Short and long-term effects of Childcare Subsidies on Labour Supply, Wages, and Child Development: Evidence from a Canadian Natural Experiment

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1. Introduction

Policy questions:

What are the short-term and long-term effects on labour supply with young children of daycare subsidies?

What are the effects of the Quebec child care policy on child development ?

In a series of 3 papers, we try to answer these questions, using simple econometric methods that deliver striking results that are not frequently observed in this literature.

The main idea is to estimate the policy effect by comparing the changes of key variables for children and mothers before and after the policy was introduced in Quebec with changes for those in the rest of Canada.

► The decision of a mother with a preschool child to participate in the labour market necessarily involves some childcare arrangements

►The labour force participation decision of mothers is particularly difficult to analyse because it is sensitive not only to the cost of childcare but also to its quality, availability, convenience, reliability, and security

■ Examining the empirical evidence: the link between childcare prices and labour supply is generally weak (e.g. Blau and Currie, 2007)

■ A few studies show a <u>strong positive impact</u> of transfers to families with pre-school children on labour supply:

•**France**: Piketty (2005) examines the extension of a similar parental home-care allowance (the "Allocation parentale d'éducation"-APE)

II. 4. – Impact de l'allocation parentale d'éducation

Tableau 1. – Baisse de l'activité féminine à la naissance du 2e enfant (estimation de l'équation probit d'offre de travail)

	(A)	(B)	(C)	(D)
Impact sur le taux d'emploi du fait d'être éligible à l'APE de rang 2	– 0,111	– 0,168	– 0,187	– 0,194
Écart-type	0,005	0,005	0,006	0,006
Variables de contrôle :				
Nombre et âge des enfants	Oui	Oui	Oui	Oui
Trend temporel (dummies années)	Non	Oui	Oui	Oui
Âge et niveau d'éducation (mère)	Non	Non	Oui	Oui
Type d'agglomération	Non	Non	Oui	Oui
Produit des dummies années par les variables sociodémographiques	Non	Non	Non	Oui

Source : Insee, enquêtes Emploi, 1982-2001.
Champ : femmes vivant en couple, âgées de moins de 55 ans (N. obs. : 592592).
Lecture : relativement aux autres femmes ayant le même nombre et du même âge, les femmes éligibles à l'APE de rang 2 (c'est-à-dire les mères de 2 enfants dont le benjamin est âgé de moins de 3 ans et est né après le 1er juillet 1994) ont un taux d'emploi inférieur de 11,1 points (spécification A). Si l'on prend en compte le fait que les taux d'emploi des autres femmes poursuivent leur progression (existence d'un trend temporel), cet effet passe à 16,8 points (spécification B). Si l'on raisonne en outre à âge, niveau d'éducation et type d'agglomération donnés, l'effet passe à 18,7 points (spécification C), et même à 19,4 points lorsque l'on suppose que le trend temporel peut varier suivant les caractéristiques sociodémographiques (spécification D).

- **Norway**: Schone (2004): mother's of 1 and 2 year-olds who did not use publicly subsidized day care became entitled to a ''cash-for-care''
- Effet de 4 à 5 points sur le taux de participation.

3. Québec's Universal Childcare Policy

■ September 1 1997: day care spaces, fee of $5 per day per child, aged 4

■ September 2000: all children aged 0 to 59 months (not eligible for kindergarten)

■ September 1997: 77,000 spaces partly subsidized

■ March 2006: 197,000 spaces, totally subsidized

■ Full-time instead of half-day publicly-provided kindergarten in a school setting

■ 1998: $5 per day before- and after-school day care for kindergarten-age and grade-school children

Table 2: Number of childcare spaces and subsidized[1] spaces for preschool children on March 31st by setting and number of children aged less than one year, 0 to 4 and 5 on July 1st, Québec, 1994-2006

| Year	Spaces in not-for-profit network[1]		Spaces in for-profit center[2] under agreement (not subsidized)[3]	Total number of spaces at a reduced fee[4]	Total number of children [less than 1 year],[5] 0-4 years and (5) years
	Center	Family-based			
1993-1994	33,452	15,253	(15,665)	64,370	[90,417] 480,098 (90,603)
1994-1995	34,545	17,871	(18,366)	70,782	[87,258] 473,113 (96,973)
1995-1996	36,708	19,479	(19,842)	76,029	[85,130] 460,657 (99,415)
1996-1997	36,101	20,328	17,629 (4,806)	74,058	[79,724] 445,143 (98,853)
1997-1998	36,977	21,761	17,979 (5,587)	76,715[6]	[75,674] 428,297 (94,674)
1998-1999	39,436	32,816	23,861 (585)	96,113[6]	[73,599] 412,161 (91,453)
1999-2000	45,793	44,882	23,270 (1,208)	113,545[6]	[72,070] 397,971 (89,358)
2000-2001	51,988	55,979	24,578 (705)	132,545	[73,699] 381,522 (87,111)
2001-2002	58,525	62,193	24,629 (976)	145,624	[72,200] 373,264 (83,582)
2002-2003	63,339	75,355	24,740 (1,620)	163,434	[73,600] 368,920 (79,015)
2003-2004	68,274	82,044	27,530 (1,907)	177,848	[74,200] 371,028 (76,105)
2004-2005	72,059	87,192	30,131 (2,695)	189,380	[76,200] 373,426 (76,060)
2005-2006	74,573	89,011	33,305 (3,487)	196,618	[80,000] N.A. (N.A.)

Sources: Department of Family (2003) for number of spaces; Institut de la statistique du Québec for number of children by age.

Données des 6 cycles de l'ELNEJ

- Tous les enfants de 0-5 ans
- Heures gardées (mode de garde principal)
- Mode de garde principal
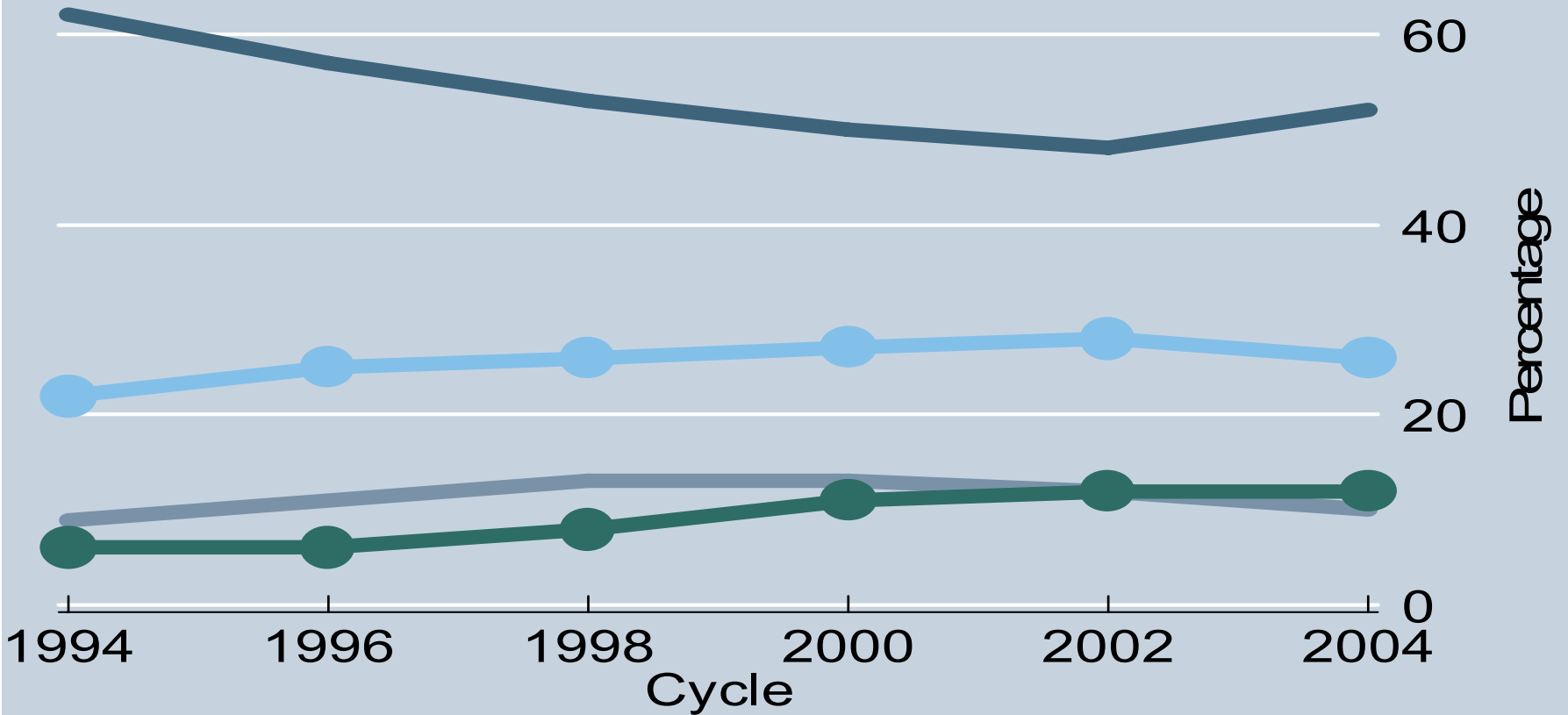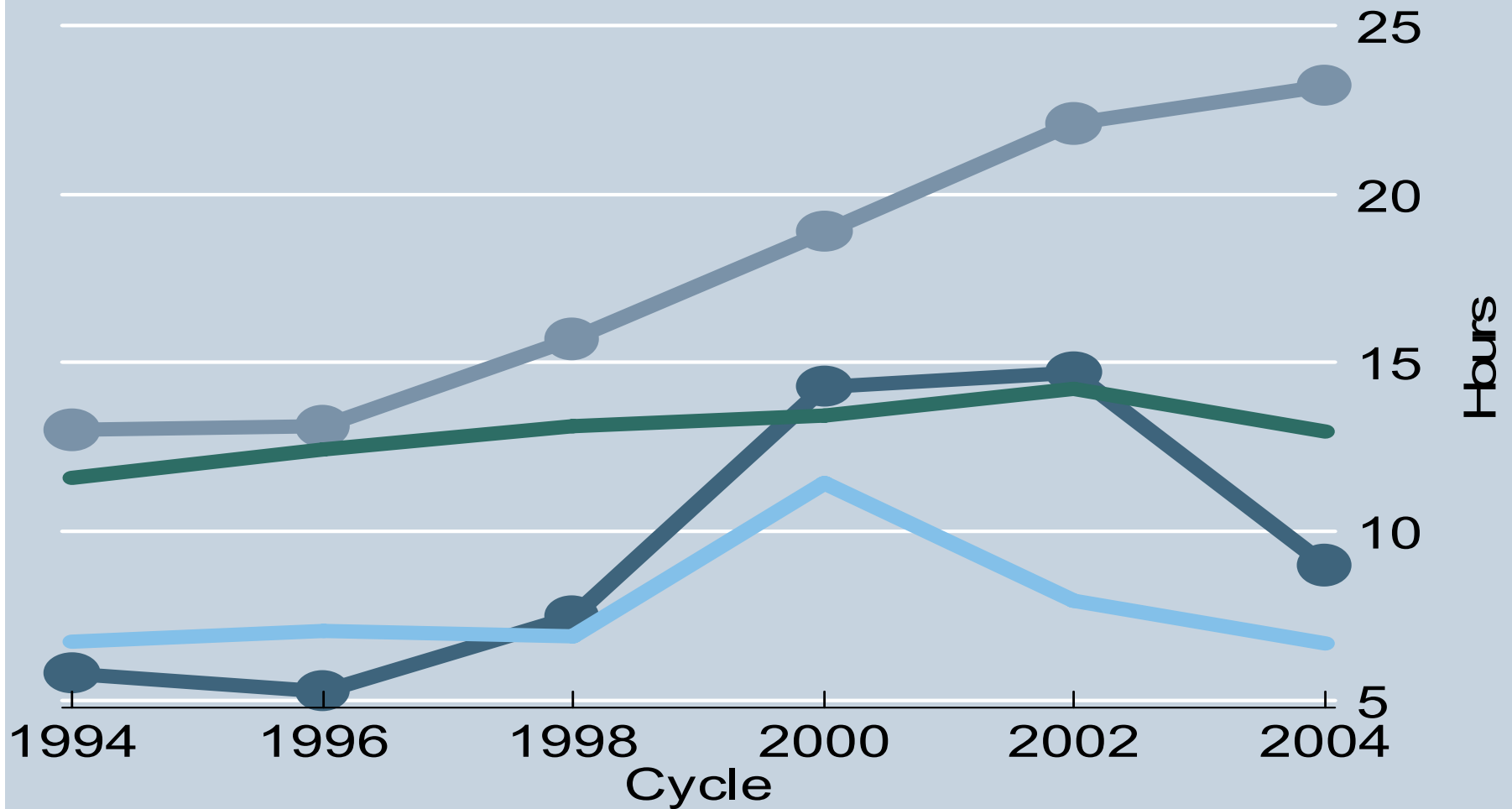
Primary care arrangements

Québec 0 to 5 years

Parental care — Home care — Out of home care
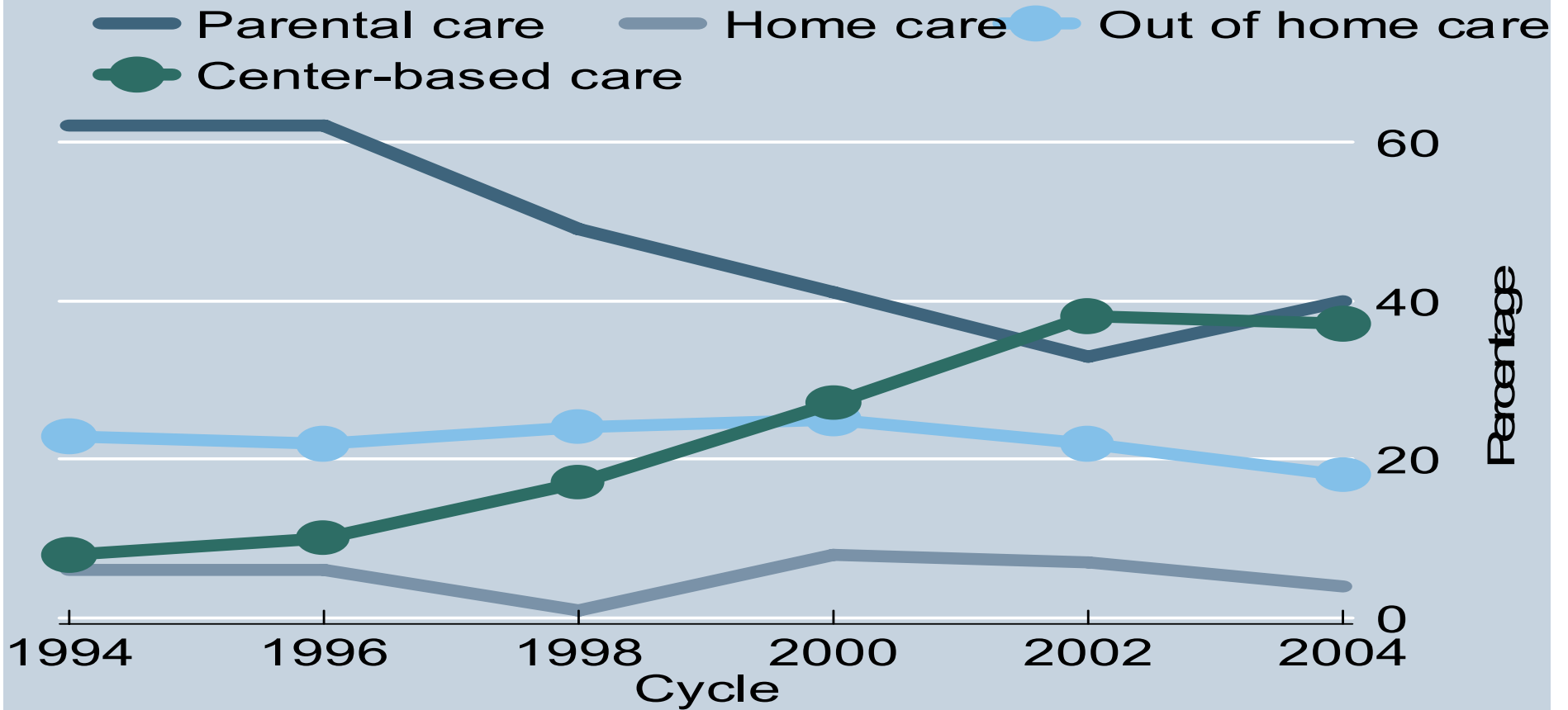
Center-based care

Primary care arrangements

Rest of Canada 0 to 5 years

— Parental care — Home care ⬤— Out of home care
⬤— Center-based care

Percentage
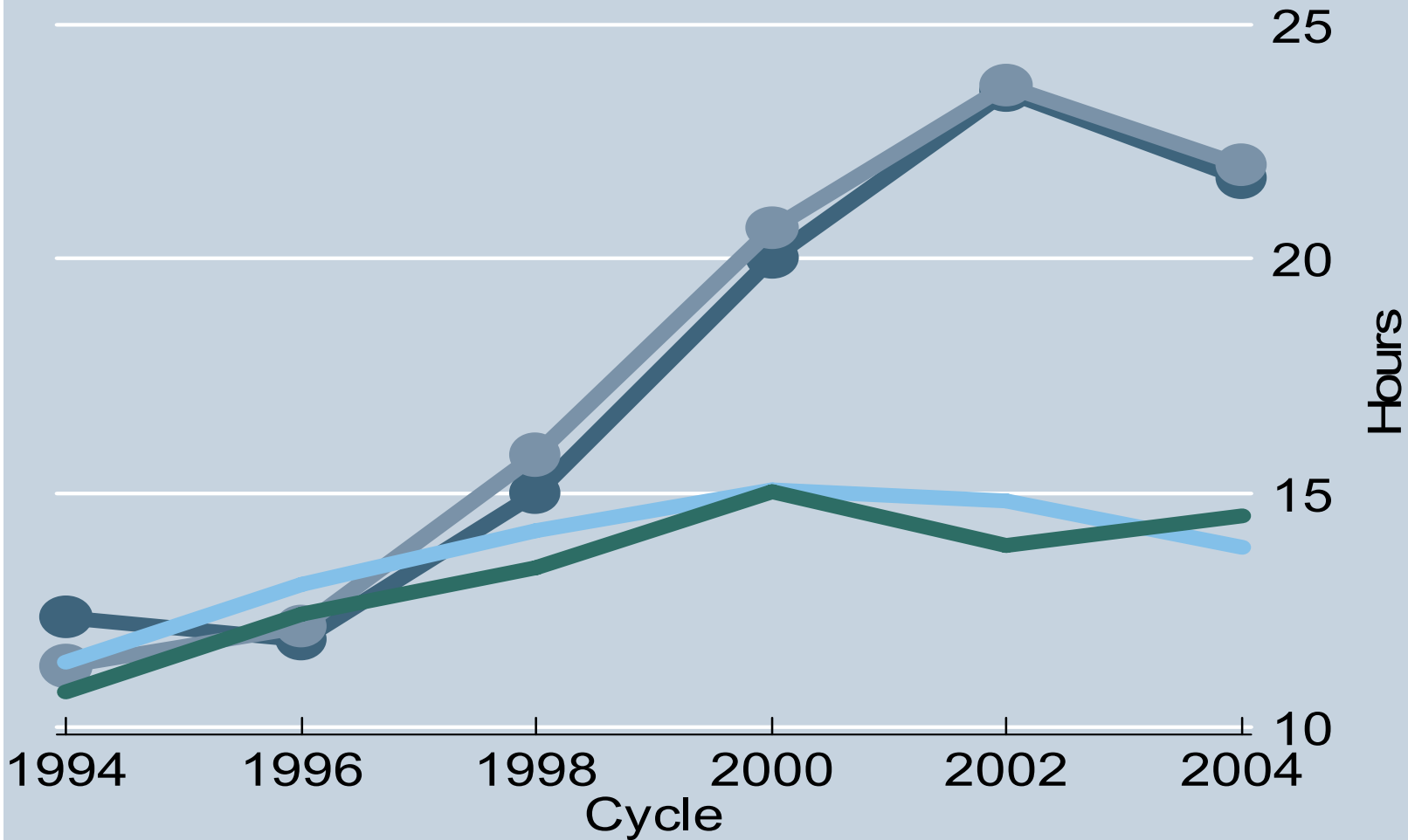
60

40

20

0

1994   1996   1998   2000   2002   2004

Cycle

Hours per week in primary care

Legend: <1 year Q, 1 year Q, <1 year C, 1 year C

Y-axis (Hours): 5, 10, 15, 20, 25

X-axis (Cycle): 1994, 1996, 1998, 2000, 2002, 2004

Hours per week in primary care

- ●── 2 years Q ●── 3 years Q ── 2 years C
- ── 3 years C

Hours

Cycle

1994 1996 1998 2000 2002 2004

25

20

15

10

Hours per week in primary care

- 4 years Q
- 5 years Q
- 4 years C
- 5 years C

Cycle
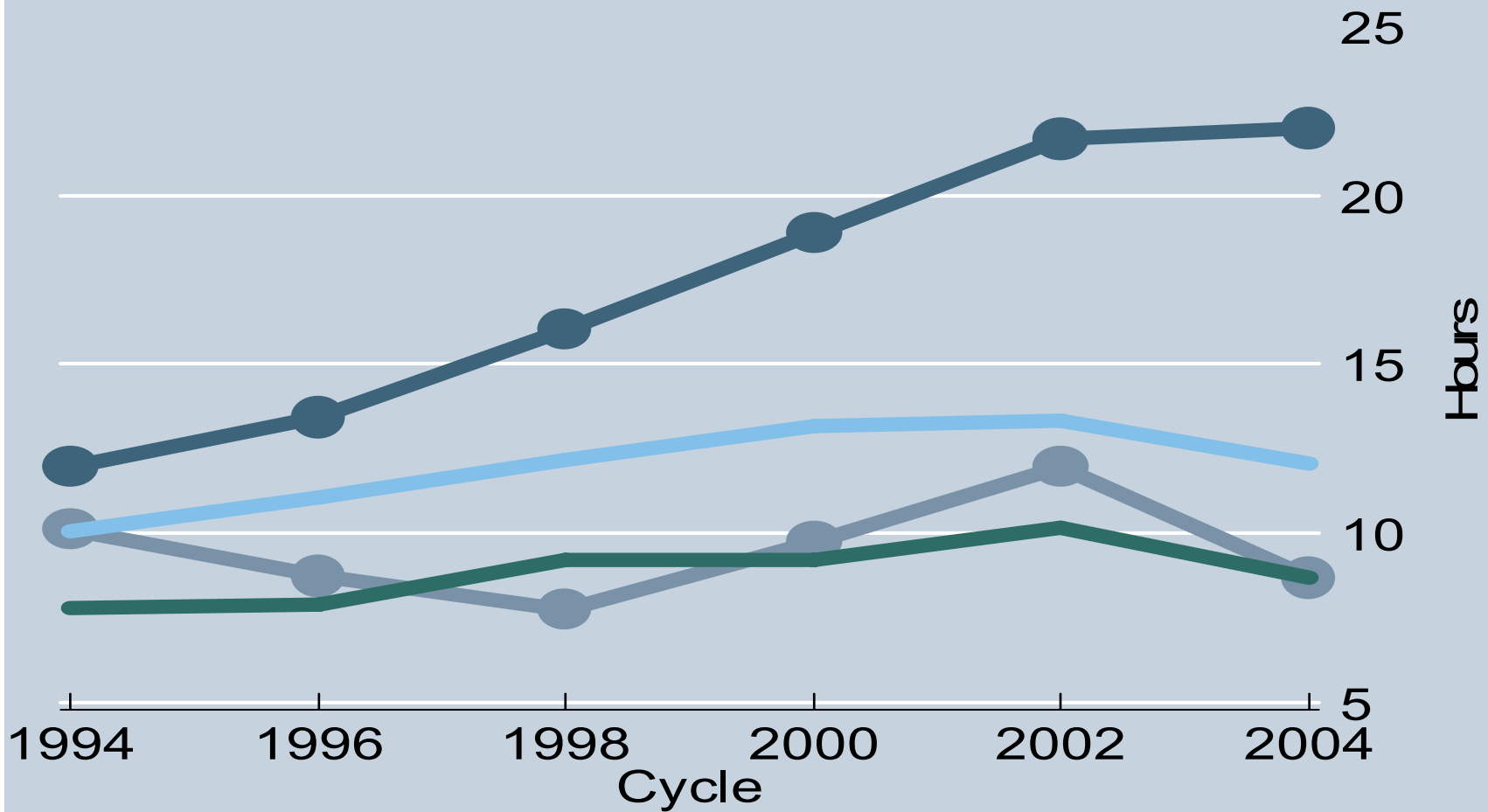
5. Travail des mères, banque de données

Statistics Canada's Longitudinal Survey of Labour and Income Dynamics (SLID), a nationwide survey on household and personal income as well as labour force participation. 5 Labour market outcomes:

1. Labour market participation (April and August)
2. Number of weeks worked during the year
3. Number of hours worked during the year
4. Earnings for the year of reference in all jobs ($2001 dollars)
5. Number of years of work experience (not shown)

Figure 1: Mothers' labor force participation in August
by ages of children in Québec (Q) and Rest of Canada (RofC)
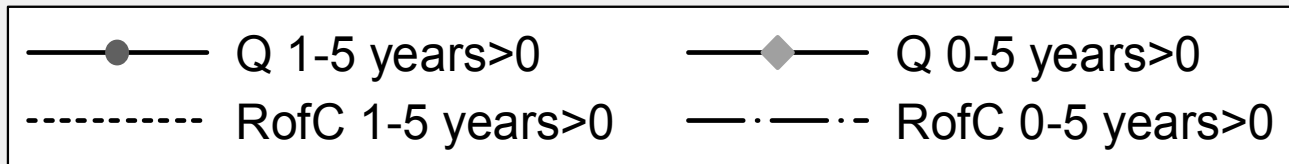
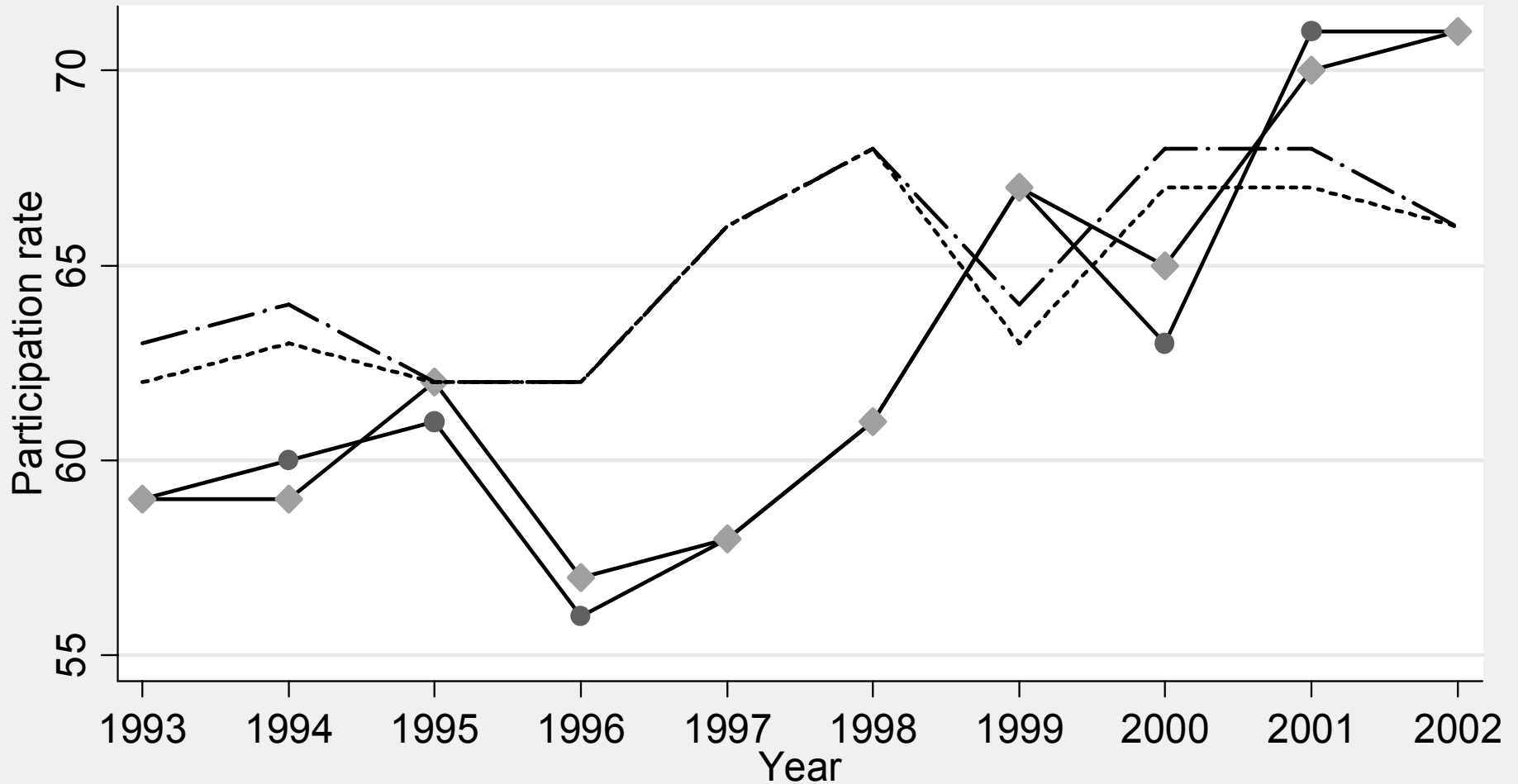Figure 3: Mothers' annual hours worked
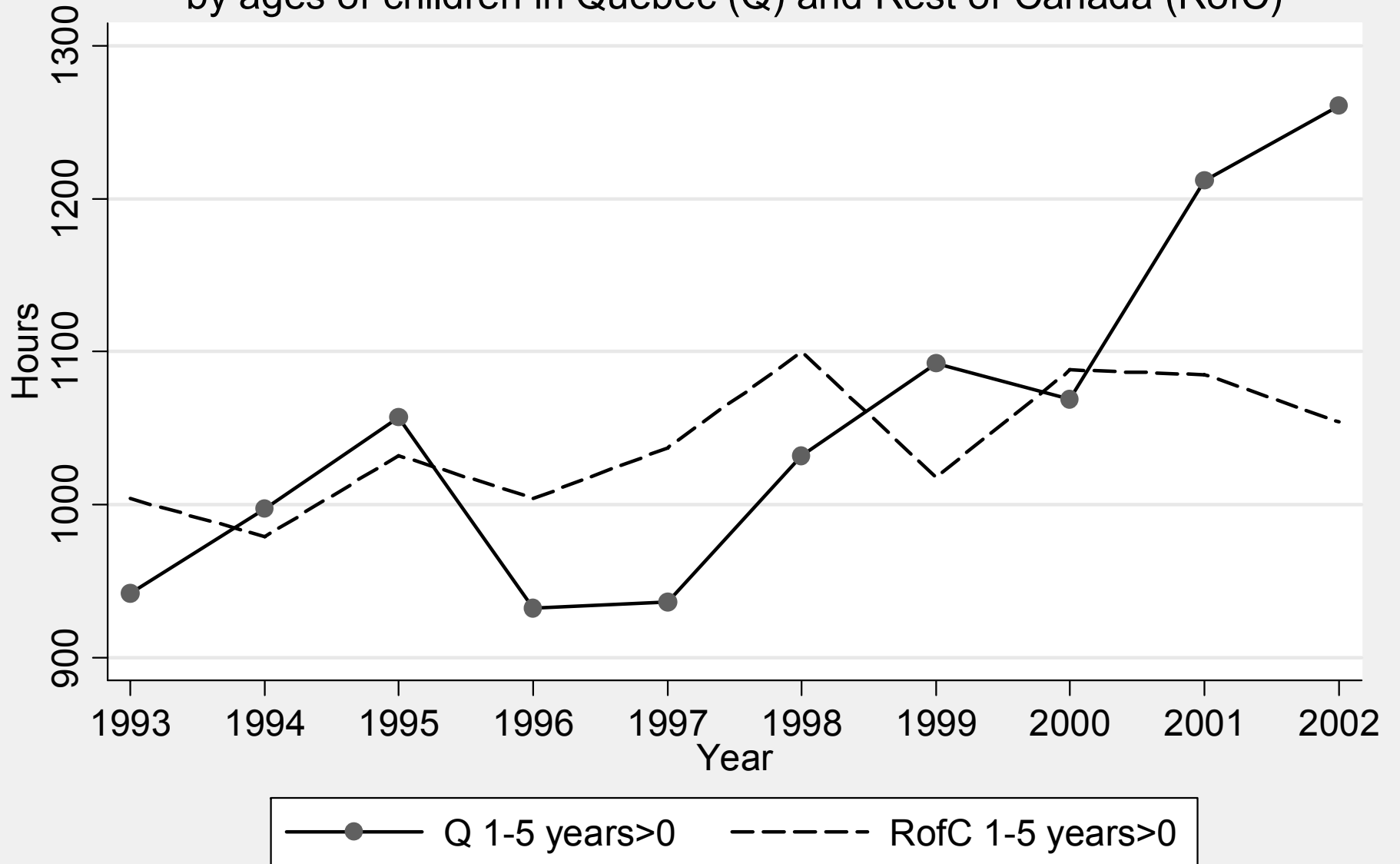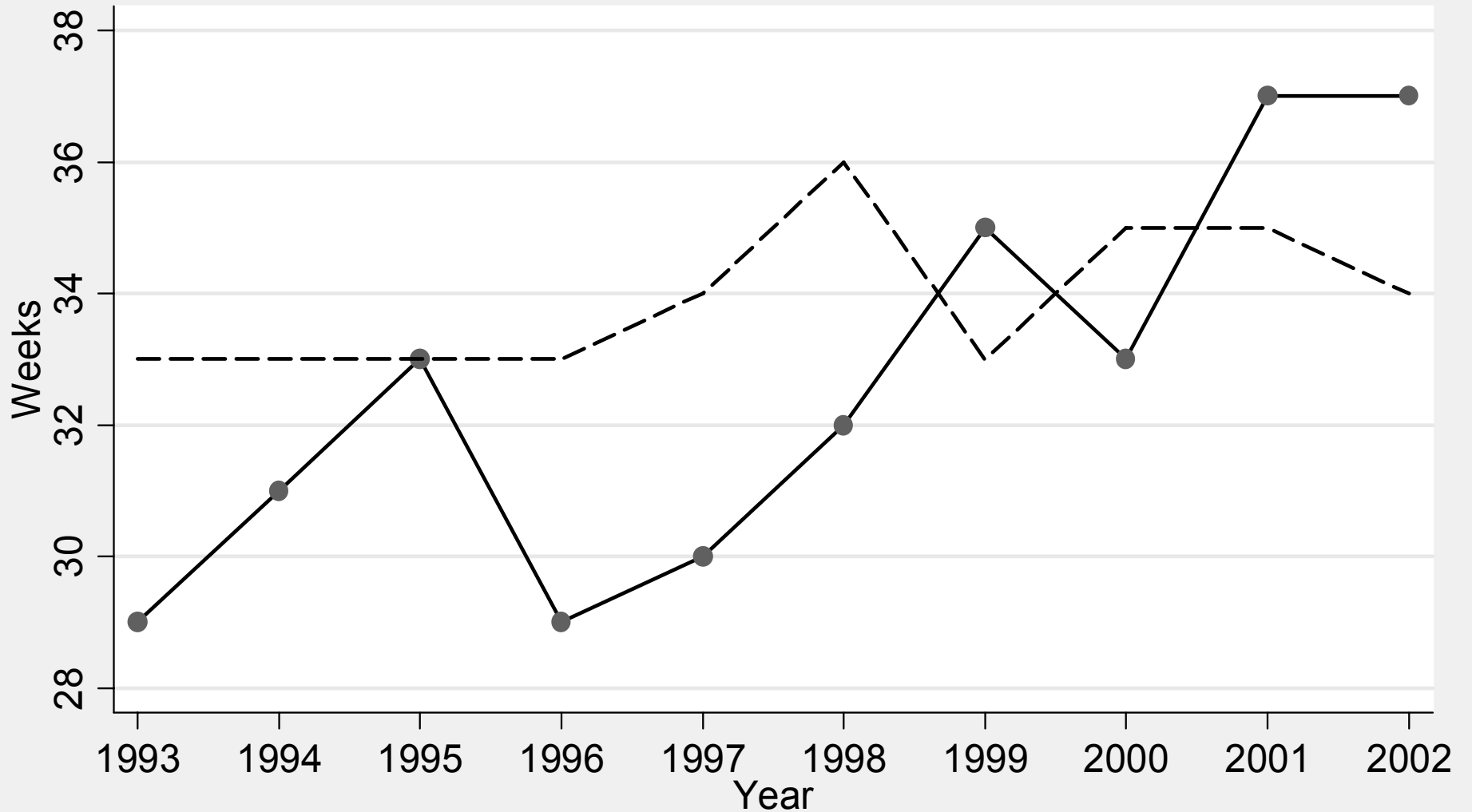by ages of children in Québec (Q) and Rest of Canada (RofC)

Figure 2: Mothers' annual weeks worked
by ages of children in Québec (Q) and Rest of Canada (RofC)

Legend: Q 1-5 years>0 · RofC 1-5 years>0

■ A few studies show a <u>strong positive impact</u> of childcare prices on labour supply:

• **Québec**: Lefebvre and Merrigan (2008, forthcoming, Journal of Labor Economics) with a sample of mothers with at least one child between 1 and 5 inclusively in the SLID as well as Baker et al. (2005) with the NLSCY

$$Y_{it} = \alpha + \theta Q_{it} + \gamma_{21}\, I(t \geq s) + (\mu_{11} + \mu_{22} Q_{it})t + \sum_{t=1999}^{2002} \beta_t\, Q_{it} + \Phi'\, X_{it} + \varepsilon_{it},$$

Specification	(i) No trends and equal effects	(ii) No trends and unequal effects			
	β	β_{1999}	β_{2000}	β_{2001}	β_{2002}
A. All mothers with a least one child aged 1 to 5 years					
Participation (N=28,351)	0.073***	0.076***	0.053*	0.083***	0.081***
Anuual hours worked	133***	84	64	169***	231***
Annual weeks worked	4.28***	3.80***	3.29**	5.09***	5.17***
Annual earnings	2,302*	522	704	3,175**	5,285***

Effets de long-terme

- A priori hypothesis on policy's long-term effects: its gradual implementation should be reflected by a pattern of increasing effects as time goes by

- Strategy: compare Québec's mothers with at least one child aged between 6 and 11 and no children less than 6, to similar mothers in the RofC from 1996 to 2004 (post-policy period effects start in 1999; in the final estimations, post-policy period effects start in 2002)

5. Data set

Statistics Canada's Longitudinal Survey of Labour and Income Dynamics (SLID), a nationwide survey on household and personal income as well as labour force participation. 5 Labour market outcomes:

1. Labour market participation (April and August)
2. Number of weeks worked during the year
3. Number of hours worked during the year
4. Earnings for the year of reference in all jobs ($2001 dollars)
5. Number of years of work experience (not shown)

The evidence supports the hypothesis of <u>strong dynamic effects of the program</u>. Although the difference in incentives to work between women in Québec and Canada is no longer diréctly affected by the childcare policy, the policy seemingly continues to produce effects on labour supply

► All labour supply indicators show that the <u>effects of the program increase over time</u> and that they are significant when trends are not included in the regression (except for annual earnings)

- We also estimated a triple difference mode where we add in the sample women with at least one child 12 to 17 and no children less than 12.

- This substracts from the DD estimate of the policy effect any possible post-policy effect particular to Quebec affecting all women in the sample leaving us with the post-policy effect caused by the policy

$$Y_{it} = \beta_0 + \beta_1 Q_{it} + \beta_2 I_{it} + \beta_3 D_{it} + \beta_4 Q_{it}I_{it} + \beta_5 Q_{it}D_{it} + \beta_6 D_{it}I_{it} + \sum_{t=1999}^{2004}\beta_t D_{it}I_{it}Q_{it} + \Phi^{'}X_{it} + \varepsilon_{it}$$

Table 5: Estimated effects of childcare regime on Québec's mothers' labour force participation, annual weeks and hours worked, and annual earnings for four specifications.

Specification	Equal policy effects		Unequal policy effects					
	(1) DD	(2)DDD	(3) DD			(4) DDD		
	$\beta_{2002\text{-}2004}$	β_{2002}	β_{2003}	β_{2004}		β_{2002}	β_{2003}	β_{2004}
ALL MOTHERS								
PANEL A: Participation [1]	**N=24,420/46,697**		**N=24,420**			**N=46,697**		
Policy variables coefficients	0.049*	0.062	0.033	0.060*	0.056	0.046	0.073*	0.069
Bootstrapped Standard error	0.027	0.040	0.030	0.030	0.035	0.041	0.041	0.048
Joint test of equal policy effects [2]	-		0.63			0.63		
PANEL B: Weeks of work	**N=24,420/46,697**		**N=24,420**			**N=46,697**		
Policy variables coefficients	2.87**	3.20	2.02	2.70*	3.91**	2.34	3.03	4.25*
Bootstrapped Standard error	1.40	2.07	1.50	1.58	1.69	2.10	2.14	2.37
Joint test of equal policy effects	-		0.39			0.38		
PANEL C: Hours of work	**N=23,396/44,777**		**N=23,396**			**N=44,777**		
Policy variables coefficients	110*	180**	93	91	145**	162*	159	217**
Bootstrapped Standard error	56	88	63	61	68	90	90	99
Joint test of equal policy effects	-		0.44			0.40		

1. In this specification the year effects of 1999 to 2001 of Québec's policy are constrained to be zero. All the parameters related to the policy are modified in order to take this change into account (this also applies to the results that follow).
2. All the tests show the p-values derived from a Chi-Square distribution (this also applies to the tests that follow).
Statistical significance: ***=1%; **=5%; *=10%.

Specification	Equal policy effects		Unequal policy effects					
	(1) DD	(2) DDD	(3) DD			(4) DDD		
	$\beta_{2002-2004}$	$\beta_{2002-2004}$	β_{2002}	β_{2003}	β_{2004}	β_{2002}	β_{2003}	β_{2004}
PANEL A.1: LED Participation [1]	**N=20,414/39,354**		**N=20,414**			**N=39,354**		
Policy variables coefficients (Bootstrapped Standard error)	0.067** (0.031)	0.105** (0.047)	0.038 (0.034)	0.085** (0.034)	0.082** (0.041)	0.076 (0.048)	0.122** (0.049)	0.120** (0.055)
Joint test of equal policy effects [2]	-		0.32			0.32		
PANEL A.2: HED Participation	**N=4,006/7,343**		**N=4,006**			**N=7,343**		
Policy variables coefficients (Bootstrapped Standard error)	-0.028 (0.054)	-0.116 (0.071)	0.007 (0.065)	-0.049 (0.071)	-0.042 (0.064)	-0.080 (0.078)	-0.136 (0.086)	-0.131 (0.084)
Joint test of equal policy effects	-		0.70			0.69		
Tests of Equal Policy Effects Between LED and HED groups: Participation (2002-2004) [3]								
Joint test of equal policy effects	0.10	0.01	0.23			0.05		
Separate tests (year-by-year)	-	-	0.63	0.07	0.09	0.11	0.01	0.01
PANEL B.1: LED Weeks of work	**N=20,414/39,354**		**N=20,414**			**N=39,354**		
Policy variables coefficients (Bootstrapped Standard error)	3.82** (1.59)	5.36** (2.42)	2.45 (1.70)	4.02** (1.77)	5.11** (1.95)	3.99 (2.49)	5.57** (2.50)	6.64** (2.73)
Joint test of equal policy effects	-		0.31			0.31		
PANEL B.2: HED Weeks of work	**N=4,006/7,343**		**N=4,006**			**N=7,343**		
Policy variables coefficients (Bootstrapped Standard error)	-1.53 (2.70)	-6.45* (3.62)	-0.30 (2.82)	-3.41 (3.57)	-1.12 (3.17)	-5.23 (3.64)	-8.33 (4.35)	-6.05 (4.02)
Joint test of equal policy effects	-		*0.39*			0.40		

- Effects of the policy on the cognitive development of children and hours spent in day care
- Data set NLSCY, children who are less than six, for effects on hours in day care
- Children who are 4 or 5 for the effects on cognitive achievement

Table 4: Estimated marginal effects (standard errors) of the policy on hours in daycare by children's age and mothers' level of education and cycle

Years	All children by age				
	<1	1	2	3	4
1998-1999 (cycle 3)	-0.88 (1.17)	1.94 (1.05)*	2.85 (1.71)*	1.86 (1.49)	1.66 (1.71)
2000-2001 (cycle 4)	6.03 (1.34)***	4.02 (1.38)***	7.75 (1.47)***	5.81 (1.37)***	5.28 (1.87)***
2002-2003 (cycle5)	7.48 (1.70)***	8.05 (1.59)***	10.49 (1.74)***	7.80 (1.68)***	7.03 (1.52)***
2004-2005 (cycle 6)	-0.45 (1.28)	9.48 (1.52)***	10.04 (1.86)***	8.68 (1.78)***	7.09 (2.14)***
Observations	9,979	16,046	10,327	13,052	9,836
H0: equal policy effects[1]	0.00	0.00	0.00	0.00	0.01
	Secondary diploma or less				
1998-1999 (cycle 3)	-0.77(1.75)	1.72 (1.63)	4.66 (2.86)	-1.45 (2.83)	-5.25 (2.57)**
2000-2001 (cycle 4)	3.49 (2.07)*	3.77 (2.33)	3.84 (2.15)*	1.57 (2.31)	2.52 (3.55)
2002-2003 (cycle5)	11.72 (3.28)***	4.25 (2.56)*	10.53 (2.96)***	5.69 (3.26)*	2.23 (2.57)
2004-2005 (cycle 6)	0.09 (1.75)	10.94 (2.62)***	12.95 (2.90)***	6.01 (3.07)*	2.99 (3.55)
Observations	3,022	4,917	3,293	4,292	3,172
H0: equal policy effects[1]	0.00	0.00	0.00	0.05	0.00
	University degree				
1998-1999 (cycle 3)	0.04 (1.92)	2.75 (1.74)	0.54 (2.51)	3.41 (2.22)	3.63 (2.82)
2000-2001 (cycle 4)	7.08 (2.13)***	6.48 (2.28)***	7.77 (2.29)***	7.39 (1.93)***	3.95 (2.52)
2002-2003 (cycle5)	8.20 (2.52)***	10.07 (2.39)***	9.48 (2.41)***	9.25 (2.42)***	9.46 (2.49)***
2004-2005 (cycle 6)	-1.31 (1.64)	8.19 (2.21)***	6.59 (2.99)***	10.34 (2.51)***	8.16 (3.11)***
Observations	4,632	7,391	4,809	5,938	4,461
H0: equal policy effects[1]	0.00	0.00	0.00	0.03	0.08

Source: Authors' estimation from the NLSCY Micro Data Files, cycles 1(1994-1995) to 6 (2004-2005). 1. p-value. Bootstrapped standard errors in parentheses: * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 3: PPVT-R Standardized Scores of children ages 4 and 5, Québec (QC), Rest of Canada (RofC) and Ontario, by cycle of the NLSCY and by mothers' level of education for the 5 year olds, Low (Led) and High (Hed)
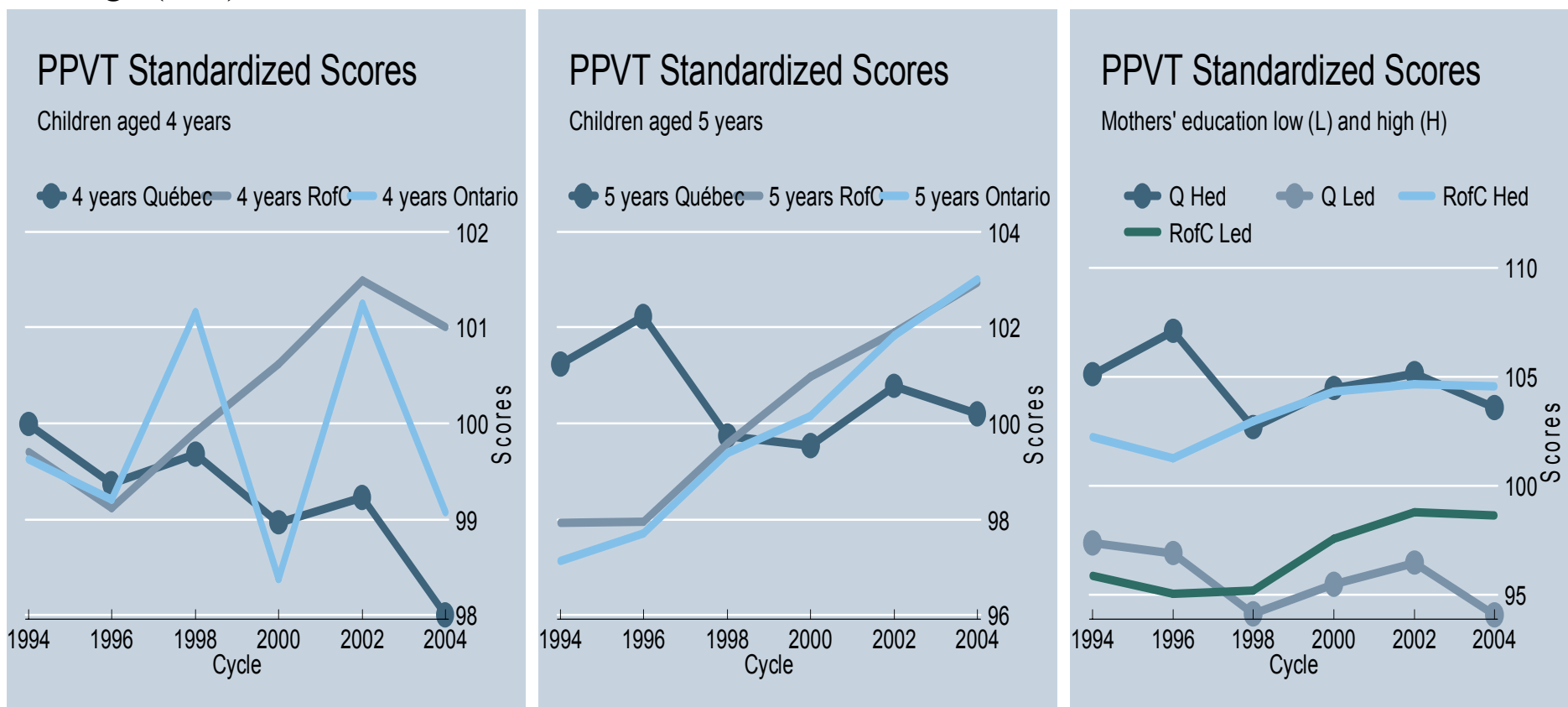
le 5: Impact of Québec's childcare policy on (bootstrapped standard errors in parenthesis)

ifications	(i) Uniform effect		(ii) Unequal effects			
	γ_{21} (cycle>=4)	β	γ_{21} (cycle>=4)	$\beta_{cycle\ 4}$	$\beta_{cycle\ 5}$	$\beta_{cycle\ 6}$
ples of 5 year olds			PPVT-SS - No covariate - (N=17,203)			
d and treatment	3.45***(0.54)	-4.28***(1.05)	3.45***(0.51)	-4.82***(1.30)	-3.65***(1.18)	-4.35***(1.51)
qual policy effects	-		0.61			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
			PPVT-SS – With covariates - (N=17,154)			
nd and treatment	2.66***(0.50)	-3.78***(0.99)	2.66***(0.50)	-4.16***(1.23)	-3.15***(1.11)	-4.02***(1.36)
qual policy effects	-		0.62			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
	PPVT-SS – Mother has Secondary Education Level or less - With covariates - (N=5,383)					
d and treatment	2.11**(0.82)	-3.78**(1.75)	2.08**(0.82)	-2.32 (2.25)	-3.81**(1.93)	-5.49**(2.39)
qual policy effects	-		0.43			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
	PPVT-SS – Mother has a University Education Level - With covariates - (N=7,758)					
d and treatment	2.59***(0.76)	-3.05**(1.38)	2.61***(0.76)	-3.34**(1.55)	-2.56 (1.64)	-3.18*(1.90)
qual policy effects	-		0.88			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
	PPVT-SS – Québec and Ontario - With covariates - (N=7,259)					
d and treatment	2.82***(0.80)	-4.05***(1.14)	2.85***(0.81)	-4.34***(1.36)	-3.55***(1.25)	-4.26***(1.48)
qual policy effects	-		0.75			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
	PPVT-Raw – With covariates - (N=17,179)					
d and treatment	3.16***(0.58)	-4.93***(1.21)	3.16***(0.58)	-4.74***(1.53)	-4.91***(1.36)	-5.18***(1.68)
qual policy effects	-		0.95			
$\beta = \gamma_{21}$ (p-value)	0.00		-			
ples of 4 year olds			PPVT-SS – No covariates - (N=8,901)			
d and treatment	1.49**(0.58)	-2.36*(1.25)	1.49**(0.58)	-1.90 (1.65)	-2.10 (1.51)	-3.22*(1.77)
qual policy effects	-		0.78			
$\beta = \gamma_{21}$ (p-value)	0.02		-			
			PPVT-SS – With covariates - (N=8,875)			
d and treatment	1.34**(0.55)	-1.29 (1.15)	1.37**(0.55)	-0.19 (1.56)	-0.93(1.40)	-3.05*(1.56)
qual policy effects	-		0.26			
$\beta = \gamma_{21}$ (p-value)	0.07		-			
	Mother has a Secondary Education Level or less – With covariates - (N=2,777)					
d and treatment	2.84***(1.01)	-3.83*(2.11)	2.92***(1.01)	-1.35 (2.73)	-3.42 (2.41)	-7.20***(2.76)
qual policy effects	-		0.15			
$\beta = \gamma_{21}$ (p-value)	0.02		-			
	Mother has a University Education Level – With covariates - (N=4,109)					
d and treatment	0.06 (0.76)	0.73 (1.64)	0.07 (0.76)	1.63 (2.42)	0.07 (2.12)	0.43 (2.13)
qual policy effects	-		0.83			
$\beta = \gamma_{21}$ (p-value)	0.74		-			
	PPVT-SS -Québec and Ontario – With covariates - (N=4,031)					
d and treatment	-0.37 (0.84)	0.55 (1.31)	-0.33 (0.84)	1.72 (1.72)	1.08 (1.52)	-1.37 (1.68)
qual policy effects	-		0.21			
$\beta = \gamma_{21}$ (p-value)	0.63		-			
	PPVT-Raw – With covariates - (N=8,891)					
d and treatment	1.52**(0.62)	-1.26 (1.44)	1.57**(0.62)	0.55 (1.98)	-0.76 (1.77)	-4.02**(2.00)
qual policy effects	-		0.13			
$\beta = \gamma_{21}$ (p-value)	0.12		-			

: No Covariate: All the controls presented in the table of descriptive statistics are excluded except: the policy variables which appear in
resent table; a dummy for the province of Quebec; dummy variables for English speaking children in Quebec and French speaking
en in the Rest of Canada; and a constant. Level of significance: * 10%; ** 5%; *** 1%.

Conclusion

➤ For participation, weeks and hours: the effects for the model without trends are very pronounced and statistically significant for both short and long-term effects, but long-term effects are significant for the lesser educated

➤ Thus the policy's long-term effects principally pertain to a class of people whose attachment to the labour market is traditionally weak: low educated mothers

- Effects on cognitive achievement are found to be negative and on hours in day care positive and very large.