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Minimum Income Proposal in Québec

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Abstract:
In 2002 the Government of Quebec enacted Bill 112, known as *An Act to Combat Poverty and Social Exclusion*. It has also instituted an advisory committee whose role is to advise the government on policies that may have a direct or indirect impact on poverty and social exclusion. The Committee published a series of recommendations in 2009 that more or less amount to a Guaranteed Minimum Income scheme. We investigate the likely consequences of the recommendations on employment and income of all individuals residing in the Province of Quebec. We do this through the use of a behavioural micro-simulation model. Our results show that the proposed recommendations would have a large negative impact on hours of work and labor force participation – and mostly so among low-income workers. The recommendations would involve outlays in the order of $2.2 billion per year.

Keywords: Poverty, Guaranteed minimum income (GMI), Micro-simulation, Behavioural response, Cost of GMI

JEL Classification: I38, J22, J48

1 Introduction

The Government of Quebec has introduced over the past fifteen years a number of relatively novel policies and initiatives with the specific objective of fighting poverty. One of the most visible such initiatives has been the enactment in 2002 of Bill 112, known as *An Act to Combat Poverty and Social Exclusion*. The Act is quite ambitious:

> *The object of this Act is to guide the Government of Québec and society as a whole towards a process of planning and implementing actions to combat poverty, prevent its causes, reduce its effects on individuals and families, counter social exclusion, and strive towards a poverty-free Québec.*

Such an Act is unique in North America; it also constitutes a significant political innovation, if only because it makes poverty reduction an explicit and central policy priority. The Act also establishes *A National Strategy to Combat Poverty and Social Exclusion* and provides for the creation of an Anti-Poverty Fund ("Fonds québécois d'initiatives sociales"). It has further instituted an advisory committee known as the CCLP ("Comité consultatif de lutte contre la pauvreté et l'exclusion sociale"). The role of the CCLP is to advise the government on the planning, implementation and assessment of actions taken within the scope of the *National Strategy*. The CCLP may also make recommendations and give opinions on government policies that may have a direct or indirect impact on poverty and social exclusion.

In this context, the CCLP published a report in 2009 containing a series of interesting and important recommendations on the means of ensuring that all Quebecers have incomes that enable them to meet their basic needs (Comité consultatif de lutte contre la pauvreté et l'exclusion sociale 2009). Two of these recommendations will be the focus of the present paper. They are singled out because they naturally lend themselves to analytical investigation and also because together they broadly amount to establishing a guaranteed minimum income.

As stressed in its Policy Statement (Gouvernement du Québec 2002), the Government of Quebec considers employment to be the primary road to independence and often the best way to combat poverty. The CCLP report and the government's statement are not entirely incompatible but they are reminiscent of the debate on the competing objectives of providing sufficient income support to escape from material poverty while making work sufficiently attractive. Although social assistance typically provides low benefits (often insufficient to escape material poverty by most standards), in some circumstances it can represent an attractive alternative to low-paid work, especially for families with children. Longer-term receipt of social assistance can also reinforce poverty by deteriorating recipients' employment skills and by lowering their aspirations and morale. Parental use of social assistance can further increases the probability that their children will eventually be recipients (see Beaulieu et al. 2005 for evidence for Quebec). As stated by the Ontario Task Force on Income Security states, "[a] modern income security system would expect and encourage individuals to assume personal responsibility for taking advantage of opportunities for engagement in the workforce or in community life." (Task Force on Modernizing Income Security for Working-Age Adults 2006, p.16)

One common "modernizing" proposal has been to add earnings supplements to existing social assistance programs. Often known as "in-work benefits," such income supplements have become major policy tools in a number of countries, including the United States (where it is known as the Earned Income Tax Credit), the United Kingdom (the Working Tax Credit) and France (Prime pour l'emploi). In Canada, a Working Income Tax Benefit (WITB) was introduced in March 2007. It is a relatively modest refundable tax credit set to 20% of earned income-up to $500 for individuals and $1,000 for families and is reduced by 15% of net income for individuals earning more than $9,500

and families earning more than $14,500. The WITB aims at improving the incentives to work for low-income Canadians and to lower the so-called "welfare wall". A different Canadian example is the proposal by Task Force on Modernizing Income Security for Working-Age Adults (2006) — also supported by Saunders (2005) — of offering a combination of a Basic Refundable Tax Credit and of a Working Income Benefit to all low-income working-age adults. This combination would offer a maximum benefit of around $4,000 per year, which would begin to be clawed back at an income level of around $5,000 per year and would be reduced to zero at income of $21,000 per year. The benefit would not be available to those without earnings.

An alternative formulation consists of a Basic Income, which can also be considered to be a form of negative income taxation. A key issue is the marginal tax rates that should apply to different implicit and explicit income tax brackets and, more particularly, whether these rates should increase or decrease with income. The Basic Income scenarios envisaged in Araar et al. (2005) broadly favor a constant marginal tax rate and, therefore, a flat tax system (see Kesselman 2000).

Yet another alternative approach is that of a Guaranteed Minimum Income (GMI). As mentioned above, it has been recently proposed by Quebec's CCLP through the following two propositions (see recommendations 2 and 13 in Comité consultatif de lutte contre la pauvreté et l'exclusion sociale 2009):

Recommendation 1 *The CCLP recommends that, as a first step, baseline financial support be set at 80% of (Statistics Canada's) Market Basket Measure for disposable income in municipalities with a population of fewer than 30,000 inhabitants.*

Recommendation 2 *The CCLP recommends that individuals who work an average of 16 weekly hours at the minimum wage have a disposable income that is no lower than the above Market Basket Measure for disposable income in municipalities with a population of fewer than 30,000 inhabitants.*

The purpose of this paper is to investigate the likely impact of the above GMI recommendations on the employment and income of individuals residing in the Province of Quebec. We do this through the use of a behavioral micro-simulation model. We first model the labor supply of a representative sample of the population using a discrete choice model and individual budget constraints that are based on the existing tax code. We next modify the budget constraints in accordance with the above recommendations. Based on the model's parameter estimates, we then simulate their likely longer term impact on employment and earnings. Our results show that the proposed recommendations would have a large negative impact on hours of work and labor force participation — and mostly so among low-income workers, in all likelihood an unintended consequence. Finally, the recommendations would be rather costly. They would amount to greater outlays of the order of $ 2.2 billion per year, of which 85% would be borne by the provincial government.

2 Data and Economic Setting

Our analysis uses data primarily drawn from Statistics Canada's Social Policy Simulation Database (SPSD/M) for 2004. SPSD/M provides a statistically representative database of individuals in their family context, with enough information on each individual to compute taxes paid to and cash transfers received from governments. The main component of the database is the Survey of Labour and Income Dynamics (SLID). Important variables that are unavailable in the SLID are imputed by Statistics Canada using the Survey of Household Spending (SHS) and administrative data. For the specific purposes of this study, additional variables such the net value of residence, the value of

financial assets and the net worth of the vehicles owned have also been imputed using the Survey of Financial Security of 2005 and Census data for 2001.[1]

2.1 Sample Characteristics

Our sample omits individuals under age 18 and over 65 as well as full-time students and the disabled. Individuals reporting earnings from self-employment and those working on average more than 70 hours per week are also excluded from the sample. Overall the sample consists of 3,031 individuals. The labor supply model is estimated for three distinct sub-groups: single men, single women, and single mothers.[2] Table 1 shows the breakdown by age groups along with their total sample weights. Total census weights for the same groups are also included to assess the representativeness of our sample. Single women and single mothers are somewhat under-represented in our sample, whereas the opposite holds for single men. The discrepancies are partly attributable to relatively small sample sizes but also to the fact that exclusion restrictions identical to those applied for our sample could not be applied to the census data when using census weights.

Table 1: Sample sizes and weights

Group	<30 years	>30 years	Total	Total sample weight	Total census weight
Single men	563	1 246	1 809	385 962	327 246
Single women	214	617	831	265 469	291 841
Single mothers	38	353	391	100 669	186 966
Total				752 100	806 053

Table 2 reports descriptive statistics on key variables included in the econometric model. The patterns reported in the table are roughly consistent with those found in the census data. Thus, single men are on average younger than both single women and single mothers. In addition, they tend to work more and earn a higher hourly wage rate. As a consequence, their earnings are also higher than those of the other groups. Finally, the table shows that single mothers have on average 1.72 children and 18% have preschoolers.

Table 2: Descriptive Statistics

Variables	Single men		Single women		Single mothers	
	Mean	Std-dev	Mean	Std-dev	Mean	Std-dev
Age	38.08	11.23	43.12	13.29	40.96	8.13
Weekly hours of work	34.51	13.70	27.53	15.73	28.02	14.86
Earnings ($1000)	43.42	66.23	23.42	34.86	21.45	16.84
Non-labor earnings ($1000)	4.39	32.60	3.57	10.01	3.01	4.86
Hourly wage rate ($)	16.51	5.14	14.50	4.09	14.75	3.99
# Children 0–18					1.72	0.95
Have preschool children					0.18	0.38

2.2 Fiscal Environment

In order to understand the likely impact of the CCLP's proposals, it is useful to depict graphically their impact on the net earnings of various individual configurations. Figures 1(a), 1(b) and 1(c) plot the yearly earnings of single males, single females and single mothers separately. All three figures

[1] The details of the imputations are not presented for the sake of brevity but are available upon request.

[2] Single fathers are not included because there are too few of them in the sample.

are sketched under the assumption that the individual earns the minimum wage since these are the individuals likely to be most affected by the proposals. The budget constraints are computed using the Canadian Tax and Credit Simulator (CTaCS) developped by Milligan (2008). CTaCS simulates the Canadian personal income tax and transfer system (provincial and federal). The program was slightly modified to take into account Quebec's 2004 welfare benefit system (Gouvernement du Québec 2004).[3] Note that we assume that the CCLP benefits would not be taxable at the federal level or at the provincial level, and that no Employment Insurance or Quebec Pension Plan premia would be levied against the benefits.

Figure 1(a) focuses on single men and women. The budget set is identical for both groups because it is drawn under the same assumptions (minimum wage, no assets, *etc.*). Notice first that inactive individuals would gain under the CCLP proposals. Indeed, they would receive a transfer equivalent to 80% of the Market Basket Measure which is substantially more than the welfare benefits that prevailed in 2004. As they start working, their net earnings increase very slowly because the government transfer decreases proportionately. As they reach 16 hours per week, workers face an implicit tax rate of 100%. Beyond 32 weekly hours of work they are no longer entitled to the transfer and then face the standard tax system. Under the existing system, net earnings increase faster than under the CCLP proposals at first due to the earnings disregard in the determination of welfare benefits. A plateau is reached as early as 7 hours of work per week because welfare benefits are taxed at an implicit rate of 100% beyond the corresponding earnings.

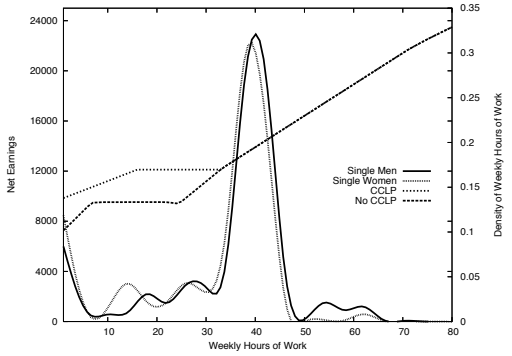
Figure 1(a) also plots the (smoothed) distribution of weekly hours of work using data from the SPSD/M database (right-hand side scale). In both cases there is considerable bunching around 40 hours per week. Yet proportionately more men work beyond 40 hours and fewer are inactive. The figure highlights the fact that the majority of singles would have a strong incentive to reduce their hours of work. Even those whose earnings are higher than the cut-off point, they still could prefer to work less and earn just slightly less than they currently do.

Figures 1(b) and 1(c) depict the budget sets and the distribution of weekly hours of work of single mothers under two different assumptions with respect to net assets. Figure 1(b) focuses on single mothers with median-level net assets and minimum wage rate. Under the current welfare regime their monthly benefits are relatively low because they are means-tested. Under the CCLP regime single mothers would enjoy a considerable increase in earnings. Figure 1(c) is sketched under the assumption that single mothers have no assets. The CCLP recommendations would not improve their situation since the existing welfare system is already more generous than the proposed CCLP benefits.

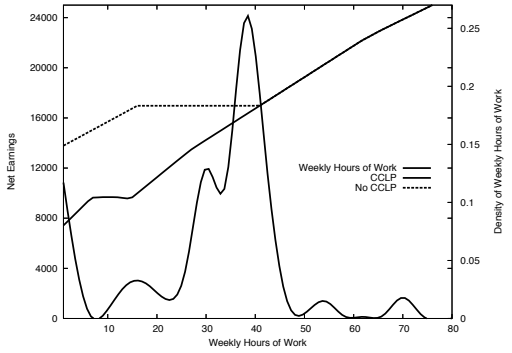
To gain a better understanding of the implicit incentive effects in both the CCLP and the *status quo*worlds, Figure 2 sketches the net hourly wage rate a single female at the gross minimum wage and with no assets would enjoy as she increases her weekly hours of work. In the current world, the income disregard in the welfare system ensures a recipient's earning are not taxed away at low hours of work. She thus enjoys a net wage rate of $7.45/hour. As her earnings increase beyond the disregard, every additional dollar of earnings decreases her welfare benefits by one dollar. She thus earns a net wage rate of $0/hour. Once her earnings completely exhaust her benefits, she starts paying income taxes and thus enjoys a net wage rate of about $6/hour. Finally, as her earnings increase beyond the first income tax bracket, she starts paying yet more taxes and works for a net wage rate of about $5 hour as a result.

In the CCLP world, the first hour of work increases earnings by as little as $2.91 because the

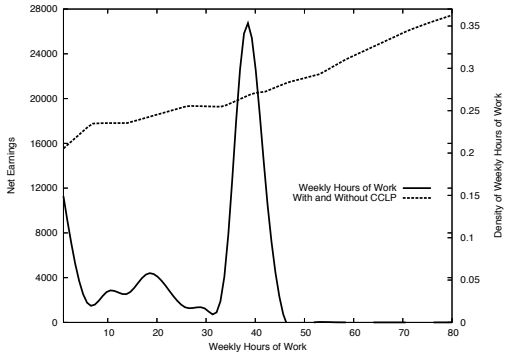
[3]Welfare benefits are means tested. As stated earlier, a number of variables need to be imputed in order to determine potential welfare benefits. These include the net property value (home and car) and net value of financial assets. They are imputed based on auxiliary regressions applied to Statistics Canada's 2005 Survey of Financial Security of 2005.



(a) Single Males and Females With No Assets



(b) Single Mothers with Median Assets



(c) Single Mothers, No Assets

Figure 1: Budget Sets for Singles and Single Mothers, with and without CCLP benefits

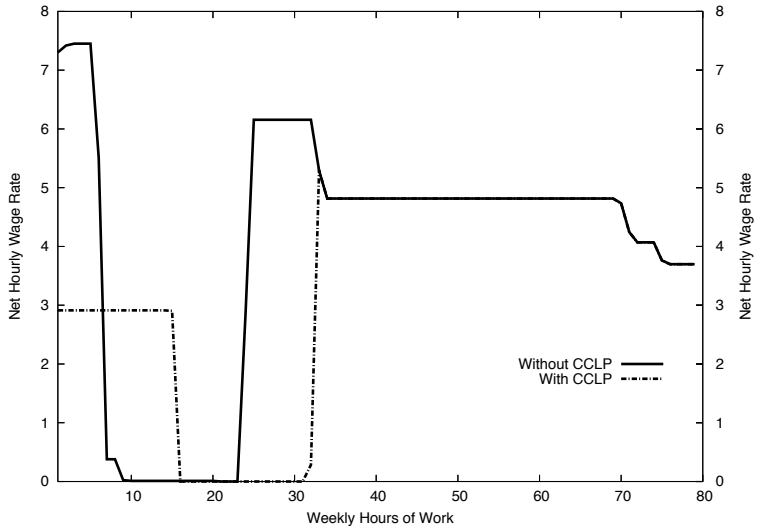


Figure 2: Net Hourly Wage Rate, Minimum Wage Worker, No Assets

transfer received from the government decreases linearly between 80% of the MBM at zero hours of work and 100% of the MBM at 16 hours of work. Consequently, as she reaches 16 hours of work per week, a single female receives a net wage rate of $0/hour. Only once she reaches 32 hours per week is her net wage rate again positive. This is because her earnings at 32 hours per week are just equal to 100% of the MBM. Working an additional hour of work will bring her beyond the threshold and she will no longer receive any transfer. Her earnings will be large enough for her to pay income taxes.

The CCLP proposals do not remove the "welfare trap" *per se*. They simply shift it rightwardly and consequently significantly changes the incentive effects at low hours of work. The likely impact of the CCLP proposals on the distribution of hours of work cannot be ascertained easily. To do this, we must turn to formal modeling.

3 Econometric Model

In order to conduct coherent policy simulations, the labor supply model must investigate individual behavior in a theoretically consistent manner.[4] Unfortunately, the highly non-linear (and often non-convex) budget constraints make that task particularly demanding if we treat hours of work as a continuous choice variable. To ease the task, it is often customary to follow Soest and Das (2001) and focus on a discrete number of weekly hours of work. Thus, let the choice set facing an individual be given by $\{h^1, h^2, \ldots, h^p\}$, where p is the number of possible choices of hours of work. Individuals are assumed to maximize a well-behaved utility function defined over leisure, l, and net income, y, with respect to time and income constraints:

$$\max U^i(l^i, y^i) \qquad s.t. \quad y^i \leq y^i(l^i, w) \quad \text{and} \quad l^i \leq T, \tag{1}$$

[4] In particular, the Slutsky restrictions must be satisfied.

where i corresponds to a given level of leisure. Hours of leisure, ($l^i = T - h^i$), are given by the time endowment, T, from which we subtract hours of work, h^i. We fix $T = 80$ hours per week.[5] Net income equals earnings, wh^i, plus exogenous non-labor income, N, and government transfers, B, less income taxes, T (Keane and Moffitt 1998):

$$y^i(h^i) = wh^i + N + B(wh^i, N, X) - T(wh^i, N, X), \tag{2}$$

where X is a vector of demographic variables.

We use a translog utility function because of its useful properties and well-known flexibility. It is defined as:

$$u^i(l^i, y^i) = \beta_1 \log(l^i) + \beta_2 \log(l^i)^2 + \beta_3 \log(y^i) + \beta_4 log(y^i)^2. \tag{3}$$

In particular, this utility function is locally flexible to the second order and does not impose the quasi-concavity of preferences.[6] As is customary, preference heterogeneity is introduced in the leisure parameter β_1:

$$\beta_1 = \alpha_0 + \alpha_1 \log(Age) + \alpha_2 \log(Age)^2 + \alpha_3 NB018 + \alpha_4 (Preschool > 0) + \upsilon, \tag{4}$$

where A is age, $NB018$ is the number of children below 18, and ($Preschool > 0$) is a dummy variable equal to one when a preschooler is present in the household. Preference for leisure also varies with unobserved characteristics, υ, random component. The letter is assumed to be independently and identically distributed as a normal random variate with mean zero and variance σ^2.

To allow for optimization errors, we also assume that the utility function itself has a random term ξ^i:

$$U^i(l^i, y^i) = u^i(l^i, y^i) + \xi^i. \tag{5}$$

This assumption is made to allow for the possibility that individuals may not know their utility levels perfectly, or for the fact that their optimal choice of labor supply may not correspond exactly to the discrete choices we model. For the purpose of identification, ξ^i is assumed to be independently and identically distributed as a Type-I extreme value random variate (namely, the Gumble distribution).

According to equation (1), an individual will choose h^i if u^i is greater than the utility associated with the other alternatives. Given the stochastic specification of the model, the probability this will happen, conditional on a given value of υ, is given by:

$$\Pr\left[u^i \geq u^j \, \forall \, j\right] = \frac{\exp\left(u^i\left(l^i, y^i\right)|\upsilon\right)}{\sum_{j=1}^{p} \exp\left(u^j\left(l^j, y^j\right)|\upsilon\right)}. \tag{6}$$

The literature on discrete labor supply models has generally found that such models tend to underpredict the number of individuals with $h = 0$. This will occur if the "fixed costs" associated with work are omitted from the analysis. For instance, Cogan (1981) insisted early on that both the monetary costs (commuting, daycare, *etc.*) and non-monetary costs (psychic costs, stress, *etc.*) be accounted for explicitly in labor supply models. Obviously, many of these costs are difficult to observe but may be proxied by demographic variables. Fixed costs must be subtracted from income if $h > 0$. The problem with this is that income minus fixed costs may be negative, a possibility that cannot be dealt with due to the form of the translog utility function. Gong and van Soest (2002) have introduced the notion of fixed income for not working. Instead of subtracting a fixed cost to work, a fixed income can be added to the income at zero hours of work, making inactivity a

[5] According to Gong and van Soest (2002), the parameter estimates are relatively insensitive to this particular normalization.

[6] The marginal utility of income must be positive for the model to be theoretically consistent (see Soest and Das 2001).

relatively more attractive alternative. Both approaches have the potential to capture the bunching at zero hours of work. For practical reasons, the model for single mothers is based upon the "fixed costs" approach, while the models for single males and females are based upon the "fixed income" approach.[7]

Fixed incomes and fixed costs are incorporated into the model by replacing $u\left(y^i, l^i\right)$ by $u\left(y^0 + FI, l^0\right)$ and $u\left(y^i - FC, l^i\right), \forall i > 0$, respectively. The precise specification is

$$FI = \gamma_0 + \gamma_1 \ln(A) \tag{7}$$

$$FC = \delta_0 + \delta_1(Preschool > 0). \tag{8}$$

Equation (7) assumes that the fixed income is related to age and equation (8) states that the fixed costs of working are associated with the presence of preschoolers. The two specifications could be made to depend on a richer set of covariates. To save on the degrees of freedom, the most parsimonious specification that nevertheless fitted the data well was, however, selected.

We make one last modification to the standard model to account for the bunching of weekly hours of work around 40. We thus write:

$$U^i(l^i, y^i) = u^i(l^i, y^i) + \theta(h = 40), \tag{9}$$

where $(h = 40)$ is a dummy indicator equal to one if the individual works exactly 40 hours per week. The parameter λ proxies a fixed effect that increases the utility associated with working forty hours per week.

Finally, note that equation (6) is written conditionally on a given realization of the random component υ. The unconditional probability is obtained by integrating it out:

$$\Pr\left[u^i \geq u^j \,\forall\, j\right] = \int \frac{\exp\left(u^i\left(l^i, y^i\right)|\upsilon\right)}{\sum_{j=1}^{p} \exp\left(u^j\left(l^j, y^j\right)|\upsilon\right)} \phi\left(\upsilon; 0, \sigma^2\right) d\upsilon, \tag{10}$$

where ϕ is the density of υ. Because υ is assumed to follow a normal distribution, equation (10) does not have a closed-form solution. We thus simulate the integration by drawing $R = 100$ draws of υ_q, $q = 1, ..., R$, from the normal distribution for each observations and compute the expected probability (10) as:

$$\widehat{\Pr}\left[u^i \geq u^j \,\forall\, j\right] = \frac{1}{R} \sum_{q=1}^{R} \frac{\exp\left(u^i\left(l^i, y^i\right)|\upsilon_q\right)}{\sum_{j=1}^{p} \exp\left(u^j\left(l^j, y^j\right)|\upsilon_q\right)}. \tag{11}$$

The maximization of the simulated likelihood function yields consistent and efficient parameter estimates if $\sqrt{N}/R \to 0$ when $R \to +\infty$ and $N \to +\infty$ (N being the number of observations; see Gouriéroux and Monfort 1991; 1996).[8]

4 Estimation and Simulation Results

The model in equation (10) is estimated for single males, single females and single mothers separately by the method of simulated maximum likelihood. All three models converged very rapidly. We first look at how the parameter estimates fare relative to the economic theory of utility maximization under budget constraints. Conditional on the parameters satisfying basic theoretical requirements, we next focus on simulating the CCLP proposals.

[7] Both approaches were in fact used for all groups. The specifications chosen offered the best fit.

[8] The literature suggests that $R = 20$ appears quite adequate (see Laroque and Salanié 1993, Kamionka 1998).

4.1 Estimation Results

The parameter estimates of the labor supply models are presented in Table 3. The parameters for the three samples are compatible with the quasi-concavity of the preferences either globally or locally[9]: 100 % of single males and females, and 94.37 % of single mothers. Furthermore, net income is found to be a normal good for 100% of single females, 98.19% of single mothers, and 96.47% of single males.[10] It thus appears that, for the majority of the individuals in our sample, hours of work can legitimately be represented as the outcome of the maximization of preferences under a budget constraint.

The parameter estimates of the fixed income term also tell an interesting story. Indeed, the parameter associated with $\log(Age)$ is positive for both single males and females and is highly statistically significant. Older singles thus behave as though they have a more marked preference for leisure. Likewise, the parameter associated with $(h = 40)$ is also positive and highly statistically significant. In our framework this is equivalent to depicting a strong preference for working the standard workweek.

The parameters of the fixed costs term are also intuitively consistent. Recall that the fixed cost is subtracted from net earnings conditional on working. The parameter estimates show that the fixed cost to work increases when preschoolers are present in the household. They thus make working a less attractive alternative. Single mothers, like single males and females, also behave as though they have a strong preference for the standard workweek (θ).

As a final check on the overall fit of the model, we report observed and predicted distributions of hours of work for the three samples separately in Table 4. For each individual we compute the budget constraint based upon his/her characteristics.[11] Next, we compute the utility associated with each discrete point of his/her budget constraint.[12] The discrete point that yields the highest utility level is then selected. The table shows that the model does a good job at predicting observed outcomes. Indeed, the differences between observed and predicted choices are small for each sample. In particular, the fit at zero [0,4[and at [36,44[([35,45[) is almost perfect. Since the parameter estimates of the three samples are consistent with *a priori* expectations and since nearly all individuals behave consistently with basic economic theory, we proceed to simulate with some confidence the expected impact of the CCLP proposals.

4.2 Simulation Results

The simulation of the CCLP proposals follows the same strategy as that outlined in the previous section. The individual budget constraints are computed in accordance with the proposals and based upon individual characteristics using CTaCS. Net income is computed for each discrete point of the budget constraint. Next, the utility level of each point is computed and the one that yields the highest utility level is selected (taking into account the distribution of the different random terms). The results of this process are reported in Tables 5–7. The three tables are arranged similarly. Row-wise they report the distribution of hours as observed in 2004 (*status quo*). Column-wise they report the distribution that would result following the implementation of the CCLP proposals. The matrices thus decompose the total changes in the hours distribution into its different components. The numbers that appear above the diagonal correspond to an increase in weekly hours of work

[9] Our specification is such that the preferences are quasi-concave whenever $u_{ll}u_y^2 + u_{yy}u_l^2 < 0$.

[10] Net income is normal if $u_{ll}u_y < 0$.

[11] Age, hourly wage rate, net assets, *etc.*

[12] The number of discrete points differ between samples to reflect the empirical distribution of weekly hours of work and to ensure there are enough sample points at each.

following the implementation of the CCLP proposals, whereas the converse holds for numbers appearing below the diagonal.

Table 5 focuses on single men. Comparing the diagonal elements with the rightmost column reveals a single major change in the hours distribution: The share of workers reporting between 36 and 44 hours per week would decrease from 56.25% (rightmost column) to 39.93% (diagonal) were the CCLP recommendations implemented.[13] This decrease in full-time work would translate into a larger share of non-participation (+12,45%) and an increase in the [4,12[bracket (+3.52%). No numbers are reported above the diagonal of the matrix. Not surprisingly, the CCLP recommendations offer little incentive to increase weekly hours of work.

Table 6 reports the simulation results for single women. The results are very similar to those of single men except for the fact that the changes in the hours of work distribution is more evenly spread out. The increases in the [0,4[and [4,12[brackets (+15.93% and +3.91%, respectively) are associated to decreases in the [28,36[and [36,44[brackets (-4.78% and -10.85%, respectively). Just as in the previous table, no numbers are reported above the diagonal, and thus the CCLP recommendations are predicted not to have a positive impact on the labor supply of single females.

Finally, the simulations results for single mothers are reported in Table 7. Recall from our previous discussion that only those single mothers who have positive assets are expected to react to the CCLP proposals.[14] According to Figure 1(c), single mothers who are not working have a stronger incentive to remain off the labor market under CCLP. Likewise, those who are active have an incentive to decrease their labor supply.

The simulation results in Table 7 are consistent with this conjecture. The changes in the hours distribution are small and none is statistically significant, save for the [35,45[bracket. For the [35,45[bracket, the share of full-time work is predicted to decrease by 3.21 percentage points, much less than what is predicted for single males and females. This is because ??? a toi Guy ??? few single mothers (COMBIEN NICHOLAS-JAMES : 80810 (324 obs ou 80%) mere monoparentales ont des actifs nets positifs, mais seulement 45346 (209 obs ou 45%) se voient reduirent leur prestations d'aide sociale Il est a noter que les revenus d'aide sociale ne sont qu'un partie des transfert qui sont verse aux femmes et que la valeur du d'aide sociale represente en moyenne 60% du revenu net de celle-ci. 37679 (154 obs ou 37%) des femmes monoparentales recoivent une subvention du cclp superieure a 100$ par annee. Les femmes recevant des subventions ne sont pas exclusivement des femmes avec des actifs positifs mais elles restent la majorite des cas.)??? have positive net assets, and among those who do, their value is small enough so that it does not decrease substantially their welfare benefits.

The previous tables described the overall expected impact of the proposed recommendations on the distribution of hours of work. The response to the proposals is likely to vary with net earnings. Table 8 reports the impact of the recommendations on the expected weekly hours of work with respect to percentiles of net earnings. It also distinguishes between the intensive margin, *i.e.* the impact on hours of work conditionally on working, and the extensive margin, *i.e.* the impact on participation *per se*. The table reveals a number of interesting results. To start with, most of the behavioral adjustments occur at the extensive margin, as shown in the first column. This was already found in Tables 5–7. These results are entirely consistent with the recent literature on income taxes and labor supply (see, *e.g.*, Blundell 2000, Eissa and Hoynes 2006, Meyer 2002). Thus, conditional on working, individuals decrease their weekly hours of work little. Many choose, however, to stop working altogether. This response varies greatly with net earnings. From Table 8, individuals in the bottom 10 or 25 percentiles react most in percentage terms, while those in the upper percentiles

[13] Most estimates are statistically significant. To avoid cluttering the table, we only indicate those that are not statistically significant at the 10% threshold.

[14] Again, this is because those without assets would be made worse off by the proposals.

react little, especially at the intensive margin. All adjustments at both the intensive and extensive margins are statistically different from zero in the upper percentiles.

All in all, our simulation results show that single males and females would react strongly to the CCLP proposals. Furthermore, our simulations also show that those that would respond most are those that have the lowest current earnings. The sharp decreases in participation rates and ensuing decreases in income taxes, coupled with sizable outlays, may make the CCLP proposals costly. We now turn to this issue.

4.3 The Cost of the CCLP Proposals

In addition to the CCLP benefits *per se*, the CCLP costs to the federal and provincial governments must take into account changes in income taxes, transfers, social assistance benefits, Quebec Pension Plan and Employment Insurance premiums, *etc*. These changes are computed under two different scenarios. In the first, the *conservative scenario*, we assume that the labor supply response following the implementation of the CCLP proposals is zero. In the second, the *behavioral scenario*, we allow for such a response. In both cases, we start by computing the taxes and transfers of each individual in our sample based on their observed labor supply. We next modify the budget constraints according to the CCLP recommendations and compute the taxes and transfers again. The differences are then multiplied by the individual sample weights to obtain an aggregate estimate of the cost of the scenarios.

Table 9 reports the costs associated with both scenarios. The upper-half panel concerns the "conservative" scenario. Recall that we assume that the CCLP benefits would not be taxable at the federal level and at the provincial level, and that no Employment Insurance or Quebec Pension Plan premia would be levied against those benefits.[15] In the case in which federal taxes would be levied against the CCLP benefits, the latter would have to be increased so that the net income accruing to the individual would meet the CCLP income objectives. Those additional CCLP expenses would represent an additional cost for the provincial government and additional revenues for the federal government. From an overall fiscal point of view, the overall cost of the CCLP recommendations would, however, not be altered were the benefits to be taxed at the federal level.

The upper panel of Table 9 represents the additional cost the provincial government would have to bear in order to meet the CCLP recommendations. The amounts are in addition to the standard welfare benefits. Many more individuals would receive CCLP benefits than there are welfare recipients. Consequently, the additional amounts are fairly sizable. The *per capita* cost of the recommendations would vary between $500 and $600 per year, and are slightly larger for single women.

The lower panel of the table reports the results of the behavioral scenario. Federal and provincial income taxes decrease because many individual decrease their labor supply in response to the CCLP benefits. Social assistance payments increase for the same reason: Those who reduce their hours of work substantially or completely often become entitled to welfare benefits. The CCLP payments thus correspond to the additional outlays the government must bear to meet the requirements of the CCLP recommendations. They are larger than in the "conservative" scenario because many individuals are expected to decrease their labor supply sufficiently to qualify for the benefits. The overall cost of the recommendations is predicted to be important: approximately $2,870 per individual, which is more than four times the *per capita* cost of the non-behavioral scenario. The total CCLP costs would then be of the order of $2.2 billion, 85% of which would be borne by the provincial

[15] Because of this, the CCLP benefits correspond to the amount over and above standard welfare benefits that are needed to meet the Market Basket Measure objectives.

government. The remaining $331 million would be borne by the federal government, $286 million of which through a fall in personal income tax revenue.

5 Conclusion

Guaranteed minimum income schemes are often proposed as a means to help escaping from poverty. These schemes can, however, generate important work disincentives. The paper focuses on one particular scheme that was recently proposed by Quebec's Comité consultatif de lutte contre la pauvreté et l'exclusion sociale. Under the proposed GMI, every inactive individual would be guaranteed an income equivalent to 80% of the Market Basket Measure. Workers with earnings at least equivalent to 16 weekly hours paid at the minimum wage would be entitled to 100% of the Market Basket Measure.

To assess the potential impact of the proposed GMI, we first estimate a structural labor supply model using the existing tax code and a representative sample of the population of Quebec. We next simulate the impact of the GMI proposals by modifying the budget sets accordingly and by predicting the labor supply of our representative sample of individuals based upon the parameter estimates of the labor supply model. Our results show that the proposed GMI would have strong negative impacts on labor market participation rates, and mostly so among low wage workers. In a world without labor market adjustments, the scheme is estimated to cost approximately $ 460 million. When labor supply effects are accounted for, the cost increases to well above $ 2 billion, due to GMI's effects on transfers and forgone taxes at the provincial and federal levels.

References

Araar, A., Duclos, J.-Y. and Blais, F. c. (2005). Effets redistributifs d'un régime d'allocation universelle : une simulation pour le québec, *Actualité économique* **81**(3): 422–484.

Beaulieu, N., Duclos, J.-Y., Fortin, B. and Rouleau, M. (2005). Intergenerational reliance on social assistance: Evidence from Canada, *Journal of Population Economics* **18**(3): 539–562.

Blundell, R. (2000). Work Incentives and "In-Work" Benefit Reforms : A Review, *Oxford Review of Economic Policy* **16**(1): 27–44.

Cogan, J. (1981). Fixed cost and labour supply, *Econometrica* **49**: 945–964.

Comité consultatif de lutte contre la pauvreté et l'exclusion sociale (2009). Individual and family income improvement targets, on optimal means for achieving them, and on baseline financial support, *Technical report*, Governement of Quebec.

Eissa, N. and Hoynes, H. (2006). Behavioral responses to taxes: Lessons from the EITC and labor supply, *Tax Policy and the Economy* **20**: 74–110.

Gong, X. and van Soest, A. (2002). Family structure and female labour supply in Mexico City, *Journal of Human Resources* **37**: 163–191.

Gouriéroux, C. and Monfort, A. (1996). *Simulation-Based Econometric Methods*, Core Lectures, Oxford University Press.

Gourriéroux, C. and Monfort, A. (1991). Simulation based econometrics in models with heterogeneity, *Annales d'économie et de statistique* **20**(1): 69–107.

Gouvernement du Québec (2002). The will to act, the strength to succeed, National Strategy to Combat Poverty and Social Exclusion.

Gouvernement du Québec (2004). Règlement sur le soutien du revenu, R.Q. c. s-32.001, r.1. **URL:** *http://www.canlii.org/fr/qc/legis/regl/rq-c-s-32.001-r1/26902/*

Kamionka, T. (1998). Simulated maximum likelihood estimation in transition models, *Econometrics Journal* **1**: C129–C153.

Keane, M. and Moffitt, R. (1998). A structural model of multiple welfare program participation and labor supply, *International Economic Review* **39**(3): 553–589.

Kesselman, J. (2000). Flat taxes, dual taxes, smart taxes: Making the best choices, *IRPP Policy Matters 1 (7)*, IRPP, Montreal.

Laroque, G. and Salanié, B. (1993). Simulation-based estimation of models with lagged latent variables, *Journal of Applied Econometrics* **8**: S119–S133.

Meyer, B. D. (2002). Labor supply at the extensive and intensive margins: The EITC, welfare, and hours worked, *The American Economic Review* **92**(2): pp. 373–379.

Milligan, K. (2008). Canadian tax and credit simulator. database, software and documentation, *Technical report*, University of British Columbia.

Saunders, R. (2005). Lifting the boats: Policies to make work pay, *Vulnerable Workers Series 5*, Canadian Policy Research Networks, Ottawa.

Soest, A. V. and Das, M. (2001). Family labor supply and proposed tax reforms in the netherlands, *De Economist* **149**: 191–218.

Task Force on Modernizing Income Security for Working-Age Adults (2006). Time for a fair deal, *Technical report*, St. Christopher House and Toronto City Summit Alliance, Toronto.

6 Parameter Estimates

Table 3: Parameter Estimates of the Labor Supply Models

Variable	Est	StdErr	Est	StdErr	Est	StdErr
	Single Men		Single Women		Single Mothers	
ln(Leisure)	102.25	24.02	203.47	41.27	228.51	97.18
$\ln(\text{Leisure})^2$	1.32	0.8	-2.47	1.56	-3.93	1.40
$\ln(\text{Leisure}) \times \ln(\text{Age})$	-59.29	12.92	-100.66	20.07	-112.39	51.12
$\ln(\text{Leisure}) \times \ln(\text{Age})^2$	8.09	1.8	14.04	2.75	16.06	6.98
ln(Leisure)×NB018					0.44	0.41
ln(Leisure)×(Preschool >0)					0.47	0.91
ln(Net income)	4.22	0.39	4.27	1.03	-1.27	0.93
$\ln(\text{Net income})^2$	0.018	0.02	0.058	0.03	0.89	0.28
40h/week (θ)	2.02	0.13	1.9	0.18	1.34	0.26
Fixed Income (FI)						
Constant (γ_0)	-36.85	6.51	-32.84	11.4		
log(Age) (γ_1)	12.20	1.99	11.4	3.67		
Fixed Costs (FC)						
Constant (δ_0)					5.57	0.30
Preschool > 0 (δ_1)					6.78	2.84

Table 4: Observed and Predicted Distributions of Weekly Hours of Work (%)

Single Men				Single Women				Single Mothers			
Hours	Obs	Pred	Diff	Hours	Obs	Pred	Diff	Hours	Obs	Pred	Diff
[0, 4[	11.64	11.45	-0.19	[0, 4[	25.54	23.88	-2.0	[0, 5[	16.27	14.84	-1.43
[4, 12[	2.1	2.45	0.35	[4, 12[	1.6	4.27	1.98	[5, 15[	5.85	6.38	0.53
[12, 20[	3.97	4.29	0.32	[12, 20[	4.68	4.98	0.61	[15, 25[	6.67	10.66	3.98
[20, 28[	6.07	7.08	1.01	[20, 28[	6.67	5.56	1.87	[25, 35[	18.47	14.93	-3.55
[28, 36[	11.03	8.16	-2.88	[28, 36[	12.48	12.5	-3.07	[35, 45[	48.46	48.44	0.0
[36, 44[	56.25	56.24	0.0	[36, 44[	46.48	46.48	0.0	[45, 55[	4.29	4.75	0.46
[44, 52[	3.65	5.95	2.3	[44, 52[	2.54	2.68	0.61				
[52, 60[	5.28	4.36	-0.92								

7 Simulation Results

Table 5: Transition Matrix of Weekly Hours of Work, Single Men, With and Without GMI (%)

Without GMI	With GMI								Total
	[0, 4[	[4, 12[	[12, 20[	[20, 28[	[28, 36[	[36, 44[	[44, 52[	[52, 60[	
[0, 4[	11.64	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.64
[4, 12[	0.04	2.07	0.0	0.0	0.0	0.0	0.0	0.0	2.11
[12, 20[	0.32	0.04	3.61	0.0	0.0	0.0	0.0	0.0	3.97
[20, 28[	1.02	0.14	0.05	4.86	0.0	0.0	0.0	0.0	6.07
[28, 36[	1.36	0.47	0.01	0.0	8.29	0.0	0.0	0.0	10.13
[36, 44[	12.45	3.52	0.35	0.0	0.0	39.93	0.0	0.0	56.25
[44, 52[	1.06	0.1	0.03	0.0	0.0	0.0	2.46	0.0	3.65
[52, 60[	1.16	0.02	0.0	0.0	0.0	0.0	0.0	4.1	5.28
Total	29.05	6.36	4.05	4.86	8.29	39.93	2.46	4.1	100.00
Change	17.41	4.25	0.08†	-1.21	-1.84	-16.32	-1.19†	-1.18†	

† The change is not statistically different from 0 at a 10% level.

Table 6: Transition Matrix of Weekly Hours of Work, Single Women, With and Without GMI (%)

Without GMI	With GMI							Total
	[0, 4[	[4, 12[	[12, 20[	[20, 28[	[28, 36[	[36, 44[	[44, 52[	
[0, 4[	25.52	0.0	0.02	0.0	0.0	0.0	0.0	25.54
[4, 12[	0.0	1.6	0.0	0.0	0.0	0.0	0.0	1.60
[12, 20[	1.11	0.0	3.57	0.0	0.0	0.0	0.0	4.68
[20, 28[	1.16	0.2	0.0	5.3	0.0	0.0	0.0	6.67
[28, 36[	4.3	0.48	0.0	0.0	7.7	0.0	0.0	12.48
[36, 44[	9.02	1.47	0.36	0.0	0.0	35.63	0.0	46.48
[44, 52[	0.36	0.15	0.0	0.0	0.0	0.0	2.03	2.54
Total	41.48	3.91	3.95	5.3	7.7	35.63	2.03	100.00
Change	15.93	2.31	-0.73 †	-1.37	-4.78	-10.85	-0.51	

† The change is not statistically different from 0 at a 10% level.

Table 7: Transition Matrix of Weekly Hours of Work, Single Mothers, With and Without GMI (%)

Without GMI	With GMI						Total
	[0, 5[	[5, 15[	[15, 25[	[25, 35[	[35, 45[	[45, 55[	
[0, 5[	16.25	0.02	0.06	0.0	0.0	0.0	16.32
[5, 15[	0.0	4.69	0.0	0.0	0.0	0.0	4.69
[15, 25[	0.13	0.03	5.87	0.0	0.0	0.0	6.03
[25, 35[	0.47	0.2	0.24	21.18	0.0	0.0	22.10
[35, 45[	1.48	0.83	0.78	0.11	43.09	0.0	46.30
[45, 55[	0.08	0.05	0.0	0.0	0.0	4.40	4.54
Total	18.42	5.83	6.95	21.29	43.09	4.40	100.0
Change	2.10†	1.13†	0.92†	-0.81†	-3.21	-0.14†	

† The change is not statistically different from 0 at a 10% level.

Table 8: Simulated Impact of the GMI Recommendations on Hours of Work, by Ranges of Net Earnings Percentiles

	Total	0–10	0–25	75-100	90–100
% *Change, Intensive Margin*					
Single males	-4.97 %***	-20.32 %***	-14.83 %***	-0.43 %***	-0.25 %***
Single females	-5.07 %***	-19.71 %***	-15.97 %***	-1.04 %***	-0.36 %***
Single mothers	-2.90 %***	-1.43 %**	-2.47 %**	-2.55 %***	-0.63 %***
% *Change, Extensive Margin*					
Single males	-21.01 %**	-40.13 %***	-34.17 %***	-7.76 %***	-6.75 %***
Single females	-16.70 %**	-24.48 %***	-24.58 %***	-9.90 %***	-6.35 %***
Single mothers	-3.08 %***	0.20 %	-2.72 %***	-2.89 %**	-2.12 %***
% *Change, Total*					
Single males	-21.67 %***	-44.81 %**	-39.41 %**	-8.19 %**	-7.00 %**
Single females	-20.85 %***	-41.92 %**	-39.74 %**	-10.94 %**	-6.70 %**
Single mothers	-5.98 %***	-1.23 %**	-5.19 %***	-5.44 %***	-2.74 %***

** Statistically significant at 5%. *** Statistically significant at 1%.

Table 9: Estimated Cost of the GMI Proposals, With and Without Labor Supply Adjustments (2004 $)

Item	Δ Single men	Δ Single Women	Δ Single Mothers	Δ Total	Δ *per capita*
	No Behavioral Adjustments				
Federal Income Taxes	0	0	0	0	0
Provincial Income Taxes	0	0	0	0	0
Federal Transfers	0	0	0	0	0
Provincial Transfers	0	0	0	0	0
Social Assistance	0	0	0	0	0
QPP	0	0	0	0	0
Employment Insurance	0	0	0	0	0
GMI	229 769 213	178 107 869	51 826 031	459 703 113	611,23
Cost: Province	229 769 213	178 107 869	51 826 031	459 703 113	611
Total cost *per capita*	595	671	515		
	With Behavioral Adjustments				
Federal Income Taxes	-172,600,000***	-87,020,000***	-13,166,392***	-286,128,417***	-363***
Provincial Income Taxes	-189,100,000***	-90,189,088***	-14,474,850***	-310,349,101***	-391***
Federal Transfers	-891,494***	-2,712,421***	798,114***	-3,109,578***	-4***
Provincial Transfers	6,699,829***	1,917,821***	1,021,065***	9,222,275***	13***
Social Assistance	207,600,000***	111,700,000***	20,856,882***	333,267,216***	452***
QPP	-85,811,920***	-45,610,428***	-6,189,933***	-141,541,762***	-183***
Employment Insurance	-38,083,052***	-20,571,730***	-2,670,436***	-62,984,674***	-82***
GMI	590,900,000***	393,100,000***	62,006,816***	1,029,897,828***	1,391***
Cost: Province	1,080,051,517***	642,517,337***	104,549,546***	1,824,278,182***	2,429***
per capita	2,798***	2,420***	1,039***		
Cost: Provincial + Federal	1,289,829,107***	747,396,550***	121,184,487***	2,170,281,695***	2,870***
per capita	3,342***	2,815***	1,204***		
Number of individuals	385,962	265,469	100,669	752,100	

*** Statistically significant at 1 %.