Desirable misuse of unemployment benefits: The economics of "Canada Dry" retirement

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Abstract

The "Canada Dry" pensions system is in some countries one of the frequent routes to early retirement. It constitutes an informal substitute for early retirement programs. Accordingly, firms lay off aged workers they find costly for what they produce and, to get their support, supplement unemployment benefits by some extra compensation that is paid until formal retirement. Whether the government cannot or does not want to stop these practises is not clear. In this paper we show that these practices may effectively be welfare improving. In other words, it may desirable to tolerate (or even encourage) some "abusive" uses of unemployment compensation schemes.

1 Introduction

In a number of countries (France, Italy, Germany, The Netherlands and Belgium) there is a fairly wide gap between the statutory and the effective retirement age. This gap raises obvious problems for the financing of social security in a world of aging populations. It can be explained by a variety of provisions that allow individuals to stop working well before the standard age. To begin with, the retirement system itself allows and effectively often encourages people to retire before they have reached the statutory age. While early retirement may come at the price of a reduction in benefits, these remain often quite generous, and are far greater than they would be under strict actuarial criteria. Several studies have shown that the structure of retirement benefits (and the implicit tax on continued activity implied by the benefit formula) has a significant impact on inactivity rates among the 55–64 age group in OECD countries.[1] Second, there are professions (such as mining, teaching, the police, the armed forces, etc.) where the official retirement age is lower than the standard age. Third, there are specific early retirement programs, usually targeted at sectors experiencing economic difficulties. Finally, disability insurance and unemployment insurance are used in some countries to allow older workers to retire well ahead of the standard age, even though they are not suffering from a serious disability and are not necessarily unable to find a job.

In this paper, we focus on the last of these avenues into early retirement, namely the one via the unemployment insurance. In the literature on early retirement, the standard argument is that workers cease to work because they can obtain generous benefits.[2] This is the case of early retirement programs and also of disability insurance, but not necessarily of unemployment insurance. Then, why do so many aged workers use this exit route? Two reasons for this. First they can be forced in. Second, they can be bribed in and this is where here the notion of "Canada Dry pension" appears. Specifically, workers who go into unemployment and accept a compensation making up for the difference between their salary and the unemployment benefit are sometimes called Canada Dry pensioners. Like the "Canada Dry Ginger Ale looks like beer, has the color of beer, but

[1] Gruber and Wise (1999) and Blondal and Scarpetta (1998 a,b).
[2] Cremer *et al.* (2004), Fenge and Pestieau (2005).

is not beer", these packages consisting of an unemployment compensation plus a more or less open payment look like but are not regular pensions.[3]

Even though the expression "Canada Dry" pension is above all used in Belgium, the practice is widespread in Europe. It can be seen as an informal substitute for early retirement schemes which do not exist everywhere.[4]

It is clear that Canada Dry pensions are legally questionable for two reasons. First, unemployment insurance is not aimed at helping elderly workers into exiting the labor force. Second, the lump-sum compensation that makes such an early retirement device acceptable to unions and workers is not always reported or properly taxed. The attitude of public authorities towards Canada Dry pensions is often ambiguous. As a matter of fact this ambiguity appears to be both intentional and unavoidable. At times, one has the feeling that they want to close their eyes before a practice that basically they find desirable. At other times, one has the impression that in any case, even if they wanted it, they couldn't stop these practices for lack of observable evidence.

In this paper we study why a Canada Dry pensions system can appear, but also why the government can be lead to tolerate it even though it could prevent it. In fact, the issue at hand is quite general. There are a number of instances where a governing authority close its eyes before practice that are not "entirely legal" for reasons of implementability or lack of information. For example, Pestieau *et al.* (2006) show that when there is a small minority of taxpayers that happen to be much less averse to risk than the majority, it may be socially desirable to let them evade taxation if the cost of control is high.

We use a stylized model of the labor market. There are three types of individuals: high ability workers, low ability workers and permanently unemployed individuals. Individuals of this latter type cannot find a job (for whatever reason) and are unemployed

[3] Old commercials for Canada Dry ginger ale on the European continent.

[4] A good illustration of this is provided by the reaction to the application of stricter rules of eligibility for traditional early retirement schemes in Belgium. Following this reform, the Belgian unemployment agancy (ONEM) reported in 2002 a tendency towards more exit of the labor force via the unemployment insurance which they impute to the Canada Dry pensions mechanisms. As a result, the share of expenditures of ONEM towards long term unemployment insurance for the old jumped from 14% in 1996 to 22% in 2002 whereas the share of expenditures towards the traditional early retirement schemes decreased from 22% in 1996 to 19% in 2002 (see OECD, 2003).

regardless of the compensation they might obtain. All workers are paid the same wage. Consequently, low ability workers are paid above their productivity and this provides an incentive to their employers to try to get rid of them. For reasons of labor market rigidities they cannot be simply fired. However, they may accept to quit if the unemployment compensation is large enough and/or if they are bribed into accepting their layoff through a Canada Dry pension.

The informational assumptions are also crucial. The government cannot observe individual productivities; in particular it cannot prevent high ability individuals from claiming unemployment insurance (after arranging to get laid off). Canada Dry pensions on the other hand are awarded by the firms who do observe worker's productivities and who can target them to the low ability individuals. Thus, the Canada Dry pensions, though relying on a misuse of unemployment benefits, can act as an (imperfect and indirect) screening device which may mitigate policy imperfection that are due to asymmetric information.

We consider two situations. In the first one, the government can monitor the Canada Dry practice; particularly it could prevent them altogether. Nevertheless it may find it desirable to let some workers exit the labor force with some compensation beyond the unemployment benefit. This is the case when the government closes its eyes on the abuse of unemployment insurance and intervenes in the determination of the compensation. In the second situation, the government cannot control the compensation but and has only indirect leverage on the workers labor market status (through the level of unemployment compensation). We show that this solution can be desirable and preferred to the solution where Canada Dry pensions are not available.

2 The model

Workers

We consider an economy with three types of workers. Type H consists of high ability workers with productivity w_H while type L workers have low ability w_L ($w_L < w_H$). Type U workers cannot find a job (for whatever reason) and are unemployed regardless

of the compensation they might obtain. The number of type i workers is given by p_i $(i = H, L, U)$ where $\sum_i p_i$ is normalized to 1. Individual utility is given by

$$u_i(c, \ell) = u(c) - v_i \ell,$$

where c is consumption and with $u(c)$ increasing and strictly concave. Labor supply ℓ is dichotomous with $\ell = 1$ in case of work and 0 otherwise, while $v_i > 0$ is the (type specific) labor disutility.

Firms

The representative firm uses a linear technology with labor as the only input. When offering a labor contract the firm cannot observe wether the worker is of type L or H. Additionally, due to institutional rigidities, the firm cannot offer a wage contingent on the (ex-post) revelation of the workers productivity. When employing both types of workers, the profit of the firm is thus given by

$$\pi = p_H w_H + p_L w_L - \overline{w}(p_H + p_L)$$

where $\overline{w}$ is the wage offered to workers. Consequently, if types L and H individuals are both working, they each receive a wage $\overline{w} = (p_H w_H + p_L w_L)/(p_H + p_L)$ by the zero profit condition.

The Canada Dry pension mechanism

Because all workers are paid the same wage, the firm may want to discharge type L workers once they are identified. However, to do so, it has to gain the acceptance of the type L workers possibly by paying them some compensation $b \geq 0$ (*or "a Canada Dry pension").* The profit they achieve after dismissing workers of type L is then equal to

$$\pi^* = p_H (w_H - \bar{w}) - p_L b;$$

it is positive as long as $b \leq \bar{w} - w_L$. Consequently the firm is ready to pay an amount up to $b_{\max} = \overline{w} - w_L$ to each type L worker in order to bring him to accept his dismissal. Note that when $b = b_{\max}$, the profit realized by the firm is equal to 0.

Because of informational asymmetries, the government cannot exclude type L workers from unemployment benefits when they are laid off. In other words it is not possible to distinguish the unemployed of type U from the unemployed of type L. Consequently, a worker of type L accepts to become unemployed if and only if:

$$u\left(c_U + b\right) \geq u\left(c_L\right) - v_L,$$

where c_U represents unemployment benefits (which equal the consumption level of type U workers) and $b \in [0, b_{\max}]$. This illustrates the main problem induced by the Canada Dry pension. A more generous unemployment insurance implies that the firm lays off type L workers more easily (i.e., at a lower cost) which may imply a social cost.

Government

The government maximizes a utilitarian welfare function that is given by

$$W = \sum_i p_i \left[u\left(c_i\right) - v_i \ell_i\right]. \tag{1}$$

Further we assume that the profits of the firm are taxed at a 100% rate.

We shall first consider the first-best social optimum that is achieved when the government observes the productivity of each worker (Section 3). Then we turn to the second-best case where the government cannot observe individuals productivities (Section 4). We distinguish three different scenarios that differ in the way b is determined.

3 First best optimum

We consider first the case where individual productivities are observable and determine the (utilitarian) first-best allocation. An allocation here consists simply of a collection of consumption bundles (c_i, ℓ_i) for $i = U, L, H$. The problem that determines the first-best allocation is given by

$$\begin{aligned} \max_{c_i, \ell_i} \quad & W = \sum_i p_i \left[u\left(c_i\right) - v_i \ell_i\right], \\ \text{s.t} \quad & \sum_i p_i \left(w_i \ell_i - c_i\right) \geq 0, \end{aligned}$$

where $w_U = \ell_U = 0$ by assumption. It is plain that the solution implies

$$c_H = c_L = c_U = p_H w_H \ell_H + p_L w_L \ell_L.$$

For simplicity we concentrate on the case where $\ell_H = 1$. We are then left with two cases, namely $\ell_L = 1$ (type H and type L individuals are employed) and $\ell_L = 0$ (only type H workers are employed.[5] In the first case, welfare is then given by

$$W_1^{FB} = u\left(p_H w_H + p_L w_L\right) - \left(p_L v_L + p_H v_H\right), \tag{2}$$

where we use superscript FB to denote First Best results. Similarly, when type L workers are not employed, the welfare level is given by:

$$W_0^{FB} = u\left(p_H w_H\right) - p_H v_H. \tag{3}$$

Consequently, H and L type workers should both be employed if and only if $W_1^{FB} \geq W_0^{FB}$ which is equivalent to

$$u\left(p_H w_H + p_L w_L\right) - u\left(p_H w_H\right) \geq p_L v_L. \tag{4}$$

In words the utility increase associated with the extra consumption (shared by all types of workers) is sufficiently large to outweigh the labor disutility of type L workers.

For the remainder of the paper we shall assume that this condition holds. In other words, we assume that in a first-best world, it is socially desirable to make type L work.

4 Asymmetric information

4.1 The information structure

Let us now assume that individual types and consumption levels are not publicly observable. The set of feasible allocations is then restricted by a certain number of incentive constraints which imply that the first-best optimum cannot be achieved anymore. As usual, a (utilitarian) solution with identical consumption levels but different labor supplies cannot be implemented (type H workers would always want to mimick type U

[5] Strictly speaking the case where only the low productive individuals work ($\ell_H = 0$ and $\ell_L = 1$) can arise but this requires v_H to be "much" larger than v_L which does not appear to be an interesting case to consider.

workers). The possibility of Canada Dry pensions brings in an extra degree of complexity. In particular, it implies that c_L, the consumption level of type L workers can no longer be directly controlled. What can be controlled is the consumption level (after tax income) of type L individuals in case they are employed. We shall denote this level by $\widetilde{c}_L$. The effective consumption level of type L is then given by

$$c_L = \begin{cases} \widetilde{c}_L & \text{if} \quad \ell_L = 1 \\ c_U + b & \text{if} \quad \ell_L = 0. \end{cases} \tag{5}$$

The information structure we adopt is inspired by the Canada Dry pension mechanism detailed in section 2. Individuals of type U cannot work and thus they cannot mimick L or H individuals who are working. Individuals of type H can mimick L and U but cannot receive a Canada Dry transfer from the firm (it is never profitable for the firm to lay off type H workers). Finally, individuals of type L can mimick those of type H and U.

To study the second-best policies it is useful to define the incentive compatible and feasible domain $D(b)$ for a given level of $b \geq 0$. With labor supplies of type U and H workers set at $l_U = 0$ and $l_H = 1$ respectively an allocation can now be characterized by a vector (c_H, c_L, c_U, ℓ_L). However, for our purpose it is more convenient to define the incentive compatible domain over the vector $(c_H, \widetilde{c}_L, c_U, \ell_L)$ of observable variables, where the relationship between c_L and $\widetilde{c}_L$ is specified by (5). We define this domain $D(b) \subset \mathbb{R}^3_+ \times \{0, 1\}$ as the union of two sets $D_1(b)$ and $D_0(b)$ associated with $\ell_L = 1$ and $\ell_L = 0$ respectively. This distinction is necessary because the relevant constraints are different depending on the status of type L worker.

We now turn to the formal definition of these two subsets. First, $D_1(b)$ is the set of vectors $(c_H, \widetilde{c}_L, c_U, 1) \in \mathbb{R}^3_+ \times \{1\}$ that satisfies the following constraints

$$u(c_H) = u(\widetilde{c}_L), \tag{6}$$

$$u(\widetilde{c}_L) - v_L \geqslant u(c_U + b), \tag{7}$$

$$u(c_H) - v_H \geqslant u(c_U), \tag{8}$$

$$p_H w_H + p_L w_L \geqslant p_H c_H + p_L \widetilde{c}_L + p_U c_U. \tag{9}$$

The first equality (that implies of course $c_H = \widetilde{c}_L$) states that type H and L workers

do not mimick each other. Condition (7) ensures that a type L worker does not want to stop working by receiving a Canada Dry pension, while (8) makes sure that workers of type H do not want to claim unemployment benefits. Note that since $b \geq 0$, (8) is redundant when $v_H \leq v_L$. Inequality (9) is the resource constraint of the economy when both types of individuals work.

Second, $D_0(b)$ is the set of $(c_H, \widetilde{c}_L, c_U, 0) \in \mathbb{R}^3_+ \times \{0\}$ that satisfy the following conditions

$$u(c_H) \geq u(\widetilde{c}_L), \tag{10}$$

$$u(c_H) - v_H \geqslant u(c_U), \tag{11}$$

$$u(c_U + b) \geqslant u(c_H) - v_L, \tag{12}$$

$$p_H w_H \geqslant p_H c_H + p_L(c_U + b) + p_U c_U. \tag{13}$$

Condition (10) ensures that type H workers do not want to mimick type L while (11) makes sure that they do not claim unemployment benefits. According to the third condition, (12), type L individuals do not claim to be of type H. Finally, (13) is the resource constraint. Combining (12) and (10) yields $u(c_U + b) \geqslant u(\widetilde{c}_L) - v_L$ so that individuals of type L do accept to be laid off in exchange of the compensation b. Observe that when $\ell_L = 0$, $\widetilde{c}_L$ is irrelevant as long as it does not exceed c_H. Consequently, we can without loss of generality set $\widetilde{c}_L$ equal to c_H so that the equality $c_H = \widetilde{c}_L$ holds for any policy in $D(b)$.

One feature of these incentive constraints deserves some additional comments. The way they are set up implies that workers of type H can claim unemployment insurance (at level c_U). However, they can never obtain a Canada Dry pension. This is because as far as b is concerned, the screening takes place at the firm level and firms (unlike the government) do observe individual productivities. This specificity of Canada Dry pension applies in all the scenarios below irrespective of how its level is determined.

In the following sections, we shall determine the second-best optimum of the economy considering successively three scenarios indexed $j = f, FC, NC$ that differ in the way b is determined. In scenario f, there is no Canada Dry pension i.e., we set $b = 0$. This can be seen as a benchmark case, but also as a case where the government is able to forbid

Scenario	Instruments	Regime 0	Regime 1
f	b forbidden	W_0^f	W_1^f
FC	Full control of b	W_0^{FC}	W_1^{FC}
NC	No control of b	W_0^{NC}	W_1^{NC}

Table 1: The different scenarios under asymmetric information

the use of Canada Dry pension. In the second scenario, FC (full control), we assume that the *level* of b is set by the government along with the other tax instruments to maximize welfare. Observe that b being granted through the firm, it can effectively be targeted to type L workers (which is not possible for "regular" unemployment benefits c_U). In scenario NC (no control), the level of b is set by the firm to maximize its profits. The firm will then set the lowest possible level of b that brings type L workers to accept their dismissal, provided that this level is not higher than $b_{\max}$ (otherwise it will set $b = 0$). The third scenario is of course the one that describes the reality of Canada Dry pensions best. Specifically it is within this scenario that we can study how the Canada Dry pension affects the policy design (unemployment compensation and taxes). The other two scenarios are nevertheless useful in that they provide interesting benchmarks.

For each scenario we separately determine the optimal policies in D_1 (Regime 1) and in D_0 (Regime 0); the global optimum is then obtained by comparing the respective welfare levels. We summarize these alternative scenarios in Table 1 where each cell gives the corresponding level of welfare:

4.2 Scenario f

Assume for the time being that $b = 0$ (and recall that $\ell_H = 1$ and $\ell_U = 0$ is assumed throughout). The second-best problem is then to maximize welfare as specified by (1), with c_L defined by (5), subject to the constraint $(c_H, \widetilde{c}_L, c_U, \ell_L) \in D(0)$ requiring that the policy is in the feasible incentive compatible domain given $b = 0$.

4.2.1 Regime 1

The determination of the "best" policy here is rather simple. It is plain that (for given levels of ℓ_i's) maximizing utilitarian welfare amounts to set the different consumption

levels as close as allowed by the incentive constraints. With $b = 0$, conditions (6)–(7) imply

$$c_H = \widetilde{c}_L > c_U.$$

Further, once $c_H = \widetilde{c}_L$ is fixed, c_U is also determined, either by (7) or by (8) depending on the maximum value of v_i. We thus have

$$c_H = \widetilde{c}_L = u^{-1}\left[u\left(c_U\right) + \max_i v_i\right] \tag{14}$$

Substituting (14) into the resource constraint (9) yields

$$p_H w_H + p_L w_L = \left(p_H + p_L\right) u^{-1}\left[u\left(c_U\right) + \max_i v_i\right] + p_U c_U, \tag{15}$$

condition which implicitly defines c_U^{f1}, the only feasible (and thus optimal) consumption level of type U workers under Scenario f, Regime 1). Substituting into the welfare function yields

$$W_1^f = \begin{cases} u\left(c_U^{f1}\right) + p_H(v_L - v_H) & \text{if} \qquad v_L > v_H, \\ u\left(c_U^{f1}\right) + p_L(v_H - v_L) & \text{otherwise.} \end{cases} \tag{16}$$

To understand this expression consider for instance the case where $v_L > v_H$. Then (7) is binding and we have $u\left(\widetilde{c}_L\right) - v_L = u\left(c_U\right)$ so that $u(c_H) - v_H = u(\widetilde{c}_L) - v_L + (v_L - v_H) = u(c_U) - (v_L - v_H)$. In words, type U and L workers have the same utility levels while type H individuals receive an extra "rent" of $(v_L - v_H)$.

4.2.2 Regime 0

Setting $b = 0$ and using (11), inequality (12) can be rewritten as

$$v_L - v_H \geq 0$$

so that $D_0(0)$ is non empty only if $v_L \geq v_H$. Consequently, when $v_L < v_H$, the optimal solution is necessarily in $D_1(0)$. It is characterized by (15) and welfare is given by W_1^f. When $v_L \geq v_H$, on the other hand, $D_0(0)$ is non empty. Utilitarian welfare is once again maximized by setting c_H as close as possible to c_U so that (11) is binding and we have

$$c_H = u^{-1}\left[u\left(c_U\right) + v_H\right].$$

Substituting into the resource constraint (13) yields

$$p_H u^{-1}\left[u\left(c_U\right)+v_H\right]+\left(p_L+p_U\right)c_U=p_H w_H,$$

the solution of which is c_U^{f0}. Further we have $c_L^{f0}=c_U^{f0}$ and from (11), $u\left(c_H^{f0}\right)-v_H=u\left(c_U^{f0}\right)$. Consequently individuals of all three types have the same utility level and welfare is simply given by

$$W_0^f=u\left(c_U^{f0}\right).$$

Recall that this solution is feasible only when $v_L \geq v_H$.

4.3 Scenario FC

Suppose now that the government has full control over $b \geq 0$. The policies considered under Scenario f remain available but the feasible domain is enlarged and now includes $D(b)$ for any $b \geq 0$. Consequently, the solution achieved under FC can never be worse than that achieved under f. Once again we successively consider D_1 and D_0.

4.3.1 Regime 1

It is plain that when workers of type L are to be induced to work, a positive level of b can only be welfare reducing; it makes the incentive constraint of type L workers harder to satisfy (and thus reduces the feasible domain). Recall also that with a utilitarian welfare function there is no need to transfer extra income to type L workers. Consequently, the optimum is achieved for $b=0$ and the solution is the same as under Scenario f. The level of welfare is given by $W_1^{FC}=W_1^f$ as defined by (16).

4.3.2 Regime 0

In this case, the government's problem is less straightforward than in the settings considered above. This is because we have b as an additional policy instrument which adds an extra degree of freedom to the government's maximization problem (that so far was rather degenerate). Recall that in Regime 0, $\ell_L=0$ and we have $c_L=c_U+b$. Substituting this equation into (12) and (13) we can write the Lagrangean expression of the

government's problem as follows:

$$\begin{aligned}\mathcal{L} &= p_H\left[u\left(c_H\right)-v_H\right]+p_L u\left(c_L\right)+p_U u\left(c_U\right)\\ &\quad +\lambda_1\left[u\left(c_H\right)-v_H-u\left(c_U\right)\right]\\ &\quad +\lambda_2\left[u\left(c_L\right)-u\left(c_H\right)+v_L\right]\\ &\quad +\gamma\left[p_H w_H-p_H c_H-p_L c_L-p_U c_U\right]\end{aligned}$$

where $\lambda_1, \lambda_2 \geq 0$. Having substituted for b, we are left with three decision variables, namely c_U, c_H and c_L. The first-order conditions are given by

$$u'\left(c_U\right) = \gamma\frac{p_U}{p_U-\lambda_1} \tag{17}$$

$$u'\left(c_H\right) = \gamma\frac{p_H}{p_H+\lambda_1-\lambda_2} \tag{18}$$

$$u'\left(c_L\right) = \gamma\frac{p_L}{p_L+\lambda_2} \tag{19}$$

We show in the Appendix that the solution implies either $\lambda_1 > 0$ and $\lambda_2 = 0$ or $\lambda_1 > 0$ and $\lambda_2 > 0$. It then follows from (17) and (19) that $c_L > c_U$, which implies $b > 0$. Consequently, when the optimal policy is in D_0, then it is necessarily associated with a positive level of b. In other words, *if this regime occurs* a fully controlled level of b is a useful policy instrument; it is not desirable to impose $b = 0$. As far as welfare is concerned we thus have $W_0^{FC} > W_0^f$. The numerical results provided below show that this regime can effectively occur even when the first-best solution implies that L type workers continue to remain in the labor force.

When this Regime occurs it is desirable to let type L workers exit the labor force and give them some compensation beyond the unemployment benefit c_U. The use of b as a screening device makes some extra redistribution towards L possible (recall that in the first-best we would have $c_L = c_H$) without interfering with the incentive constraint from type H workers to type L workers.

4.4 Scenario NC

In this scenario, the level of b is set by the firm to maximize its profits. The firm will then set the lowest possible level of b that brings type L workers to accept their

dismissal, provided that this level is not higher than $b_{\max} = \overline{w} - w_L$ (otherwise it will set $b = 0$). The Canada Dry pension is not publicly observable so that unemployed of type U and those of type L cannot be distinguished (and receive the same compensation). Note that even though the government no longer controls b, it does have some indirect control over the workers labor market status. Specifically, the lower is the unemployment compensation c_U (and the higher is $\widetilde{c}_L$) the more expensive it will be for the firms to induce the workers of type L to accept their dismissal. As for the previous scenarios we shall consider first Regime 1 and then Regime 0.

4.4.1 Regime 1

To achieve this regime, the policy must be chosen in $D_1(b_{\max}) = D_1(\overline{w} - w_L)$; i.e., the highest level of b that the firm would be willing to pay is not sufficient to induce type L workers to leave their job. Recall that (6) implies $c_H = \widetilde{c}_L$. Furthermore, with a utilitarian welfare function, it is plain that $c_H = \widetilde{c}_L$ should be as close as possible to c_U. Assuming that (8) does not bind, the constraint (7) must then be binding and, substituting for $b_{\max}$ we have

$$u(c_L) - v_L = u(c_U + \overline{w} - w_L).$$

Consequently, the solution satisfies

$$c_H = \widetilde{c}_L = u^{-1}\left[u(c_U + \bar{w} - w_L) + v_L\right] \tag{20}$$

and the values of c_i can be obtained using the resource constraint. Compared to the optimum obtained when b is controlled ((14) versus (20)) we see that the non observability of b implies an additional informational premium (rent) for both L and H so that $W_1^{NC} < W_1^{FC}$. In other words, if Regime 1 occurs, the possibility of Canada Dry pension is necessarily "a bad thing". If the firms could be prevented from using Canada Dry pensions, such a prohibition would be optimal here. Recalling that in Regime 1, the optimum under full control implied $b = 0$, this result does of course not come as a surprise.

To sum up, the optimum is described by

$$W_1^{NC} = (p_H + p_L)\, u(c_U + \overline{w} - w_L) + p_H(v_L - v_H) + p_U u(c_U),$$

where c_u is the solution to

$$p_H w_H + p_L w_L = (p_H + p_L)\, u^{-1}\left[u\left(c_U + \bar{w} - w_L\right) + v_L\right] + p_U c_U.$$

4.4.2 Regime 0

We now turn to the policies that induce type L workers to quit the labor force. The firm sets b at the lowest possible level in $[0, \overline{w} - w_L]$ that brings type L workers to accept their dismissal. This, in turn requires that (12) is satisfied or, equivalently (making use of 10) that $u(c_L) = u\left(c_U + b\right) \geqslant u\left(\widetilde{c}_L\right) - v_L = u\left(c_H\right) - v_L$. Formally, define b^* as the smallest solution in $[0, \overline{w} - w_L]$ to

$$u(c_U + b^*) \geq u\left(c_H\right) - v_L. \tag{21}$$

The set of admissible policies associated with Regime 0 are then given by the set $D_0(b^*)$. It can then easily be shown that the constraint (11) is necessarily binding. Condition (21) can then be rewritten as follows.

$$u\left(c_H\right) - v_H = u\left(c_U\right) \leq u\left(c_U + b^*\right) + \left(v_L - v_H\right).$$

This expression shows that $b^* > 0$ if and only if $v_H > v_L$; otherwise we have $b^* = 0$. Intuitively, when $v_H < v_L$, type L workers have a higher disutility of labor than type H workers. The (binding) incentive constraint that makes type H individuals indifferent between working and claiming unemployment insurance then implies that the L types workers also prefer to be unemployed (even when they do not get an extra compensation).

Summing up, b^* is determined by

$$\begin{cases} u(c_U + b^*) = u\left(c_U\right) + \left(v_H - v_L\right) & \text{if } v_H > v_L, \\ b^* = 0 & \text{otherwise.} \end{cases} \tag{22}$$

Furthermore, this expression, along with the binding incentive constraint (11) and the resource constraint (13) completely determine the solution. Specifically, from the incentive constraint, $u\left(c_H\right) - v_H = u\left(c_U\right)$, we obtain

$$c_H = u^{-1}\left[u\left(c_U\right) + v_H\right],$$

Scenario	Regime 1	Regime 0
f	W_1^f, $b = 0$	W_0^f, $b = 0$ if $v_L \geq v_H$ non existence if $v_L < v_H$
FC	$W_1^{FC} = W_1^f$, $b = 0$	W_0^{FC}, $b > 0$
NC	W_1^{NC}, $b = 0$	$W_0^{NC} = W_0^f$, $b = 0$ if $v_L \geq v_H$, W_0^{NC}, $b > 0$ if $v_L < v_H$.

Table 2: Main results: levels of b and welfare.

so that c_L and c_U are obtained by solving the resource constraint

$$p_H w_H - (p_U + p_L)c_U - p_L b^* - p_H u^{-1}\left[u\left(c_U\right) + v_H\right] = 0,$$

while making use of the definition of b^*, equation (22). Substituting the solution into the welfare function then yields

$$W_0^{NC} = \left(p_U + p_H\right) u\left(c_U\right) + p_L u(c_U + b^*).$$

One should stress that when $b^* = 0$, i.e., when $v_L \geq v_H$, the solution is the same as the one when b is forbidden so that when $v_L \geq v_H$ we have $W_0^{NC} = W_0^f$.

4.5 The desirability of a Canada Dry pension

Table 2 summarizes the main results obtained so far. Furthermore, we have some results regarding the ranking of these welfare levels, in particular

$$W_1^{NC} < W_1^f = W_1^{FC}.$$

and (as long as W_0^f exists)

$$W_0^f < W_0^{FC} \quad W_0^{NC} \leq W_0^{FC}.$$

One way or the other, it is plain that the scenario FC can only dominate the others (at least weakly). However, if we want to assess the overall welfare impact of Canada Dry pensions, this is not the relevant comparison to make.

As mentioned in the introduction, the question we ask is the following. Is it possible that the second-best solution with Canada Dry pensions yields a higher level of welfare

	f $(w_L = 1)$	FC $(w_L = 1)$	f or FC $(w_L = 1.1)$
Optimal Regime	1	0	1
c_L	1.28	0.5	1.34
b	0	0.26	0
c_U	0.31	0.24	0.33
c_H	1.28	1	1.34
W	-1.14	-1.11	-1.10

Table 3: Numercial illustation with $v_H = v_L = 1.4$. The utility function is $u(c) = \log(c)$. Parameters are $p_U = 0.4$, $p_L = 0.4$, $p_H = 0.2$, $w_H = 2.5$ and $w_L = 1$ or $w_L = 1.1$.

than the second-best without Canada Dry pension in a setting where the *first-best is achieved when all types work.* In other words, can it be desirable to induce type L workers via Canada Dry pensions to quit the labor force even when first-best efficiency call for all types of workers to stay in the labor force. Table 2 suggests that the answer to this question crucially hinges on the comparison between the levels of labor disutility, v_H and v_L.

Consider first the case where $v_L \geq v_H$. In this setting, Canada Dry pension can be *potentially* welfare-improving only under the FC scenario. Under NC they are irrelevant and they will not effectively be used. Table 3 provides numerical examples to show that this *potential* welfare improvement may or may not translate into an *effective* welfare improvement. In one case (when $w_L = 1.1$) we have $b = 0$ with Regime 1 occurring and with no effective role for the extra instrument. In the other case (with $w_L = 1.0$), Regime 0 occurs with a positive level b and Canada Dry pension turn out to be welfare enhancing. Intuitively, Canada Dry pension are useful here because they provide additional informations. As we show, even if work is desirable for both types of workers in a first-best world, it may be optimal to let type L workers stop working in an asymmetric information setting. When the government does not observe individuals productivities but can still control b, the solution in regime 1 involves an informational premium for types L and H workers. This premium is detrimental to type U individuals so that the government may want to make type L individuals not work. In our informational setting, if it is not desirable to make type L not work, one way to

	f (with $w_L = 1$)	f (with $w_L = 1.1$)	FC	NC
Optimal Regime	1	1	0	0
c_L	1.36	1.42	0.5	0.34
b	0	0	0.33	0.14
c_U	0.20	0.21	0.17	0.20
c_H	1.36	1.42	1.15	1.39
W	-1.38	-1.34	-1.33	-1.36

Table 4: Numercial illustation with $v_H = 1.9 > v_L = 1.4$. The utility function is $u(c) = \log(c)$. Parameters are $p_U = 0.4$, $p_L = 0.4$, $p_H = 0.2$, $w_H = 2.5$ and $w_L = 1$ or $w_L = 1$.

redistribute income towards types L is to use the Canada Dry pension mechanism in order to screen types L. Since type H workers cannot pretend to have a Canada Dry pension, giving extra income to type L individuals does not have any impact on the incentive compatibility constraints and the level of redistribution is greater.

Let us now turn to the case where $v_L < v_H$. In this situation Table 2 is much less informative because several of the welfare comparisons become ambiguous. This ambiguity of course also suggests, that there may be more room for a *potentially* welfare improving role of Canada Dry pensions, even when they are not observed and controlled by the government. To resolve this ambiguity we resort again to numerical illustrations; see Table 4. These examples show that both cases are effectively possible. For $w_L = 1$, we have $W_1^f > W_0^{NC}$ while $w_L = 1$ yields $W_1^f < W_0^{NC}$. To understand why this latter result emerges, recall that when $v_L < v_H$, Regime 0 is not feasible when b is unavailable but it is when b is available. The welfare improving role of b emerges precisely when it is impossible to make type L workers stop working without the use of a Canada Dry pension. To be more precise, without a Canada Dry pension, when type L individuals stop working type H individuals would also quit the labor force. This problem is avoided when Canada Dry pensions are available to firms who target them to type L workers (recall that firms observe workers' types while the government does not).

To sum up, when (as in the example provided) NC yields a higher level of welfare than f, we can say that Canada Dry pensions are overall a good thing. Forbidding them, even if it were feasible would not be the right course of action.

5 Conclusion

In this paper we have shown not only why what we call a Canada Dry pensions system can appear, but also why the government can be lead to tolerate it even though it could prevent it. The Canada Dry pensions system appears when an employer has aged employees who cost more than they produce. In the absence of early retirement schemes, the employer bribes these costly old workers into unemployment. Unemployment compensation plus a more or less visible bribe make it acceptable for the workers to exit the labor force. In most instances, the government does not observe such a practice. If it did, it would prevent it forcing employers to keep their employees. However, there are cases when a social welfare maximizing government may find this practice desirable.

The problem studied in this paper is not restricted to the only issue of retirement. It can appear whenever wages are superior to productivity and the only way for the employer to get rid of costly workers is to bribe them in some kind of social insurance, disability or unemployment. Naturally, with spot market wages and effective monitoring of social insurance, the practice of Canada Dry pensions would disappear. spot market wages would make it unneeded and effective monitoring of unemployment insurance would make it impossible.

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A Proof

Using the equality $c_L = c_U + b$, we can express the problem of the social planner by the following Lagrangean:

$$\begin{aligned}\mathcal{L} &= p_H\left[u\left(c_H\right) - v_H\right] + p_L u\left(c_L\right) + p_U u\left(c_U\right) \\ &\quad +\lambda_1\left[u\left(c_H\right) - v_H - u\left(c_U\right)\right] \\ &\quad +\lambda_2\left[u\left(c_L\right) - u\left(c_H\right) + v_L\right] \\ &\quad +\gamma\left[p_H w_H - p_H c_H + p_L c_L + p_U c_U\right]\end{aligned}$$

The FOC's are:

$$\begin{aligned}&\left(p_H + \lambda_1 - \lambda_2\right) u'\left(c_H\right) - \gamma p_H = 0 \\ &\left(p_L + \lambda_2\right) u'\left(c_L\right) - \gamma p_L = 0 \\ &\left(p_U - \lambda_1\right) u'\left(c_U\right) - \gamma p_U = 0\end{aligned}$$

- Suppose $\lambda_1 = 0$ and $\lambda_2 > 0$. The first order conditions yield:

$$\begin{aligned}u'\left(c_U\right) &= \gamma \\ u'\left(c_H\right) &= \gamma\frac{p_H}{p_H - \lambda_2} \\ u'\left(c_L\right) &= \gamma\frac{p_L}{p_L + \lambda_2}\end{aligned}$$

This gives $c_H < c_U < c_L$ which is impossible as it contradicts $u(c_H) - v_H \geq u(c_U)$.

- Suppose $\lambda_1 > 0$ and $\lambda_2 > 0$. By the incentive compatibility constraints, it means that $u(c_H) - v_H = u(c_U) = u(c_L) + (v_L - v_H)$. Moreover, the first order conditions yield

$$\begin{aligned} u'(c_U) &= \gamma \frac{p_U}{p_U - \lambda_1} \\ u'(c_L) &= \gamma \frac{p_L}{p_L + \lambda_2} \\ u'(c_H) &= \gamma \frac{p_H}{p_H - \lambda_2 + \lambda_1} \end{aligned}$$

  so that $c_L > c_U$. This regime is thus possible if $v_L < v_H$ otherwise it contradicts $u(c_U) < u(c_L)$.

- Suppose $\lambda_1 > 0$ and $\lambda_2 = 0$. By the incentive compatibility constraints, it means that $u(c_H) - v_H = u(c_U) < u(c_L) + (v_L - v_H)$. The first order conditions yield:

$$\begin{aligned} u'(c_U) &= \gamma \frac{p_U}{p_U - \lambda_1} \\ u'(c_H) &= \gamma \frac{p_H}{p_H + \lambda_1} \\ u'(c_L) &= \gamma \end{aligned}$$

  so that $c_H > c_L > c_U$.