic disciplines, including economics, political science and sociology. As such, the literature has very diverse and conflicting underlying conceptions of the nature of the state, of society, of individuals, of social welfare, and of the appropriate balance between the responsibility of the individual and the broader collective of society in providing for the economic welfare of the aged. Some of the literature has characterized public pension policy as "a distributional process based on accommodation between two opposing logics of distribution – one that

attaches rights to the possession of property and another that attaches rights to persons as citizens" (Prince, 1986, p. 130), and further, that this tension is "inherent in the conjunction of a democratic polity and a capitalist economy" (Myles, 1984, p. 72). Having recognized this diversity in the literature, this review will limit itself to briefly considering some of the major issues in the economic literature on retirement income policy, with application to the Canadian retirement income system. The intent is to provide a context for understanding DIPs as one element of the broader retirement income policy system.

There is little in the previous discussion of the microeconomics of savings or public finance literature to suggest a positive role for government in the retirement income field, no obvious rationale for government intervention. Individuals will smooth their consumption between their working years and their retirement years themselves, as suggested by the theoretical life-cycle saving literature. If anything, the prescription for governments is a negative one; they should make sure that their tax systems are neutral between current and future consumption, thereby not hindering consumption smoothing over individuals' life-cycles. They should do so by relying on expenditure or consumption taxation rather than on annual income taxation, which penalizes future consumption.

In fact, the direct provision of public pension benefits is a central function of governments all over the industrialized world. These programs are the largest items in the expenditure budgets of most industrialized countries. In Canada, in the 2003/04 fiscal year, Old Age Security and Guaranteed Income Supplement payments totaled more than $27 billion, and the Canada and Quebec Pension Plans paid benefits totalling roughly $29.5 billion (HRDC, 2004). As noted in section 2, although these are clearly the most

significant programs, there are many other programs, operating at all levels of government, that also operate to provide income support to the elderly.

Further perspective is provided by taxation income statistics. In aggregate, individuals age 65 or older reported roughly $109 billion of income in the 2002 tax year, the most recent data published. Roughly 40% of this was public pension income (CPP/QPP, OAS, GIS). About 30% was income from DIPs. Another 18% was interest, dividend, and capital gains income from savings outside DIPs. Roughly 10% was income from employment or self-employment. The remaining 2% was comprised of other miscellaneous sources of income. Figures have been derived from CCRA (2004). Clearly, the public sector plays a very significant role in the direct provision of income to the elderly.

It seems clear that the major reason for public intervention in this policy field has been the fairly widespread failure of individuals to save enough to ensure at least a basic standard of living in retirement. Although little formal data appears to be available on the income of the elderly until the 1950s, the "grinding poverty" of much of the elderly appears to have been striking in the early 20th century, when the first public pensions were introduced in Canada (Bryden, 1974). It has been suggested that the continuing industrialization and urbanization of Canada at the end of the 19th century played a role in this, by weakening the traditional extended family and its ability to support the elderly. Part of this was the loss of the family farm system, which had formed the basis for intergenerational transfers within many families (Burbidge, 1987). It is clear that even today, when real incomes are much larger, that large numbers of individuals fail to save

significant amounts for retirement, and rely wholly or mostly on public pensions for their income after age 65 (Banting and Boadway, 1997).

It is generally acknowledged in the literature that, at a minimum, the government will need to provide a welfare safety net to keep some of the elderly out of abject poverty. Such a program would tend to be conceived as rather limited in scope, aimed particularly at those with very low lifetime incomes, perhaps having only a tenuous attachment to the labour market, and so on. There is little expectation that such individuals could finance their own retirement. This sort of welfare policy can be justified on general redistributional grounds, or perhaps with notions of interdependent preferences. This objective might be implemented with income-tested or means-tested public pension programs funded from general tax revenues, and would correspond to the concept of the GIS in Canada. Such a program might be considered the "first pillar" of retirement income policy (James, 1997) or alternatively, as the foundation of the retirement income pyramid. It is less clear how OAS, which is fundamentally a flat-rate universal old age pension, can be defended on this basis; the introduction of the OAS clawback in the late 1980s did little to change this, as the clawback only starts biting at high income levels.

What is more controversial is the reason why such large numbers of the elderly, including those with significant lifetime incomes and seemingly not fitting the parameters for the "first pillar" as described, reach retirement age with little or no saving.
This continues to be true today, which is particularly puzzling since over the last fifty years, real incomes have increased enormously, and reasonable savings vehicles have been widely available. Why do so many individuals behave in a manner that is clearly at odds

with any reasonable predictions of life-cycle saving theory? It seems to go well beyond being plausibly ascribable to differences in preferences between current and future consumption.

There are two main hypotheses in the literature attempting to explain why many individuals do not save for retirement in a meaningful way, if at all. The first has been described as individual myopia. In sharp contrast to the life-cycle model of consumption and saving, which describes individuals as making rational decisions using very long planning horizons to optimize their welfare (i.e., their entire lifetime), the myopia hypothesis suggests that at least some individuals have much shorter planning horizons. The question of how they are going to support themselves in retirement rarely enters their decision-making horizon until they are close to retirement age (Diamond, 1977). At that point, it will generally be too late to accumulate large amounts of savings.

The other hypothesis suggests that rather than being irrational, as implied by the myopia theory, many individuals are "super-rational". They consume all of their income during their working years, instead of saving, because they calculate that governments (or others), confronted with their poverty in old age, will provide for them. In short, they become "free-riders" in their own retirement. They are successful, because governments do, in fact, "come to the rescue of those who do not provide for themselves" (Boadway, 1997, p.62), typically through income-tested public pension policies in the "first pillar" of the retirement income policy system.

Some economists seem to have difficulty accepting the myopia hypothesis, and instead ascribe primarily to "super-rationality" as the underlying reason many individuals do not save for retirement (Boadway, 1997). The key to their discomfort with the myopia hypothesis seems to be that it clashes with the basic axioms of the microeconomic model, which sees individuals as purely rational, calculating beings making decisions with perfect information. However, even casual observation suggests that while some people are long-term planners, others have a very short-term perspective, with the present and near future wholly dominating their financial decision-making. This seems to include many people with average or high incomes. A surprising number of people seem to be only one or two paycheques away from financial straits. Many of this latter group would have little, if any, knowledge or understanding of the details of public pension system, let alone be making "super-rational" calculations concerning the interaction of their potential saving with public pension entitlements. On the other hand, the long-term, rational perspective embodied in the life-cycle consumption and saving model almost certainly reflects the behaviour of other individuals. For some of these individuals, the availability of income-tested public pensions, and the associated saving-disincentives likely have a significant impact on their saving choices, especially for those individuals whose potential private savings would not be much larger than the value of public pension entitlements.
Both of these hypotheses, myopia and "super-rationality", especially when taken together, seem to have significant explanatory power.

These hypotheses purporting to explain the absence of meaningful saving by a significant portion of the population are taken in the literature to be a rationale for public

intervention, typically expressed in terms of "paternalism" or market failure arguments. The prescription is often some form of mandatory saving, which constitutes the "second pillar" of the system. The objectives for this are two-fold. The first is to overcome individual myopia and ensure that working individuals have a source of income at retirement. The second, related objective, is to reduce free-riding by reducing the population's reliance on the welfare safety-net of income-tested public pensions (Slater, 1995).

There are other efficiency-based arguments for government intervention. On the basis of incomplete private markets or market failure, it has been argued that the private sector does not provide fair annuity prices because of adverse-selection problems. It has been suggested that only the government is in a position to properly insure against inflation. It has been argued that only the public sector is well placed to provide efficient insurance against the more general socioeconomic risk associated with mortality, disability, the labour market more generally, and the variability of financial market returns (Horner, 1983).

Another set of issues concerns "pay-as-you-go" funding versus "full-funding" or "pre-funding" of public pensions. An individual saves for retirement by accumulating assets over the course of his working years. At retirement, these accumulated assets can then be used to provide a flow of retirement income or consumption, perhaps through purchasing an annuity, or by other means. By its very nature, an individual's saving is "fully-funded"; the retirement income promise and the accumulated saving are one and the same. Similarly, when a government decides to directly intervene by establishing public

pensions to overcome the myopia and "super-rationality" problems described above, the resulting program might require that employees and employers each annually contribute an amount equal to 5% of employee wages to a public pension account for that employee. These contributions would earn interest, and the accumulated contributions plus interest would eventually be used to fund a retirement pension for that employee. That would be one version of a fully-funded public pension. However, given its powers to tax, a government also has other funding options. In most cases, public pensions paid to the elderly are funded by collecting separate public pension "contributions" from younger, working individuals, which are then immediately paid out as benefits to the elderly. There is no saving, as such, involved; this is a direct intergenerational transfer from younger generations to retired generations. These pensions are referred to as unfunded or "pay-as-you-go" pensions. Sometimes, public pensions are paid out of general tax revenues; this is also an intergenerational transfer, except to the extent that the elderly pay taxes.

There is a considerable literature debating the efficiency and equity implications of unfunded versus funded public pensions. Early literature suggested that unfunded public pensions amounted to one of the few economic "free lunches" actually available. By having the public pensions of each generation paid by the generations following it, all generations would able to have higher consumption than if each generation actually saved and funded (or pre-funded) its own pensions, thereby unequivocally increasing social welfare (Aaron, 1966). However, this result only holds when the economic and demographic conditions of the "golden age" of the 1950s and 1960s hold, with high rates

of growth in population and real wages relative to the rate of interest. More formally, an unfunded public pension plan implicitly earns a "rate of return" equal to the growth of its tax base, which is taken as the sum of the rates of population growth and real wages. A pre-funded plan will earn the interest rate. If the tax base associated with an unfunded plan is growing faster than the rate of interest, than a fixed contribution rate will provide larger benefits for all generations than those available from a pre-funded plan. Conversely, a given benefit can be funded with lower contribution rates. Either way, all generations could be better off with an unfunded plan.

Unfortunately, these demographic and economic conditions did not persist, and they are now generally considered as having been an aberration. There seems to be a consensus that the reverse situation is generally applicable, that real interest rates are, in fact, greater than the sum of population growth and real wages. In this case, an unfunded plan is not Pareto-efficient. In most of the theoretical models in the literature, an unfunded plan increases the welfare of those generations in the middle of their working life when the plan is introduced, but reduces the welfare of all subsequent generations, through its impact on aggregate saving and, therefore, on future productivity and income (Burbidge, 1987). The size of this displacement of savings by unfunded public pensions, and the subsequent loss of welfare to subsequent generations has been very widely debated in the theoretical and empirical literature, mostly emanating from the United States, with no signs of any consensus (Feldstein, 1974) (Barro, 1978) (Auerback and Kotlikoff, 1981) and (Kotlikoff and Summers, 1981). At the very least, however, the economic "free lunch" or

efficiency justification for intergenerational transfers through public pensions seems to have lost any support in the literature.

Another rationale in the literature for unfunded public pensions is based on equity principles. It is suggested by Banting and Boadway (1997) that unfunded pensions could be defended as a temporary intergenerational risk-sharing mechanism, to transfer resources to particularly "unlucky" generations, such as those facing major depressions, for example, with the cost of these transfers then being amortized over subsequent lucky generations.

In the last decade in particular, a significant amount of literature has addressed the "political risk" seemingly associated with the establishment of unfunded or "pay-as-you-go" public pension plans. Economic characteristics aside, it is argued that the political implementation of these programs has been consistently problematic throughout the industrialized world. The main issue seems to be the mismatch between the relatively short time horizons of politicians and the far-sightedness and discipline necessary to manage intergenerational transfers credibly.

These same political pressures no doubt played an important role in ensuring that governments all through the OECD chose unfunded public pension programs rather than funded ones. Even if unfunded public pensions do not offer an economic "free lunch", they certainly do offer something of a political one. The first generation of recipients gets immediate benefits, often large benefits, that they typically pay little or nothing for. This is not a criticism – this is a basic characteristic of unfunded plans, and it has proven irresistible to politicians. However, above and beyond this, throughout the OECD,

politicians have consistently implemented unfunded public pension programs in a manner that has provided large benefits to initial generations, but is not sustainable for later generations, or which require immense increases in contribution rates. This has been done in initial program design, and by not adjusting these programs to provide reasonable intergenerational outcomes in the face of changing economic and demographic factors. These programs have provided "positive transfers to early cohorts, and losses to their children" (James, 1997, p. 34).

In Canada, for example, even when it was unmistakably evident by the 1980s that the economic and demographic assumptions underlying the introduction of the Canada Pension Plan had been much too optimistic, and that future contribution rates would have to triple over initial projections to fund promised benefits, politicians responded by further enriching the benefits received by the current elderly (Robson, 1996), thereby making the program even more unsustainable. The Canadian government finally moved in the late 1990s to "cap" the intergenerational inequity of the C.P.P., largely by increasing contribution rates well above those currently required, in order to pre-fund some portion of C.P.P. benefits, and attempt to make the plan sustainable indefinitely at a contribution rate of 9.9% of pensionable earnings.

In terms of the literature discussed above, the OAS and the GIS comprise the "first pillar" of the system, or the base of the pyramid, providing a basic minimum income or safety net. The OAS is unusual in this regard, in that it is basically universal and flat-rate, rather than being means or income-tested. As noted previously, it became income-tested at relatively high income levels starting in 1989. As of 2005, the clawback begins to have

effect at roughly $60,000 of individual net income. The OAS seems to correspond to notions of entitlement as a "right of citizenship", rather than reflecting the economic arguments made above. There is an efficiency case that can be made for delivering universal rather than "targeted" or income-tested transfers, in terms of avoiding the negative incentive effects of targeted programs, but at the cost of increased inefficiency at the higher levels of taxation needed to finance the more expensive universal programs (Boadway and Bruce, 1994). The GIS (along with its complement, the Spousal Allowance), which is available on top of the OAS, is the more traditional, income-tested component of the first pillar, aimed directly at providing a safety net for the low-income elderly.

The CPP is a mandatory earnings-related program that speaks to both the myopia and "free-riding" theories in the literature. It arguably corresponds to the "second pillar" of mandatory saving, or the middle of the retirement consumption pyramid. It forces working individuals to make regular contributions towards the retirement income system, and in the process creates an income entitlement that will allow a modest amount of consumption smoothing between an individual's working years and retirement. At the same time, it reduces possible free-riding by reducing individuals' access to GIS. It has been argued above that the income provision roles of the CPP and GIS are not distinct enough, i.e., that the CPP is effectively a mixed "first pillar" and "second pillar" program. This likely reflects the fact that GIS was originally designed as something of a substitute for the CPP; the GIS was designed as a transitional program, intended to remain in effect only until the

CPP ramped up in its first decade. Like that other temporary program, the Income Tax Act, the GIS has proved to have considerable staying power.

All of these public pension programs have been almost exclusively unfunded, based primarily upon intergenerational transfers. As mentioned, this is in the process of moderate change, as some fairly modest but significant prefunding of the CPP's liabilities is under way, responding to issues of sustainability and intergenerational inequity.

The policy goal of a minimum income for the elderly is not inconsistent with the life-cycle theory of consumption and saving. However, the core of the model is really more about maintaining some consistency of one's standard of living across one's lifetime, rather than merely poverty avoidance in retirement. The life-cycle model's predictions correspond more closely to the income replacement policy goal, which in the Canadian retirement income system has effectively been left to the private sector, to saving done by individuals. As noted, at the margin, the CPP does provide a very modest explicit income-replacement twist to public pensions.

There are a number of features of the institutions involved with DIPs that tie into the theoretical retirement income literature discussed. By providing tax-effective saving vehicles, thereby implicitly encouraging saving through DIPs, which produce visible, taxable income in retirement, the government encourages self-reliance and reduces free-riding through dependence on the GIS for retirement income. Indeed, this is one of the stated policy goals of the programs, to encourage individual saving for retirement, thereby lessening the future burden on the public pension system. The "tagging" of these

programs as "retirement" saving may also serve to counteract some of the myopia exhibited by many individuals in their saving decisions. This may also be encouraged by the annual notice included in each person's tax assessment, informing each them of their RRSP deduction limit for the upcoming year. For RRSPs in particular, the "front-loading" of the benefits of the tax deduction likely also operates to counteract individual myopia about their future needs for retirement income. Myopic individuals will value the immediate tax refund, but pay considerably less attention to the future tax liabilities associated with an RRSP contribution. This particular aspect of individual myopia is exploited by the financial industry, whose marketing strategies "sell" RRSPs by stressing the value of the tax deduction while giving short shrift to the accompanying future tax liabilities.

There are several features of the "institutional arrangements" associated with DIPs, that while they don't reflect public policy or regulation, are also relevant to the literature discussed. While an employer is not required to establish an RPP, once it has been established, it is almost always compulsory for employees to participate. The mandatory nature of this saving ties in well with the myopia theory. An RPP also has the potential to be an effective vehicle for individuals to efficiently pool various types of socioeconomic, mortality and financial market risk, and to achieve economies of scale that would not be attainable by individuals saving independently.

3.4 Behavioural Responses to Tax Incentives for Saving

There is a certain amount of positive theoretical and empirical literature on individuals' use of DIPs, whether it be RRSPs in Canada, or IRAs or 401(k)s in the United States, which examines how individuals will respond to the tax treatment provided to DIPs in a progressive annual income tax system. This section focuses on those DIPs that are most closely linked to individual behaviour, personal savings vehicles such as RRSPs, rather than RPPs, which are generally established by employers, and offer little ongoing behavioural discretion to individuals beyond the initial decision of what employer to work for. These plans will be generically referred to as "tax-deferred savings plans".

A substantial empirical literature addresses the question of whether, or to what extent, tax incentives to savings, such as tax-deferred savings plans, actually increase total saving rather than merely divert it from other forms of saving. There is a limited theoretical literature more specifically concerned with how individuals will use tax-deferred savings plans in the context of a progressive annual income tax system. There is also a modest theoretical and empirical literature looking at the behavioural response of individuals to changes in the parameters of their tax-deferred savings plan choices, i.e., responses to changes in contribution limits, or to changes in marginal tax rates. All of these literatures will be examined below, in turn.

3.4.1 Do Tax Incentives Increase Saving?

To this point, tax-deferred savings plans have been discussed primarily in terms of generic individual intertemporal or life-cycle consumption planning, their implications for equity and efficiency in the taxation of individuals, and in terms of their income or consumption-replacement role in the broader retirement income system. Only passing reference has been made to tax-deferred savings plans as a "tax incentive" for saving, i.e., as an explicit attempt to stimulate or increase the total saving of individuals.

Increasing saving is often one of the many policy goals attached to various public policies, like DIPs, that are directed at saving. Several rationales for wanting to increase saving are often used. The first, as discussed, is to reduce the reliance on government pensions such as GIS, or other income-tested programs, thereby reducing the financial costs of such programs and the economic costs of their disincentive effects. This sort of policy goal seems a poor match for DIPs, however, in the context of the GIS.
It only required about $3,300 of annual DIP income (in 2003) for someone with pre-retirement earnings at the AIW to no longer qualify for the GIS (assuming CPP benefits), so this doesn't seem a particularly convincing justification for limits supporting DIP retirement income equal to 70% of pre-retirement earnings.

The more general policy rationale for wanting to increase savings seems to be the desire to increase aggregate saving. As alluded to in the discussion of consumption taxation versus income taxation, and in the discussion of funded versus unfunded public pensions, there is a fairly widespread, although still contentious, argument in the literature

that aggregate saving in Canada (and elsewhere) is lower than optimal, and that increased aggregate saving would lead to higher investment, with this in turn creating higher productivity and larger future incomes, and higher "steady-state" social welfare – this argument is generally discussed in terms of "dynamic efficiency". The literature evaluating the welfare effects of increased aggregate saving any further is outside the scope of this paper. It will just be taken as a given that this is often a policy goal associated with DIPs.

There is an enormous amount of largely empirical literature dealing with the total savings response of individuals to savings incentives provided by public policy. These incentives are typically conceptualized as providing a general increase in the after-tax rate of return (or interest rate). For example, tax-deferred savings plans, or other programs that move the treatment of savings from income tax treatment to consumption tax treatment, would increase the after-tax rate of return on savings from (1-t)r to r, where t is the marginal tax rate and r is the gross rate of return.

The central question is: what effect do these public policy incentives actually have on saving? Do they increase saving? Decrease saving? By how much? Unfortunately, it is not clear, even theoretically, what will be the magnitude, or necessarily even the direction (or "sign") of individuals' savings responses to an increase in the after-tax rate of return. The measure of this response is usually referred to as the "interest-elasticity of saving". Increasing the after-tax rate of return reduces the effective price of future consumption. This has two theoretical effects: a substitution effect and an income effect. The substitution effect operates to shift some of an individual's consumption from the present to the future (increasing saving). However, the decrease in the price of future

consumption also has a positive income effect. This positive income effect would cause an individual to increase consumption in both the future and the present; increasing present consumption requires a reduction in savings. Since the after-tax rate of return has increased, it is possible for an individual to save less than before, yet still have higher future consumption. Since the substitution and income effect work in opposite directions, the overall effect of the increase on the after-tax rate of return on saving is theoretically ambiguous; the interest-elasticity of saving can only be determined empirically.

An extensive amount of empirical research has been undertaken on the question of what impact tax-deferred savings plans have had on saving behaviour, especially during the last twenty years in the United States. It is clear that a large amount of funds flow through tax-deferred savings vehicles. However, it is possible that much of this may not constitute an increase in current saving in response to the incentives offered by these programs. The empirical question is: to what extent do current RRSP contributions, for example, represent new current saving at the margin that can be attributed directly to the RRSP program, how much of it is current saving that would have taken place in any event, and how much of it is funded not by current saving, but by past savings, which are merely being shifted from one form into another, more tax-advantaged form? Only the first of these sources of funding for RRSP contributions represents savings attributable to the RRSP program. In other words, to what extent are RRSPs creating new savings rather than merely diverting existing saving?

This has proved to be an extremely difficult empirical research problem. The majority of the research has been undertaken in attempts to evaluate the marginal

savings impact of the American IRA and 401(k) programs, which are quite similar to Canada's RRSPs. Diverse empirical methods and data sources have been used to try and shed some light on this question. The research has produced little consensus in the literature, with some studies suggesting that these programs have created no new savings at all, and others showing that virtually all contributions to these plans represent new saving (Poterba, Venti and Wise, 1996) (Engenn, Gale and Scholz, 1996) (Hubbard and Skinner, 1996). A more detailed review of this large body of research is contained in Bernheim (1999).

At a minimum, this would suggest that the "interest-elasticity of savings" is not negative, i.e., none of this research finds that total savings decrease as a result of these plans. However, the substantive criticism in the literature regarding the methodologies and data used in all of this research make drawing any overall conclusions problematic – "one cannot review the voluminous literature on taxation and saving without being somewhat humbled by the enormous difficulty of learning anything useful about even the most basic empirical questions" (Bernheim, 1999, p. 88).

There is a limited amount of Canadian research on this question, on the impact of RRSPs on either aggregate or micro-level saving. Overall, this research too is essentially ambiguous on the impact of RRSPs in increasing household or aggregate saving, with some studies suggesting meaningful correlations between the availability of tax incentives for saving and the personal saving rate (Burbidge and Davies, 1994b), and others arguing that there is little evidence that RRSPs increase saving (Sabelhaus, 1997) (Burbidge, Fretz and Veal, 1997).

3.4.2 Behavioural Aspects of Tax-Deferred Savings Plans

There is another, less extensive, literature that examines the behavioural impacts of tax-deferred savings plans in a more narrow sense, aimed specifically at examining how, and to what extent, individuals will use such plans.

Perhaps the best jumping-off point is the literature that examines the implementation issues associated with transforming a progressive annual income tax into a progressive lifetime expenditure tax. The goal of a lifetime expenditure tax is to tax individuals on the basis of their lifetime expenditure, i.e., lifetime expenditure is the tax base. The lifetime measures of expenditure, income and taxes are equal to the present values of the associated annual flows over a lifetime, discounted with the real interest rate. In such a system, horizontal equity would require that individuals with equal lifetime expenditure (or income) would pay equal lifetime taxes, regardless of the intertemporal timing of their consumption, or of the timing of their income receipts. Similarly, in terms of vertical equity, with a progressive lifetime expenditure tax system, the average lifetime tax rate would increase with lifetime expenditure, regardless of the time path of consumption and income. Davies and St-Hilaire (1987) discuss the economic issues associated with the lifetime expenditure tax base in considerable detail.

Daly (1981) and Hood (1982) show that under certain assumptions, such as perfect capital markets, giving welfare-maximizing individuals unlimited access to two different specific types of saving opportunities or financial assets will transform an annual progressive income tax base into a progressive lifetime expenditure tax base. The first type

of asset is the traditional tax-deferred savings plan, which permits "registered" saving. This constitutes traditional consumption tax treatment. Contributions to these plans would be deductible from annual income for tax purposes, capital income accruing on those contributions is not taxed on an ongoing basis, and all withdrawals from these plans are added to an individual's income for tax purposes, i.e., contributions plus capital income, are fully taxable upon withdrawal. This approach corresponds to the current tax treatment of RRSPs in Canada, and IRAs and 401(k)s in the United States. The second kind of saving would receive the alternative type of consumption tax treatment; it would be "non-registered" or "tax-prepaid" saving. This form of saving would not receive a deduction, i.e., savings be taxed upfront, but subsequent income earned on the savings and eventual withdrawal or consumption would be tax-free. This approach corresponds to the tax treatment received by "Roth IRAs" in the United States, or to the tax treatment of principal residences in Canada. In the purest form of this system, registered and non-registered borrowing, or "negative balances", would also have to be available.

Faced with these options, optimizing individuals would arrange their affairs in such a way as to be taxed on the basis of lifetime expenditure. Registered assets would be used to achieve perfect lifetime tax averaging, with marginal tax rates being equalized across all years, thereby minimizing lifetime taxes. Every individual with the same lifetime expenditure or income would face the same after-tax lifetime budget constraint. Non-registered saving (and borrowing) would then be used to move an individual's consumption along the lifetime budget constraint, allocating an individual's consumption

among years in accordance with their intertemporal preferences, with reference to the before-tax interest rate.

This analysis suggests that the current Canadian tax system, which includes opportunities to save in both registered (RRSPs) and non-registered forms (durables, home equity), may roughly provide lifetime expenditure tax treatment for those Canadians who do not find themselves constrained by current tax-deferred savings plan limits, or by the availability of tax-prepaid savings alternatives. It also highlights the importance of the lifetime tax-averaging aspect of RRSPs. The nature of the tax-averaging aspect of RRSPs is clarified in Davies (1988), which decomposes the effect of RRSP tax treatment into a basic tax-sheltering effect and a separate tax-averaging effect.

Androkovich, Daly and Naqib (1992) extend Daly's (1981) model to situations where tax- prepaid saving is not available, i.e., where non-registered saving is taxed on an annual income tax basis. The result is that rather than using tax-deferred savings plans to equate marginal tax rates through time, the optimal path of marginal tax rates generally increases steadily over time. This reflects the fact that, in these circumstances, pure marginal tax rate smoothing has to be traded off against the taxation of saving done outside tax-deferred plans; this results in higher use of tax-deferred savings plans than optimal for perfect tax averaging.

To this point, none of this literature has incorporated the impact of the limits placed on saving done through tax-deferred savings plans. All of the models have assumed that contributions are not constrained. In an attempt to measure the impact of the RRSP room

carry-forward introduced in 1991, which allows that portion of an individual's RRSP contribution limit that was unused in a given year to be carried forward to future years, Gupta, Venti and Wise (1994) develop a model that incorporates annual RRSP limits as a constraint, and then estimate the model using Canadian longitudinal data from 1982 to 1987. They use the results to simulate the impact of relaxing the annual contribution limits using the RRSP carry-forward. The simulations suggest that relaxing the annual limits in this manner results in both significantly higher probabilities of individuals making an RRSP contribution, and much higher long-term average RRSP contributions.

Milligan (2003) develops a theoretical model to examine the impact of increasing future contribution limits on current RRSP contributions. The model suggests that annual RRSP contribution limits have a "use it or lose it" effect on current RRSP contributions. Faced with meaningful contribution constraints in the future, individuals respond by contributing more in the present. This effect dilutes the importance of the lifetime tax averaging in the RRSP contribution decision. Increases in future RRSP contribution limits, whether through a carry-forward mechanism or other means, has the effect of reducing this "use it or lose it" effect, thereby reducing current RRSP contributions, and restoring the primacy of the tax-averaging motivation for RRSP use. Milligan estimates an econometric model to empirically test his hypothesis using data on individual RRSP contributions between 1987 and 1991. He finds a strong negative relationship between future limits and current contributions, which supports his hypothesis. No predictions are made about the impact of the carry-forward on lifetime RRSP contributions, as opposed to current contributions.

Related to this RRSPs and tax-averaging literature, yet, for the most part, strangely disconnected, is an empirical literature examining the sensitivity of contributions to tax-deferred income plans to current marginal tax rates. The theoretical literature discussed to this point has stressed the importance of the tax-averaging role of RRSPs in a progressive annual income tax system. However, this empirical literature generally does not employ a conceptual framework that attempts to provide an explanation as to why and how the current marginal tax rate would be an important determinant of contributions to tax-deferred savings plans. Explicitly or implicitly, most of this literature suggests that higher current marginal tax rates make individuals more likely to contribute to a tax-deferred savings plan, or to contribute more, and vice-versa, i.e., that there is a positive relationship between marginal tax rates and RRSP contributions. What is generally missing is a conceptual link to individual expectations of marginal tax rates at withdrawal; it is the difference between the marginal tax rates at contribution and withdrawal that provides tax-averaging benefits.

O'Neill and Thompson (1987) estimated an econometric model utilizing tax return data and concluded that there was a strong positive relationship between IRA contributions and marginal tax rates at the time of contribution. Based on this, they predicted that the reduction of marginal tax rates in the 1986 federal tax reform would substantially reduce IRA contributions. Subsequent literature criticized their model for its failure to control for income adequately.

Using the 1983 U.S. Survey of Consumer Finances, Collins and Wycoff (1988) find that perceived marginal tax rates do not have a material impact on household decisions to participate in either IRAs or 401(k) plans.

Venti and Wise (1988) estimate econometric models for U.S. IRA contributions using 1982 survey data. They find that the marginal tax rate has no effect on the average amount of IRA contributions, but a significant impact on the decision to make a contribution; higher marginal tax rates are associated with higher IRA participation rates. They also provide estimates based on Canadian RRSP contributions in 1981, which suggested a much smaller impact on participation rates, and none on average contribution.

Long (1990) investigates the impact of marginal tax rates on IRA saving by exploiting the variation in tax rates across the U.S. states. He estimates an econometric model using 1983 personal income tax data, and finds that IRA contributions increase with the marginal income tax rate.

Veall (1999) tests the impact of changing marginal tax rates on RRSP contributions by utilizing the variation in Canadian federal income tax rates between 1987 and 1988 due to tax reform. He estimates an econometric model using longitudinal tax data between 1986 and 1989. He finds that, contrary to his hypothesis, higher marginal tax rates are associated with lower, not higher RRSP contributions.

Using household expenditure survey data from 1982 to 1996, Milligan (2002a) examines the impact of marginal tax rates on the probability of making an RRSP contribution. In the data he uses, marginal tax rates vary both over time and across

provincial jurisdictions. He finds that marginal tax rates are positively related to the likelihood of making an RRSP contribution. The magnitude of this relationship was quite modest. Milligan also predicts future income and marginal tax rates for the individuals in his data set, and finds support for the hypothesis that the introduction of the RRSP carry-forward makes current RRSP contributions more sensitive to future marginal tax rates; those with predicted higher future marginal tax rates were much less likely to make a current RRSP contribution when the carry-forward was available. This is consistent with a primary tax-averaging motive for making contributions.

3.5 Tax Expenditures

The term "tax expenditure" was coined by Surrey (1973) to describe certain benefits delivered by governments to individuals through the use of various tax provisions; colloquially, probably better known as "tax breaks". Just like normal budgetary expenditures, tax expenditures have implications for the allocation of resources in the economy (efficiency), and for the distribution of income and wealth (equity). The concept is that governments deliver benefits to individuals and groups not only through direct expenditure programs, from which recipients receive a cheque, but also through the tax system, by enacting special tax measures that reduce the taxes of certain individuals. In this context, one hundred dollars of tax not collected from an individual is equivalent to sending that individual a cheque for a comparable amount.

There are several theories as to why governments might use the tax system in this way. One is a public policy instrument sort of approach, which sees the tax system, like the

expenditure budget, as a legitimate vehicle to pursue various policy goals, in addition to its role as a revenue-raiser. The tax system may be seen as more effective or efficient than a spending program in delivering certain benefits, or in encouraging or discouraging certain sorts of behaviour, for example. Maslove (1989) discusses the role of the tax system as providing a rich menu of policy instruments to pursue specific policy goals. Trebilcock et al. (1982) provide a general theory of policy instrument choice. A more cynical view, expressed in Mucciaroni (1990), is that governments have used tax expenditures because they undergo less formal scrutiny than spending programs, and tend to deliver benefits in a more subtle, hidden and concentrated manner that is not very visible to the more dispersed electorate. Doern (1989) explores the politics of tax expenditures, encompassing both of these latter ideas, and also discusses how the politics of the budgetary process influences tax expenditure outcomes.

Identifying tax expenditures is often problematic. It is simply not reasonable to start from the position that every dollar of national income not collected by governments as taxes constitutes a tax expenditure. It is necessary to distinguish in some manner between those tax provisions that are basic, structural elements of the tax system (necessary to define it in terms of its basic revenue-raising role), and those that are tax expenditures. In practice, analysts define an ideal or "benchmark" tax system. Deviations from this benchmark tax system are then considered tax expenditures. This approach leads to its own set of problems, as the ideal tax system is essentially a normative construct, and is inherently subjective. There are major controversies in the literature as to what constitutes the ideal tax base, ideal accounting or measurement period, ideal structure of tax rates, and

so on (Bruce, 1988). Even once a benchmark tax system has been decided on, there are typically grey areas as to whether some tax provisions qualify as benchmark provisions or tax expenditures (Block and Maslove, 1994).

Deciding whether DIPs are tax expenditures is particularly contentious. As discussed at some length in section 3.2, one of the biggest disputes in the public finance literature over the last thirty years has been whether comprehensive annual income or consumption is the most ideal tax base, and should therefore serve as the foundation of a benchmark tax system. As noted, DIP tax treatment is one example of consumption tax treatment. Income saved in DIPs is taxed upon consumption (when withdrawn), rather than when it is earned. Advocates of consumption taxation would not consider DIPs a tax expenditure, but rather an integral element of the benchmark tax system. Supporters of comprehensive annual income taxes, on the other hand, would definitely consider DIPs to be tax expenditures. Some observers have suggested that at least two tax expenditure accounts should be prepared; one using comprehensive annual income as a tax base, and the other relying on a consumption tax base (Wildasin, 1988). Alternatively, regardless of whether consumption or income is preferred as a tax base, it can be argued that DIPs are a structural element of the tax system, operating to move its definition of ability to pay towards a lifetime, rather than annual, accounting period.

The empirical tax expenditure literature can be broken down into two basic categories. The first is concerned solely with estimating the aggregate tax revenue foregone through tax expenditures; the most prominent of this literature is the tax

expenditure accounts that have been produced intermittently by the federal Department of Finance since 1979, which have employed a number of different methodologies to measure the size of the aggregate tax expenditure associated with DIPs. The other literature is much more diverse, but one thing it all has in common is a particular interest in examining the distributive effects of tax expenditures across individuals in different income groups. This reflects the traditional view that tax expenditures are inherently unfair, that they tend to exhibit "upside-down equity", with the benefits accruing disproportionately to higher income individuals (Maslove, 1981).

In actual practice, the applied Canadian tax expenditure literature, without exception, treats DIPs as tax expenditures rather than as an element of the benchmark tax system. As is standard in the empirical literature, the benchmark tax system used is a version of the income tax base; while reference is made to comprehensive annual income as the ideal, what is actually used is more pragmatic and closer to the actual income tax system.

Sometimes, there is brief mention of some of the conceptual issues concerning treating DIPs as tax expenditures; see Smith (1979), Kesselman (1979), and St-Hilaire (1996). Unfortunately, few of these studies use an adequate measurement framework to evaluate the benefits associated with DIPs. With the exception of Davies (1988), and the aggregate tax expenditure accounts produced by the Department of Finance, the studies focus exclusively on the immediate tax benefits associated with the deduction for DIP contributions, and ignore both the subsequent deferral of taxation on the rate of return on savings, and the cost of the tax paid on DIP withdrawals. They also restrict

themselves to a single annual snapshot of behaviour. Without exception, these studies identify DIPs as the largest tax expenditures. They are also typically considered one of the most regressive. For example, using 1991 annual data, St-Hilaire (1996) estimates that the top income quintile (earnings greater than $37,500), with 20% of the population, and 51% of total income, made 66% of RRSP contributions, and enjoyed 74% of the tax benefits associated with RRSPs. The second highest income quintile had 20% of the population, and 24% of total income, made 22.5% of RRSP contributions and received 19% of the RRSP tax benefits.

Of the studies examining the distributive impacts of tax expenditures, Davies (1988) is the only one paying concentrated attention to DIPs. The rest of this literature evaluates the entire gamut of personal income tax expenditures, and only covers DIPs in passing. Davies provides a much more thorough discussion of the conceptual issues relating to identifying DIPs as tax expenditures. He develops and applies a comprehensive benefit framework, properly identifying and capturing all of the tax elements associated with DIP treatment: the initial deduction, the ongoing tax sheltering, and the ultimate tax payable upon withdrawal. A proper framework for evaluating the tax benefits associated with DIPs is discussed in more detail in section 4.3. Davies then explores the distribution of RRSP benefits using a lifetime framework. He creates a synthetic cohort using 1977 data on RRSP contributions. He simulates a lifetime of income, RRSP contributions, marginal tax rates, and RRSP withdrawals for this synthetic cohort, and then examines the magnitude of the resulting lifetime benefits from RRSP use, and its distribution. He finds, in the scenario most relevant to this research, that the top

permanent income quintile, with 20% of the population, has 36.2% of lifetime income, pays 53.6% of federal income taxes, makes 64% of RRSP contributions, and receives 62.6% of RRSP benefits. The second highest permanent income quintile, with 20% of the population, has 23.2% of lifetime income, pays 20.5% of federal taxes, makes 20.8% of RRSP contributions, and enjoys 20.5% of RRSP tax benefits. The magnitude of lifetime RRSP benefits was equal to 3.4% of lifetime income for the top quintile, and 1.7%, 1.2%, 0.7% and 0.3% for the quintiles that follow, respectively.

The results of both St-Hilaire (1996) and Davies (1988) indicate that RRSP benefits are considerably regressive across the entire income distribution, relative to either income or income taxes, and that RRSP benefits are highly concentrated in the top income quintile. The similarity of the "big picture" is particularly interesting, given the large methodological differences between the two studies. The results in Davies (1988) show that a quintile's share of RRSP benefits is very closely tied its share of RRSP contributions, which demonstrates that the concentration of RRSP benefits largely reflects the concentration of RRSP saving, rather than being a function of the mechanics of RRSP tax treatment. This finding does not hold as strongly in St-Hilaire (1966), because of the incorrect methodology used, which measure benefits as the straight value of the tax deduction. It is striking how much more egalitarian the distribution of income is using permanent, rather than annual income; the top annual income quintile in St-Hilaire (1996) commands 51% of total income, while the top permanent income quintile in Davies (1988) enjoys 36.2% of total income.

4.0 LONGITUDINAL DIP BENEFIT INCIDENCE

4.1 Overview of Research Project

This research discusses and develops a conceptual and methodological framework that can be used to identify, measure and analyze the benefits provided to individuals through their saving in DIPs. This framework is subsequently applied to longitudinal microdata in order to examine the size, composition, and distribution of the benefits received by individuals as a result of their DIP saving from 1991 to 2001.

This research is situated squarely within the applied tax expenditure literature discussed in section 3.5. The DIP benefit framework developed is largely an extension and a refinement of the existing literature, and owes a particular intellectual debt to Davies (1988). The broader literatures described in sections 3.1 to 3.4 provide a wider conceptual foundation for the research, supplying crucial context that informs both its structure, including the choice of counterfactuals, and the interpretation of its findings.

Most of the existing applied tax expenditure literature relies on a single year of simple cross-sectional data when analyzing tax expenditures. This can be problematic because, as a number of studies, such as Davies, St.-Hilaire and Whalley (1984), have confirmed, individuals' circumstances and behaviour in any given year are often a poor indication of their permanent or lifetime states or behaviour, because annual data reflects an amalgam of permanent behaviour, year-to-year fluctuations, and life-cycle effects. For example, a given individual may have low earnings in a particular year. These low earnings may be typical for that individual, that is, may actually reflect his permanent

earnings. On the other hand, his low earnings in that particular year may reflect temporary unemployment. Alternatively, his lifetime earnings may be very high, but he may be currently a student, or be retired; in either case, his low current earnings reflect life-cycle effects, not permanent earning status. For most purposes, the vertical equity implications of taxes or other public policy instruments is much more meaningfully examined using permanent or lifetime measures of economic well-being or ability to pay, rather than the muddle of permanent, transitory and age-related effects contained in most annual data. It is clear that individuals experience considerable variation in earnings from year to year. Using the LAD's longitudinal data, Finnie (1999) finds that from 1982 to 1992, fewer than 70% of individuals remain in the same earnings quintile from any particular year to the next year, and that at the end of a five-year period, only 50% of individuals were in the same earnings quintile that they were at the beginning of the period. Fullerton and Rogers (1991) find that in a given year, only roughly 25% of individuals are in the same annual and lifetime income decile, and that only 56.1% are in an annual income decile within plus or minus one of their lifetime income decile.

In addition to masking an individuals' permanent ranking in the distribution of economic well-being, annual data may poorly reflect the permanent behaviour or outcomes being assessed. For example, an individual's RRSP contribution in a given year may be typical, reflecting permanent behaviour. Alternatively, it may be the only RRSP contribution he ever makes, or the only year he fails to make an RRSP contribution, or may even be a "catch up" contribution using the RRSP carryforward, reflecting many years worth of DIP limits. Clearly, using a single snapshot of simple cross-sectional data to

make judgements about the outcomes and distributional impacts associated with a policy has the potential for highly misleading findings. In general, using an annual observation period has the effect of significantly exaggerating the regressiveness or progressiveness of the tax or policy provision in question, relative to a longer observation period which smooths the effects of temporary fluctuations (Kesselman and Cheung, 2004).

The attractiveness of longitudinal, rather than annual, incidence analysis is particularly striking with regard to DIPs, and the retirement income policy field more generally, where outcomes are the cumulative result of decades of behaviour, and one of the policy goals, adequate replacement of pre-retirement consumption, is explicitly longitudinal. In addition, any tax expenditures associated with DIPs are inherently lifetime (or at least longitudinal) tax expenditures. An RRSP contribution, for example, is associated with an income tax deduction at the time of contribution, the non-taxation of subsequent capital income, and the inclusion in income for tax purposes of all amounts eventually withdrawn. The incidence and distributional impact of this policy can only be meaningfully assessed by integrating all of these aspects together in a longitudinal or lifetime benefit framework.

In this study, the benefits associated with individuals' actual DIP saving over an eleven-year longitudinal period (1991to 2001) are estimated and analyzed. In order to estimate the benefits associated with this saving, it is necessary to model its holding or compounding period, and its ultimate withdrawal, much of which is projected to take place in the future, at retirement age. That is, a lifetime benefit framework is required, even

though DIP saving during a shorter eleven-year period is what is being evaluated. This approach contrasts with Davies (1988), who creates a synthetic cohort and uses 1977 data on RRSP contributions to project the cohort's lifetime RRSP contributions and resulting lifetime benefits. The approach used in this study is broadly similar to that used by the Department of Finance in its recent development of supplemental "present value" tax expenditure estimates for DIPs (Department of Finance, 2001). However, the latter does not examine the distribution of DIP benefits; its purpose is to estimate the present value of the aggregate revenue foregone by the federal government in the present and future as a result of the DIP saving of all Canadians in a particular year.

This study relies on the longitudinal data on DIP saving from 1991 to 2001 available through custom data retrievals from Statistics Canada's Longitudinal Administrative Databank (the LAD). Individuals are analyzed within age cohorts, thereby controlling for life-cycle effects. Within each age cohort, individuals are divided into subgroups based on 1991 to 2001 longitudinal earnings; the eleven-year measurement period controls for year-to-year earnings variation, and is a much more robust proxy for permanent earnings than annual earnings would be. The benefit incidence analysis uses actual data on the longitudinal DIP behaviour of individuals over eleven years, thereby capturing the longitudinal intensity or consistency of DIP plan saving, including the impact of short-term withdrawals. This approach is compatible with the recent prescriptions for the fiscal and tax incidence literature made by Kesselman and Cheung (2004), who argue that research would be significantly improved by the use of actual microdata sets with multi-year longitudinal data, broken out by age cohort.

A number of significant contributions to the literature are made by this study. As alluded to, the longitudinal microdata used for this research are considerably more attractive than that typically used in the literature, with the partial exception of Davies (1988). These data allow for distributional judgements to be made based on individuals' permanent ranking in the earnings distribution, after controlling for life-cycle effects and year-to-year variation in earnings. It allows for a more robust measurement of individual DIP saving, by observing DIP saving – both contributions and withdrawals – over more than a decade, rather than relying on a single year's observation, which may reflect transitory behaviour. On a related note, the longitudinal nature of the data, coupled with the development and application of personal income tax calculators, permits comparisons between the marginal income tax rates applying to individuals' DIP contributions and those applying to their DIP withdrawals from 1991 to 2001. These comparisons produce the first empirical insights in the literature into the actual short-term income tax-averaging outcomes achieved by individuals through their use of DIPs.

In addition, this study employs a proper DIP benefit measurement framework, as adapted from Davies (1988), and uses more meaningful counterfactuals than typically available in the literature. Most of the literature is quite weak in this regard, using highly-flawed benefit frameworks that inaccurately identify the benefits from using DIPs. In the existing literature, benefits are often measured against counterfactuals that are difficult to justify normatively.

The analysis is also more comprehensive than most of the literature, in that it includes saving done through both RRSPs and RPPs (including employer contributions to RPPs), and also incorporates the impact of RRSP withdrawals made before retirement. The current literature focuses almost exclusively on RRSP contributions, with some attention paid to employee contributions to RPPs.

This research also provides the first benefit incidence analysis that meaningfully captures the impact of the important 1990 DIP reform, including the integration of RRSP and RPP limits and the introduction of the RRSP carryforward; the existing literature is quite dated in this regard. It also reflects the impact of the 1988 income tax reform, which made significant changes to the rate structure of the personal income tax.

For the most part, the existing literature measures the benefits of DIP saving as being those benefits flowing through the stand-alone personal income tax system. This approach is also the centerpiece of this research. However, this approach has been supplemented by employing an extended DIP benefit framework that incorporates the impact of DIP saving not only on personal income taxes, but also on individual and family entitlements under a number of other programs, including child benefit programs and public pension programs.

The remainder of the paper proceeds as follows. The rest of section 4 discusses and presents the methodology used in the empirical research in considerable detail, starting at the level of broad conceptual frameworks and narrowing down to specific details about the data source used, how subgroups have been formed, and how variables have been

calculated. The empirical results for DIP benefits are then presented using two separate counterfactuals. The primary counterfactual is a comprehensive annual income tax. The second counterfactual used is a broader "policy counterfactual"; this counterfactual replaces DIPs with tax-prepaid savings plans, and is made revenue neutral. DIP benefits are measured relative to these counterfactuals using two different benefit frameworks. The core benefit framework consists of DIP benefits realized under the stand-alone personal income tax (PIT); it will often be referred to as the "PIT benefit framework". The other benefit framework used is an "extended benefit framework" that includes the impact of DIPs on individual and family entitlements under a number of other programs, in addition to the benefits realized under the PIT.

4.2 Methodology: Broad Benefit Incidence Framework/Counterfactual

The first step in examining the size and distribution of benefits provided by DIPs is to establish a reasonable standard of comparison, also known as a counterfactual, in order to identify and measure what can be considered the marginal benefits associated with DIPs. The question that should be asked is how large are the benefits associated with DIPs, and how are they distributed, relative to some meaningful, self-contained, alternative or substitute state of affairs? In doing this sort of analysis, there are issues about the "grand" policy counterfactual, as well as narrower questions about the assumptions made concerning individuals' behavioural responses to a policy change, about the economic incidence of taxes on saving, and about the presumed taxation of savings in the absence of DIPs.

Setting up an appropriate counterfactual is often very challenging, especially when non-trivial tax expenditures are being evaluated, or when the tax expenditure in question is an integral piece in a larger complementary set of policy provisions. For instance, if it has been established that DIPs play an important policy role in providing retirement income to the broad middle class, then how should this be incorporated into the counterfactual? Might one assume, for example, that DIPs are replaced by an expanded Canada Pension Plan that provides more retirement income to the middle class through higher pensionable earnings or higher entitlement rates? Similarly, if it is felt that DIPs are an integral component in the structure of the income tax system, pushing it towards a tax on consumption, should the counterfactual include offsetting changes in the structure of income tax rates, and/or a shift in tax mix towards the GST? Furthermore, considered in isolation, eliminating DIPs would increase income tax revenues; the distributive impacts of how this revenue is used should be incorporated into the analysis in some manner, perhaps by otherwise lowering income tax rates to offset these revenues, thereby making the counterfactual revenue neutral. These issues are discussed in some detail in Davies (1988). The existing applied literature gives short shrift to these issues, typically ignoring them. In other cases, these issues are acknowledged, but avoided through the use of strong assumptions. In any case, the benefit incidence of DIPs has always been considered strictly in isolation in the applied literature – the counterfactual simply assumes that DIPs are eliminated, and that no other tax or policy changes accompany this. Hettich and Winer (1999) are highly critical of most of the existing literature's failure to incorporate models of collective choice into its analysis; existing policy reflects a political equilibrium, and the removal of DIPs would necessarily require corresponding changes in the use of

other policy instruments to arrive at a new equilibrium. Davies (1988) notes that when DIP benefits are considered in isolation, the implicit assumption is that any accompanying policy changes would have a neutral distributional impact.

Depending on the counterfactual chosen, eliminating DIP tax treatment would likely have the effect of significantly changing the incentives facing individuals (and employers) making saving decisions. Any resulting changes in behaviour, i.e., less saving or more saving, should be incorporated into the counterfactual. A related issue is the difference between the statutory and economic incidence of taxes. It is generally accepted that often those upon whom taxes are levied are able to shift at least some of the burden of these taxes to others. It would follow that some of the benefits associated with DIPs are not realized by the individuals saving in them, but by others, in their roles as consumers or labour, for example. In the absence of any agreement in the theoretical or applied literature about the magnitude, or even necessarily, the direction of these behavioural changes, or on the true economic burden of taxes on saving, the counterfactuals used in the tax expenditure literature have assumed no behavioural change by savers in response to the elimination of DIPs, and also that savers enjoy the full benefits of DIPs.

In order to identify the marginal benefits associated with DIPs, it is also necessary to specify exactly what tax treatment the savings that would otherwise be directed into DIPs would receive in the counterfactual. One might think that the answer would fall neatly out of the benchmark tax system being used; for example, the comprehensive annual income tax. Such a tax system taxes all income when it is earned, including that

saved instead of consumed. Any capital income subsequently earned by these savings would also be taxed, and on an annual basis.

Little of the empirical tax expenditure literature even considers the tax treatment of savings in a counterfactual; the benefit methodologies used stall out with the measurement of the initial deduction for DIP contributions. The only two studies utilizing an explicit counterfactual for the tax treatment of savings are Davies (1988) and the Department of Finance's tax expenditure accounts. Interestingly enough, neither of these studies uses comprehensive income tax principles in their counterfactuals for taxing saving. Davies (1988) employs two counterfactuals. Each reflects the actual personal income tax system at a particular point in time. The first reflects the tax system as it existed around 1977, at which point in the absence of DIPs, many individuals would still have had access to other tax shelter opportunities. The second is the tax system after the 1988 income tax reform, after which it is assumed that in the absence of DIPs, individuals' saving faces the default tax treatment received by interest income under the Income Tax Act, i.e., the full taxation of the entire nominal return to saving. The counterfactual used in the Department of Finance's tax expenditure accounts is also a representation of how the actual, existing Canadian personal income tax system taxes capital income earned outside of DIPs. The latter currently varies tremendously, and bears little resemblance to comprehensive income tax treatment. Actual tax treatment depends on whether the capital income takes the form of interest, dividends, or capital gains, and further on whether an individual is taking advantage of special tax provisions. At one time or another, the latter would include the capital gains exemption, registered home ownership saving plans, the investment

income deduction, registered education savings plans, and so on. More discussion on the taxation of capital income in Canada is contained in Davies and St-Hilaire (1987). Nominal interest income is fully taxed, while less tax is paid on capital income received in the form of dividends and capital gains. Many of the special tax provisions for capital income have been relatively short-lived, and new provisions have been introduced quite frequently. Current special tax provisions of consequence for capital income earned outside of DIPs include the tax treatment relating to principal residences (family homes), the partial exemption of nominal capital gains from inclusion in the tax base, enhanced registered education savings plans and certain aspects of universal life insurance.

It is difficult to make a convincing case for using counterfactuals that attempt to mirror the existing, highly flawed tax treatment of capital income in the current income tax system in the absence of DIPs. Indeed, using such counterfactuals seems directly counter to generally understood principles for tax expenditure accounting. The taxation of the return to savings in the existing tax system, once DIP tax treatment is excluded, bears little relation to any principled benchmark tax system. This approach may be understandable if the primary interest is in estimating the revenue loss to the government resulting from DIPs, i.e., a sort of quasi-positive analysis, although the implicit assumption that it would be possible to remove DIP tax treatment without some sort of offset is dubious. The use of the existing tax system as a counterfactual seems even harder to justify if the focus of interest is the size and distribution of benefits received by individuals through their use of DIPs. Measuring the "benefits" received by individuals from their use of DIPs is inherently a normative exercise, and calls for a more principled counterfactual than the

existing tax system in the absence of DIPs. The general failure of the existing tax system to adequately deal with the inflation component of capital income, and its consequential levying of confiscatory real tax rates on real capital income, realized outside DIPs, makes relying on it as a counterfactual particularly problematic.

A crucial feature of a proper comprehensive annual income tax is that it only taxes real, rather than nominal, capital income. The difference between a nominal rate of return and a real rate of return is inflation. An example is in order. Assume someone has $1,000 of savings, and earns a gross or nominal rate of return of 5% on their savings in a taxation year. Suppose also that inflation during the year is 3%, and that this individual has a marginal tax rate of 40%. The total nominal capital income received is $50 before-tax. So, the individual now has $1050. However, the inflation-adjusted, or real value, of his savings is really only $1019.42 ($1050/1.03). So the real increase in his wealth is only $19.42; the rest of the $50 is simply compensation for inflation. The real rate of return received on his saving is 1.942%. A proper comprehensive annual income tax would charge him 40% of $20 ($1050 - $1030) or $8 of income tax on his capital income.

In contrast, the default tax treatment of the current income tax system is to tax the entire amount of nominal capital income, including the component reflecting inflation. In the example cited above, the tax payable on the capital income would be $20 (marginal tax rate of 40% multiplied by nominal income of $50). Unfortunately, this constitutes a real marginal tax rate of 100%; the individual is left with total savings of $1030 which, after inflation, is unchanged from the previous year. The main point is that the current income tax system is not neutral with respect to inflation and the taxation of capital

income. Indexed tax brackets and exemptions solve this problem adequately for earnings and other forms of income, but are totally insufficient for capital income. In the absence of DIPs and other tax shelters, the Income Tax Act taxes capital income at confiscatory real marginal tax rates. It is not clear that substantive arguments can be made for taxing much of the returns to saving at real rates that are considerably higher than those applying to other types of income. For the most part, the two ends of the spectrum in the normative debate are not taxing the returns to saving at all (consumption taxation), or taxing saving comparably to other forms of income, i.e., in a proper comprehensive annual income tax framework.

It does not seem reasonable when analyzing the benefit incidence of DIPs to use a counterfactual that taxes the inflationary component of capital income. It certainly doesn't meet the standard of a comprehensive annual income tax. Indeed, it has been argued (Bruce, 1988) that taxing the inflationary component of capital income is properly considered a negative tax expenditure – i.e., a tax penalty. Further, rather than being substitutes for each other, as implied by the idea of a counterfactual, DIP tax treatment and current non-DIP tax treatment are probably best viewed as complements – the confiscatory real tax rates imposed on much non-DIP saving is only tolerated by voter-taxpayers because the availability of DIPs (and other tax-advantaged vehicles) allow most of them to avoid it. Or conversely, the main reason DIPs and other tax shelters for saving exist is to compensate for the flaws in the default tax treatment of capital income.

In light of the issues discussed, this research evaluates the benefit incidence of DIPs using two separate counterfactuals. The primary counterfactual is particularly relevant for

evaluating popular assertions that DIPs provide highly regressive benefits. It considers DIPs in isolation, with no accompanying policy changes. It is not revenue neutral. It is assumed that there would be no behavioural change associated with eliminating DIPs, and furthermore, that savers bear the entire economic burden of taxes on saving. All of these are typical of the literature. The sole departure of this counterfactual is that it measures the benefits of DIPs relative to a proper comprehensive annual income tax; only the real returns to saving are taxed. There is no taxation of the inflation component of the nominal return to saving.

The second, or supplementary, counterfactual that DIPs are evaluated against is more ambitious and comprehensive in some aspects, although perhaps less fundamental. The perspective it embodies is more about evaluating the distributive effects of alternative policy instruments to achieve given policy goals. These policy goals are those previously identified for DIPs: allowing the broad middle class to save for retirement effectively, and moving the income tax system away from a tax on income and towards a tax on consumption. This counterfactual to DIPs relies on "tax-prepaid" savings plans, as discussed in section 3.4.2, as a substitute for DIPs. Tax-prepaid savings plans serve an important role in the tax and retirement saving programs in some countries, and have been recently receiving considerable attention in Canada as a possible supplement to DIPs (Kesselman and Poschmann, 2001a). Contributions to TPSPs would not be deductible from income. This would eliminate, or at least moderate, the two features of DIPs that attract the most political criticism – the supposed regressiveness of the deduction, and the short-term revenue loss for governments. Accruing capital income and withdrawals would

not be taxed. Furthermore, this counterfactual will be made revenue neutral. Any differences in tax revenue between the two options will be absorbed by a proportionate change in average tax rates in the counterfactual.

The amount of saving done by an individual in these counterfactuals is equal to the size of their DIP saving after the impact of the initial tax deduction. For example, an individual in a 30% marginal tax bracket can contribute $100 of pre-tax income to a DIP and receive an immediate reduction in income taxes of $30, for an out-of-pocket saving cost of $70. Alternatively, that individual can save $70 in a counterfactual that does not provide a tax deduction. Each alternative has the individual saving comparable amounts – $100 of pre-tax income or $70 of after-tax income.

It is important not to lose sight of a third counterfactual that is not being formally evaluated in the research, but is certainly implicit. That third counterfactual is a consumption tax base. As noted in the previous literature review, this counterfactual is certainly as legitimate and relevant as the previous two. However, when the consumption tax base is the counterfactual, DIPs essentially merge into the benchmark tax system, leaving no empirical results to analyze. This implicit counterfactual will, therefore, be treated in a contextual manner only.

4.3 Methodology: Identifying and Quantifying DIP Benefits

Having set the parameters for the broad frameworks or counterfactuals against which the benefits associated with DIPs will be compared, it is necessary to specify a methodology which identifies and quantifies these benefits. The required methodology is necessarily more complex than that required to evaluate many tax expenditures. The majority of tax expenditures entail tax consequences, such as a deduction or tax credit, that are limited to a single taxation year. This is not true of DIPs; often, the benefits associated with making an RRSP contribution or earning entitlement to an RPP benefit can only be properly ascertained over a measurement period consisting of many years or decades.

As noted previously, contributions to DIPs are deductible from income, capital income earned by those contributions is not taxed as it accrues, and all withdrawals from DIPs are fully taxable (they are added to income). The benefit implications of each of these elements must be incorporated into the analysis. Unfortunately, the nuances of this have been poorly handled in much of the applied literature on tax expenditures. Many of the studies, and much of the broader criticism aimed at DIPs have focused exclusively on the value of the initial tax deduction received for DIP contributions. The other elements of DIP tax treatment are ignored. Typically, it is asserted that DIPs are regressive because high income earners get a larger benefit from this tax deduction, as their marginal tax rate is higher than lower income Canadians. For example, someone with a 50% marginal tax bracket saves $500 in tax through deducting a $1,000 RRSP contribution, while someone in

a 25% tax bracket making the same RRSP contribution only saves $250 in tax; therefore, RRSPs are regressive. This sort of analysis is completely inadequate.

A proper framework for identifying and quantifying the benefits associated with DIP saving identifies the total after-tax wealth created by making a contribution to a DIP and subtracts the total after-tax wealth that would be created by saving an equivalent amount, after-tax, in the counterfactual instead. The present value of this DIP benefit is, therefore, captured by Equation 1:

$$\text{DIP benefit} = \frac{\overset{(1)}{R(1+r)^n(1-t_2)} - \overset{(2)}{(1-t_1)R(1+r(1-t^*))^n}}{(1+r)^n}$$

Here, R is the amount of the DIP contribution, r is the annual before-tax real rate of return, t_1 is the marginal tax rate in the year of contribution, t_2 is the marginal tax rate in the year of withdrawal, t^* is the marginal tax rate applying to capital income in the counterfactual, and n is the number of years between a DIP contribution and its subsequent withdrawal (the compounding period). Term 1 in the numerator corresponds to the after-tax proceeds of the DIP contribution upon withdrawal at the end of the compounding period. Term 2 in the numerator is a measure of the after-tax value of an equivalent amount of savings in the counterfactual at the end of the compounding period. The denominator discounts the results back to the year of initial contribution; the discount rate used for this purpose is also r, the before-tax real rate of return.

The formula can be expressed perhaps more intuitively as follows, in Equation 2:

$$\text{DIP Benefit} = \underset{(1)}{t_1 R} + \underset{(2)}{\frac{R(1-t_1)\,[(1+r)^n - (1+(1-t^*)\,r)^n]}{(1+r)^n}} - \underset{(3)}{\frac{t_2 R\,(1+r)^n}{(1+r)^n}}$$

In this equation, Term 1 is the DIP contribution multiplied by the marginal tax rate in the year of deduction; it measures the immediate tax relief secured by the deduction of DIP contributions, and is the element most frequently focused on in the applied tax expenditure literature. Term 2 captures the taxes avoided on an annual, ongoing basis by saving in a form which shelters accruing capital income from taxes. Individuals earn an annual rate of return of r on their DIP savings, rather than retaining only (1-t*)r in a counterfactual which taxes annual capital income at a marginal tax rate of t*. This will be called the "tax-shelter benefit". Term 3 quantifies the income tax that must be paid when the DIP contribution and its accrued capital income are withdrawn in year n. It is most directly a function of t_2, the marginal tax rate faced by the individual in year n. As these elements of tax treatment take place in different years, terms 2 and 3 have been discounted back to the year of DIP contribution, also using a discount rate of r.

Equation 2 can be rearranged and further simplified to create Equation 3:

$$\text{DIP Benefit} = \underset{(1)}{(t_1 - t_2)\,R} + \underset{(2)}{\frac{R(1-t_1)\,[(1+r)^n - (1+(1-t^*)\,r)^n]}{(1+r)^n}}$$

In Equation 3, Term 1 measures the "tax-averaging benefit" associated with a DIP (which can be positive, zero or negative). This is simply the difference between the marginal tax rates faced by individuals upon contributing and withdrawing from their DIPs, multiplied by the amount of the original DIP contribution. Term 2 is the same "tax-shelter benefit" discussed in Equation 2. The tax-shelter benefit for a given amount of DIP saving increases with the tax rate on capital income in the counterfactual, (t^*), and also with the length of the compounding period, (n). Interestingly, the way the mathematics works out, in the absence of tax-averaging benefits, i.e., $t_1=t_2$, the total amount of after-tax wealth created in a DIP will be equivalent to that which an individual would accumulate by investing the after-deduction amount of the original contribution, $(1-t_1)R$, outside a DIP, but subsequently not paying any tax on the capital income accruing, i.e. the individual realizes an after-tax rate of return of r, rather than (1-t)r. This is the same as "tax-prepaid" consumption tax treatment, as discussed in section 3.4.2.

This framework for identifying and measuring DIP benefits draws primarily on Davies (1988). Davies uses a two-period notation rather than a multi-period notation. A more significant departure made by this study is the choice of discount rate. Davies (1988), perhaps following Rea (1980), uses an after-tax interest rate, (1-t)r, to discount individuals' future DIP benefits to present value. The appropriate conception of the discount rate for this purpose would seem to be individuals' marginal rate of time preference, i.e., that rate at which individuals are willing to exchange consumption between time periods, rather than another approach to the discount rate, such as the social opportunity cost of capital, for example. The main question is whether the before-tax or

after-tax interest rate is a better measure of individuals' average marginal rate of time preferences for DIP saving. This study discounts future DIP benefits using the before-tax interest rate, r, as a proxy for individuals' average marginal rate of time preference, rather than (1-t)r. Even at the margin, after their DIP saving, the vast majority of Canadians are not constrained by DIP saving limits; that is, they have the opportunity to earn an interest rate of r, rather than (1-t)r, on any marginal saving. This was the finding made by Burbidge, Fretz, and Veall (1997). Preliminary analysis of this issue using LAD data confirms that fewer than 10% of all individuals with positive longitudinal earnings, and fewer than 25% of individuals in the top annual earnings quintile, have used all or virtually all of their DIP saving room. For total DIP saving (which is what is relevant here), rather than just at the margin, the argument is even stronger; the tax-shelter component of DIP benefits operates to provide individuals with a rate of return equal to r, rather than (1-t)r, on all of their DIP saving. It seems clear that in their DIP use, the vast majority of Canadians are better characterized as exchanging present consumption for future consumption at a rate of time preference equal to r, rather than (1-t)r. A revealed preference approach, therefore, suggests that the before-tax interest rate, r, is the appropriate rate to use to discount individuals' future DIP benefits. Indeed, in other work, Davies argues that given DIPs and tax-prepaid saving opportunities, most Canadians "face a consumption tax world" (Davies 1997, p. 244), which implies that they receive an after-tax rate of return on their saving equal to r, rather than (1-t)r.

Using r, rather than (1-t)r, as the discount rate results in a somewhat different DIP benefit formula, shown above, than that developed in Davies (1988), particularly with

respect to the calculation of tax-shelter benefits. The main implication of using r as the discount rate in this study is that all individuals face the same discount rate, and that the present value of a dollar of DIP benefit in a particular future year is equal for all individuals. In contrast, as marginal tax rates rise with income, using (1-t)r as the discount rate would lead to discount rates that are not constant but rather fall with income; as a result, the present value of a dollar of future DIP benefits would not be constant, but would rather increase across the income or earnings distribution.

The core DIP benefit framework presented above identifies the benefits of DIP saving as those resulting from its interactions with the stand-alone personal income tax system. This is the methodology typically used in the existing literature.

Another aspect of identifying the benefits associated with DIP saving, however, consists of looking beyond the formal personal income tax system. Individuals' entitlements under many programs are tied directly or indirectly to net income as defined by individuals' tax returns, and are, thereby, directly affected by the changes in net income caused by DIP contributions and withdrawals. These programs include elderly entitlement programs (GIS, OAS, and GAINS), various federal and Ontario child benefit programs, and several miscellaneous programs (the GST Credit, and the Ontario Property and Sales Tax Credit). It is possible to debate whether all of these various policy provisions or mechanisms are best considered "programs" or something else – transfer programs, refundable tax credits, and so forth. For the purposes of exposition, they will all be considered programs providing entitlements.

Typically, program entitlements are reduced (or clawed back) as net income rises; these entitlement reductions operate much like taxes. The literature often refers to "marginal effective tax rates" when incorporating the impact of these entitlement reductions into the measurement of marginal tax rates. Dahlby (1994) and Davies (1998) provide broad discussions of these issues. More specific analysis of the effect of the clawbacks of elderly entitlement programs on the benefit associated with retirement saving programs is contained in Kesselman and Poschmann (2001) and Shillington (2003). In the latter study, it is argued that, as a result of such clawbacks, low-income Canadians receive little to no net benefit from their retirement saving.

In the interests of a more comprehensive analysis of the benefits associated with DIP saving, the PIT benefit framework has been supplemented by the use of an extended benefit framework that also incorporates the impact of DIP saving on a number of elements of the broader tax and transfer system – individual and family entitlements under nine programs providing income-tested entitlements. DIP benefits will be estimated for each of the two counterfactuals using both of these benefit measurement frameworks.

4.4 Methodology: Data and Empirical Strategy

This research takes advantage of the rich longitudinal data available through custom data retrievals from Statistics Canada's Longitudinal Administrative Databank (the LAD). The LAD is a random 20% longitudinal sample of all Canadian individuals and families filing one or more tax returns, i.e., of the T1 Family File. The data are available in both an individual universe and a census family universe. The data are primarily the demographic, income, and taxation information contained in individuals' personal income tax returns, although a number of other administrative sources are also used in its development. Statistics Canada (1997) estimates that LAD coverage of the population is about 97% for the period being studied. Its coverage rate for individuals using DIPs is likely even better.

The LAD contains data for the years 1982 to 2001. However, the full set of variables of interest for this research is only available beginning in 1991. While there is data on individual annual RRSP contributions going back to 1982 and data on RPP income from 1986 on, data on RRSP withdrawals only became available beginning in the 1988 tax year, and pension adjustments are only available in the LAD starting in 1991. For most purposes, then, this paper will restrict itself to using 1991 to 2001 data. The LAD also includes variables for these years for federal and provincial income tax actually paid, as well as many variables necessary to calculate an individual's personal income tax and entitlements to many entitlement programs – taxable income, net income, non-refundable tax credits, age, marital status, number and ages of children, disability status, Ontario tax credits, and so forth.

It should be noted that, in 1992, the federal government introduced a program allowing special RRSP withdrawals – the RRSP Home Buyer's Plan. This program permits individuals to withdraw up to $20,000 from their RRSPs to be used as a down payment on their first home. Unlike ordinary RRSP withdrawals, the funds are not added to an individual's income at the time of withdrawal. The withdrawal is conceived of as a loan – individuals are scheduled to repay their RRSP in fifteen equal annual installments (these repayments do not receive a tax deduction). Each year, any scheduled repayments that have not been made are added to an individual's income for tax purposes, i.e., are treated as a regular RRSP withdrawal. Starting in 1995, the LAD's RRSP withdrawal variable reflects not only normal RRSP withdrawals, but also missed repayments under the RRSP Home Buyer's Plan. Frenken (1998) suggests that some 20-25% of these scheduled annual repayments are not made, and that in 1995, some $219 million, or 3.2% of aggregate RRSP withdrawals, reflect these missed repayments under the Home Buyer's Plan.

An explanation of the pension adjustment is likely in order. Pension adjustments were created by the 1990 DIP reform, in order that an individual's new RRSP room for a year could be reduced to reflect his or her saving in RPPs. An individual's pension adjustment in a given year is an estimate of the present value of the DIP saving represented by his or her accrual under an RPP for that year. For "defined contribution" RPPs, the pension adjustment is simply the sum of employee and employer contributions made to an individual's pension account. The majority of individuals who are members of an RPP, however, belong to a "defined benefit" RPP, whereby each year they earn entitlement not

to well-defined current saving, but rather to a future benefit at retirement, which is often tied to their current or future earnings. In these cases, the pension adjustment is a relatively rudimentary estimate of the present value of this future benefit. Care must be taken in making comparisons across different cohorts, as the present value factors used do not vary by age; pension adjustments may overstate the DIP saving of the younger cohorts, and understate that of the older cohorts. For the purpose of this paper, a pension adjustment is considered comparable to an RRSP contribution.

One of the basic methodological issues for a study of this type is the choice of the unit of analysis. DIP benefits and economic welfare could be assessed by disaggregating the population into a distribution either of individuals, families, or households (all individuals living in a dwelling). All of these approaches have been used in the literature. The tax incidence literature appears to most typically use households as the unit of analysis (Kesselman and Cheung, 2004), while the tax expenditure literature primarily uses a universe comprised of individuals. Davies (1988), utilizing a sample of married couples for his analysis, is something of an exception in this latter literature.

Each of these possible choices has its advantages and disadvantages. None of them is clearly superior to the others for all purposes. One reason that the individual is attractive as a unit of analysis for tax expenditure incidence is that federal and provincial personal income taxes are largely levied on individual income (there are a number of elements of the personal income tax, such as the spousal tax credit, that effectively make the personal income tax base something of a hybrid between individual and family income). On the other hand, it seems reasonable to expect that an individual's economic welfare may be a

function, not only of his own income, but also, where applicable, of the income of his spouse (income pooling), the number of dependents in his family, and so forth. It is also often argued that there are significant economies of scale in household formation, i.e., that two adults living together can live more cheaply than two individuals with separate households. These factors suggest that a broader economic unit – the family or the household, possibly adjusted for family size and composition, may be an appropriate unit of analysis. These are complex issues; they are discussed in considerably more detail in Woolley (2000) and Maloney (1994).

With the LAD data, the options are using the individual or the census family as the unit of analysis; no data on households are available. In the end, the determining factor for the choice was the impact of the longitudinal nature of the analysis on the LAD sample size. Family units are quite unstable over time, as individuals marry, or break up or divorce. In most cases, if a couple breaks up, one of the spouses (married or common-law) ends up being dropped from the LAD sample. The number of stable families in the LAD family universe from 1991 to 2001 is less than 40% of the number of individuals. Individuals were, therefore, chosen as the unit of analysis; at the margin, the individual universe was considerably less susceptible to data suppression difficulties.

A consequence of this choice is that individuals with comparable individual earnings will be grouped together, even though their broader family circumstances may be substantially different. For example, the lowest earnings group will include some individuals living in relative or absolute poverty, and also stay-at-home spouses in well-off families. These differences in an individual's ranking in the individual and family

universes may also mask the visibility of the impact of DIP saving on program entitlements, which are typically based on family income.

On a related point, there is an aspect of RRSP benefits that ties directly into this discussion of individual versus family units of analysis. An individual with a spouse may contribute some or all of his RRSP contribution into a "spousal RRSP". While the contributing spouse gets the tax deduction for the RRSP contribution, the RRSP proceeds will be added to the other spouse's income when withdrawn; this facilitates a certain amount of income and tax averaging within families. The LAD data do not permit the identification of spousal RRSP contributions from 1991 to 2001. In this study, it has, therefore, been assumed that an individual's RRSP contributions are made to his own RRSP. However, preliminary exploration of spousal RRSP incidence, based on earlier LAD data, indicates that incorporating spousal RRSPs into the study would not materially change the distribution of DIP benefits. The LAD captures spousal RRSP contributions from 1987 to 1992; these data suggest that roughly 75% of spousal RRSP contributions are made by the top earnings decile. However, spousal RRSP contributions constitute, on average, less than 5% of aggregate RRSP contributions (roughly 2.2% of aggregate DIP saving), and less than 10% of the RRSP contributions of the top earnings decile. Applying this data, and using the most generous tax averaging assumptions, spousal RRSPs increase the top decile's share of DIP benefits from 24.4% to 24.7%, an insignificant amount. The benefit-shares of the other earnings groups change even less. All figures are for the most representative age cohort (age 35-44).

This study applies the benefit frameworks discussed in section 4.3 to LAD data in order to estimate the benefit incidence of DIP saving done from 1991 to 2001 by residents of Ontario. Only individuals in the database for this entire period have been included in the sample. The sample was restricted to residents of Ontario in order to simplify the analysis, i.e., so that it was only necessary to model one set of provincial income taxes and benefit programs. Ontario was chosen because it has the greatest population, which in turn leads to the largest sample size and the least concern about the suppression of small cells due to Statistics Canada's stringent privacy rules for this data source.

For the purposes of this research, Ontario residents have been divided into thirty separate subgroups. First, they were divided into five age cohorts, according to their age as of December 31, 1991. The age cohorts chosen were age 25-34, 35-44, 45-54, 55-64 and age 65 or older. Individuals younger than age 25 were restricted from the analysis. Dividing the sample into cohorts in this manner controls for earnings differences by age, i.e., individuals within a cohort should be at reasonably comparable positions in their earnings life-cycle. In addition, age may be one of the factors influencing DIP saving, so dividing the sample into age cohorts also controls for age influences on DIP saving. This study focuses on the DIP benefits received by the youngest two cohorts. The older cohorts (age 45-54, 55-64 and age 65+ as at December 31, 1991) were used primarily to generate the younger cohorts' projected marginal tax rates on capital income in the counterfactuals (t^*), and the marginal tax rates applying to their DIP withdrawals made at retirement age (t_2). This is discussed in more detail below.

Most of the empirical tax expenditure literature examines the distribution of tax benefits across income groups, rather than earnings groups. Earnings, a narrower concept than income, has been chosen in this case because the DIP programs are explicitly aimed at earnings replacement, not income replacement; at least until the annual fixed-dollar ceiling on DIP limits is reached, DIP limits are a fixed proportion of earnings. Someone with high income, but without earnings, cannot save in a DIP. Earnings have been defined in such a way to mimic the definition used in the Income Tax Act to calculate DIP limits as closely as possible; earnings are comprised primarily of income from employment and self-employment, along with a number of other very minor components.

The total annual income variable most closely corresponding to the "broad income" definition of income typically used in tax incidence studies (Kesselman and Cheung, 2004) is the LAD's "XTIRC" variable (Statistics Canada, 2002). This variable includes market income, including most forms of capital income, plus public transfer payments, such as public pension payments, Employment Insurance, Workers' Compensation, federal and provincial child benefits, social assistance payments, refundable tax credits and family benefits. It does not include capital gains. For individuals under age 65, it does not include RRSP income. A longitudinal version of this variable has been used in this study as one of the default standards of comparison against which the distribution of DIP benefits have been evaluated (the other being longitudinal personal income taxes). The distribution of DIP benefits relative to the distribution of longitudinal earnings is not discussed in the study, although this is included as supplemental information in the tables in the appendix.

Each age cohort has been further divided into six longitudinal earnings groups according to earnings percentile. An individual's longitudinal earnings are equal to the present value of his or her earnings from 1991 to 2001. Longitudinal earnings, measured over an eleven-year period, provide a significantly better measure of individuals' permanent economic well-being than would a one-year observation. Beach and Finnie (1998) have demonstrated that individuals exhibit substantial earnings mobility over time; annual earnings tend to reflect transitory circumstances, and are often not representative of permanent earnings. The earnings distribution was initially divided into quintiles. The top quintile of earners was subsequently divided more finely, into two deciles. The bottom quintile, another population of considerable policy interest, was not further subdivided because of concerns with small cell sizes and the related data suppression issues (many fewer individuals at the bottom of the earnings distribution use DIPs). The resulting earnings percentiles by subgroup are 0-20%, 20-40%, 40-60%, 60-80%, 80-90% and 90-100%.

Table 1 provides some data on the makeup of these subgroups. The age cohort and longitudinal earnings percentile columns merely identify the subgroup. The next column shows the mean longitudinal earnings for that subgroup, as described above. The next three columns may be more intuitive; mean longitudinal earnings have been translated into an equivalent annual earnings concept, to be representative of the annual earnings represented by the longitudinal present value. The mean earnings for the subgroup, as well as the earnings range for that subgroup (minimum to maximum earnings), have been reported. Here, one sees that in each cohort, the lowest earnings quintile (p0-p20) has

extremely low mean equivalent annual earnings. It is likely that many individuals in the lowest earnings group of each cohort have zero earnings, and that low attachment to the work force is primarily responsible for an individual's presence in the lowest earnings group. Any individual working full-time, even at minimum wage, would be in a higher earnings group. Earnings in the second quintile are still quite modest, with mean equivalent annual earnings only modestly larger than full-time work at the minimum wage. The dollar limits on DIP saving from 1991-2001 (i.e., $13,500 per year for most of this period) were only reached by individuals earning $75,000 or more per year; one can see that the DIP limit would likely have consistently applied only to those individuals well past the 90th percentile of their cohort's longitudinal earnings distribution. Individuals at the very bottom of the earnings distribution of each cohort actually report negative earnings, largely reflecting self-employment losses reported for tax purposes; they have been shown as zero earnings in the table. The mean earnings of the highest earnings group in each cohort is sharply higher than that of the next highest group, reflecting the asymmetrical nature of the earnings distribution, with individuals at the top of the distribution having extremely high earnings. Also worth noting is that, as one might expect, the earnings distribution contracts sharply for the older cohorts, especially for the eldest.

For the most part, the distribution of DIP benefits will be analyzed across the longitudinal earnings distribution within cohorts. This will allow a more substantive analysis of the distributive impacts of DIPs than most of the literature, which makes no attempt to control for age, or to identify permanent, rather than transitory, earnings or income.

The longitudinal nature of DIP benefits, as discussed in detail in section 4.3, makes empirical research on this topic challenging. In particular, to properly determine the benefits associated with a given amount of DIP saving, it is necessary to observe the marginal tax rate applying to a DIP contribution both at the time of contribution and also when the funds are subsequently withdrawn. Ideally, an entire lifetime's worth of annual observations on DIP saving and tax circumstances would be available, from the year of first DIP contribution to the year of final DIP withdrawal. This would ensure an entirely robust determination of DIP benefits.

Longitudinal data, tracking individuals' DIP contributions and withdrawals from 1991 to 2001, along with the relevant personal income tax and entitlement program details, provide a significant window on DIP benefits and their distribution. However, for the majority of individuals, DIP saving during this period is not neatly self-contained within this period. That is, many individuals made DIP contributions in the period that will not be withdrawn until unobserved, future periods. Conversely, other individuals made DIP withdrawals in the period that clearly reflect DIP contributions made in previous periods. Individual behaviour will vary greatly, but overall, younger cohorts will contribute significantly more than they withdraw in the period, and the oldest cohorts, at retirement age, will withdraw much more than they contribute.

A cohort's DIP saving in the period has, accordingly, been separated into two categories for calculating DIP benefits. The first category is short-term saving; this is that portion of DIP saving for which it is possible to match a cohort's DIP contributions in the period with corresponding withdrawals in the period. For short-term saving, all of the

components of DIP benefits described in section 4.3 can be been calculated based solely on actual individual data.

The remainder of a cohort's DIP saving in the period is long-term saving. Only one of the two facets of such saving (contributions or withdrawals) is observable in the 1991 to 2001 data. For younger cohorts, the current marginal tax rate at contribution (t_1) is observed, but not the future marginal tax rate at withdrawal (t_2). For older cohorts, the current marginal tax rate at withdrawal is observed, but the previous marginal tax rate at contribution is not observed. In either case, t^* is not observed for that portion of the compounding period outside 1991 to 2001. In order to incorporate the DIP benefits associated with such long-term DIP saving into the analysis, it is necessary to make projections for the marginal tax rates that are unobserved or extra-period (i.e. t^* and either t_1 or t_2, depending on the cohort). In order to do this, some elements of a "synthetic cohort" approach were used to blend partial data from several cohorts to create fewer "synthetic" cohorts with complete data.

There are two main choices for an analytical approach. One approach would be to use the retired cohorts as the foundation of the analysis, observe their retirement age t_2 directly, and make assumptions about their previous t_1 and extra-period t^* by making linkages with the younger cohorts. The other approach, and that taken in this research, is to focus the analysis primarily on the DIP saving of the younger cohorts, whose DIP contributions in the period dominate their withdrawals. In this case, any DIP contributions not withdrawn within the period (long-term saving) are assumed to remain invested until

retirement age. At that point, it is projected that the marginal tax rate paid on these withdrawals (t_2) by a subgroup is equivalent to that applying to the 1991 to 2001 DIP withdrawals of their counterparts in the older retired cohorts. Similarly, for that part of the compounding period that the t*'s of the younger cohort's subgroups are unobservable, they are projected to equal the mean t*'s of their older counterparts across the intermediary cohorts. Subgroups have been matched across cohorts according to earnings percentile for this purpose.

As an example, consider the benefits of long-term (or extra-period) DIP saving for the subgroup with earnings between the 60th and 80th percentile, contained within the age 25-34 cohort. The t_1 of this DIP saving is observable in the data, as is t* for the first part of the compounding period. However, t_2 at retirement age, and t* from 2002 to retirement age are unobserved and must be projected. This subgroup's retirement age t_2 will be projected as equal to the mean of the t_2's of the comparable earnings groups (p60-p80) in the age 55-64 and age 65+ cohorts. The projected t* will equal the mean t* of the comparable earnings subgroups (p60-p80) across the age 35-44, 45-54 and 55-64 cohorts.

A weakness of this synthetic approach is that it assumes away "cohort effects" in tax and clawback rates; there may be systematic differences between the future marginal tax rates applying to DIP withdrawals at retirement of those who are 30 now, and the current marginal tax rates of those who are 65 now. These differences could stem from long-term changes to the tax and transfer system, public pensions, general wealth, and so on. What is key, however, is not the absolute value of t_2 for an earnings group at

retirement, but rather its relative slope across the earnings distribution. This may mitigate these concerns to a certain extent. In any event, projecting that the future will be at least relatively similar to 1991-2001 is the best that can be done.

The age 25-34 and age 35-44 cohorts were chosen for the core of the analysis. The expectation is that the longitudinal earnings of these individuals from 1991 to 2001 is a reasonable proxy for their permanent earnings, and that judgements made about the distribution of benefits across earnings groups will, therefore, be relatively robust. Considerable analysis of the data for these cohorts did not produce any suggestions that this was not the case. Initially, the age 45-54 cohort was also included in the analysis. Repeatedly, however, indications surfaced which strongly suggested that large numbers of individuals in this cohort's lowest earnings groups were actually retired for some or all of this period, and that they actually had high levels of permanent earnings, rather than the low levels indicated by their 1991-2001 earnings. This mismatch greatly compromised any distributional analysis of DIP benefits, so the cohort was dropped from the analysis. It is expected that the results for the age 35-44 cohort will be most representative of lifetime DIP results; the age 25-34 cohort can be considered somewhat less "mature" in their DIP use, especially regarding its accrual of benefits under RPPs.

The basic longitudinal earnings approach used is also problematic for ranking the individuals of the older cohorts (age 45-54, 55-64 and age 65+) by earnings. Longitudinal 1991-2001 earnings may not be a reasonable reflection of permanent earnings for these older individuals, as many of them will be retired for the period, or retire during the period. Many of them have no earnings in the period, or have low earnings. It would be difficult to

distinguish between differences in individuals' permanent or lifetime earnings, and individual differences in retirement ages. This makes matching younger and older subgroups across cohorts on the basis of total 1991 to 2001 discounted earnings, in order to project t_2 and t^* for the younger cohorts, unreliable. Therefore, a different approach has been taken for ranking the individuals in these older cohorts by earnings. These cohorts have been divided into earnings subgroups based on their best five years' earnings from 1982 to 2001 (1982 being the earliest year of LAD data). Extending the earnings period further back to 1982, and using a "best five-years" approach rather than a "total years" approach should provide a better correlation with permanent earnings for individuals at or approaching retirement age.

To reiterate, the DIP benefits received by an individual can be identified and measured using the following formula, as described in section 4.3. Term 1 captures the tax-averaging benefits experienced through a given amount of DIP saving, while Term 2 is a measure of the tax-shelter benefits associated with the same:

$$\text{DIP Benefits} = \underbrace{(t_1 - t_2)R}_{(1)} + \underbrace{\frac{R(1-t_1)\left[(1+r)^n - (1+(1-t^*)r)^n\right]}{(1+r)^n}}_{(2)}$$

DIP benefits have been calculated at the longitudinal earnings subgroup level of aggregation within each cohort. Marginal tax rates have been calculated at the level of the individual, and have then been aggregated up to the subgroup level. DIP benefits have been calculated separately for short-term DIP saving and long-term DIP saving.

R is the present value of the stream of each subgroup's DIP saving (RRSP contributions plus pension adjustments) for each year from 1991 to 2001, discounted using a 3% real rate. Total R has been divided into short-term DIP saving (that offset by withdrawals in the period) and long-term DIP saving.

The marginal tax rate applying to the DIP contributions, (t_1), is the same for short-term and long-term DIP saving. It is equal to the total reduction in longitudinal subgroup personal income taxes resulting from the deduction of DIP saving from taxable income, divided by the total amount of subgroup longitudinal DIP saving (R).
For entitlement clawbacks, it is equal to the total increase in longitudinal subgroup entitlements, divided by R. Further details on these calculations are provided below in the discussions of personal income tax calculators and program entitlement calculators.

The marginal tax rate applying to longitudinal DIP withdrawals, (t_2), is equal to the increase in longitudinal personal income taxes resulting from the inclusion in income of longitudinal DIP withdrawals, divided by the size of longitudinal DIP withdrawals.
For entitlement clawbacks, it is equal to the reduction in longitudinal subgroup entitlements divided by R. Further details on the calculation of t_2 are provided below.

The "tax-averaging rate", (t_1-t_2), is equal to the marginal tax rate or marginal clawback rate applying to longitudinal DIP contributions, minus the marginal tax or clawback rate applying to longitudinal DIP withdrawals. For short-term DIP saving, actual LAD data has been used to calculate both terms of the tax-averaging rate (t_1-t_2); only data for those individuals with both longitudinal DIP contributions and withdrawals exceeding

$1,000 have been included in this calculation. For the long-term portion of DIP saving, the tax-averaging rate is equal to the entire subgroup's t_1, minus the projected t_2 for the subgroup at retirement age (as discussed previously).

The marginal tax or clawback rate applying to capital income in the counterfactual, t*, is not directly observed in the data. It has been estimated, by slightly increasing the observed values of t_1. The counterfactual used is a comprehensive annual income tax; as a result, t* is applied to real capital income only, not nominal capital income. A subgroup's short-term t* reflects its observed t_1 during the 1991-2001 longitudinal period.
As discussed previously, a subgroup's projected long-term t* applies to saving that compounds until retirement age; it has been developed using a synthetic cohort approach that matches subgroups across cohorts using relative earnings within each cohort, and averages their t*'s.

A real interest rate (r) of 3% has been used in the benefit calculation for both the rate of return and the discount rate. This seems a plausible central estimate in the literature for the mean marginal rate of time preference of individuals. It also seems reasonable as a rate of return realizable by individuals on their DIP savings. Although little data is available on the actual pre-tax rate of return realized by individuals on their individual saving, actuaries typically use real rates of return in the range of 3.5% - 4.5% in their projections for registered pension plans; a long-term real rate of return of 4.1% has been projected for the Canada Pension Plan (OSFI, 2004), reflecting historical returns to a mixed portfolio of stocks and bonds. Given the much higher management expenses faced by

retail investors, and their relative lack of investing sophistication compared to large pensions plans, an overall estimate of a real rate of return of 3% on DIP saving seems reasonable. Sensitivity analysis using a 5% rate of return and discount rate did not substantially change the results of this study.

A compounding period (n) of three years has been assumed for short-term DIP saving. Long-term DIP saving has been assumed to be withdrawn at an average age of 70; the mean compounding period is, therefore, equal to 70 minus the average age of a cohort in 1996 (the middle of the contributory period).

All of the empirical results of this study are expressed in terms of longitudinal variables. This is true of the measures of DIP saving, DIP benefits, earnings, income, income taxes, marginal tax rates and DIP participation rates. Many of these variables are expressed in dollars; these variables have been created by converting all figures to constant year-2000 dollars, and then calculating the present value of the corresponding stream of annual amounts using a real 3% discount rate. Variables that are expressed as a percentage, such as marginal tax rates, have been calculated by taking the ratio of the two underlying longitudinal variables (which have been expressed in dollars). Longitudinal participation rates reflect participation at any point in the longitudinal period; any individual that made a DIP contribution in at least one year from 1991 to 2001 is counted as having positive longitudinal DIP participation.

4.5 Personal Income Tax Calculators

The marginal personal income tax rates applying to DIP saving, on both the contribution and withdrawal side, are central components in determining the benefits received by the users of DIPs. There appears to be little existing empirical research examining this issue in the literature. This research, by using longitudinal data to track the marginal tax rates applying to individuals' DIP contributions and withdrawals, provides the first empirical evidence on the actual tax-averaging outcomes resulting from DIP use.

The LAD includes variables on individual taxable income, DIP contributions and withdrawals, non-refundable tax credits, the pension income credit and so forth. If one assumes that DIP contributions and withdrawals are the most marginal components of taxable income for individuals, which seems a reasonable assumption for most individuals, then with these variables (and the application of a series of federal and Ontario tax calculators) it is possible to calculate the change in annual personal income taxes resulting from DIP contributions and withdrawals. It is a small step from here to calculating longitudinal t_1 and t_2, the relevant marginal tax rates.

Reasonably sophisticated federal and Ontario personal income tax calculators were developed for each year from 1991 to 2001, based on the actual parameters of these tax systems in each of those years. These calculators incorporate basic tax brackets, tax rates, tax credits and surtaxes, as well as the provisions of the Ontario Tax Reduction program. The results of these calculators were validated by comparing their calculations to the actual personal income tax liabilities of individuals, as reported in the LAD.

The calculators tracked the actual mean tax liabilities of subgroups very well, typically within one half of one percent. The calculators should be considerably more accurate in calculating changes in tax liability at the margin.

For each year, each individual's tax liability was calculated before and after the impact of DIPs. To establish t_1, an individual's taxable income was increased by his or her RRSP contributions and pension adjustment for the year. The resulting change in tax liability divided by the amount of DIP saving yields annual t_1. Similarly, to establish t_2, an individual's taxable income was reduced by the size of their DIP withdrawal, and their non-refundable tax credits were reduced by the pension income tax credit (as applicable). The resulting decrease in their federal and Ontario personal income tax liability, divided by total DIP withdrawals, is a measure of annual t_2. These changes in annual tax liability were calculated in nominal dollars, converted to real dollars, and discounted using a real 3% rate to yield the change in longitudinal personal income taxes resulting from DIP contributions and withdrawals. Dividing the latter by the actual longitudinal DIP contributions and withdrawals yields the required longitudinal measures of t_1 and t_2.

4.6 Program entitlement calculators

As previously discussed, there are many programs (whether expenditure programs or refundable tax credits) which provide entitlements to individuals that depend, in part, on individual or family net income or taxable income. Typically, these programs reduce or "claw back" benefits as the income of an individual or family increases. While not formally taxes, these entitlement reductions or clawbacks effectively have the same distributive impacts (and the same behavioural incentives) on individual and family welfare as taxes do. In an attempt to be more comprehensive, this research supplements its analysis of the distributive effects of DIP saving on individuals' personal income taxes with an analysis of the distributive effects on the entitlements provided by nine different programs from 1991 to 2001. The nine programs (6 federal, 3 provincial) being analyzed were chosen as those likely to have the greatest distributive impact, and as being reasonably amenable to modeling. Four of the programs are past or present child benefit programs, three are public pension programs, and the other two are miscellaneous refundable tax credits. The programs are:

1. Canada Child Tax Credit (CTC)

2. National Child Supplement (NCS)

3. Ontario Child Care Supplement for Working Families (OCCSWF)

4. Family Allowance (FA)

5. Guaranteed Income Supplement (GIS)

6. Ontario Guaranteed Annual Income System (GAINS)

7. Old Age Security (OAS)

8. GST Credit (GSTC)

9. Ontario Property and Sales Tax Credits (OPSTCs)

The OPSTCs are delivered directly through the tax system. The rest of the programs are linked directly or indirectly to net or taxable income as reported through the tax system. Except for the child benefit programs, these programs were in effect for all of the 1991-2001 period. Child benefit programs were also in effect throughout this period, but underwent considerable change, with no one program being in force throughout the entire period.

These programs all exhibit the same sort of basic structure. First, an individual's or family's base (or gross) entitlement to benefits under the program is established according to the program's parameters for the year in question; this often depends on a number of demographic and other variables. These variables can include number of children, age of children, the number of spouses in the family, marital status, age of adults, family earnings, net family income and so forth. As the LAD is organized in a family universe as well as an individual one, the family-level variables necessary to make these calculations are generally available.

Second, base benefit entitlements are clawed back, at a particular "clawback rate", as individual or family net income exceeds a prescribed level, the "clawback threshold". The result is the net benefit payable to that individual or family under the program.

Much in the same way that a DIP contribution lowers the personal income tax payable in the year, a DIP contribution, by reducing individual or family net income, can have the effect of increasing the net entitlement received by an individual or his family under one of these programs utilizing clawbacks. Similarly, DIP withdrawals can reduce net entitlements under these programs. In the case of the GSTC, not only is the net entitlement tied to net income, but some aspect of the base entitlement is as well.

Calculating the impact of DIP saving on individual entitlements under these programs closely parallels the calculation of benefits from the personal income tax; the same formula can be applied. The clawback rate is analogous to the tax rate. Unlike the personal income tax, where the tax brackets and rates are quite orderly, and tax liability is open-ended, the clawbacks associated with these programs are quite disparate. The clawbacks cease to be relevant once the net benefit is exhausted (i.e., there is a ceiling on the clawback), and the clawback rates and clawback ranges differ markedly among the programs. Some programs, such as the OPSTC, the GSTC and the CTC utilize relatively moderate clawback rates over large income ranges. Other programs, such as GIS, GAINS, and NCS, utilize punitively high clawback rates (up to 50%) over much narrower income ranges.

Nine entitlement calculators were developed to model the net entitlements provided by these programs to an individual or family. This was done utilizing the actual program parameters for each of the years from 1991 to 2001. Base entitlements were established, and the clawback rates and thresholds were then applied to establish net entitlements.

It should be noted that in most cases, the actual benefits received from these programs are not included as LAD variables. The calculators model entitlements using LAD data on individual and family circumstances. It is clear that significant numbers of individuals do not apply or otherwise do what is necessary to actually receive some of these entitlements. For example, there has been considerable media attention in the past few years paid to the fact that a significant number of the elderly have not received the GIS even though they were eligible, because they never applied. In that sense, this portion of the DIP benefit analysis reflects changes in potential program entitlements caused by DIP saving, which may or may not have been actually received. This is not necessarily a weakness.

Entitlements under these programs were modeled before and after DIP contributions, and before and after DIP withdrawals, year by year, to yield the stream of annual changes attributable to DIPs. Changes in family-level entitlements were allocated between spouses, where applicable, in accordance with individual shares of annual family DIP contributions and withdrawals. These changes in annual entitlements were then discounted to yield the longitudinal change in program entitlements resulting from each of DIP contributions and DIP withdrawals. The marginal tax rates, t_1 and t_2, were then

created by dividing the former by individuals' actual longitudinal DIP contributions and withdrawals.

TABLE 1
SUBGROUP EARNINGS AND INCOME DATA ($ 2000)

Age Cohort	Longitudinal Earnings Percentile	Mean Longitudinal Earnings	Mean Equivalent Annual Earnings	Minimum Equivalent Annual Earnings	Maximum Equivalent Annual Earnings	Mean Equivalent Annual Total Income
25-34	p0-p20	$49,700	$3,877	$0	$9,549	$10,641
25-34	p20-p40	$201,500	$15,717	$9,549	$21,648	$19,803
25-34	p40-p60	$353,300	$27,557	$21,648	$33,120	$30,641
25-34	p60-p80	$509,800	$39,764	$33,120	$47,183	$42,232
25-34	p80-p90	$678,200	$52,900	$47,183	$59,120	$55,148
25-34	p90-p100	$1,157,900	$90,316	$59,120	unlimited	$92,958
35-44	p0-p20	$65,900	$5,140	$0	$12,296	$11,211
35-44	p20-p40	$248,900	$19,414	$12,296	$26,246	$23,331
35-44	p40-p60	$419,900	$32,752	$26,246	$39,190	$36,007
35-44	p60-p80	$608,200	$47,440	$39,190	$56,930	$50,683
35-44	p80-p90	$807,000	$62,946	$56,930	$69,831	$66,183
35-44	p90-p100	$1,609,200	$125,518	$69,831	unlimited	$123,662
45-54	p0-p20	$48,800	$3,806	$0	$9,930	$12,641
45-54	p20-p40	$203,500	$15,873	$9,930	$22,261	$23,556
45-54	p40-p60	$360,100	$28,088	$22,261	$34,676	$35,803
45-54	p60-p80	$539,300	$42,065	$34,676	$51,690	$49,817
45-54	p80-p90	$744,600	$58,079	$51,690	$66,690	$65,613
45-54	p90-p100	$1,555,400	$121,321	$66,690	unlimited	$134,775
55-64	p0-p20	$0	$0	$0	$35	$21,810
55-64	p20-p40	$22,100	$1,724	$35	$4,225	$22,042
55-64	p40-p60	$88,900	$6,934	$4,225	$10,887	$24,711
55-64	p60-p80	$200,000	$15,600	$10,887	$22,951	$33,803
55-64	p80-p90	$352,300	$27,479	$22,951	$35,099	$45,169
55-64	p90-p100	$1,069,300	$83,405	$35,099	unlimited	$102,859
65+	p0-p20	$0	$0	$0	$0	$34,563
65+	p20-p40	$0	$0	$0	$0	$24,275
65+	p40-p60	$0	$0	$0	$0	$29,028
65+	p60-p80	$150	$12	$0	$352	$61,289
65+	p80-p90	$18,600	$1,451	$352	$3,479	$29,317
65+	p90-p100	$295,600	$23,057	$3,479	unlimited	$19,866

5.0 EMPIRICAL RESULTS: DIP BENEFITS (PIT BENEFIT FRAMEWORK)

5.1 Introduction

This section presents empirical results on the size, composition and distribution of DIP benefits realized (or projected to be realized) by individuals from their DIP saving from 1991 to 2001. The DIP benefits being measured in this section are restricted to the PIT benefit framework – those provided directly by the personal income tax system (combined federal plus Ontario), i.e., no attempt is made in this section to incorporate the impact of DIPs on the various entitlement programs discussed in section 4.
The quantification of these personal income tax benefits has been performed using a comprehensive annual income tax as the relevant counterfactual, i.e., benefits are measured relative to the results individuals would receive saving comparable after-tax amounts under a comprehensive annual income tax. DIPs are considered strictly in isolation; no other policy, fiscal, or behavioural changes are assumed to accompany the implicit removal of DIPs. As discussed in section 4, a comprehensive annual income tax taxes all real returns to saving as regular income; however, the inflationary component of the nominal return to saving is not taxed, as it does not represent a real increase in wealth.

Rather than proceeding directly to the final results on the size and distribution of DIP benefits, the intermediary results for the various components of the benefit formula developed in section 4.3 are fleshed out in some detail in order to provide insights into the outcomes that ultimately result from their combination. The DIP benefit formula is repeated here for convenience:

$$\text{DIP Benefits} = \underbrace{(t_1 - t_2)R}_{(1)} + \underbrace{\frac{R(1-t_1)\left[(1+r)^n - (1+(1-t^*)r)^n\right]}{(1+r)^n}}_{(2)}$$

Recall that the first term represents tax-averaging benefits, and the second term measures tax-shelter benefits.

5.2 R : Participation Rate

The foundation for determining tax benefits received through DIP saving is the actual incidence of DIP saving itself, i.e., how many individuals are saving using DIPs, and how much are they saving? Chart 1 provides an initial answer to this question by examining the DIP participation rate of individuals in the cohorts, across earnings groups. Over the 1991 to 2001 period, most individuals saved using DIPs in at least one year. Well over 90% of individuals in each of the top four earning groups (p40-p100) of each cohort participated. Participation was very strong, averaging greater than 80%, in the second earnings group (p20-p40) of each cohort. Only in the lowest income group (p0-p20) of each cohort was participation sharply lower, at between some 30-40%. Given the very low earnings and income of the lowest earnings group of each cohort, as seen in Table 1, the participation rate is surprisingly high. The latter may reflect high variability of income, i.e., a few years with significant earnings (making DIP saving more likely), followed or preceded by years of considerably lower earnings. The participation pattern across earnings groups is very consistent across the age cohorts. The participation rates of

the younger cohort are somewhat lower overall, particularly so for the lowest two earnings groups.

Chart 2 examines participation rates from 1991 to 2001 by type of DIP for a representative cohort (the age 35-44 cohort). Participation rates are shown for all DIPs (as in Chart 1), and separately for RPP participation and RRSP participation. RPP participation rates are lower than RRSP participation rates for all earnings groups; this is logical because all individuals with earnings have independent access to RRSPs, but not everyone with earnings is a member of an RPP. The RPP participation rate starts very low with the lowest earning group, and then increases steadily with relative earnings until the highest earning group, where it drops off, likely reflecting self-employed professionals with large earnings but without access to an RPP. In contrast, the RRSP participation rate increases quickly over the lowest few earnings groups and then levels off considerably. Note that the DIP saving categories are not mutually exclusive; an individual saving in both an RPP and an RRSP is captured in both participation rates.

5.3 R: Amount of DIP Saving

The participation rates provided in Charts 1 and 2 provide no indication of intensity or depth of DIP participation. Chart 3 addresses this point by showing the mean longitudinal DIP saving of those individuals who did save in DIPs, expressed as a percentage of their longitudinal earnings. The reformed DIP system is designed to provide DIP saving limits equal to 18% of longitudinal earnings (also capped with a dollar limit).

In the 1991-2001 period, there were also opportunities, above and beyond the basic 18% limit, for some individuals to contribute retiring allowances and pension income to their RRSP. These extra opportunities were mostly short-term, primarily available as transition measures from the pre-reform system to the reformed system. A limited capacity to transfer retiring allowances or severance pay to an RRSP, on top of normal DIP limits, still exists in the current DIP system, but it primarily applies to pre-reform years of service only.

Across the cohorts, the share of savers' longitudinal earnings saved in DIPs increases steadily across the first four earnings groups, from 6.4% to 12.2% of earnings for the age 25-34 cohort, and from 9.0% to 14.6% of earnings for the age 35-44 cohort. Here, the trends between these two cohorts diverge. The savings rate flattens out at 12.2% for the age 25-34 cohort, then drops to 10.9% for the highest earnings group. The latter group saves more in absolute dollar terms, but their high earnings hits the fixed dollar DIP limits, so their DIP saving rate as a proportion of earnings falls. The savings rate of the age 35-44 cohort does not flatten out for the p80-p90 earnings group, but increases significantly, to 18.6%. This reflects very strong RPP saving in particular, significantly greater than that done by earnings groups below or above them in earnings distribution of their cohort, or by the equivalent earnings group in other cohorts. It seems that this subgroup's combination of age and earnings is the "sweet spot" for consistently accruing benefits under an RPP. Once again, the savings rate for the highest earnings group of this cohort drops substantially. Average DIP saving for this earning group, expressed in dollars, is comparable to that of the p80-p90 earnings group. The lower savings rate

reflects much higher earnings; presumably the DIP limit restrictions are operating to restrict DIP saving from keeping pace with this subgroup's earnings. The RPP saving for this highest decile is much lower than for the p80-p90 decile, but this is offset by much higher RRSP saving.

More generally, the difference in DIP saving rates between the age 25-34 cohort and the age 35-44 cohort is largely a reflection of differences in RPP saving; more of the older cohort are accruing benefits under an RPP. This is as expected.

5.4 R: Short-term vs. Long-term DIP Saving

As discussed in more detail in section 4.4, each subgroup's DIP saving has been divided into two components: short-term and long-term saving. Short-term saving consists of those DIP contributions made in the 1991 to 2001 longitudinal period that are balanced by offsetting DIP withdrawals in that period. The balance of a cohort's DIP contributions in the period, where no offsetting withdrawal is observed, is considered long-term saving that is assumed held until retirement age.

Charts 4 and 5 examine the DIP saving of the cohorts in this context. A clear pattern emerges across the cohorts. The DIP saving of the lowest earnings group (p0-p20) of each cohort consists almost entirely of short-term saving; the vast majority of DIP contributions made by these subgroups are offset by DIP withdrawals. This finding flips completely around in the second earnings group (p20-p40), with some three-quarters of

DIP saving being long-term. Long-term saving clearly dominates short-term saving in these cohorts as one moves up the earnings distribution from there.

5.5 Marginal Tax Rates on Deduction (t_1)

Another component needed to calculate the benefits received by individuals through their use of DIPs is the marginal tax rate that applied to their DIP contributions, or more properly, DIP deductions, from income. This is t_1 in the formula laid out in section 4.3. In much of the tax expenditure literature, t_1 is taken as a measure of the benefit of saving $1 in a DIP. The inadequacy of such an approach has been discussed in section 4.

Chart 6 provides a stylized picture of the relationship between an individual's annual taxable income and combined federal and provincial marginal personal income tax rates in Canada from 1991 to 2001. It is a simplification for illustrative purposes; it does not accurately reflect the impact of most tax credits, surtaxes and other elements that are captured by the more complex personal income tax calculators actually used to calculate marginal tax rates in this study. Taxable income is taxed with a series of step-like marginal tax rates, like a staircase, that increase with income. Each "slice" of income, as defined by the tax brackets, is assigned a separate marginal tax rate. For example, in Chart 6, the first $7,000 of annual taxable income is taxed at a 0% rate. The next $23,000 of annual taxable income (from $7,000 to $30,000) is taxed at a 25% rate. The subsequent $30,000 of taxable income (from $30,000 to $60,000) is taxed at a 40% rate, and so on.

The actual mean marginal tax rate that applied to the deduction of individuals' longitudinal DIP saving (t_1) from 1991 to 2001, by age cohort and earnings group, is shown in Chart 7. All marginal tax rates reflect combined federal and provincial personal income taxes. These marginal tax rates were calculated by applying the personal income tax calculators described in section 4. The marginal tax on deduction increases relatively smoothly and consistently across each cohort's earnings groups. For the age 25-34 cohort, it increases from roughly 21.5% for the lowest earnings quintile to 47.5% for the top decile. A widely similar pattern applies to the other cohort. The mean marginal tax rates at deduction for the younger cohort lags those of the older, reflecting lower earnings at an earlier point on their life-cycle.

5.6 Short-term Tax-Averaging Rates (t_1-t_2)

The tax-averaging rate (t_1-t_2) realized by an individual is an important determinant of the benefits he receives from DIP use.

It may be useful to consult Chart 6 again to help conceptualize tax averaging. The marginal income tax rates that an individual faces over his lifetime will typically vary considerably over the years. Putting aside changes in the tax system over time, an individual's annual taxable income will be affected by many short-term and long-term factors. Schooling, regular promotions and seniority, overtime, disability, unemployment, increasing financial wealth, and retirement are just a few of many factors that can cause an individual's annual taxable income to vary significantly across a lifetime. Effectively, each

individual faces a whole set of the staircases of marginal tax rates depicted in Chart 6, one for each year of their life. In some years, an individual might be on the highest steps of the marginal tax rate staircase, while in other years, he would be on lower steps. Given the tools, an individual interested in minimizing his lifetime taxes would move as much of his income through time from the higher steps to lower steps in other years, as was possible. Taken to the limit, this would lead an individual to have the same marginal tax rate in every year; hence, the term "tax averaging". DIPs are one of the tools that are available, within limits, to do this. In essence, the tax-averaging rate is the difference in height between steps. If an individual is able to contribute $5,000 to a DIP at a marginal tax rate of 40% in one year, and withdraw it at a marginal rate of 25% in another year, then he has a positive tax-averaging rate of 15%. It is worth noting that some taxable income ranges offer better tax-averaging opportunities than others; the marginal tax rate steps are much steeper at low to moderate levels of taxable income than they are at high levels of taxable income.

Chart 8 depicts the development of the mean short-term tax-averaging rate. It shows the mean marginal tax rate at deduction of longitudinal DIP contributions (t_1) and the mean marginal tax rate paid on longitudinal DIP withdrawals in the period (t_2) for the age 25-34 cohort. The mean tax-averaging rate is the vertical distance between these two lines. In this case, mean t_1 is greater than mean t_2 for each earnings group. This means that each subgroup enjoyed positive tax-averaging benefits on average, i.e., it was able to transfer income saved in DIPS across time to a year when it was taxed at a lower rate. Chart 8 shows that the lowest earnings groups enjoyed a substantially positive tax-averaging rate, which, while remaining positive, generally decreased with earnings.

The tax-averaging rate did increase slightly for the highest earning decile. The rates shown are combined federal and provincial personal income taxes.

The mean short-term tax-averaging rate across earnings groups is shown directly for the cohorts in Chart 9. To reiterate, the short-term tax-averaging rate is that applying to DIP contributions that were also withdrawn within the longitudinal period. The marginal tax rates at contribution (t_1) and the marginal tax rates at withdrawal (t_2) used in its construction reflect the actual, observed marginal tax rates that applied to individuals who made both substantive DIP contributions, and DIP withdrawals, during the longitudinal period.

The short-term tax-averaging rate results are very comparable for the two cohorts. The tax-averaging rate is highest for the lowest earnings group, approaching 10%. It falls quite sharply through the middle of the earnings distribution, and levels off at much lower levels, below 4%, for the higher earnings groups. This result is fairly intuitive.
It correlates well with the shape of the marginal tax rate curve; the change in marginal tax rates between tax brackets is quite large at low taxable income levels, but decreases significantly as taxable income rises. Someone at the bottom end of the earnings distribution may have the potential to move taxable income from the 40% tax bracket to the 25% bracket, or possibly even from the 25% bracket to the zero bracket, through their DIP contributions and withdrawals. An individual in the highest longitudinal earnings group does not have such large tax-averaging opportunities, unless the variability of his taxable income over the years in question is very dramatic, crossing multiple tax brackets.

Chart 10 moves beyond the mean of short-term tax-averaging rate to consider its distribution for individuals in the age 35-44 cohort. Within each earnings group, individuals have been ranked from lowest to highest by their short-term tax-averaging percentile across the x-axis. Although the numbers are different, the general pattern seen at the median (the 50th percentile) is similar to that at the mean; short-term tax-averaging rates are reasonably sizeable for the lowest earnings group, at 6.6%, then decrease with earnings, remaining within a tight range of 1% to 2.1% for the top four earnings groups.

However, individuals' short-term tax-averaging rates vary widely. With one minor exception (the p0-p20 earnings group), more than 25% of the individuals in each earnings group have negative tax-averaging rates, i.e., their marginal tax rate on DIP withdrawal is higher than that on contribution. On the other hand, some individuals are able to make withdrawals at much lower marginal tax rates than that applying to their contributions; those at the 95th percentile in each earnings subgroup enjoy tax-averaging rates ranging from 19%-20% for the highest earnings groups, to 30% for the lowest earnings groups.

The magnitude of changes in marginal tax rates in the relevant taxable income range clearly has a persistent impact on short-term tax-averaging rates. All across the distribution of tax-averaging results, the lowest earnings group has the most extreme tax-averaging rate (largest positive or largest negative). At each point in the distribution of tax-averaging results, with a few minor exceptions, the magnitude of the tax-averaging rate falls as earnings rise, which is completely consistent with the reductions in the size of marginal tax rate increases as taxable income rises.

5.7 Projected t_2 and Long-term Tax-Averaging Rates (t_1-t_2)

Long-term DIP saving is DIP saving that was contributed during the 1991 to 2001 period, but is not offset by DIP withdrawals during that period. It is projected that it will be withdrawn in the future, at retirement age. Therefore, unlike short-term tax-averaging rates, where both t_1 and t_2 were directly observed, for long-term DIP saving, only t_1 has been observed. Consequently, t_2 has been projected using a synthetic cohort approach that matches the subgroups of younger cohorts to subgroups in retirement-age cohorts, and projects that the future t_2's of the younger cohorts will be equal to those of their matched counterparts of retirement age. As discussed in section 4.4, for the purpose of this matching, the earnings distribution of the retired cohorts has been established using each individual's best five years of earnings from 1982 to 2001.

Chart 11 shows the projected mean long-term t_2 by earnings subgroup, which is applied to all cohorts. What is immediately striking is how flat most of the curve is. It is much flatter than the marginal tax rate curve applying to DIP deductions in Chart 7, for example.

The mean marginal tax rate applying to DIP withdrawals increases with earnings group, but at a very modest slope, for most of the earnings distribution. It increases substantially more rapidly for the upper two deciles, particularly the top earnings decile. Further insight is available from examining the underlying income data in Table 1. The longitudinal income distribution of the age 55-64 and age 65+ cohorts is much more compressed than that of younger cohorts. This is particularly true for the earnings groups

below the 90th percentile. Consequently, the mean marginal tax rates applying to their DIP withdrawals are likewise compressed. Much of this is likely the result of the nature of Canada's public pension system – as discussed in section 2, in the main, it operates to provide a minimum income floor. In addition, many individuals undoubtedly find themselves unable to save enough for complete consumption averaging between their working and retired life. Many other individuals appear to prefer early retirement with lower consumption over later retirement with full consumption averaging.

The projected mean long-term tax-averaging rates for each cohort, across earnings groups, are shown by Chart 12. For each cohort, the overall projected long-term tax-averaging rates are considerably higher than the short-term tax-averaging rates shown in Chart 9; this reflects the fact that, overall, the taxable income of a cohort is projected to drop significantly upon retirement.

The relationship between projected long-term tax-averaging rates and longitudinal earnings group is very different from the short-term rates – practically inverted. Projected mean long-term tax-averaging rates for the lowest earnings groups are negligible or even negative; the mean tax-averaging rate is -1.5% for the age 25-34 cohort, and roughly zero for the age 35-44 cohort. They increase quite strongly through the middle of the earnings distribution, before leveling off, even declining, for the highest earnings groups. For the age 25-34 cohort, the projected long-term tax-averaging rate peaks with the p60-p80 earnings group at about 14.6%, then falls to 13.6% and 13%, for the highest two deciles, respectively. The projected rates for the age 35-44 age cohort consistently increase

going up the earnings distribution, peaking at 18.2% for the second highest earning decile (p80-p90), and then dropping back down to under 15% for the highest decile.

The factors underlying the long-term tax-averaging rates are more complex than was the case with short-term tax-averaging rates. Short-term tax-averaging rates seem largely a reflection of the basic marginal tax-rate structure; changes in the marginal income tax rates applying to those taxable income ranges being typically impacted by the DIP saving of the lower earnings groups are quite large. This produces large tax-averaging rates for these groups. This is less and less true as earnings increase. This basic marginal tax rate and bracket structure appears much less dominant in determining the projected long-term tax-averaging results for DIPs. What appears to be more significant is the size of a cohort's projected income at retirement relative to their current income, i.e., their income replacement rates.

Consulting Table 1, the total income of the age 55-64 and age 65+ cohorts is about three quarters that of the cohorts in their prime working years. The gap between working and retirement age income for a cohort as a whole is sizeable, which suggests that overall long-term tax-averaging rates are significantly positive. However, there is a wide divergence in income replacement rates across the earnings groups in a cohort, as seen in Table 1, and this is reflected in the wide differences in projected long-term tax-averaging rates observed across earnings groups. For a rough estimate of these differences in income-replacement rates, compare the mean equivalent annual total income of the earnings groups of the cohort in its prime working years (age 35-44) with their equivalents in the two oldest cohorts. Averaging the data in the two oldest cohorts to yield projected

long-term data, the lowest earnings group (p0-p20) of a cohort appears to have an income-replacement rate exceeding 100%. As one goes up the earnings distribution from there, income-replacement rates are roughly 100%, 80%, 65%, 65% and 60% respectively. This has important ramifications for long-term tax-averaging rates. All else being equal, for a tax system with increasing marginal tax brackets, the greater the gap between an individual's income during their working years, and their non-DIP retirement income, the greater the prospect for high long-term tax-averaging rates.

Therefore, the lowest two earnings groups face projected mean taxable income at retirement that is greater than their current income; the result is a small, negligible, or even negative projected mean tax-averaging rate, even though individuals in these subgroups typically face very steep marginal tax "steps". The projected retirement income of the middle earnings groups is substantially lower than their current working income. In addition, the height of the marginal tax steps they act upon with their DIP saving is reasonably steep. As a result of both of these factors, their projected long-term tax-averaging rates are considerably higher. At the top of the earnings distribution, the relative income gap between working and retirement taxable income is even larger, but individuals face a much flatter marginal tax rate structure applying to their DIP withdrawals. The result is that projected long-term tax-averaging rates level off, and then decrease at the top of the earnings distribution.

Another influence, albeit more minor, on the projected long-term tax-averaging rates, is the pension income credit. It provides a certain amount of positive tax averaging, by effectively lowering t_2 for all earnings groups, independently of the formal tax brackets.

As it is capped at $1,000 per year, the pension income credit will tend to have the largest impact on the tax-averaging rates of the lowest earnings groups and a relatively minor impact on the highest earnings groups.

5.8 Marginal Tax Rates on Capital Income (t*)

The mean short-term and projected long-term marginal income rates applying to real capital income in the counterfactual (t*) are shown in Chart 13. These marginal tax rates have been estimated by taking individuals' marginal tax rate on their DIP saving, and increasing it modestly to reflect the fact that capital income in the counterfactual would be added to, not deducted from, pre-DIP taxable income. Given the use of the comprehensive annual income tax as the counterfactual, these marginal tax rates have been applied to real capital income (a 3% rate of return) in the counterfactual, not to a nominal rate of return.

Short-term t* applies to short-term DIP saving, and reflects a subgroup's actual marginal tax rate during the 1991 to 2001 longitudinal period.

Projected long-term t*, which is used to calculate tax-shelter benefits until age 70, has been calculated using a synthetic cohort approach that matches subgroups across cohorts on the basis of longitudinal earnings. This was discussed in more detail in section 4.4.

For the age 25-34 cohort, short-term t* starts at roughly 22% for the lowest earning group, and increases steadily across the earnings distribution to 47.5%. Projected long-term t* follows a similar pattern, but lies above short-term t* at every point in the earnings distribution. This reflects the fact that this cohort is at an early point in its

earnings life-cycle; the mean taxable income of all of its earnings groups is projected to increase over the remainder of their working life.

Short-term t* for the age 35-44 cohort shows a broadly similar pattern, but is generally larger than the short-term t* of the younger cohort, reflecting its higher income. The projected long-term t* for the age 35-44 is typically very similar to its short-term t*, another indication of this cohort's relative maturity in its life-cycle.

5.9 DIP Benefits: Size, Composition and Distribution

At this point, one can pull together all the components of the DIP benefit formula that have been developed above, and calculate the benefits realized by or projected for individuals resident in Ontario as a result of their saving in DIPs from 1991 to 2001. The benefits in question are the tax savings realized under the combined federal and provincial personal income tax (the PIT benefit framework). Benefits are measured relative to a proper comprehensive annual income tax base that taxes only the real return to saving. DIPs are considered strictly in isolation.

There are a number of different contexts or frameworks that may provide insights regarding the size of DIP benefits or assist in making judgements about the distribution of DIP benefits. For example, the most traditional criticism of DIPs in the policy literature, and more generally, is that they are unfair because they are a tax deduction and, thereby, offer benefits that correspond to an individual's marginal tax rate, which increases with income. The inadequacies of this argument have been discussed at some length. However,

implicit in this argument is a judgement that the benefit per dollar saved is an important criterion against which the distributive impact of DIPs should be judged. This sort of reasoning was also used to argue that the conversion of most tax deductions to tax credits in the 1988 federal income tax reform increased the equity of the tax system.

More typically, when evaluating distributive outcomes, the formal tax expenditure literature takes a broader approach that examines how the total benefits associated with a tax expenditure are shared across income groups, as compared to some reasonable standard of comparison. There is debate about what standard of comparison is most appropriate, but typically the standards of comparison used are a group's share of income, and a group's share of income tax liabilities. Under this sort of approach, the share of benefits received by an income group will be a product not only of the benefit per dollar saved, but also of the group's participation rate and the mean amount saved by its members.
This methodology is directly related to the supplementary argument sometimes made about the distributive impact of DIPs – that they are unfair because higher income individuals are more likely to be savers, and to save more, than individuals with lower incomes.

The present value of mean DIP benefits per saver, broken down by cohort and earnings group, is shown in Chart 14 in constant 2000 dollars. Mean DIP benefits range from $616 to $53,493. Benefits for the lowest earnings group of each cohort are particularly small. With only one exception, mean benefits increase with earnings (they fall with earnings between the top two earnings groups in the age 35-44 cohort). Benefits are larger for the older cohort.

Mean DIP benefits are expressed relative to savers' earnings in Chart 15. All variables are longitudinal, expressed in present value terms. For the age 25-34 cohort, total benefits start at just under 1% of earnings for the lowest earnings group, and increase steadily across the earnings distribution, reaching 4.5% for the p60-p80 subgroup, at which point they level off, and then fall slightly to 3.9% of savers' earnings for the highest earnings group. Mean DIP benefits are somewhat higher overall for the age 35-44 cohort, particularly for the p40-p60 and p80-p90 subgroups. The large size and relative prominence of the benefits experienced by the second highest earnings group (p80-p90), at about 6.6% of longitudinal earnings, is of particular note. The main reasons for this have been identified earlier. As shown in Chart 3, this subgroup's DIP saving relative to earnings is significantly larger than any other; in particular, this reflects its very strong accrual of RPP benefits. This subgroup also has the highest projected long-term tax-averaging rate, as shown in Chart 12. Also notable are the relatively low benefits of the highest earnings group of this cohort. This subgroup's DIP benefits, expressed in absolute dollars, are slightly lower than those of the p80-p90 subgroup. However, the small size of DIP benefits relative to earnings for this subgroup primary reflects its large earnings. Presumably, the dollar cap on DIP saving limits has operated to restrict its DIP saving. This subgroup has mean annual earnings considerably higher than those generating DIP saving room. So effectively, the numerator (DIP saving or benefits) is capped, while the denominator (earnings) is not. It may be worth noting that if the top two earnings deciles are combined into a p80-p100 quintile, the results are much smoother, with benefits equal to 4.3% of savers' earnings, which falls between those of the two preceding quintiles.

Charts 16 and 17 break the total DIP benefit into its underlying components. While tax-averaging benefits are significant for all subgroups, tax-shelter benefits are larger than tax-averaging benefits for all but the lowest earnings group of each age cohort. That is, the difference between the marginal tax rate when DIP saving is contributed, and when it is withdrawn, provides smaller benefits than the ongoing sheltering of capital income from taxation during the compounding period. The younger the cohort, the more true this will be, as the compounding period will be correspondingly longer.

Long-term benefits are also much larger than short-term benefits for all but the lowest earning group. It must be noted that, while the lowest earnings group captures some significant short-term tax-averaging benefits, these are at the expense of significantly larger potential long-term tax-shelter benefits.

The mean longitudinal DIP benefit per dollar saved is shown in Chart 18. It is quite low for the subgroups with the lowest earnings, at $.13 for the youngest cohort, and $.11 for the age 35-44 cohort. The DIP benefit per dollar then increases to $.25 and $.22 for the second earning groups, and stays in a tight range between $.30 and $.37 for the rest of the earnings distribution of both cohorts. It is quite striking how little variation there is in the benefit per dollar saved across the top four subgroups. Past the 40th percentile of the earnings distribution, the benefit received per dollar saved is very consistent, at between $.30 and $.37. With the exception of the lowest quintile, all of the subgroups receive a substantial benefit rate on their DIP saving. There is considerable equality of benefit opportunity across most of the earnings distribution; for those individuals with significant

earnings, the differences in DIP benefits received are primarily a function of the amount of DIP saving done, not of the mechanics of DIP tax treatment.

Table 2 presents the subgroup shares of cohort DIP benefits, as well as their cohort shares of various measures potentially relevant as standards of comparison: population, income, earnings, income tax liabilities, and DIP saving. Population is something of a "straw man"; it is difficult to argue that the benefits of DIP saving should be shared equally among all individuals, regardless of DIP saving, earnings, income or tax liabilities. For the purpose of symmetry, the top two earnings deciles have first been consolidated into one quintile. This facilitates comparison with the existing literature, some of which is not broken down so finely. The top quintile is subsequently broken out separately into deciles.

DIP benefits are heavily concentrated in the top three longitudinal earnings quintiles; in both cohorts, about 95% of DIP benefits are realized by these quintiles. The top quintile alone captures more than 50% of each cohort's DIP benefits. However, income, earnings, tax liabilities and DIP saving, the most relevant standards of comparison, are almost as highly concentrated as DIP benefits. In each cohort, the bottom quintile's share of DIP benefits is less than half of one percent, which is well under its share of total income, earnings, income tax or DIP saving. The same information is also presented in Table A1 in the Appendix.

The share data from Table 2 have been standardized by creating indices of relative advantage by dividing an earning group's share of DIP benefits by its share of income, personal income taxes, and DIP saving, respectively. An index number of one indicates

that a group's share of benefits is proportionate to its share of the comparison variable. These indices are presented in Charts 19 to 22. These indices are also presented in table A2 in the Appendix. Chart 19 shows the indices for the age 35-44 cohort broken into five earnings subgroups; the earnings distribution is broken out by quintile. Chart 20 shows this cohort broken into six earnings subgroups; the top quintile has been disaggregated into deciles. The results for the age 35-44 cohort are highlighted because the data suggest that it is more representative of individuals' lifetime interaction with the DIP system, in that this cohort's RPP saving is more mature than that of the younger cohort, i.e., the younger cohort hasn't quite hit its stride yet in this regard. Charts 21 and 22 apply the same analysis to the age 25-34 cohort.

Chart 19 shows that, for the age 35-44 cohort, the lowest quintile's share of DIP benefits is much lower than its share of income, taxes or DIP saving. The second quintile's relative share of DIP benefits is appreciably higher, but still less than one. DIP benefits are at least as concentrated as income for each of the three highest earnings quintiles; the relative concentration of benefits increases between the third and fourth quintile, and drops modestly between the fourth and fifth quintiles. It seems reasonable to characterize DIP benefits as being fairly proportional relative to income over the top three earnings quintiles (p40-p100).

DIP benefits are more concentrated than income taxes over the third and fourth quintiles, and less concentrated than income taxes for the fifth quintile. There is a clear downward trend of DIP benefits relative to income tax liabilities, i.e., DIP benefits appear progressive from p40 to p100, using a liability progression standard.

DIP benefits are just about as concentrated as DIP saving over the top three quintiles, although the ratio of DIP benefits to saving increases modestly with earnings. This finding parallels that shown in Chart 18, that DIP benefits per dollar saved are very consistent across these earnings groups.

Chart 20 disaggregates the top earnings quintile of the age 35-44 cohort into two deciles; it is otherwise identical to Chart 19. It is immediately apparent that the fifth quintile's relatively well-behaved results mask large differences in outcomes between the top two deciles. In the p80 to p90 subgroup, DIP benefits are substantially more concentrated than income or income taxes, and somewhat more concentrated than DIP saving. This is not a complete surprise, as the underlying charts have shown that this subgroup has the largest DIP saving relative to savers' earnings, and the largest DIP benefit per dollar of its cohort. In contrast, for the top decile, DIP benefits are significantly less concentrated than income, and much less concentrated than income taxes. These outcomes also parallel underlying findings, which, in particular, have demonstrated the constraint of the fixed dollar DIP limits on the DIP saving of this subgroup.

Indices of relative advantage for the age 25-34 cohort are shown in Chart 21 and Chart 22. As before, Chart 21 breaks the cohort into five quintiles, and Chart 22 breaks the top quintile more finely into deciles.

Examining Chart 21, the distributional picture of DIP benefits for the age 25-34 cohort is quite similar to the age 35-44 cohort. The main difference is that, for the younger cohort, the "crossover" point at which DIP benefits become more concentrated than income

and income taxes, and benefits switch from being regressive to more proportional to income, or progressive using a liability progression standard, is one quintile higher in the earnings distribution. This primarily reflects the fact that this younger cohort is still making the transition to accruing substantial benefits in RPPs. DIP benefits are much less concentrated than income, income taxes and DIP saving in the first quintile. Benefits become more concentrated across the second and third quintile, but do not reach an index number of one. In the fourth and fifth quintile, however, DIP benefits are significantly more concentrated than income, and remain relatively proportional across the quintiles. Benefits are significantly more concentrated than income tax liabilities for the fourth quintile, but are less concentrated than income taxes in the fifth quintile. DIP benefits are roughly as concentrated as DIP saving for these highest two quintiles. Chart 22 displays the same data, but breaks the top quintile into deciles. This confirms that DIP benefits are relatively more concentrated in the p80 to p90 decile than in the top decile, but not to the same stark extent as for the age 35-44 cohort. This largely reflects the lower level of RPP saving by this younger cohort.

Overall, the data developed on the distribution of DIP benefits under the personal income tax present a reasonably coherent portrait. Relative to a comprehensive annual income tax counterfactual, DIP saving offers a fairly substantial and relatively flat benefit rate, as measured by mean benefit per dollar saved, to most of the earnings distribution. This is much less true of the bottom of the earnings distribution, particularly the first quintile. As one would expect, these results are borne out by the share data, which show that at the bottom of the earnings distribution, DIP benefits are quite low relative to DIP

saving, but largely level out at a ratio close to one as earnings increase past the middle of the earning distribution.

The most striking finding of this research, using the "relative shares" approach to evaluating distributive outcomes, is that DIP benefits are much less concentrated at the top of the earnings distribution than is implied by the existing literature, or than is asserted by many policy advocates who criticize DIPs for their supposed regressiveness. There is no empirical literature that is directly comparable because the most relevant empirical research evaluates RRSPs rather than all DIP saving. St-Hilaire (1996) and Davies (1988) found that the benefits from RRSPs were substantially less concentrated than income for all quintiles except for the top quintile, at which point benefits were considerably more concentrated than income. Both studies also found that DIP benefits were regressive through the entire income distribution, relative to either income or income tax liabilities. In contrast, the research presented here finds that for the age 35-44 cohort, which is considered the most representative, DIP benefits are at least as concentrated as income for each of the top three quintiles, and that across the top three quintiles, DIP benefits are reasonably proportional to income, and progressive relative to income tax liabilities. This study also finds that, within the top quintile, DIP benefits relative to income or income taxes are at least twice as concentrated in the p80 to p90 decile as they are in the p90 to p100 decile, and that in the latter decile, benefits are significantly less concentrated than either income or income taxes. This is also a significant finding that does not appear in the existing literature.

The outcomes of the age 25-34 cohort are generally congruent with these findings for the older cohort. The outcomes for this younger cohort reflect a less "mature" level of RPP saving because of its age. Largely as a result of this, the basic characterization of the distribution of DIP benefits still generally holds, but is pushed up one quintile on the earnings distribution, and DIP saving and benefits are less concentrated in the p80-p90 subgroup. DIP benefits remain more concentrated in the p80-p90 subgroup than in the top decile, but less strikingly so.

To some, the relatively small benefits, however measured, provided by DIPs to the lowest earnings groups of the cohorts may tarnish what they might otherwise consider an attractive distributional picture. One of the pitfalls of examining one piece of a policy system in isolation, however, is that the broader context can be lost. Ideally, one would examine the size and distribution of benefits comprehensively across all retirement income programs and related tax provisions, rather than separately examining individual components. As discussed in the section on institutions, although DIPs are flexible and can be used by individuals for many purposes, their main role in the retirement income policy system is to enable individuals with average or greater earnings to save in an effective manner for retirement, thereby providing them with the ability to create a meaningful level of earnings replacement. Individuals in the lowest earnings groups have low earnings, even negligible in the case of the first quintile, and receive a high level of earnings replacement from the public pension system. It may not be reasonable to be highly critical of DIPs for not providing more significant benefits to the bottom end of the earnings distribution. The fact that DIPs have provided these subgroups with relatively small benefits may be a

largely unavoidable and not particularly significant outcome in the broader perspective. Most of the major policy components of the broader retirement system (GIS, OAS and CPP) are either primarily focused, or at least provide relatively larger benefits, to the bottom end of the earnings distribution. This likely more than offsets the regressiveness of DIP benefits for these groups. DIPs are really the only component of the retirement income system that is predominantly focused on serving the needs of the rest of the earnings distribution. It seems appropriate to be most interested in the distribution of DIP benefits across the middle and higher earnings groups.

Similarly, cautions about the partial nature of this analysis apply equally to the other subgroups. For example, in addition to these other explicit retirement income programs, the benefit implications of the tax treatment of principal residences should ideally be incorporated to form a broader distributional picture. Also, it has been shown that DIP benefits are relatively less concentrated in the top decile than in much of the earnings distribution, presumably reflecting policy design – the fixed dollar limits on DIP saving. However, it would be a mistake to assume that this provides a complete portrait of this subgroup's lifetime consumption averaging and benefits to saving. More so than the rest of the earnings distribution, the top decile of the earnings distribution is likely to have significant financial and real assets outside of DIPs, and a comprehensive analysis of the benefits provided by the entire tax and retirement income systems would have to incorporate the benefits associated with this other saving. Compared to a meaningful counterfactual, the mean benefit rate associated with saving outside DIPs, however, is

unlikely to be very high, for the reasons discussed in section 4.2. It is certainly unlikely to be as high as that applying to saving done through DIPs.

5.10 Distribution of RRSP Benefits: Comparison with the Existing Literature

As noted in the previous section, the existing literature does not evaluate all DIP saving, but tends to restrict itself to RRSPs. This makes comparing the results of this study with the literature, except in a very general way, problematic.

In order to facilitate more meaningful comparisons with the existing literature, the benefits associated with RRSPs, rather than broader DIP saving, have been calculated separately. The methodology used to do so is identical to that discussed, but saving was restricted to RRSP contributions only.

Charts 23 to 26 present share data expressed in the relative advantage indices used in the previous charts. Charts 23 to 25 show a subgroup's share of RRSP benefits relative to its share of income, income tax liabilities, and RRSP saving, respectively. Chart 26 shows the relative concentration of RRSP saving across subgroups.

The results of this research were compared to those contained in Davies (1988) and St-Hilaire (1996). Davies (1988) is the only study in the tax expenditure literature paying close attention to RRSPs, and St-Hilaire (1996) is one of the more recent general examinations of the distribution of Canadian tax expenditures. Both of these have been discussed in the literature review section. There are significant differences in methodology

and data among the sources being compared. These must be kept in mind when comparing the outcomes. Some of the most important follow.

St-Hilaire (1996) uses a simple cross-sectional approach, relying on 1991 data on individuals. There is no control for age or transitory income. RRSP benefits are measured as simply the value of the initial tax deduction.

Davies (1988) constructs a synthetic cohort using 1977 RRSP contribution data. Longitudinal data is used to create subgroups based on permanent income. The unit of analysis is married couples. Benefits are identified and measured using a lifetime benefit framework. Several counterfactuals are used; the results examined here are those from the "post-reform" or full-taxation counterfactual, in which the entire amount of nominal capital income is taxed.

This study, which is referenced as Moore (2005) in the charts, uses a longitudinal benefit framework that estimates the longitudinal or lifetime benefits from RRSP saving done from 1991 to 2001, by age cohort. The counterfactual is a comprehensive annual income tax. Data on RRSP saving and other parameters are drawn from a longitudinal databank containing 1991 to 2001 data on RRSP contributions, taxes and other parameters. The data presented in the charts are for the age 35-44 cohort, which is considered most representative of general DIP benefit outcomes. The population of individuals is divided into subgroups based on relative permanent earnings (longitudinal earnings from 1991 to 2001).

Chart 23 examines a subgroup's share of RRSP benefits relative to its share of income. Davies (1988) and St-Hilaire (1996) find that RRSP benefits are sharply regressive, and are less concentrated than income across all of the income distribution except for the top quintile, where they are substantially more concentrated than income.

This study finds that RRSP benefits are regressive between the first and third quintile, but relatively proportional, i.e., a flat percentage of income, between the third and the fifth quintiles. RRSP benefits are at least as concentrated as income for each of the top three quintiles, and benefits are more concentrated in the second, third and fourth quintiles and less concentrated in the fifth quintile than suggested by the rest of the literature. It does not appear in the chart, but disaggregating the top quintile into deciles reveals that benefits are quite proportional across the p80-p90 and p90-p100 earnings subgroups; the ratios of the share of RRSP benefits to share of income for these subgroups are 1.17 and 1.07, respectively. This confirms that RPP saving, not RRSP saving, is primarily responsible for the huge spike in DIP benefits for the p80-p90 subgroup, as shown in Chart 20.

Chart 24 shows the research outcomes for subgroups' share of RRSP benefits relative to their share of income taxes. Davies (1988) finds RRSP benefits to be regressive over the entire income distribution, and St-Hilaire (1996) finds the same, except for being relatively proportionate between the second and third quintiles. RRSP benefits are found to be more concentrated than tax liabilities for only the highest quintile, and at or near parity for the second highest quintile.

This study finds that RRSP benefits are regressive relative to tax liabilities between the first and third quintiles, and progressive from the third to the fifth quintile. RRSP benefits are more concentrated than tax liabilities for the middle three quintiles, and less concentrated than tax liabilities for the first and fifth quintiles. Relative to tax liabilities, RRSP benefits are more concentrated than in the other studies for all quintiles except the fifth. Disaggregating the fifth quintile produces ratios of 1.04 and .75 for the p80-p90 and p90-p100 deciles, respectively.

The ratio of RRSP benefits to RRSP contributions is shown in Chart 25 by subgroup. St-Hilaire (1996) finds that RRSP benefits are strongly regressive relative to RRSP contributions across the entire income distribution, with benefits only as concentrated as contributions for the top quintile; this reflects the flawed methodology used in this study, with benefits measured as the straight value of the initial RRSP deduction. Both Davies (1988) and this study find a much tighter correlation between RRSP benefits and RRSP contributions; RRSP benefits do start off as quite regressive relative to RRSP contributions at the bottom end of the income or earnings distribution, but become less so as income or earnings increase, until share of RRSP benefits becomes fairly proportionate (or only mildly regressive) to share of RRSP contributions over the top three quintiles.

The concentration of RRSP contributions across subgroups is shown in Chart 26. RRSP contributions are most concentrated in the top quintile in St-Hilaire (1996). This high level of concentration relative to the other studies appears to primarily reflect differences in the data sources and in the construction of the underlying subgroups.

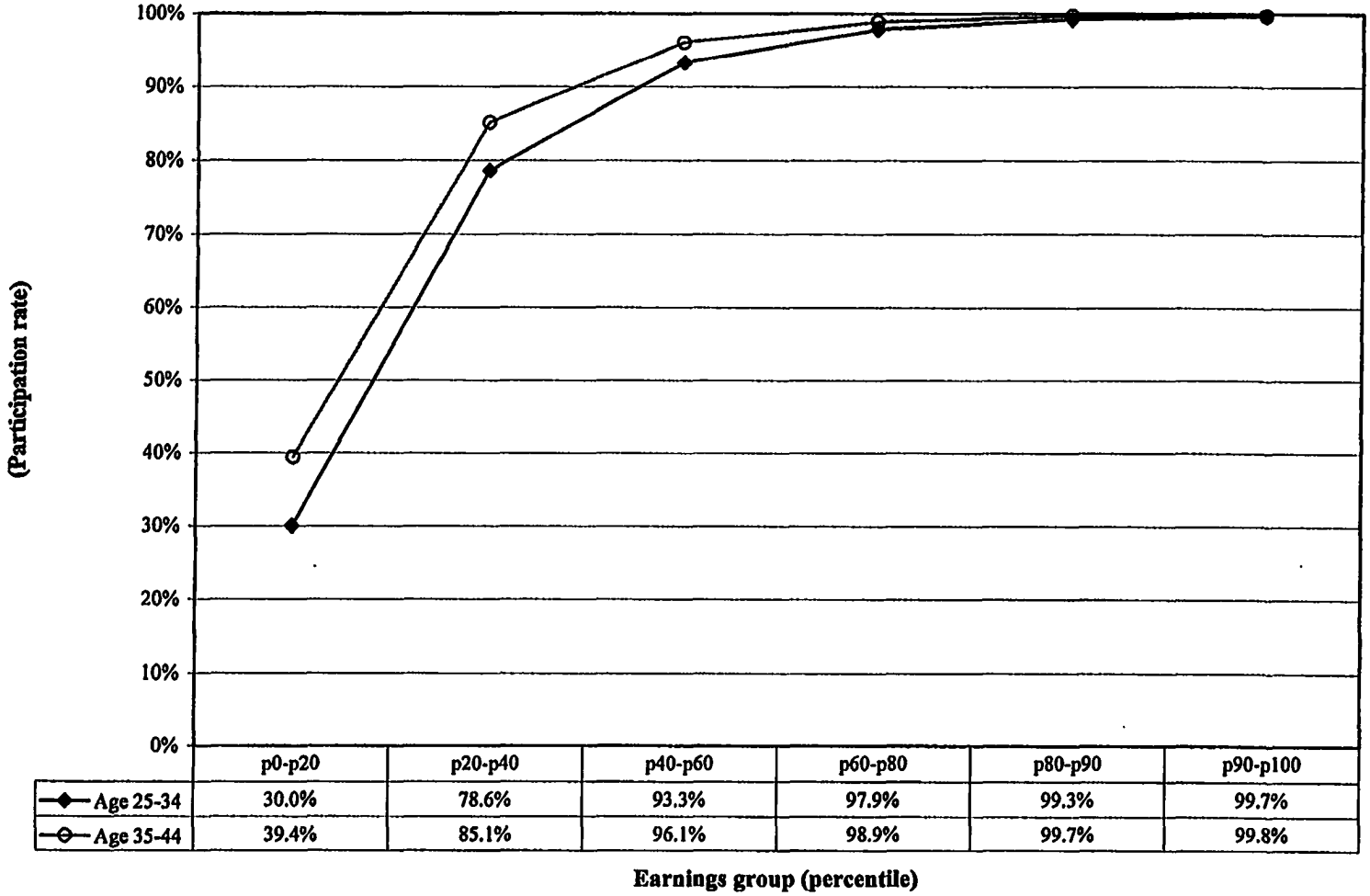
The data used is simple cross-sectional data for 1991, with no controls for age. Davies (1988) also shows RRSP contributions as very concentrated in the top quintile, although somewhat less so. Although the latter study relied on 1977 data, it also noted that RRSP contributions appeared to have been getting less concentrated in the highest income quintile over time, and hypothesized that RRSP benefits might become progressive relative to income tax liabilities. Chart 26 confirms that the concentration of RRSP contributions in the top quintile was significantly lower in the 1991-2001 data used in this study than that in the 1977 data used by Davies (1988). The share of contributions made by the three middle quintiles is correspondingly higher. This reduction in saving concentration is responsible for a good deal of the broader distribution of RRSP benefits found in this study. Indeed, as shown in Chart 24, this study does find that RRSP benefits are progressive relative to tax liabilities, at least over the second half of the earnings distribution.

The fact that, in this study, subgroups have been constructed on the basis of relative earnings rather than relative income does not appear to be primarily responsible for the substantially lower concentration of RRSP contributions in the top quintile, at 45.4%, than that found in the other literature referenced. Taking the data used in this study, but applying a simple cross-sectional framework to the underlying annual 1991 data, reveals that the top quintile of earners age 35-44 in that year, grouped only by annual 1991 earnings, made 64.7% of all RRSP contributions made by that age group. This high level of concentration in the top quintile is comparable to that found by St-Hilaire (1996), despite the fact that relative earnings rather than relative income is used to determine the subgroups. The observed differences in RRSP contribution concentration in this study and

St-Hilaire (1996) appear to primarily reflect substantial differences between the distributions of annual and more permanent earnings or income, and likely, differences between transitory and more permanent RRSP contribution behaviour. It is completely consistent with the permanent income hypothesis, (Friedman 1957), for example, that individuals with annual earnings exceeding their longer-term earnings expectations would respond by making larger RRSP contributions than normal.

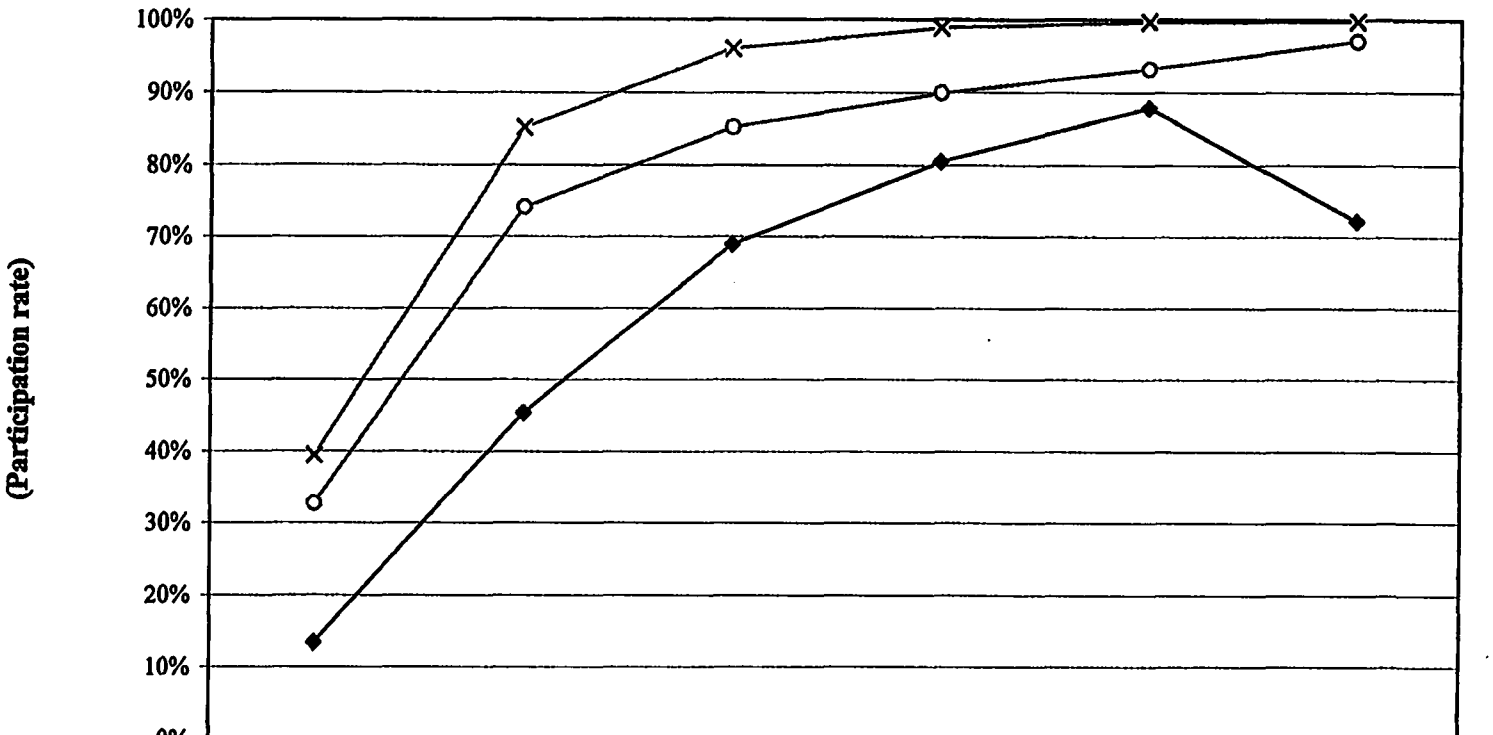
A significant portion of the reduction in the concentration of RRSP contributions in the top quintile found in this study, as compared to Davies (1988), which relies on much older 1977 data, likely reflects the steady and substantial increase in annual RRSP participation rates over the past few decades, which appears to have been more pronounced for the broad middle of the earnings distribution. Using LAD data, Moore (2001) finds that the percentage of all tax-filers claiming an RRSP deduction on their annual income tax return increased from 15.1% in 1982 to 34.5% by 1998. However, while the annual RRSP participation rate rose from 34% to 71% for the top earnings quintile (based on annual earnings) during this period, it rose relatively more for the next two quintiles, from 20% to 51% for the p60-p80 quintile, and from 13% to 31% for the p40-p60 quintile.

Chart 1 : Longitudinal DIP Participation Rates by Cohort and Earnings Group 1991 to 2001



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	30.0%	78.6%	93.3%	97.9%	99.3%	99.7%
Age 35-44	39.4%	85.1%	96.1%	98.9%	99.7%	99.8%

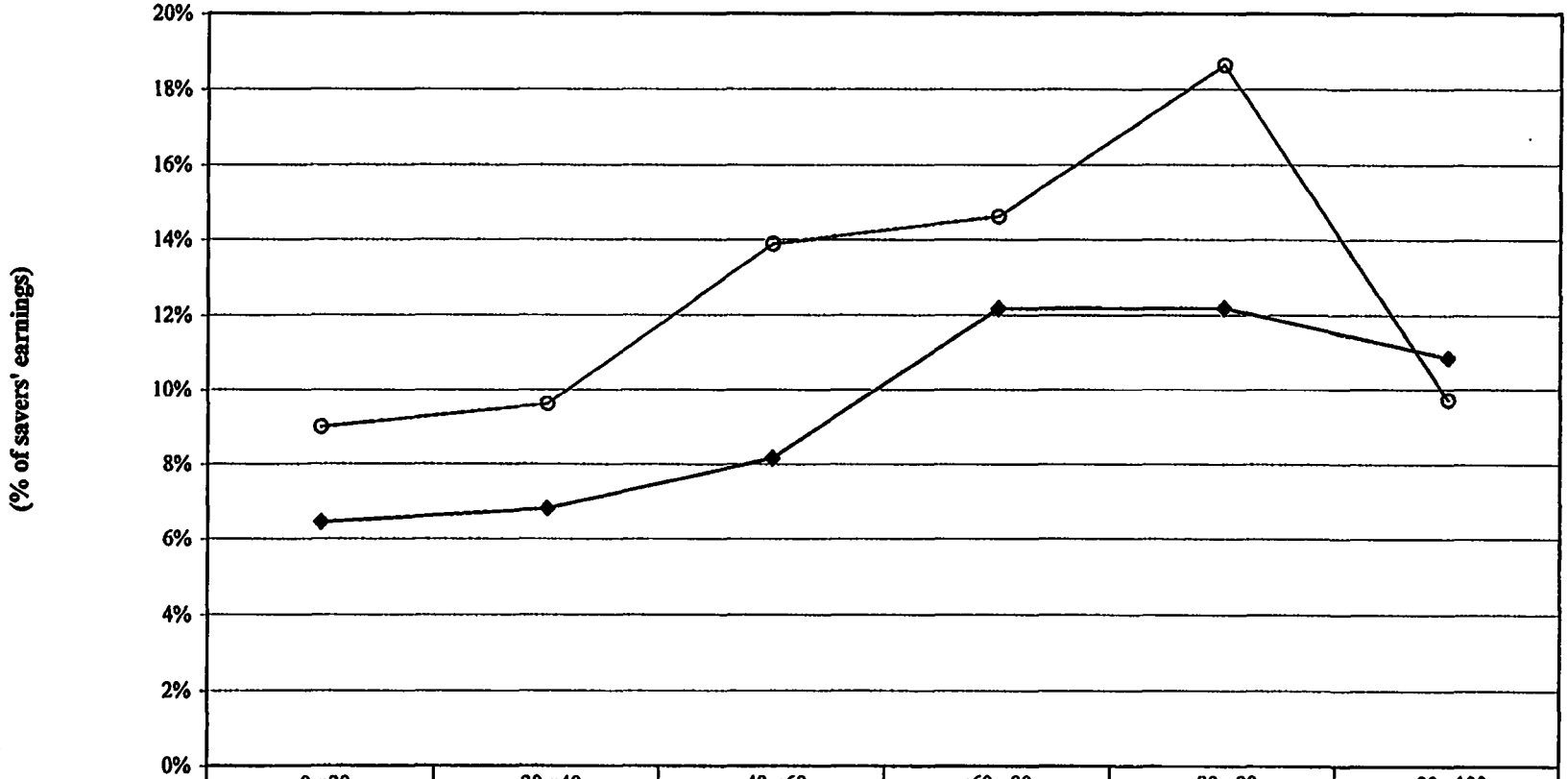
Chart 2: Longitudinal DIP Participation Rates by Type of DIP
Age 35-44 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
RPP	13.5%	45.3%	68.9%	80.4%	87.9%	72.2%
RRSP	32.6%	74.1%	85.2%	89.9%	93.2%	97.1%
All DIPs	39.4%	85.1%	96.1%	98.9%	99.7%	99.8%

Earnings group (percentile)

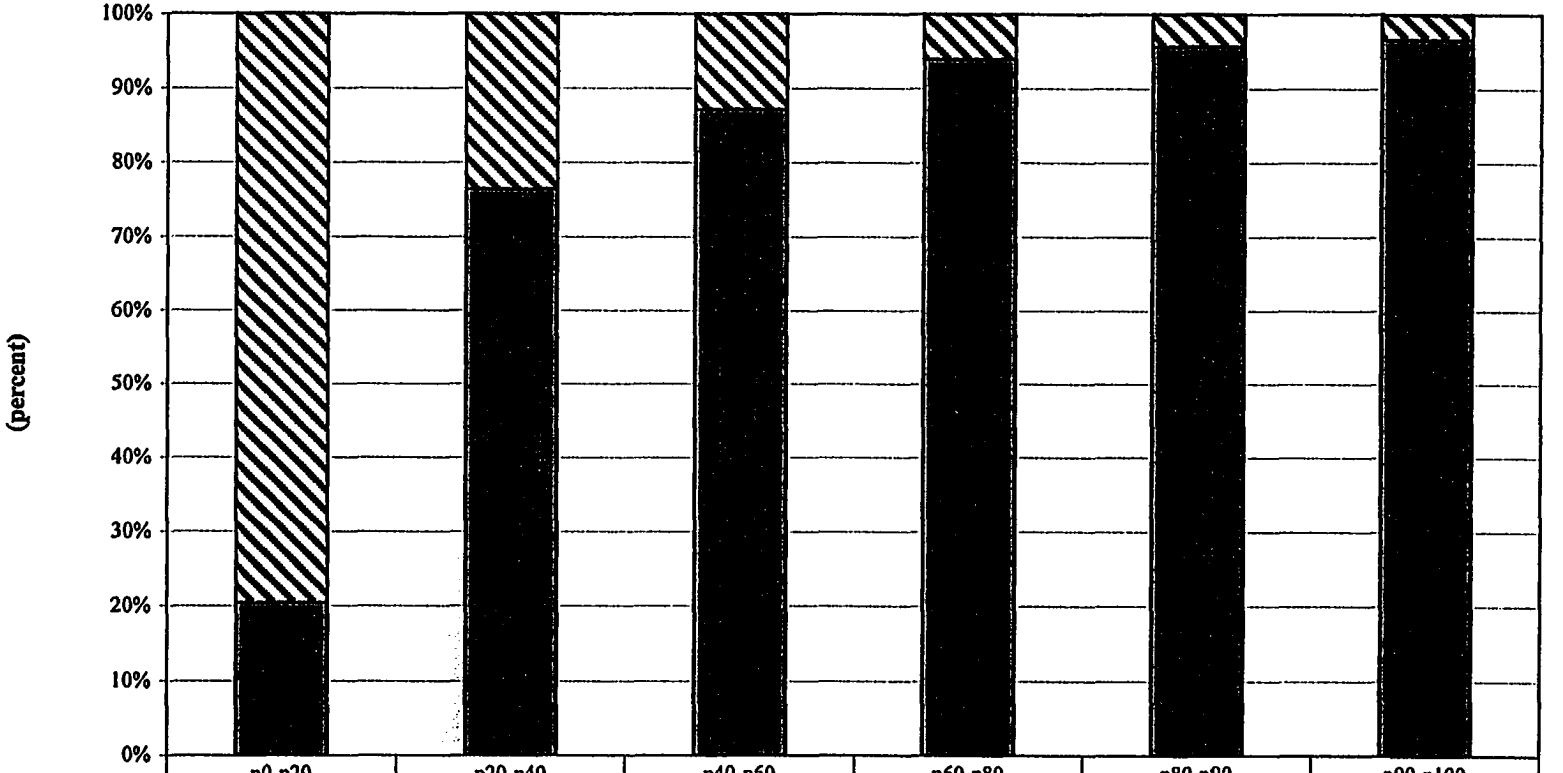
Chart 3
Mean DIP Saving



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	6.4%	6.8%	8.2%	12.2%	12.2%	10.9%
Age 35-44	9.0%	9.6%	13.9%	14.6%	18.6%	9.7%

Earnings group (percentile)

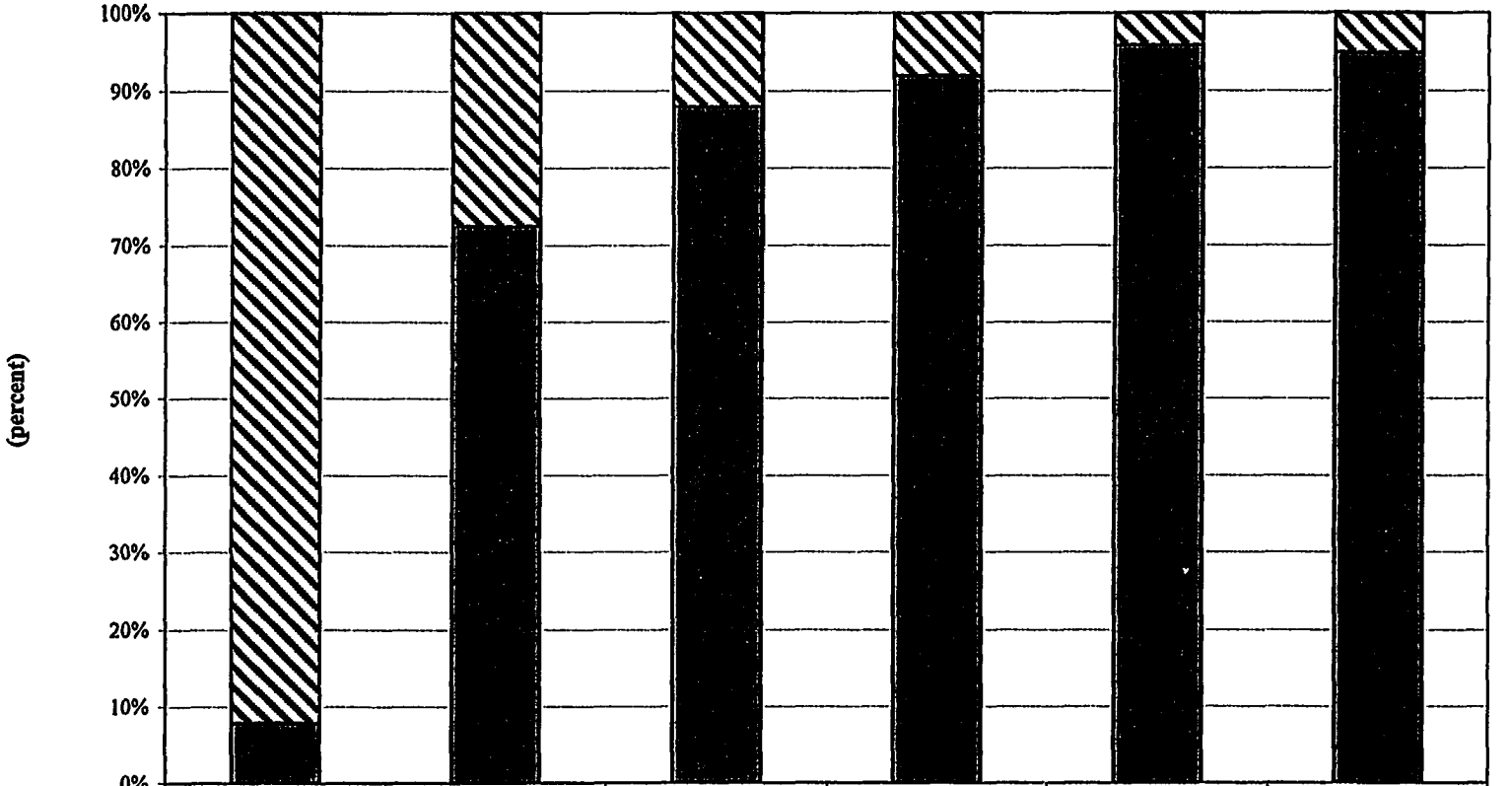
Chart 4 : Short-term vs. Long-term DIP Saving
Age 25-34 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Short-term	79.6%	23.6%	12.8%	6.0%	4.4%	3.4%
Long-term	20.4%	76.4%	87.2%	94.0%	95.6%	96.6%

Earnings group (percentile)

Chart 5: Short-term vs. Long-term DIP Saving
Age 35-44 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Short-term	92.1%	27.5%	12.1%	8.0%	4.2%	5.2%
Long-term	7.9%	72.5%	87.9%	92.0%	95.8%	94.8%

Earnings group (percentile)

Chart 6 : Stylized Structure of Marginal Personal Income Tax Rates (Federal plus Ontario Personal Income Taxes)

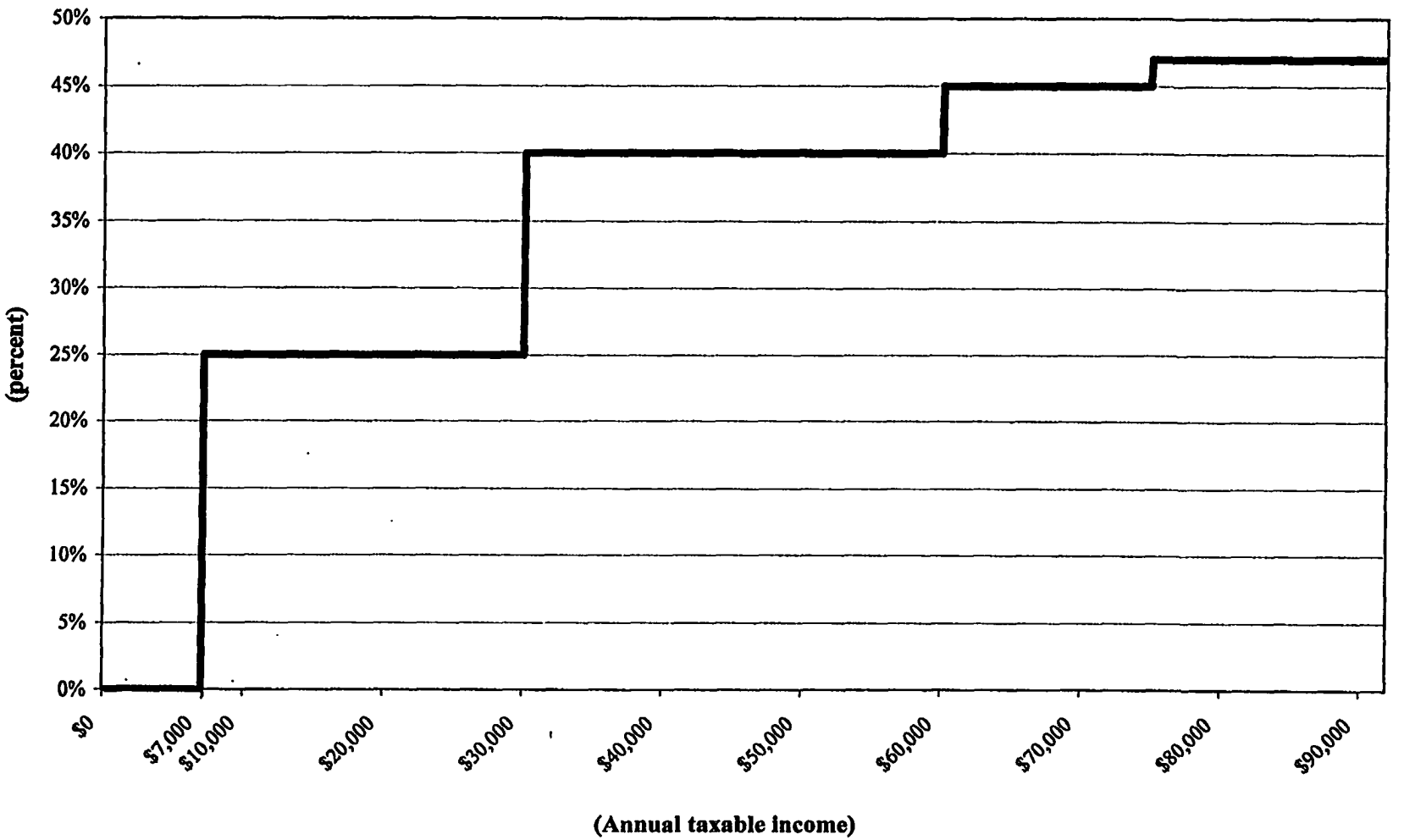
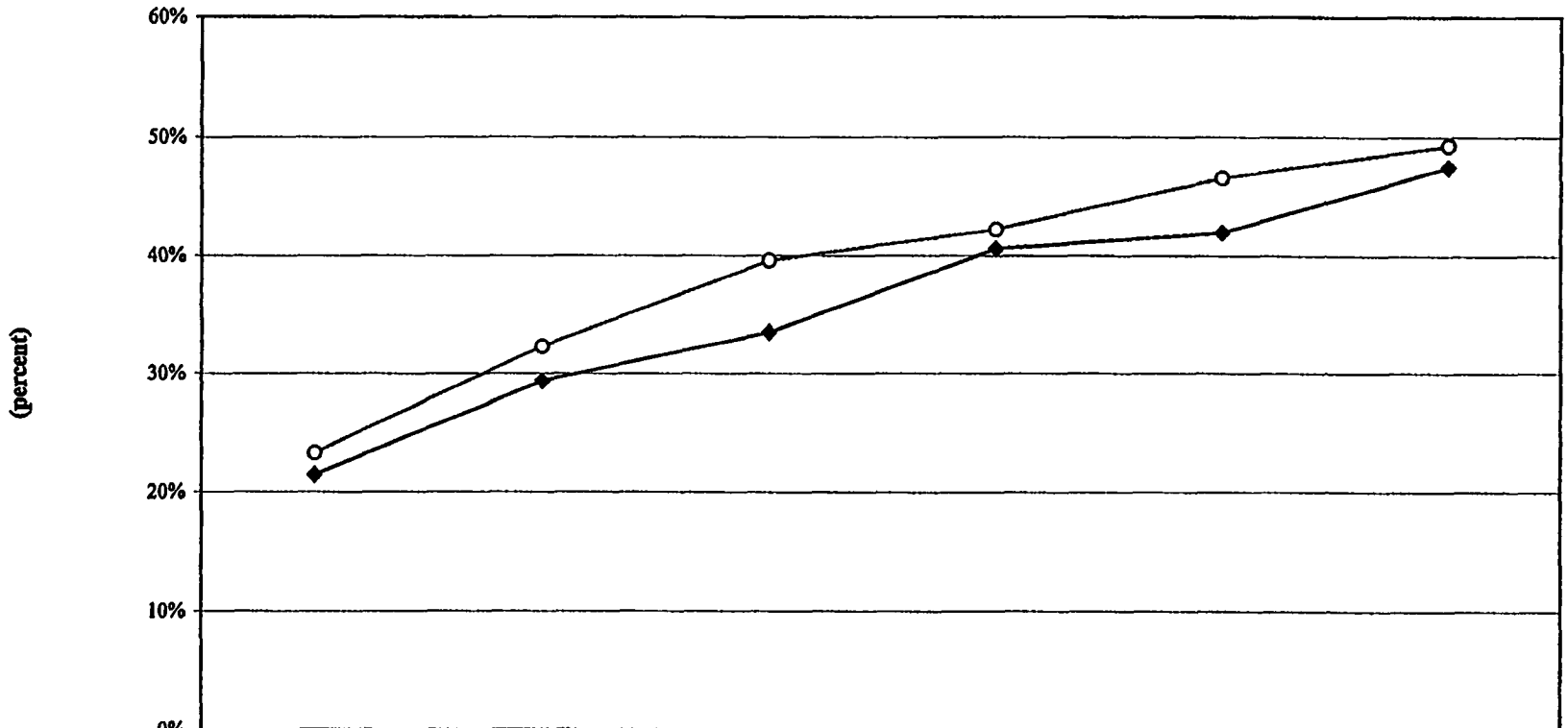


Chart 7

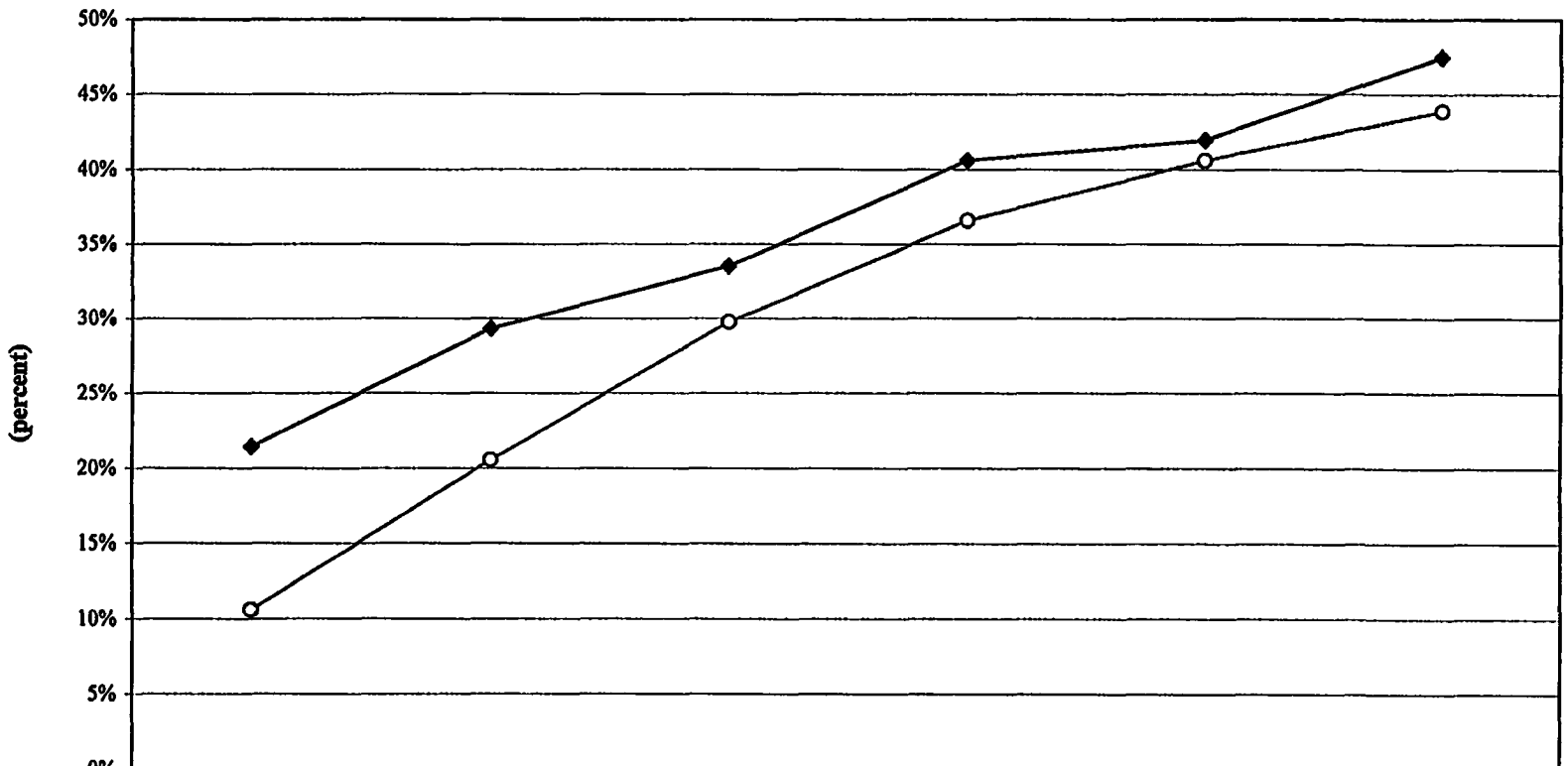
Mean Marginal Tax Rate on Deduction of DIP Saving (t_1)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	21.45%	29.32%	33.51%	40.59%	41.96%	47.48%
Age 35-44	23.28%	32.30%	39.59%	42.24%	46.58%	49.29%

Earnings group (percentile)

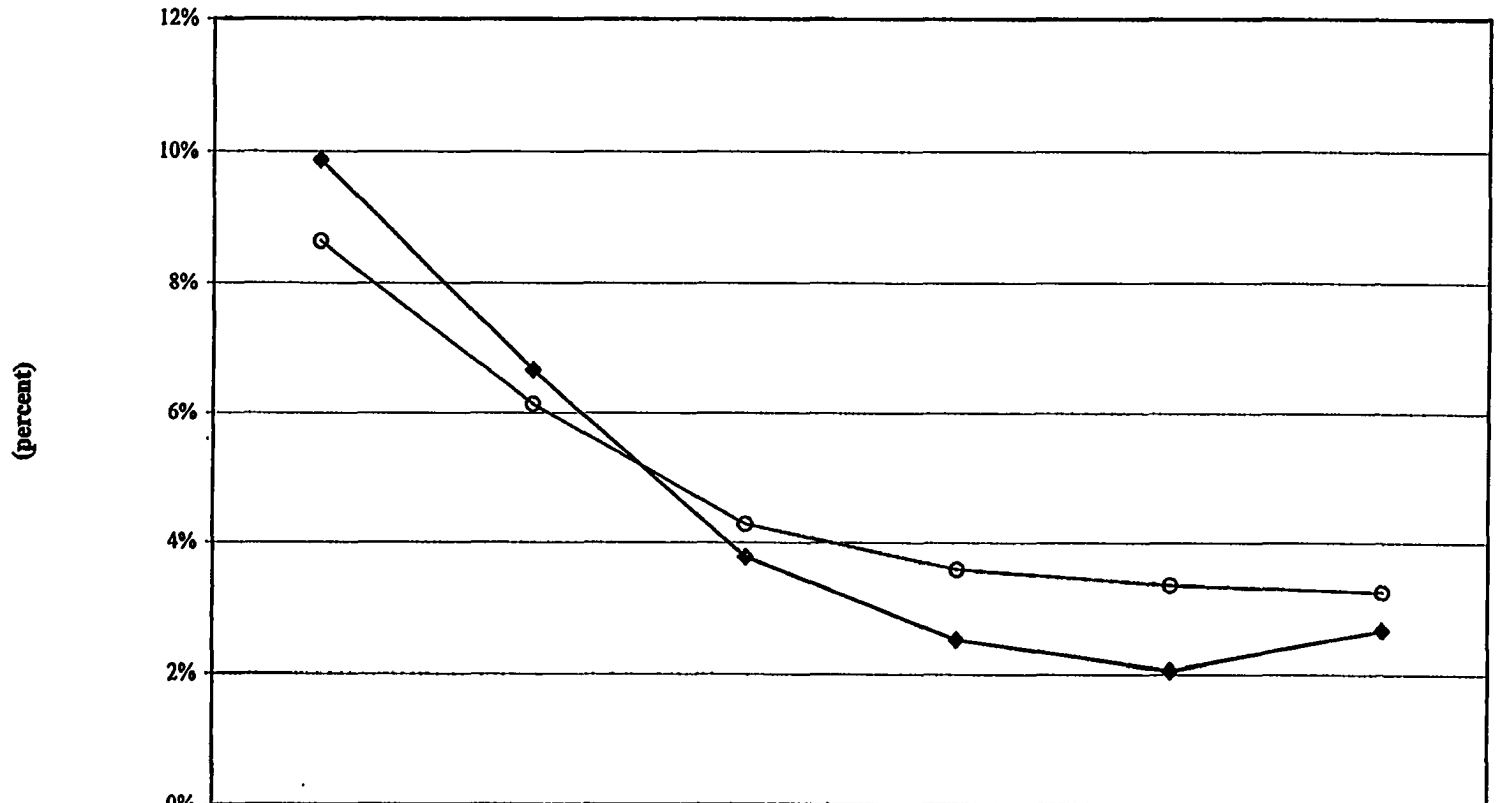
Chart 8
Tax Averaging, Mean t_1 vs. Mean Short-term t_2
Age 25-34 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
t1	21.45%	29.32%	33.51%	40.59%	41.96%	47.48%
t2	10.61%	20.55%	29.76%	36.56%	40.59%	43.88%

Earnings group (percentile)

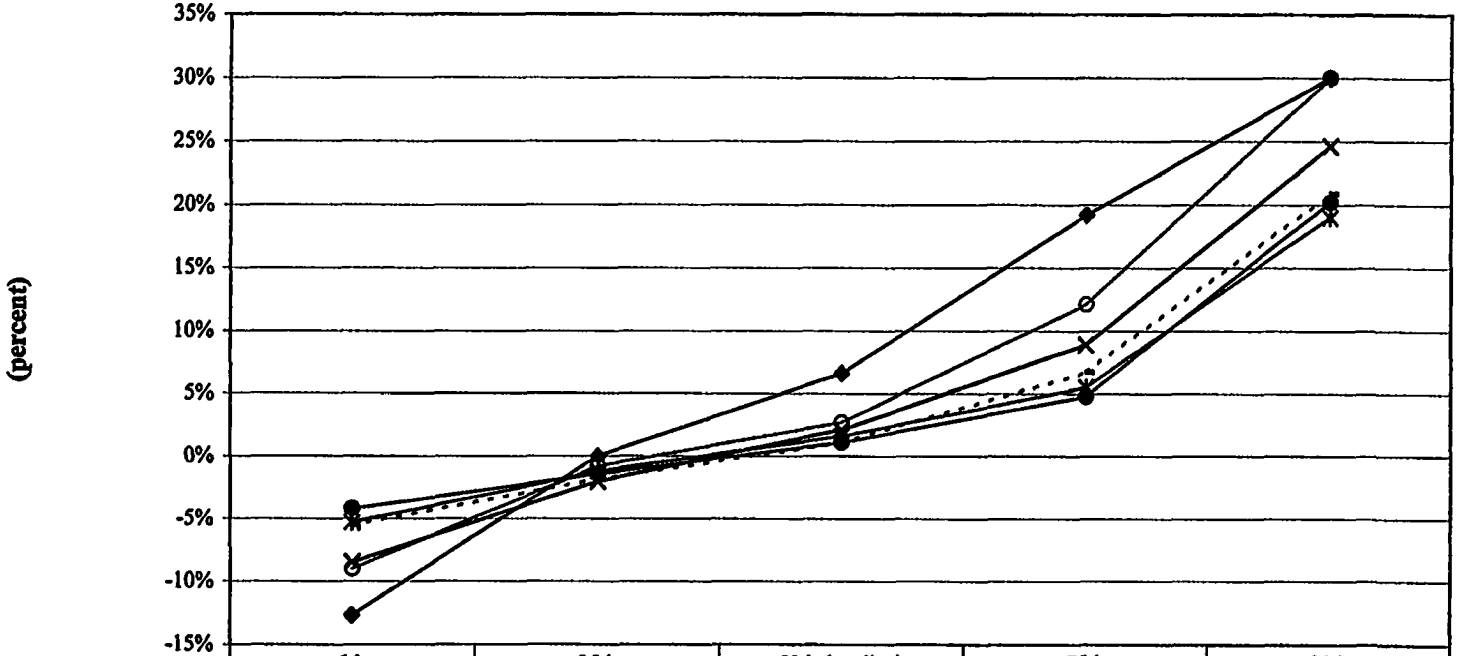
Chart 9
Mean Short-term Tax-Averaging Rate (t_1-t_2)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	9.87%	6.66%	3.77%	2.50%	2.05%	2.65%
Age 35-44	8.63%	6.13%	4.28%	3.58%	3.35%	3.24%

Earnings group (percentile)

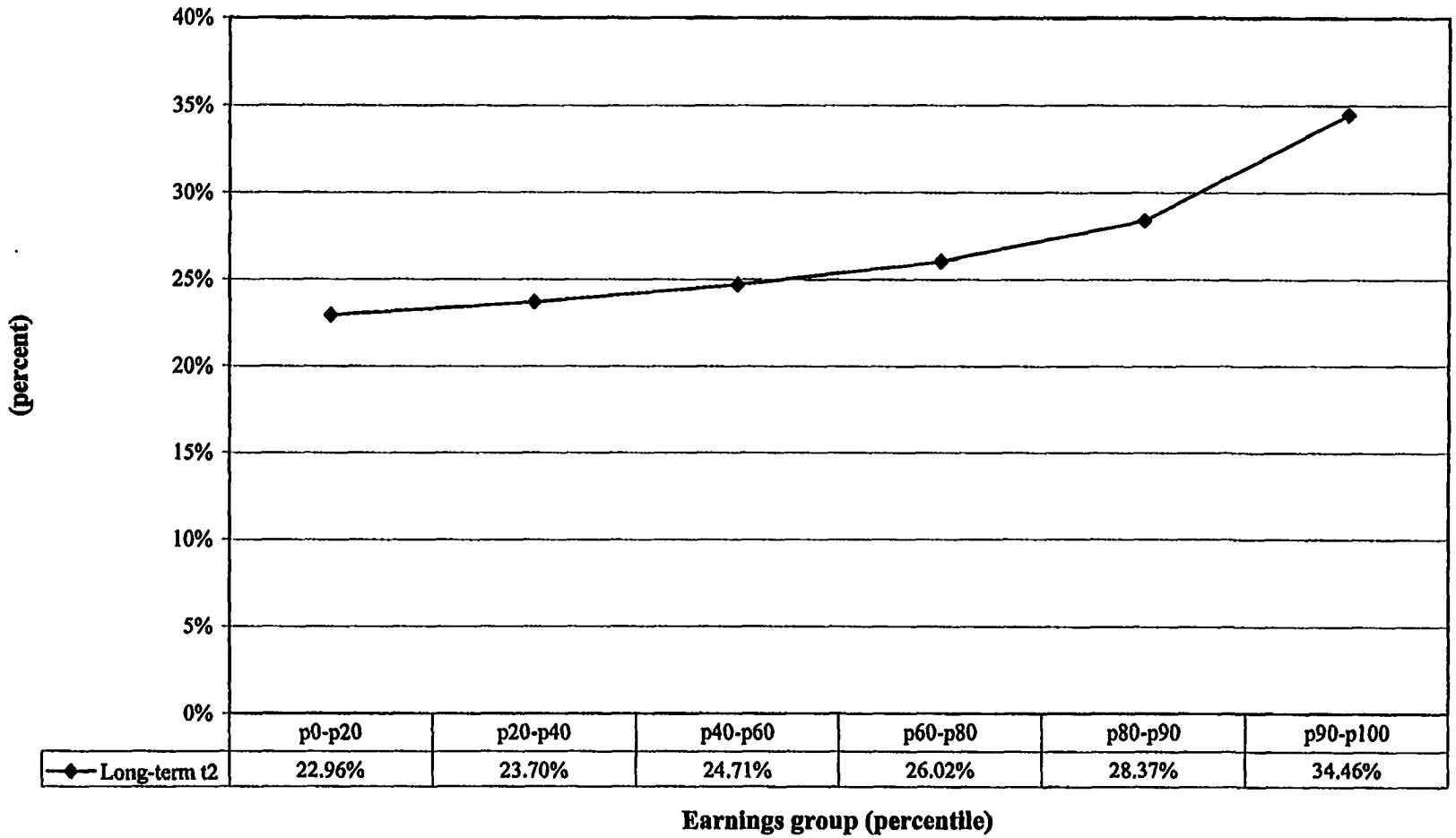
Chart 10 : Distribution of Short-term Tax-Averaging Rate (t_1-t_2)
Age 35-44 Cohort



	5th	25th	50th (median)	75th	95th
p0-p20	-12.7%	0.0%	6.6%	19.2%	30.0%
p20-p40	-9.0%	-0.8%	2.7%	12.1%	30.0%
p40-p60	-8.5%	-2.0%	2.1%	8.9%	24.6%
p60-p80	-5.5%	-1.8%	1.1%	6.7%	20.9%
p80-p90	-5.3%	-1.2%	1.6%	5.5%	19.0%
p90-p100	-4.2%	-1.4%	1.1%	4.8%	20.2%

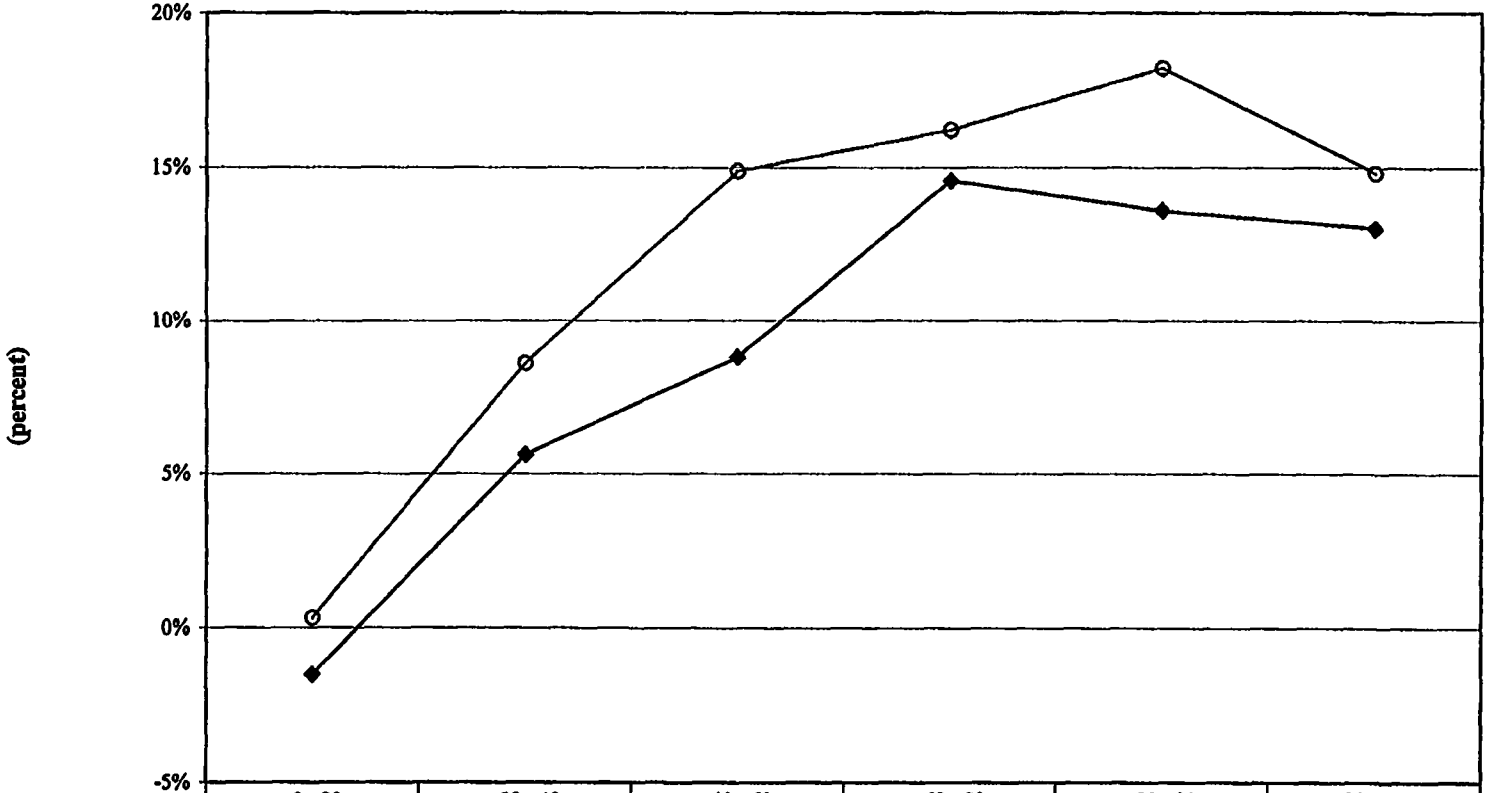
(Tax averaging percentile)

Chart 11 : Projected Mean Long-term t_2
All Cohorts



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term t2	22.96%	23.70%	24.71%	26.02%	28.37%	34.46%

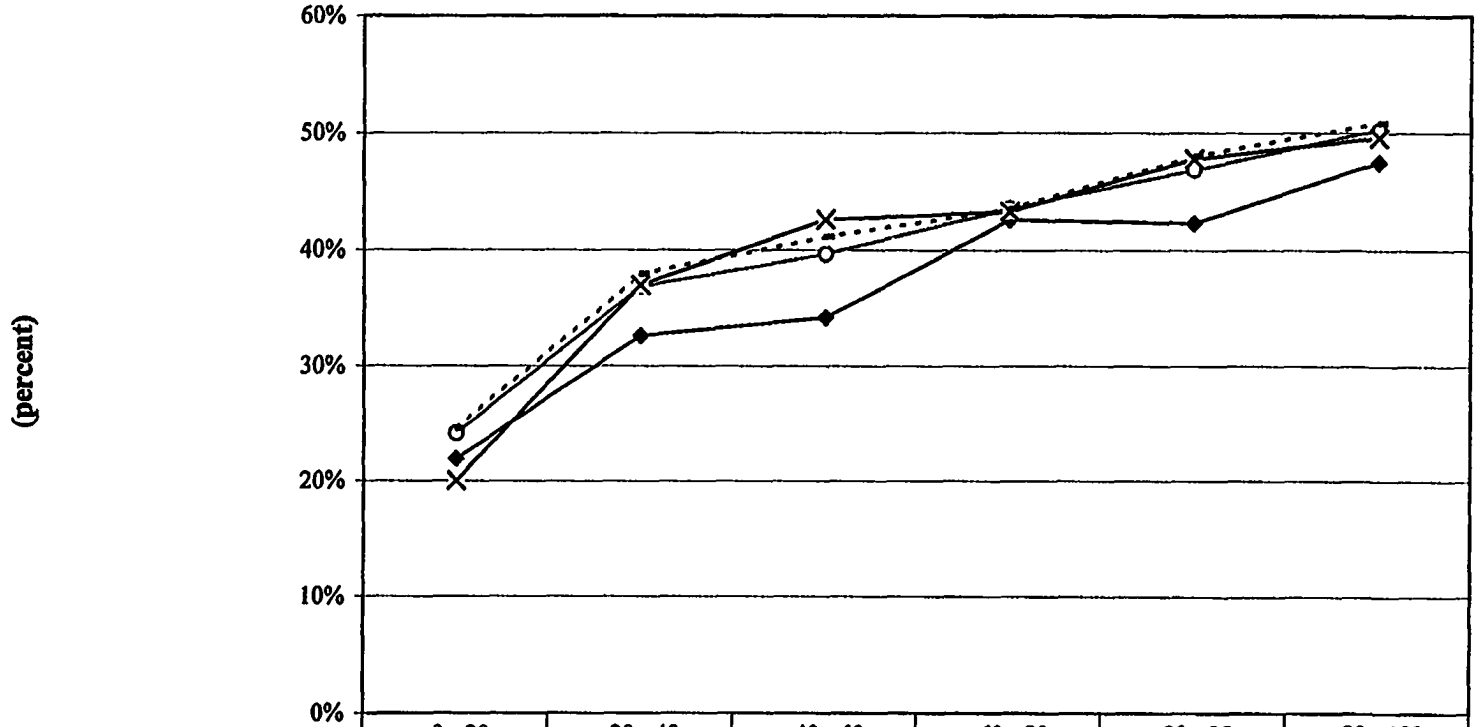
Chart 12
Projected Mean Long-term Tax-Averaging Rate (t_1-t_2)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	-1.51%	5.61%	8.81%	14.57%	13.59%	13.01%
Age 35-44	0.32%	8.60%	14.88%	16.22%	18.21%	14.83%

Earnings group (percentile)

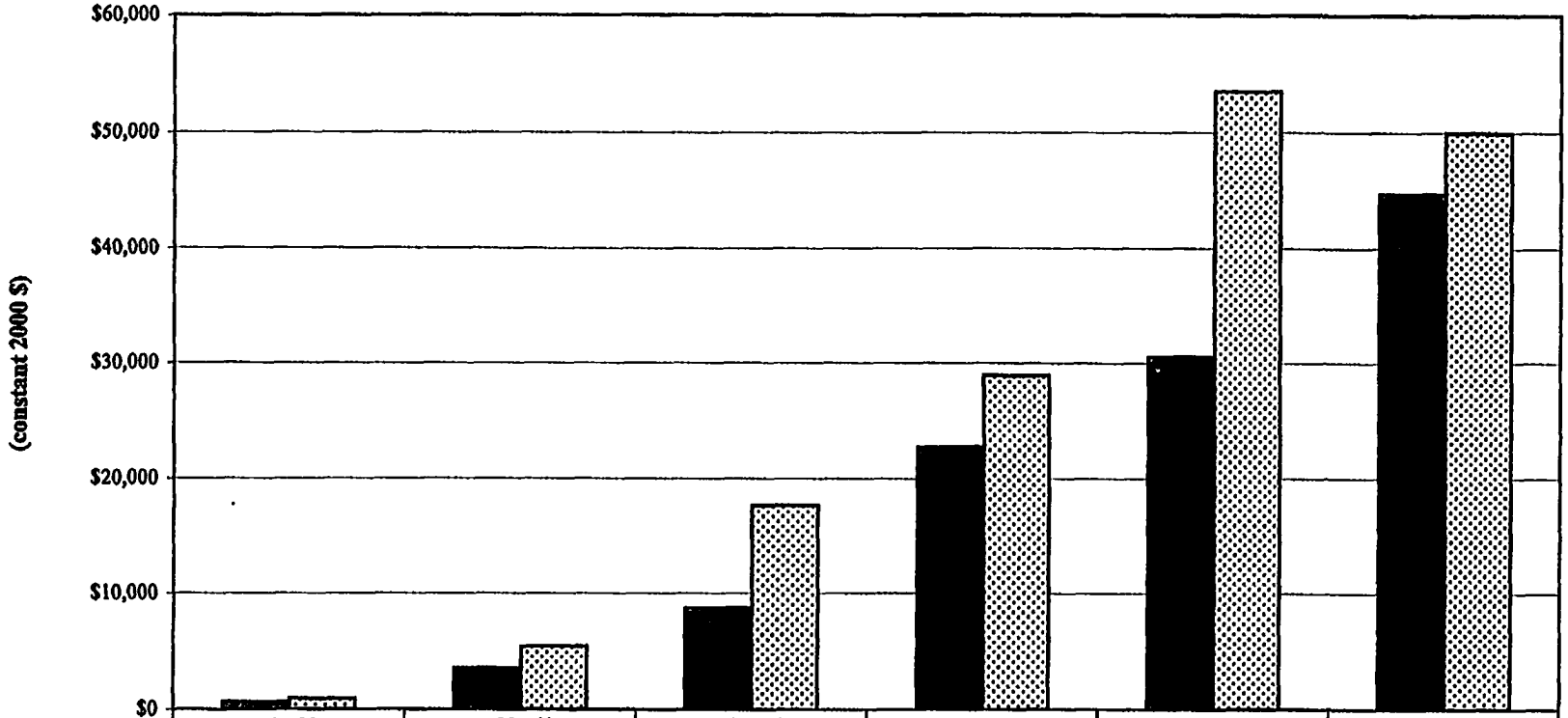
Chart 13: Short-term and Projected Long-term Marginal Tax Rate (t*) on Capital Income



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34, short-term t*	21.90%	32.60%	34.20%	42.60%	42.30%	47.50%
Age 25-34, long-term t*	24.13%	36.88%	39.65%	43.55%	46.85%	50.28%
Age 35-44, short-term t*	20.00%	37.00%	42.60%	43.30%	47.80%	49.60%
Age 35-44, long-term t*	24.53%	37.97%	41.13%	43.53%	48.03%	50.87%

Earnings group (percentile)

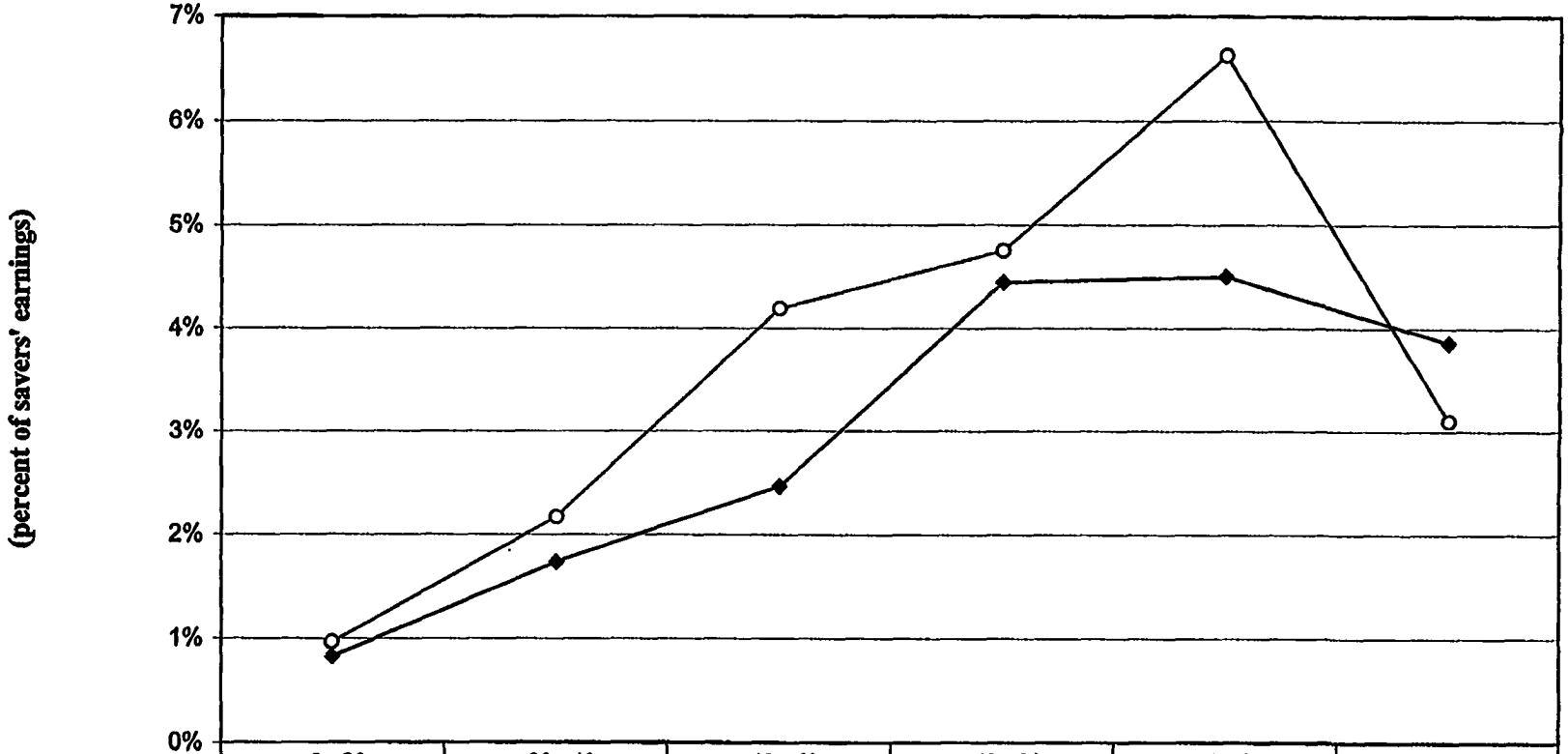
Chart 14
Mean DIP Benefits per Saver



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	$616	$3,570	$8,731	$22,665	$30,510	$44,684
Age 35-44	$914	$5,464	$17,623	$28,907	$53,493	$49,952

Earnings group (percentile)

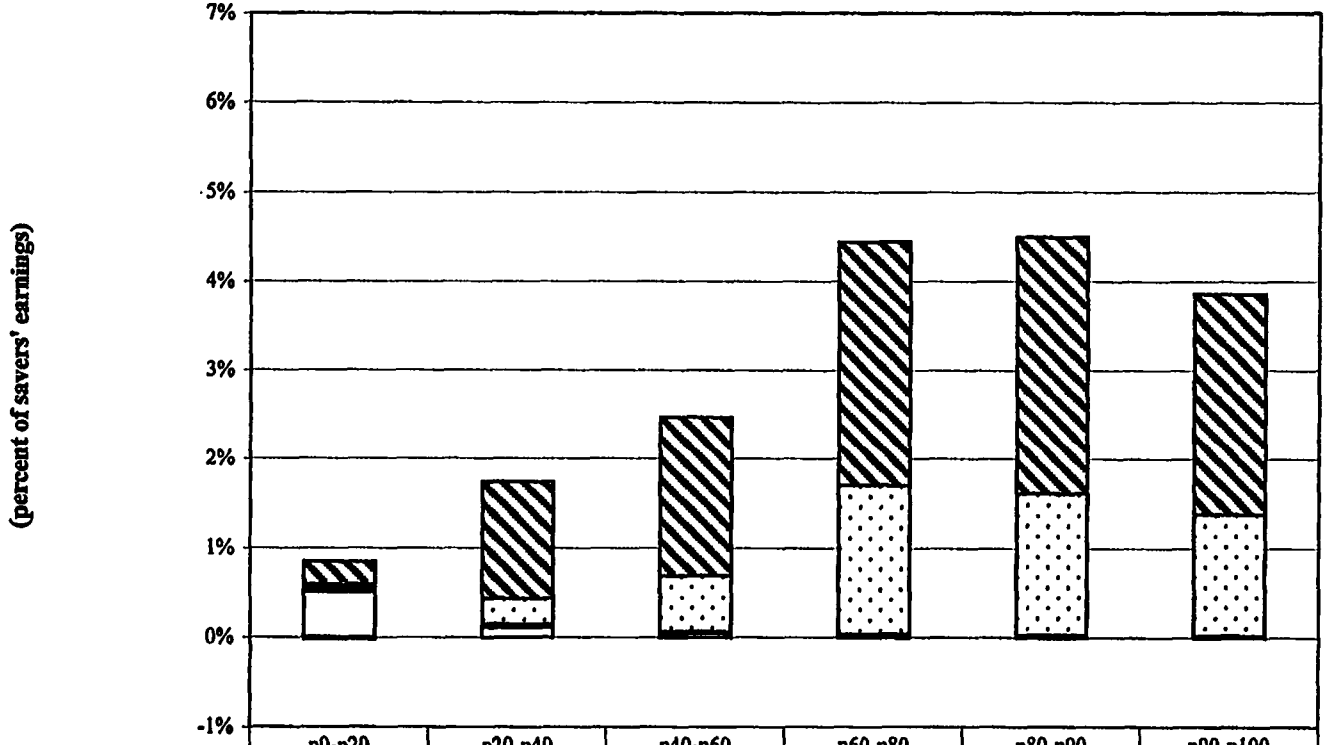
Chart 15
Mean DIP Benefits as Percent of Savers' Earnings



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	0.83%	1.74%	2.46%	4.44%	4.50%	3.86%
Age 35-44	0.97%	2.17%	4.19%	4.75%	6.63%	3.10%

Earnings group (percentile)

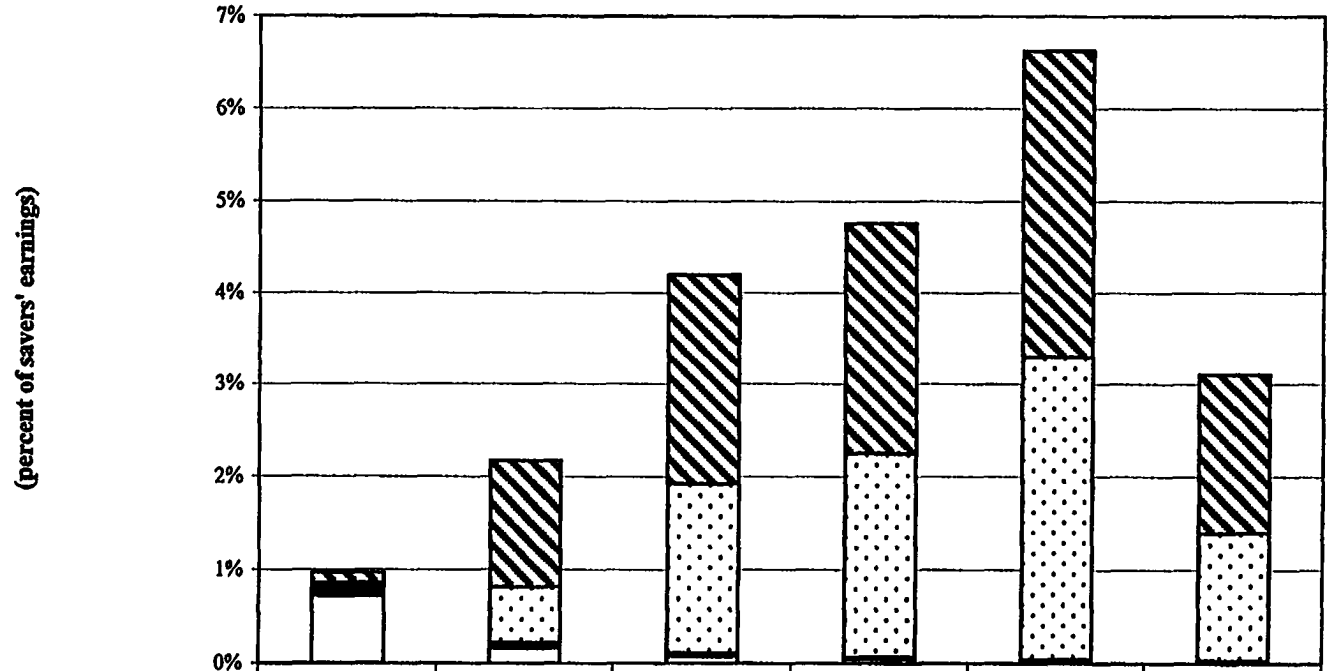
Chart 16: Mean DIP Benefits by Component
Age 25-34 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term tax shelter	0.26%	1.30%	1.77%	2.74%	2.89%	2.48%
Long-term tax averaging	-0.02%	0.29%	0.63%	1.67%	1.59%	1.36%
Short-term tax shelter	0.08%	0.04%	0.02%	0.02%	0.01%	0.01%
Short-term tax averaging	0.51%	0.11%	0.04%	0.02%	0.01%	0.01%

Earnings group (percentile)

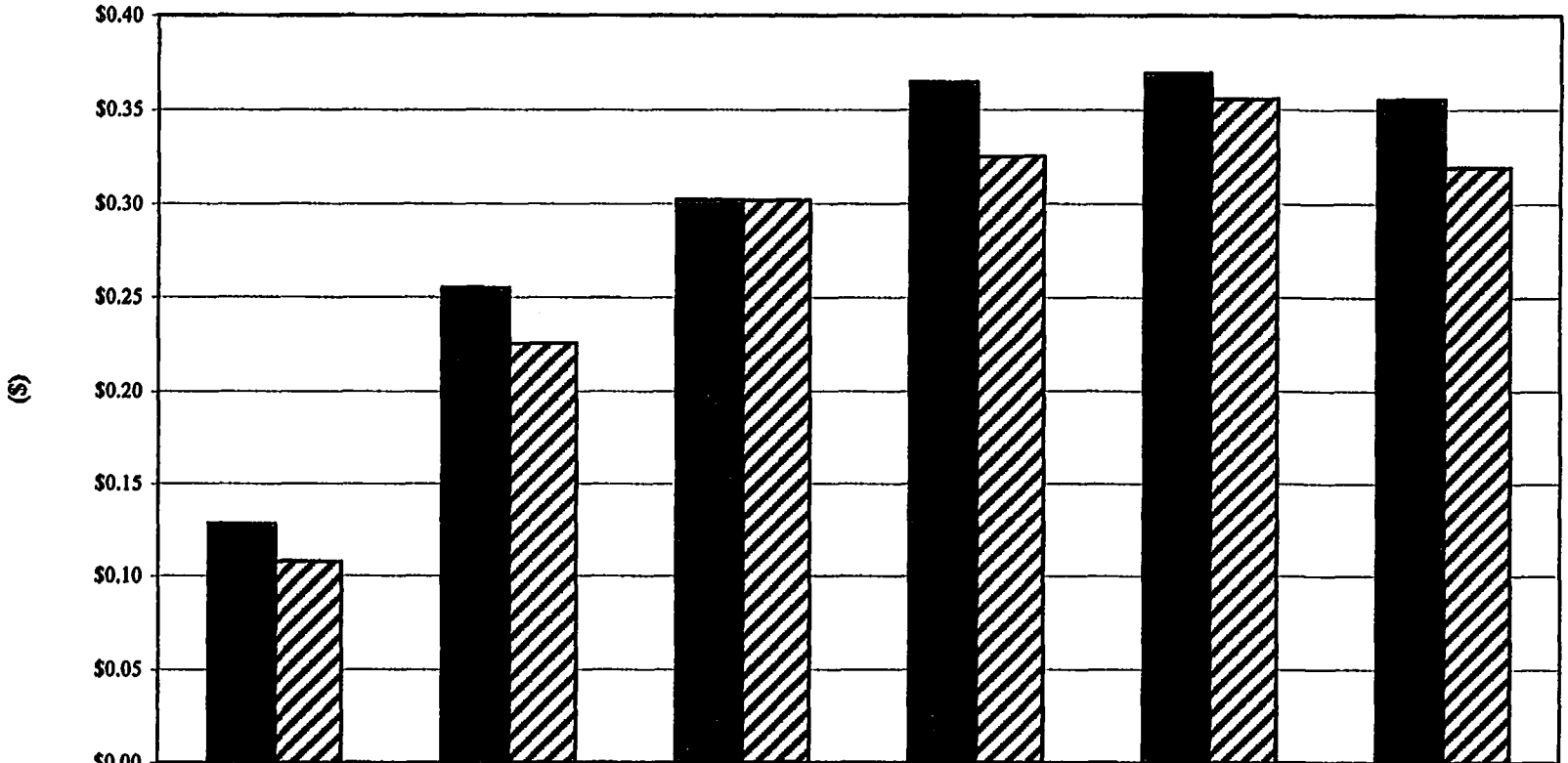
Chart 17: Mean DIP Benefits by Component
Age 35-44 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term tax shelter	0.11%	1.35%	2.27%	2.50%	3.33%	1.71%
Long-term tax averaging	0.00%	0.60%	1.81%	2.18%	3.25%	1.37%
Short-term tax shelter	0.14%	0.06%	0.04%	0.03%	0.02%	0.01%
Short-term tax averaging	0.72%	0.16%	0.07%	0.04%	0.03%	0.02%

Earnings group (percentile)

Chart 18
Mean DIP Benefit per Dollar Saved



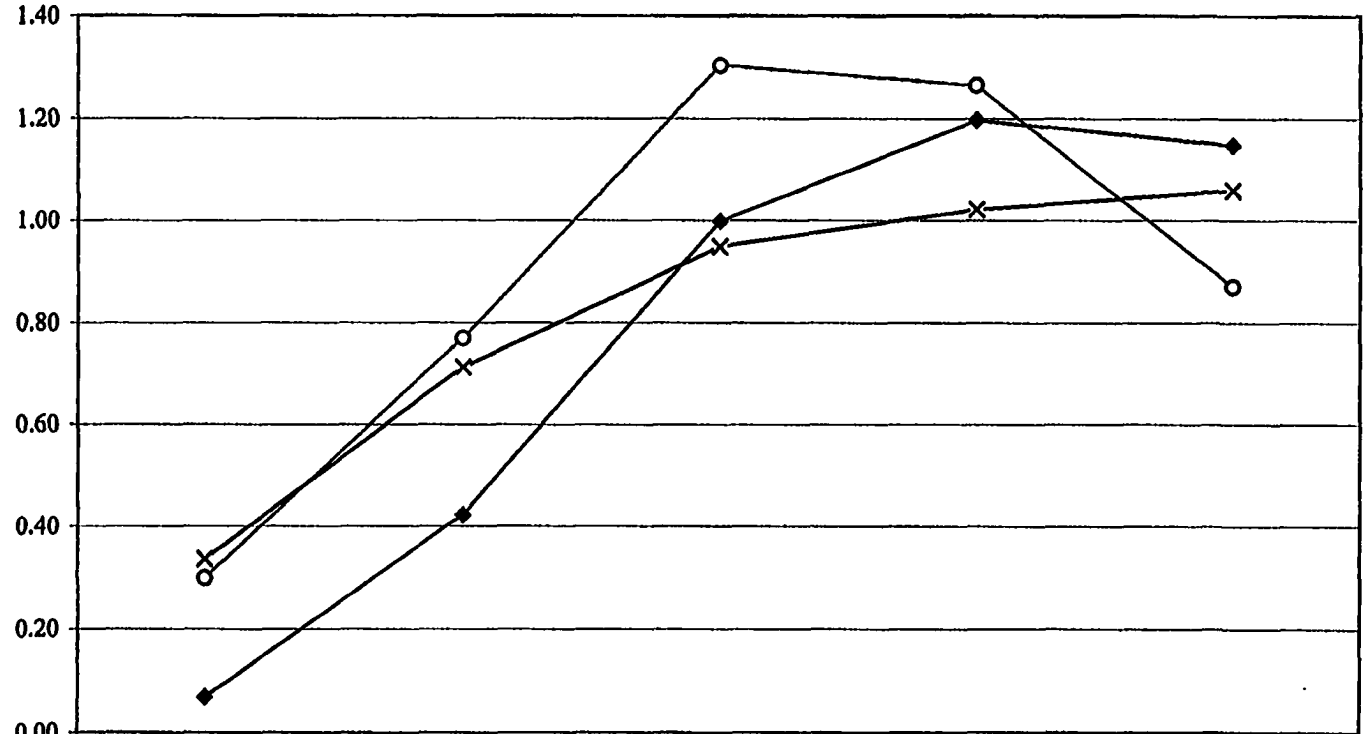
	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	$0.13	$0.25	$0.30	$0.36	$0.37	$0.36
Age 35-44	$0.11	$0.23	$0.30	$0.33	$0.36	$0.32

Earnings group (percentile)

TABLE 2
DIP BENEFITS UNDER THE PERSONAL INCOME TAX
COHORT-SHARE DATA

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.3%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	4.0%	20.0%	11.1%	9.9%	5.7%	5.4%
25-34	p40-p60	11.5%	20.0%	17.2%	17.4%	12.9%	13.2%
25-34	p60-p80	31.4%	20.0%	23.8%	25.1%	23.2%	29.8%
25-34	p80-p100	52.9%	20.0%	41.9%	45.2%	57.2%	50.8%
25-34	p80-p90	21.4%	10.0%	15.5%	16.7%	17.7%	20.1%
25-34	p90-p100	31.5%	10.0%	26.4%	28.5%	39.5%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.4%	20.0%	5.2%	2.6%	1.2%	1.1%
35-44	p20-p40	4.6%	20.0%	10.8%	9.8%	5.9%	6.4%
35-44	p40-p60	16.6%	20.0%	16.6%	16.5%	12.7%	17.5%
35-44	p60-p80	28.0%	20.0%	23.4%	23.9%	22.2%	27.4%
35-44	p80-p100	50.5%	20.0%	44.0%	47.3%	58.0%	47.7%
35-44	p80-p90	26.1%	10.0%	15.3%	15.8%	17.2%	23.4%
35-44	p90-p100	24.4%	10.0%	28.7%	31.5%	40.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

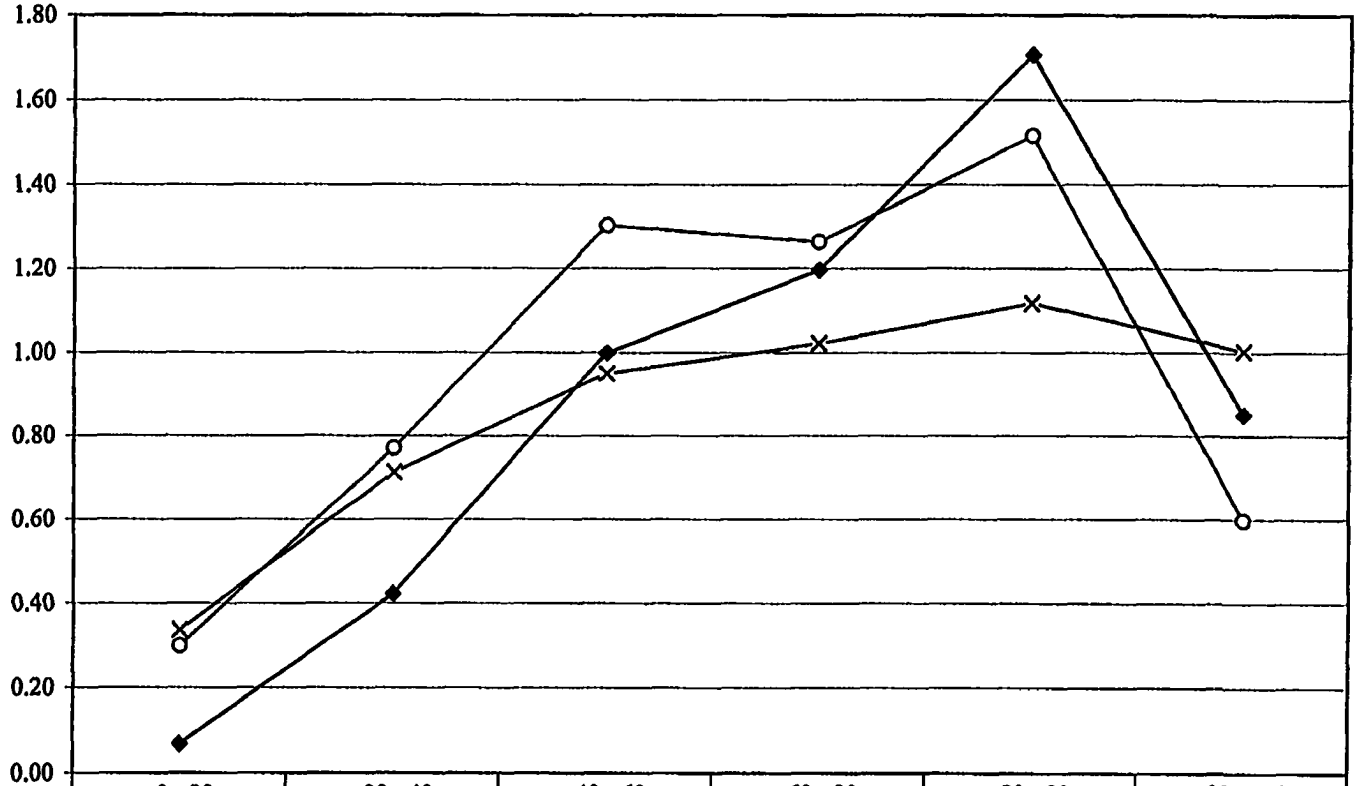
Chart 19: Indices of Relative Advantage, Personal Income Tax
Age 35-44 Cohort, 5 Earnings Groups



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
Benefits:Income	0.07	0.42	1.00	1.20	1.15
Benefits:Taxes	0.30	0.77	1.30	1.26	0.87
Benefits:Saving	0.34	0.71	0.95	1.02	1.06

Earnings group (percentile)

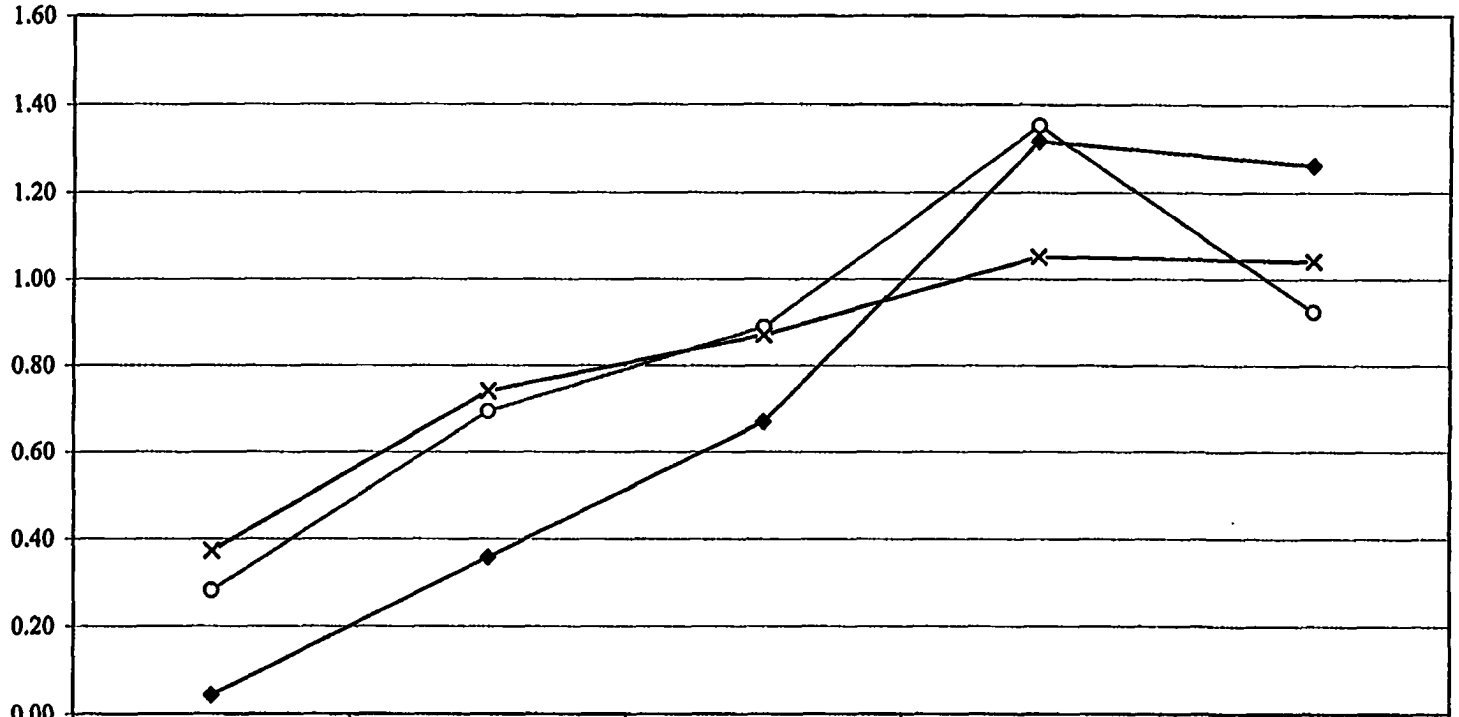
Chart 20: Indices of Relative Advantage, Personal Income Tax
Age 35-44 Cohort, 6 Earnings Groups



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
—◆— Benefits:Income	0.07	0.42	1.00	1.20	1.71	0.85
—○— Benefits:Taxes	0.30	0.77	1.30	1.26	1.52	0.60
—×— Benefits:Saving	0.34	0.71	0.95	1.02	1.12	1.00

Earnings group (percentile)

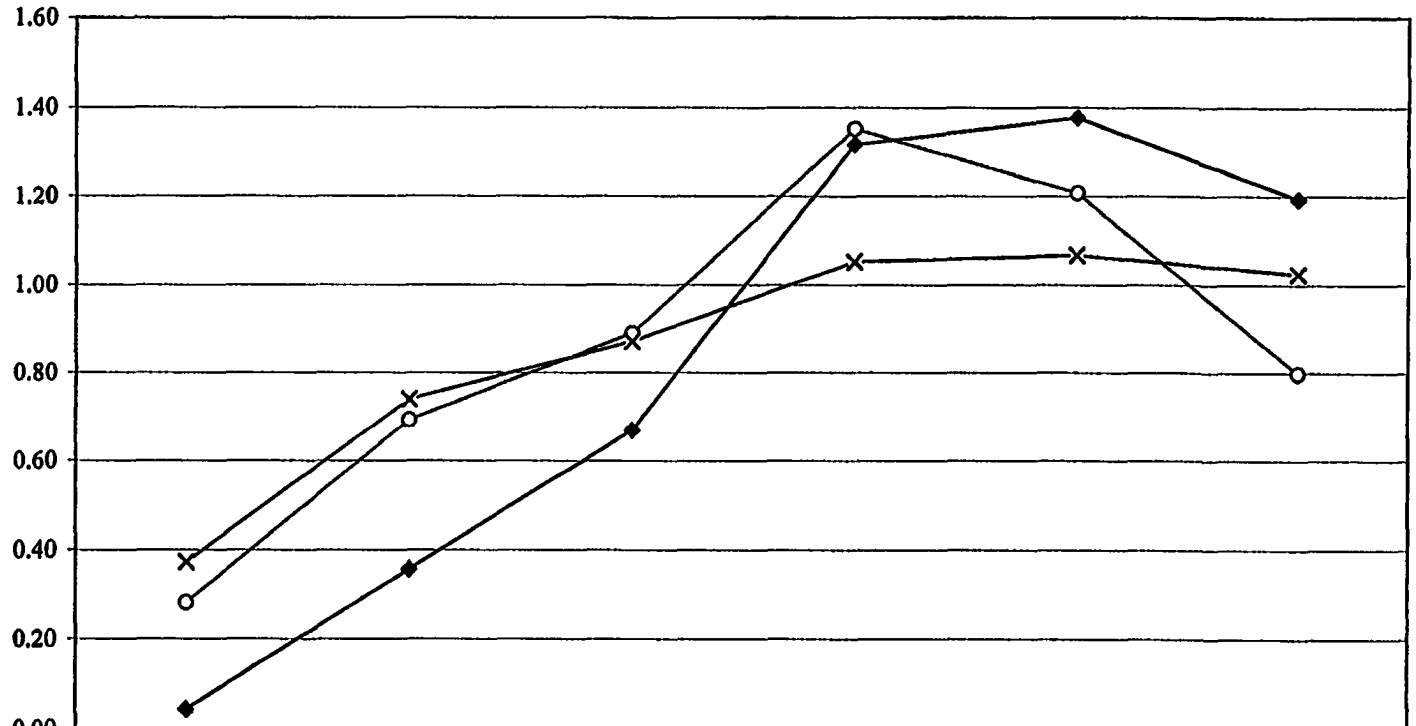
Chart 21: Indices of Relative Advantage Personal Income Tax
Age 25-34 Cohort, 5 Earnings Groups



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
—◆— Benefits:Income	0.04	0.36	0.67	1.32	1.26
—○— Benefits:Taxes	0.28	0.69	0.89	1.35	0.92
—×— Benefits:Saving	0.37	0.74	0.87	1.05	1.04

Earnings group (percentiles)

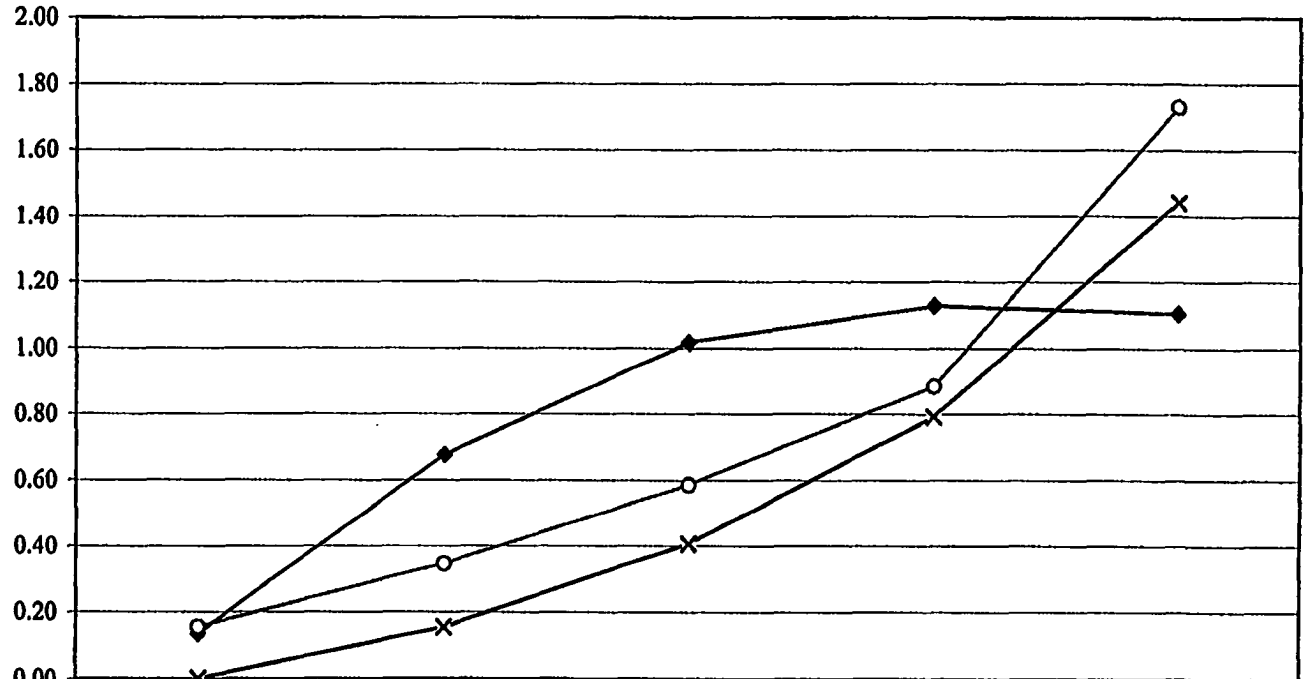
Chart 22: Indices of Relative Advantage, Personal Income Tax
Age 25-34 Cohort, 6 Earnings Groups



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Benefits:Income	0.04	0.36	0.67	1.32	1.38	1.19
Benefits:Taxes	0.28	0.69	0.89	1.35	1.21	0.80
Benefits:Saving	0.37	0.74	0.87	1.05	1.07	1.03

Earnings group (percentile)

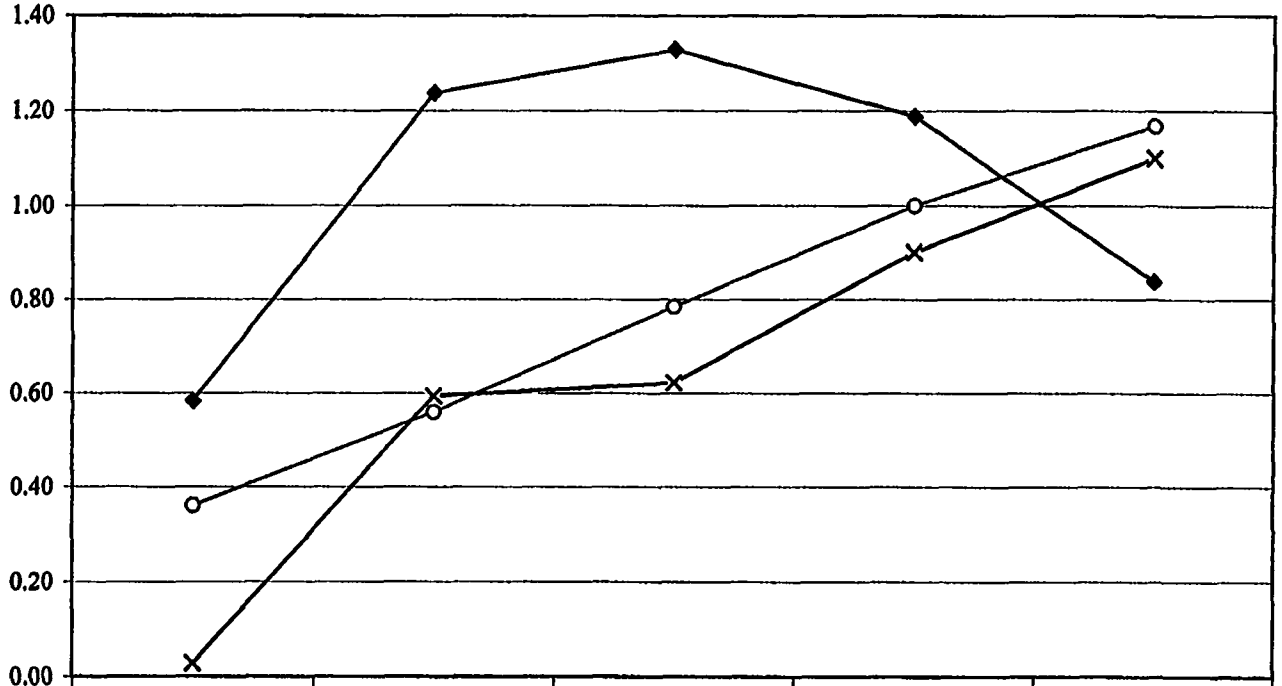
Chart 23
Share of RRSP Benefits/ Share of Income
Comparison with the Literature



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
Moore (2005)	0.13	0.68	1.02	1.13	1.10
Davies (1988)	0.15	0.35	0.59	0.88	1.73
St.-Hilaire (1996)	0.00	0.15	0.41	0.79	1.44

Earnings or income group (percentile)

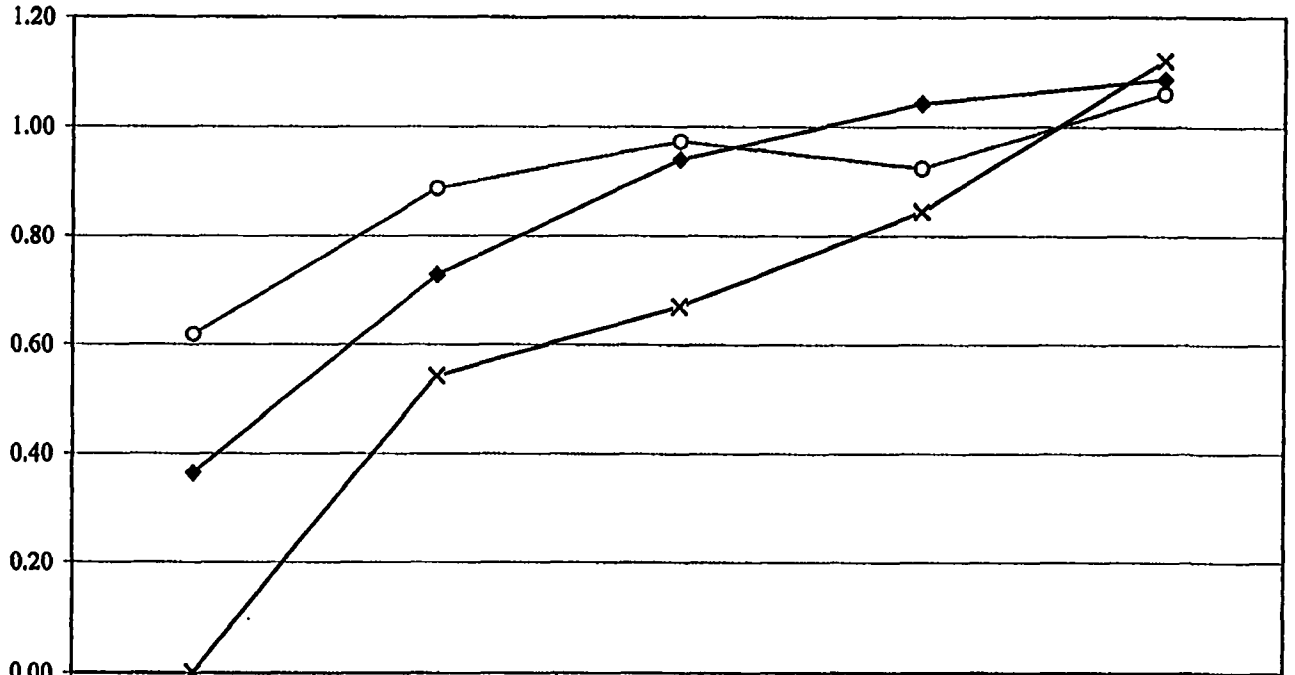
Chart 24
Share of RRSP Benefits/ Share of Income Taxes
Comparison with the Literature



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
Moore (2005)	0.58	1.24	1.33	1.19	0.84
Davies (1988)	0.36	0.56	0.78	1.00	1.17
St.-Hilaire (1996)	0.03	0.59	0.62	0.90	1.10

Earnings or income group (percentile)

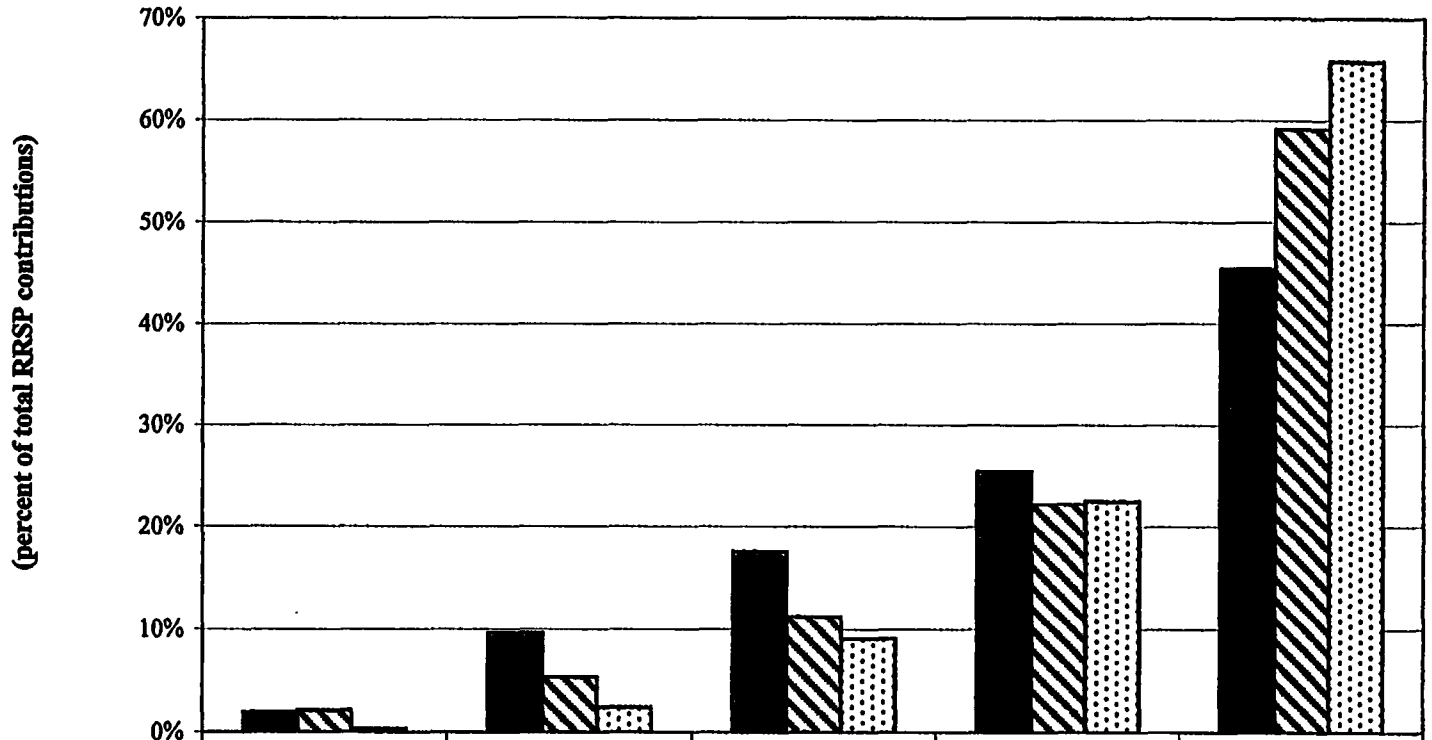
Chart 25
Share of RRSP Benefits/ Share of RRSP Contributions
Comparison with the Literature



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
Moore (2005)	0.36	0.73	0.94	1.04	1.09
Davies (1988)	0.62	0.89	0.97	0.92	1.06
St.-Hilaire (1996)	0.00	0.54	0.67	0.84	1.12

Earnings or income group (percentile)

Chart 26: Concentration of RRSP Contributions
Comparison with the Literature



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p100
Moore (2005)	1.95%	9.65%	17.52%	25.46%	45.42%
Davies (1988)	2.10%	5.30%	11.20%	22.20%	59.10%
St.-Hilaire (1996)	0.30%	2.40%	9.10%	22.50%	65.70%

Earnings or income group (percentile)

6.0 EMPIRICAL RESULTS: DIP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

6.1 Introduction

This section of the study extends the PIT benefit framework, which is based on the stand-alone personal income tax, to incorporate the impact of DIP saving from 1991 to 2001 on individual and family entitlements under nine different programs. These programs include four child benefit programs, three public pension programs, the GST credit and the Ontario property and sales tax credits. All of these will be referred to as programs providing entitlements, although more specific and diverse nomenclature could be used. Each is a policy provision that provides benefits to individuals and families through one mechanism or another. These programs all include a graduated clawback of entitlements once certain income thresholds are reached. The distributive impact of these clawbacks is effectively the same as taxes, and changes in individuals' entitlements (positive or negative) under these programs as the result of DIP saving can be considered an element of DIP benefits.

DIP benefits continue to be measured using a comprehensive annual income tax as a counterfactual, i.e., benefits are measured relative to the results individuals would receive if saving comparable after-tax amounts under a comprehensive annual income tax. One implication of this is that for the purpose of determining entitlements under these various programs, only real capital income is included in an individual's net income.

A fair amount of the tax incidence literature, such as Davies (1998) and Kesselman and Poschmann (2001), uses broad frameworks that incorporate entitlement clawbacks into their analysis to a certain extent. Perhaps such studies are better characterized as the tax and transfer incidence literature. Quite a bit of the literature, including Wolfson (1979), Shillington (1999) and Mintz and Wilson (2002) identifies the clawbacks associated with the public pension programs, in particular, as important impediments to DIP saving, particularly for lower income Canadians. The literature appears to only consider the effect of clawbacks on DIP benefits at the time of withdrawal, rather than also considering their impact at the time of contribution and during the compounding period.

Traditionally, the empirical tax expenditure literature evaluates the benefits of tax expenditures under the personal income tax in isolation, without incorporating the impact of tax expenditures on entitlements of these related programs through their links to net income. Davies (1988) is one exception; he bluntly models the impact of the GIS clawback in his examination of the benefits of RRSP saving. The Department of Finance's recent supplement to its tax expenditure estimates for DIP saving, the "present value" estimates (Department of Finance, 2001), incorporates the impact of DIP saving on entitlements under several of these programs, notably the CTC, OAS and the GSTC.

As was the case with the personal income tax, the counterfactual used to evaluate the marginal impact of DIPs on entitlements under these programs is a comprehensive annual income tax, which taxes only the real component of capital income.

Entitlements under the following nine programs have been modeled:

1. Canada Child Tax Credit (CTC)

2. National Child Supplement (NCS)

3. Ontario Child Care Supplement for Working Families (OCCSWF)

4. Family Allowance (FA)

5. Guaranteed Income Supplement (GIS)

6. Ontario Guaranteed Annual Income System (GAINS)

7. Old Age Security (OAS)

8. GST Credit (GSTC)

9. Ontario Property and Sales Tax Credits (OPSTCs)

These programs all have clawbacks, have a potentially significant impact on the benefits of DIP saving, and are feasible to model. Three of them, GIS, OAS, and GAINs are particularly relevant to DIPs, as they provide retirement income.

The approach used to calculate the size, composition and distribution of DIP benefits is essentially identical to that used for the personal income tax. Entitlement reductions replace taxes, and clawback rates are substituted for tax rates. The methodology used to calculate the effective marginal tax rates associated with the impact of DIP

contributions and withdrawals on net entitlements under these programs is discussed in more detail in section 4.4.

In what follows, the parameters for the benefit formula laid out in section 4.3 (t_1, short-term and projected long-term (t_1-t_2), t^*), are first developed and discussed. These parameters are then used to calculate the size, composition and distribution of the DIP benefits resulting from the interaction of DIPs with these entitlement programs.

6.2 R: Participation Rate, Amount, and Term of DIP Saving

The various aspects of R, the amount of DIP saving, were discussed in detail in sections 5.2 to 5.4. There is no change in any of these variables for the calculation of the changes in entitlements resulting from DIP savings. This includes the development, by age cohort and longitudinal earnings group, of the DIP saving participation rate, the mean amount of DIP saving, and the breakout of DIP saving into short-term and long-term saving.

6.3 Marginal Clawback Rates on Deduction (t_1)

The marginal clawback rate applying to DIP contributions, or t_1, is one of the important components needed to estimate the net benefits received by individuals through their use of DIPs.

The structure and parameters of these entitlement programs are very diverse. The personal income tax is a relatively coherent set of provisions with consistent application; the basic "staircase" structure of marginal personal income tax rates was discussed in section 5.5. In contrast, many of these programs are only applicable to individuals meeting specific criteria, such as age, children of a certain age, family income and so forth. They tend to either impose clawbacks with high rates over narrow income ranges, or low rates over much broader income ranges. It often seems that little attention is paid to the cumulative impact of all of these clawbacks on top of income tax rates by those designing policy.

A simplified overview of the structure of these clawbacks in 1998 is provided in Table 3. The clawback rates range from 2% for the Ontario property and sales tax credit for individuals under age 65, to 50% for the Guaranteed Income Supplement. Most of the clawbacks are applied on family net income. Many of the clawbacks start being levied at family incomes of $20,000 to $26,000. In some years, families with very modest incomes ($25,000-$30,000) with two children under the age of 19 could be paying cumulative clawback rates of some 40% on top of marginal personal income tax rates. Similarly, the GIS clawback rate on income other than OAS is extremely high, at 50%. Although it applies to a very narrow income range, the clawback rate of the Ontario GAINS program is also 50%.

Basic entitlements under these programs typically vary according to individual and family circumstances such as number of children, marital status, and so on. The clawback ceilings will vary accordingly (clawback ceiling = (basic entitlemement/clawback rate) +

clawback threshold). The clawback ceilings in Table 3 are estimates of those applying to an illustrative beneficiary. For the public pension entitlements, a single or widowed individual over age 65 has been used. The clawback ceilings for the other benefits reflect a family composed of two spouses and two children under 18.

The formal clawback rate for Old Age Security and the Family Allowance (the latter program was terminated in 1992) is 15%. However, income from these programs is (or was) taxable, so 9% is an estimate of the net after-tax clawback rate for these programs.

For the purposes of the following analysis, the impact of these nine clawbacks has been summed into one measure. The accompanying commentary, where appropriate, makes reference to the impact of specific program clawbacks.

The mean marginal clawback rate (t_1) applying to the deduction of individuals' DIP contributions from 1991 to 2001 is shown for the two age cohorts in Chart 27. The mean clawback rates are quite modest, at a maximum of 4.5% for the lowest earnings group in the age 25-34 age cohort. The mean marginal clawback rate declines with earnings, falling to under 1% for the highest earnings group in each cohort. These mean marginal clawback rates reflect clawbacks under the GST credit, the OPSTC, and the four child benefit programs; the three public pension programs are not relevant for the t_1 of these young cohorts.

The mean marginal clawback rate is higher for the younger cohort across the entire earnings distribution; a significant portion of this reflects the larger impact of the

deduction of DIP contributions on the younger cohort's entitlements under the child benefit programs. This reflects the cohort's age, and its lower earnings. On average, the younger cohort is more likely than the older cohort to have children under the age of 19 during most of the longitudinal period. The younger cohort's somewhat lower earnings also makes it likely that a larger proportion of their DIP deductions fall within the relevant clawback ranges.

6.4 Short-term Clawback-Averaging Rates (t_1-t_2)

Short-term clawback-averaging rates are those applying to DIP contributions that were offset by DIP withdrawals over the 1991-2001 period. The marginal clawback rates at contribution (t_1) and at withdrawal (t_2) used in its calculation reflect the actual observed marginal clawback rates of those individuals making both sizeable DIP contributions and withdrawals during the longitudinal period.

Mean short-term clawback-averaging rates across earnings groups are shown in Chart 28 for the two cohorts. The mean short-term clawback-averaging rate is very consistent across earnings subgroups and across cohorts, and is virtually nil; which is to say, at the mean, very similar marginal clawback rates apply to individuals' DIP contributions and withdrawals. The clawback-averaging rates are all marginally negative, and in a very tight band, between zero and -.52%.

Chart 29 goes further to explore the distribution of short-term clawback-averaging rates for individuals in the age 25-34 cohort. For the purposes of this chart, individuals

have been ranked from lowest to highest by their short-term clawback-averaging percentile across the horizontal axis, within each earnings group. Clearly, there is some meaningful short-term clawback averaging taking place, but within each subgroup, positive and negative clawback averaging is quite balanced. The median clawback-averaging rate is indeed zero for all subgroups. There is considerable dispersion around the mean, however. The clawback-averaging rate ranges from –9% at the 5th percentile, to 8.1% at the 95th percentile. Between the 25th and 75th percentile, it ranges from –2.2% to 1.4%. It is clear that the impact of the clawbacks, positive or negative, is most significant for the lowest earnings groups, as the absolute value of the clawback-averaging rate drops quite sharply as earnings increase. This is as one would expect, given that the net income ranges impacted most heavily by program clawbacks are quite low, as demonstrated in Table 3.

6.5 Projected t_2 and Long-term Clawback-Averaging Rates (t_1-t_2)

That portion of a cohort's DIP saving that is not offset by DIP withdrawals in the period is considered long-term saving, held until retirement. For this saving, only t_1 is observable in the data. As discussed in sections 4.4 and 5.7, the future t_2 for this saving has been projected using a synthetic cohort approach that assigns the current t_2 of retired cohorts to the future withdrawals of generations that are currently of working age. Individuals are matched across cohorts using their relative earnings position within their cohort for this purpose.

The mean projected long-term clawback rate on DIP withdrawals (t_2) for all cohorts is shown in Chart 30. The public pension program clawbacks are the primary determinants of these results, although the GST credit and OPSTCs are significant. The child benefit programs have no impact on the retirement-age clawback rates.

The projected mean clawback rate applying to DIP withdrawals is quite substantial, ranging from 11.6% for the lowest earnings group, to 5.2% for the highest earnings group. It falls with earnings at a relatively constant slope.

The effect of the GIS clawback is easily the most significant component of the projected mean clawback rate, accounting for about 70% of total cohort benefits clawed back as a result of DIP withdrawals in retirement. Although the GIS clawback has a meaningful impact on the DIP withdrawals of all earnings groups, its relative impact decreases sharply with earnings, reflecting the relatively low income ranges it targets; as a result, the mean long-term clawback rate falls with earnings. The OAS clawback is significant for only the highest earnings group. Although the GAINS clawback is steep, it covers such a narrow income range that it is not significant at the mean.

Taking the marginal clawback rates applying to DIP contributions (t_1) and subtracting those projected to apply to withdrawals (t_2) yields the projected mean long-term clawback-averaging rate (t_1-t_2), which is shown by age cohort in Chart 31.

The projected mean long-term clawback-averaging rate is negative, and of significant size, for all earnings groups, as projected t_2 is consistently greater than t_1.

It is generally quite flat through the first three to four earnings quintiles, where it is the most punitive, because the mean clawback rate at deduction (t_1) is falling with earnings at roughly the same rate as the projected clawback rate at withdrawal (t_2). It increases (becomes less negative) at the upper end of the earnings distribution, where t_2 falls faster than t_1. For the age 25-34 age cohort, the projected mean clawback-averaging rate starts at –7.1% for the lowest earnings group, and increases to -4.4% for the top earnings decile. For the age 35-44 cohort, it begins at –8.4% for the lowest earnings group, and increases to –4.7% for the top decile.

The most important determinant of the sizeable, negative, projected mean long-term clawback-averaging rate, and its pattern across earnings groups, is the impact pattern of the GIS clawback.

Given the substantial size of the statutory clawback rates used by many of these entitlement programs, it is unexpected that the mean impact of DIP contributions and withdrawals on program entitlements, represented as marginal clawback rates, is not larger. As just one example, the GIS clawback rate is 50% over a significant income range, but it is not producing the large mean t_2's for the lower earnings groups that one might have expected. An important factor seems to be the partial nature of the clawbacks, which only apply over particular income ranges, combined with individual circumstances that change across years. A large portion of an individual's DIP contributions or withdrawals may fall into a relevant clawback range in a given year, but not at all in previous or subsequent years. This is another example of how longitudinal data is superior to annual cross-

sectional data; making judgements about individuals' circumstances based on annual data can be very misleading, because annual outcomes can be very transitory in a longer-term perspective. In every case, the average clawback rate for a program experienced by a subgroup in its DIP saving is a small fraction of the statutory clawback rate. For example, the mean GIS clawback rate experienced by the first two earnings groups in the age 55-64 cohort on their DIP withdrawals from 1991 to 2001 was 9.6% and 7.6%, respectively, out of a possible 50%. Similarly, the mean OAS clawback rate experienced by the top earnings decile of the same cohort on their DIP withdrawals during this period was 1.5% out of a possible 9%. For those clawbacks that apply to family income rather than individual income, particularly those targeted at low levels of family income, another factor would be possible large differences between individual and family income. The lowest earnings groups will include significant numbers of individuals, such as stay-at-home spouses, with low personal earnings, but much higher family income. These individuals are less likely to be impacted by clawbacks applying to low levels of family income, which in turn will reduce the average clawback rate for these earnings groups.

As we have seen in Chart 29 with respect to short-term clawback-averaging rates, the mean masks considerable variation. Unfortunately, data on the distribution of long-term clawback-averaging rates are not available. Doubtless, some individuals do typically consistently face these clawbacks at very punitive levels on their retirement-age DIP withdrawals, but they appear to be in the minority, even in the most relevant earnings groups. A finer subgroup breakdown at the bottom of the earnings distribution might better reveal these individuals.

6.6 Marginal Clawback Rates on Capital Income (t*)

The mean marginal clawback rates applying to real capital income in the counterfactual during the compounding period are shown in Chart 32.

The mean marginal clawback rates fall markedly with earnings, reflecting the concentration of many of the clawbacks at low income levels. Short-term t*'s are as high as 4.1% for the younger cohort, fall steadily across the earnings distribution to 1% for the top decile. The short-term t*'s for the age 35-44 cohort start at 3.8% for the lowest earnings group, and fall steadily with earnings, to some .4% for the highest earnings decile. The projected long-term t*'s for the two cohorts follow a similar pattern, but are smaller than the short-term t*'s.

The short-term t*'s are dominated by the impact of the various child benefit clawbacks, particularly the Canada Child Tax Credit for most of the earnings distribution, and the family allowance at the upper end. The greater short-term t*'s for the younger cohort largely reflect the increased presence of young children in that cohort, as well as somewhat lower levels of income. Projected long-term t*'s have been developed through a synthetic approach that matches subgroups across cohorts on the basis of longitudinal earnings, as discussed in section 4.4. Projected long-term t*'s are smaller than in the short-term, primarily because the impact of the clawbacks of the various child benefit programs drop as children age. The family allowance was removed from the long-term projections, as it no longer exists. As cohorts age, the t*'s primarily reflect the GST clawbacks and the OPSTCs.

6.7 DIP Benefits: Size, Composition and Distribution

It is possible at this point to combine the previous findings about the longitudinal prevalence, size and nature of individuals' DIP saving from 1991 to 2001, with the relevant marginal clawback rates and clawback-averaging rates developed in this section in order to calculate the impact of DIP saving on individuals' entitlements under the nine programs chosen for analysis.

The composition of individuals' benefits from DIP savings under these programs, expressed relative to savers' earnings, is shown in Chart 33 and 34. It is clear that, for both cohorts and across all earnings groups, there is a fairly significant and negative clawback-averaging effect on DIP saving. Given that both the mean short-term and projected mean long-term clawback-averaging rates were negative all across the earnings distribution, this is as expected. This negative impact is partially offset, for all earnings groups, by a positive tax shelter effect. In a nutshell, DIP withdrawals reduce individuals' entitlements at retirement under the GST credit, the OPSTCs, and especially under public pension programs. However, DIP saving offers increased entitlements under the GST credit, OPSTCs, and child benefit programs at the time of deduction and throughout the compounding period as a partial offset. The net cumulative effect of these components is a negative one for all subgroups, i.e., DIP saving provides a negative net benefit to cohorts through their impact on the entitlements of these nine programs.

The mean net benefit of DIP saving under these programs, adding all of the benefit components together, is expressed relative to savers' earnings in Chart 35. The mean net

clawback benefit of DIP savings under these programs lie in a tight, flat band between nil and -1.1% of earnings. Interestingly, the negative impact of these clawbacks is smallest for the lowest earnings groups, even though they face the most negative projected long-term averaging rates. For the bottom quintile in particular, the potentially strongly negative impact of these projected long-term clawback-averaging rates, which mostly reflects the GIS clawback, is ameliorated by the fact that this subgroup appears to withdraw most of its DIP saving prior to retirement, as demonstrated in Charts 4 and 5. The GIS clawback is, thereby, largely avoided. Clawback benefits relative to savers' earnings are more negative over the middle of the earnings distribution before becoming less negative again for the highest earnings group. The size of these impacts on program entitlements is quite small relative to the DIP benefits accruing to cohorts under the personal income tax, which, for context, are also shown in Chart 35.

Given the relatively small size and the consistency of these negative clawback benefits across earnings groups, it would appear that combining DIP benefits from the personal income tax and those from these nine entitlement programs in the extended benefit framework is unlikely to result in a distributive pattern for DIP benefits that is markedly different from that of the personal income tax alone. Combined DIP benefits will be smaller than the stand-alone personal income tax benefits, but the differences in distribution will be relatively subtle.

One of the approaches used to evaluate the distribution of benefits flowing from DIP use has been to evaluate the benefit per dollar saved in DIPs across earnings groups. This measure is shown in Charts 36 and 37 for the two cohorts. Each chart shows the DIP

benefit per dollar saved resulting from the clawbacks, from the personal income tax, and from the combination of the personal income tax plus the clawbacks. For the age 25-34 cohort, the DIP benefit per dollar realized from the clawbacks starts at -$.01 for the lowest quintile, becomes increasingly negative as earnings increase, to -$.06 for the fourth quintile, before becoming modestly less negative across the top two deciles. A similar pattern is observed for the age 35-44 cohort. The pattern of DIP benefits across earnings groups for the combination of the personal income tax plus the clawbacks is very similar to that resulting from personal income tax alone; the benefit per dollar saved remains relatively flat across the middle and upper end of the earnings distribution. Overall, the clawbacks have the effect of slightly reducing the differences between subgroups in the DIP benefit per dollar saved, although they simultaneously lower the overall DIP benefit per dollar saved by about 15%.

Thus, after incorporating the clawbacks of these nine entitlement programs into an extended DIP benefit framework, most of the earnings distribution, at least past the 40th percentile, still received substantial net benefits for every dollar saved in DIPs, and faced a fairly level net benefit rate, ranging between $.26 and $.32 per dollar saved for the age 25-34 cohort, and between $.24 and $.30 per dollar saved for the age 35-44 cohort. The bottom two quintiles of the cohorts did not fare as well; the second quintiles received benefits of $.18 and $.22 per dollar saved, but the bottom quintiles only received $.11 or $.12 of benefits for each dollar of DIP saving.

The other approach to examining the distribution of benefits of DIPs, and the more traditional methodology in the tax expenditure literature, is to examine the share of total

cohort DIP benefits across earnings groups as compared to a standard of comparison, typically income or tax liabilities. In effect, this type of analysis integrates the benefit per dollar saved with the participation rate and mean amounts saved. This analysis was done in section 5 for DIP benefits under the personal income tax. A similar stand-alone analysis on the distribution of the negative DIP benefits resulting from these nine entitlement programs with clawbacks will not be performed. Rather, the distribution of DIP benefits using the extended benefit framework, which includes the personal income tax and the nine program clawbacks, will be compared with the distribution of benefits from the personal income tax alone; the difference between the two being the distribution of DIP benefits from the program clawbacks. Given what we have observed so far, expectations are that the shares of cohort DIP benefits across earnings subgroups will be little changed by adding the DIP benefit impacts of these nine clawbacks into the analysis. The addition of these program clawbacks to the DIP benefit framework appears to have the effect of reducing the net benefits individuals receive from DIP saving, but makes little change to their relative distribution.

Chart 38 compares the shares of cohort DIP benefits realized by each subgroup under the stand-alone personal income tax system, with those realized by each subgroup when the DIP benefit framework has been expanded with these clawbacks. It confirms that the subgroup shares of cohort DIP benefits are virtually unchanged. In the age 25-34 cohort, the top decile receives a slightly larger share of cohort benefits, largely at the expense of the p60-p80 earnings subgroup. In the age 35-44 cohort, both of the top deciles

receive a modestly larger share of benefits, especially the top quintile. This is largely at the expense of the p40-p60 and p60-p90 earnings groups.

In section 5.9, various indices of relative advantage were developed for the stand-alone personal income tax system. These consisted of the ratios of each subgroup's share of DIP benefits to its share of income, income tax liabilities, and DIP saving, respectively, as shown in Charts 19 to 22. These ratios are virtually identical under an extended DIP benefit framework that includes the negative net DIP benefits realized by the interaction of DIP saving with the clawbacks of these entitlement programs. All of the analysis about the distribution of DIP benefits under the personal income tax remains completely intact when benefits are examined in this more comprehensive manner, so it will not be repeated here. Detailed data on cohort shares and the indices of relative tax advantage for the extended benefit framework, using a comprehensive annual income tax counterfactual, are contained in Tables A3 and A4 of the Appendix.

In summary, the nine programs analyzed effectively impose the equivalent of marginal tax rates, sometimes extremely high marginal tax rates, through their graduated clawback of program entitlements over particular income ranges. As a result of their impact on net income at the margin, DIP contributions and withdrawals have the potential to produce significant changes in individuals' entitlements under these programs; these changes (positive and negative) are properly considered aspects of DIP benefits.
This research suggests that including these entitlement clawbacks in the measurement of DIP benefits has the net effect of reducing total benefits by roughly 15%. However, it appears to have virtually no effect on the relative distribution of DIP benefits by earnings

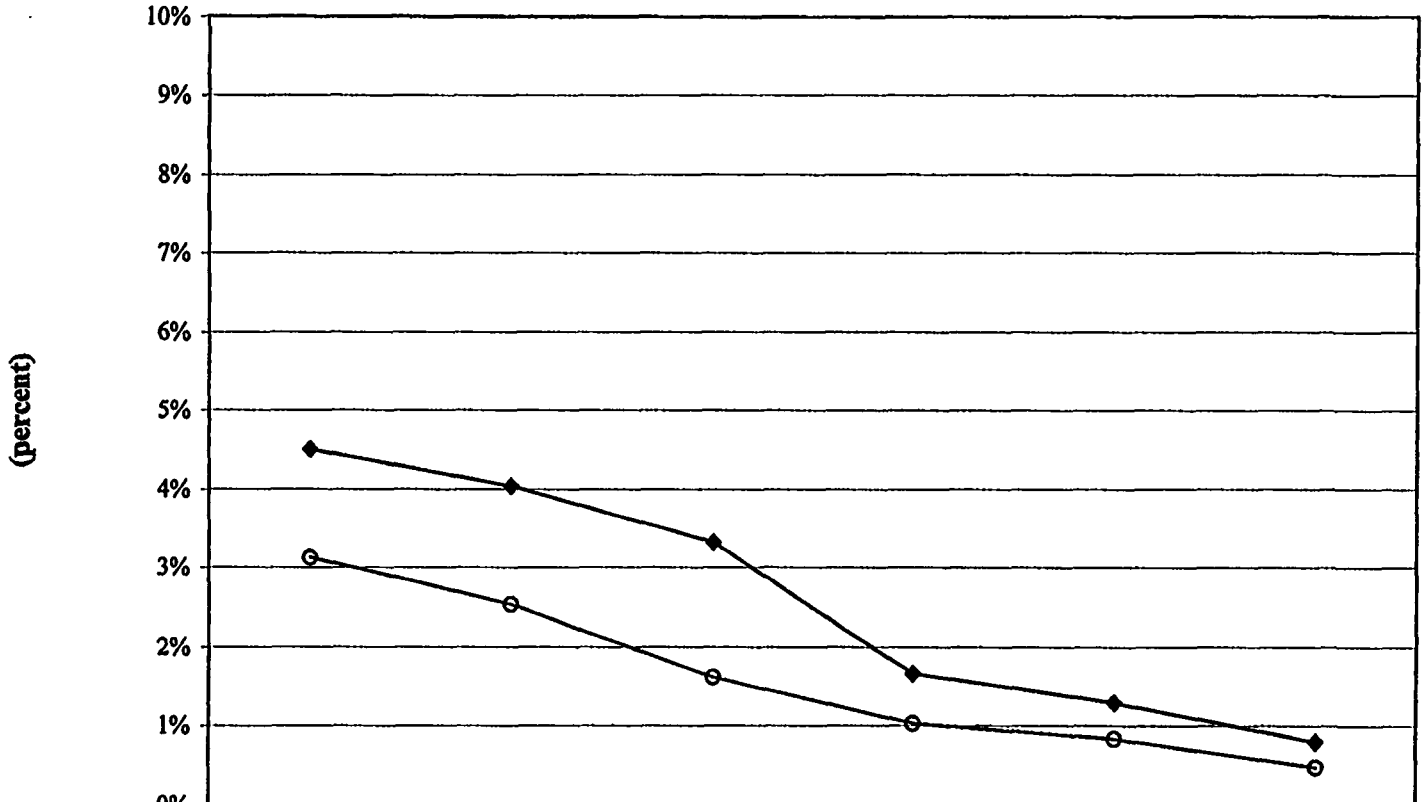
subgroup. This is surprising, given that most of these clawbacks have effect over very specific income ranges, and that cumulative clawback rates over particular low income ranges can be 30% to 50%, or higher. The actual mean subgroup clawback rates on the deduction and withdrawal of DIP saving are much lower than the statutory rates. Presumably, this reflects the fact that many clawbacks have effect over narrow income ranges, and that at the mean, individuals' interactions with them through their DIP saving has been partial and sporadic over time. In a given year, the impact of the clawbacks on an individual's DIP benefits may be significant, but over a longer time period, the average impact is much smaller. This finding may also reflect the fact that many clawbacks are levied on family income, whereas the earnings groups used in this study are based on individual earnings.

There is no doubt that some individuals faced very large clawback rates on their DIP saving, but it is not visible at the mean, at the quintile level of aggregation. Also of particular note in these results is the fact that the lowest earnings quintile largely avoided the punitive GIS clawback, by withdrawing most of its DIP savings in the short-term.

TABLE 3
1998 CLAWBACK STRUCTURE OF SELECTED ENTITLEMENT PROGRAMS

Entitlement Program	Clawback Rate	Clawback Target	Clawback Threshold	Typical Clawback Ceiling
GST credit	5.0%	family net income	$25,921	$38,081
Ontario Property and Sales Tax Credit				
under age 65	2.0%	family net income	$4,000	$25,500
age 65+	4.0%	family net income	$22,000	$38,425
Canada Child Tax Credit				
one child	2.5%	family net income	$25,921	$75,241
more than 1 child	5.0%	family net income	$25,921	$70,981
National Child Supplement				
one child	11.5%	family net income	$20,921	$27,750
two children	20.1%	family net income	$20,921	$27,750
three+ children	27.5%	family net income	$20,921	$27,750
Ontario Child Care Supplement for Working Families	8.0%	family net income	$20,000	$33,750
Family Allowance (1992)	9.0%	individual net income	$53,215	$58,815
Guaranteed Income Supplement	50.0%	family net income	$4,902	$16,552
Guaranteed Annual Income System (Ontario)	50.0%	family net income	$4,902	$6,894
Old Age Security	9.0%	individual net income	$53,215	$85,895

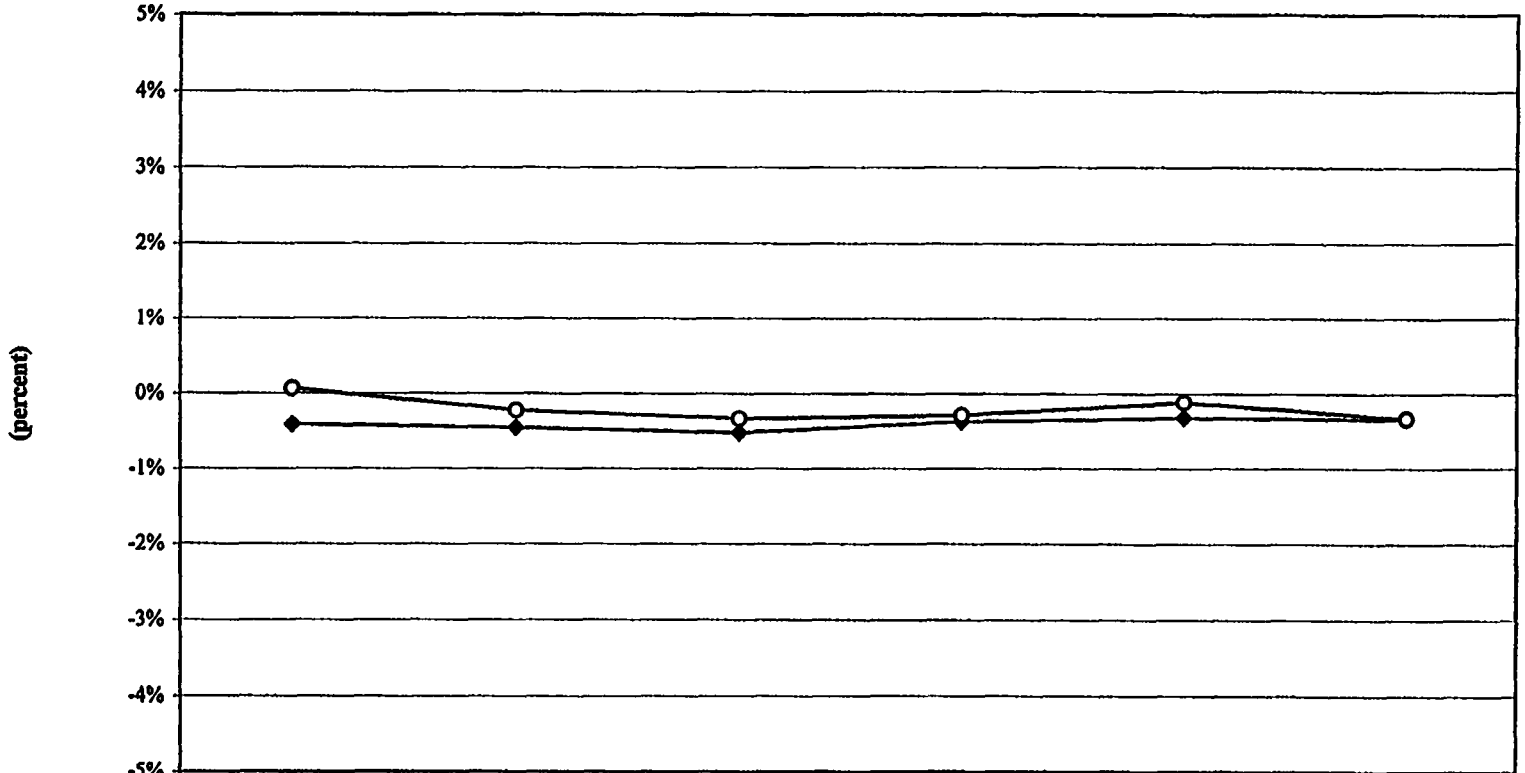
Chart 27
Mean Clawback MTR on Deduction (t_1)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	4.50%	4.04%	3.32%	1.66%	1.29%	0.80%
Age 35-44	3.12%	2.54%	1.61%	1.03%	0.84%	0.48%

Earnings group (percentile)

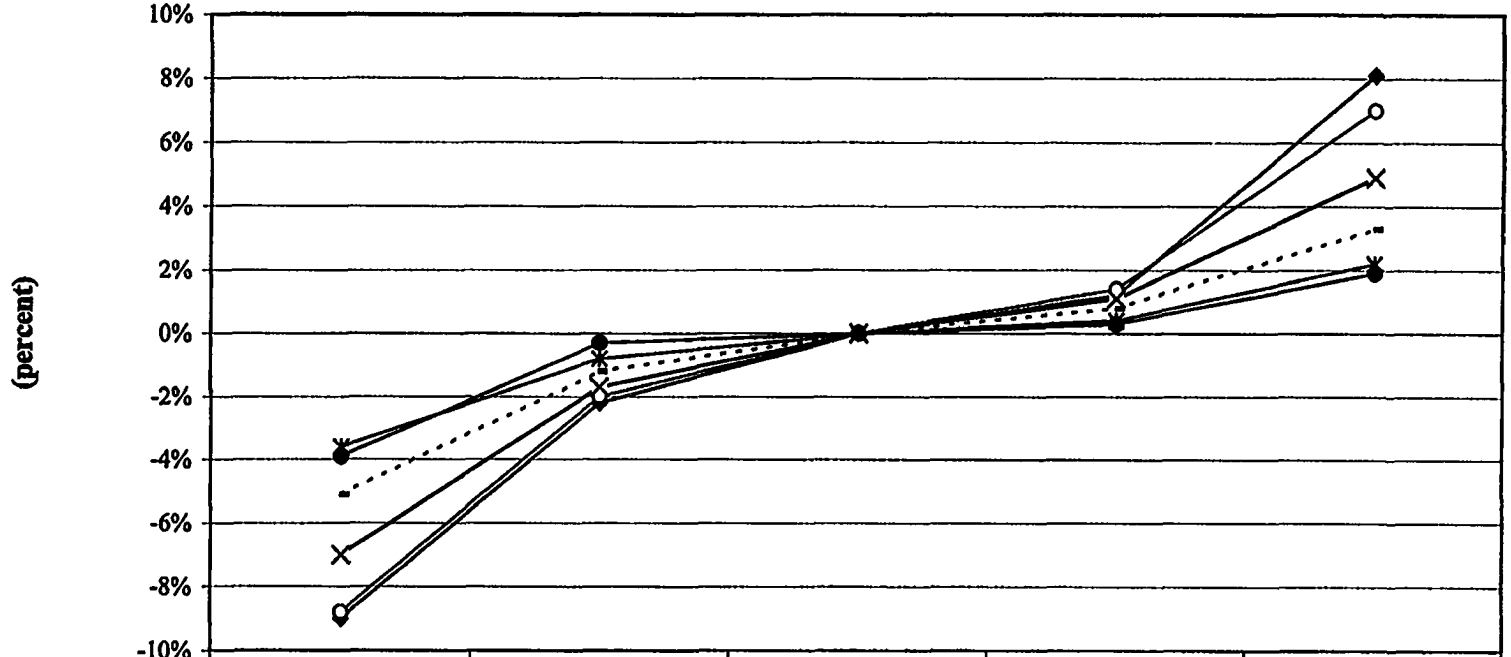
Chart 28
Mean Short-term Clawback-Averaging Rate (t_1-t_2)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	-0.41%	-0.46%	-0.52%	-0.37%	-0.32%	-0.34%
Age 35-44	0.06%	-0.22%	-0.33%	-0.29%	-0.12%	-0.33%

Earnings group (percentile)

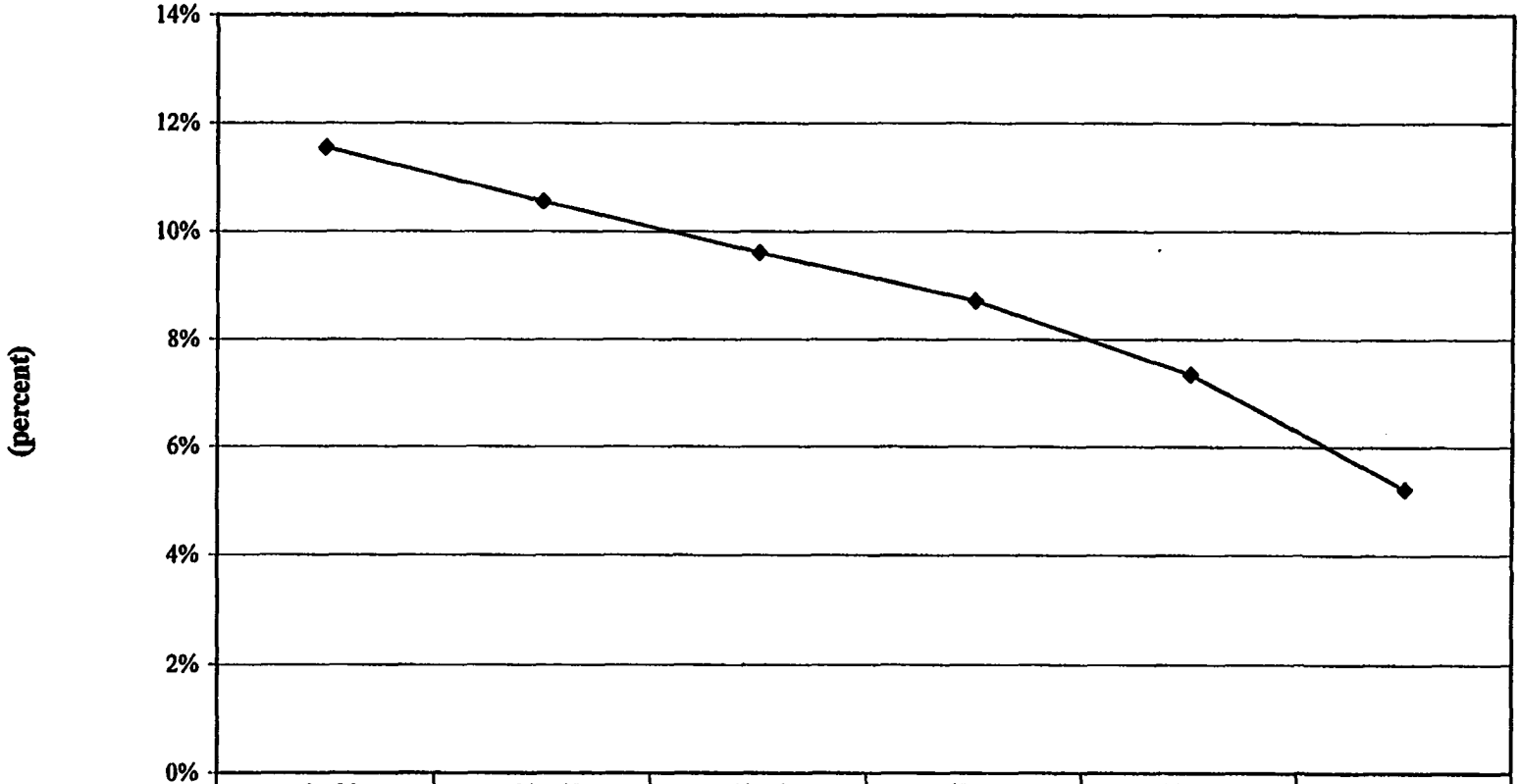
Chart 29: Distribution of Short-term Clawback-Averaging Rate (t_1-t_2)
Age 25-34 Cohort



	5th	25th	50th (median)	75th	95th
p0-p20	-9.0%	-2.2%	0.0%	1.2%	8.1%
p20-p40	-8.8%	-2.0%	0.0%	1.4%	7.0%
p40-p60	-7.0%	-1.7%	0.0%	1.1%	4.9%
p60-p80	-5.1%	-1.2%	0.0%	0.8%	3.3%
p80-p90	-3.6%	-0.8%	0.0%	0.4%	2.2%
p90-p100	-3.9%	-0.3%	0.0%	0.3%	1.9%

(Clawback averaging percentile)

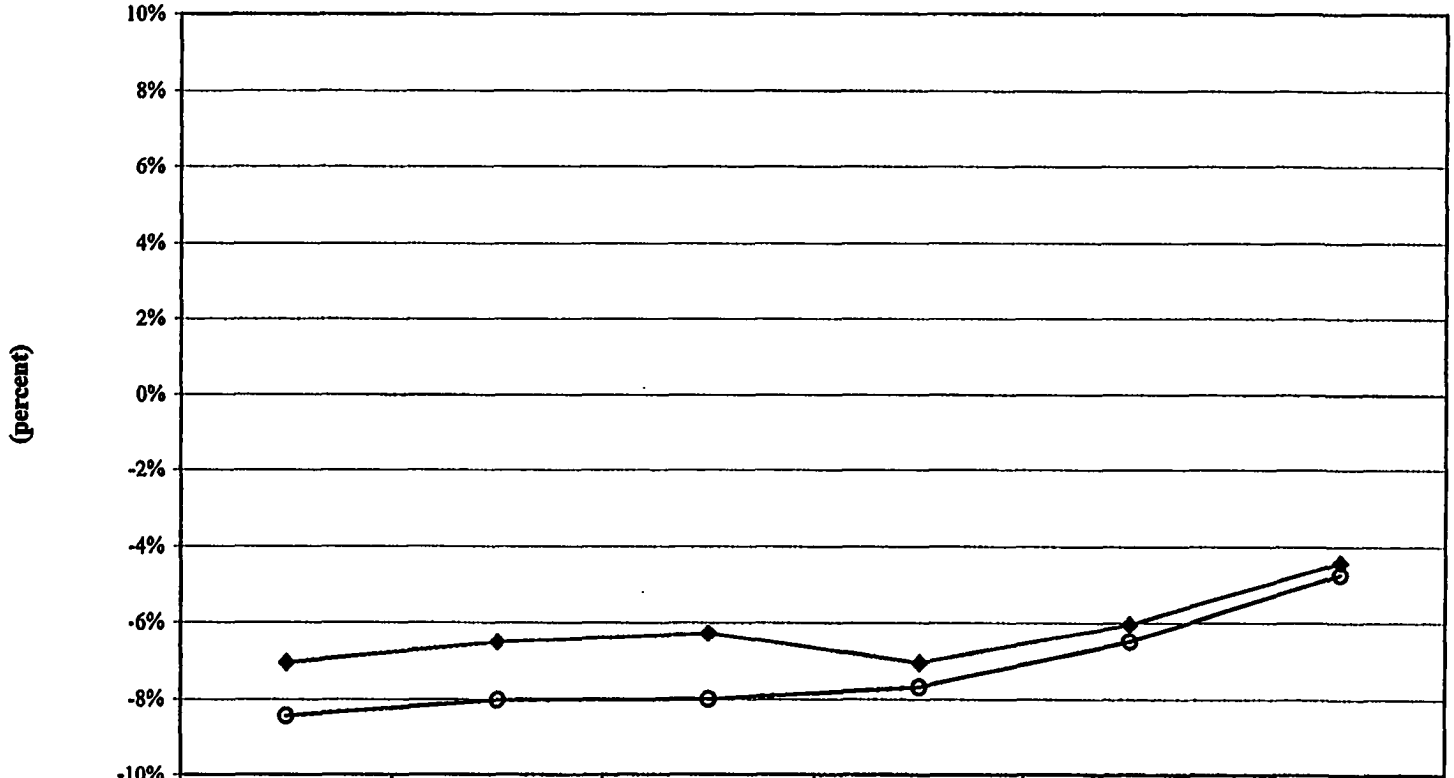
Chart 30: Projected Mean Long-term Clawback Rate (t_2)
All Cohorts



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term t2	11.56%	10.56%	9.61%	8.71%	7.34%	5.22%

Earnings group (percentile)

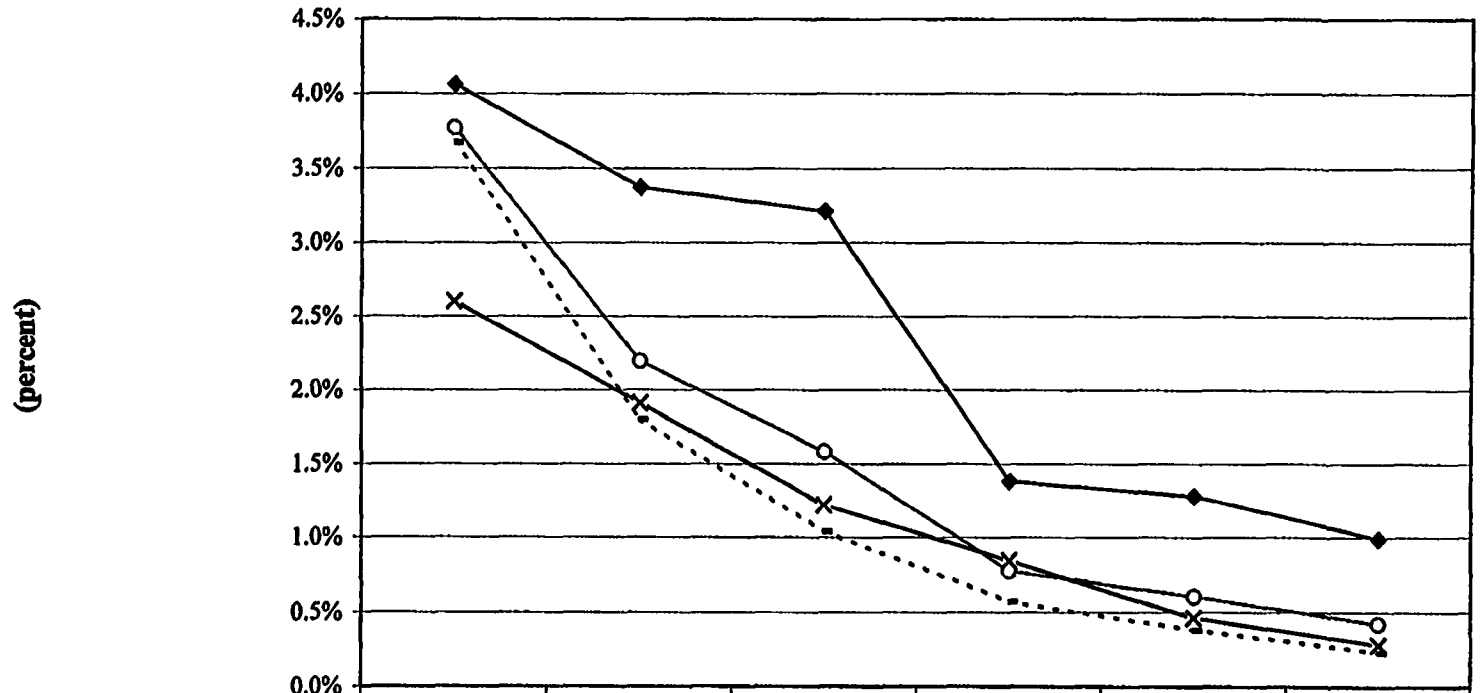
Chart 31
Mean Projected Long-term Clawback-Averaging Rate (t_1-t_2)



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34	-7.05%	-6.52%	-6.29%	-7.05%	-6.05%	-4.42%
Age 35-44	-8.43%	-8.02%	-7.99%	-7.68%	-6.50%	-4.74%

Earnings group (percentile)

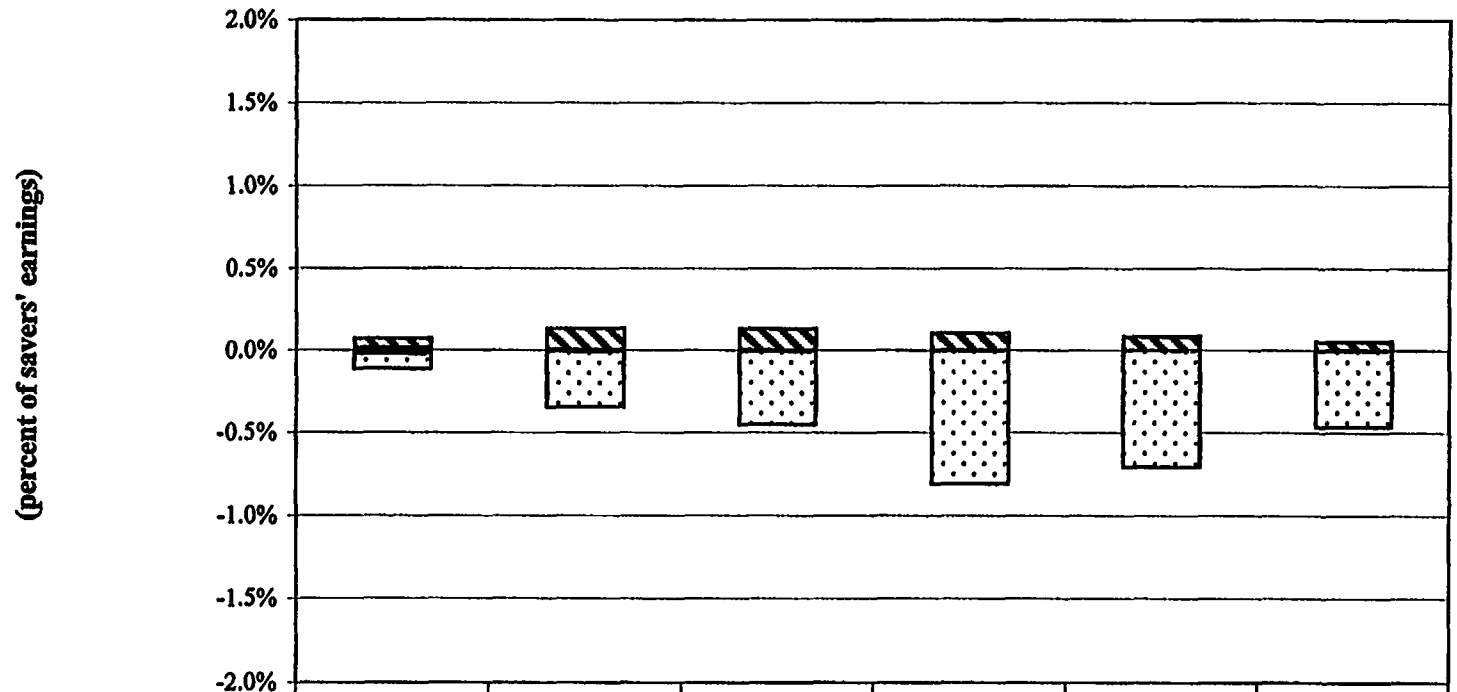
Chart 32: Short-term and Projected Long-term Marginal Clawback Rate (t*) on Capital Income



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34, short-term t*	4.06%	3.37%	3.21%	1.38%	1.28%	0.99%
Age 25-34, long-term t*	3.77%	2.19%	1.58%	0.77%	0.61%	0.42%
Age 35-44, short-term t*	2.60%	1.91%	1.22%	0.84%	0.46%	0.28%
Age 35-44, long-term t*	3.67%	1.80%	1.04%	0.57%	0.38%	0.23%

Earnings group (percentile)

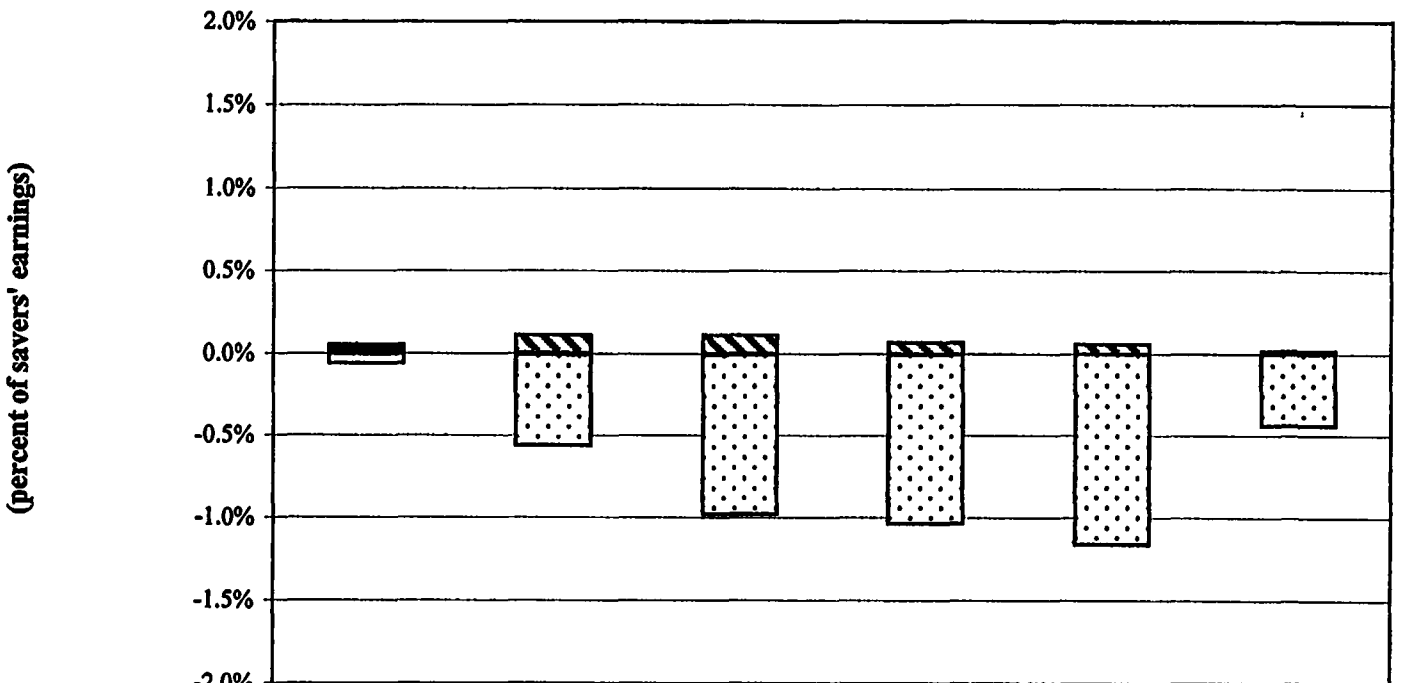
CHART 33: Components of Total Clawback Benefit
Age 25-34 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term tax shelter	0.05%	0.13%	0.13%	0.10%	0.08%	0.05%
Long-term tax averaging	-0.09%	-0.34%	-0.45%	-0.81%	-0.71%	-0.46%
Short-term tax shelter	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%
Short-term tax averaging	-0.02%	-0.01%	-0.01%	0.00%	0.00%	0.00%

Earnings group (percentile)

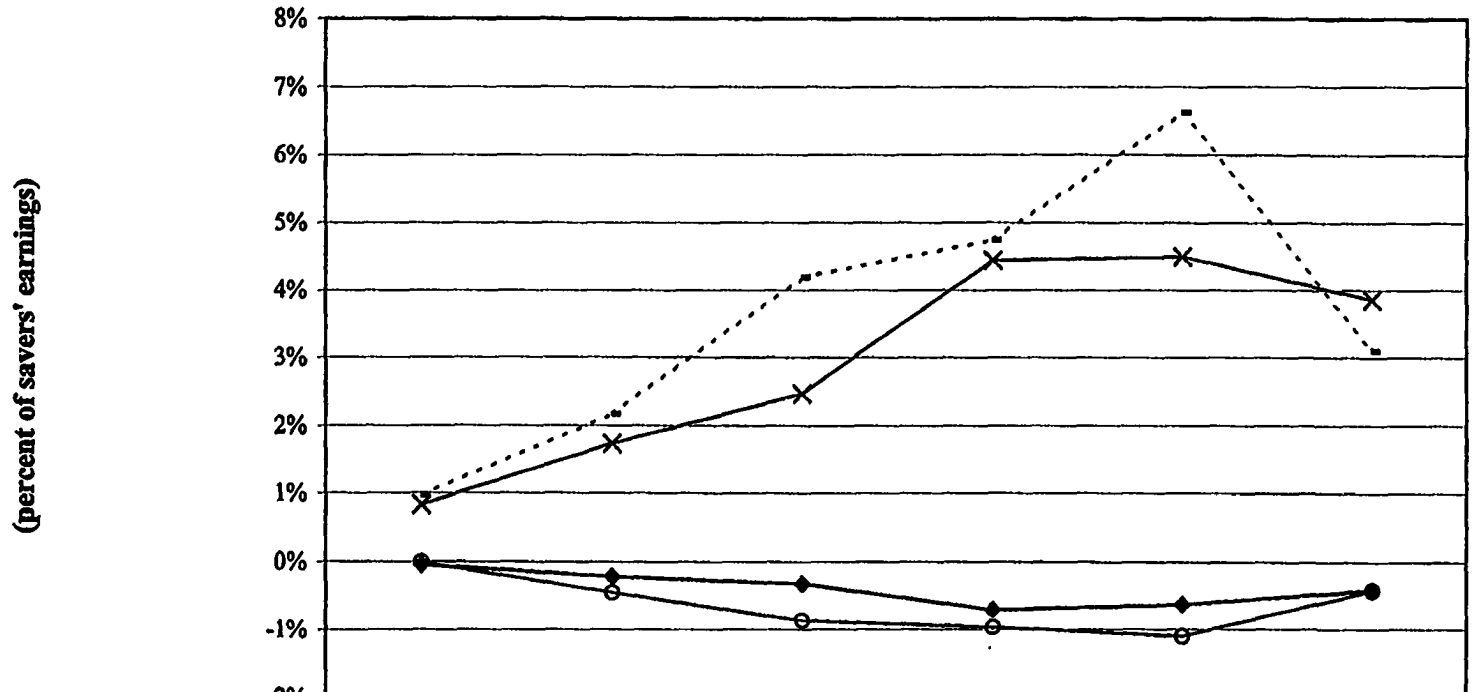
Chart 34: Components of Total Clawback Benefit
Age 35-44 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Long-term tax shelter	0.02%	0.11%	0.11%	0.07%	0.06%	0.02%
Long-term tax averaging	-0.06%	-0.56%	-0.97%	-1.03%	-1.16%	-0.44%
Short-term tax shelter	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%
Short-term tax averaging	0.01%	-0.01%	-0.01%	0.00%	0.00%	0.00%

Earnings group (percentile)

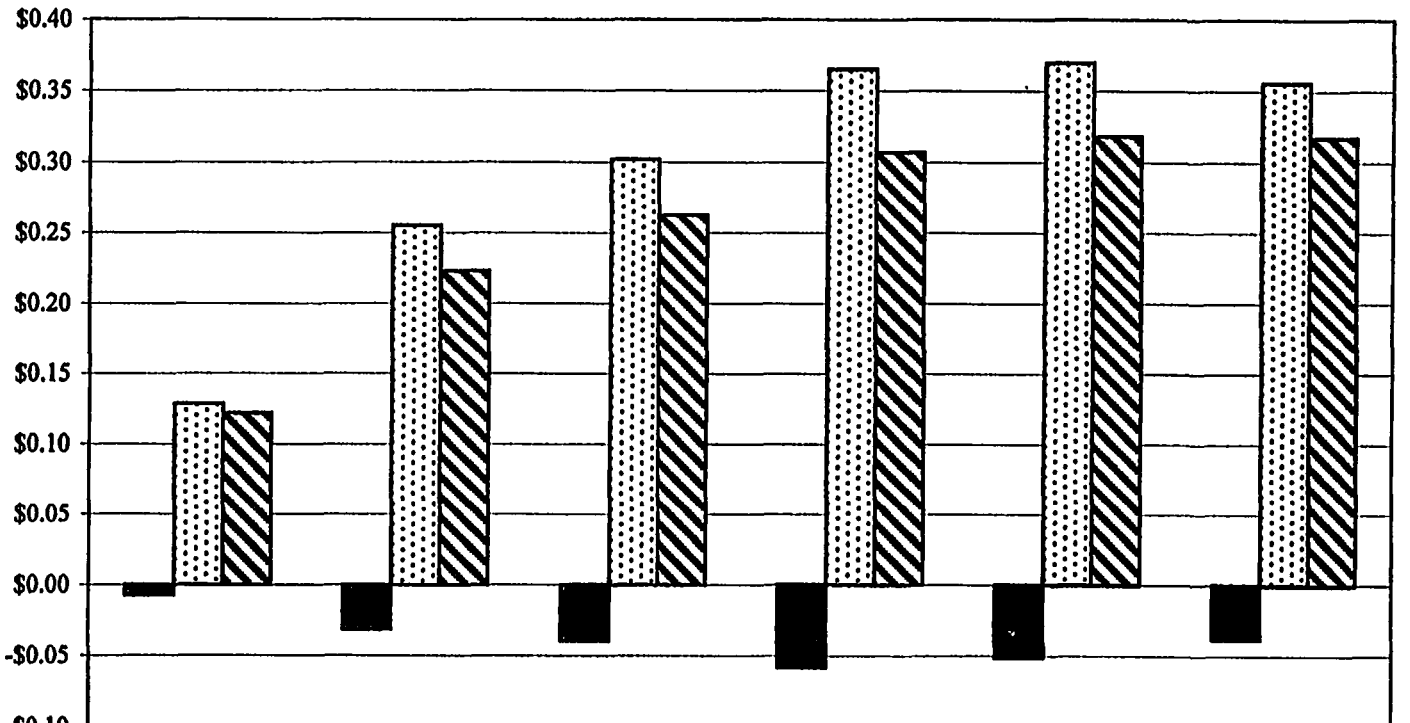
Chart 35
Mean Net Clawback Benefits and PIT Benefits



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Age 25-34 Clawbacks	-0.04%	-0.22%	-0.32%	-0.71%	-0.63%	-0.41%
Age 35-44 Clawbacks	-0.01%	-0.45%	-0.87%	-0.97%	-1.10%	-0.42%
Age 25-34 PIT	0.83%	1.74%	2.46%	4.44%	4.50%	3.86%
Age 35-44 PIT	0.97%	2.17%	4.19%	4.75%	6.63%	3.10%

Earnings group (percentile)

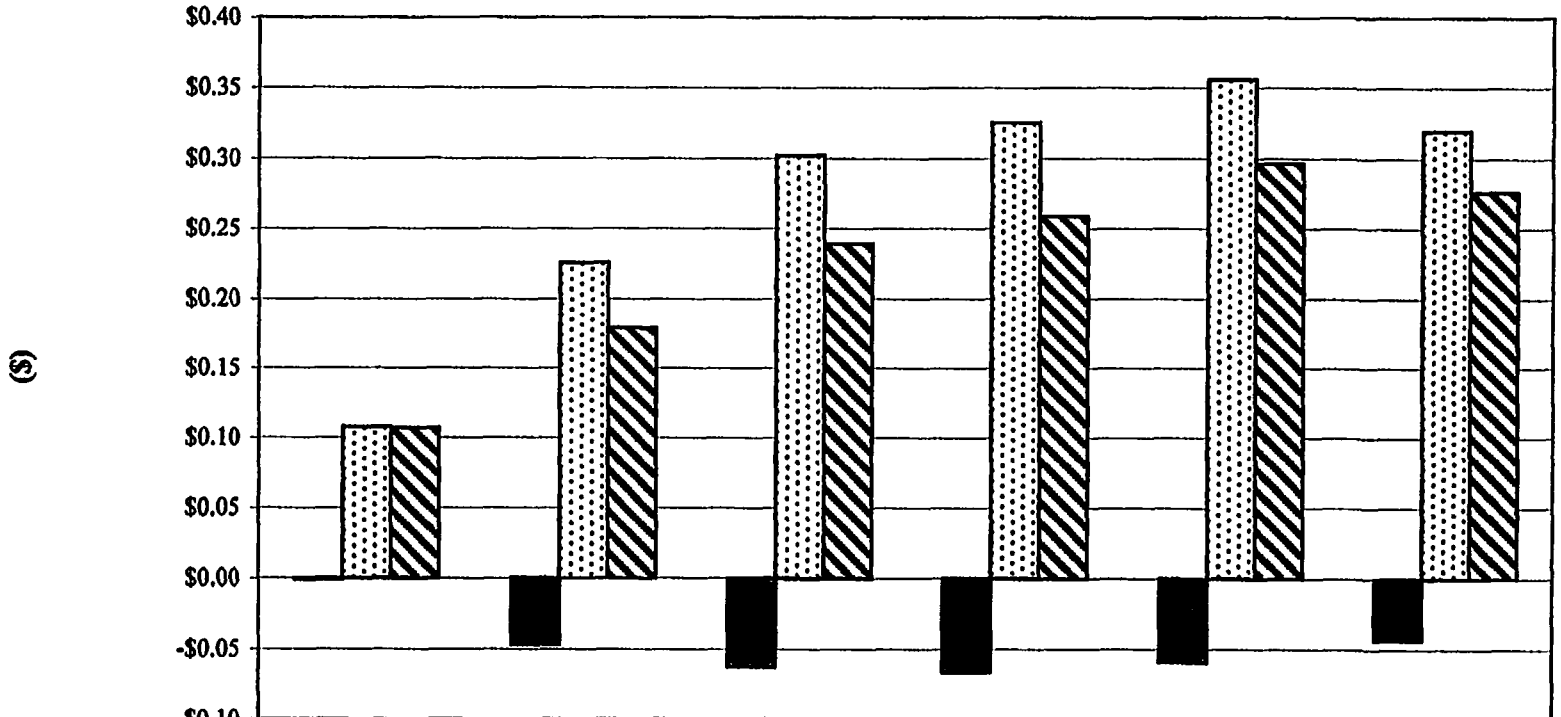
Chart 36: Mean DIP Benefit per Dollar Saved
Age 25-34 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Clawbacks	-$0.01	-$0.03	-$0.04	-$0.06	-$0.05	-$0.04
PIT	$0.13	$0.25	$0.30	$0.36	$0.37	$0.36
PIT + Clawbacks	$0.12	$0.22	$0.26	$0.31	$0.32	$0.32

Earnings group (percentile)

Chart 37: Mean DIP Benefit per Dollar Saved
Age 35-44 Cohort



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Clawbacks	$0.00	-$0.05	-$0.06	-$0.07	-$0.06	-$0.04
PIT	$0.11	$0.23	$0.30	$0.33	$0.36	$0.32
PIT + Clawbacks	$0.11	$0.18	$0.24	$0.26	$0.30	$0.28

Earnings group (percentile)

Chart 38: Share of Cohort DIP Benefits
PIT vs. PIT + Clawbacks

	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
PIT	0.26%	3.97%	11.51%	31.36%	21.40%	31.50%		0.35%	4.56%	16.58%	28.01%	26.11%	24.40%
PIT + Clawbacks	0.29%	4.01%	11.54%	30.44%	21.27%	32.46%		0.43%	4.39%	15.97%	27.11%	26.46%	25.65%

Age cohort and earnings group (percentile)

7.0 EMPIRICAL RESULTS: POLICY COUNTERFACTUAL (TAX-PREPAID SAVINGS PLANS)

7.1 Introduction

To this point, the counterfactual that has been used to evaluate the benefits of DIPs has been a comprehensive annual income tax. It was argued in section 4.2 that a comprehensive annual income tax is a more meaningful counterfactual than that generally used in the applied tax expenditure literature. However, in a broader sense, simply using a comprehensive annual income tax as a counterfactual has some major shortcomings. DIPs serve fundamental roles in retirement income policy and tax policy. DIPs are one of the central components of the retirement income system that provide retirement income to the broad middle and top of the earnings distribution. Looking at essentially the same policy goals, but through a different lens – the public finance perspective – DIPs are integral to the structure of the personal income tax system, effectively pushing it toward being more of a tax on consumption than a tax on income for most of the population, and simultaneously permitting a certain amount of lifetime tax averaging. On that level, it is nonsensical to implicitly suggest that DIPs could just be abolished, and that whatever remains of the existing retirement income and tax policy systems would just carry on as is. In essence, a balanced policy counterfactual is required, rather than just a narrow, technical counterfactual. This approach considers DIPs as one particular set of policy instruments out of many that could be utilized to achieve certain policy outcomes or address certain policy goals. The size and distribution of DIP benefits can then be evaluated in comparison

to those of other policy instruments that could be used in order to address these policy goals.

There are many potential candidates for a policy counterfactual for DIPs. One possibility might be an expansion of the scope of the Canada Pension Plan to provide better income replacement for middle and upper-income individuals. Another might be a major shift in tax mix toward consumption taxation by slashing income taxes and raising payroll taxes and the GST.

Tax-prepaid saving plans (TPSPs) have been chosen as the policy counterfactual for DIPs. This sort of savings instrument was discussed briefly in section 3.4.2. TPSPs represent an alternative form of tax-preferred saving. TPSPs would continue to address the central policy goals as DIPs – they would facilitate the smoothing of individuals' consumption between work and retirement, and would continue to provide a significant consumption tax element to the personal income tax system. Unlike DIPs, TPSPs do not have a tax-averaging effect. TPSPs have been advocated by Kesselman and Poschmann (2001a), among others, as a useful complement to DIPs that would eliminate the substantial disincentives to saving faced by individuals potentially affected at the margin by the GIS clawback, or anyone else who otherwise would be withdrawing from their DIPs at higher effective marginal tax rates than applied at the time of contribution, i.e., ($t_2 > t_1$). TPSPs would likely also be a politically attractive alternative to DIPs; they would be perceived as being less regressive than DIPs, as there is no initial tax deduction associated with them. The initial tax deduction is often incorrectly perceived as making

DIPs highly regressive. TPSPs would also be politically attractive because, unlike a DIP, a contribution to a TPSP would not entail an upfront revenue loss for governments.

This counterfactual, as is the case of the existing literature, assumes no behavioural change by savers in response to the replacement of DIPs with TPSPs, i.e., that the amount of saving, measured either pre-tax or after-tax, will be the same in either case. It also assumes that savers enjoy the full incidence of DIP benefits.

Replacing DIPs with TPSPs would also increase income tax revenues on a longitudinal or lifetime basis. The reasons for this will be discussed below.
This counterfactual will be made revenue neutral to DIPs. This has been done by reducing average personal income tax rates in the counterfactual; the increase in income tax revenue resulting from replacing DIPs with TPSPs has been reallocated to individuals according to their share of personal income tax liabilities in the counterfactual.

The benefit incidence of DIPs has always been considered strictly in isolation in the existing applied literature – the counterfactual, whether explicit or implicit, is simply that DIPs are eliminated; no other tax or policy changes accompany this. Davies (1988) discusses these issues at some length and notes that in such cases, it is being implicitly assumed that any policy or fiscal changes required to balance the removal of a tax expenditure, i.e., to make the analysis self-contained, are distributively neutral. However, this is problematic when multiple standards of comparison are considered relevant. Fiscal or policy changes cannot be simultaneously neutral by a share of income standard and by a share of tax liabilities standard, for example.

Whereas contributions to DIPs are made with pre-tax income (i.e., are deductible from taxable income), saving in a TPSP is done out of after-tax income; no deduction is associated with contributions to a TPSP. No income tax is paid on the annual capital income accruing on savings in either DIPs or TPSPSs during the compounding period. All withdrawals from DIPs are fully taxed as income. Withdrawals from TPSPs are not taxed at all; the income tax on saving done in TPSPs has been prepaid.

Recall that the benefits realized by an individual contributing an amount, R, to a DIP can be calculated with the following formula:

$$\text{DIP Benefit} = \underset{(1)}{t_1 R} + \underset{(2)}{\frac{R(1-t_1)\,[(1+r)^n - (1+(1-t^*)\,r)^n]}{(1+r)^n}} - \underset{(3)}{\frac{t_2 R\,(1+r)^n}{(1+r)^n}}$$

Term 1 is the income tax reduction resulting from the initial deduction of the DIP contribution. Term 2 is the tax avoided on the capital income accruing during the compounding period. Term 3 is the tax liability when funds are withdrawn from the DIP and added to income.

This formula for DIP benefits can be readily transformed into a formula for measuring TPSP benefits. Term 1 and Term 3 are not applicable to TPSPs; the remainder of the formula, Term 2, captures the benefits of saving in a TPSP relative to saving in a counterfactual. Here, the benefit is discounted to the year of contribution:

$$\text{TPSP Benefit} = \frac{R(1-t_1)\,[(1+r)^n - (1+(1-t^*)\,r)^n]}{(1+r)^n}$$

The benefit from saving in a TPSP is the tax on accruing capital income that is avoided during the compounding period. This is what was previously identified as the "tax shelter" component of DIP benefits. An individual saving in a TPSP receives a total annual return on his saving equal to r, rather than receiving $(1-t^*)r$ in the counterfactual. A DIP is functionally equivalent to a TPSP plus a tax-averaging benefit.

Benefits from a DIP will be equivalent to those from a TPSP when $t_1=t_2$, i.e., when tax-averaging benefits are zero. If follows that when tax-averaging benefits are positive, i.e., $(t_1>t_2)$, DIP benefits will be larger than TPSP benefits, and when tax-averaging benefits are negative, $(t_2>t_1)$, TPSP benefits will be larger.

If a DIP is equivalent to a TPSP plus tax-averaging benefits, then measuring DIP benefits using stand-alone TPSPs as a counterfactual simply yields DIP's tax-averaging benefits. Tax-averaging benefits for DIPs have been shown as significantly positive for the earnings distribution as a whole, whether they are being measured relative to the personal income tax alone, or relative to the personal income tax plus clawbacks. The total of these tax-averaging benefits will then also be equal to the extra tax revenue that has to be returned to taxpayers in the counterfactual in order to maintain revenue neutrality. Measuring the marginal benefit of DIPs, relative to a revenue-neutral TPSP counterfactual, essentially collapses to comparing the distribution of DIP tax-averaging benefits to the latter's redistribution as a "revenue-neutrality benefit" in the counterfactual. In this case, it is being redistributed according to subgroups' share of income tax liabilities.

Strictly speaking, measuring DIP benefits using TPSPs as a counterfactual requires taking the total after-tax proceeds of saving in a DIP and subtracting the total after-tax proceeds of saving in a TPSP. Rather than proceeding immediately to this, total DIP benefits will be first compared to total TPSP benefits both with and without an adjustment to ensure revenue neutrality. The difference between total DIP benefits and total benefits of a revenue-neutral TPSP counterfactual is equivalent to directly measuring DIP benefits using a revenue-neutral TPSP counterfactual.

All of these benefits will be calculated using a comprehensive annual income tax counterfactual. Section 7.2 will evaluate this data using the PIT benefit framework. Section 7.3 will provide the same analysis using the extended benefit framework that incorporates the nine income-tested programs introduced in section 6. Only total benefits will be considered, rather than their composition; the composition of DIP benefits has been discussed in detail in section 5, and TPSPs simply consist of a tax-shelter benefit. As noted, the composition of DIP benefits is implicit when DIPs are being compared to TPSPs; the TPSP benefit is equivalent to the DIP tax-shelter benefit, and the difference between DIPs and TPSPs is, therefore, the tax-averaging component of DIP benefits. The aggregate size of a cohort's benefits will be identical for DIPs and the revenue-neutral TPSP counterfactual; what is at issue is differences in the relative distribution of benefits.

The parameters for the benefit formula for TPSPs are simply a subset of those already presented in section 5 for DIPs; the latter can be consulted for more information. The most significant parameter is t*, which is discussed in section 5.8.

7.2 Distribution of DIP Benefits (PIT Benefit Framework)

Charts 39 and 40 depict the mean benefits of the alternatives broken out by subgroup for the two cohorts, expressed relative to savers' earnings. The first column shows the benefits received by a subgroup from saving in a stand-alone TPSP, i.e., without a revenue-neutrality condition. The second column adds a subgroup's "revenue-neutrality benefit" to their TPSP benefits. The third column is total DIP benefits. The fourth column is the marginal DIP benefit, measured relative to the revenue-neutral TPSP counterfactual.

As expected, stand-alone TPSP benefits are substantially smaller than DIP benefits. The revenue-neutrality benefit is particularly large relative to the stand-alone TPSP benefit, for the bottom quintile, reflecting low levels of saving relative to income tax liabilities. It is also relatively large for the top decile. Marginal DIP benefits (or disbenefits) are of substantial relative magnitude, especially for the lower earnings groups. Total DIP benefits relative to earnings are some 40% lower than in the counterfactual for the lowest quintile, and some 20% lower for the second-lowest quintile. For the age 25-34 cohort, marginal DIP benefits are most positive for the p60-p80 earnings group, and are also positive for the p80-90 earnings group. Marginal DIP benefits are negative for the remaining subgroups, particularly so for the bottom two quintiles.

In the age 35-44 cohort, marginal DIP benefits are positive for the p40-p60, p60-p80, and p80-p90 earnings groups, particularly so for the latter. Marginal DIP benefits are negative for the remaining earnings groups; they are relatively largest for the bottom quintiles, and largest in absolute terms for the top decile.

The benefit per pre-tax dollar saved (or benefit rate) is shown for the two age cohorts in Charts 41 and 42. Expressing TPSP benefits per pre-tax dollar saved, rather than more naturally by after-tax dollar saved, allows for direct comparison with DIPs, where contributions are made out of pre-tax dollars. The benefit rate for stand-alone TPSPs is considerably smaller than for DIPs. In each cohort, relative to the revenue-neutral counterfactual, DIPs substantially lower the benefit rate for the lowest two quintiles, greatly increasing the disparity between the benefit per dollar saved between the latter and the rest of the earnings distribution. They also have the effect of pulling the benefit rate of the top decile down toward the mean for the rest of the earnings distribution, and substantially enhance the benefit rate of the p60-p80 and p80-p90 subgroup. The p40-p60 earnings groups received positive negative DIP benefits per dollar saved for the age 25-34 age cohort, and positive DIP benefits per dollar saved for the age 35-44 age cohort.

The indices of relative advantage used in section 5 for DIPs have been constructed for three different scenarios in Charts 43, 44, and 45. The indices are equal to a subgroup's share of cohort benefits divided by its share of cohort income, income taxes, and saving, respectively. The scenarios are for stand-alone TPSPs, the revenue-neutral TPSP counterfactual, and DIPs. It is not possible to directly measure a subgroup's share of the marginal DIP benefit (relative to the revenue-neutral TPSP counterfactual), because by definition, when added over the entire cohort, it sums to zero. Cohort-share data and the related indices of relative advantage for tax-prepaid saving plans, measured using the PIT benefit framework, are also presented in Tables A5 to A8 of the Appendix, for both a stand-alone TPSP scenario and a revenue-neutral TPSP scenario.

Charts 43 to 45 paint the same basic distributional picture, with differences only in degree. It is the same distributional pattern suggested by Charts 39 to 42. DIP benefits are significantly more concentrated in the middle earnings groups than are the benefits of the revenue-neutral TPSP counterfactual. This is true whether the standard of comparison used is share of income, share of income taxes, or share of saving. For the age 25-34 cohort, DIP benefits are relatively more concentrated in the p60-p80 and p80-p90 subgroups, at the expense of both the lowest three quintiles and the highest decile. This difference in benefit concentration is particularly notable for the lowest two quintiles, relative to share of income taxes or share of saving. For the age 35-44 cohort, DIP benefits are more concentrated in the p40-p60, p60-p80 and p80-p90 earnings subgroups, particularly the latter. The differences in benefit concentration are more pronounced for the age 35-44 cohort. DIP benefits are more concentrated than those in the counterfactual for those subgroups whose share of cohort tax-averaging benefits is greater than their share of cohort income tax liabilities.

While these marginal distributional differences between DIPs and the counterfactual exist, and are significant, it is also true that in an absolute sense, the main thrusts of the overall distributional portrait created by these two alternatives are quite similar. As an illustration, for the age 35-44 cohort, both DIPs and the counterfactual provide benefits that are more concentrated than income for the p60-80, and p80-p90 earnings groups. In the counterfactual, benefits are less concentrated than income for the p40-p60 earnings group, but DIP benefits are as concentrated than income for this group. Benefits are more concentrated than income for the p90-p100 earnings group in the

counterfactual, but DIP benefits for this group are less concentrated than income. Both DIPs and the counterfactual provide benefits that are more concentrated than income taxes for the p40-p60, p60-p80, and p80-p90 earnings groups, and benefits that are less concentrated than income taxes for the p0-p20 and p90-p100 earnings groups. The benefits received by the p20-p40 earnings group are roughly as concentrated as income taxes in the counterfactual, but are less concentrated using DIPs.

The fact that both DIPs and a revenue-neutral TPSP counterfactual provide broadly similar distributional outcomes is not surprising. To a significant extent, these outcomes are predetermined by the policy goals being pursued, rather than being a function of the particular policy instruments chosen. If the main policy purpose underlying DIPs is essentially to facilitate consumption smoothing between work and retirement for the middle and top of the earnings distribution, than any reasonable policy instrument used, including even an expansion of the public pension system, for example, would primarily operate to concentrate benefits to those individuals.

7.3 Distribution of DIP Benefits (Extended Benefit Framework)

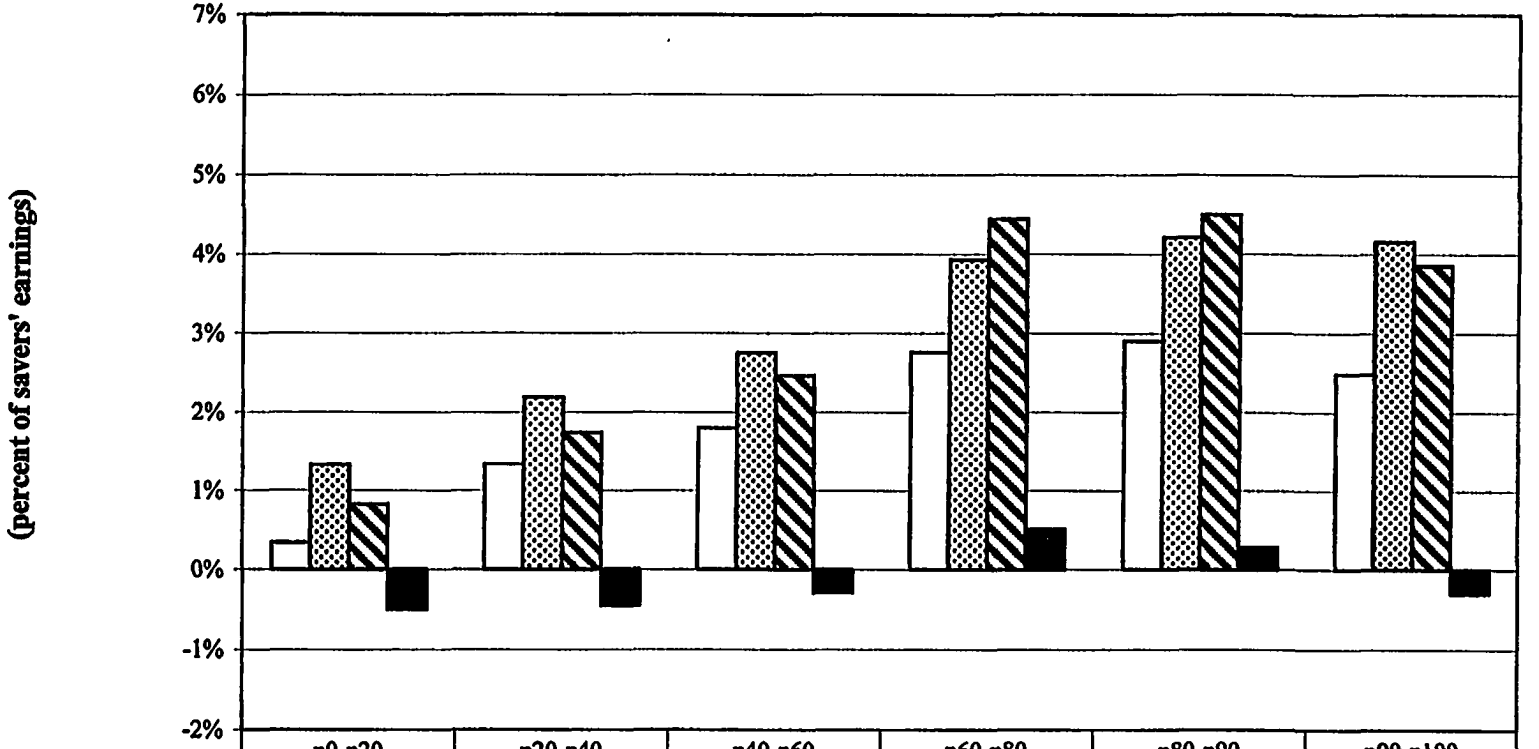
The distribution of DIP benefits relative to a revenue-neutral TPSP counterfactual continues to be examined in Charts 46 to 52. In these charts, however, DIP benefits are not measured using the PIT benefit framework. Instead, the extended benefit measurement framework, which also incorporates the impact of the clawbacks of the nine programs analyzed in section 6, has been used. The relevant cohort-share data, and the corresponding indices of relative advantage, are presented for both a stand-alone TPSP scenario, and a revenue-neutral TPSP scenario, in Tables A9 to A12 of the Appendix.

The general pattern of distributive outcomes observed in section 7.2 remains intact. The benefits provided by DIPs are larger and more concentrated for the p60-p80 and p80-p90 subgroups in the age 25-34 cohort, and for the p40-p60, p60-p80 and p80-p90 subgroups in the age 35-44 cohort, than they are in the revenue-neutral counterfactual. This is true whether one is examining the size of benefits relative to earnings in Charts 46 and 47, the benefit rate per dollar saved in Charts 48 and 49, or the indices of relative advantage in Charts 50 to 52.

These distributive differences are smaller, however, than they are using the PIT benefit framework, which only captures benefits flowing through the stand-alone personal income tax. This is because the clawbacks have a negative clawback-averaging benefit overall. The effect of incorporating the clawbacks into the benefit framework reduces the total size of DIP tax-averaging benefits. This provides less scope for differences in the distribution of benefits between DIPs and the counterfactual.

A significant marginal distributive effect of incorporating the clawbacks into the benefit framework is to reduce the size of the positive marginal DIP benefits realized by the subgroups in the middle of the earnings distribution. These reductions are accompanied by a reduction in the negative marginal DIP benefits for the lowest quintile and top decile in both cohorts (i.e., an increase in marginal benefits). The negative marginal DIP benefits of the remaining subgroups, p20-p40 and p40-p60 in the age 25-34 cohort, and p20-p40 in the age 35-44 cohort, are less affected by the integration of the clawbacks into the benefit framework.

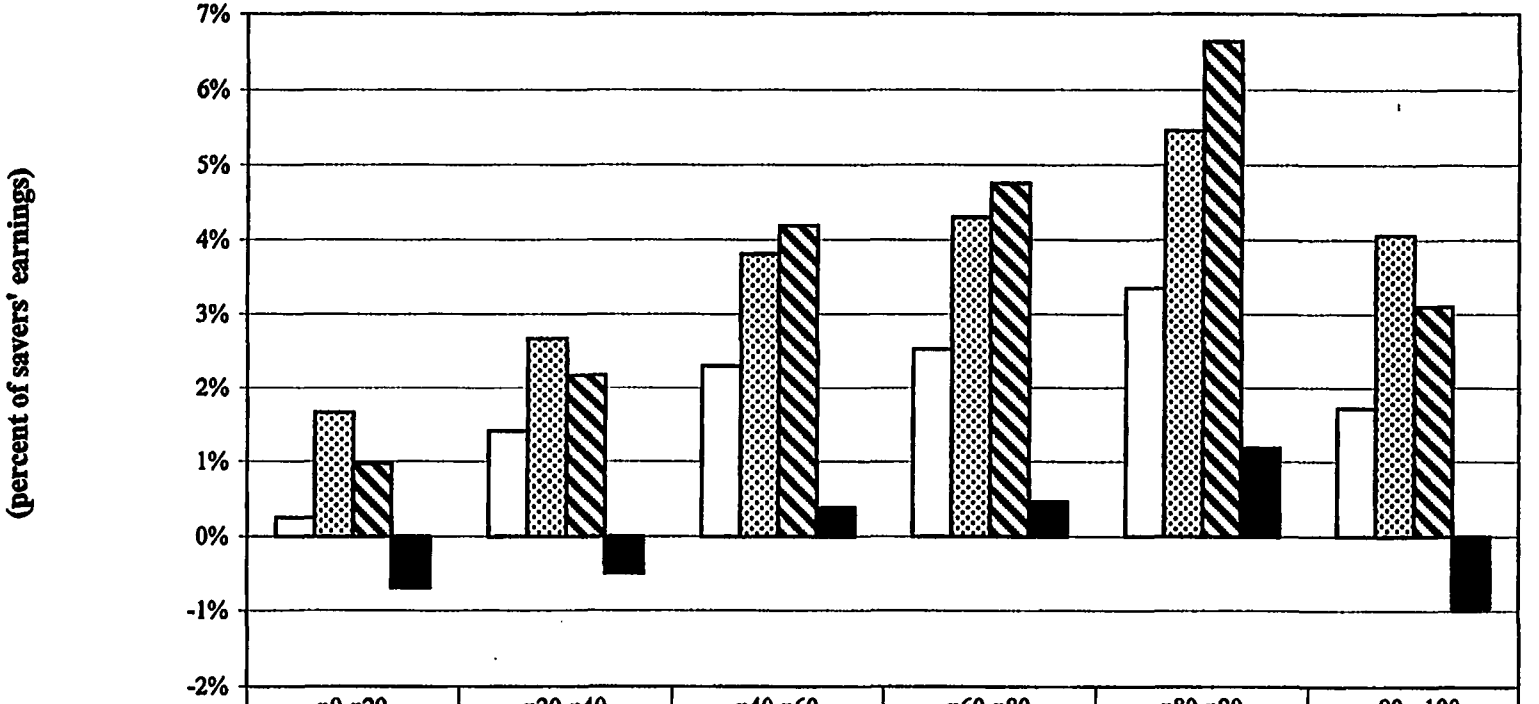
Chart 39: Mean DIP Benefits vs. TPSP Benefits
Age 25-34 Cohort, PIT Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	0.34%	1.34%	1.80%	2.76%	2.90%	2.48%
Revenue-neutral TPSP	1.33%	2.18%	2.75%	3.93%	4.22%	4.16%
DIP	0.83%	1.74%	2.46%	4.44%	4.50%	3.86%
Marginal DIP	-0.50%	-0.45%	-0.29%	0.51%	0.28%	-0.30%

Earnings group (percentile)

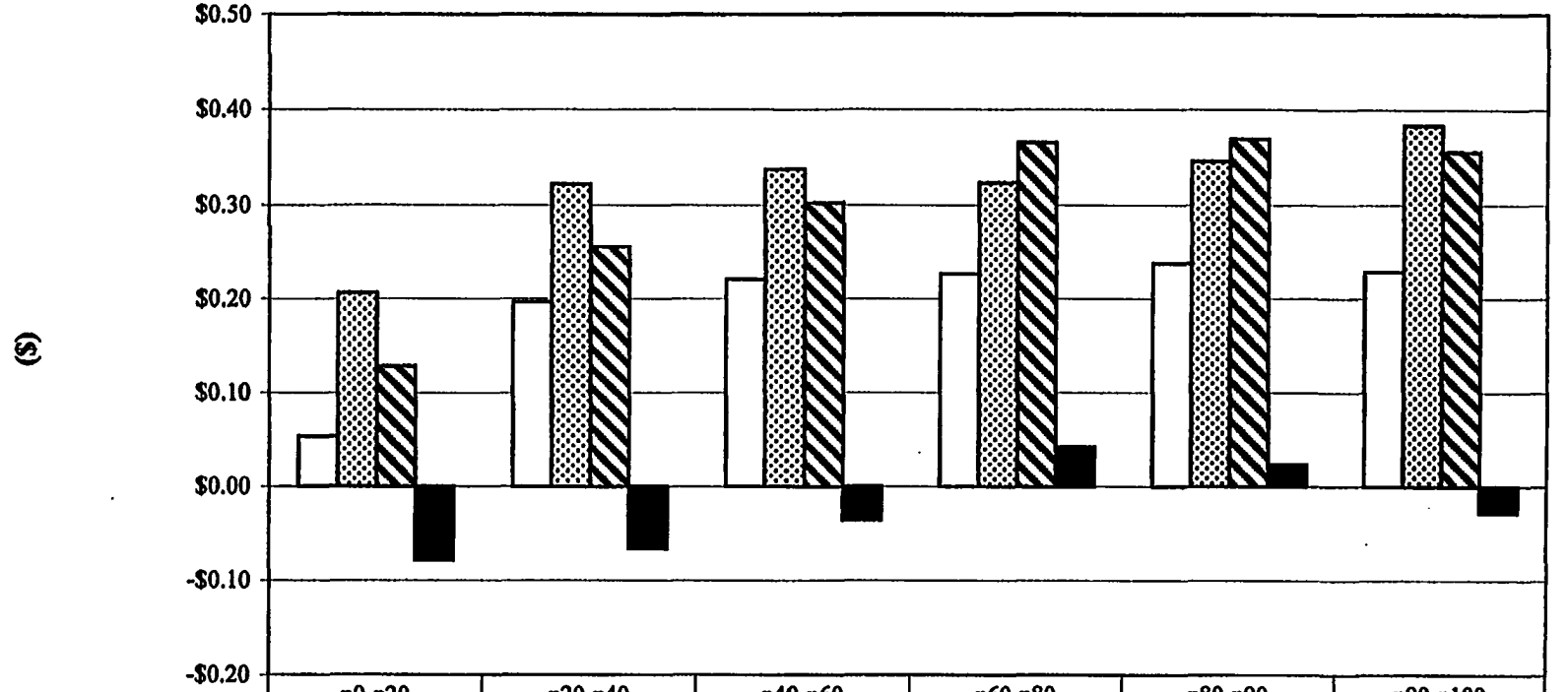
Chart 40: Mean DIP Benefits vs. TPSP Benefits
Age 35-44 Cohort, PIT Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	0.24%	1.41%	2.30%	2.53%	3.35%	1.72%
Revenue-neutral TPSP	1.66%	2.67%	3.81%	4.30%	5.45%	4.06%
DIP	0.97%	2.17%	4.19%	4.75%	6.63%	3.10%
Marginal DIP	-0.69%	-0.50%	0.38%	0.46%	1.18%	-0.96%

Earnings group (percentile)

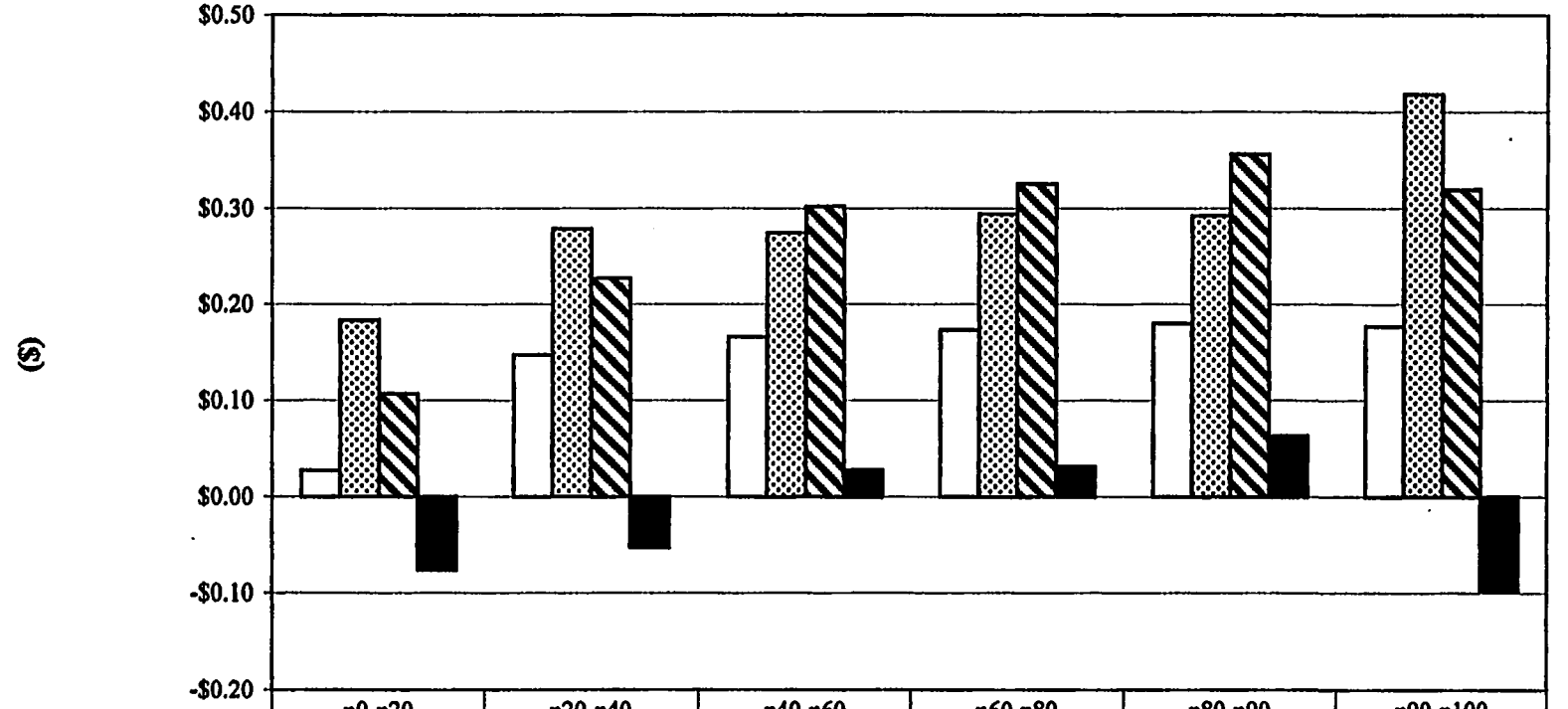
Chart 41: Benefit per Pre-Tax Dollar Saved, DIP vs. TPSP
Age 25-34 Cohort, PIT Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	$0.05	$0.20	$0.22	$0.23	$0.24	$0.23
Revenue-neutral TPSP	$0.21	$0.32	$0.34	$0.32	$0.35	$0.38
DIP	$0.13	$0.26	$0.30	$0.37	$0.37	$0.36
Marginal DIP	-$0.08	-$0.07	-$0.04	$0.04	$0.02	-$0.03

Earnings group (percentile)

Chart 42: Benefit per Pre-Tax Dollar Saved, DIP vs. TPSP
Age 35-44 Cohort, PIT Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	$0.03	$0.15	$0.17	$0.17	$0.18	$0.18
Revenue-neutral TPSP	$0.18	$0.28	$0.27	$0.29	$0.29	$0.42
DIP	$0.11	$0.23	$0.30	$0.33	$0.36	$0.32
Marginal DIP	-$0.08	-$0.05	$0.03	$0.03	$0.06	-$0.10

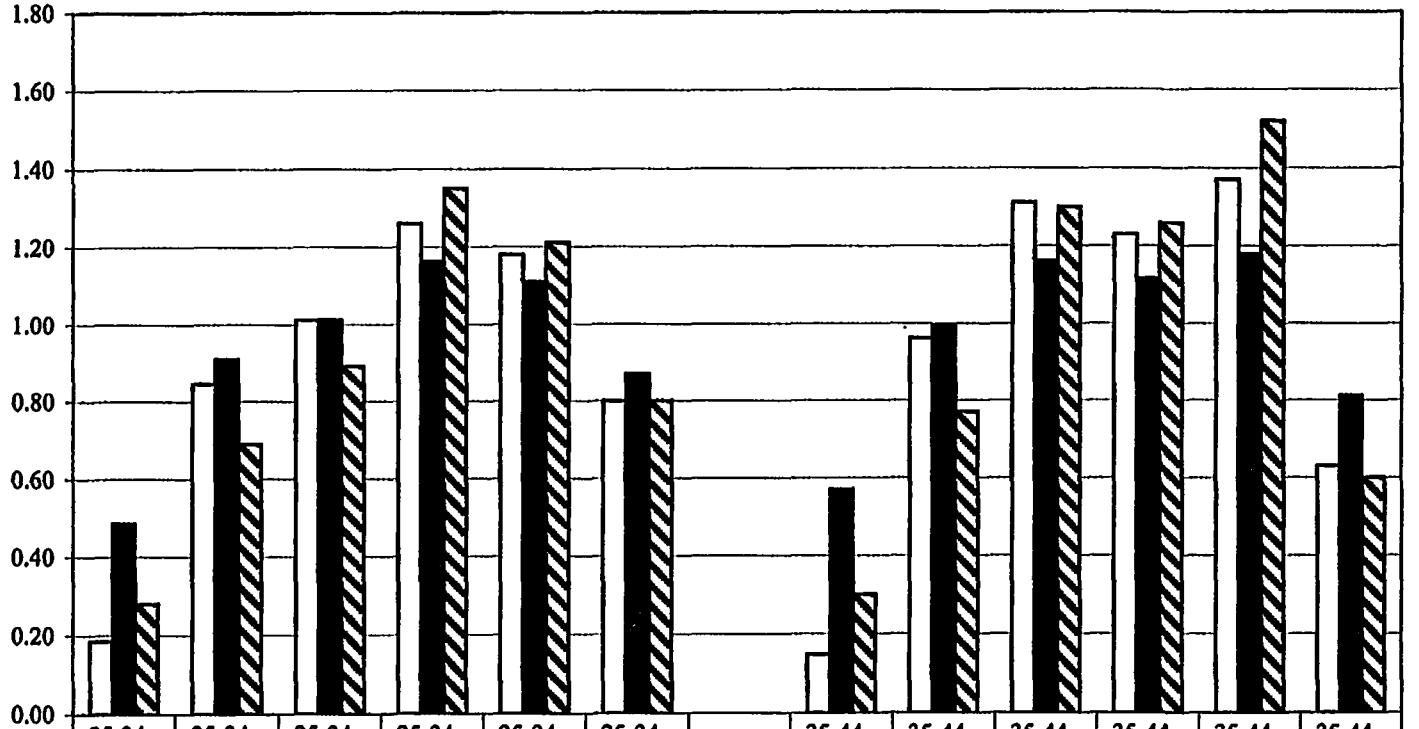
Earnings group (percentile)

Chart 43: Share of Benefits/ Share of Income, DIP vs. TPSP
PIT Benefit Framework

	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.03	0.42	0.75	1.26	1.36	1.18		0.03	0.51	1.02	1.18	1.60	0.88
Revenue-neutral TPSP	0.07	0.45	0.75	1.16	1.29	1.29		0.12	0.53	0.90	1.07	1.38	1.13
DIP	0.04	0.36	0.67	1.32	1.38	1.19		0.07	0.42	1.00	1.20	1.71	0.85

Age cohort and earnings group (percentile)

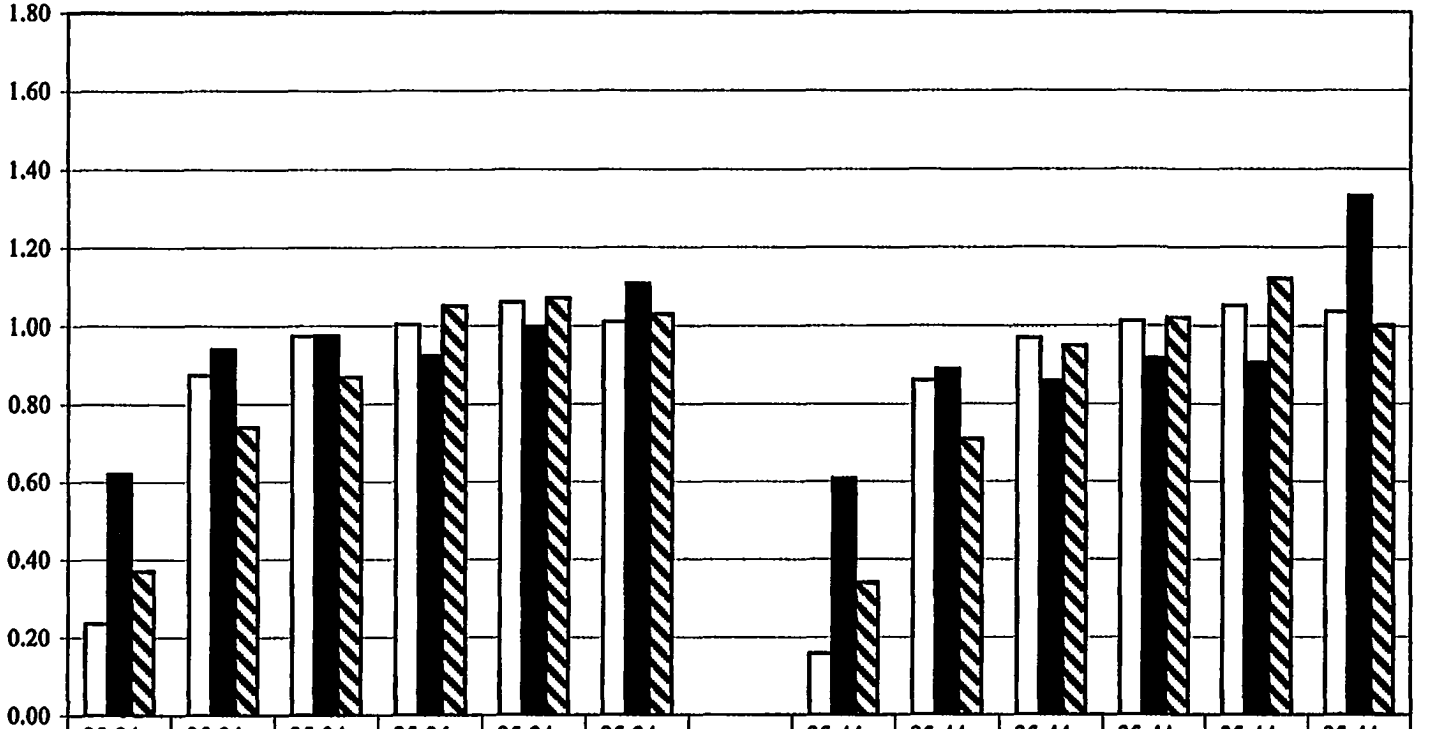
Chart 44: Share of Benefits/ Share of Income Taxes, DIP vs. TPSP
PIT Benefit Framework



	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.18	0.85	1.01	1.26	1.18	0.80		0.15	0.96	1.31	1.23	1.37	0.63
Revenue-neutral TPSP	0.49	0.91	1.01	1.16	1.11	0.87		0.57	0.99	1.16	1.12	1.18	0.81
DIP	0.28	0.69	0.89	1.35	1.21	0.8		0.3	0.77	1.3	1.26	1.52	0.60

Age cohort and earnings group (percentile)

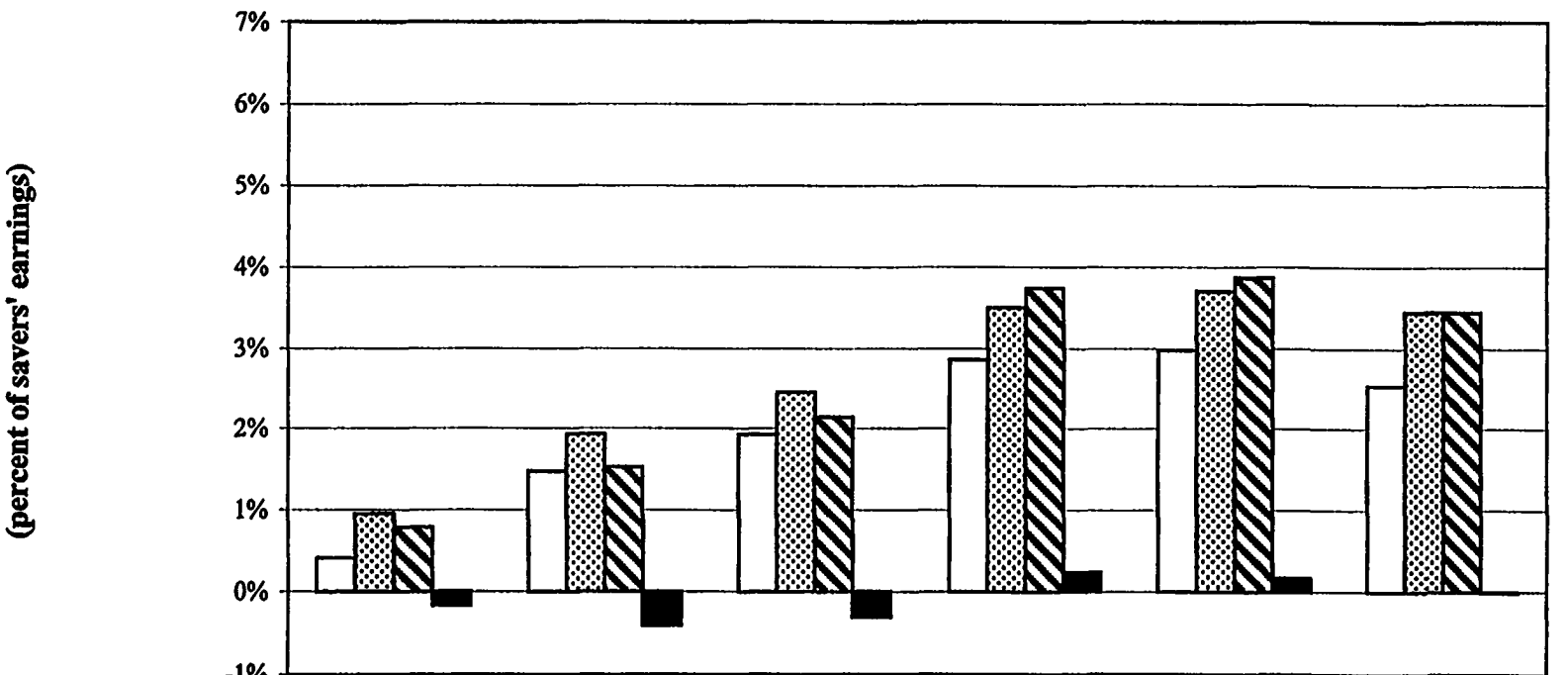
Chart 45: Share of Benefits/ Share of Saving, DIP vs. TPSP
PIT Benefit Framework



	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.24	0.88	0.98	1.00	1.06	1.01		0.16	0.86	0.97	1.01	1.05	1.03
Revenue-neutral TPSP	0.62	0.94	0.98	0.92	1.00	1.11		0.61	0.89	0.86	0.92	0.91	1.33
DIP	0.37	0.74	0.87	1.05	1.07	1.03		0.34	0.71	0.95	1.02	1.12	1

Age cohort and earnings group (percentile)

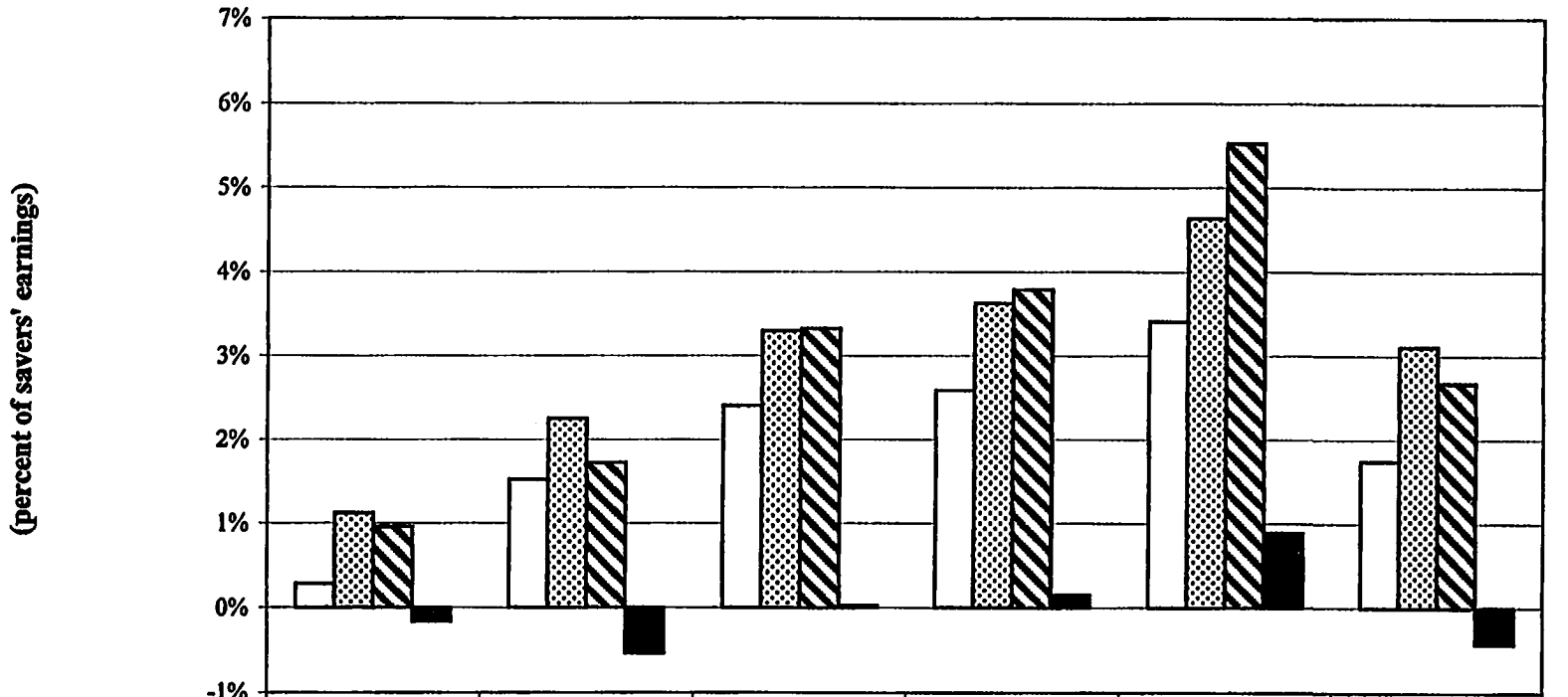
Chart 46: Mean DIP Benefits vs. TPSP Benefits
Age 25-34 Cohort, Extended Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	0.41%	1.47%	1.93%	2.86%	2.98%	2.54%
Revenue-neutral TPSP	0.95%	1.93%	2.45%	3.50%	3.70%	3.45%
DIP	0.78%	1.52%	2.14%	3.74%	3.87%	3.44%
Marginal DIP	-0.17%	-0.41%	-0.31%	0.23%	0.17%	-0.01%

Earnings group (percentile)

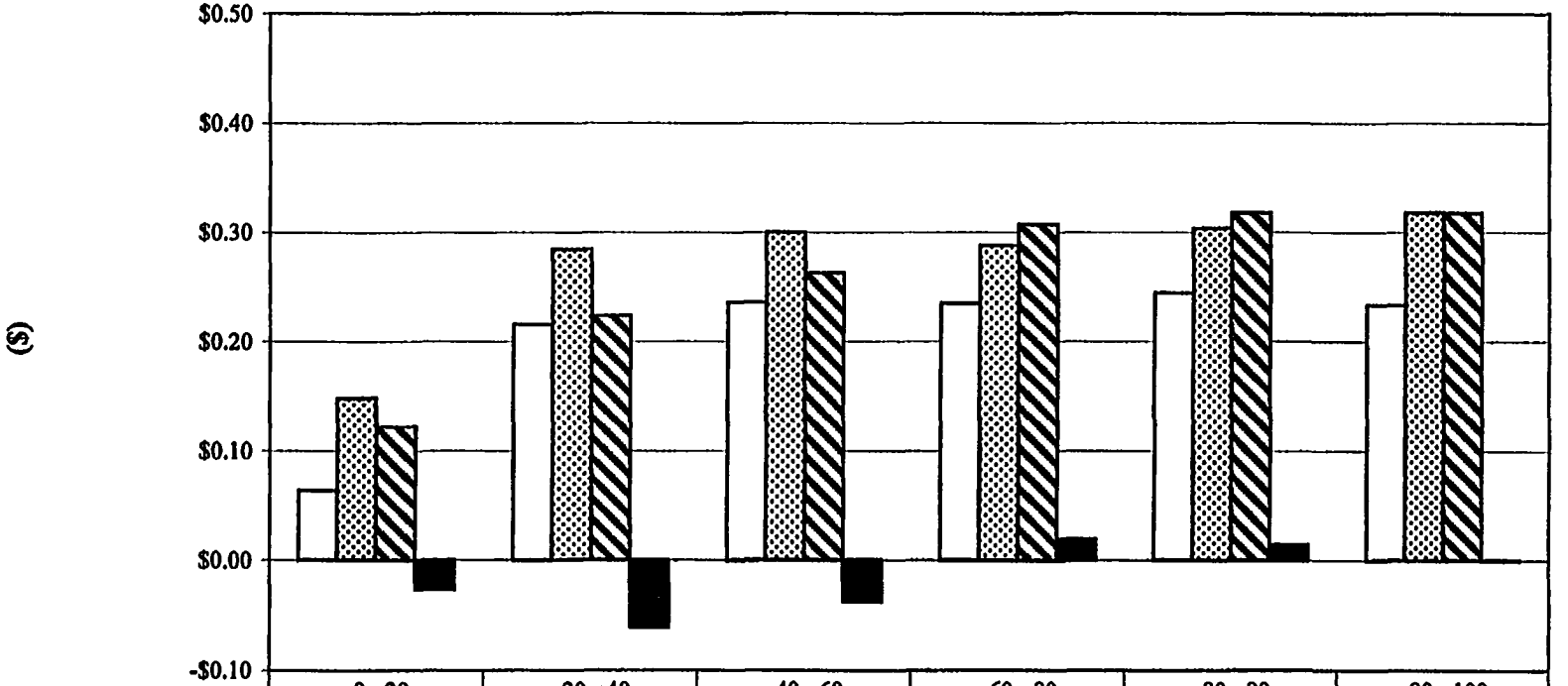
Chart 47: Mean DIP Benefits vs. TPSP Benefits
Age 35-44 Cohort, Extended Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	0.29%	1.52%	2.41%	2.60%	3.41%	1.74%
Revenue-neutral TPSP	1.12%	2.26%	3.30%	3.63%	4.64%	3.10%
DIP	0.96%	1.72%	3.32%	3.78%	5.53%	2.68%
Marginal DIP	-0.16%	-0.54%	0.03%	0.15%	0.89%	-0.42%

Earnings group (percentile)

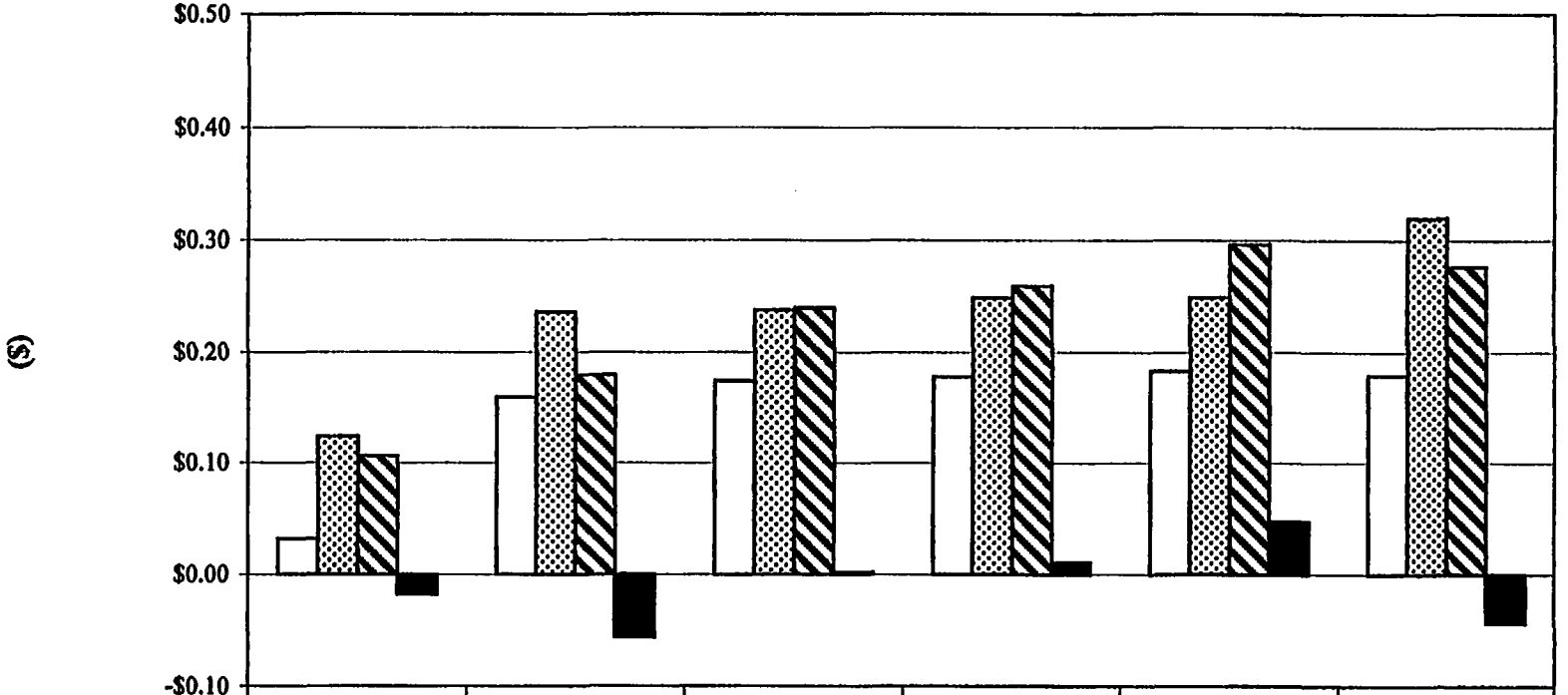
Chart 48: Benefit per Pre-Tax Dollar Saved, DIP vs. TPSP
Age 25-34 Cohort, Extended Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	$0.06	$0.22	$0.24	$0.24	$0.24	$0.23
Revenue-neutral TPSP	$0.15	$0.28	$0.30	$0.29	$0.30	$0.32
DIP	$0.12	$0.22	$0.26	$0.31	$0.32	$0.32
Marginal DIP	-$0.03	-$0.06	-$0.04	$0.02	$0.01	$0.00

Earnings group (percentile)

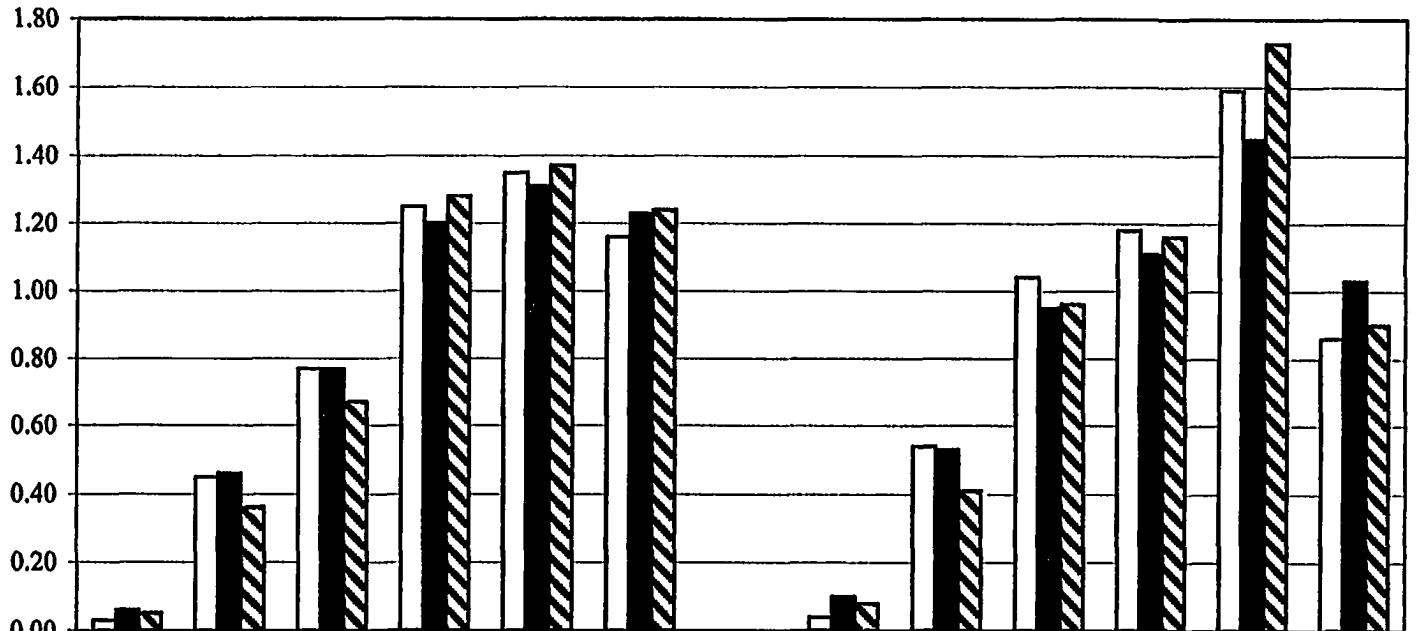
Chart 49: Benefit per Pre-Tax Dollar Saved, DIP vs. TPSP
Age 35-44 Cohort, Extended Benefit Framework



	p0-p20	p20-p40	p40-p60	p60-p80	p80-p90	p90-p100
Stand-alone TPSP	$0.03	$0.16	$0.17	$0.18	$0.18	$0.18
Revenue-neutral TPSP	$0.12	$0.24	$0.24	$0.25	$0.25	$0.32
DIP	$0.11	$0.18	$0.24	$0.26	$0.30	$0.28
Marginal DIP	-$0.02	-$0.06	$0.00	$0.01	$0.05	-$0.04

Earnings group (percentile)

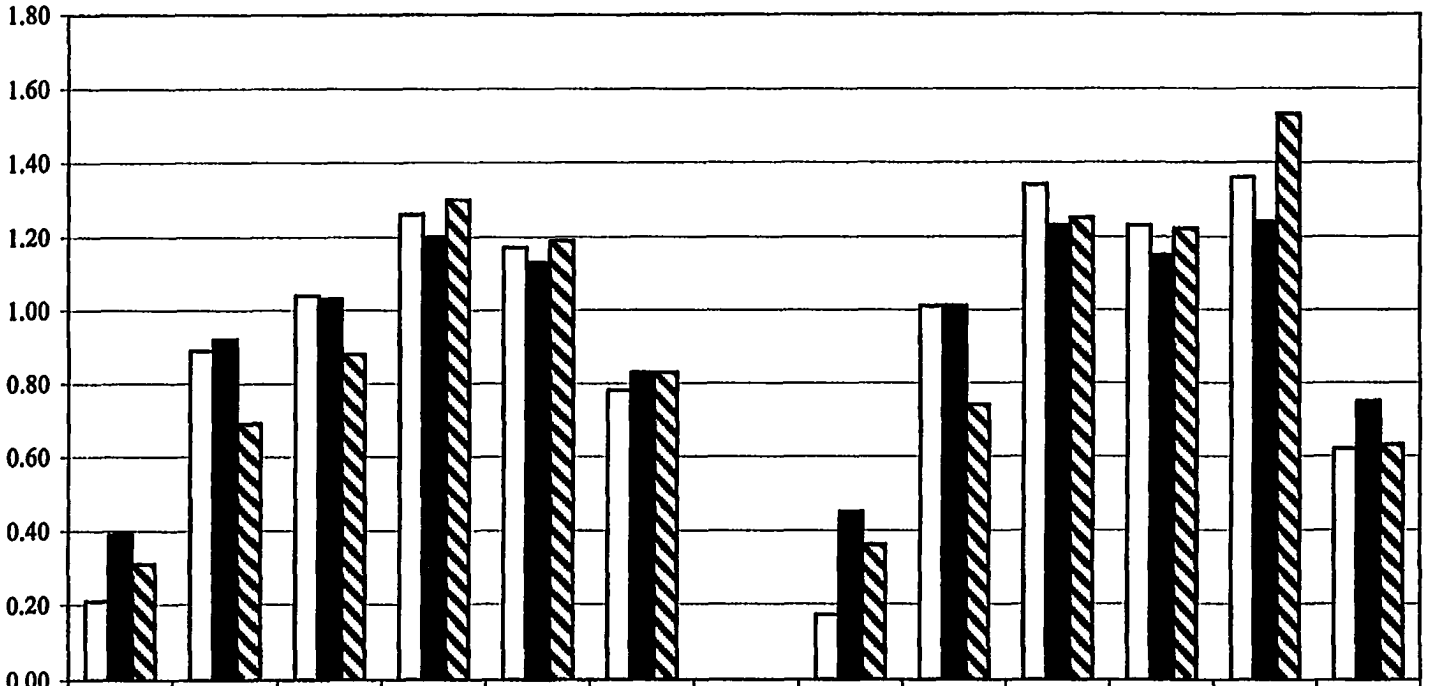
Chart 50: Share of Benefits/ Share of Income, DIP vs. TPSP
Extended Benefit Framework



	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.03	0.45	0.77	1.25	1.35	1.16		0.04	0.54	1.04	1.18	1.59	0.86
Revenue-neutral TPSP	0.06	0.46	0.77	1.20	1.31	1.23		0.10	0.53	0.95	1.11	1.45	1.03
DIP	0.05	0.36	0.67	1.28	1.37	1.24		0.08	0.41	0.96	1.16	1.73	0.9

Age cohort and earnings group (percentile)

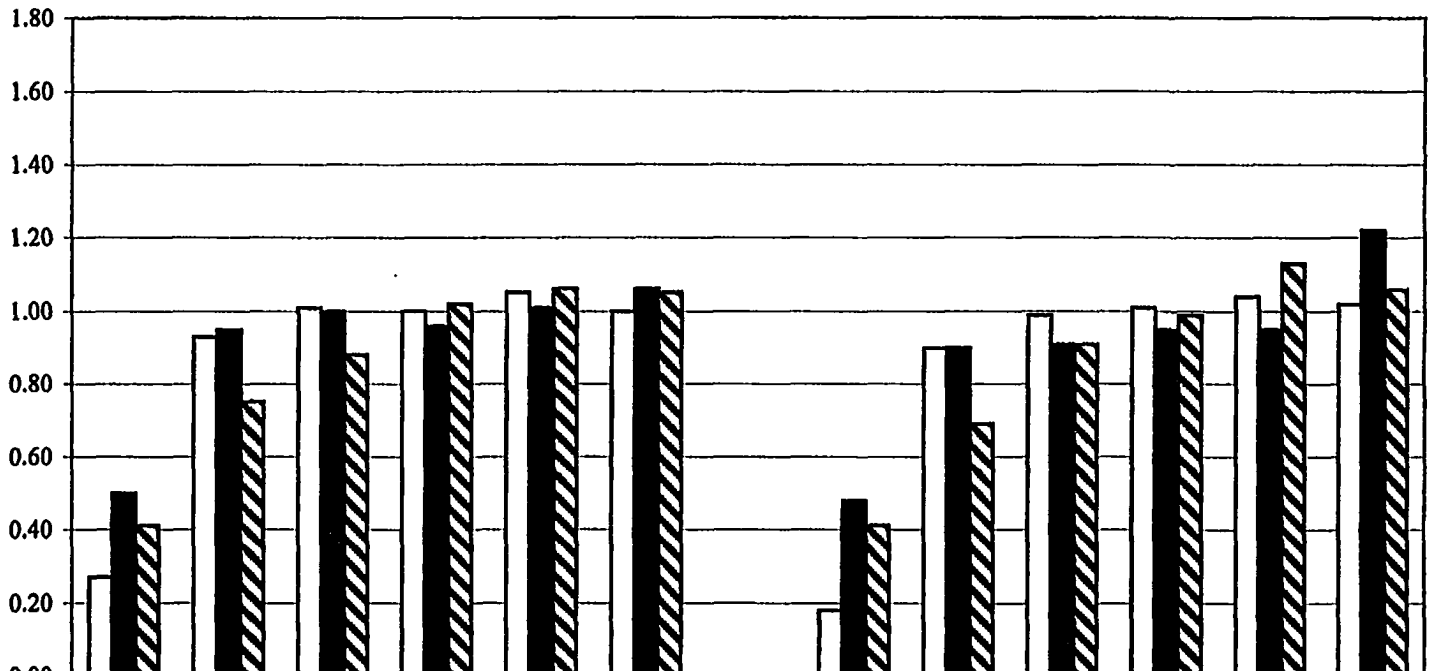
Chart 51: Share of Benefits/ Share of Income Taxes, DIP vs. TPSP
Extended Benefit Framework



	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.21	0.89	1.04	1.26	1.17	0.78		0.17	1.01	1.34	1.23	1.36	0.62
Revenue-neutral TPSP	0.39	0.92	1.03	1.2	1.13	0.83		0.45	1.01	1.23	1.15	1.24	0.75
DIP	0.31	0.69	0.88	1.3	1.19	0.83		0.36	0.74	1.25	1.22	1.53	0.63

Age cohort and earnings group (percentile)

Chart 52: Share of Benefits/ Share of Saving, DIP vs. TPSP
Extended Benefit Framework



	25-34 p0-p20	25-34 p20-p40	25-34 p40-p60	25-34 p60-p80	25-34 p80-p90	25-34 p90-p100		35-44 p0-p20	35-44 p20-p40	35-44 p40-p60	35-44 p60-p80	35-44 p80-p90	35-44 p90-p100
Stand-alone TPSP	0.27	0.93	1.01	1	1.05	1		0.18	0.9	0.99	1.01	1.04	1.02
Revenue-neutral TPSP	0.5	0.95	1	0.96	1.01	1.06		0.48	0.9	0.91	0.95	0.95	1.22
DIP	0.41	0.75	0.88	1.02	1.06	1.05		0.41	0.69	0.91	0.99	1.13	1.06

Age cohort and earnings group (percentile)

8.0 CONCLUSIONS AND SUMMARY OF MAIN FINDINGS

8.1 Introduction and Contribution to the Literature

Public policy often serves as a forum for violent disagreement between competing ideas and perspectives. This statement is certainly applicable to perceptions of the impact of deferred income plans on the fairness of the tax system. Many observers consider DIPs very regressive. Others see DIPs as having no impact on vertical equity at all, but rather as important in enhancing the horizontal equity of the tax system.

In the past three decades, the contention that consumption (or expenditure) taxation is superior to annual income taxation has been a frequent theme in the normative public finance literature, challenging the previous and long-standing consensus that Haig-Simons annual income is the tax base with the most attractive properties. To adherents of consumption taxation, any equity implications of a consumption tax base are fundamentally about horizontal equity. Consumption taxes are seen as being horizontally equitable between savers and non-savers, whereas annual income taxes, which tax capital income, are seen as penalizing savers relative to non-savers having the same lifetime consumption opportunities. Vertical equity concerns are generally considered best dealt with separately through an appropriate rate schedule, rather than through the choice of tax base. In this context, DIPs merely perform a role in implementing the consumption tax base, and by definition, do not constitute a tax expenditure, nor provide a benefit.

A different perspective is provided by the proponents of annual income taxes. This perspective holds that all income should be included in the tax base when it is

received, regardless of whether it is consumed or saved, and capital income should be taxed identically to other forms of income. DIPs are clearly tax expenditures in this framework. Tax preferences applying to savings, such as DIPs, are considered particularly problematic in terms of vertical equity because saving rates increase with income. Although this point of view appears to be increasingly under siege within the public finance discipline, it still retains considerable currency in the broader public policy arena, where it is often argued that deferred income plans, particularly RRSPs, are highly regressive, primarily operate to provide high levels of benefits to the rich (National Council of Welfare, 1999), Torjman and Battle (1994), or even have the perverse effect of redistributing wealth from lower-income to upper-income Canadians (Ragan, 1996).

The view that DIPs are highly regressive finds considerable support in the existing applied tax expenditure literature. All of this literature uses an annual income tax as the benchmark tax system, rather than using a consumption tax, or a lifetime income tax. These studies have consistently found that DIP benefits are highly concentrated at the top of the income distribution, more highly concentrated than either income or income tax liabilities, and further, that DIP benefits are regressive, increasing across the entire income distribution at a faster rate than either income or income tax liabilities.

A critical evaluation of the existing tax expenditure literature, however, reveals considerable weakness, even after putting aside arguments that a consumption tax or a lifetime income tax would be a more appropriate benchmark tax system. Existing studies typically employ methodological frameworks that fail to properly conceptualize the benefits received from DIPs, or measure benefits relative to counterfactuals that tax the

inflationary component of capital income. For the purpose of making distributional judgements, individuals are typically sorted into an income distribution using a simple observation of annual income, which masks the fundamental, permanent differences in the economic well-being of individuals by not controlling for transitory, year-to-year fluctuations in income or for life-cycle effects. Similarly, only a single snapshot of annual DIP saving behaviour is taken, so there is no distinction between transitory and more permanent DIP saving behaviour. Davies (1988) exhibits few of these weaknesses, but relies on 1977 data; as such, those results are very dated and are not reflective of the current DIP system, which was substantially reformed in 1990.

This study makes a number of contributions to the applied tax expenditure literature. Some of these contributions are methodological in nature, and others consist primarily of the development of more robust data than are generally used in the existing literature. The study provides a much-needed update to the literature, by estimating the size, composition, and distribution of DIP benefits resulting from individuals' DIP saving from 1991 to 2001. As such, it is the first study that fully reflects the changes in incidence flowing from the substantive reform of the DIP system in 1990, and also from the 1988 reform of the personal income tax. The analysis is more comprehensive than any of the existing literature in that the entire integrated DIP system, including RRSP contributions, RPP saving, and pre-retirement DIP withdrawals, is incorporated into the analysis.

The study uses data developed through custom retrievals from Statistics Canada's Longitudinal Administrative Databank, a longitudinal microdata source with a very large sample size, based on data from individual tax returns. Unlike most studies, the study

controls for life-cycle effects by evaluating DIP benefits across the earnings distribution within age cohorts. Longitudinal earnings and income variables control for year-to-year fluctuation by using an eleven-year observation period, which provides a much better indication of permanent values than a single annual observation would. While other studies rely on a single annual snapshot of actual DIP saving behaviour, this study tracks the DIP saving of each individual longitudinally from 1991 to 2001 to more robustly capture permanent behaviour. Given certain assumptions, this also permits the calculation of the actual marginal tax rates applying to individuals' DIP contributions and withdrawals during that period.

A proper longitudinal benefit measurement framework, incorporating all of the components of DIP benefits – the initial deduction of DIP contributions, the ongoing tax-sheltering of capital income during the compounding period, and final inclusion of all DIP withdrawals in taxable income – has been adapted from Davies (1988), the only existing study which uses an adequate benefit framework to examine the distribution of DIP benefits.

The counterfactuals used in this study to measure DIP benefits are also departures from the current literature, which tends to use some variant of the existing tax system as a counterfactual. The primary counterfactual used is a proper comprehensive annual income tax. The comprehensive annual income tax counterfactual is supplemented with a broader "policy counterfactual", which consists of a revenue-neutral tax-prepaid saving plan scenario as a substitute for DIPs.

It is worth reemphasizing that, although a comprehensive annual income tax provides an important counterfactual to DIPs, in an important sense, it also represents the most extreme scenario, and results in the largest DIP benefits. The consumption tax and lifetime income tax are alternative benchmark tax systems that are just as fundamental, and as discussed, have entirely different implications for DIP benefits.

The PIT benefit framework used in the study identifies the benefits of DIP saving as those resulting from its interactions with the stand-alone personal income tax system. This is the same basic methodology typically used by the existing literature. This approach has been supplemented in this study, however, by the use of an extended DIP benefit framework that also incorporates the impact of DIP saving on a number of elements of the broader tax and transfer system – individual and family entitlements under nine programs providing income-tested entitlements. These programs include four child benefit programs, three public pension programs, the GST credit and the Ontario property and sales tax credits. The detailed LAD microdata permits the micro-level modeling of entitlements under these programs, something that has not been feasible for previous studies.

8.2 Summary of Main Findings

The main findings of this study are as follows :

1. The first major finding of this study is that the DIP benefit per dollar saved (the DIP benefit rate), relative to a comprehensive annual income counterfactual, is substantial but relatively consistent for those individuals at or above the 40th earnings percentile. This is in direct contradiction to popular perceptions that the DIP benefit rate corresponds to the marginal tax schedule, with benefit rates increasing sharply with income.

For the age 25-34 cohort, the DIP benefit rate for the third quintile is $.30 per dollar saved. The benefit rate is flat across all higher earnings groups, at $.36 to $.37. The second quintile has a benefit rate of $.25 per dollar saved, and the first quintile's benefit rate is $.11 per dollar saved in DIPs.

The results for the age 35-44 cohort are quite similar; the benefit rate for the top 60% of the earnings distribution remains between $.30 and $.36, with the highest benefit rate being received by the p80-p90 earnings group. The benefit rates for the first and second earnings quintile are significantly lower, at $.11 and $.23, respectively.

For individuals with average or greater earnings, the potential benefits available through saving in DIPs are primarily a function of the amount of DIP saving done, not of the mechanics of DIP tax treatment. The DIP benefit rate is relatively proportionate across the middle and upper end of the earnings distribution.

2. Rather than examining the benefit rate, the more traditional approach to evaluating the distribution of a tax expenditure's benefits is to examine the distribution or shares of total benefits across subgroups, relative to standards of comparison that are considered relevant. Typically, share of income and share of income tax liabilities are the standards of comparison used. A subgroup's total DIP benefits will reflect not only its DIP benefit rate, but also the amount of DIP saving done by that subgroup.

This study finds that not only the upper end but also the broad middle of the earnings distribution, receives relatively concentrated DIP benefits. For the age 35-44 cohort, DIP benefits are much less concentrated than income for the lower two quintiles. However, DIP benefits are at least as concentrated as income for each of the top three quintiles – which comprise fully 60% of the population. DIP benefits are regressive relative to income between the first three quintiles, and fairly proportionate to income between the third and fifth quintiles. DIP benefits are less concentrated than income taxes for the first, second and fifth quintiles, and more concentrated than income taxes for the third and fourth quintiles. DIP benefits are regressive relative to income taxes between the first and third quintiles, and progressive relative to income taxes between the third and fifth quintiles. In general, the findings for the age 25-34 cohort are quite similar. The main difference is that the point at which DIP benefits become at least as concentrated as income or income taxes, and benefits switch from being regressive to being relatively proportional with income, or progressive with income taxes, is one quintile higher in the earnings distribution. The data suggest that this reflects the younger cohort's relative immaturity with respect to the accrual of RPP benefits; as it proceeds along its life-cycle, RPP saving

will rise accordingly. The results for the age 35-44 cohort are, therefore, considered the most broadly representative of the DIP system.

These findings are in stark contrast to the findings of the existing literature, and more-widespread perceptions about the distributive effects of DIPs. While none of the existing tax expenditure literature examines DIP saving comprehensively, including both RRSP and RPP saving, without exception it finds that RRSP benefits are highly concentrated, relative to either income or income taxes, in the top income quintile. The concentration of RRSP benefits is substantially lower in the other quintiles, and RRSP benefits are regressive across the entire income distribution.

3. A related major finding comes from disaggregating the top quintile into its component deciles. This reveals that DIP benefits are substantially more concentrated, relative to either income or income taxes, in the p80-p90 earnings group than they are in the top decile (p90-p100). For the age 35-44 cohort, the most representative cohort, benefits are at least twice as concentrated in the former than the latter. DIP benefits for the p80-p90 earnings group are much more concentrated than either income or income taxes. On the other hand, DIP benefits for the top decile are substantially less concentrated than either of the latter, particularly income taxes. Effectively, relative DIP benefits are quite regressive between the p60-80 and p80-p90 earnings groups, and sharply progressive between the latter and the top decile.

These trends hold true for the age 25-34 cohort, but much less strikingly so, reflecting the younger cohort's lower rate of RPP saving, which, as the cohort ages, will be most highly concentrated in the p80-p90 earnings group.

This finding also challenges the existing literature, which finds that the relative concentration of RRSP benefits increases monotonically across the income distribution, peaking at its top. Further disaggregating DIP saving into RPP and RRSP saving reveals that, although the difference in relative benefit concentration between the two top deciles is greatest for RPP benefits, RRSP benefits are also more concentrated, relative to income or income taxes, in the p80-p90 earnings group than in the top decile.

The substantially lower concentration of DIP benefits in the top decile primarily reflects the constraints posed by the fixed annual dollar limits on DIP saving. These limits appear to have little effect on the p80-p90 earnings group, but appear to sharply limit the DIP benefits accruing to the top decile.

4. This study confirms the literature's general findings that DIPs provide small and regressive benefits, regardless of the measure or standard of comparison used, to the bottom two earnings quintiles, particularly the bottom quintile.

It is argued that in the context of the broader retirement income system, this may not be overly troubling, as most of the system's other components, such as Old Age Security, the Guaranteed Income Supplement, and the Canada Pension Plan are either primarily focused, or at least provide relatively larger benefits, to this part of the earnings distribution.

5. The PIT benefit framework was extended to include as DIP benefits not only the change in income taxes resulting from DIP saving, but also the changes in individual and family entitlements under nine programs with income-tested clawbacks. These programs included four child benefit programs, three public pension programs, the GST credit, and the Ontario property and sales tax credits. The primary impacts of DIP saving on entitlements under these programs can be summarized as follows. DIP withdrawals reduce individuals' entitlements at retirement age under the public pension programs, the GST credit, and the OPSTCs. These negative benefits are partially offset by increased entitlements under child benefit programs, the GST credit and the OPSTCs resulting from the initial deduction of DIP contributions, and from the non-taxation of capital income accruing in DIPs throughout the compounding period. Overall, the net cumulative effect is to reduce total DIP benefits by roughly 15%. However, it was found that including these changes in entitlements had no perceptible impact on the distribution of DIP benefits across the earnings distribution. This was an unexpected finding, given that cumulatively the clawbacks associated with these programs impose very high clawback rates, up to 50% or more, over certain income ranges, most notably at low levels of family income.
This finding appears to reflect the fact that, at the mean, the interaction of individuals' DIP savings with these clawbacks has been partial and quite sporadic. For the low earnings groups in particular, it likely also reflects the fact that many of the clawbacks apply to family income, and a significant number of individuals in the lowest earnings groups, such as stay-at-home spouses, have low personal earnings but have significantly larger family incomes, which fall outside the relevant clawback ranges. This dilutes the average impact of such clawbacks on these earnings groups.

Particularly notable is that the lowest earnings quintile appears to largely avoid the punitive impact of the GIS clawback on their DIP savings by withdrawing the latter before retirement age.

6. The primary counterfactual of this study measures DIP benefits in isolation, assuming that no other fiscal or policy changes would accompany the removal of DIPs. This has been supplemented by a different approach, which compares the distributional impact of DIPs to those of another policy instrument that could be used to pursue similar policy goals – this can be thought of as a "policy counterfactual". The benefit incidence of DIPs has been compared to that of tax-prepaid savings plans (TPSPs). An adjustment has been made to ensure that the two scenarios are revenue neutral by returning the difference in tax revenues to individuals according to their share of income tax liabilities. TPSPs are an alternate form of tax-preferred saving. Contributions to TPSPs do not receive a deduction, nor are withdrawals from TPSPs taxable. Like DIPs, no income tax is paid on annual capital income accruing within the plan.

The study finds that DIPs and a revenue-neutral TPSP scenario (or counterfactual) result in broadly similar distributional outcomes, quite similar to the findings described above. There would seem to be a certain degree of inevitability about this. If the primary functional role of DIPs in the broader retirement income and tax systems is to provide a meaningful opportunity for the middle and top of the earnings distribution to smooth consumption between work and retirement, it is unlikely that the benefits of DIPs, or those of any reasonable substitute policy instruments, will operate other than to concentrate benefits to these parts of the earnings distribution.

At the margin, however, relative to the revenue-neutral TPSP counterfactual, DIPs deliver significantly greater benefits to the middle of the earnings distribution, and notably smaller benefits to the bottom two quintiles and the top decile.

7. Although the study presents the development of actual short-term tax-averaging rates, (t_1-t_2), as an intermediate step in the construction of estimates for DIP benefits, these findings are worthy of independent highlighting. There is nothing in the existing literature that provides insights into the actual tax-averaging outcomes associated with the use of DIPs. It is only possible to observe the latter through the use of data sources such as the LAD, containing detailed longitudinal financial and tax data. Long-term tax-averaging outcomes are more crucial to the determination of system-wide DIP benefits; unfortunately, entire lifetimes' worth of longitudinal data are necessary to observe these, so they must be projected. However, actual short-term tax-averaging outcomes during the 1991 to 2001 period remain of considerable interest.

All subgroups in each cohort experienced positive mean short-term tax-averaging rates from 1991 to 2001. The pattern of mean short-term tax-averaging rates was quite comparable for the two age cohorts. The mean short-term tax-averaging rate is highest for the lowest earnings quintile, approaching 9-10%. It falls sharply through the next two quintiles, at between 6% and 7% for the second quintile and roughly 4% for the third quintile, and then levels off for the top three earnings groups, at roughly 2.5% for the age 25-34 cohort and 3.5% for the age 35-44 age cohort. The changing size of mean tax-averaging rates across the earnings distribution is quite intuitive; it correlates well with the magnitude of the changes in marginal tax rates at different levels of taxable income.

The change in marginal tax rates between tax brackets is large at low levels of taxable income, but decreases substantially as taxable income rises.

The relatively large short-term tax-averaging rate for the lowest quintiles of each cohort is of particular significance. This is because, in contrast to the rest of the earnings groups, the lowest quintile withdraws most of its DIP saving in the short-term. The short-term tax-averaging rate is, therefore, the most crucial determinant of its DIP benefits.

Examining not the mean, but rather the distribution, of short-term tax-averaging rates provides further insights. The median short-term tax-averaging rate for the age 35-44 cohort ranges from 6.6% for the bottom quintile, to between 1% and 1.6% for the top three earnings groups. However, at the 25th percentile, the short-term tax-averaging rate ranges from 0% to –2%, and at the 5th percentile, from roughly –13% to –4% across the earnings distribution. At the other end of the spectrum, at the 75th percentile, the short-term tax-averaging rate ranges from 19% for the lowest quintile, to 5% for the highest decile; at the 95th percentile, the short-term tax-averaging rate ranges from 30% for the lowest two quintiles to about 20% for the top three earnings groups. While the median tax-averaging rates are quite modest, some individuals manage to capture very substantial tax-averaging benefits through DIP use, while others, with substantially negative tax-averaging rates, would be better off saving outside DIPs.

8. While not formally evaluated, this study appears to confirm the literature's findings that longitudinal, multi-year data are superior to annual data for incidence studies, and produce substantially different findings.

Using LAD data, it has been found that, when relying on annual data, the distribution of RRSP contributions is substantially more concentrated in the top quintile than is the case when multi-year, longitudinal data is used for the analysis. When individuals aged 35-44 in 1991 are divided into earnings groups based on 1991 annual data, the top quintile makes fully 64.7% of 1991 RRSP contributions. However, when these same individuals are divided into subgroups based on their longitudinal earnings from 1991 to 2001, the top quintile makes only 45.4% of longitudinal RRSP contributions from 1991 to 2001. The extent to which this difference reflects disparities between annual and permanent or multi-year earnings, versus disparities between annual and permanent RRSP contribution behaviour, is not clear. However, the resulting difference in the concentration of DIP saving and DIP benefits is striking. It seems clear that annual behaviour and earnings status can be very transitory, and that annual data is a poor indicator of longer-term or permanent behaviour or states.

The analysis of mean clawback rates in the study also suggests that individuals experience substantial mobility and variation in their taxable income from year to year, and that a single annual snapshot may be very unrepresentative of longer-term, more permanent experience. Even for programs with broad clawback ranges, and looking only at the most relevant earnings groups, the mean clawback rates on DIP contributions and withdrawals are a small fraction of the statutory rates. This suggests that individuals' interactions with the clawbacks through their DIP saving tends to be quite partial and transient, and that individual net income tends to vary substantially from year to year. Individuals' circumstances under the tax and transfer system appear to be very fluid, and observation in

any one year seems likely to be a poor measure of more permanent states. This finding reinforces the contention that multi-year longitudinal data are much more desirable than annual data for tax and fiscal incidence studies.

8.3 Limitations of Study and Directions for Future Research

While this study makes a significant contribution to the applied tax expenditure literature in a number of ways, it also exhibits a number of limitations, many of which suggest possible future directions for research. Many of the limitations of this study are more generally inherent to this type of research, and others are more particular to the methodology and data used in this study.

The methodology used in this study, and in all of the other relevant tax expenditure studies, is essentially a static accounting exercise. It is assumed that no behavioural changes would result from the removal of DIP tax treatment, i.e., that the total pre-tax or after-tax amount saved in the counterfactuals would be equivalent to that saved in DIPs. To the extent that this is not true, this methodology either overstates or understates DIP benefits. This effectively implies, for example, that individuals do not respond to the upfront tax deduction associated with DIPs by saving more, and that the GIS clawback does not deter low-income individuals from saving in DIPs. There does not appear to be an obstacle to estimating behavioural responses to DIP tax treatment in principle. However, as discussed in section 3.4.1, the interest elasticity of saving is theoretically

indeterminate, and despite an enormous amount of research, there is absolutely no consensus in the empirical literature about its size or even sign.

On a related point, the study assumes that savers receive the entire benefit from DIPs. The counterpart to this is that savers bear the entire economic burden of the taxation of capital income under the personal income tax, that none of the burden is shifted to other economic actors. This assumption is also entirely typical of the literature. Kesselman and Cheung (2004) point out, however, that some of the literature suggests that some of the burden of capital income taxation in the PIT is shifted to consumers, and that tax and fiscal incidence studies should pay more attention to the implications of alternate shifting assumptions. If indeed some of the burden of capital income taxes is shifted from savers to consumers, it follows that some portion of DIP benefits is ultimately enjoyed by consumers rather than savers.

In this study, for the purpose of evaluating the distributive outcomes associated with DIP saving, individuals have been sorted into groups according to relative longitudinal earnings. It has been argued that this methodology is more suitable than sorting by income, or at least defensible, because DIP saving limits are based solely on earnings. However, establishing subgroups based on earnings makes comparison with the existing literature difficult, because the latter, without exception, uses income for this purpose. It was argued in section 5.10 that it does not appear that this difference is responsible for the reduction in DIP saving concentration in the top quintile found in this study, as compared to the existing literature. This could be verified by an explicit comparison of the longitudinal earnings

and income distributions, or by reconfiguring the subgroups on the basis of longitudinal income.

Another limitation of this study, and any other study properly estimating DIP benefits, is the need to project the holding periods for individuals' DIP saving, as well as the future marginal tax rates applying to their DIP withdrawals, and the marginal tax rates applying to capital income during the compounding period. Ideally, it would be possible to use actual data for all of these. Unfortunately, for DIPs, the long time horizons involved make this impossible. Forty to sixty years of longitudinal data, covering a cohort's entire working life and retirement, would be required to completely avoid making projections. As a result, one is forced to rely on some form of synthetic data, typically created by matching individuals across age cohorts, and project that the future experience of the younger cohorts will match the current experience of the older cohorts (or vice versa). Of course, it is not realistic to expect that predictions made today about marginal tax rates forty years from now will be accurate. It may be somewhat more reasonable to predict that the relative distribution of marginal tax rates across the earnings distribution will be comparable to the present or the recent past. In any event, no better options are available.

There are interesting research possibilities related to this. What actual long-term tax-averaging rates have currently retired cohorts experienced through their DIP saving over the past fifty years? Presumably, some methodology could be created to examine this question, if not with microdata, at least at a higher level of aggregation, using taxation statistics. Long-term real income growth, the growth of government and taxation, changes in the tax mix, and the changing structure of the personal income tax rate schedule over

time would be important determinants. The impact of the time inconsistency of the income tax schedule on DIP benefits, measured over decades, would be a particularly interesting topic; just in relatively recent years, consider the impact of the de-indexation of the tax system, the flattening of the income tax schedule in the 1988 federal personal income tax reform, and the more recent reductions in income tax rates by the federal and Ontario governments, for example.

Issues related to the time consistency of the DIP system itself are also significant. What has been evaluated in this study is DIP saving, and by implication the parameters of the DIP system, from 1991 to 2001. The distributive implications of the DIP system prior to its reform in 1990, or in the future, have the potential to be quite different.
This is particularly true for the pre-reform DIP system, which underwent fundamental, systematic change in 1990. Comparisons of the findings of this study with Davies (1988), which used 1977 RRSP saving data, lend support to this contention. Recent federal budgets have proposed increasing the annual dollar limit on DIP saving to $22,000 by 2010 (the concurrent limit of 18% of earnings remains unchanged). These changes, if they survive to fruition, will not markedly change the distribution of DIP benefits from that found by this study. These increases will only increase DIP saving limits for those individuals with very high annual earnings, who will typically be in the top longitudinal earnings decile. However, the real size of the proposed limit increase is much smaller than it appears; much of the nominal limit increase merely compensates for inflation. In real terms, DIP saving limits for even the highest earners will increase by 20% or less, as compared to the average DIP limits existing from 1991to 2001. Correspondingly

increasing the DIP benefits of the top earnings decile by 15%-20% does not materially change the findings of this study; DIP benefits remain less concentrated than either income or taxes for the top decile. For the age 35-44 cohort, benefits remain fairly proportionate relative to income, and progressive relative to income taxes, between the third and fifth quintiles. The steep progressiveness of DIP benefits between the p80-p90 and p90-p100 earnings groups, relative to either income or income taxes, remains, although it is moderated somewhat.

As previously discussed, another limitation of this study, and the rest of the literature, is the partial nature of the analysis. It was argued that DIPs are one component of a much broader retirement income policy system. Within the retirement income system, DIPs have a particular role, and their distributive effects must be evaluated in that context. It is argued that the low benefits provided by DIPs to the bottom two quintiles can be largely excused on that basis. DIPs primarily function to provide benefits to the middle and upper end of the earnings distribution, and other retirement income programs are tasked to provide relatively concentrated benefits to the bottom of the earnings distribution. If this is the argument, then an evaluation of the benefit incidence of DIPs should be contained within a broader analysis of the incidence of the entire retirement income system, or at least supplemented with studies of its other components. This suggests an agenda for future research. Similar arguments can be made about DIPs being part of the tax system; that it is the overall distributive impact of the tax system that is important; the distributive outcomes associated with any particular element of that system, in isolation, are much less significant.

A certain amount of the literature, including Wolfson (1979) and Shillington (2003), emphasizes the confiscatory impact of the GIS clawback on the retirement savings of low-income Canadians. There is no actual data in the literature showing how many individuals are affected by the GIS clawback in this manner, and to what extent. The referenced authors have made inferences through microsimulations or by examining the 1999 Survey of Financial Security. This study, as it directly models the impact of the GIS clawback using microdata, had the potential to provide actual data on the potential impact of the GIS clawback on DIP retirement withdrawals. However, the study was not able to adequately observe individuals whose DIP saving was heavily impacted by the GIS clawback. Presumably this reflects aggregation at the quintile level used in the study, plus the lack of data on the distribution of marginal tax rates applying to DIP income, rather than the marginal tax rate at the mean. Following up this topic in more detail remains an interesting research possibility.

Despite these qualifications, this dissertation makes a substantive contribution to the literature, and its findings fundamentally challenge existing understandings of the distributional impact of DIPs.

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10. APPENDIX

TABLES A1 TO A12

COHORT-SHARE DATA AND INDICES OF RELATIVE ADVANTAGE FOR VARIOUS COUNTERFACTUALS AND BENEFIT-MEASUREMENT FRAMEWORKS

TABLE A1
COHORT-SHARE DATA
DIP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.3%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	4.0%	20.0%	11.1%	9.9%	5.7%	5.4%
25-34	p40-p60	11.5%	20.0%	17.2%	17.4%	12.9%	13.2%
25-34	p60-p80	31.4%	20.0%	23.8%	25.1%	23.2%	29.8%
25-34	p80-p100	52.9%	20.0%	41.9%	45.2%	57.2%	50.8%
25-34	p80-p90	21.4%	10.0%	15.5%	16.7%	17.7%	20.1%
25-34	p90-p100	31.5%	10.0%	26.4%	28.5%	39.5%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.4%	20.0%	5.2%	2.6%	1.2%	1.1%
35-44	p20-p40	4.6%	20.0%	10.8%	9.8%	5.9%	6.4%
35-44	p40-p60	16.6%	20.0%	16.6%	16.5%	12.7%	17.5%
35-44	p60-p80	28.0%	20.0%	23.4%	23.9%	22.2%	27.4%
35-44	p80-p100	50.5%	20.0%	44.0%	47.3%	58.0%	47.7%
35-44	p80-p90	26.1%	10.0%	15.3%	15.8%	17.2%	23.4%
35-44	p90-p100	24.4%	10.0%	28.7%	31.5%	40.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE A2
INDICES OF RELATIVE ADVANTAGE
DIP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.01	0.04	0.11	0.28	0.37
25-34	p20-p40	0.20	0.36	0.40	0.69	0.74
25-34	p40-p60	0.58	0.67	0.66	0.89	0.87
25-34	p60-p80	1.57	1.32	1.25	1.35	1.05
25-34	p80-p100	2.65	1.26	1.17	0.92	1.04
25-34	p80-p90	2.14	1.38	1.28	1.21	1.07
25-34	p90-p100	3.15	1.19	1.11	0.80	1.03
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.02	0.07	0.14	0.30	0.34
35-44	p20-p40	0.23	0.42	0.47	0.77	0.71
35-44	p40-p60	0.83	1.00	1.01	1.30	0.95
35-44	p60-p80	1.40	1.20	1.17	1.26	1.02
35-44	p80-p100	2.53	1.15	1.07	0.87	1.06
35-44	p80-p90	2.61	1.71	1.65	1.52	1.12
35-44	p90-p100	2.44	0.85	0.77	0.60	1.00
35-44	Total	1.00	1.00	1.00	1.00	1.00

TABLE A3
COHORT-SHARE DATA
DIP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.3%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	4.0%	20.0%	11.1%	9.9%	5.7%	5.4%
25-34	p40-p60	11.5%	20.0%	17.2%	17.4%	12.9%	13.2%
25-34	p60-p80	30.4%	20.0%	23.8%	25.1%	23.2%	29.8%
25-34	p80-p100	53.7%	20.0%	41.9%	45.2%	57.2%	50.8%
25-34	p80-p90	21.3%	10.0%	15.5%	16.7%	17.7%	20.1%
25-34	p90-p100	32.5%	10.0%	26.4%	28.5%	39.5%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.4%	20.0%	5.2%	2.6%	1.2%	1.1%
35-44	p20-p40	4.4%	20.0%	10.8%	9.8%	5.9%	6.4%
35-44	p40-p60	16.0%	20.0%	16.6%	16.5%	12.7%	17.5%
35-44	p60-p80	27.1%	20.0%	23.4%	23.9%	22.2%	27.4%
35-44	p80-p100	52.1%	20.0%	44.0%	47.3%	58.0%	47.7%
35-44	p80-p90	26.5%	10.0%	15.3%	15.8%	17.2%	23.4%
35-44	p90-p100	25.7%	10.0%	28.7%	31.5%	40.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.1%	100.0%

TABLE A4
INDICES OF RELATIVE ADVANTAGE
DIP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.01	0.05	0.12	0.31	0.41
25-34	p20-p40	0.20	0.36	0.40	0.70	0.75
25-34	p40-p60	0.58	0.67	0.66	0.89	0.87
25-34	p60-p80	1.52	1.28	1.21	1.31	1.02
25-34	p80-p100	2.69	1.28	1.19	0.94	1.06
25-34	p80-p90	2.13	1.37	1.28	1.20	1.06
25-34	p90-p100	3.25	1.23	1.14	0.82	1.05
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.02	0.08	0.17	0.36	0.41
35-44	p20-p40	0.22	0.41	0.45	0.74	0.69
35-44	p40-p60	0.80	0.96	0.97	1.26	0.91
35-44	p60-p80	1.35	1.16	1.14	1.22	0.99
35-44	p80-p100	2.61	1.18	1.10	0.90	1.09
35-44	p80-p90	2.65	1.73	1.67	1.54	1.13
35-44	p90-p100	2.57	0.89	0.81	0.63	1.06
35-44	Total	1.00	1.00	1.00	1.00	1.00

TABLE A5
COHORT-SHARE DATA
STAND-ALONE TPSP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.2%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	4.7%	20.0%	11.1%	9.9%	5.6%	5.4%
25-34	p40-p60	12.9%	20.0%	17.2%	17.4%	12.7%	13.2%
25-34	p60-p80	29.9%	20.0%	23.8%	25.1%	23.7%	29.8%
25-34	p80-p100	52.3%	20.0%	41.9%	45.2%	57.1%	50.8%
25-34	p80-p90	21.2%	10.0%	15.5%	16.7%	17.9%	20.1%
25-34	p90-p100	31.1%	10.0%	26.4%	28.5%	39.2%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.2%	20.0%	5.2%	2.6%	1.1%	1.1%
35-44	p20-p40	5.5%	20.0%	10.8%	9.8%	5.7%	6.4%
35-44	p40-p60	16.9%	20.0%	16.6%	16.5%	12.9%	17.5%
35-44	p60-p80	27.7%	20.0%	23.4%	23.9%	22.5%	27.4%
35-44	p80-p100	49.7%	20.0%	44.0%	47.3%	57.7%	47.7%
35-44	p80-p90	24.5%	10.0%	15.3%	15.8%	17.9%	23.4%
35-44	p90-p100	25.1%	10.0%	28.7%	31.5%	39.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE A6
INDICES OF RELATIVE ADVANTAGE
STAND-ALONE TPSP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.01	0.03	0.07	0.18	0.24
25-34	p20-p40	0.23	0.42	0.47	0.85	0.88
25-34	p40-p60	0.65	0.75	0.74	1.01	0.98
25-34	p60-p80	1.49	1.26	1.19	1.26	1.00
25-34	p80-p100	2.62	1.25	1.16	0.92	1.03
25-34	p80-p90	2.12	1.36	1.27	1.18	1.06
25-34	p90-p100	3.11	1.18	1.09	0.80	1.01
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.01	0.03	0.06	0.15	0.16
35-44	p20-p40	0.28	0.51	0.56	0.96	0.86
35-44	p40-p60	0.85	1.02	1.03	1.31	0.97
35-44	p60-p80	1.39	1.18	1.16	1.23	1.01
35-44	p80-p100	2.48	1.13	1.05	0.86	1.04
35-44	p80-p90	2.45	1.60	1.55	1.37	1.05
35-44	p90-p100	2.52	0.88	0.80	0.63	1.03
35-44	Total	1.00	1.00	1.00	1.00	1.00

TABLE A7
COHORT-SHARE DATA
REVENUE-NEUTRAL TPSP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.4%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	5.0%	20.0%	11.1%	9.9%	5.6%	5.4%
25-34	p40-p60	12.9%	20.0%	17.2%	17.4%	12.7%	13.2%
25-34	p60-p80	27.6%	20.0%	23.8%	25.1%	23.7%	29.8%
25-34	p80-p100	54.0%	20.0%	41.9%	45.2%	57.1%	50.8%
25-34	p80-p90	20.0%	10.0%	15.5%	16.7%	17.9%	20.1%
25-34	p90-p100	34.0%	10.0%	26.4%	28.5%	39.2%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.6%	20.0%	5.2%	2.6%	1.1%	1.1%
35-44	p20-p40	5.7%	20.0%	10.8%	9.8%	5.7%	6.4%
35-44	p40-p60	15.0%	20.0%	16.6%	16.5%	12.9%	17.5%
35-44	p60-p80	25.1%	20.0%	23.4%	23.9%	22.5%	27.4%
35-44	p80-p100	53.5%	20.0%	44.0%	47.3%	57.7%	47.7%
35-44	p80-p90	21.2%	10.0%	15.3%	15.8%	17.9%	23.4%
35-44	p90-p100	32.4%	10.0%	28.7%	31.5%	39.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE A8
INDICES OF RELATIVE ADVANTAGE
REVENUE-NEUTRAL TPSP BENEFITS (PIT BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.02	0.07	0.18	0.49	0.62
25-34	p20-p40	0.25	0.45	0.51	0.91	0.94
25-34	p40-p60	0.65	0.75	0.74	1.01	0.98
25-34	p60-p80	1.38	1.16	1.10	1.16	0.92
25-34	p80-p100	2.70	1.29	1.20	0.95	1.06
25-34	p80-p90	2.00	1.29	1.20	1.11	1.00
25-34	p90-p100	3.40	1.29	1.20	0.87	1.11
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.03	0.12	0.25	0.57	0.61
35-44	p20-p40	0.28	0.53	0.58	0.99	0.89
35-44	p40-p60	0.75	0.90	0.91	1.16	0.86
35-44	p60-p80	1.26	1.07	1.05	1.12	0.92
35-44	p80-p100	2.68	1.22	1.13	0.93	1.12
35-44	p80-p90	2.12	1.38	1.34	1.18	0.91
35-44	p90-p100	3.24	1.13	1.03	0.81	1.33
35-44	Total	1.00	1.00	1.00	1.00	1.00

TABLE A9
COHORT-SHARE DATA
STAND-ALONE TPSP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.2%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	5.0%	20.0%	11.1%	9.9%	5.6%	5.4%
25-34	p40-p60	13.3%	20.0%	17.2%	17.4%	12.7%	13.2%
25-34	p60-p80	29.9%	20.0%	23.8%	25.1%	23.7%	29.8%
25-34	p80-p100	51.7%	20.0%	41.9%	45.2%	57.1%	50.8%
25-34	p80-p90	21.0%	10.0%	15.5%	16.7%	17.9%	20.1%
25-34	p90-p100	30.6%	10.0%	26.4%	28.5%	39.2%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.2%	20.0%	5.2%	2.6%	1.1%	1.1%
35-44	p20-p40	5.8%	20.0%	10.8%	9.8%	5.7%	6.4%
35-44	p40-p60	17.3%	20.0%	16.6%	16.5%	12.9%	17.5%
35-44	p60-p80	27.7%	20.0%	23.4%	23.9%	22.5%	27.4%
35-44	p80-p100	49.0%	20.0%	44.0%	47.3%	57.7%	47.7%
35-44	p80-p90	24.3%	10.0%	15.3%	15.8%	17.9%	23.4%
35-44	p90-p100	24.7%	10.0%	28.7%	31.5%	39.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE A10
INDICES OF RELATIVE ADVANTAGE
STAND-ALONE TPSP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.01	0.03	0.08	0.21	0.27
25-34	p20-p40	0.25	0.45	0.50	0.89	0.93
25-34	p40-p60	0.67	0.77	0.76	1.04	1.01
25-34	p60-p80	1.49	1.25	1.19	1.26	1.00
25-34	p80-p100	2.58	1.23	1.14	0.90	1.02
25-34	p80-p90	2.10	1.35	1.26	1.17	1.05
25-34	p90-p100	3.06	1.16	1.08	0.78	1.00
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.01	0.04	0.07	0.17	0.18
35-44	p20-p40	0.29	0.54	0.59	1.01	0.90
35-44	p40-p60	0.86	1.04	1.05	1.34	0.99
35-44	p60-p80	1.38	1.18	1.16	1.23	1.01
35-44	p80-p100	2.45	1.11	1.04	0.85	1.03
35-44	p80-p90	2.43	1.59	1.53	1.36	1.04
35-44	p90-p100	2.47	0.86	0.79	0.62	1.02
35-44	Total	1.00	1.00	1.00	1.00	1.00

TABLE A11
COHORT-SHARE DATA
REVENUE-NEUTRAL TPSP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Cohort Total Benefits	Share of Cohort Population	Share of Cohort Total Income	Share of Cohort Earnings	Share of Cohort Income Tax	Share of Cohort DIP Saving
25-34	p0-p20	0.4%	20.0%	6.0%	2.5%	0.9%	0.7%
25-34	p20-p40	5.1%	20.0%	11.1%	9.9%	5.6%	5.4%
25-34	p40-p60	13.2%	20.0%	17.2%	17.4%	12.7%	13.2%
25-34	p60-p80	28.5%	20.0%	23.8%	25.1%	23.7%	29.8%
25-34	p80-p100	52.8%	20.0%	41.9%	45.2%	57.1%	50.8%
25-34	p80-p90	20.3%	10.0%	15.5%	16.7%	17.9%	20.1%
25-34	p90-p100	32.5%	10.0%	26.4%	28.5%	39.2%	30.7%
25-34	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
35-44	p0-p20	0.5%	20.0%	5.2%	2.6%	1.1%	1.1%
35-44	p20-p40	5.8%	20.0%	10.8%	9.8%	5.7%	6.4%
35-44	p40-p60	15.9%	20.0%	16.6%	16.5%	12.9%	17.5%
35-44	p60-p80	26.0%	20.0%	23.4%	23.9%	22.5%	27.4%
35-44	p80-p100	51.9%	20.0%	44.0%	47.3%	57.7%	47.7%
35-44	p80-p90	22.2%	10.0%	15.3%	15.8%	17.9%	23.4%
35-44	p90-p100	29.7%	10.0%	28.7%	31.5%	39.8%	24.3%
35-44	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

TABLE A12
INDICES OF RELATIVE ADVANTAGE
REVENUE-NEUTRAL TPSP BENEFITS (EXTENDED BENEFIT FRAMEWORK)

Age Cohort	Longitudinal Earnings Percentile	Share of Benefits/Share of Cohort Population	Share of Benefits/Share of Cohort Total Income	Share of Benefits/Share of Cohort Earnings	Share of Benefits/Share of Cohort Income Taxes	Share of Benefits/Share of Cohort DIP Saving
25-34	p0-p20	0.02	0.06	0.14	0.39	0.50
25-34	p20-p40	0.25	0.46	0.51	0.92	0.95
25-34	p40-p60	0.66	0.77	0.76	1.03	1.00
25-34	p60-p80	1.43	1.20	1.14	1.20	0.96
25-34	p80-p100	2.64	1.26	1.17	0.93	1.04
25-34	p80-p90	2.03	1.31	1.22	1.13	1.01
25-34	p90-p100	3.25	1.23	1.14	0.83	1.06
25-34	Total	1.00	1.00	1.00	1.00	1.00
35-44	p0-p20	0.03	0.10	0.19	0.45	0.48
35-44	p20-p40	0.29	0.53	0.59	1.01	0.90
35-44	p40-p60	0.79	0.95	0.96	1.23	0.91
35-44	p60-p80	1.30	1.11	1.09	1.15	0.95
35-44	p80-p100	2.59	1.18	1.10	0.90	1.09
35-44	p80-p90	2.22	1.45	1.40	1.24	0.95
35-44	p90-p100	2.97	1.03	0.94	0.75	1.22
35-44	Total	1.00	1.00	1.00	1.00	1.00