

An Econometric Analysis of Intergenerational Reliance on Social Assistance^{*}

Jean-Yves Duclos[†]

Bernard Fortin[‡]

Manon Rouleau[§]

May 2000

Abstract

This paper examines the intergenerational transmission of participation in Québec's social assistance program. The analysis takes into account two sources of intergenerational transmission. The first one is due to a correlation across generations of individual characteristics which influence participation. The second one is due to a causal link between parents' and children's participation. We also attempt to identify the periods during which parental receipt of social assistance has the strongest influence on the child's propensity to replicate this behaviour during adulthood. Our data is from the administrative records of Québec's *Ministère de la Solidarité Sociale* and covers 17 204 young people who were 18 years old in 1990 and whose parents were recipients of social assistance during at least one month between 1983 and 1995. Our results reveal that a ten-percentage point increase in the parental participation rate during the youth's pre-adult years (age 7–17) raises the youth's participation rate by about two percentage points during early adulthood (age 18–21). We cannot, however, statistically reject the hypothesis that the impact of parental participation on the child's future participation rate is independent of the childhood period at which it is experienced.

^{*} We thank the *Conseil Québécois de la Recherche Sociale (CQRS)* and the *Ministère de la Solidarité Sociale* for their financial support. We are also grateful to the *Ministère de la Solidarité Sociale* for access to and advice on the data used in this paper. We especially benefited from the expertise of Pierre Lanctôt and Alain Boisvert from the Ministry. We also wish to thank Hélène Roberge and France Labrecque for their invaluable contribution to the collection and treatment of the data and Nicolas Beaulieu for his research assistance. Finally, we thank Andrew Clark and Marc Van Audenrode for helpful comments.

[†] Département d'économie, Université Laval and CRÉFA. E-mail address: jduc@ecn.ulaval.ca

[‡] Département d'économie, Université Laval, CRÉFA and CIRANO. E-mail address: bernard.fortin@ecn.ulaval.ca

[§] Human Resources Development Canada (HRDC). This paper is written in a personal capacity and does not necessarily represent the view of HRDC. E-mail address: manon.rouleau@spg.org

1 Introduction

In Québec, as in other Canadian provinces, social assistance benefits are paid to those whose income is deemed insufficient, whether permanently or temporarily. The social assistance program thus has the effect of reducing the incidence of poverty and of improving the financial situation of families with limited resources. The program has nonetheless been criticized as generating undesirable effects on recipients and on their environment¹. One such effect that is frequently mentioned is the transmission of past program participation by parents into an increased probability of future participation by their children. This effect has, however, rarely been investigated or documented in Canada. This paper is intended to shed light on this issue by estimating the magnitude and the nature of intergenerational reliance on social assistance in the province of Québec.

An observed correlation between the participation profiles of parents and their children may originate from two distinct sources: there may be a causal link between parents' participation and that of their children, and there may be intergenerational correlation between individual-specific traits that affect the propensity to participate. As we discuss below, the presence of a causal link is very closely related to the principle of learning by imitation and to the acquisition of information on how to use the program. Through this link, participation in the social assistance system by a parent, at a time when the youth has not yet reached adulthood, can increase the probability that the latter will participate in the future. It is also recognized that certain observed and non-observed characteristics tend to be correlated across parents and their children (*e.g.*, the level of education, the motivation to work, the neighbourhood of residence), and that these characteristics can affect the degree of reliance on social assistance. For instance, both the parents and the children may perceive work, not as an opportunity for self-actualization, but rather as an alienating experience, for social or family-specific reasons. In this case, the exclusion of young adults from the labour market, and consequently their reliance on social assistance, springs from values and perceptions commonly shared by the parents and the children, and is not directly caused by the parents' participation in the social assistance program [see, for instance, An *et al.* (1993) and Duncan *et al.* (1988) for American evidence on this].

For public policy reasons, it is important to identify correctly not only the magnitude, but also the transmission mechanism of intergenerational reliance on social assistance. In the specific case in which the child replicates the social assistance behaviour exhibited by the parent, there will be a causal link between parents' and children's participation in social assistance. In such a case, policies which impact on parents' participation will also affect that of their chil-

1. For a review of the issues and of the American evidence, see Moffitt (1992).

dren. This implies that any cost-benefit analysis of these programs should account not only for their impact on the current generation, but also for their impact on future generations. Thus, in the presence of a causal link, implementing more stringent admissibility criteria for the parents may result in a reduced participation rate among their children. However, even when social assistance participation is correlated across generations, the impact of tightening parental eligibility criteria on youth participation will be mitigated to the extent that the correlation of parents' and children's behaviour is purely an outcome of the sharing of values and attitudes generated by their common general living environment. A more effective policy to decrease reliance on social assistance would in this case target the social assistance determinants shared by the parents and their children.

The rest of the paper runs as follows. In Section 2 we present the principal socio-economic factors that distinguish between causality and heterogeneity. We also illustrate intuitively a way of capturing this distinction statistically. In Section 3 we present the econometric model. The sample is described in Section 4. The results of the econometric estimation are presented in Section 5. We conclude our analysis by proposing some avenues for further research.

2 Causality versus shared determinants

As discussed in the introduction, the intergenerational transmission of reliance on social assistance can take two distinct forms, depending on the nature of the correlation mechanism. Observed correlations between participation rates may result from a causal link between the behaviour of parents and children, or may be attributable to the correlation across generations of determinants of social assistance.

The notion of a causal link refers to a natural replication of the parental social assistance behaviour by the children. The mere fact that the parents are on social assistance during some period of the youth's pre-adult life may provide an incentive for him to participate in the program. Several factors can generate this causal link:

- Replication of parental model:

The youth may manifest an increased motivation to become a social assistance recipient simply because his parents were recipients during his pre-adult life, namely, simply to replicate the family model projected by his parents [An *et al.* (1993), Corcoran *et al.* (1992), Pepper (1995), Gottschalk (1996)]. Parental participation in the program can also change family values, by discouraging the formation of self-sufficiency habits [Duncan, Hill and Hoffman (1988)]. In Québec, for some youths, parental replication makes participation in the social

assistance system viewed as a "natural" and necessary step before integrating the labour force [Lanctôt and Lemieux (1995)].

- Lower cost of participating in the social assistance program :

Parents already well informed of the procedures of obtaining social assistance can show their child how to use the system efficiently. Unlike a child with parents that are active in the labour market and know nothing of the program's characteristics, a child of recipient parents can more readily obtain information, and will have a lesser need to inform others of his wish to apply for benefits, thus plausibly decreasing the social stigma associated to claiming social assistance [Antel (1992), Gottschalk (1996)].

- Higher job search costs:

Owing to their status as social assistance recipients, recipients are less equipped to offer their children opportunities to develop job-search skills. Furthermore, since they have fewer interactions with the labour market, they also have less scope to provide their children with contacts to people with information and influence on that market [Duncan *et al.* (1988), Antel (1992)].

- Pressure from claiming parents:

When challenged to discuss candidly their reasons for participating in social assistance, some young Québec claimants said that they were pressured by their parents [Lanctôt and Lemieux (1995)]. Youths above 18 years were especially prone to be asked by their parents to claim social assistance if they dropped out of school. In the Québec system, the loss of student status entails a reduction in the benefits paid to the parents when the youth reaches 18 years; by collecting social assistance for himself the youth can partially compensate for these foregone benefits.

- Diminished family stigma owing to parents' participation:

Having parents who receive or have received social assistance benefits makes social assistance receipt more acceptable within the family and decreases the feeling of social "marginality". It can therefore reduce the child's reluctance to participate in the program [Antel (1992), Duncan *et al.* (1988), Levine and Zimmerman (1996), and Gottschalk (1996)].

The second explanation for an observed correlation between parents' and children's participation relates to the correlation of observed and unobserved social assistance determinants across parents and children. Several such determinants have been identified:

- Shared attitudes towards the socio-economic environment:

The correlation across parents and children of attitudes towards their socio-economic environment plays a likely role in explaining the correlation in their socio-economic decisions. One may think of genetically determined skills, a more or less competitive attitude, short-

sightedness, motivation to work, resourcefulness, etc. For instance, if work is perceived as an alienating experience, voluntary non-participation in the labour market (and thus reliance on social assistance) can be viewed as a rational decision, both by parents and by children [Duncan *et al.* (1988) and Solon *et al.* (1988); see also Conseil permanent de la jeunesse (1993) for Québec evidence].

- Fatalistic perception of poverty:

In underprivileged socio-economic segments of the population, families may attribute their poverty to fate rather than to a lack of motivation, while among more privileged groups the environment is assumed by families to be transformable by effort [Moreau (1995)].

- Correlation of individual characteristics across generations:

Some personality and environmental characteristics, possibly difficult to observe directly, are plausibly transmitted from parents to children, and these may impact upon their common propensity to receive social assistance [see in particular Duncan *et al.* (1988) and Levine and Zimmerman (1996)].

To illustrate the separate effect of these types of transmission mechanisms, consider an hypothetical example in which the observed and unobserved characteristics of parents (and thus the determinants of parental reliance on social assistance) are the same before and after their children have reached adulthood. For simplicity, further suppose that the observed pre- and post-adult periods for the children are of identical length, and that the social assistance participation rate of children once they have become adults is deterministically set by their characteristics (which are correlated with those of their parents) and by the pre-adult participation rate of their parents. Table 1 in the Appendix shows the participation rates of four such hypothetical pairs of parents and children. These participation rates are defined as the proportion of time spent on average on social assistance by the parent or by the adult child.

Comparing these four pairs enables us to show the causal effect of parental participation on the participation of children as well as the effect of the correlation of social assistance determinants across generations. Indeed, the data of Table 1 was built in such a way that the child's adult participation rate is the sum of half the parent's overall average participation rate (the effect of the intergenerational correlation of social assistance determinants) and of half the parent's participation rate prior to the child's adulthood (the causal effect). Comparing pair 1 with pair 2, we note that the participation of parents is on average the same for the whole observed period of time (40% + 60% versus 60% + 40%). Thus, the effect of parents' characteristics on their own social assistance participation is roughly the same. If intergenerational welfare transmission only took place through the transmission of the parents' characteristics, we would expect the participation of the children 1 and 2 to be the same. This is not the case, however, since the child whose parent had lower pre-adult participation (pair 1) also

has lower welfare participation. This would indicate the presence of a causal effect in the intergenerational transmission of social assistance dependence, since, for equal overall parental propensity to rely in welfare, greater participation prior to adulthood leads to greater child participation once he has become adult. Comparing pairs 3 and 4 leads to the same observation: average parental participation is the same in both cases, but when greater parental participation is observed before the child's adulthood, this is causally transmitted into greater child social assistance participation once child adulthood is reached. Statistically, this introduces a greater correlation between children's social assistance participation and pre-adult parental participation than between children's social assistance participation and post-adult parental participation. We shall find this in the description of our own data below.

Table 1 also shows the effect of the intergenerational correlation of characteristics associated with greater social assistance participation. Parents 1 and 3 and parents 2 and 4 have identical participation rates prior to the adulthood of their children. Hence, if intergenerational social assistance transmission only took place through the causal transmission of the parents' participation prior to their child's adulthood, we would expect the participation of children 1 and 3 and of children 2 and 4 to be the same. This, however, is not the case since children whose parents experience overall lower social assistance reliance also experience lower social assistance participation. Intergenerational correlation of reliance on social assistance in Table 1 would thus be explained both by causal transmission of parents' behaviour prior to their children's adulthood, and by the intergenerational transmission of determinants of social assistance participation.

3 The econometric model

As mentioned above, little statistical evidence on the intergenerational correlation of reliance on social assistance can be found in Canada². The American evidence, whose analysis has grown in sophistication in the last two decades following the increased availability of panel data, has stressed among other things the need to model jointly the distribution of parents' and children's spells on social assistance³. It moreover suggests that we should allow the impact of the parental participation in social assistance to depend on the pre-adult age of the child during which it is observed. This is also the modelling approach we follow here.

2. Some Canadian evidence on the intergenerational correlation of earnings and income [see Corak and Heisz (1998) and (1999)] and of unemployment insurance benefit receipts [see Corak (1999)] does exist, however.

3. See in particular Antel (1992) and Gottschalk (1996), although the former finds no evidence of intergenerational correlation of unobserved welfare determinants in the American AFDC program.

Following Antel (1992) and Gottschalk (1996), our econometric approach provides simultaneous estimation of social assistance participation of the parents and their adult children. Let $y_{i,t}$ be a binary variable assuming the value one (1) if youth i received social assistance during month t , and zero (0) otherwise, and let $Y_{i,t}$ be a binary variable representing the corresponding information for i 's parent. We denote by $\{w_{i,t}\}$ a stochastic process defined by a series of time-indexed observations on $w_{i,t}$. The expression $\{y_{i,t}\}$ thus includes the set of the observed episodes on social assistance for child i (as an adult), and $\{Y_{i,t}\}$ the set of observations on the parent before and after the child reaches adulthood. We assume that the explanatory variables for the parent, $X_{i,t}$, and for the child, $x_{i,t}$, are weakly exogenous and that they are generated by a process which is independent of the parameters of the joint distribution of $y_{i,t}$ and $Y_{i,t}$. Thus, we can focus on the estimation of the parameters of the conditional density function $f(\{y_{i,t}\}, \{Y_{i,t}\} | \{x_{i,t}\}, \{X_{i,t}\})$. Since the variables for the observed episodes are binary, we assume that they are generated by a latent process based on the variables $y_{i,t}^*$ and $Y_{i,t}^*$, which in turn are defined as:

$$\begin{aligned} Y_{i,t}^* &= X_{i,t}B + U_{i,t}, \\ y_{i,t}^* &= x_{i,t}\beta + \delta Y_{i,t}^- + u_{i,t}. \end{aligned}$$

Thus, we postulate that $Y_{i,t} = 1$ if $Y_{i,t}^* \geq 0$, and $Y_{i,t} = 0$ otherwise, and analogously for $y_{i,t}$. The vector $Y_{i,t}^-$ represents the parental participation rates during the periods immediately preceding t (or preceding adulthood, depending on the specification). The vector of coefficients δ allows us to identify the causality described in the previous sections. We assume that the error terms are normal i.i.d. across the pairs i of parents and children, and are defined such that $U_{i,t} = V_i + \epsilon_{i,t}$ and $u_{i,t} = \pi V_i + e_{i,t}$. The term V_i captures the unobservable (permanent) characteristics shared by the parents and the children. The terms $\epsilon_{i,t}$ and $e_{i,t}$ represent the components of the error terms which are distributed independently (and identically) over time. If σ_V^2 , σ_U^2 , and σ_u^2 represent the variance of V_i , $U_{i,t}$ and $u_{i,t}$ respectively, the correlation (ρ) of the error terms is given by:

$$\rho \equiv \text{corr}(U_{i,t}, u_{i,t}) = \frac{\pi \sigma_V^2}{\sigma_u \sigma_U}. \quad (1)$$

Failure to account for this correlation would result in a bias in the estimate of the parameter δ because of the correlation between $Y_{i,t}^-$ and V_i . Notice that the lagged values of the variables $Y_{i,t}^*$ and $y_{i,t}^*$ do not appear in the model. Consequently, we have assumed that there is no intertemporal dependence in individual spells on social assistance. Alternatively, the retained specification may be interpreted as a reduced form of the true process generating the values of $Y_{i,t}^*$ and $y_{i,t}^*$. A comprehensive analysis of the presence or absence of intertemporal dependence, given the possible existence of correlation between the error terms in the equations

for the parent's and the children's spells, would require a multi-spell transition model, which we intend to develop in a future study. As in earlier studies by Antel (1992) and Gottschalk (1996), we also assume that the causal link, if it exists, works from previous participation by the parents to subsequent participation by the children, and not vice versa—which seems a plausible hypothesis.

The specification of the distribution of the latent variables, $Y_{i,t}^*$ and $y_{i,t}^*$, naturally leads us to model the observed distribution of $\{Y_{i,t}^*\}$ and $\{y_{i,t}^*\}$ as bivariate probit. Since many observations are available (12 per year) for both the children and the parents, we estimate the bivariate probit model using a process of repeated observations [see, *e.g.*, Gouriéroux (1984)].

One can give an intuitive interpretation of the econometric approach we use. To capture the correlation between the unobserved characteristics of the parents and those of the child, the model implicitly evaluates the difference between the parents' observed and predicted participation rate. For example, if a parent consistently participates in social assistance at a mean rate (pre- and post-adult) that is lower than that predicted by his or her observable individual characteristics, there is reason to believe that the parent is influenced by specific unobserved factors which constitute a disincentive to resorting to social assistance. We can then use the statistical difference between the predicted and observed participation to verify whether some proportion π of this difference is observed in the case of the child. In the affirmative, the parameter ρ becomes statistically significant, and we conclude that there exists a correlation between the unobserved variables of parents and children. If, conversely, a greater participation of the parent is not correlated with, and has no statistical effect on, the behaviour of the child unless this participation occurs before the child reaches the age of majority, we conclude that there exists a causal link between the child's and the parents' participation. In this case the parameter δ will be statistically significant.

4 Data

4.1 Sample construction

The first step was to extract all the administrative records from the database of the *Ministère de la Solidarité Sociale* pertaining to children having reached the age of 18 years between 1982 and 1995 (whether or not they themselves were claimants at any time during these years) and whose parents were on social assistance for at least one month between 1979 and 1995. This database covers a total of 230,961 children. In certain cases, changes in the

composition of adults in the household occurred and we needed to identify the most representative parental authority for the child. In such cases, we retained the recipient parent having had custody of the child for the longest period (“claimant parent”).

The next step involved reconstructing the social assistance history of the parents for the entire period between 1979 and 1995 inclusively. Nearly 150,000 parents were identified. For the period from 1990 to 1995, the same data was gathered for those children who collected social assistance during adulthood. This database comprised a total of nearly 100,000 youths. The data from the samples was then pooled and standardized, *i.e.*, we created a consistent coding for the variables across years, given that various coding systems had been used between 1979 and 1995.

For the specific purposes of this study, we selected from among our original sample those recipients who were deemed able to work. We kept in our final sample only youths who were 18 years old in 1990 (and thus who were 7 in 1979 and 23 at the end of the observation period). This choice yielded three benefits. First, the period during which we were able to gather information on the youths (1990–1995) allowed us to draw up a relatively informative picture of their participation profile. Second, the data on the parents covered a sufficiently long period to allow us to capture their participation for the greater part of their children’s youth. Third, this procedure made us focus on a single one-year cohort of young adults, and therefore purged our analysis of the effect of cyclical socio-economic factors on the social assistance profile of young adults. Only parents born after 1930 were considered. This ensured that our database did not include parents whose age precluded them from receiving social assistance (age 65 or more). Finally, we also eliminated from our sample mothers who had given birth to a child before the age of 15.

The final sample comprised data on 17 204 youths (1990–1995) merged with data on their parents (1979–1995). From this total, 9,613 youths (55.9%) never made any claim between 1990 and 1995, while 7,591 (44.1%) received social assistance for at least one month. Note that since the data are administrative in nature, our analysis is conditional on parents having received social assistance for at least one month between 1979 and 1995. This precludes us from considering those parents who never received social assistance, but whose children did receive it in their youth. Furthermore, unlike Gottschalk (1992) for instance, we cannot deal separately with the effects of parents’ eligibility to and parents’ receipt of social assistance on the behaviour of their children. Also, we have little information on individual characteristics of youths of our sample who did not incur a social assistance spell between 1990 and 1995. Apart from these caveats, however, our data compare well in scope with the American data (typically PSID or NLS) data used to consider the intergenerational transmission of social assistance. Being administrative, their informative content is relatively reliable and less subject to the statistical biases (such as attrition and non-response biases) that can affect survey data.

The sample size is very large, the data are monthly (in the US, the data used have often been yearly), and they cover a social assistance historical period of 17 years for parents and 6 years for their children.

4.2 Descriptive statistics

At this point it is of some interest to present some of the characteristics of the final sample used as well as the correlations between the participation rates of parents and children. The main variables used for constructing the descriptive statistics are the parents' and the children's rates of social assistance participation. These rates represent the proportion of a time period during which an individual or a household receives benefits. More precisely, we define the following variables:

- **Py18** to **Py21**: the youth's annual participation rate⁴ for a specific year between 1990 and 1994 during which he was between 18 and 21 years old.
- **Py1821**: the youth's participation rate over the period during which he was between 18 and 21 years old.
- **Pp7** to **Pp21**: annual parental participation rate⁵ for a specific year between 1979 and 1995 during which the youth was between 7 and 21 years old.
- **Pp-**: parental participation rate during the youths' pre-adult period (7–17 years).
- **Pp712**: parental participation rate during the time the youth was aged between 7 and 12 (childhood).
- **Pp1318**: parental participation rate during the time the youth's age was between 13 and 18 (adolescence).
- **Pp+**: parental participation rate during the youths' adult period (18–21 years).
- **Pptotal**: parental participation rate over the total period (1979–1994), *i.e.*, the period during which the youth was between 7 and 21 years old.

Table 2 provides the mean observed value for parental participation rates and for those of adult children. The parental participation rate over the childhood period of their children (Pp712) is 0.43 while it reaches 0.49 over their adolescence period (Pp1318). The mean participation rate of adult children (Py1821) is 0.23 when aged between 18 and 21. One observes that adult children's participation rates increase as the children get older, starting from 0.15

4. Total number of months in which the youth participated over the year divided by twelve.

5. Total number of months in which the parents participated over the year divided by twelve.

when they are 18 years of age and reaching 0.27 when they are 21. Part of the explanation can be found in the 1990–1993 Canadian recession that strongly affected the labour market for young workers. Table 3 presents the distribution of youths by type of family of origin, identified during the parent’s last spell as a claimant between 1979 and 1990. The categories “single” or “childless couple” denote parents with no dependents during their last spell on social assistance. The type of family of origin is “single-parent” in 61% of the cases and “two-parent” in 39%.

Table 4 provides the correlation coefficients between the annual participation rates of the youths and those of the parents for the youths’ pre-adult (age 7–17) and adult (age 18–21) periods. For each of these two periods, results are first presented for the entire sample (17,204 observations). They are then presented for two sub-samples, according to whether the youths belonged to two-parent families.

The results from the whole sample, as well as those from the sub-samples (constructed according to the type of family of origin), all reveal a positive and statistically significant correlation between the youths’ participation rates and the preceding ($Pp-$) and subsequent ($Pp+$) participation rates of their parents. However, the value of the correlation coefficients between the youths’ participation rates and those of the parents during the youths’ pre-adult period ($Pp-$) is greater than the corresponding results for the parents’ participation rates during the youths’ adult period. Moreover, equality of correlation coefficients over these two periods is statistically rejected (at the 5% level) in all cases. These results, which correspond to our expectations, are depicted in Figure 1. Table 4 shows also that the correlation coefficients pertaining to the sub-sample of youths from two-parent families are greater than those from the single-parent offspring.

In Table 5, we report the correlation coefficients between parental participation rates when their children are pre-adolescent (7–12) and adolescent (13–18) and the participation rates of children when they are adult (18–21). These statistics are calculated for the entire sample and for the aforementioned sub-samples (single- and two-parent families of origin). All coefficients have a positive and statistically significant sign. As a general rule, the correlation detected between parents’ participation rates and those of the youth is higher for the adolescence period compared to the childhood period. Moreover, the coefficients of correlation for youths from two-parent families remain higher than for those emanating from single-parent families. Figure 2 depicts these results.

5 Estimation Results

This section presents the estimation results of the bivariate probit model (with repeated observations) discussed in Section 3. Recall that because there are missing data on the parents of separated or divorced families, the observed characteristics of the parents are limited to those of the most representative claimant parent. The model allows the simultaneous estimation of the equation for the young adult's participation rate over a specific period and the equation for the parent's participation rate for the same period. The model accounts for the unobserved permanent individual characteristics of the parents and the youth, and for their correlation. Finally, a variable (which, in some cases, is vector-valued) of past participation rates of the parents is an explanatory variable for the child's participation rate. The coefficient(s) associated with this variable thus allows us to evaluate the causal link between parents' and their children's participation in the social assistance program.

Since individual and family data are drawn from the administrative records of the *Ministère de la Solidarité Sociale*, they are only available for periods during which individuals or families receive social assistance. To allow for the absence of continuous data, we adopted the following strategy:

- The same explanatory variables are used for the entire sample period and do not vary over time.
- The values used for these variables are those observed at the end of the claimant parents' last spell on social assistance between 1979 and 1990.

After some experimentations, the following variables were included in the vector $x_{i,t}$ of exogenous variables influencing the children's participation:

- The gender of the young adult ($Male = 1$).
- The number of years of education of the claimant parent ($P - Educ$). A greater level of education is likely to provide access to better-paid employment for children and may affect their preferences for labour activities [Solon (1992), Levine and Zimmerman (1996)]. This variable is also used as a proxy for "potential" income. This is important since, as Levine and Zimmerman (1996) emphasize, the apparent transmission of social assistance receipt may be simply due to an intergenerational transmission of a low earning potential.
- The ethnic origin of the claimant parent ($Canadian = 1$). The propensity to participate can vary between ethnic groups [Gottschalk (1996)].

- Primary language (*English* = 1, when the language spoken in the family of origin is English)—this variable may be correlated with possessing the social and economic skills required to integrate into the labour market, as well as with the local characteristics of the environment in which the family lives.
- The region of the claimant parent’s residence— average duration on social assistance varies strongly between regions [Duclos *et al.* (1999)]. Thirteen regions were used, with Montreal as the reference region.

All of these variables (except the youth’s gender) are also included in the vector $X_{i,t}$ of exogenous variables affecting participation in the social assistance system of the claimant parent. The following variables also appear in that vector:

- The number of dependent children (*NChildren*)—Antel (1992) mentions that this variable may affect both time and money costs of participating in the labour market.
- The age of the claimant parent in January 1990 (*P – Age*)—individuals aged 46 years and more have longer spells on social assistance [Duclos *et al.* (1999)].
- The household type (single- or two-parent) at the end of the claimant parent’s last spell on social assistance (*Two – parent* = 1 for two-parent households). A large number of studies have shown that household type has a strong influence on social assistance dependence.

The inclusion of these latter variables ensures that the model is identified. To test for over-identification, all these variables were individually incorporated in the equation for the youth’s participation. No one of them was significant at the 5% level.

Table 6 presents descriptive statistics on the exogenous variables used in the estimation. In the sample used, 50.3% of children are male. Moreover, the claimant parents’ average level of education is 8.5 years, which is, as expected, not very high. Close to 88% of claimant parents are of Canadian origin.

Table 7 reports bivariate probit results for the entire time interval during which the adult children were between 18 to 21 years old. Tables 8 to 11 report results for each year within this interval. To reduce space, results for the parents’ equation are presented only in the specification pertaining to the entire time interval (Table 7). The presence of unobserved heterogeneity is not rejected in any of the specifications. Indeed, the positive and significant value of the coefficient ρ in each table corroborates the hypothesis of correlation between the unobserved social assistance determinants of parents and children.

Furthermore, the presence of a causal link between the social assistance participation of parents and that of their children when they are adults is not rejected either. Indeed, the results in the third column of the tables reveal that, at the mean values of the explanatory variables, a one percentage point increase in the parent's participation rate during the pre-adult phase⁶ increases the participation rate of the 18-year old youth by 0.15 percentage point, that of the 19-year old by 0.19 percentage point, and those of 20- and 21-year old by 0.2 and 0.19 percentage point respectively. For all ages taken together (*cf.* Table 7) the impact is 0.17 percentage point. The coefficients associated with previous participation by the parents are all statistically significant.

Years of schooling of the parent have, as expected, a negative impact on the youth's propensity to participate. Thus, at the mean of the explanatory variables, an additional year of schooling of the claimant parent reduces the child's participation rate, between the ages of 18 and 21, by two percentage points (*cf.* column 3 in Table 7). Additionally, the average participation rate of young males is ten percent lower than that of young females for these same ages. We also notice that being a parent of Canadian origin increases the 18- to 21-year old youth's mean participation rate by fifteen percent. Youths whose parents reside in certain regions, such as Gaspesia, the Saguenay, Mauricie, Estrie and North du Québec have a higher participation rate than those whose parents live in Montreal. Thus, having a claimant parent in Gaspesia at the end of his/her last spell on social assistance increases the participation rate of a 18- to 21-year old youth by 12.3 percentage points over the region of Montreal, at the mean of the explanatory variables. As far as the parent's equation is concerned, Table 7 reports that, as expected, the number of dependent children, being young, being a member of a two-parent family and being more educated, all have a negative effect on the probability of the parent to claim social assistance.

Table 12 presents the results of the univariate probit model estimates for youths in the age 18–21 interval. This method implicitly imposes that ρ is zero and therefore that there is no unobserved heterogeneity. Comparing the results in Table 12 with those of the bivariate model for the same ages (Table 7), we see that in both cases the coefficients associated with the previous participation rate of the representative parent are positive and significant. However, its value is higher (by 18%) when unobserved heterogeneity is ignored (0.661 *vs.* 0.560). This result, which is statistically significant, is explained by the fact that some part of the correlation is now attributed to a causal link while it is actually due to unobserved heterogeneity. Thus, this result illustrates the importance of accounting for this phenomenon.

The results of the bivariate model for the 18–21 interval (Table 7) allow us to evaluate the

6. Notice that the previous participation rate covers different observation periods depending on the reference age of the youth used in the table.

impact of the parental participation rate on the child's participation over the entire duration of eligibility for social assistance (18–65). For simplicity, assume that the marginal effect (in terms of participation rates) remains constant over the life cycle. In this case, the model predicts that a one-month increase in the parent's participation while the youth was aged between 7 and 17 years will increase the child's participation by 0.73 ($= 0.17 \cdot 564/132$) months over the ages 18 to 65. This result suggests that a policy intervention targeted at reducing the participation of parents of 7–17 year-old will have a non-negligible long-term impact on the child's participation over his entire life cycle.

It is important to identify the stages in the child's development during which parental participation has the greatest impact on the child's propensity to participate during the 18–21 year-old period. To do so, we first divide the parent's total time spent on social assistance during the child's pre-adult life into two parts: childhood (7–12 years) and adolescence (13–17 years). Notice that these two periods are not of the same length (6 years *vs.* 5 years). Consequently, in order to correctly interpret the corresponding coefficients, we express the variables in terms of the total number of months of parental participation in each spell (rather than measure the intensity as a participation rate).

The results of these estimates are presented in Table 13. We observe that the impact of parental participation is stronger during adolescence than during childhood, in terms of the young adult's participation rate between 18 and 21 years of age. A one-month increase in the parents' participation rates induces an 0.077 month increase in the child's participation between the ages of 18 and 21 if it occurs during the 13–17 interval, and a 0.051 month increase when it falls in childhood. Several explanations may be advanced. First, it is possible that, as the child approaches the age of 18 (the threshold for eligibility to social assistance⁷), the claimant parent increasingly encourages the youth to participate in the program to maximise the level of total social assistance benefits. Second, the learning effect pertaining to using the program may be more pronounced during adolescence. Third, it is possible that the effect of imitating parents' behaviour is more important when their spells on social assistance are more recent.

These explanations must, however, be treated with caution from a statistical point of view. Indeed, a log-likelihood test does not reject the hypothesis that the effects of previous parental participation during childhood and adolescence are equal (test statistic = $1.18 < 3.84 = \chi^2_{(1,5\%)}$). Thus, we cannot conclude from our data that the effect of parental participation on youth participation depends in its timing.

Table 14 provides more detailed analysis of the relative importance of the different periods

7. This threshold applies to all youths except for young mothers for whom the threshold is 15 years.

during which parents received social assistance benefits in the youth's pre-adult life. More precisely, we examine separately the intensity of the parents' spells over the ages 7–9, 10–12, 13–15, and 16–17. Again, the unit of measure adopted for constructing the variables is the total number of months of parental participation during the different stages. Extending parental participation by one month when the child was between 7 and 9 results in an increase in the latter's participation of 0.089 months between the ages of 18 and 21. This may suggest that the memory of a spell on social assistance is never entirely forgotten by the child. However, if the child witnesses his parents' participation in the social assistance program when he is between 10 and 12, the impact on future participation is not statistically insignificant. On the other hand, this impact again becomes significant, taking the values of 0.086 and 0.083 months respectively, during the age 13–15 and age 16–17 phases. One interpretation of these results is that the imitation effect appears greater when the youth is still a child (7–9) than at the beginning of adolescence. Nonetheless, the learning (and possibly the pressure effect from the parents) seems strongest when the youth is in mid-adolescence. Here again, however, these interpretations are subject to caution since we still cannot reject the hypothesis that the coefficients are all equal across the periods (test statistic = $4.26 < 7.81 = \chi^2_{(3,5\%)}$).

6 Conclusion

The results presented in this paper document the intergenerational transmission of reliance on social assistance in Canada. We show the existence of a significant correlation between parents' participation in social assistance during their children's pre-adult stage and the children's participation during early adulthood. This correlation may, however, come from two distinct sources. On the one hand, imitation and learning processes may generate a causal link between parents' and children's reliance on social assistance. On the other hand, this correlation may be attributable to the intergenerational transmission of individual (observed and unobserved) characteristics that determine the degree of reliance on social assistance. The implications of these two sources of correlation are certainly not the same. In the presence of a causal link, policies that affect parental social assistance participation, such as the tightening of eligibility criteria, can affect the siblings' participation rate. In the absence of a causal link, however, the only parental policies that can affect children's future participation rates will be those that target intergenerationally transmitted social assistance determinants.

Our econometric approach allows us to quantify the effect of the two sources of intergenerational transmission. Our empirical results reveal a significant causal link between parents' and children's reliance on assistance. A ten-percentage-point increase in the parents' participation rates during the child's pre-adult period (7–17 years) yields a 1.7 percentage-point

increase in the participation rate of the young adults (18–21 years). If we were to assume that this result extends over the child's entire adulthood, this would mean that a one-month increment in the parents' participation during the youth's pre-adult stage increases the latter's participation by nearly 3/4 of a month over the period from 18 to 65. This result suggests that any cost-benefit analysis of income security policies should consider not only their impact on the current generation, but also on future generations.

We also sought to identify the sub-periods of the youth's pre-adult life (7–17) during which the parents' participation has the greatest impact. Our results suggest that this value is greatest during adolescence (13–17 years). However, we cannot statistically reject the hypothesis that this effect remains constant across the sub-periods.

Our analysis suffers from a number of limitations which suggest some natural extensions. First, since the data come from administrative records of the Québec social assistance program, all parents used in our analysis have spent at least one month on social assistance during the pre-adult period of the child. Therefore, our analysis cannot be used to analyse the impact of parental participation in social assistance but only its duration, conditional on minimal participation. Moreover, this suggests that our estimates may suffer from a selectivity bias. Also, we ignore time-dependency in our analysis: more sophisticated transition models would provide an interesting alternative to the bivariate probit model we use in this paper. Moreover, using samples with youths of various ages may provide an interesting complement to our results, which are based on youths who were 18 years old in 1990. In particular, this would allow us to control for the effect of the level of economic activity on the intergenerational reliance on social assistance. Finally, the follow-up period could be extended longer into the adult life of the children, that is, beyond 21 years old.

References

- [1] An, C., R. Haveman and B. Wolfe (1993) "Teen Out-of-wedlock Births and Welfare Receipt: The Role of Childhood Events and Economic Circumstances", *Review of Economics and Statistics*, Vol. LXXV, No. 2, 195-208.
- [2] Antel, J. (1992) "The Intergenerational Transfer of Welfare Dependency: Some Statistical Evidences", *Review of Economics and Statistics*, Vol LXXIV, No.3, 467-73.
- [3] Conseil permanent de la jeunesse (1993), "Dites à tout le monde qu'on existe", *Avis sur la pauvreté des jeunes*.
- [4] Corak, M. and A. Heisz (1998) "How to Get Ahead in Life: Some Correlates of Intergenerational Income Mobility in Canada", In Miles Corak (editor), *Labour Markets, Social Institutions, and the Future of Canada*, Ottawa: Statistics Canada, Catalogue Number 89-553-xpb.
- [5] Corak, M. and A. Heisz (1999) "The Intergenerational Earnings and Income Mobility of Canadian Men: Evidence from Longitudinal Income Tax Data", *Journal of Human Resources*, Vol. 34, No. 3 (Summer), 504-33.
- [6] Corak, M. (1999) "Intergenerational Influences of the Receipt of Unemployment Insurance", Mimeo, Family and Labour Studies, Statistics Canada.
- [7] Corcoran, M., R. Gordon, D. Laren and G. Solon (1992) "The Association between Men's Economic Status and their Family and Community Origins", *Journal of Human Resources*, Vol. 27, No. 4 (Fall), 575-601.
- [8] Cyrus, C. Y. and Hui-Wen (1990) "Intergenerational Income-group Mobility and Differential Fertility", *American Economic Review*, Vol. LXXX: 1125-1138.
- [9] Duclos, J.-Y., B. Fortin, G. Lacroix, and H. Roberge (1999) "The Dynamics of Welfare Participation in Quebec", in *Women and Work*, ed. Richard P. Chaykowski and Lisa M. Powell, John Deutsch Institute for the Study of Economic Policy, 191-224.
- [10] Duncan, J. G., M. S. Hill and D. S. Hoffman (1988) "Welfare Dependence Within and Across Generations", *Science*, Vol. 239, 467-71.
- [11] Gottschalk, P. (1992) "The Intergenerational Transmission of Welfare Participation: Facts and Possible Causes", *Journal of policy analysis and management*, Vol. 11, No 2, 254-72.
- [12] Gottschalk, P. (1996) "Is the correlation in welfare participation across generations spurious?", *Journal of Public Economics*, No. 63, 1-25.
- [13] Gouriéroux, C. (1984) "Econométrie des variables qualitatives", Economica: Paris, 356 p.
- [14] Lanctôt, P. and N. Lemieux (1995) "Commencer sa vie à l'aide sociale", Ministère de la Sécurité du revenu, Direction générale des politiques et des programs: 132 p.

- [15] Levine, P. B. and D. J. Zimmerman (1996) "The Intergenerational Correlation in AFDC Participation: Welfare Trap or Poverty Trap?", *Institute for research on poverty*, Discussion paper No 1100-96.
- [16] Moffitt, R. (1992) "Incentive Effects of the U.S. Welfare System: A Review", *Journal of Economic Literature*, Vol. 30, 1-61.
- [17] Moreau L. (1995) "La pauvreté et le décrochage scolaire ou la spirale de l'exclusion", Direction de la recherche, de l'évaluation et de la statistique, Ministère de la Sécurité du revenu: 46 p.
- [18] Pepper, J. (1995) "Dynamics of Intergenerational Transmission of Welfare Receipt in the United-States", *Journal of Family and Economics Issues*, Vol. 16: 265-279.
- [19] Solon, G. (1992) "Intergenerational Income Mobility in the United States", *American economic review*, 82: 393-408.
- [20] Solon, G., M. Corcoran, R. Gordon and D. Laren (1988) "Sibling and Intergenerational Correlations in Welfare Program Participation", *Journal of Human Resources*, Vol. 23, No. 3.

Table 1
Participation Rates of Four Hypothetical Pairs of Parent-child

	Parental Participation Rate when their children		Participation rate of the children once they have become adults
	are not yet adults	have become adults	
Pair 1	40%	60%	45%
Pair 2	60%	40%	55%
Pair 3	40%	80%	50%
Pair 4	60%	60%	60%

Table 2
Mean Observed Value and Reference Period
for Social Assistance Participation Rates

	Participation Rate	Reference Period
Child related variables		
Py18	0.15	12 month period between 1990 and 1991
Py19	0.23	12 month period between 1991 and 1992
Py20	0.27	12 month period between 1992 and 1993
Py21	0.27	12 month period between 1993 and 1994
Py1821	0.23	48 month period between 1990 and 1994
Parent related variables		
Pp7	0.37	12 month period between 1979 and 1980
Pp8	0.40	12 month period between 1980 and 1981
Pp9	0.45	12 month period between 1981 and 1982
Pp10	0.53	12 month period between 1982 and 1983
Pp11	0.59	12 month period between 1983 and 1984
Pp12	0.60	12 month period between 1984 and 1985
Pp13	0.60	12 month period between 1985 and 1986
Pp14	0.57	12 month period between 1986 and 1987
Pp15	0.53	12 month period between 1987 and 1988
Pp16	0.50	12 month period between 1988 and 1989
Pp17	0.47	12 month period between 1989 and 1990
Pp18	0.44	12 month period between 1990 and 1991
Pp19	0.43	12 month period between 1991 and 1992
Pp20	0.43	12 month period between 1992 and 1993
Pp21	0.42	12 month period between 1993 and 1994
Pp22	0.42	12 month period between 1994 and 1995
Pp-	0.51	132 month period between 1979 and 1990
Pp+	0.43	60 month period between 1990 and 1995
Pp712	0.49	72 month period between 1979 and 1984
Pp1318	0.52	72 month period between 1984 and 1990
Pptotal	0.48	192 month period between 1979 and 1995

Table 3
Distribution of Youths by Type of Family of Origin

<i>Type</i>	<i>Frequency</i>
<i>Single-parent Family</i>	
Single person	1,268
Single parent (1 child)	4,045
Single parent (2 children)	5,170
sub-total	10,483
<i>Two-parent family</i>	
Childless couple	321
Two parents (1 child)	1,564
Two parents (2 children)	4,836
sub-total	6,721
Total	17,204

Table 4

Correlation Coefficients between Annual Participation Rates of Children and those of Parents at the Pre-adult (7-17 years) and Adult (18-21 years) Periods of Children

	Participation Rate of Children			
	Py18	Py19	Py20	Py21
Pp-				
Total sample (1)	0,2085** [0,0072]	0,2077 [0,0072]	0,1992 [0,0073]	0,1924 [0,0074]
Children from two-parent families (2)	0,2580 [0,0122]	0,2565 [0,0120]	0,2492 [0,0121]	0,2328 [0,0122]
Children from one-parent families (3)	0,1808 [0,0090]	0,1761 [0,0092]	0,1658 [0,0093]	0,1634 [0,0094]
Pp+				
Total sample	0,1978 [0,0077]	0,1943 [0,0075]	0,1903 [0,0075]	0,1846 [0,0075]
Children from two-parent families	0,2468 [0,0129]	0,2421 [0,0123]	0,2366 [0,0122]	0,2192 [0,0122]
Children from one-parent families	0,1680 [0,0097]	0,1631 [0,0096]	0,1596 [0,0096]	0,1600 [0,0096]

* The family type corresponds to the one observed at the last spell of parents on social assistance between 1979 and 1990.

** Correlation coefficient *** Standard error

(1) 17 204 obs. (2) 6 722 obs. (3) 10482 obs.

Table 5

Correlation Coefficients between Annual Participation Rates of Children and those of Parents at Pre-adolescence (7-12 years) and Adolescence (13-18 years) Periods of Children

	Participation Rate of Parents			Participation Rate of Children		
	Py18	Py19	Py20	Py18	Py19	Py20
Pp712						
Total sample (1)	0,1695** [0,0075]	0,1711 [0,0075]	0,1624 [0,0075]	0,1539 [0,0075]		
Children from two-parent families (2)	0,2186 [0,0127]	0,2199 [0,0124]	0,2091 [0,0124]	0,1934 [0,0124]		
Children from one-parent families (3)	0,1414 [0,0094]	0,1396 [0,0095]	0,1313 [0,0095]	0,1256 [0,0095]		
Pp1318						
Total sample (1)	0,2053 [0,0072]	0,2004 [0,0072]	0,1937 [0,0072]	0,1895 [0,0072]		
Children from two-parent families	0,249 [0,0123]	0,2427 [0,0119]	0,2391 [0,0119]	0,2244 [0,0120]		
Children from one-parent families	0,1795 [0,0090]	0,1715 [0,0091]	0,1621 [0,0092]	0,1631 [0,0093]		

* The family type corresponds to the one observed at the last spell of parents on social assistance between 1979 and 1990.

** Correlation coefficient *** Standard error

(1) 17 204 obs. (2) 6 722 obs. (3) 10482 obs.

Table 6
Descriptive Statistics on Exogenous Variables

Variable	Mean	Std. Dev.	Minimum	Maximum
Male	0.5037	0.5000	0.00	1.00
Nchildren	1.8608	1.1816	0.00	10.00
P-Educ	8.5360	2.8141	1.00	20.00
P-Age	43.6943	5.6963	33.00	59.00
English	0.0900	0.2862	0.00	1.00
Two-parent	0.3907	0.4879	0.00	1.00
Canadian	0.8794	0.3256	0.00	1.00
Gaspesia	0.0349	0.1835	0.00	1.00
Bas St-Laurent	0.0398	0.1955	0.00	1.00
Saguenay	0.0490	0.2159	0.00	1.00
Québec	0.1217	0.3269	0.00	1.00
Mauricie	0.0767	0.2661	0.00	1.00
Estrie	0.0463	0.2101	0.00	1.00
Montréal	0.1420	0.3491	0.00	1.00
Lanaudière	0.1141	0.3179	0.00	1.00
Laurentides	0.0964	0.2952	0.00	1.00
Outaouais	0.0503	0.2185	0.00	1.00
Abitibi	0.0312	0.1737	0.00	1.00
North	0.0292	0.1685	0.00	1.00

Table 7
 Estimation Results
 Bivariate Probit Model
 Dependent Variables: Py1821 and Pp1821

Child's equation			
Variable	Coefficient	Standard error	Marginal effect
Constant	-1.829	0.117	
Pp717	0.560	0.066	0.170*
Male	-0.367	0.039	-0.125
P-Educ	-0.063	0.007	-0.019
Canadian	0.440	0.084	0.111
English	-0.117	0.082	-0.037
Gaspesia	0.361	0.090	0.095
Bas St-Laurent	-0.003	0.098	-0.001
Saguenay	0.282	0.086	0.077
Québec	-0.008	0.072	-0.027
Mauricie	0.157	0.076	0.045
Estrie	0.094	0.096	0.028
Montérégie	-0.031	0.069	-0.010
Lanaudière	-0.199	0.082	-0.065
Laurentides	-0.179	0.082	-0.058
Outaouais	-0.309	0.107	-0.104
Abitibi	-0.100	0.119	-0.032
North	0.036	0.118	0.011
ρ	0.123	0.025	
Log likelihood	-12223.80		

* This marginal effect measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 17 years on his participation rate when aged between 18 and 21 years.

Table 7 (continued)
 Estimation Results
 Bivariate Probit Model
 Dependent Variables: Py1821 and Pp1821

Parent equation		
Variable	Coefficient	Standard error
Constant	-0.062	0.107
Nchildren	-0.110	0.009
P-Educ	-0.094	0.004
P-Age	0.016	0.002
English	0.023	0.039
Two-parent	-0.284	0.002
Canadian	0.011	0.036
Gaspesia	0.018	0.061
Bas St-Laurent	0.075	0.057
Saguenay	-0.069	0.055
Québec	-0.144	0.041
Mauricie	-0.036	0.046
Estrie	-0.177	0.057
Montérégie	-0.193	0.038
Lanaudière	-0.211	0.040
Laurentides	-0.247	0.044
Outaouais	-0.289	0.055
Abitibi	-0.453	0.069
North	-0.518	0.072
Log likelihood	-12223.80	

Table 8
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py18 and Pp18

Variable	Coefficient	Standard error	Marginal effect
Constant	-1.633	0.097	
Pp717	0.643	0.058	0.153*
Masc	-0.363	0.033	-0.102
P-Educ	-0.059	0.006	-0.014
Canadian	0.303	0.068	0.061
English	-0.079	0.068	-0.020
Gaspesia	0.498	0.080	0.090
Bas St-Laurent	0.110	0.084	0.025
Saguenay	0.420	0.075	0.079
Québec	0.055	0.063	0.013
Mauricie	0.299	0.066	0.061
Estrie	0.233	0.080	0.049
Montérégie	0.010	0.061	0.002
Lanaudière	-0.189	0.071	-0.049
Laurentides	-0.098	0.070	-0.025
Outaouais	-0.230	0.092	-0.061
Abitibi	0.124	0.096	0.028
North	0.268	0.095	0.055
ρ	0.117	0.022	
Log likelihood	-14235.64		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 17 years on his participation rate when he was 18 years of age.

Table 9
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py19 and Pp19

Variable	Coefficient	Standard error	Marginal effect
Constant	-1.153	0.068	
Pp718	0.623	0.044	0.188*
Male	-0.253	0.024	-0.083
P-Educ	-0.054	0.005	-0.016
Canadian	0.396	0.047	0.101
English	-0.041	0.048	-0.013
Gaspesia	0.131	0.068	0.038
Bas St-Laurent	-0.035	0.066	-0.011
Saguenay	0.171	0.060	0.048
Québec	-0.069	0.047	-0.022
Mauricie	0.131	0.052	0.038
Estrie	0.086	0.063	0.025
Montérégie	-0.043	0.044	-0.013
Lanaudière	-0.162	0.049	-0.052
Laurentides	-0.119	0.051	-0.037
Outaouais	-0.104	0.063	-0.033
Abitibi	-0.084	0.077	-0.026
North	0.106	0.074	0.031
ρ	0.097	0.017	
Log likelihood	-17454.52		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 18 years on his participation rate when he was 19 years of age.

Table 10
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py20 and Pp20

Variable	Coefficient	Standard error	Marginal effect
Constant	-1.022	0.062	
Pp719	0.620	0.043	0.204*
Male	-0.181	0.023	-0.063
P-Educ	-0.043	0.043	-0.014
Canadian	0.323	0.043	0.094
English	-0.053	0.044	-0.018
Gaspesia	0.041	0.066	0.013
Bas St-Laurent	-0.182	0.065	-0.063
Saguenay	0.117	0.057	0.037
Québec	-0.120	0.044	-0.041
Mauricie	0.024	0.049	0.008
Estrie	-0.001	0.060	-0.002
Montérégie	-0.040	0.042	-0.013
Lanaudière	-0.086	0.044	-0.029
Laurentides	-0.109	0.047	-0.037
Outaouais	-0.104	0.059	-0.035
Abitibi	-0.116	0.072	-0.040
North	0.117	0.070	0.037
ρ	0.106	0.017	
Log likelihood	-18666.44		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 19 years on his participation rate when he was 20 years of age.

Table 11
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py21 and Pp21

Variable	Coefficient	Standard error	Marginal effect
Constant	-0.851	0.061	
Pp720	0.591	0.042	0.197*
Male	-0.201	0.022	-0.071
P-Educ	-0.042	0.004	-0.014
Canadian	0.291	0.040	0.088
English	-0.070	0.044	-0.024
Gaspesia	-0.074	0.065	-0.025
Bas St-Laurent	-0.260	0.064	-0.093
Saguenay	-0.022	0.057	-0.007
Québec	-0.264	0.044	-0.094
Mauricie	-0.092	0.049	-0.031
Estrie	-0.166	0.060	-0.058
Montérégie	-0.135	0.041	-0.047
Lanaudière	-0.126	0.043	-0.044
Laurentides	-0.197	0.047	-0.069
Outaouais	-0.176	0.058	-0.062
Abitibi	-0.174	0.070	-0.061
North	-0.052	0.071	-0.018
ρ	0.076	0.017	
Log likelihood	-18900.38		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect associated measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 20 years on his participation rate when he was 21 years of age.

Table 12
 Estimation Results
 Univariate Probit Model
 Dependent Variables: Py1821 and Pp1821

Variable	Coefficient	Standard error	Marginal effect
Constant	-0.882	0.056	
Pp717	0.661	0.033	0.201*
Male	-0.129	0.022	-0.041
P-Educ	-0.045	0.004	-0.014
Canadian	0.280	0.040	0.076
English	-0.083	0.042	-0.026
Gaspesia	0.136	0.062	0.039
Bas St-Laurent	-0.061	0.061	-0.019
Saguenay	0.137	0.055	0.040
Québec	-0.092	0.042	-0.029
Mauricie	0.068	0.047	0.020
Estrie	0.060	0.057	0.018
Montérégie	-0.040	0.040	-0.012
Lanaudière	-0.104	0.043	-0.033
Laurentides	-0.096	0.045	-0.030
Outaouais	-0.102	0.056	-0.032
Abitibi	0.007	0.067	-0.002
North	0.198	0.066	0.056
Log likelihood	-8851.50		

* This marginal effect measures the impact of a one percentage point increase in the parent's participation rate when the child was aged between 7 and 17 years on his participation rate when he was aged between 18 and 21 years.

Table 13
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py1821 and Pp1821

Variable	Coefficient	Standard error	Marginal effect
Constant	-1,855	0.121	
Pp712total	0.003	0.0008	0.051*
Pp1318total	0.005	0.001	0.077*
Male	-0.367	0.040	-0.125
P-Educ	-0.063	0.007	-0.019
Canadian	0.447	0.085	0.113
English	-0.116	0.083	-0.037
Gaspesia	0.363	0.091	0.095
Bas St-Laurent	-0.004	0.098	-0.001
Saguenay	0.280	0.086	0.076
Québec	-0.006	0.072	-0.002
Mauricie	0.157	0.076	0.045
Estrie	0.097	0.096	0.029
Montérégie	-0.030	0.069	-0.009
Lanaudière	-0.195	0.082	-0.064
Laurentides	-0.176	0.082	-0.057
Outaouais	-0.305	0.011	-0.103
Abitibi	-0.098	0.119	-0.031
North	0.044	0.118	0.013
ρ	0.114	0.026	
Log likelihood	-12223.21		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect measures the impact of a one-month increase in the parent's participation when the child's age was in the interval corresponding to this variable, on the child's number of months of participation when he was aged between 18 and 21 years.

Table 14
 Estimation Results for the Child's Equation
 Bivariate Probit Model
 Dependent Variables: Py1821 and Pp1821

Variable	Coefficient	Standard error	Marginal effect
Constant	-1.838	0.122	
Pp79	0.006	0.002	0.089*
Pp1012	0.000	0.002	0.003*
Pp1315	0.006	0.002	0.086*
Pp1617	0.006	0.003	0.083*
Male	-0.367	0.040	-0.125
P-Edu2c	-0.063	0.007	-0.019
Canadian	0.446	0.086	0.112
English	-0.118	0.083	-0.038
Gaspesia	0.360	0.091	0.094
Bas St-Laurent	-0.004	0.099	-0.001
Saguenay	0.279	0.086	0.076
Québec	-0.007	0.072	-0.002
Mauricie	0.160	0.076	0.046
Estrie	0.097	0.096	0.029
Montérégie	-0.030	0.069	-0.009
Lanaudière	-0.197	0.082	-0.064
Laurentides	-0.176	0.082	-0.057
Outaouais	-0.305	0.108	-0.104
Abitibi	-0.100	0.119	-0.032
North	0.046	0.118	0.014
ρ	0.112	0.028	
Log likelihood	-12221.67		

The following variables were considered in the parents' equation: the number of dependent children, the number of years of schooling of the claimant parent, the claimant parent's age in 1990, the household type, ethnic origin, language spoken in the family of origin and the region of residence.

* This marginal effect measures the impact of a one-month increase in the parent's participation when the child's age was in the interval corresponding to this variable, on the child's number of months of participation when he was aged between 18 and 21 years.

FIG. 1 --: Correlations between Annual Participation Rates of Children and Anterior and Future Participation Rates of Parents

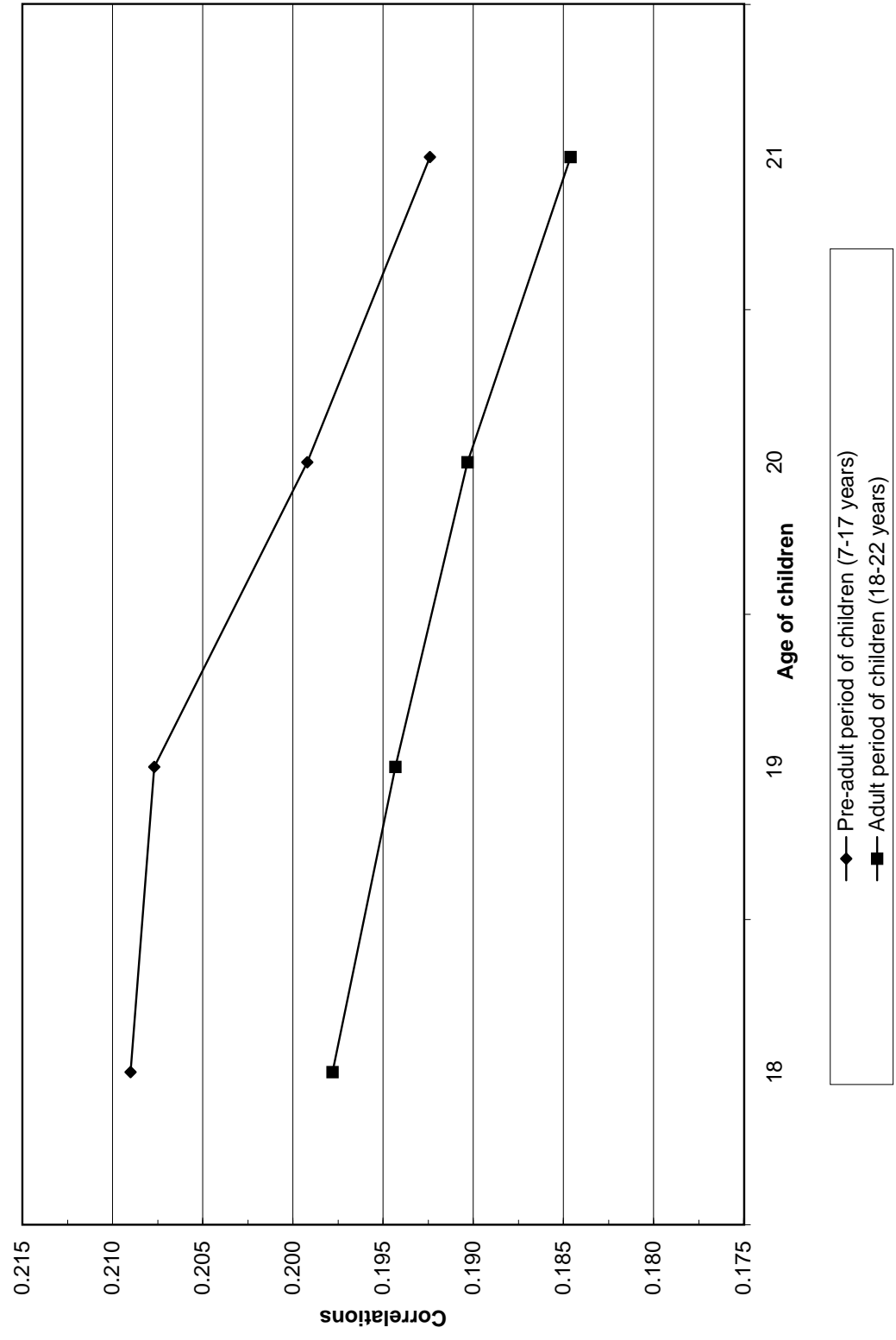


FIG. 2 --: Correlation Coefficients between Annual Participation Rates of Children and that of Parents during Pre-adolescence and Adolescence Periods of Children

