

**THREE ESSAYS ON THE ECONOMICS OF
LABOUR AND THE FAMILY**

by

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DECLARATION OF CO-AUTHORSHIP

I hereby declare that the third paper of this dissertation (Chapter 4) incorporates material that is the result of joint research with Dr. Umut Oguzoglu. The extent of the co-authorship for the paper is explained below.

Chapter 4: “Labour supply of Australian men and women before and after divorce”

In this chapter, I identified the research question, performed the data cleaning, contributed to statistical design and econometric estimation and wrote the first and subsequent drafts of the manuscript. In this chapter, Dr. Oguzoglu advised on the appropriate econometric methodology and aided in the interpretation of results. Dr. Oguzoglu reviewed the preliminary and final drafts of the manuscript.

I hereby certify that, with above qualifications, this dissertation and the research therein is the product of my own work.

Abstract

This dissertation includes three papers that address various aspects of the economics of labour and the family. The dissertation integrates the discussion on the following issues: (1) the allocation of housework and childcare in Canadian two-earner households (2) the effect of family policy reform on time allocation and labour supply in two-parent families (3) effect of anticipated divorce and divorce duration on male and female labour supply.

The first paper *Time Allocation Gender Gap in Native-born and Foreign-born Families in Canada* focuses on the difference between the housework and childcare share produced by foreign-born husbands compared to Canadian-born husbands. This empirical analysis employs the data from the Canadian General Social Survey. The results show that foreign-born husbands have a lower share of housework and childcare compared to their Canadian-born counterparts.

The second paper *The effect of Quebec childcare policy change on the labour market outcomes and time distribution in the family* analyzes the effect of the childcare policy change that took place in Quebec in 1997-2000. The results show that the introduction of “\$5 per day” daycare subsidized by the Quebec government increased the labour supply of married mothers and also affected the allocation of time husbands and wives spend on housework and childcare. The data from this project were drawn from 1996 and 2001 Canadian Census.

The third paper *Labour supply of Australian men and women before and after divorce* studies the changes in the labour supply of men and women before and after divorce. The data for empirical analysis employs 12 waves of Household, Income and

Labour Dynamics in Australia Survey (HILDA). The outcome suggests that men and women do not change labour participation and weekly working hours in anticipation of divorce. Women increase labour force participation and weekly hours worked as a result of divorce. Men's labour supply does not change in response to divorce.

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Chapter 1. Introduction

This dissertation is composed of three papers in the field of family economics. Two issues are discussed throughout the dissertation. First, the research studies the time allocation of husbands and wives to unpaid labour within household. Second, the research analyzes the changes of labour supply of men and women based on external factors, such as an introduction of a childcare subsidy, and internal factors such as marital dissolution. The empirical results of the dissertation aim to provide a better understanding of the balance between economic and non-economic activities that in turn can aid in the formulation of public policies on welfare improvement.

The first paper (chapter 2) of this dissertation studies the determinants of the share of unpaid housework and childcare produced by husbands in Canadian households. In particular, the paper aims to capture the difference between housework and childcare input of Canadian-born husbands and their foreign-born counterparts while controlling for personal and household characteristics of respondents. The study also analyzes if immigrants from different regions of origin have similar patterns in housework and childcare time allocation and if immigrants change their housework and childcare preferences while living in Canada.

There is a large body of empirical literature on the determinants of household time allocation, housework in particular. In general, the literature shows that such factors as age of partners, their education and pre-marital endowment play important role in distribution of housework. The level of housework produced by husbands depends on household income and relative income earned by husbands and wives (Brayfield 1992; McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006; A. Parkman

2004; Alvarez and Miles 2003). The presence of children positively affects the volume of housework in households and the distribution of housework produced between husbands and wives (Douthitt 1989; McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006; Greenstein 1996; Alvarez and Miles 2003; Brayfield 1992).

There are two major gaps in the literature on household time allocation. First, the amount of research that focuses on household time allocation in families from different nations is rather limited due to the lack of data about foreign-born individuals and their immigration histories. The small number of existing studies showed that in immigrant families men are less involved in housework activities (Brayfield 1992; Frank and Hou 2013; Klaveren 2006). The literature found that ethnicity has an insignificant effect on the time spent by mothers on childcare, but did not focus on fathers' participation in childcare (Zaiceva and Zimmermann 2013). Second, due to the lack of data, many works studied childcare as a part of housework. Whenever housework and childcare were analyzed separately, the housework and childcare equations were estimated without recognition of the interdependence between them (McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006).

This paper contributes to the time use literature by incorporating a wider range of immigration parameters, including the region of origin of immigrants and the number of years immigrants live in Canada. Moreover, the absolute and relative time allocation to housework and childcare by husbands and wives is estimated using simultaneous estimation techniques. The results of this paper will be interesting to scholars and policy analysts who study household microeconomic decisions related to household production

The second paper (chapter 3) extends the study of time allocation within households by looking at the changes in time use brought by the reforms in government family policy. In particular, this study analyzes the impact of the Quebec universal childcare policy on the allocation of the housework and childcare time of Quebec mothers and fathers. The issues of parental labour supply are also covered in this paper in the context of family policy reform by comparing labour market outcomes in two-parent families in Quebec and the Rest of Canada.

In 1997-2000 the government of Quebec introduced a universal childcare policy reform which included the provision of subsidized daycare for zero- to four-year old children, the provision of subsidized pre- and after-school daycare for school-age children and full-time kindergarten for five-year-old children. As a result, this policy had a significant positive impact on the labour supply of mothers with small children (Baker, Gruber, and Milligan 2005; Lefebvre and Merrigan 2008; Lefebvre, Merrigan, and Verstraete 2009; Kottelenberg and Lehrer 2013). The labour supply of fathers did not get much attention from researchers.

The increase in the labour supply of mothers may affect the distribution of time spent on various activities not only by these women, but also by their husbands. The literature showed that parental roles in the family were redistributed in a more egalitarian manner. Researchers suggested that the departure from more traditional task allocation in families negatively affected parental well-being in Quebec (Stalker and Ornstein 2013; Brodeur and Connolly 2013). However, the literature did not study the effect of the childcare policy reform on the allocation of housework and childcare between husbands and wives explicitly.

This study aims to close the gap in the literature by analyzing the effect of the Quebec childcare policy reform on parental labour supply of both mothers and fathers. Moreover, the paper focuses on the effect of the policy on the allocation of housework and childcare between mothers and fathers of zero- to five-year-old children.

Similar to the second paper, the third paper of this dissertation (chapter 4) looks at the labour supply of men and women. In this paper, the labour supply is studied in the context of internal changes in family structure, in particular, marital disruption leading to divorce. First, the research is focused on those men and women who anticipate divorce in one to four years. Second, the research analyzes labour supply outcomes of those men and women who adjust to divorce during the one to five year period after divorce.

Existing literature showed that, in general, economic reasons play an important role in decisions about marital separation and divorce (GS Becker, Landes, and Michael 1977; d'Amico 1983; Ono 1998; Hoffman and Duncan 1995; Burgess, Propper, and Aassve 2003a; S. Bianchi et al. 2000). Research also found that men and women experience a negative impact of divorce on household and per-person income which is more severe for women than men (de Regt, Mortelmans, and Marynissen 2012; Smock 1993; Smock 1994; Poortman 2000; S. M. Bianchi, Subaiya, and Kahn 1999). Studies of the labour market reported that divorced women tend to spend more time on paid work (de Regt, Mortelmans, and Marynissen 2012; Parr 2012; de Vaus et al. 2014; Duncan and Hoffman 1985), while divorced men tend not change their labour supply preferences in response to divorce (Jarvis and Jenkins 1999; Finnie 1993; Mueller 2005).

There are several limitations of the previous studies of pre- and post-divorce periods. First, the data used in empirical analysis was taken from the surveys of 1980-

1990s (Özcan and Breen 2012). Second, the research employed cross-sectional or short-term longitudinal data sets and did not allow for the study of divorce in a dynamic context (for example, Schoen et al. 2002; Sayer and Bianchi 2000; de Regt, Mortelmans, and Marynissen 2012; Smock 1993; Smock 1994; Poortman 2000). Third, to our knowledge there is no research that combines analysis of labour market outcomes of individuals both before and after divorce.

This study adds to the literature by updating existing research using twelve waves of 2001-2012 Australian data. This paper analyzes the labour supply of individuals who divorce within the next one to four years and of those individuals who go through the divorce adjustment phase for one to five years. The estimations are used to identify if men and women change labour supply in anticipation of divorce and as a consequence of divorce.

The empirical approach in this dissertation uses a variety of econometric techniques based on the cross-sectional data of the Canadian General Social Survey and Canadian Census and longitudinal data of the Australian Household, Income and Labour Dynamics Survey. As a result, this dissertation addresses the issues of paid and unpaid labour supply in Canadian and Australian households. The key concepts include the difference of housework and childcare allocation in foreign-born families compared to Canadian-born families, the effect of the family policy reforms on the paid and unpaid labour supply in two-parent families and the effect of marital dissolution on the labour supply of men and women.

References

- Alvarez, Begona, and Daniel Miles. 2003. "Gender Effect on Housework Allocation: Evidence from Spanish Two-Earner Couples." *Journal of Population Economics* 16 (2): 227–242. <http://link.springer.com/article/10.1007/s001480200126>.
- Baker, Michael, Jonathan Gruber, and Kevin Milligan. 2005. "Universal Childcare, Maternal Labor Supply, and Family Well-Being." 11832. NBER Working Paper No. 11832.
- Becker, GS, EM Landes, and RT Michael. 1977. "An Economic Analysis of Marital Instability." *The Journal of Political Economy* 85 (6): 1141–1187. <http://www.jstor.org/stable/10.2307/1837421>.
- Bianchi, S M, L Subaiya, and J R Kahn. 1999. "The Gender Gap in the Economic Well-Being of Nonresident Fathers and Custodial Mothers." *Demography* 36 (2) (May): 195–203. <http://www.ncbi.nlm.nih.gov/pubmed/10332611>.
- Bianchi, SM, MA Milkie, LC Sayer, and JP Robinson. 2000. "Is Anyone Doing the Housework? Trends in the Gender Division of Household Labor." *Social Forces*. <http://sf.oxfordjournals.org/content/79/1/191.short>.
- Brayfield, April a. 1992. "Employment Resources and Housework in Canada." *Journal of Marriage and the Family* 54 (1) (February): 19. doi:10.2307/353272. <http://www.jstor.org/stable/353272?origin=crossref>.
- Brodeur, Abel, and Marie Connolly. 2013. "Do Higher Child Care Subsidies Improve Parental Well-Being? Evidence from Quebec's Family Policies." *Journal of Economic Behavior & Organization* 93 (September): 1–16. doi:10.1016/j.jebo.2013.07.001. <http://linkinghub.elsevier.com/retrieve/pii/S0167268113001674>.
- Burgess, Simon, Carol Propper, and Arnstein Aassve. 2003. "The Role of Income in Marriage and Divorce Transitions among Young Americans." *Journal of Population Economics* 16 (3) (August 1): 455–475. doi:10.1007/s00148-003-0124-7. <http://link.springer.com/10.1007/s00148-003-0124-7>.
- d'Amico, R. 1983. "Status Maintenance or Status Competition? Wife's Relative Wages as a Determinant of Labor Supply and Marital Instability." *Social Forces* 61 (4): 1186–1205. <http://sf.oxfordjournals.org/content/61/4/1186.short>.
- De Regt, S., D. Mortelmans, and T. Marynissen. 2012. "Financial Consequences of Relationship Dissolution: A Longitudinal Comparison of Formerly Married and Unmarried Cohabiting Men and Women." *Sociology* 47 (1) (November 5): 90–108. doi:10.1177/0038038512453793. <http://soc.sagepub.com/cgi/doi/10.1177/0038038512453793>.

- De Vaus, D., M. Gray, L. Qu, and D. Stanton. 2014. "The Economic Consequences of Divorce in Australia." *International Journal of Law, Policy and the Family* 28 (1) (February 6): 26–47. doi:10.1093/lawfam/ebt014. <http://lawfam.oxfordjournals.org/cgi/doi/10.1093/lawfam/ebt014>.
- Douthitt, Robin a. 1989. "The Division of Labor within the Home: Have Gender Roles Changed?" *Sex Roles* 20 (11-12) (June): 693–704. doi:10.1007/BF00288080. <http://link.springer.com/10.1007/BF00288080>.
- Duncan, G J, and S D Hoffman. 1985. "A Reconsideration of the Economic Consequences of Marital Dissolution." *Demography* 22 (4) (November): 485–97. <http://www.ncbi.nlm.nih.gov/pubmed/4076480>.
- Fernandez, Cristina, and Almudena Sevilla-sanz. 2006. "Social Norms and Household Time Allocation." 648.
- Finnie, Ross. 1993. "Women , Men , and the Economic Consequences of Divorce : Evidence from Canadian Longitudinal Data." *The Canadian Review of Sociology and Anthropology*. 30 (2): 205–241.
- Frank, Kristyn, and Feng Hou. 2013. "Cultural Influences Across Time and Space : Do Source-Country Gender Roles Affect Immigrant Women ' S Paid and Unpaid Labour Act Iivity ?" Catalog no. 11F0019M, no. 349. Analytical Studies - Research Paper Series.
- Greenstein, TN. 1996. "Husbands' Participation in Domestic Labor: Interactive Effects of Wives' and Husbands' Gender Ideologies." *Journal of Marriage and the Family* 58 (3): 585–595. <http://www.jstor.org/stable/353719>.
- Hoffman, Saul D, and Greg J Duncan. 1995. "The Effect of Incomes , Wages , and AFDC Benefits on Marital Disruption." *The Journal of Human Resources* 30 (1): 19–41.
- Jarvis, Sarah, and Stephen P. Jenkins. 1999. "Marital Splits and Income Changes: Evidence from the British Household Panel Survey." *Population Studies* 53 (2) (January): 237–254. doi:10.1080/00324720308077. <http://www.tandfonline.com/doi/abs/10.1080/00324720308077>.
- Klaveren, C Van. 2006. "A Collective Household Model of Time Allocation: A Comparison of Native Dutch and Immigrant Households in the Netherlands." 1753. CESifo Working Paper. <http://www.econstor.eu/handle/10419/25798>.
- Kottelenberg, Michael J., and Steven F. Lehrer. 2013. "New Evidence on the Impacts of Access to and Attending Universal Child-Care in Canada." *Canadian Public Policy* 39 (2) (June 1): 263–286. doi:10.3138/CP.39.2.263.

<http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CP.39.2.263>.

- Lefebvre, Pierre, and Philip Merrigan. 2008. "Child-care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada." *Journal of Labor Economics*. <http://www.jstor.org/stable/10.1086/587760>.
- Lefebvre, Pierre, Philip Merrigan, and Matthieu Verstraete. 2009. "Dynamic Labour Supply Effects of Childcare Subsidies: Evidence from a Canadian Natural Experiment on Low-Fee Universal Child Care." *Labour Economics* 16 (5) (October): 490–502. doi:10.1016/j.labeco.2009.03.003. <http://linkinghub.elsevier.com/retrieve/pii/S0927537109000323>.
- McFarlane, S, Roderic Beaujot, and Tony Haddad. 2000. "Time Constraints and Relative Resources as Determinants of the Sexual Division of Domestic Work." *Canadian Journal of Sociology* 25 (1). <http://www.jstor.org/stable/3341911>.
- Mueller, Richard E. 2005. "The Effect of Marital Dissolution on the Labour Supply of Males and Females: Evidence from Canada." *The Journal of Socio-Economics* 34 (6) (December): 787–809. doi:10.1016/j.socec.2005.07.023. <http://linkinghub.elsevier.com/retrieve/pii/S1053535705000387>.
- Ono, Hiromi. 1998. "Husbands' and Wives' Resources and Marital Dissolution." *Journal of Marriage and the Family* 60: 674–689.
- Özcan, Berkay, and Richard Breen. 2012. "Marital Instability and Female Labor Supply." *Annual Review of Sociology* 38 (1) (August 11): 463–481. doi:10.1146/annurev-soc-071811-145457. <http://www.annualreviews.org/doi/abs/10.1146/annurev-soc-071811-145457>.
- Parkman, Allen. 2004. "Bargaining Over Housework. The Frustrating Situation of Secondary Wage Earners." *The American Journal of Economics and Sociology* 63 (4).
- Parr, Nick. 2012. "Trends in Differentials in the Workforce Participation of Mothers with Young Children in Australia 2002–2008." *Journal of Population Research* 29 (3) (June 22): 203–227. doi:10.1007/s12546-012-9089-2. <http://link.springer.com/10.1007/s12546-012-9089-2>.
- Poortman, Anne-Rigt. 2000. "Sex Differences in Theeconomic Consequences of Separation: A Panel Study of the Netherlands." *European Sociological Review* 16 (4): 367–383.
- Sayer, L. C., and S. M. Bianchi. 2000. "Women's Economic Independence and the Probability of Divorce: A Review and Reexamination." *Journal of Family Issues* 21

(7) (October 1): 906–943. doi:10.1177/019251300021007005.
<http://jfi.sagepub.com/cgi/doi/10.1177/019251300021007005>.

Schoen, Robert, Nan Marie Astone, Kendra Rothert, Nicola Standish, and Young Kim. 2002. “Women ’ S Employment , Marital Happiness , and Divorce.” *Social Forces* 81 (2): 643–662.

Smock, Pamela. 1993. “The Economic Costs of Marital Disruption for Young Women over the Past Two Decades.” *Demography* 30 (3): 353–371.
<http://link.springer.com/article/10.2307/2061645>.

———. 1994. “Gender and the Short-Run Economic Consequences of Marital Disruption.” *Social Forces* 73 (1): 243–62.

Stalker, Glenn, and Michael Ornstein. 2013. “Quebec, Daycare, and the Household Strategies of Couples with Young Children.” *Canadian Public Policy* 39 (2) (June 1): 241–262. doi:10.3138/CPP.39.2.241.
<http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CPP.39.2.241>.

Zaiceva, Anzelika, and Klaus F. Zimmermann. 2013. “Children, Kitchen, Church: Does Ethnicity Matter?” *Review of Economics of the Household* 12 (1) (February 2): 83–103. doi:10.1007/s11150-013-9178-9. <http://link.springer.com/10.1007/s11150-013-9178-9>.

Chapter 2. Time Allocation Gender Gap in Native-born and Foreign-born Working Couples in Canada

Abstract

In this paper the Canadian Time Use Survey (CTUS) is used to study the allocation of time in Canadian two-earner households, with special emphasis on the role of the family's immigration history and ethnic background. Regression results show that immigrant men have a lower share of hours spent on household work compared to Canadian-born men. Moreover, this pattern of time allocation in first generation immigrant families affects the time allocation in second generation immigrant families. The joint estimation of the husband's housework share and child care share leads to the loss of significance of the immigration variable in both equations.

JEL-Codes: D13, J2

Keywords: Unpaid work, intra-household allocation of time

2.1. Introduction

Increasing female participation in the labour market since the 1950s (Blau, Ferber, and Winkler 2010) affected the time allocation patterns between husbands and wives in three ways. First, the increase in time wives spend working reduced their time available for household chores, childcare and leisure, which resulted in wives' "own time substitution" (Deding and Lausten 2006). For example, in the United States married women increased their labour market participation by 16.3 hours from 1978 to 2000. Higher hours of work in the labour market were offset by a decrease in household production of 11.2 hours per week during the same period (Blau, Ferber, and Winkler 2010).

Second, the increase in female market work led to "cross-spouse/same activity substitution" as male labour market participation declined (Deding and Lausten 2006). For example, between 1980 and 2006 in Australia, Austria, Ireland, Italy and Spain 12-20% more women participated in the labour force, while men's participation decreased by 2-9% (Blau, Ferber, and Winkler 2010). Finally, the increase in female labour market participation resulted in the "cross-spouse/different activity substitution" when husbands adjusted the amount of time spent on household work (Deding and Lausten 2006). Empirical evidence suggests that factors such as relative wages, relative educational attainment, advanced technologies, a tendency for smaller families and the opportunity to substitute housework with the purchase of market goods and services explains the change in total hours of housework and the share of husbands' housework hours. At the same time, cultural norms about gender roles influence the bargaining power of wives and affect the absolute and relative hours husbands and wives spend doing housework. The extent to which these norms can be exported from the country of

origin of immigrants and then assimilated in the host country would affect the gap between the time allocating preferences of immigrants compared to native-born individuals.

This study adds to the existing literature on the allocation of household time use in three ways. First, the analysis of the four latest Canadian Time Use Surveys (CTUS) cycles determines personal and household characteristics, in particular immigration background, that affect the proportion of unpaid work produced by Canadian husbands. Second, the husband's share of child care is estimated jointly with the housework share. Third, controlling for the period of immigration and time allocation in second generation families, the persistence of traditional time allocation norms is considered. The empirical findings of the paper could assist in formulation of public policies on adaptation and social welfare of immigrants.

The paper is organized as follows: Section 2.2 includes an overview of theoretical and empirical literature on determinants of housework time allocation. Section 2.3 presents sample selection strategy and summary statistics. Section 2.4 explains model specification and provides a variables description. Section 2.5 reports regression results. Section 2.6 makes a summary of empirical findings.

2.2. Background and literature review

Theoretical Background of Family Distribution Models

Family economics covers a wide scope of time allocation and income distribution models. In the early literature, unitary models considered a household consisting of several individuals cohabitating together and having similar preferences. As a result, these individuals maximized joint preferences subject to a pooled family budget

constraint (Gary Becker 1974; Samuelson 1956). Samuelson (1956) constructed a household utility function consisting of the individual utility functions of family members. The agreement among household members allowed maximizing their joint utility and pooling their incomes together. Solutions led to family demand functions that depended on prices and pooled incomes and analyzed the consumption behavior of the family as a whole. Becker (1974) introduced a slightly different analysis of household utility maximization. He assumed a head of the family who would take into account the preferences of the rest of the family members and on the basis of his knowledge and who would make decisions for the entire household.

There are several problems associated with the unitary approach. First of all, the unitary approach ignores the fact that individual preferences of family members may differ from each other. Income pooling did not allow the analysis of how the distribution of income affects bargaining power and decision-making processes within families. Moreover, such factors as financial well-being, the level of education and family status of both partners before marriage, market and non-market labour distribution, and the number of children could significantly shift the bargaining and decision-making power among individuals within the family. The unitary approach did not study the effect of a change in personal incomes of family members, as well did not consider the possibility of divorce in families decision making. At the same time empirical estimates showed that the change in a spouse's income is important and affects consumption distribution within families (Manser and Brown 1980; Browning and Chiappori 1998; Lundberg and Pollak 1993).

Cooperative games of family behavior were introduced by Manser and Brown (1980) and McElroy and Horney (1981) and were characterized by joint maximization of the household utility function through Nash bargaining by spouses. Individual utilities inside and outside the marriage were compared. Manser and Brown introduced a divorce as a threat point. Husband and wife considered separation if a bargaining solution could not be found. Mutual love and care about each other were expressed as extra surplus that people get in marriage. McElroy and Horney went the other way and considered a decision to get married as a threat point. The surplus obtained from marriage was assumed and was not expressed directly.

Cooperative models were criticized by Lundberg and Pollak (1993) mainly because they lead to the anonymity result: income distribution within a family did not affect individual consumption decisions. Thus Lundberg and Pollak introduced the model of “separate spheres bargaining” allowing each individual to face his/her own budget constraint. The authors claimed that family behavior is heavily affected by “gender roles” assigned by society. Lundberg and Pollak also added exogenous social norms to emphasize gender specialization within the family and, in particular, the role of the husband as a primary income earner and the wife as a housekeeper. The authors claimed that the result of non-cooperative behavior within the marriage could be a good alternative to a costly divorce. The distribution of public goods depended not only on the total resources of the family, as in the cooperative game model, but also on who controls these resources. As a result, the spouse’s utility depended positively on the resources held by his or her partner and the provision of public goods by the husband or wife. There were two possible equilibria: partners could choose a positive amount of the public good

to supply to the household, or they could choose a corner solution in which the public good was provided by only one family member while the other free-rides. Thus, the Lundberg and Pollak model leads to two types of equilibria – with and without anonymity.

Chen and Woolley (2001) explicitly included a caring parameter to the non-cooperative model. They studied the effect of a monetary transfer between spouses on the bargaining results and equilibria. They concluded that the equilibrium outcome would depend on the threshold levels of the transfer amount, the man's caring factor about his wife, and the woman's bargaining power.

Thus, in non-cooperative games the members of the household make their decision independently from each other but take into account the action of a partner. As a result, they achieve a Cournot-Nash solution. Non-cooperative bargaining models presented the internal threat points other than costly divorce (Leuthold 1968; Chen and Woolley 2001; Konrad and Lommerud 1995; Konrad and Lommerud 2000; Lundberg and Pollak 1993).

Empirical literature on housework and childcare time distribution

There is a large empirical literature on the determinants of household time allocation, housework in particular. In two-earner families such factors as personal and household income, spouses' age and education, number and age of children were found to be important factors in husbands' and wives' housework time allocation decisions. In general, the literature showed that increases in household income leads to a higher share of housework produced by husbands (McFarlane, Beaujot, and Haddad 2000). Women who earn more than their husbands decrease the absolute and proportional amount of

time spent on housework compared to their husbands (Brayfield 1992; Fernandez and Sevilla-sanz 2006; A. M. Parkman 2004). Similarly, higher husbands' earnings share negatively affects male participation in housework (Alvarez and Miles 2003; Brayfield 1992; Greenstein 1996). Studies of the labour force status of respondents do not entirely agree on how this affects the allocation of domestic work in the family. Hamdad (2003) estimated that working women reduce housework production compared to their unemployed counterparts, while their employed husbands increase household production compared to unemployed husbands. Some studies found no significant influence of labour force status of the respondent or spouse on the allocation of household chores (Brayfield 1992). Other studies showed that women reduce the amount of non-paid domestic labour when they are employed, while husbands' employment did not have significant impact (Douthitt 1989). Bianchi (2011) showed that both part-time and full-time employment reduces housework participation of husbands and wives.

It was also found that with age women do more household chores compared to their husbands (Bayudan 2006; McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006; Frank and Hou 2013; Brayfield 1992) while men with age do less housework (S. Bianchi 2011). At the same time, the hours spent on a particular activity might vary. For example, Parkman (2004) showed that as women age, they increase cooking and outdoor activities, while both spouses reduce number of hours spent on indoor cleaning. The literature showed that more educated husbands do a larger proportion of the total housework, but there is no clear conclusion about effect of higher educational attainment on the absolute amount of time spent on housework by husbands

and wives (Fernandez and Sevilla-sanz 2006; A. M. Parkman 2004; Alvarez and Miles 2003; Frank and Hou 2013; Brayfield 1992; S. Bianchi 2011).

An increase in family size positively affects the volume of housework to be done; therefore, the number of housework hours allocated by both husband and wife increases (Douthitt 1989). At the same time it was found that the husband's share of housework decreases in larger families (McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006; Greenstein 1996; Alvarez and Miles 2003; Frank and Hou 2013; Brayfield 1992).

Previous studies showed that immigration history and the country of origin play an important role in the time allocation within households. Immigrant couples share housework differently compared not only to their native born counterparts, but also to immigrants from other source countries depending on the gender roles perceptions in the society. Married women who emigrated from countries with high female-male education rates and female-male labour market participation rates produced a lower share of housework after immigration (Frank and Hou 2013). Klaveren (2006) found that Dutch immigrants have different attitudes towards labour market and housework distribution between husbands and wives based largely on the source country. For those who emigrated from Turkey, household production had the strongest negative effect on male utility while the strongest positive effect on female utility compared to the immigrants from Surinam or Dutch Antilles and native Dutch. Moreover, labour income had the largest positive impact on Turkish immigrant men's utility. This difference in preferences showed that the attitude towards traditional gender task allocation between the husband and the wife varies from country to country and remains persistent after immigration.

Many immigrant men and women adjust their attitude towards gender roles in paid and unpaid labour markets after arrival in Canada. For example Haddad and Lam (1988) interviewed 117 Canadian men who immigrated to Canada from Asia, South and West Europe, West India and the Middle East and asked about their attitude towards housework chores allocation between husband and wife. The authors concluded that 75% of the immigrant men supported the division of gender roles in the home country. However, only 12% of respondents did not change their traditional attitude towards domestic labour sharing upon coming to Canada. In addition, 32% of immigrants responded that they did only a minimal amount of household chores due to some “situational constraints”, such as the social influence of the immigrant community in Canada. The rest of the immigrants (more than 55%) adjusted their share of household production after arriving in Canada according to their and their wives’ labour market status.

Years since immigration affect housework time allocation in immigrant families as well. Frank and Hou (2013) showed that women who immigrated in the 1970s and the beginning of the 1980s did a higher share of housework than their husbands, although every year of living in Canada reduced their absolute involvement in domestic production. In contrast, Craig (2007) found that women increased both paid and unpaid hours upon immigration, including childcare and had to reduce personal care and leisure time. Ribar (2012) found that first generation American immigrant males did less domestic work compared to the third generation males and American-born, while first generation females did more housework compared to the third generation females and American-born.

Many data sets do not contain information about immigration history and the country of origin of respondents. Therefore language proficiency was often included as a proxy for ethnicity and immigration status. For example, it was found that Canadian men who spoke a language other than English or French did a significantly lower proportion of feminine tasks such as cooking and in-door cleaning; moreover, French speaking husbands had a lower share of housework compared to their English-speaking counterparts (Brayfield 1992). Women who immigrated to Canada from English or French speaking countries and those who were married to non-immigrant husbands did significantly less household work (Frank and Hou 2013).

The time use literature that investigates the relationship between hours spent by spouses on childcare and housework is scarce. Very often child care is included as a part of unpaid work along with housework (R. Beaujot 2005; Craig 2007; Bonke and Jensen 2012).

At the same time, the presence of children affects time distribution of full-time working couples between household chores, childcare and leisure. First, larger families have a higher demand for household production, and both fathers and mothers spend more time on cooking, indoor and outdoor cleaning and other chores. Second, children, especially at a young age, require care from their parents. The parents have to reduce housework, leisure and personal care activities to spend more time with children. McFarlane, Beaujot, and Haddad (2000) showed that both fathers and mothers spend more time on household production and child care compared to respondents without children. They found that mothers with more children older than 5 years old increase housework time, but reduce child care time, while fathers' housework time is affected

neither by the number nor by the age of children, but child care time is negatively affected by these variables. Haddad (1994) also concluded that men with older children are less likely to participate in child care and housework. Fernandez and Sevilla-sanz (2006) showed that mothers with younger children have a higher share of child care in the family.

Not only personal and household characteristics weakly affect the amount of time parents spend on childcare. Haddad (1994 and McFarlane, Beaujot, and Haddad (2000) found that only longer hours of paid work negatively affect child care time of fathers. Bianchi (2011) also showed that labour force status of both mothers and fathers plays significant role in child care time distribution. An increase in female labour force participation between 1965 and 2008 led to a decline in hours mothers spend looking after children, while fathers increased child care time. Fathers do more child care when they have missing incomes or better education (Haddad 1994; Deding and Lausten 2006). Fernandez and Sevilla-sanz (2006) and Sevilla-Sanz, Gimenez-Nadal, and Fernandez (2010) showed that better education of mothers negatively affects their share of child care in the family. Older mothers and those with lower educational attainment (high school graduates) tend to do less child care (Bonke and Deding 2008; Bayudan 2006).

The works discussed above in the majority of cases analyze the absolute amount of time parents spend on childcare. Besides that, child care and housework equations are estimated separately (Tony Haddad 1994; McFarlane, Beaujot, and Haddad 2000; Fernandez and Sevilla-sanz 2006) and do not take into account the fact that these two decisions depend on each other. This work will jointly estimate the relative allocation of

time between fathers and mothers and study whether the immigration parameter has a significant impact on the child care share.

2.3. Sample Selection and Summary Statistics

The data for empirical analysis was drawn from the Canadian Time Use Survey (CTUS) conducted as a part of the Canadian General Social Survey (GSS) in 1986, 1992, 1998, 2005, and 2010 by Statistics Canada and available through the Manitoba Research Data Center (RDC). The GSS was introduced in 1985 with its primary purpose to collect data about living conditions of the population over time as well as study the effect of public policies. Every year the GSS focuses on some specific aspect of life, such as health, victimization, education, work and retirement, social support, engagement and time use. The CTUS is conducted in the form of a telephone interview and collects information about time allocation of the respondent and his or her partner as well as personal and household characteristics. The time use data is collected with the help of a time use diary (the record of respondents' activity during a 24-hour period) and questions asking the respondent to estimate time spent on unpaid work activities during the previous week. The sample sizes in the CTUS in 1992, 1998, 2005 and 2010 were 9,815, 10,749, 19,597 and 15,390 respondents respectively.

Two subsamples were constructed to analyze the allocation of time spent on household chores and childcare by partners¹. The first subsample is used to analyze time allocation of couples on housework. The second subsample is used to study time allocation of the couple between housework and child care. Both subsamples include

¹ In the paper the term partner is used to identify individuals living in marital or common-law relationships. The terms husband and wife are used here to highlight the difference between male and female partners.

pooled cross sectional data sets based on the 1992, 1998, 2005 and 2010 CTUS cycles. The 1986 CTUS cycle was not used in the research due to lack of data about the personal characteristics and time use of the respondent's partner. In each CTUS cycle the sample size was restricted to married or common-law couples, aged 20-64 years, working full-time and declaring employment as a major income source. The first subsample was limited to couples without children or nuclear families with single children younger than 25. As a result of these restrictions, the size of the first pooled subsample was reduced to 4,012 families. The second subsample consisted of couples with children and included 2,274 households.

The restrictions above, first, rule out the situations in which partners in one-earner households might specialize in paid and unpaid work. Second, the sample does not include couples who live with parents or other adults. Their inclusion may alter the household chores allocation between partners and may increase the probability that the household income is supplemented by incomes of other household members. The cases in which some respondents or their partners declared full-time employment, but did not work during the time of the survey (for example due to vacation, health or maternity leave) were controlled by the inclusion of dummy variables in the regression analysis.

Even though the CTUS is a rich data set, it is limited in several ways. First, the cross sectional CTUS design does not allow for a dynamic analysis of time allocation. Second, while CTUS collects very detailed data about respondents, questions about other household members were limited to some spousal personal characteristics and time use. The data on spousal time use is not only limited, but also might be misreported, since this information is collected from the answers of the respondent. In addition, the immigration

history of the partner was not recorded until 2010. Given that, in this study “immigrant family” or “foreign-born family” had to be defined as one in which at least one partner (the respondent) was born outside of Canada. This definition of immigrant families ignores the possibility the foreign-born (FB) respondents may marry Canadian-born respondents (CB) individuals, CB respondent may marry FB individuals and FB husband and wife may be from different countries (regions) of origin.

The pooled sample included data from 4,012 families combined from the 1992, 1998, 2005 and 2010 GSS data sets (table 2.1). The subsample of immigrants included 578 (14.4%) families. On average, FB husbands and wives were two years older compared to CB. Immigrant husbands and wives had higher educational attainment compared to their CB counterparts. CB husbands and wives reported higher personal incomes compared to immigrant husbands and wives. Lower personal incomes of FB men and women resulted in \$2,000 smaller household incomes in immigrant households, by \$2,000 on average. Husbands’ income share was 57% in CB families, while it was 56% in FB families. The average number of children in CB and FB families was 1.83 and 1.85, respectively.

Insert Table 2.1 here

Table 2.2 provides summary statistics of time use data for the pooled sample. Estimated share of housework done by husbands was 38.8% in the CB sample and 36.8% in the FB sample. These estimates were very close to the housework shares estimated on

the basis of six waves of the Canadian Census (Frank and Hou 2013)². In CB families, the husbands' share of time spent on housework was 2% higher than the same ratio in the immigrant families. Both Canadian-born and foreign-born wives allocated at least 5 hours more on household production compared to their husbands. The difference does not seem to be very large; however, the housework in the present context includes not only traditionally feminine activities, but also house, car and yard maintenance, which overestimates the husbands' every day involvement in housework. While house, car and yard maintenance are important housework tasks, they are not done on a regular ongoing basis similar to cooking and indoor cleaning.

Insert Table 2.2 here

Family size positively affects the absolute amount of housework that needs to be produced. Mothers and fathers also have to allocate time on looking after their children. To do so, parents may reduce time spent on labour market activities, leisure, personal care, and housework. Table 2.3 below compares hours spent on housework by husbands and wives with children and hours spent on housework by husbands and wives without children. First, it is observed that the total hours of housework is higher in CB and FB families with children. Both husbands and wives with children spend more hours on domestic work than those without children. CB mothers do six hours more housework and FB mothers do five hours more housework compared to their childless female counterparts. The difference in housework hours of husbands with and without children is

² Frank and Hou (2013), using Canadian CENSUS data, estimated wives' share of housework as 66.9% for CB compared to 68.2% for FB in 1996 and 62.2% for CB compared to 64.6% for FB in 2006.

more modest: two hours per week for CB fathers and one and a half hours for FB fathers. As a result, the fathers' share of housework was 37% in Canadian families and 35% in FB families.

Insert Table 2.3 here

CB and FB families spent on average 60 and 50 weekly hours caring for children. CB mothers reported 17 hours per week more childcare compared to CB fathers, while FB mothers reported only 9 childcare hours more than FB fathers. The husbands' share of childcare was 38% in CB families compared to 32% in FB families. Overall, the average share of time husbands spent on housework and childcare together was 35% in CB households, and 33% in FB households.

Figure 2.1 below displays the allocation of time between CB and FB husbands and wives in 1992, 1998, 2005 and 2010. In general, in every year wives spent a significantly larger number of hours on housework compared to husbands in both the CB and FB samples. Wives and husbands in the FB sample did less housework compared to their counterparts in the CB sample. Both men and women reduced the number of housework hours from 1992 until 2005, but in 2010 the time spent on household production increased in both CB and FB families. This increase in household production may reflect the outcomes of the 2009 financial crises and possible reduction of household incomes compared to the pre-2009 period. The household income comparison showed that household income on average was growing by \$10,000 per period until 2005 (1992-1998, 1998-2005), while it increased by \$3,000 between 2005 and 2010³.

³ Source: authors calculations, not reported in the paper.

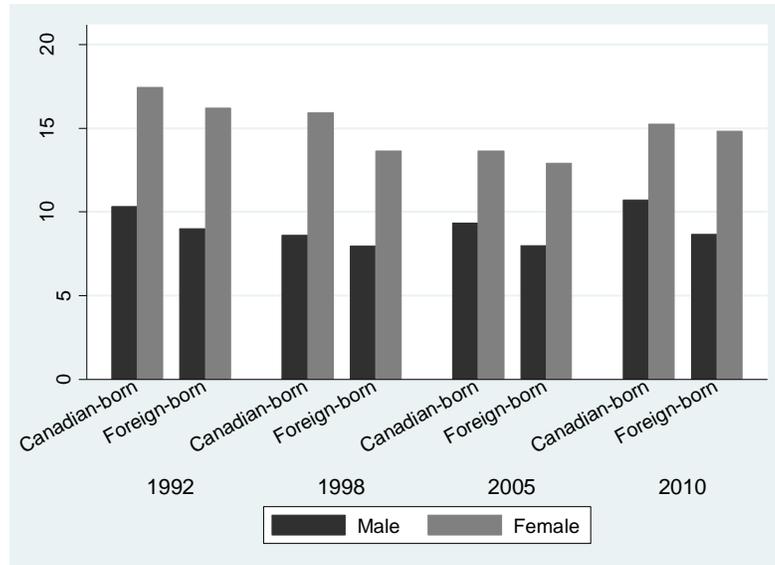


Figure 2.1. Housework in Canadian-born and foreign-born samples

The analysis of absolute time shows that FB husbands did fewer hours of housework compared to their CB counterparts. Moreover, the husbands' housework share was smaller for immigrants. Only in 1998, due to a sharp decrease in immigrant wives' hours of domestic labour, did FB husbands produce a larger share of housework compared to CB husbands. In 1992 CB husbands had a 37.2% share of housework compared to a 33.7% share for FB husbands. In 1998 CB husbands produced 35.6% of housework, while FB husbands produced 36% of the housework. In 2005 the husbands' share of domestic work was 39% in both the CB and FB samples. In 2010 CB husbands increased their domestic work share to almost 41% and immigrant husbands reduced the share to 36.7%.

Figure 2.2 illustrates the pattern of absolute household time allocation for CB and FB husbands and wives by income group. Those CB men who were in the lowest household income group (income below \$40,000), had the lowest domestic production. They increased domestic household hours at higher income levels, but did not change them dramatically. Foreign-born men increased housework participation with the higher

levels of income (still producing less than CB husbands), but at income levels of \$80,00 and higher, they reduced housework hours. CB wives from lower income groups tended to spend the most hours on domestic work, but when household incomes increased above \$60,000, they decreased household production by about 3-4 hours. Immigrant women spent the most hours on housework when their household income was in the range between \$40,000 and \$80,000. The richest FB wives worked the least hours at home.

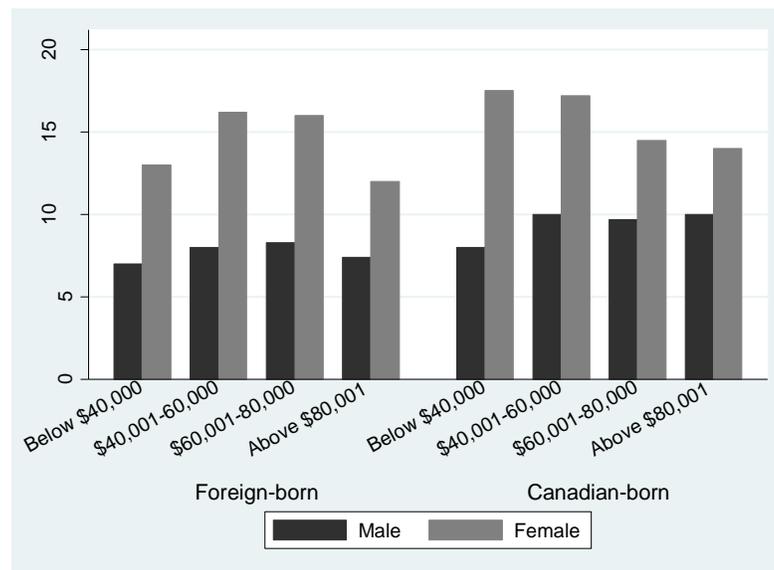


Figure 2.2. Housework in Canadian-born and foreign-born samples: by household income.

2.4. Model Specification

Data analysis was carried out using the two-limit TOBIT model since the dependent variable, the share of husband's housework α_i , is a censored variable that takes values from 0 to 1. Two model modifications were used in empirical estimation. The first model modification aims to analyze the factors affecting husbands' share of unpaid work including housework and house maintenance in families with or without children. The two-limit TOBIT model is specified as the following:

$$\alpha_i^h = X_{ki}\beta_k + HH_i\gamma_i + IM_i\mu_i + \varepsilon_i \quad [2.1]$$

$$\alpha_i^h = \begin{cases} \alpha_i^{h*} & \text{if } \alpha_{iL}^h < \alpha_i^{h*} < \alpha_{iU}^h \\ \alpha_{iL}^h & \text{if } \alpha_i^{h*} = 0 \\ \alpha_{iU}^h & \text{if } \alpha_i^{h*} = 1 \end{cases}$$

Where $\alpha_i^h = \frac{h_{i,m}}{h_{i,m}+h_{i,f}}$ is the share of time the husband spends on housework in household i . $h_{i,m}$ here is the number of hours the husband spent doing unpaid housework last week. Housework included cooking, cleaning, grocery shopping and laundry for the household and any unpaid work to maintain or improve the house, yard or automobile. $h_{i,f}$ represents time spent on similar activities done by the wife. The definition of housework includes not only traditionally feminine activities such as cooking and cleaning, but also traditionally masculine activities such as house, yard, and automobile maintenance. The inclusion of the latter activities positively affects husbands' housework hours and may not capture the specialization of husbands and wives in "masculine" and "feminine" jobs. More specific composition of housework can be calculated using the 24-hour CTUS time-use diary, but this data is available only for one partner. Since the study aims to analyze the relative allocation of housework between the partners, more general definition of housework was used in this paper.

The second model modification aims to analyze how partners with children allocate their time when they have to do household chores and childcare. The simultaneous two-limit TOBIT model is specified as the following:

$$\alpha_i^h = X_{ki}\beta_k + HH_i\gamma_i + IM_i\mu_i + \varepsilon_i \quad [2.2]$$

$$\alpha_i^h = \begin{cases} \alpha_i^{h*} & \text{if } \alpha_{iL}^h < \alpha_i^{h*} < \alpha_{iU}^h \\ \alpha_{iL}^h & \text{if } \alpha_i^{h*} = 0 \\ \alpha_{iU}^h & \text{if } \alpha_i^{h*} = 1 \end{cases}$$

$$\alpha_i^{ch} = X_{ki}\beta_k + HH_i\gamma_i + IM_i\mu_i + \varepsilon_i \quad [2.3]$$

$$\alpha_i^{ch} = \begin{cases} \alpha_i^{ch*} & \text{if } \alpha_{iL}^{ch} < \alpha_i^{ch*} < \alpha_{iU}^{ch} \\ \alpha_{iL}^{ch} & \text{if } \alpha_i^{ch*} = 0 \\ \alpha_{iU}^{ch} & \text{if } \alpha_i^{ch*} = 1 \end{cases}$$

Equation [2.2] is identical to the equation [2.1] in the model 1. In equation [2.3],

$\alpha_i^{ch} = \frac{ch_{i,m}}{ch_{i,m}+ch_{i,f}}$ is the share of time the husband spends on childcare in household i .

$ch_{i,m}$ is the number of hours the husband spent on childcare last week. $ch_{i,f}$ represents the time spent on similar activities by the wife. These variables were constructed from the following CTUS questions: *Last week, how many hours did you spend looking after one or more children living in your household, without pay?* and *Last week, how many hours did your spouse spend looking after one or more children living in your household, without pay?*⁴

In both models X_{ki} represents a set of personal characteristics of husbands and wives such as age, education and personal incomes, HH_i represents a set of household characteristics including household income, number of children and their age; IM_i represents the set of variables indicating the immigration background of respondents.

Three different model specifications were used based on the immigration variables. The first set of models was controlled for respondent who were not born in Canada. The regressions included the various combinations of personal and household characteristics, such as age, education and labour force status of partners, absolute and relative household income and the number of children. In the second set of regressions,

⁴ Childcare is defined in the CTUS as the activities including household work for zero- to five-year-old children living in the household. The definition of childcare in this paper is more broad and includes time spent looking after zero- to fourteen-year-old children living in households.

immigration status was included as categorical set of dummy variables indicating *years since immigration*. The third set of regressions controlled for the *region of origin* of immigrants. A more explicit description of explanatory variables is presented below.

As described earlier, *immigrant* is a dummy variable which takes the value of 1 if the person was not born in Canada. Official immigration status is not taken into account, so immigrants in the present context are individuals who were born outside Canada and resided in Canada during the time of survey. These individuals could be landed immigrants, permanent residents or temporary residents.

Years since immigration is constructed as a set of dummy variables to indicate those immigrants who came to Canada within the past 3 years, 4-8 years ago, 9-18 years ago or more than 19 years ago. The reference group is the Canadian-born population.

The *region of origin* of the immigrant differentiates Canadian-born respondents from immigrants who came from North America, South and Central America, Europe (including USSR), Africa and Asia (including the Middle East). The limitation of this variable is that the region of origin could include countries with very different cultural backgrounds and attitudes toward male – female task allocation. A *country of origin* variable was not used since in some cases the number of respondents from a specific country did not exceed the minimum limit set by the RDC.

The *second generation* dummy variable indicates individuals who were born in Canada, but at least one of their parents was born outside of Canada. The inclusion of this variable tests if second generation immigrants mimic the time allocation behavior of their parents or share housework similarly to Canada-born couples.

The age of partners is reflected in two variables: the *husband's age* and the *age difference*. The latter variable was included to test if women older than their husbands have more bargaining power and therefore do less household work. Similarly, older husbands are expected to do a lower proportion of the household work in comparison to their wives.

Education variables available in the GSS reflect the highest level of education obtained by the respondent and partner. The *husband's education group* identifies whether the husband obtained undergraduate or graduate education or not. The *difference in education* variable identifies if both partners have the same educational level, if the wife is more educated or if the husband is more educated.

The *log of household income* was included to control the ability of households at higher income levels to substitute household work for market-produced goods. The *husband's share of household income* was included since earlier research showed that a higher income share reduces the amount of the household work done by the husband. Personal and household income data available in the GSS is given in categorical format, indicating the income groups of the respondent and his or her household. The personal and household incomes were approximated by taking the midpoint between the lower and higher boundaries of each income group. Therefore, the income share earned by the husband variable reflects not the actual income proportion, but the fact that the partners are in different income groups. As a robustness check, a set of *difference in income* dummy variables was created to indicate families in which the husband earned more than the wife and families in which the wife earned more than the husband. The regression results that employ *husband's income share* and income difference variables

give consistent results.

As discussed above, the dummy variables *husband didn't work last week* and *wife didn't work last week* were included to account for partners who declared full-time employment labour force status, but did not work last week.

Number of children was included to account for the higher amount of housework to be done in larger families and possibly extra housework help received from the children. The model of housework and childcare time allocation based on the second subsample was controlled for the presence of zero- to four-, five- to twelve-, and thirteen- to fourteen-year-old children. Finally, dummy variables controlling for the year of the survey were added. 1992 was chosen as the base year.

2.5. Regression Results

2.5.1. *Husbands' share of housework*

Table 2.4 below presents the set of TOBIT results for the first model specification (equation [2.1]). In this model specification the dummy variable *immigration* was used to distinguish CB husbands and wives from FB husbands and wives. Columns from 1 to 7 include various model specifications to track if there is any change in the significance of the immigration variable due to inclusion of personal or household characteristics. The main result showed that FB husbands had a 2.03-2.56 percentage point lower share of household work compared to CB husbands. The results remained robust to the modifications in the control variables.

Insert Table 2.4 here

In general, all coefficients exhibited the expected signs. The *husband's age* negatively affected his proportion of housework, while the *age difference between*

husband and wife was not significant. The *husband's education* had a robust positive and significant effect only in the case of a graduate degree. Husband's undergraduate degree positively affected his share of housework only when the model did not control for personal and household income levels. Once income variables were added to the model, the undergraduate degree of a husband became insignificant (Columns 2-7, table 2.4).

Columns 2-7 in table 2.4 show that the *log of household income* appeared to be an important variable. Increasing household income by 1% increased the husband's housework share by 6.0 percentage points. Housework share included such activities as house, automobile and yard maintenance. Richer households own more property, hence, men may participate more in these masculine activities adding to their share of total household production. As expected, an increase in the *husband's income share* by 1% reduced his participation by 8.7-8.9 percentage points, while the dummy variables indicating if husband or wife had higher earnings were found to be statistically insignificant.

Although all respondents and their partners declared full-time employment, some of them did not work during the week before the survey. The dummy variables *husband didn't work last week* and *wife didn't work last week* were found to be a significant determinant of housework time allocation. Full-time working husbands who were not engaged in paid work increased their share of domestic labour by 4.02-4.32 percentage points, while their share fell by 5.56-6.37 percentage points when their wives did not go to work.

An increase in the number of children negatively affected the husbands' housework share (Columns 5 and 7, table 2.4). The age of children had a slightly

different effect on husbands' housework. The presence of 0-4 year-old children in the household did not change time allocation between husband and wife, while the presence of at least one child over 5 decreased husbands' share of domestic work by 3.4-4 percentage points (Column 6, table 2.4).

Another interesting result was found by including a dummy variable indicating second generation Canadians, those respondents who were born in Canada, but for whom at least one of their parents moved to Canada at some point in time. Second generation husbands had a 2 percentage points smaller share of household work compared to their CB counterparts (Columns 4 and 7, table 2.4). This result showed that immigrant husbands not only did a lower proportion of domestic housework than CB husbands, but also their children mimicked the time allocation patterns of their parents, although at lower rates. This result was consistent with previous studies that showed that parental behavior and attitudes significantly affect their children's participation in household activities and their attitudes towards gender roles (Cunningham, 2001).

Table 2.5 presents the results of the regressions in which immigration was controlled by the *number of years since immigration* to Canada and the *region of origin* of immigrants. In this model specification, personal and household characteristics variables had similar coefficients as in the models in table 2.4 and are not reported here. Columns 1 and 2 in table 2.5 report that the *years since immigration* coefficient was significant only for the case of immigrants who came to Canada nine to eighteen years ago. This cohort of FB men had a housework share 4.3-4.35 percentage points less compared to their CB counterparts. Columns 3-5 in table 2.5 show that the *region of origin* variables were found to be significant and negative only for immigrants who came

to Canada from Asia or the Middle East. North American immigrants had 5.68 percentage points higher housework share when the regression included controls for the age of children.

Insert Table 2.5 here

2.5.2. *Husbands' share of housework and childcare*

Previous discussion suggests that presence of children in the family negatively affects the relative time husbands spend on housework and house maintenance. Frank and Hou (2013) showed that the presence of children significantly increases the share of housework and house maintenance done by women. Tables 2.6 and 2.7 present findings based on the simultaneous two-limit Tobit regressions with the *husband's share of housework* and the *husband's share of childcare* as dependent variables (equations [2.2] and [2.3]). The results indicated that in a sample that excludes couples without children, immigration parameters lose their significance. Any indicators of FB husbands such as *immigrant*, *second generation* and *region of origin* were insignificant. Immigrant fathers who came to Canada nine to eighteen years ago had a 3.78 percentage point lower share of housework, but otherwise the *years since immigration* coefficient remained insignificant.

Table 2.6 reports the results of simultaneous Tobit estimation on the housework share of husbands in families with children. The *husbands' share of housework* was affected by the same personal and household characteristics in families with and without children, except for the *husband's education*. The *log of household income* had a stronger effect on the husband's share of housework compared to the model reported in table 2.4. The increase in household income by 1% resulted in a 7.87-7.98 percentage points

increase in father's relative housework participation. The increase in the father's share of household income reduced his participation in housework by 9.64-9.91 percentage points. Fathers who did not work last week increased their housework share on average by 7.80 percentage points. Fathers reduced their share of housework by 5.8 or 6.5 percentage points whenever mothers were not engaged in paid employment. Columns 1, 3 and 5 of table 2.6 report that the number of children in the family reduced the share of housework produced by fathers by 2.28-2.30 percentage points. The children's age had a negative effect on the fathers' share of housework only in case of the presence of five- to twelve-year-old children in the family.

Insert Table 2.6 here

The fathers' share of childcare was not affected by immigration parameters. At the same time, all personal and household characteristics except for the parental age *difference* had significant coefficients. In general, older fathers, educated better than their wives, did a smaller share of childcare. Husbands with undergraduate and graduate degrees had 3.83 and 5.88 percentage point higher shares of childcare, respectively, compared to high school graduates (Column 1 in table 2.7). Both household income and husband's share of household income positively affected the fathers' share of childcare.

Children's age played an important role in the allocation of childcare time between fathers and mothers. Fathers with five- to twelve-year-old children had a 14.8 percentage point higher childcare share, and fathers with zero- to four-year-old children had 9.8 percentage point higher childcare share, compared to fathers with children older than fifteen (Columns 2, 4 and 6 in table 2.7).

Insert Table 2.7 here

2.6. Conclusion

In this paper I studied the time allocation of Canadian households with the emphasis on the difference between Canadian-born and foreign-born couples. The results are as follows. First, the factors affecting husband's unpaid work share include age and education of the husband, his income and labour market status and number and age of children. It seems that wives' education level and the difference of educational attainment between husbands and wives are insignificant factors of relative housework allocation. The share of housework of husbands in larger families was found to be smaller compared to the families with fewer children. However, when the shares of housework and childcare were estimated simultaneously, the smaller husbands' share of housework was offset by the larger husbands' share of childcare.

Second, it was found that immigrant husbands report lower share of housework compared to their CB counterparts. The dummy variables controlling for the region of origin of immigrant and the years since immigration were only partially significant. In general, immigrant husbands did about 2% less housework than their Canadian-born counterparts. The housework share of Asian husbands and those who immigrated nine to eighteen years ago was found to be lower compared to Canadian-born husbands. Moreover, second generation Canadians showed a pattern of housework time allocation similar to that of their first generation immigrant parents, which implied that the children of immigrants mimic their parents in the household chores time distribution. This similarity between the second generation Canadian husbands and immigrant husbands may indicate that immigrant families preserve their social norms and traditions in Canada

and pass them to their children. The joint estimation of the husband's housework share and child care share leads to the loss of significance of immigration parameters.

The empirical findings of this paper may suggest that some immigrant families may have only partial adaptation to Canadian living style. The preservation of cultural values and traditions remain important to foreign-born men and women and may have a positive effect on their social welfare. At the same time, immigrant families with children seem to allocate their housework and childcare time similar to Canadian-born families. The presence of children creates more opportunities for immigrant men and women to interact with their CB counterparts and share the information about household resource allocation experiences. Those immigrants without children may reside in Canada, but remain in their traditional communities and have less opportunity to adopt Canadian culture of household practices. The results of this paper may aid in formulation of public policies on adaptation and welfare of immigrants, including provision of information about balanced allocation of time between paid and unpaid work in families.

2.7. Tables

Table 2.1. Sample statistics for couples in the CTUS (pooled sample)

	Families with / without children				Families with children			
	Canadian-born		Foreign-born		Canadian-born		Foreign-born	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Husband's age	39.09	9.15	41.92	9.02	39.19	6.79	41.48	6.68
Wife's age	37.06	8.86	39.59	8.76	37.17	6.46	39.05	6.19
Husband's education (in years)	13.84	2.53	14.94	2.48	13.8	2.54	14.92	2.62
Wife's education (in years)	14.09	2.38	14.85	2.27	13.96	2.44	14.87	2.32
Household income	74,494	21,287	72,417	22,868	75,310	20,733	70,768	22,636
Husband's personal income	42,299	20,597	40,592	22,322	43,162	20,784	39,461	21,444
Wife's personal income	32,194	19,396	31,825	21,044	32,148	19,744	31,307	21,501
Husband's share of earnings	0.57	0.21	0.56	0.23	0.58	0.21	0.56	0.23
Husband did not work last week	0.04	0.2	0.04	0.19	0.04	0.18	0.04	0.19
Wife did not work last week	0.08	0.27	0.04	0.2	0.1	0.31	0.04	0.19
Number of children	...	...	...	...	1.83	0.75	1.85	0.79
Number of observations	3,434		578		1,926		348	

Table 2.2. Sample statistics: Housework for couples in the CTUS (pooled sample)

	Families with / without children			
	<u>Canadian-born</u>		<u>Foreign-born</u>	
	Mean	Std.Dev.	Mean	Std.Dev.
Husband's hours of housework	9.81	9.75	8.40	8.89
Wife's hours of housework	15.30	12.91	14.31	11.45
Total hours of housework	25.11	18.32	22.71	15.87
Husband's share of housework	0.39	0.22	0.37	0.23
Number of observations	3,434		578	

Table 2.3. Sample statistics: Housework and childcare for couples in the CTUS (pooled sample)

	Families without children				Families with children			
	CB		FB		CB		FB	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
Husband's hours of housework	8.38	8.39	7.46	6.77	10.93	10.57	9.03	10.01
Wife's hours of housework	11.77	9.96	11.24	9.16	18.06	14.23	16.33	12.34
Total hours of housework	20.16	14.96	18.71	12.96	28.99	19.73	25.36	17.04
Husband's share of housework	0.41	0.22	0.39	0.23	0.37	0.21	0.35	0.23
Husband's hours of childcare	...	...	...	...	21.71	19.85	18.11	18.64
Wife's hours of childcare	...	...	...	...	38.85	29.39	32.01	26.72
Total hours of childcare	...	...	...	...	60.57	40.18	50.12	37.62
Husband's share of childcare	...	...	...	...	0.33	0.23	0.31	0.24
Number of observations	1,508		230		1,926		348	

Table 2.4. TOBIT results: Husband's share of housework, all families. Model specification 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Immigrant	-0.03** (0.01)	-0.02* (0.01)	-0.02** (0.01)	-0.03** (0.01)	-0.02* (0.01)	-0.02* (0.01)	-0.02** (0.01)
Husband's age	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Age difference: husband is older	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Age difference: wife is older	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Husband's education: undergraduate	0.03*** (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)
Husband's education: graduate	0.07*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)
Husband is more educated	-0.03*** (0.01)	-0.02* (0.01)	-0.02* (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)	-0.02 (0.01)
Wife is more educated	0.02* (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
log of household income		0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)	0.06*** (0.01)
Husband earns more		-0.02 (0.01)	-0.02 (0.01)				
Wife earns more		0.01 (0.01)	0.01 (0.01)				
Husband didn't work last week			0.04** (0.02)	0.04** (0.02)	0.04** (0.02)	0.04** (0.02)	0.04** (0.02)

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Table 2.4 - *continued*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Wife didn't work last week			-0.06***	-0.06***	-0.06***	-0.06***	-0.06***
			(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Husband's share of household				-0.09***	-0.09***	-0.09***	-0.09***
				(0.02)	(0.02)	(0.02)	(0.02)
Second generation				-0.02*			-0.02**
				(0.01)			(0.01)
Number of children					-0.02***		-0.02***
					(0.00)		(0.00)
Children: 0-4 year old						-0.02	
						(0.01)	
Children: 0-14 year old						-0.04***	
						(0.01)	
Children: 5-14 years old						-0.03***	
						(0.01)	
Observations	4,012	4,012	4,012	4,012	4,012	4,012	4,012

Standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

Table 2.5. TOBIT results: Husband's share of housework, all families. Model specifications 2-4.

	(1)	(2)	(3)	(4)	(5)
Second generation					-0.02** (0.01)
Years since immigration: less than 4	0.03 (0.04)	0.03 (0.04)			
Years since immigration: 4-8	-0.03 (0.02)	-0.03 (0.02)			
Years since immigration: 9-18	-0.04** (0.0)	-0.04** (0.0)			
Years since immigration: more than 19	-0.01 (0.01)	-0.01 (0.01)			
Region of origin: North America			0.05 (0.03)	0.06* (0.03)	0.05 (0.03)
Region of origin: South / Central America			-0.03 (0.03)	-0.03 (0.03)	-0.03 (0.03)
Region of origin: Europe (including USSR)			-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Region of origin: Africa			-0.04 (0.04)	-0.04 (0.04)	-0.05 (0.04)
Region of origin: Asia (Including Middle East)			-0.03* (0.02)	-0.04** (0.02)	-0.04** (0.02)
Controlled for number of children and their age	No	Yes	No	Yes	No
Observations	4,012	4,012	4,012	4,012	4,012

Standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

Table 2.6. Simultaneous TOBIT results: Husband's share of housework, families with children.

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrant	-0.02 (0.01)	-0.02 (0.01)				
Second generation	-0.01 (0.01)	-0.02 (0.01)			-0.01 (0.01)	-0.02 (0.01)
Husband's age	-0.00*** (0.00)	-0.00** (0.00)	-0.00*** (0.00)	-0.00** (0.00)	-0.00*** (0.00)	-0.00* (0.00)
Age difference: husband is older	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Age difference: wife is older	-0.01 (0.02)	-0.00 (0.02)	-0.01 (0.02)	-0.00 (0.02)	-0.01 (0.02)	-0.00 (0.02)
Husband's education: undergraduate	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Husband's education: graduate	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)	0.00 (0.02)
Husband is more educated	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Wife is more educated	-0.00 (0.02)	-0.00 (0.02)	-0.00 (0.02)	-0.00 (0.02)	-0.00 (0.02)	-0.00 (0.02)
log income HH	0.08*** (0.02)	0.08*** (0.02)	0.08*** (0.02)	0.08*** (0.02)	0.08*** (0.02)	0.08*** (0.02)
Husband's share of household income	-0.10*** (0.02)	-0.10*** (0.02)	-0.10*** (0.02)	-0.10*** (0.02)	-0.10*** (0.02)	-0.10*** (0.02)
Husband didn't work last week	0.08*** (0.03)	0.08*** (0.03)	0.08*** (0.03)	0.08*** (0.03)	0.08*** (0.03)	0.08*** (0.03)
Wife didn't work last week	-0.06*** (0.02)	-0.07*** (0.02)	-0.06*** (0.02)	-0.07*** (0.02)	-0.06*** (0.02)	-0.07*** (0.02)

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Table 2.6 - *continued*

	(1)	(2)	(3)	(4)	(5)	(6)
Children: 0-4 year old		0.01 (0.01)		0.01 (0.01)		0.01 (0.01)
Children: 5-12 year old		-0.02* (0.01)		-0.02* (0.01)		-0.02* (0.01)
Children: 13-14 year old		-0.00 (0.01)		-0.00 (0.01)		-0.00 (0.01)
Number of children	-0.02*** (0.01)		-0.02*** (0.01)		-0.02*** (0.01)	
Years since immigration: less than 4			0.07 (0.05)	0.07 (0.05)		
Years since immigration: 4-8			-0.04 (0.03)	-0.04 (0.03)		
Years since immigration: 9-18			-0.04* (0.02)	-0.04* (0.02)		
Years since immigration: more than 19			-0.01 (0.02)	-0.01 (0.02)		
Region of origin: North America					0.05 (0.05)	0.05 (0.05)
Region of origin: South / Central America					-0.01 (0.03)	-0.01 (0.03)
Region of origin: Europe (including USSR)					-0.01 (0.02)	-0.01 (0.02)
Region of origin: Africa					-0.07 (0.05)	-0.07 (0.05)
Region of origin: Asia (Including Middle East)					-0.03 (0.02)	-0.03 (0.02)
Observations	2,274	2,274	2,274	2,274	2,274	2,274

Standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

Table 2.7. Simultaneous TOBIT results: Husband's share of childcare, families with children.

	(1)	(2)	(3)	(4)	(5)	(6)
Immigrant	-0.01 (0.01)	-0.01 (0.01)				
Second generation	-0.00 (0.02)					
Husband's age	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)	-0.01*** (0.00)
Age difference: husband is older	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.02 (0.02)
Age difference: wife is older	-0.00 (0.02)	0.00 (0.02)	-0.00 (0.02)	0.00 (0.02)	-0.00 (0.02)	0.00 (0.02)
Husband's education: undergraduate	0.04** (0.02)	0.03* (0.02)	0.04** (0.02)	0.03* (0.02)	0.04** (0.02)	0.03* (0.02)
Husband's education: graduate	0.06** (0.03)	0.04 (0.03)	0.05* (0.03)	0.04 (0.03)	0.06** (0.03)	0.04 (0.03)
Husband is more educated	-0.03** (0.02)	-0.03** (0.02)	-0.03** (0.02)	-0.03** (0.02)	-0.03** (0.02)	-0.03** (0.02)
Wife is more educated	0.05*** (0.02)	0.04** (0.02)	0.05*** (0.02)	0.04** (0.02)	0.05*** (0.02)	0.04** (0.02)
log income HH	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)	0.06*** (0.02)
Husband's share of household income	0.13*** (0.03)	0.14*** (0.03)	0.13*** (0.03)	0.14*** (0.03)	0.13*** (0.03)	0.14*** (0.03)
Husband didn't work last week	0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.03)	0.13*** (0.03)
Wife didn't work last week	-0.13*** (0.02)	-0.13*** (0.02)	-0.13*** (0.02)	-0.13*** (0.02)	-0.13*** (0.02)	-0.13*** (0.02)

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Table 2.7 - *continued*

	(1)	(2)	(3)	(4)	(5)	(6)
Children: 0-4 year old		0.10*** (0.01)		0.10*** (0.01)		0.10*** (0.01)
Children: 5-12 year old		0.15*** (0.01)		0.15*** (0.01)		0.15*** (0.01)
Children: 13-14 year old		0.10*** (0.01)		0.10*** (0.01)		0.10*** (0.01)
Number of children	0.02*** (0.01)		0.02*** (0.01)		0.02*** (0.01)	
Years since immigration: less than 4			-0.01 (0.05)	-0.03 (0.05)		
Years since immigration: 4-8			0.00 (0.04)	-0.01 (0.03)		
Years since immigration: 9-18			0.02 (0.03)	0.02 (0.02)		
Years since immigration: more than 19			-0.03 (0.02)	-0.03 (0.02)		
Region of origin: North America					0.015 (0.05)	0.015 (0.05)
Region of origin: South / Central America					0.03 (0.04)	0.03 (0.04)
Region of origin: Europe (including USSR)					-0.03 (0.03)	-0.03 (0.03)
Region of origin: Africa					0.00 (0.05)	-0.02 (0.05)
Region of origin: Asia (Including Middle East)					-0.00 (0.02)	-0.01 (0.02)
Observations	2,274	2,274	2,274	2,274	2,274	2,274

Standard errors in parentheses, * p<0.1 ** p<0.05 *** p<0.01

References

- Alvarez, Begona, and Daniel Miles. 2003. "Gender Effect on Housework Allocation: Evidence from Spanish Two-Earner Couples." *Journal of Population Economics* 16 (2): 227–242. <http://link.springer.com/article/10.1007/s001480200126>.
- Bayudan, Connie G. 2006. "Wives' Time Allocation and Intrahousehold Power: Evidence from the Philippines." *Applied Economics* 38 (7) (April 20): 789–804. doi:10.1080/00036840600597972. <http://www.tandfonline.com/doi/abs/10.1080/00036840600597972>.
- Beaujot, R. 2005. "Models of Time Use in Paid and Unpaid Work." *Journal of Family Issues* 26 (7) (October 1): 924–946. doi:10.1177/0192513X04273583. <http://jfi.sagepub.com/cgi/doi/10.1177/0192513X04273583>.
- Becker, Gary. 1974. *A Theory of Social Interactions*.
- Bianchi, SM. 2011. "Family Change and Time Allocation in American Families." *The ANNALS of the American Academy of Political and Social Science*. doi:10.1177/0002716211413731. <http://ann.sagepub.com/content/638/1/21.short>.
- Blau, Francine D., Marianne A. Ferber, and Anne E. Winkler. 2010. *The Economics of Women, Men, and Work*. Upper Saddle River, NJ: Prentice Hall.
- Bonke, J, and M Deding. 2008. "Intra- Household Specialization in Housework in the United States and Denmark." *Social Science Quarterly* 89 (4). <http://onlinelibrary.wiley.com/doi/10.1111/j.1540-6237.2008.00597.x/full>.
- Bonke, J, and B Jensen. 2012. "Paid and Unpaid Work in Denmark--Towards Gender Equity." *Electronic International Journal of Time Use*. <http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authType=crawler&jrnl=18609937&AN=85126428&h=2MErPus4LkKC8%2FmVTcl5Zgu1wPc9N9wqvwdTf8IVKKCmN9hya%2FjY32%2FoxKrybTA6t94JIylPAfzdgMAQ%2FT1mg%3D%3D&crl=c>.
- Brayfield, April a. 1992. "Employment Resources and Housework in Canada." *Journal of Marriage and the Family* 54 (1) (February): 19. doi:10.2307/353272. <http://www.jstor.org/stable/353272?origin=crossref>.
- Browning, Martin, and Pierre-Andre Chiappori. 1998. "Efficient Intra-Household Allocation: A General Characterization and Empirical Tests." *Econometrica*: 1241–1278.
- Chen, Zhiqi, and Frances Woolley. 2001. "A Cournot–Nash Model of Family Decision Making." *The Economic Journal* 111 (474): 722–748. <http://onlinelibrary.wiley.com/doi/10.1111/1468-0297.00657/abstract>.

- Craig, Lyn. 2007. "Is There Really a Second Shift, and If So, Who Does It? A Time-Diary Investigation." *Feminist Review* 86 (86): 149–170. <http://www.palgrave-journals.com/fr/journal/v86/n1/abs/9400339a.html>.
- Deding, M., and M. Lausten. 2006. "Choosing between His Time and Her Time: Market Work and Housework of Danish Couples." *Electronic International Journal of Time Use Research* (3).
- Douthitt, Robin a. 1989. "The Division of Labor within the Home: Have Gender Roles Changed?" *Sex Roles* 20 (11-12) (June): 693–704. doi:10.1007/BF00288080. <http://link.springer.com/10.1007/BF00288080>.
- Fernandez, Cristina, and Almudena Sevilla-sanz. 2006. "Social Norms and Household Time Allocation." 648.
- Frank, Kristyn, and Feng Hou. 2013. "Cultural Influences Across Time and Space : Do Source-Country Gender Roles Affect Immigrant Women ' S Paid and Unpaid Labour Act Ivity ?" Catalog no. 11F0019M, no. 349. Analytical Studies - Research Paper Series.
- Greenstein, TN. 1996. "Husbands' Participation in Domestic Labor: Interactive Effects of Wives' and Husbands' Gender Ideologies." *Journal of Marriage and the Family* 58 (3): 585–595. <http://www.jstor.org/stable/353719>.
- Haddad, T, and L Lam. 1988. "Canadian Families-Men's Involvement in Family Work: A Case Study of Immigrant Men in Toronto." *International Journal of Comparative Sociology* 29 (3-4). <http://www.ingentaconnect.com/content/brill/ijcs/1988/00000029/F0020003/art00009>.
- Haddad, Tony. 1994. "Men's Contribution to Family Work: A Re-Examination Of time Availability." *International Journal of Sociology of the Family* 24 (1): 87–111.
- Hamdad, Malika. 2003. "Valuing Households' Unpaid Work in Canada, 1992 and 1998: Trends and Sources of Change." *Statistics Canada Economic Conference*. <http://www.statcan.gc.ca/conferences/econ2003/valuing-valeur3c-eng.pdf>.
- Klaveren, C Van. 2006. "A Collective Household Model of Time Allocation: A Comparison of Native Dutch and Immigrant Households in the Netherlands." 1753. CESifo Working Paper. <http://www.econstor.eu/handle/10419/25798>.
- Konrad, Kai A., and Kjell Erik Lommerud. 1995. "Family Policy with Non-Cooperative Families." *The Scandinavian Journal of Economics*: 581–601.
- . 2000. "The Bargaining Family Revisited." *Canadian Journal of Economics* 33 (2): 471–487.

- Leuthold, JH. 1968. "An Empirical Study of Formula Income Transfers and the Work Decision of the Poor." *Journal of Human Resources* 3 (3): 312–323. <http://www.jstor.org/stable/145103>.
- Lundberg, Shelly, and RA Pollak. 1993. "Separate Spheres Bargaining and the Marriage Market." *Journal of Political Economy* 101 (6): 988–1010. <http://www.ifpri.org/sites/default/files/pubs/pubs/jhu/households/intrahhresch05.pdf>.
- Manser, Marilyn, and Murray Brown. 1980. "Marriage and Household Decision-Making: A Bargaining Analysis." *International Economic Review* 21 (1): 31–44. <http://www.jstor.org/stable/2526238>.
- McElroy, MB, and MJ Horney. 1981. "Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand." *International Economic Review* 22 (2): 333–349. http://faculty.smu.edu/millimet/classes/eo7321/papers/mcelroy_horney.pdf.
- McFarlane, S, Roderic Beaujot, and Tony Haddad. 2000. "Time Constraints and Relative Resources as Determinants of the Sexual Division of Domestic Work." *Canadian Journal of Sociology* 25 (1). <http://www.jstor.org/stable/3341911>.
- Parkman, Allen M. 2004. "Bargaining over Housework." *American Journal of Economics and Sociology* 63 (4): 765–794.
- Ribar, DC. 2012. "Immigrants' Time Use: A Survey of Methods and Evidence." 6931. Discussion Paper. <http://www.econstor.eu/handle/10419/67310>.
- Samuelson, PA. 1956. "Social Indifference Curves." *The Quarterly Journal of Economics* 70 (1): 1–22. <http://qje.oxfordjournals.org/content/70/1/1.short>.
- Sevilla-Sanz, A, JI Gimenez-Nadal, and C Fernandez. 2010. "Gender Roles and the Household Division of Unpaid Work: Evidence from the Spanish Time Use Survey." *Feminist Economics*: 0–53. <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Gender+Roles+and+the+Household+Division+of+Unpaid+Work+:+Evidence+from+the+Spanish+Time+Use+Survey#1>.

Chapter 3. The Effect of Quebec Childcare Policy Change on Labour Market Outcomes and Time Distribution in Families

Abstract

This paper uses both a difference-in-difference and a triple difference approach to estimate the effect of the 1997 universal childcare reform in Quebec on the absolute and relative supply of paid and unpaid labour in Quebec families. The results show that the introduction of the universal childcare subsidy led to an increase in the labour force participation, weekly hours and annual weeks worked of mothers. The policy change did not have a significant effect on the labour supply outcomes of fathers of zero- to five-year-old children and earnings of mothers and fathers. The mothers and fathers whose zero- to five-year-old children were eligible for subsidized daycare decreased the amount of time spent on housework, but did not change the amount of time spent on childcare.

JEL-Codes: D1, J2, H2

Keywords: Labour supply, paid and unpaid work, intra-household allocation of time, childcare policy

3.1. Introduction

Universal childcare policies implemented in Quebec in from 1997 to 2000 included the provision of subsidized “\$5 per day” daycare for pre-school children, full-time kindergarten enrollment for five-year-old children and subsidized “\$5 per day” pre- and after- school daycare for five- to twelve-year-old children. As a result, this policy can be expected to have had a significant impact on the labour supply of mothers of small children, the amount of time mothers spend on childcare, as well as child development. The supply of paid labour and childcare are two essential components of time use for many parents. An increase in time spent by mothers in the paid market takes away hours for childcare, household chores, personal care and leisure. The decrease in the supply of female unpaid housework in the family could be replaced by an increase in the husband’s housework and childcare participation. In addition, families experience higher incomes that could be allocated towards the purchase of household production goods and services that substitute for time, which in turn would reallocate time spent by mothers and fathers on various activities.

The objective of this paper is to study the impact of the Quebec universal childcare policy, “\$5 per day” daycare in particular, on the labour supply and allocation of the time of Quebec mothers and fathers. The first goal was to estimate labour supply outcomes such as labour force participation, weekly hours and annual weeks worked, and annual earnings of Quebec mothers affected by the family policy reform. The paper also estimated the probability of Quebec mothers reporting not-working, part-time employment or full-time employment status after the policy change. The second goal of the paper was to estimate similar labour market outcomes for Quebec fathers affected by the introduction of subsidized daycare. While mothers’ labour supply has been studied by

many authors before (Baker, Gruber, and Milligan 2005; Lefebvre, Merrigan, and Verstraete 2009; Lefebvre and Merrigan 2008), the labour supply of fathers has not been studied by the literature⁵. The third goal of the paper was to analyze if there were changes in the absolute and relative time allocated to housework and childcare by mothers and fathers living in Quebec as a result of the policy reforms. The labour supply and time allocation outcomes of Quebec mothers and fathers of zero- to five-year-old children were compared to their counterparts living in the Rest of Canada (ROC) and Ontario, as well as those mothers and fathers who had six- to seventeen-year-old children.

The paper is organized as follows: Section 3.2 describes the Quebec childcare policy, its goals and outcomes and provides an overview of previous research. Section 3.3 describes sample selection and provides summary statistics. Section 3.4 focuses on empirical strategy and model specification. Section 3.5 reports the regression analysis results and section 3.6 summarizes findings.

3.2. Background and literature review

In 1997 the government of Quebec introduced a flat \$5 per day charge for pre-school daycare and additional subsidies to eligible low-income families. In 2004 the cost of daycare was increased to \$7 per day. The introduction of the daycare subsidy was done in four phases. In 1997 only four-year-old children were eligible for the daycare subsidy. Eligibility was expanded to three-year-old children in 1998, two-year-olds in 1999 and new born and one-year-olds in 2000. The parents had to commit to 261 days of daycare per year and could use daycare for up to 11 hours per day.

⁵ Although it was mentioned in the descriptive analysis in Haecck, Lefebvre, & Merrigan (2013), but not estimated in a regression analysis

Quebec's Universal Daycare Plan also included \$5 per day before- and after-school daycare for school-age children and the introduction of voluntary full-time kindergarten for five-year-old children. Ninety-eight percent of five-year-olds in Quebec attended full-time kindergarten starting in 1997 and more than half of them used subsidized before- and after-school daycare (Lefebvre, Merrigan, and Verstraete 2009).

The provision of the daycare subsidy increased the demand for daycare services, but the number of daycare spots increased only in 1999. Therefore, in the beginning, the \$5 subsidy benefitted only those families whose children were in daycare at that time. Haeck, Lefebvre, and Merrigan (2013) reported that the number of daycare spots increased by 211 percent between 1997 and 2012, totaling 245,107, of which the daycare subsidy was provided in 89 percent of cases. Lefebvre and Roy-desrosiers (2011) reported that the total cost of funding of the direct daycare subsidies increased from \$288 million in the 1996-1997 fiscal year to \$2.0 billion in the 2010-2011 fiscal year. The government daycare subsidy increased from \$3,888 per space in the 1996-1997 fiscal year to \$9,061 in 2009-2010⁶.

Baker, Gruber, and Milligan (2005) provided the first comprehensive study of the effect of the Quebec daycare policy change. They showed that the policy had a short-run positive effect on mothers' labour participation and labour supply and a negative effect on child behavioral outcomes, child health and parenting practices. Kottelenberg and Lehrer (2013) expanded the study of Baker et al. and estimated the long-term effect of the policy on child outcomes and child and parental health. The authors concluded that the introduction of daycare subsidies and the expansion of daycare provision had a

⁶ All dollar figures are in nominal terms.

significant negative effect in the longer term on child outcomes, including test scores, behavioral variables and health.

Lefebvre and Merrigan (2008) estimated a strong positive impact of the subsidized daycare policy on the labour supply of mothers of zero- to- five-year-old children. The authors showed that Quebec mothers increased their annual labour force participation, weeks and hours worked. The authors found weaker effects for mothers with lower levels of education compared to their more educated counterparts, but noted that these mothers also could benefit not only from increases in their working income but also from the relaxed liquidity constraint. In addition, the positive effect on labour supply was caused not only by the decrease in the cost of daycare, but also by the expansion of daycare spots. Lefebvre, Merrigan, and Verstraete (2009) showed that the daycare subsidy policies had a positive effect on mothers' labour supply in the long run. Specifically, the mothers affected by the policy had higher labour market outcomes when their children reached the age of five compared to those who never benefitted from daycare subsidies. Furthermore, mothers without high school education benefitted more from the policy change compared to high school graduates and mothers with a post-graduate degree.

Haeck, Lefebvre, and Merrigan (2013) showed that the daycare subsidies had a positive impact on mothers' income share in two-parent households. In addition, the higher income share of Quebec mothers had a positive effect on some expenditure items, such as eating out and household operational expenses, providing evidence for substitution of home-produced items by goods and services purchased from the market.

Haeck et al. reported that the Quebec universal childcare policy did not affect fathers' labour supply outcomes such as weeks worked and total earnings.

Although Barrington-Leigh (2013) found Quebecers experienced a substantial increase in life satisfaction in general, Brodeur and Connolly (2013) showed a negative impact on parental life satisfaction for more educated mothers and fathers. The authors suggested that the decline in family well-being was determined by fathers who had to adjust to changes of gender roles within a family. The redistribution of parental roles was analyzed by Stalker and Ornstein (2013) who showed that the childcare subsidy policy affected the probability of both Quebec parents having a job increased compared to the ROC. Specifically, stronger results were found for common-law couples who allocated market work and childcare responsibilities in more egalitarian manner.

Non-cooperative models in household economics suggest that household members make independent decisions taking into account the actions of a partner, relative resources brought to the family by the husband and the wife, as well as spouses' pre-marriage endowment. Individuals facing a time constraint allocate their time between paid and unpaid labour, personal care and leisure. The presence of children in the family adds childcare to the list of activities and redistributes time among all other activities. On top of that, social norms emphasize gender specialization within the family and, in particular, the role of the husband as a primary income earner and the wife as a homemaker. Therefore in non-cooperative models husbands and wives, while caring about each other's wellbeing, bargain about their resource allocation including paid and unpaid labour supply and expenditures (Leuthold 1968; Chen and Woolley 2001; Konrad and Lommerud 1995; Konrad and Lommerud 2000; Lundberg and Pollak 1993).

Empirical studies reported various research outcomes on the relationship between labour force status of individuals and their participation in housework. Hamdad (2003) reported that employed women spent less time on housework compared to their unemployed counterparts, while their employed husbands spent more time on housework compared to unemployed husbands. Douthitt (1989) reported similar outcomes for women, but did not find any impact of labour force status on husbands' housework. Bianchi (2011) showed that both part-time and full-time employment negatively affected housework participation of husbands and wives. Brayfield (1992) found no significant influence of labour force status of the respondent or the spouse on the allocation of household chores.

The analysis of the effect of labour market participation on childcare brought more consistent results in the literature. Fathers who worked longer hours tended to do less childcare, while those fathers who reported zero incomes did more childcare (Haddad 1994; McFarlane, Beaujot, and Haddad 2000). Bianchi (2011) also showed that an increase in female labour force participation between 1965 and 2008 led to a decline in hours mothers spent looking after children, while fathers increased childcare time.

The presence of children affects the time distribution of full-time working couples between household chores, childcare and leisure. The amount of cooking and indoor and outdoor cleaning is positively related to the number of family members (McFarlane, Beaujot, and Haddad 2000). Besides that, children, especially under the age of five, require additional care that could include such activities as playing and educating the child and taking care of behavioral and emotional development. Both mothers and fathers reallocate their time from such activities as paid work, housework, leisure and personal

care towards childcare (McFarlane, Beaujot, and Haddad 2000) . The age of children plays an important role in family resource allocation. Mothers with children less than five years of age have a higher share of childcare in the family (Fernandez and Sanz 2006) and decrease childcare time when children grow up (McFarlane, Beaujot, and Haddad 2000) . Children's ages negatively affect the participation of fathers in housework and childcare (McFarlane, Beaujot, and Haddad 2000) . The present research took into account personal and household characteristics to estimate the effect of government childcare policies on the labour supply and housework and childcare hours of Quebec mothers and fathers. The methodology and results are presented below.

3.3. Sample Selection and Summary Statistics

The data for the empirical analysis was drawn from the 1996 and 2001 Canadian Census. The choice of the 1996 and 2001 Census cycles captured the effect of the policy, which started in 1997 and was fully adopted in 2000. The econometric difference-in-difference (DD) estimation was carried out using the sample of two-parent married or common-law couples with zero- to five-year-old children and no children older than five. The sample was restricted to families with twenty-four- to fifty-five-year-old mothers and twenty-four- to sixty-five-year-old fathers. After excluding observations with missing information, the 1996 and 2001 Census samples were pooled. The 1996 subsample included 14,717 families, and the 2001 subsample included 13,089 families, giving in total of 27,806 observations. The proportion of Quebec families was 25% in 1996 and 22% in 2001.

The DD analysis estimates the effect of the childcare subsidy provision on parents of pre-schoolers. However, the family policy reform included other aspects such as an

introduction of full-time kindergarten and subsidized pre- and after-school daycare for school-age children. As an extension, the triple difference (DDD) model was estimated to compare parents of zero- to five-year-old children (and no children older than five) and parents of six- to seventeen-year-old children (and no children younger than six). For this purpose, the parents of six- to seventeen-year-old children and no zero- to five-year-old children were added to the original data set. The significance of the DDD coefficients would indicate that the “\$5 per day daycare” policy had an effect only on parents of pre-schoolers, but did not affect the parents of school-age children. However, if the joint policy affected labour supply and time allocation of the parents of school-age children, the results of DDD estimation will remain insignificant.

The original sample was modified in several ways for the robustness check of the results. First, the original sample was modified to include families with at least one zero- to five-year-old child who also could have six- to seventeen-year-old children. The inclusion of families with six- to seventeen-year-old children controlled for additional policy implications such as introduction of full-time kindergarten for five-year-olds and \$5 per day pre- and after- school daycare for five- to twelve-year-olds. In addition, the 1997 family policy reforms in Quebec substituted a universal child allowance for children less than eighteen years of age with a child tax benefit for families with children less than eighteen. This reform created incentives to increase labour supply for families with lower incomes, but made work less attractive for already working parents. Therefore the inclusion of families with six- to eighteen-year-old children controlled the estimation for a wider scope of the family policy reform. Second, the sample was restricted to have Ontario as a single comparison group for Quebec. This modification was done to

minimize the regional differences between the target group and the control group. Ontario was chosen because economies of Quebec and Ontario are similar and are affected by similar business cycle fluctuations (Lefebvre, Merrigan, and Verstraete 2009). Sampling weights were not used in summary statistics and regression analysis.

The main limitation of the data is that it is impossible to differentiate families with children in public or private daycare from families with children without daycare. Following the literature, Quebec residence was used as a proxy to identify families eligible to receive the uniform childcare subsidies (Kottelenberg and Lehrer 2013). The Quebec universal policy change included other aspects such as introduction of full-time kindergarten and provision of pre- and after- school subsidies, and the present analysis overestimated the effect of the introduction of the childcare subsidy for preschoolers. While Lefebvre et al. (2009) showed that the introduction of the before- and after- school childcare subsidy did not affect the labour supply of mothers, the effect of full-time kindergarten could be captured in the reported results. This paper estimated the overall impact of Quebec universal childcare policy; however, the introduction of \$5 childcare fee for zero- to four-year-old children had a major impact on the time redistribution and labour market outcomes of mothers and fathers.

Summary statistics of the personal and household characteristics of mothers and fathers of zero- to five-year-old children and no children older than five residing in Quebec, the ROC and Ontario are presented in table 3.1.

Insert Table 3.1 here

Table 3.1 shows that the proportion of mothers older than forty-five years of age did not exceed 1% of mothers and the proportion of fathers older than forty-five years of age did not exceed 5% of fathers in Quebec, the ROC and Ontario. The tendency of having children at a later age was reflected in the decrease in the proportion of twenty-five- to thirty-four-year-old parents and the increase in the proportion of thirty-five to forty-four-year-old parents between 1996 and 2001. The proportion of twenty-five- to thirty-four-year-old parents was larger in Quebec compared to the ROC and Ontario in both years, which could reflect more flexible attitudes towards cohabitation and out-of-marriage childbirth in Quebec. Women in Quebec on average enter a marriage or common-law union two or more years earlier than women in the ROC, and therefore, have children at younger age (Bélanger, Morency, and Spielauer 2010). Studies showed that Quebec had an increased fertility rates in response to the Allowance for Newborn Children policy which was in effect from 1988 to 1997 (Milligan 2005).

The nation-wide increase in education levels during the given time period was consistent with the higher proportion of mothers and fathers in the older age group (thirty-five to forty-four-year-old). The levels of education of the ROC and Ontario mothers and fathers showed similar trends, but differed from the Quebec trend. The implementation of childcare reform in Quebec may have made education more affordable and reduced the time constraint for Quebec mothers and fathers and may have had a positive effect on post-secondary education participation. For example, the proportion of high-school graduates dropped in the ROC and Ontario from 17-18% in 1996 to 13-14%

for fathers and to 10-12% for mothers in 2001. In Quebec the proportion of high-school graduates was 22% in 1996 and declined to the national levels in 2001.

The proportions of college graduates among the ROC and Ontario fathers increased by two percentage points and did not change for mothers. At the same time, the proportions of college graduates in Quebec increased by seven percentage points for fathers and by four percentage points for mothers. While the number of university graduates among Quebec fathers fell by four percentage points and increased among Quebec mothers by one percentage point, the number of respondents with unfinished university degrees increased from 1% in 1996 to 9-11% in 2001.

The composition of Quebec residents by immigration status was different from the ROC due to the language constraint faced by immigrants (Lefebvre, Merrigan, and Verstraete 2009). In 1996 only 11% of fathers and 9% of mothers living in Quebec reported that they were born outside of Canada. In the ROC the proportions of foreign-born mothers and fathers were 25% and 23% respectively. These numbers increased in 2001 in Quebec to 13% of foreign-born fathers and 12% of foreign-born mothers, but remained the same in the ROC. The proportion of foreign-born mothers and fathers in Ontario exceeded the ROC average and increased from 27% to 30% for fathers and from 27% to 29% for mothers over the given period.

The majority of Quebec families consisted of two Canadian-born partners (87% in 1996 and 84% in 2001). Only 7% of Quebec families were formed by two foreign-born partners in 1996. This proportion increased to 9% in 2001, but remained only half that of the ROC and Ontario.

In the families with zero- to five-year-old children and no children older than five, the average number of children was similar in Quebec, the ROC and Ontario in 1996 (1.51, 1.52 and 1.53 respectively). In 2001 the average number of children declined in all provinces, but the change was more pronounced in Quebec (to 1.45 compared to 1.49 in the ROC and 1.48 in Ontario). In the sample of families with zero- to five-year-old children who also could have six- to seventeen-year-old children, there were, on average, two children per family in both 1996 and 2001.

The proportion of Quebec couples living common-law increased from 40% in 1996 to 48% in 2001, while in the rest of the country and in Ontario the proportion of common-law unions did not exceed 10% in both years. Common-law unions are widely accepted in Quebec and are treated as an equal alternative to marriage, while in the ROC cohabitation is considered as a way to test the relationships before marriage (Beaujot, Du, and Ravanera 2013). My estimates stay in line with the literature which showed that 35% of Quebec couples lived common-law (compared to 13% in the ROC) (Bélanger, Morency, and Spielauer 2010; Girard 2008).

Urban population in Quebec was 67% in 1996 and 69% in 2001, which was two percentage points above the ROC, but 8-9 percentage points below Ontario. Urban population was defined as metropolitan areas with 100,000 population⁷.

Previous research showed that the provincial family policy reform, in particular implementation of the subsidized daycare, positively affected labour force participation rates of Quebec mothers (Baker, Gruber, and Milligan 2005; Lefebvre, Merrigan, and Verstraete 2009). Table 3.2 showed that the labour force participation of mothers of zero-

⁷ Quebec cities that qualified as metropolitan areas were Quebec City, Montreal, Sherbrook and Trois-Rivieres.

to five-year-old children increased from 70% in 1996 to 75% in 2001. Female labour force participation was 69% in the ROC in 1996 and did not change over the given period. The Ontario mothers decreased their labour force participation from 71% in 1996 to 69% in 2001. The proportion of mothers employed full-time increased from 59% in 1996 to 66% in 2001, while the proportion of mothers employed part-time declined from 20% in 1996 to 17% in 2001. At the same time, the proportion of the ROC full-time working mothers increased by two percentage points (from 55% in 1996 to 57% in 2001) and the proportion of the ROC part-time working mothers decreased by less than one percentage point. Ontario mothers reported full-time employment status in 60% of cases in 1996 (with an increase by one percentage point in 2001) and part-time employment status in 21% of cases (without change over the given period).

Quebec and Ontario mothers reported an increase in weekly hours worked from 33.38 to 34.78 in 2001 (compared to 1996). The ROC mothers worked one hour a week less, on average, in both years compared to their Quebec and Ontario counterparts. Number of weeks worked by Quebec and the ROC mothers increased by one (to forty one weeks) and Ontario mothers did not change the number of weeks worked over the period.

Table 3.2 reports that the labour force participation of Quebec fathers of zero- to five-year-old children was similar to those of the ROC and Ontario fathers and was 92-93%. Ninety four percent of Quebec fathers reported having a full-time job for at least 30 hours a week in the previous year in both 1996 and 2001. The proportion of full-time working fathers was 94% in the ROC and Ontario in 1996, but increased in 2001 by two and one percentage points respectively. The proportion of fathers with part-time

employment did not exceed 4% in any year in Canada. The number of weekly working hours of Quebec fathers was 2-3 hours below the ROC and Ontario averages in both years, but did not change much between 1996 and 2001. Over the period, Quebec fathers increased labour supply by one week per year, but the number of working weeks remained below the ROC and Ontario averages.

Insert Table 3.2 here

Beaujot et al. (2013) reported that on average incomes in Quebec were below the national average, but the development of socio-economic trends showed parallel dynamics with the rest of the country. The 1996 and 2001 Census data also illustrated that both Quebec mothers and fathers had lower earnings compared to the ROC and Ontario. Quebec fathers increased their earnings from \$35,124 to \$41,622 over the period, while the ROC fathers' earnings increased from \$39,557 in 1996 to \$47,732 in 2001. Ontario fathers had average income of \$50,625 in 2001, which was above the national average. The earnings of Quebec, the ROC and Ontario mothers increased on average by \$5,000, with the lowest earnings in Quebec and the highest earnings in Ontario. The data showed a negative trend in the fathers' share of total earnings in Quebec (it declined by two percentage points) and the ROC (it declined by one percentage point), but the earnings share of Ontario fathers increased by one percentage point over the period. On average, Canadian fathers earned 71-73% of total family earnings in 1996 and 70-72% in 2001.

Table 3.3 reports the housework and childcare time allocation data of Canadian mothers and fathers of zero- to five-year-old children and no children older than five. The time spent on unpaid housework and childcare was recorded in the Census as interval

data. The hours of housework and childcare of mothers and fathers in this paper was calculated as the interval midpoint.

Insert Table 3.3 here

The summary statistics analysis revealed that in both 1996 and 2001 fewer Quebec mothers and fathers reported non-zero hours of housework compared to the ROC and Ontario mothers and fathers. While in the ROC and Ontario the proportion of fathers reporting positive hours increased from 71% in 1996 to 73% in 2001, in Quebec this proportion declined by 0.18 percentage points over the period. The proportion of mothers reporting positive hours of housework fell in Quebec, the ROC and Ontario, but this decline was more pronounced in Quebec. Overall, data showed that both mothers and fathers reduced the amount of housework over the period. However, while fathers in all three regions cut their housework by less than one hour, Quebec mothers reduced housework by two hours (compared to one hour in the ROC and Ontario). The fathers' housework share was the highest in Quebec in both years, and increased from 39% in 1996 to 41% in 2001. The housework share of fathers in the ROC and Ontario also increased by two percentage points over the period, but did not exceed 38% in both years.

The proportion of fathers in Quebec, the ROC and Ontario who reported positive hours of childcare increased over the period, but the proportion of mothers reporting positive hours of childcare did not change. Mothers and fathers in all three regions increased their childcare time by 1-2 hours a week and the fathers' share of childcare increased by one percentage point.

It is unclear if changes in absolute and relative housework and childcare hours of mothers and fathers in Quebec were caused by the provincial \$5 daycare subsidy policy.

The descriptive statistics showed similarities in housework and childcare time allocation trends in Quebec, the ROC and Ontario. The next section of the paper focuses on the multivariate regression results and explores the effect of the Quebec family policy on the variables of interest.

3.4. Model Specification

The difference-in-difference (DD) and triple difference (DDD) models were employed to analyze the effect of the Quebec childcare policy change on the labour market outcomes of coupled mothers and fathers, as well as their time allocation between housework and childcare. In the DD model the treatment group was represented by the families with zero- to five-year-old children residing in Quebec, while the control group consisted of the families with zero- to five-year-old children residing in the ROC. The effect of the policy change was captured through the comparison of the labour market and time allocation outcomes in 1996 (the year before the policy was implemented) and 2001 (the year after the policy was implemented fully). The standard estimation equation is represented as:

$$Y_{ipt} = \beta_0 + \beta_1 Q_p + \beta_2 \tau_t + \beta_3 (Q * \tau)_{pt} + \Phi' X_{ipt} + \varepsilon_t \quad [3.1]$$

Y_{ipt} here is a set of variables of interest, including the fathers' and the mothers' labour-market outcomes (labour force participation, full-time vs. part-time employment, hours worked last week, weeks worked last year, and wages earned last year) and the absolute and relative amount of their time spent on housework and childcare. In the model, Q_p is a dummy variable which takes the value of 1 if the respondents were the residents of Quebec, and it controls for fixed provincial effects. τ_t is a dummy variable that takes the value of 1 if the respondents answered the Census questionnaire in 2001,

and it controls for the time-specific effects of the policy. Parameter β_3 is the main variable of interest in the model and represents the effect of the Quebec policy change on dependent variables over time. X_{ipt} is the set of control variables that includes personal and household characteristics of mothers and fathers.

The DDD model extends the analysis by including coupled mothers and fathers with six- to seventeen-year-old children as an additional control group. The DDD model takes the general form:

$$Y_{ipt} = \beta_0 + \beta_1 Q_p + \beta_2 \tau_t + \beta_3 Ch05 + \beta_4 (Q * \tau)_{pt} + \beta_5 (Q * Ch05) + \beta_6 (\tau * Ch05) + \beta_7 (Q * \tau * Ch05) + \Phi' X_{ipt} + \varepsilon_t \quad [3.2]$$

As in the DD model (equation [3.1]), the DDD model controls for fixed-time and fixed-province effects and their interaction. The dummy variable $Ch05$ is added to the equation [3.1] to identify mothers and fathers of zero- to five-year-old children as a treatment group. The equation [3.2] is also controlled for the time effect on the treatment group ($\tau * Ch05$) and fixed-province effect on the treatment group ($Q * Ch05$). The parameter of interest β_7 in the DDD model captures the policy effect on the labour supply and time allocation outcomes specific to the mothers and fathers of zero- to five-year-old children residing in Quebec during the policy implementation period.

In both equations [3.1] and [3.2] the dependent variable Y_{ipt} represents various labour market and time allocation outcomes. The Probit model was used to estimate the probability of mothers' and fathers' labour force participation. The Ordered Probit model was used to estimate the effect of the policy reform on mothers' and fathers' labour force status recorded as not-employed, part-time employed and full-time employed. These three employment states represent a natural order through the increase of labour hours

supplied: zero hours for not working, 1-29 hours for part-time and 30 and more hours for full-time workers (Powell 1998; Gustafsson and Stafford 1992). For easier interpretation, the predicted probabilities were computed in the Ordered Probit model by holding all variables at their means and varying the policy variable ($Q * \tau$) in the DD model and ($Q * \tau * Ch05$) in the DDD model). A one-limit Tobit model was appropriate in the estimation of weeks and hours worked by mothers and fathers and hours spent by them on childcare and housework. The use of the Tobit model allowed accounting for those mothers and fathers who reported zero hours or weeks of employment, housework and childcare. Finally, the two-limit Tobit model was used to estimate fathers' share of earnings, housework and childcare in the family since these dependent variables are censored by zero from below and by one from above. While DD and DDD models suggest the linear functional form, they also could be estimated in non-linear setting (Puhani 2012). The treatment effect is estimated as the coefficient of the group and time interaction variable and will be reported here. Marginal effects are reported.

Labour market and time allocation outcome regressions were explained in both DD and DDD models in four ways. The first model did not control for any personal or household characteristics and reported the net effect of the policy. The second model included personal characteristics such as age group, education level, immigrant status and number of children. The third model controlled for additional family characteristics such as official marital status (married vs. common-law), place of residence (urban vs. rural) and mobility (reallocation to Quebec from the other provinces or abroad). The fourth model controlled for partners' personal characteristics by inclusion of such variables as age difference, education difference between partners, their immigration status and

father's proportion of household earnings (only in housework and childcare time allocation equations).⁸

There are some model specification issues that have to be accounted for. First, the policy has to be unexpected to be considered exogenous. Lefebvre & Merrigan (2008) pointed out that the details of the policy change were available to the public only a few months before implementation. Pre-policy labour supply trends were controlled in this paper since the data were collected from the 1996 Census. Second, the introduction of the childcare subsidy may stimulate interprovincial migration to Quebec. This endogeneity issue was controlled by mobility variables. The mobility variables identified respondents who moved to Quebec from another province or another country during last year or in the previous five years⁹.

3.5. Regression Results

3.5.1. *Labour market outcomes*

Tables 3.4 and 3.5 present the DD and DDD estimated TOBIT marginal effects of the policy on labour supply dependent variables. OLS results are reported as well. Table 3.4 reports the results for the sample in which the ROC was a control group. Table 3.5 reports the results for the sample in which Ontario was a control group.

Insert Table 3.4 here

⁸ The results of estimations are robust to the model specifications. Therefore only the model specification that controls for personal and household characteristics is reported further.

⁹ In the sample used for this paper the level of interprovincial migration to Quebec one year before the survey was 0.4% in 1996 and 1.1% in 2001. The level of interprovincial migration to Quebec during last five years before the survey was 1.6% in both 1996 and 2001. The level of migration to Quebec from another country during the last year before the survey was 0.2%. Only 2-3% of respondents moved to Quebec in the last five years.

Insert Table 3.5 here

In tables 3.4 and 3.5, columns 1 and 2 report the DD effect of the policy on labour market outcomes of Quebec parents of zero- to five-year-old children and with no children older than five years of age. The model reported in columns 3 and 4 expanded the original sample to include mothers and fathers of zero- to five-year-old children who also could have six- to seventeen-year-old children. Accounting for the presence of six- to seventeen-year-old children allowed controlling for other aspects of the Quebec family policy changes such as the provision of pre- and after-school daycare and the substitution of the child allowance by the child tax benefit. The presence of six- to seventeen-year-old children in families creates additional incentives for parents to participate on the labour market and increase total family income. Parents also have to spend more time on housework and childcare in larger families. At the same time, older children can take over some housework and childcare responsibilities and affect the time distribution between mothers and fathers. The results in columns 5 and 6 present the DDD extension to the original DD model. DDD specification estimated the effect of the policy on parents of zero- to five-year-old children and with no children older than five with an additional control group consisting of parents of six- to seventeen-year-old children and no children younger than six. The coefficients were controlled for own age and education of mothers and fathers, the difference in their age and education level, immigration and mobility status, official marital status (marriage vs. common-law) and place of residence (urban vs. rural).

Table 3.6 reports the results of the Ordered Probit predicted probabilities estimation for the labour force status of mothers and fathers. The results were very robust

for various model specifications and the choice of control group. Therefore results are reported here for the original sample, with the inclusion of personal and household characteristics, and only for the ROC as a control group. Column 1 reports the estimates of the DD model and Column 2 reports the estimates of the DDD model.

Insert Table 3.6 here

The regression analysis suggests that Quebec mothers of zero- to five-year-old children who were eligible for “\$5 per day” daycare increased their labour supply. The top panel of table 3.4 reports the effect of the policy on mothers’ labour supply. The DD model (columns 1 and 3) showed that the odds of labour force participation of Quebec mothers of zero- to five-year-old children and with no children older than five years of age (affected by the policy) was 12% higher compared to their ROC counterparts. These Quebec mothers worked 1.38 hours and 1.73 weeks more than the ROC mothers. The only labour supply indicator which was not affected by the policy was the amount of wages earned by Quebec mothers during the year previous to the Census interview. The lack of effect of the policy on wages could be explained by the short-run nature of the investigation.

The top panel of table 3.5 reports similar outcomes for Quebec mothers of zero- to five-year-old children and with no children older than five years of age relative to their Ontario counterparts. The choice of Ontario mothers as a control group did not affect the significance of the policy coefficient, but the magnitude of the policy effect was higher compared to the ROC. For example, the labour force participation of Quebec mothers of zero- to five-year-old children and with no children older than five years of age (columns

1 and 3) was found to be 16% higher compared to Ontario mothers; Quebec mothers worked 1.94 hours and 2.49 weeks more than Ontario mothers.

The inclusion of those mothers of zero- to five-year-old children who also could have six- to seventeen-year-old children to the sample (column 3) led to a slight decline in coefficients, but the coefficients remained significant with both control groups (tables 3.4 and 3.5).

Further, the DDD estimated parameters of labour force participation, weekly hours and annual weeks reported by Quebec mothers of zero- to five-year-old children lost their significance when they were compared to the mothers of six- to seventeen-year-old children, and the control group consisted of the ROC mothers (columns 5 and 6 in table 3.4). When Ontario was the control group the labour force participation coefficient remained significant, but the weekly hours and annual weeks worked variables lost significance (columns 5 and 6 in table 3.5). This evidence suggested that mothers of six- to seventeen-year-old children were affected by the policy changes in a similar way as mothers of children eligible for the daycare subsidy. First, mothers of six- to nine-year-old children were eligible for the daycare subsidy in 1997-2000. Second, the Quebec family policy reform introduced the subsidy for pre- and after-school daycare for five- to twelve-year-old children, Third, the policy reform substituted tax benefits for child allowance for families with children younger than eighteen. This finding supports the results of Lefebvre et al. (2009) who observed that mothers of six- to eleven-year-old children significantly benefitted from the new policy.

The bottom panel of table 3.4 (columns 1 and 2) reports DD estimates which indicate that the Quebec childcare policy did not have a significant impact on the labour

force participation, hours worked per week, annual weeks worked and annual wages of fathers of zero- to five-year-old children when Quebec is compared to the rest of the country. Fathers of zero- to five-year-old children who also could have six- to seventeen-year-old children worked 0.47 hours per week more compared to their ROC counterparts (column 3 in table 3.4).

The bottom panel of table 3.5 reports the DD model with Ontario as a single control group; the fathers affected by the policy change worked 0.68-0.81 weeks per year more compared to those who were unaffected by the policy change. The rest of the coefficients remain insignificant, which is a likely outcome when the subsidized daycare affects mostly mothers' labour supply.

The results of the DDD estimation were more robust to the model specifications and the choice of control groups. Tables 3.4 and 3.5 (columns 5 and 6) show that the policy did not have a significant effect on the labour force participation, annual weeks worked and annual wages earned by Quebec fathers. However, Quebec fathers had smaller weekly hours worked compared to their ROC and Ontario counterparts.

While the changes in family policy, the provision of daycare subsidies in particular, targeted poverty reduction, both DD and DDD models did not reveal any effect of the policy change on annual wages earned by mothers and fathers when Quebec was compared to the ROC. In models with Ontario as a single control group, showed that Quebec mothers of zero- to five-year-old children had \$1,928 higher annual wages compared to mothers of six- to seventeen-year-old children. Quebec fathers experienced a decline in their annual wages by \$1,921 compared to Ontario fathers of zero- to five-year-old children. The effect of the policy on the share of fathers' earnings was not found

to be significant in models with the ROC as a control group. Fathers' earnings share were found to be 2-3 percentage points lower in families affected by the policy change in models with Ontario as a control group.

Overall the reform of Quebec family policy had a positive effect on labour force participation and labour supply of mothers of zero- to five-year-old children. The effect of the reform on fathers' labour force participation and labour supply was either neutral or negative. Table 3.6 summarizes the computed predicted probabilities of three labour force status groups of mothers and fathers¹⁰. Both DD and DDD models showed that the probability of Quebec mothers reporting non-working and part-time employment statuses is lower compared to the ROC mothers. Quebec mothers were more likely to report full-time employment compared to the ROC mothers (62% vs. 57% in the DD model).

The probability that fathers reported non-working status was similar in the DD model between Quebec fathers and the ROC fathers, but increased from 2% to 4% in the DDD model. The odds that fathers reported part-time employment was higher in Quebec, while the odds that fathers reported full-time employment was lower in the ROC. All coefficients in this estimation were significant at 1% significance level.

¹⁰ The estimation results were very robust to various model specifications. The coefficients reported in Column 1 of table 3.6 include only estimation of the Ordered Probit DD model for Quebec mothers and fathers of zero- to five-year-old children. The coefficients reported in Column 2 of table 3.6 include estimation of the Ordered Probit DDD model for Quebec mothers and fathers of zero- to five-year-old children relative to mothers and fathers of six- to seventeen-year-old children. In both columns reported results compare Quebec with the ROC as a control group.

3.5.2. *Housework and childcare time allocation outcomes*

Tables 3.7 and 3.8 present the DD and DDD estimated effect of the policy on the hours of housework and childcare dependent variables¹¹. Table 3.7 reports the results for the sample in which the ROC was the control group. Table 3.8 reports the results for the sample in which Ontario was the control group. The structure of tables 3.7 and 3.8 is similar to the structure of tables 3.4 and 3.5.

Insert Table 3.7 here

Insert Table 3.8 here

The DD model reported in tables 3.7 and 3.8 shows a negative and strongly significant effect of the policy on the time spent by Quebec mothers and fathers on housework. Mothers of zero- to five-year-old children spent 0.85 hours less on housework after the policy was implemented. The coefficient of the policy effect became smaller when parents of zero- to five-year-old children who also could have six- to seventeen-year-old children were added to the sample (column 3). Fathers affected by the policy spent 0.66 hours less on housework compared to fathers unaffected by the policy. This negative effect became smaller when parents of zero- to five-year-old children who also could have six- to seventeen-year-old children were added to the sample. In the DDD model, the parameters showing the policy effect on mothers' and fathers' housework hours were found to be insignificant (columns 5 and 6 in tables 3.7 and 3.8). In the DD model, the share of housework time spent by fathers was found to be 2 percentage points lower in the families affected by the policy, but the coefficient lost its significance when when families with six- to seventeen-year-old children were added to

¹¹ The detailed estimation outcomes of the DD regression are reported in appendices 3.1-3.3.

the sample. In the DDD model, fathers of zero- to five-year-old children had 3 percentage points lower housework share compared to fathers of six- to seventeen-year-old children.

The estimation results lead to the following conclusions. First, the policy had a negative effect on housework time spent by mothers and fathers, with a larger magnitude for mothers. This outcome could be a result of twin substitution effects for mothers – they have an arranged daycare for children, supply more hours to the labour market and reduce housework. Also, the income effect created by cheaper daycare and additional family income allows mothers and fathers to substitute household production with market goods and services. Second, the inclusion of personal and household characteristics in the estimation weakened the effect of the policy for both parents. Such personal characteristics as age, education, immigration status, and marital status affect the time distribution of parents on housework¹². These results are consistent with previous literature that showed that mothers with lower education levels were more affected by the policy compared to mothers with higher education (Lefebvre and Merrigan 2008; Lefebvre, Merrigan, and Verstraete 2009).

Third, the inclusion of families with six- to seventeen-year-old children weakened the policy effect for mothers, but increased it for fathers. Family size positively affects the amount of housework and housework allocation. It had been shown that a larger number of children increases housework produced by both mothers and fathers, but more so for mothers, especially in families with younger children (Mcfarlane, Beaujot, and Haddad 2012; Fernandez and Sevilla-sanz 2006). Fourth, the policy coefficient lost significance in the DDD model, when parents of zero- to five-year-old children were

¹² The full estimation results are presented in appendices 3.1-3.3.

compared to parents of six- to seventeen-year-old children. This result suggested the Quebec family policy reform affected not only parents of pre-schoolers eligible for daycare but also parents of six- to seventeen-year-old children. Finally, while the daycare availability and affordability allowed both mothers and fathers to reduce the absolute amount of time spent on housework, fathers' share of housework was found to be 2 percentage points lower in families affected by the policy.

The results of the DD model did not reveal any significant effect of the policy reform on the amount of time spent by mothers and fathers on childcare (tables 3.7 and 3.8). However, the outcomes of the DDD model showed that childcare hours of Quebec mothers and fathers of zero- to five-year old children were found to be lower compared to mothers and fathers of six- to seventeen-year-old children (by 1.09 hours for fathers and by 1.50 hours for mothers). More affordable daycare increased incentives for parents to put their of zero- to five-year old children into public or private daycare, increase labour supply and cut hours spent on housework and childcare. It is likely that the daycare decisions were made by the parents of six- to seventeen-year-old children before the policy was implemented. As a result, the policy reforms did not change childcare time allocation for parents with school-age children and had only an income effect by relaxing a financial constraint. In both DD and DDD models the share of childcare done by fathers was found to be 2-3 percentage points lower in families affected by the policy change.

3.6. Conclusion

The Quebec universal childcare policy reform was implemented from 1997 to 2000 and introduced subsidized "\$5 per day" daycare for zero- to four-year-old children, full-time kindergarten for five-year-old children and subsidized pre- and after school

daycare for five- to twelve-year-old children¹³. In addition, the child allowance was substituted by the child tax benefit for families with zero- to eighteen-year-old children. The policy positively affected the labour market outcomes of mothers of small children, but negatively affected health and behavioural outcomes of children (Baker, Gruber, and Milligan 2005; Haeck, Lefebvre, and Merrigan 2013; Lefebvre, Merrigan, and Verstraete 2009). This paper focused on the effect of the Quebec policy reforms, more specifically the introduction of “\$5 per day” daycare, on the labour supply outcomes of both mothers and fathers. Also the paper investigated if there was a change in the absolute and relative amount of time spent by mothers and fathers on housework and childcare as a result of the policy change.

The estimation results stayed in line with the previous literature (Baker, Gruber, and Milligan 2005; Lefebvre and Merrigan 2008; Lefebvre, Merrigan, and Verstraete 2009; Haeck, Lefebvre, and Merrigan 2013) and showed a positive impact of the policy reform on labour force participation, weekly hours and annual weeks worked for mothers of zero- to five-year-old children. However, when mothers of zero- to five-year-old children were compared to mothers of six- to seventeen-year-old children the policy coefficients lost significance for labour force participation, weekly hours and annual weeks worked. The probability of mothers working full-time was higher in the groups affected by the policy change; the probability of mothers not-working or working part-time was lower in the in the groups affected by the policy change.

The estimation did not reveal a significant response of fathers’ labour supply outcomes to the policy reform. However, the probability that fathers affected by the

¹³ The fee stayed the same throughout the study period and was not raised to \$7 per day until 2004.

policy held a full-time job was found to be lower compared to those fathers who were unaffected. The fathers of zero- to five-year-old children supplied fewer weeks of employment compared to fathers of six- to seventeen-year-old children. The Quebec policy reform did not have a significant impact on the mothers' and fathers' earnings, but reduced the fathers' share in total family earnings.

In the DD model the comparison of mothers and fathers of zero- to five-year-old children before and after daycare subsidy was introduced showed that the policy reform negatively affected housework hours, but did not childcare hours. In the DDD model the policy reform reduced childcare time of mothers and fathers of pre-schoolers compared to the parents of school-age children in the ROC and Ontario. The effect of the policy reform on housework was not significant in the DDD model for both mothers and fathers implying that housework hours of Quebec, the ROC and Ontario parents changed in the same direction simultaneously.

The descriptive comparison of Canadian fathers' share of time spent on housework and childcare in 1996 and 2001 showed that fathers on average increased participation in household production activities, especially in Quebec. However, regression analysis reported that in the absence of the Quebec childcare policy, the fathers' share of household activities would be 1-3 percentage points higher.

Overall, this analysis suggested that the 1997-2000 reforms of the family policy in Quebec created incentives for mothers of zero- to five-year-old children to increase their labour market participation, while it did not affect the labour supply of fathers. In addition, the policy reform affected the allocation of time spent on housework and

childcare. Mothers and fathers reduced hours spent on domestic production activities, but mothers ended up doing higher proportion of housework and childcare.

3.7. Tables

Table 3.1. Sample statistics: Parents in the Census, 1996 and 2001

	Quebec		The Rest of Canada		Ontario	
	1996	2001	1996	2001	1996	2001
Mothers' age group						
25 to 34 years of age	0.80	0.74	0.77	0.70	0.76	0.68
35 to 44 years of age	0.19	0.25	0.22	0.29	0.23	0.30
45 to 54 years of age	0.01	0.01	0.01	0.01	0.00	0.01
Fathers' age group						
25 to 34 years of age	0.64	0.57	0.60	0.52	0.60	0.51
35 to 44 years of age	0.32	0.39	0.36	0.43	0.37	0.44
45 to 54 years of age	0.03	0.04	0.03	0.05	0.03	0.05
Mothers' education group						
High-school graduate	0.22	0.10	0.17	0.12	0.18	0.12
College graduate	0.35	0.39	0.36	0.36	0.37	0.37
Some university	0.01	0.11	0.04	0.12	0.04	0.10
Bachelor degree or higher	0.30	0.31	0.30	0.31	0.30	0.32
Father's education group						
High-school graduate	0.22	0.13	0.17	0.13	0.18	0.14
College graduate	0.32	0.39	0.34	0.36	0.34	0.36
Some university	0.01	0.09	0.04	0.11	0.04	0.10
Bachelor degree or higher	0.29	0.25	0.28	0.27	0.29	0.29
Family composition						
Foreign born mother	0.09	0.12	0.23	0.25	0.27	0.29
Foreign born father	0.11	0.13	0.23	0.25	0.27	0.30
Both spouses Canadian born	0.87	0.84	0.70	0.68	0.65	0.63
One spouse is Foreign born	0.06	0.08	0.14	0.14	0.15	0.15
Both spouses Foreign born	0.07	0.09	0.16	0.18	0.20	0.22
Number of children	1.51	1.45	1.53	1.49	1.52	1.48
Common-law couple	0.40	0.48	0.08	0.10	0.06	0.09
Urban residents	0.67	0.69	0.65	0.67	0.76	0.77
N	3,695	2,890	11,022	10,199	5,767	5,488
Source: 1996 and 2001 Canadian census (DLI)						

Table 3.2. Sample statistics: Labour market outcomes of parents age 5 or younger

	Quebec		The Rest of Canada				Ontario					
	1996	2001	1996	2001	1996	2001	1996	2001				
	Percentage distribution											
Mother is in labour force	70.47	74.95	68.86	68.69	70.57	69.37						
Mother worked mostly part-time last year	20.03	17.3	25.43	24.79	21.59	21.05						
Mother worked mostly full-time last year	58.89	65.99	55.14	56.72	59.62	60.62						
Father is in labour force	91.83	92.94	92.92	93.29	93.6	94.17						
Father worked mostly part-time last year	3.71	3.25	3.68	2.64	3.4	2.15						
Father worked mostly full-time last year	94.24	94.39	94.31	95.8	94.54	96.28						
	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %	Non-zero, %
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Mother's hours worked last week	60.00	33.38	61.52	34.78	60.31	32.57	60.26	33.06	61.42	33.87	60.46	34.45
Mother's weeks worked last year	78.92	40.26	83.29	41.53	80.58	39.88	81.51	40.83	81.20	41.06	81.67	41.51
Mother's wages earned last year	76.86	20,784	79.97	25,031	77.36	21,973	78.29	26,460	78.20	24,534	78.46	29,103
Father's hours worked last week	89.20	43.59	90.24	43.13	90.45	45.58	90.97	46.28	91.40	45.28	92.24	45.81
Father's weeks worked last year	97.94	46.24	97.65	47.79	97.99	47.33	98.44	48.14	97.94	48.11	98.43	48.67
Father's wages earned last year	93.21	35,124	94.19	41,622	92.81	39,557	93.30	47,732	92.91	41,604	93.77	50,625
N	3,695		2,890		11,022		10,199		5,767		5,488	

Source: 1996 and 2001 Canadian census (DLI)

Table 3.3. Sample statistics: Housework and childcare time allocation of parents age 5 or younger

	Quebec				The Rest of Canada				Ontario			
	1996		2001		1996		2001		1996		2001	
	Non-zero, %	Mean	Non-zero, %	Mean	Non-zero, %	Mean	Non-zero, %	Mean	Non-zero, %	Mean	Non-zero, %	Mean
Mother's hours of housework	91.04	13.8	87.58	11.76	93.84	17.36	92.29	16.23	93.13	16.24	91.60	15.06
Father's hours of housework	67.14	6.93	66.96	6.5	70.95	7.74	73.27	7.69	70.07	7.38	73.07	7.23
Mother's hours of childcare	96.37	24.41	96.37	25.12	95.19	30.48	95.17	31.58	94.59	29.3	94.66	30.25
Father's hours of childcare	84.38	12.14	86.78	13.65	82.67	14.22	84.67	15.66	81.58	13.61	84.48	15.13
Father's share of housework	67.14	0.39	66.96	0.41	70.95	0.35	73.27	0.37	70.07	0.36	73.07	0.38
Father's share of childcare	84.38	0.34	86.78	0.35	82.67	0.31	84.67	0.32	81.58	0.31	84.48	0.32
N	3,695		2,890		11,022		10,199		5,767		5,488	

Source: 1996 and 2001 Canadian census (DLI)

Table 3.4. Regression results: Policy effect on labour market outcomes (Quebec
vs. the Rest of Canada)

Children by age	DD model				DDD model	
	0-5		0-17		0-5 vs. 6-17	
	TOBIT	OLS	TOBIT	OLS	TOBIT	OLS
Mothers' labour market outcomes						
In labour force	0.12*** (0.04)	0.04*** (0.01)	0.10*** (0.03)	0.03*** (0.01)	0.07 (0.05)	0.02 (0.01)
Hours worked last week	1.38 (0.87)	1.00* (0.53)	1.31** (0.63)	0.91** (0.40)	0.23 (0.89)	0.34 (0.64)
Weeks worked last year	1.73** (0.70)	1.36** (0.57)	1.31** (0.57)	0.95** (0.44)	0.91 (0.82)	0.67 (0.69)
Wages earned last year	380.37 (628.00)	172.46 (502.85)	87.21 (492.42)	-114.11 (376.36)	1,105.83 (774.10)	993.68 (632.72)
Fathers' labour market outcomes						
In labour force	0.06 (0.05)	0.01 (0.01)	0.06 (0.04)	0.01 (0.01)	-0.07 (0.07)	-0.01 (0.01)
Hours worked last week	-0.69 (0.55)	-0.72 (0.50)	-0.66 (0.43)	-0.69* (0.38)	-1.60** (0.69)	-1.44** (0.62)
Weeks worked last year	0.40 (0.32)	0.42 (0.32)	0.47* (0.25)	0.48* (0.24)	-0.64 (0.42)	-0.62 (0.41)
Wages earned last year	-1012.18 (808.36)	-1,043.18 (758.47)	-869.47 (624.48)	-924.33 (584.52)	45.40 (1,060.20)	22.20 (984.55)
Observations	27,806	27,806	50,370	50,370	80,108	80,108

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Source: Authors' calculations, reported fully in appendices 3.1 and 3.2.

Table 3.5. Regression results: Policy effect on labour market outcomes (Quebec vs. Ontario)

Children by age	DD model				DDD model	
	0-5		0-17		0-5 vs. 6-17	
	TOBIT	OLS	TOBIT	OLS	TOBIT	OLS
Mothers' labour market outcomes						
In labour force	0.16*** (0.04)	0.05*** (0.01)	0.12*** (0.03)	0.04*** (0.01)	0.12** (0.05)	0.04** (0.02)
Hours worked last week	1.94** (0.95)	1.31** (0.58)	1.55** (0.69)	1.00** (0.43)	1.37 (0.98)	1.19* (0.70)
Weeks worked last year	2.49*** (0.76)	2.03*** (0.63)	1.85*** (0.62)	1.43*** (0.49)	1.32 (0.91)	1.00 (0.76)
Wages earned last year	708.72 (710.98)	353.92 (571.35)	-57.24 (561.77)	-336.07 (429.78)	1,927.70** (886.01)	1699.69** (724.23)
Fathers' labour market outcomes						
In labour force	0.05 (0.06)	0.01 (0.01)	0.08* (0.05)	0.01* (0.01)	-0.06 (0.07)	-0.01 (0.01)
Hours worked last week	-0.68 (0.57)	-0.69 (0.52)	-0.51 (0.43)	-0.54 (0.40)	-1.46** (0.71)	-1.33** (0.65)
Weeks worked last year	0.68* (0.35)	0.70** (0.35)	0.81*** (0.27)	0.82*** (0.26)	-0.55 (0.45)	-0.53 (0.44)
Wages earned last year	-1921.95** (888.26)	-1904.67** (835.54)	-2039.74*** (691.94)	-2031.86*** (648.72)	-731.30 (1178.96)	-706.45 (1097.23)
Observations	17,840	17,840	31,807	31,807	49,721	49,721

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Source: Authors' calculations, reported fully in appendices 3.1 and 3.2.

Table 3.6. Regression results: Policy effect on the predicted probabilities of mothers' and fathers' labour force participation in Quebec (Quebec vs. the Rest of Canada).

	(1) DD model		(2) DDD model	
<u>Mothers from Quebec and the Rest of Canada</u>				
Not working, control group	0.18***	(0.00)	0.16***	(0.00)
Not working, treatment group	0.15***	(0.01)	0.13***	(0.01)
Working part-time, control group	0.25***	(0.00)	0.26***	(0.00)
Working part-time, treatment group	0.23***	(0.01)	0.24***	(0.01)
Working full-time, control group	0.57***	(0.00)	0.58***	(0.00)
Working full-time, treatment group	0.62***	(0.02)	0.63***	(0.02)
<u>Fathers from Quebec and the Rest of Canada</u>				
Not working, control group	0.02***	(0.00)	0.02***	(0.00)
Not working, treatment group	0.02***	(0.00)	0.04***	(0.01)
Working part-time, control group	0.03***	(0.00)	0.03***	(0.00)
Working part-time, treatment group	0.04***	(0.00)	0.05***	(0.01)
Working full-time, control group	0.96***	(0.00)	0.95***	(0.00)
Working full-time, treatment group	0.94***	(0.01)	0.92***	(0.01)
Control variables	yes		yes	
N	27,806		80,108	

Standard errors in parentheses
 * p<0.1 ** p<0.05 *** p<0.01

Table 3.7. Regression results: Family policy effect on housework and childcare
(Quebec vs. the Rest of Canada)

Children by age	DD model				DDD model	
	0-5		0-17		0-5 vs. 6-17	
	TOBIT	OLS	TOBIT	OLS	TOBIT	OLS
Mothers' housework and childcare						
Hours of housework	-0.85** (0.41)	-0.56 (0.41)	-0.81** (0.32)	-0.64** (0.30)	-0.30 (0.47)	-0.27 (0.44)
Hours of childcare	-0.30 (0.47)	-0.06 (0.50)	0.19 (0.35)	0.21 (0.34)	-1.50** (0.60)	-1.06** (0.53)
Fathers' housework and childcare						
Hours of housework	-0.66** (0.31)	-0.39* (0.24)	-0.74*** (0.24)	-0.57*** (0.18)	-0.58 (0.38)	-0.35 (0.27)
Hours of childcare	0.00 (0.44)	-0.23 (0.41)	-0.10 (0.34)	-0.14 (0.28)	-1.09* (0.58)	-0.30 (0.43)
Relative housework and childcare						
Father's share of housework	-0.02** (0.01)	-0.00 (0.01)	-0.01* (0.01)	-0.01* (0.01)	-0.03** (0.01)	-0.02** (0.01)
Father's share of childcare	0.00 (0.01)	-0.02** (0.01)	-0.00 (0.01)	-0.00 (0.00)	-0.03** (0.01)	-0.01 (0.01)
Observations	27,806	27,806	50,370	50,370	80,108	80,108

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Source: Authors' calculations, reported fully in appendices 3.1 and 3.2.

Table 3.8. Regression results: Family policy effect on housework and childcare
(Quebec vs. Ontario)

Children by age	DD model 0-5		DD model 0-17		DDD model 0-5 vs. 6-17	
	TOBIT	OLS	TOBIT	OLS	TOBIT	OLS
Mothers' housework and childcare						
Hours of housework	-0.74* (0.44)	-0.56 (0.41)	-0.81** (0.34)	-0.68** (0.31)	-0.13 (0.51)	-0.11 (0.47)
Hours of childcare	-0.08 (0.52)	-0.06 (0.50)	0.39 (0.39)	0.40 (0.37)	-1.45** (0.66)	-1.01* (0.58)
Fathers' housework and childcare						
Hours of housework	-0.67** (0.32)	-0.39* (0.24)	-0.80*** (0.25)	-0.60*** (0.18)	-0.30 (0.39)	-0.19 (0.29)
Hours of childcare	-0.31 (0.47)	-0.23 (0.41)	-0.14 (0.36)	-0.15 (0.30)	-1.22** (0.62)	-0.41 (0.46)
Relative housework and childcare						
Father's share of housework	-0.02** (0.01)	-0.02** (0.01)	-0.02* (0.01)	-0.01* (0.01)	-0.02 (0.01)	-0.01 (0.01)
Father's share of childcare	-0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)	-0.00 (0.01)	-0.03*** (0.01)	-0.02** (0.01)
Observations	17,840	17,840	31,807	31,807	49,721	49,721

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Source: Authors' calculations, reported fully in appendices 3.1 and 3.2.

Appendix 3.1. TOBIT regression results: Family policy effect on labour market
outcomes of mothers (Quebec vs. the Rest of Canada)

	In labour force	Hours worked last	Weeks worked last	Wages earned last
Resident of Quebec	-0.06* (0.03)	-0.65 (0.66)	-2.36*** (0.54)	-2,387.75*** (482.53)
Year 2001	-0.03* (0.02)	-0.41 (0.42)	0.71** (0.34)	3,044.63*** (307.05)
Affected by QB policy	0.12*** (0.04)	1.38 (0.87)	1.73** (0.70)	380.37 (628.00)
Age group: 35-44 years	0.10*** (0.02)	4.72*** (0.46)	1.82*** (0.38)	5,248.66*** (338.59)
Age group: 45-54 years	0.13 (0.09)	8.55*** (2.00)	3.92** (1.66)	7,546.76*** (1,476.23)
Husband is in older age	0.02 (0.02)	1.64*** (0.44)	-0.19 (0.36)	1,681.07*** (317.83)
Wife is in older age	-0.06 (0.04)	-1.15 (0.93)	-0.14 (0.76)	-37.62 (676.84)
High school graduate	0.26*** (0.03)	5.22*** (0.75)	6.53*** (0.60)	4,710.04*** (541.92)
College graduate	0.39*** (0.03)	6.09*** (0.67)	8.75*** (0.54)	7,988.87*** (484.64)
Some university	0.36*** (0.04)	5.00*** (0.92)	9.06*** (0.74)	9,761.20*** (665.46)
Bachelor degree or	0.55*** (0.03)	7.08*** (0.72)	11.16*** (0.58)	17,587.23*** (519.01)
Husband is more	-0.05** (0.02)	-2.52*** (0.52)	-1.93*** (0.42)	-765.54** (374.78)
Wife is more educated	0.06*** (0.02)	1.67*** (0.44)	0.86** (0.36)	-1,209.20*** (318.46)
Foreign born husband	-0.10*** (0.03)	-1.01* (0.58)	-2.26*** (0.47)	-2,095.47*** (423.20)
Foreign born wife	-0.30*** (0.03)	-4.82*** (0.59)	-6.25*** (0.48)	-6,561.90*** (425.16)

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Appendix 3.1 - *continued*

	In labour force	Hours worked last	Weeks worked last	Wages earned last year
Number of children	-0.25*** (0.01)	-6.50*** (0.31)	-6.41*** (0.25)	-5,062.53*** (222.73)
Moved to Quebec in	-0.34** (0.15)	-0.97 (3.59)	-10.24*** (2.93)	-9,593.83*** (2,659.37)
Moved to Quebec in	-0.81*** (0.20)	-16.19*** (5.21)	-15.32*** (4.03)	-10,611.19*** (3,656.65)
Common law couple	-0.10*** (0.03)	-0.67 (0.76)	-1.77*** (0.61)	-2,351.39*** (550.01)
Common law couples	0.23*** (0.05)	1.25 (1.06)	3.31*** (0.86)	2,633.32*** (772.68)
Urban resident	0.09*** (0.02)	1.59*** (0.41)	2.22*** (0.33)	4,753.82*** (297.59)
N	27,806	27,806	27,806	27,806

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Marginal effects reported

Appendix 3.2. TOBIT regression results: Family policy effect on labour market
outcomes of fathers (Quebec vs. the Rest of Canada)

	In labour force	Hours worked	Weeks worked	Wages earned last	Father's earnings
Resident of Quebec	-0.13*** (0.04)	-2.64*** (0.42)	-1.42*** (0.25)	-4,898.28*** (618.79)	0.01 (0.01)
Year 2001	0.03 (0.03)	1.17*** (0.27)	1.10*** (0.16)	7,551.84*** (395.61)	0.01** (0.01)
Affected by QB policy	0.06 (0.05)	-0.69 (0.55)	0.40 (0.32)	-1,012.18 (808.36)	-0.01 (0.01)
Age group: 35-44 years old	-0.03 (0.03)	-1.19*** (0.32)	-0.07 (0.19)	5,951.86*** (466.74)	-0.04*** (0.01)
Age group: 45-54 years old	-0.21*** (0.07)	-2.69*** (0.70)	-0.55 (0.41)	8,475.74*** (1,027.88)	-0.04** (0.01)
Age group: 55-64 years old	-0.77*** (0.15)	-	-5.04*** (1.19)	5,267.92* (2,970.13)	-0.12*** (0.04)
Father is in older age group	0.02 (0.04)	0.45 (0.37)	-0.03 (0.22)	-2,201.44*** (543.09)	0.02*** (0.01)
Mother is in older age group	0.01 (0.06)	-1.28** (0.56)	0.31 (0.33)	1,513.83* (814.12)	-0.04*** (0.01)
High school graduate	0.32*** (0.04)	3.09*** (0.42)	2.99*** (0.25)	4,583.44*** (618.71)	-0.01 (0.01)
College graduate	0.39*** (0.03)	3.34*** (0.38)	3.67*** (0.22)	9,533.22*** (553.98)	-0.03*** (0.01)
Some university	0.46*** (0.06)	4.18*** (0.57)	3.98*** (0.33)	11,596.78*** (831.32)	-0.08*** (0.01)
Bachelor degree or higher	0.66*** (0.04)	5.87*** (0.43)	5.11*** (0.25)	23,455.02*** (626.64)	-0.06*** (0.01)
Father is more educated	-0.07** (0.03)	-0.36 (0.31)	-0.41** (0.18)	-3,061.13*** (454.30)	0.08*** (0.01)
Mother is more educated	0.07** (0.03)	0.90*** (0.30)	0.25 (0.18)	402.07 (442.39)	-0.07*** (0.01)
Foreign born father	-0.19*** (0.04)	-2.09*** (0.37)	-2.22*** (0.22)	-7,775.44*** (544.88)	-0.02*** (0.01)
Foreign born mother	-0.16*** (0.04)	-2.24*** (0.37)	-1.95*** (0.22)	-5,881.56*** (545.71)	0.06*** (0.01)

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Appendix 3.2 - continued

	In labour force	Hours worked	Weeks worked	Wages earned last year	Father's earnings
Number of children	0.05** (0.02)	0.83*** (0.19)	0.44*** (0.11)	2,556.61*** (283.25)	0.08*** (0.00)
Moved to Quebec in last 5 years	-0.09 (0.21)	2.19 (2.26)	0.04 (1.33)	6,172.46* (3,301.02)	0.16*** (0.05)
Moved to Quebec in last year	-0.96*** (0.22)	-9.35*** (3.09)	-5.62*** (1.79)	-1,919.08 (4,449.70)	0.09 (0.06)
Common law couple	-0.39*** (0.04)	-4.60*** (0.48)	-4.07*** (0.28)	-7,417.61*** (708.81)	-0.02** (0.01)
Common law couples in Quebec	0.30*** (0.06)	2.71*** (0.68)	2.78*** (0.40)	4,420.97*** (995.26)	-0.01 (0.01)
Urban resident	0.19*** (0.03)	-0.14 (0.26)	1.64*** (0.15)	6,912.99*** (383.58)	-0.02*** (0.01)
N	27,806	27,806	27,806	27,806	27,806

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Marginal effects reported

Appendix 3.3. TOBIT regression results: Family policy effect on housework and childcare (Quebec vs. the Rest of Canada)

	Housework			Childcare		
	Father's hours	Mother's hours	Father's share	Father's hours	Mother's hours	Father's share
Resident of Quebec	-1.27*** (0.24)	-3.31*** (0.32)	-0.01 (0.01)	-2.31*** (0.34)	-5.91*** (0.36)	0.02*** (0.01)
Year 2001	0.32** (0.15)	-1.23*** (0.20)	0.03*** (0.00)	1.83*** (0.22)	1.41*** (0.23)	0.01*** (0.00)
Affected by QB policy	-0.66** (0.31)	-0.85** (0.41)	-0.02** (0.01)	0.00 (0.44)	-0.30 (0.47)	0.00 (0.01)
Age group: 35-44 years old	1.08*** (0.18)	0.64*** (0.22)	0.03*** (0.01)	-0.25 (0.26)	-2.18*** (0.25)	0.02*** (0.00)
Age group: 45-54 years old	1.76*** (0.39)	1.29 (0.98)	0.04*** (0.01)	-0.85 (0.57)	-6.25*** (1.12)	0.02*** (0.01)
Age group: 55-64 years old	1.89* (1.12)	... ...	0.02 (0.04)	-3.37** (1.65)	... ...	0.01 (0.03)
Father is in older age group	-0.57*** (0.20)	0.01 (0.21)	-0.01* (0.01)	0.38 (0.30)	-1.23*** (0.24)	-0.01 (0.00)
Mother is in older age group	1.24*** (0.31)	0.17 (0.45)	0.03*** (0.01)	1.20*** (0.45)	1.03** (0.51)	0.03*** (0.01)
High school graduate	0.06 (0.24)	-0.56 (0.35)	0.03*** (0.01)	1.01*** (0.34)	1.15*** (0.40)	0.02*** (0.01)
College graduate	0.31 (0.21)	-0.11 (0.31)	0.04*** (0.01)	1.37*** (0.31)	2.59*** (0.36)	0.03*** (0.00)
Some university	0.04 (0.32)	-0.65 (0.43)	0.05*** (0.01)	1.94*** (0.46)	3.06*** (0.49)	0.04*** (0.01)

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Appendix 3.3 - *continued*

	Housework				Childcare	
	Father's hours	Mother's hours	Father's share	Mother's hours	Father's hours	Father's share
Bachelor degree or higher	-0.23 (0.24)	-1.96*** (0.34)	0.06*** (0.01)	1.20*** (0.35)	2.92*** (0.38)	0.04*** (0.01)
Father is more educated	-0.44** (0.17)	0.44* (0.24)	-0.03*** (0.01)	-0.31 (0.25)	1.51*** (0.28)	-0.01*** (0.00)
Mother is more educated	-0.24 (0.17)	0.70*** (0.21)	0.01 (0.01)	0.24 (0.24)	0.11 (0.24)	0.00 (0.00)
Foreign born father	-0.96*** (0.21)	-0.64** (0.28)	-0.04*** (0.01)	-2.52*** (0.30)	-2.82*** (0.32)	-0.03*** (0.00)
Foreign born mother	-0.91*** (0.21)	-0.86*** (0.28)	-0.03*** (0.01)	-3.25*** (0.30)	-4.39*** (0.32)	-0.03*** (0.00)
Number of children	0.99*** (0.11)	4.51*** (0.14)	-0.02*** (0.00)	0.45*** (0.16)	2.59*** (0.17)	-0.01*** (0.00)
Father's salary share	-1.88*** (0.23)	9.12*** (0.31)	-0.15*** (0.01)	-5.56*** (0.33)	9.50*** (0.35)	-0.15*** (0.01)
Moved to Quebec in last 5 years	1.46 (1.24)	2.18 (1.69)	0.03 (0.04)	0.89 (1.82)	0.20 (1.93)	0.01 (0.03)
Moved to Quebec in last year	-0.98 (1.76)	-4.23* (2.34)	-0.06 (0.06)	1.76 (2.45)	1.88 (2.59)	0.02 (0.04)

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Appendix 3.3 - *continued*

	Housework				Childcare	
	Father's hours	Mother's hours	Father's share	Mother's hours	Father's hours	Father's share
Common law couple	0.60** (0.27)	0.34 (0.36)	0.01 (0.01)	0.25 (0.39)	-0.40 (0.41)	-0.00 (0.01)
Common law couples in	-0.80** (0.38)	-2.06*** (0.51)	0.01 (0.01)	0.25 (0.55)	-0.59 (0.58)	0.02*** (0.01)
Urban resident	-1.14*** (0.14)	-2.18*** (0.19)	-0.01** (0.00)	-0.10 (0.21)	-1.37*** (0.22)	0.01*** (0.00)
N	27,806	27,806	27,806	27,806	27,806	27,806

Standard errors in parentheses

* p<0.1 ** p<0.05 ***

Marginal effects reported

References

- Baker, Michael, Jonathan Gruber, and Kevin Milligan. 2005. "Universal Childcare, Maternal Labor Supply, and Family Well-Being." 11832. NBER Working Paper No. 11832.
- Barrington-Leigh, Christopher P. 2013. "The Quebec Convergence and Canadian Life Satisfaction, 1985–2008." *Canadian Public Policy* 39 (2) (June 1): 193–219. doi:10.3138/CPP.39.2.193. <http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CPP.39.2.193>.
- Beaujot, Roderic, Ching Jiangqin Du, and Zenaida Ravanera. 2013. "Family Policies in Quebec and the Rest of Canada: Implications for Fertility, Child-Care, Women's Paid Work, and Child Development Indicators." *Canadian Public Policy* 39 (2) (June 1): 221–240. doi:10.3138/CPP.39.2.221. <http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CPP.39.2.221>.
- Bélangier, Alain, Jean-Dominique Morency, and Martin Spielauer. 2010. "A Microsimulation Model to Study the Interaction between Fertility and Union Formation and Dissolution : An Application to Canada and Quebec." *Canadian Studies in Population* 37 (3-4): 339–373.
- Bianchi, SM. 2011. "Family Change and Time Allocation in American Families." *The ANNALS of the American Academy of Political and Social Science*. doi:10.1177/0002716211413731. <http://ann.sagepub.com/content/638/1/21.short>.
- Brayfield, April a. 1992. "Employment Resources and Housework in Canada." *Journal of Marriage and the Family* 54 (1) (February): 19. doi:10.2307/353272. <http://www.jstor.org/stable/353272?origin=crossref>.
- Brodeur, Abel, and Marie Connolly. 2013. "Do Higher Child Care Subsidies Improve Parental Well-Being? Evidence from Quebec's Family Policies." *Journal of Economic Behavior & Organization* 93 (September): 1–16. doi:10.1016/j.jebo.2013.07.001. <http://linkinghub.elsevier.com/retrieve/pii/S0167268113001674>.
- Chen, Zhiqi, and Frances Woolley. 2001. "A Cournot–Nash Model of Family Decision Making." *The Economic Journal* 111 (474): 722–748. <http://onlinelibrary.wiley.com/doi/10.1111/1468-0297.00657/abstract>.
- Douthitt, Robin a. 1989. "The Division of Labor within the Home: Have Gender Roles Changed?" *Sex Roles* 20 (11-12) (June): 693–704. doi:10.1007/BF00288080. <http://link.springer.com/10.1007/BF00288080>.

- Fernandez, Cristina, and Almudena Sevilla Sanz. 2006. "Social Norms and Household Time Allocation." No. 2006-38. *Chemical Communications (Cambridge, England)*. Vol. 3. doi:10.1039/b911905a. <http://www.ncbi.nlm.nih.gov/pubmed/19841818>.
- Fernandez, Cristina, and Almudena Sevilla-sanz. 2006. "Social Norms and Household Time Allocation." 648.
- Girard, C. 2008. "Le Bilan Démographique Du Québec." Québec.
- Gustafsson, Siv, and F Stafford. 1992. "Child Care Subsidies and Labor Supply in Sweden." *Journal of Human Resources* 27 (1): 204–230. <http://www.jstor.org/stable/145917>.
- Haddad, Tony. 1994. "Men's Contribution to Family Work: A Re-Examination Of time Availability." *International Journal of Sociology of the Family* 24 (1): 87–111.
- Haeck, Catherine, Pierre Lefebvre, and Philip Merrigan. 2013. "The Impact of a Universal Low-Fee Childcare Program on the Distribution of Income and Expenditures within the Family: A Natural Experiment from Canada." *Iussp.org* (April). http://www.iussp.org/sites/default/files/event_call_for_papers/ExpendituresVA111.pdf.
- Hamdad, Malika. 2003. "Valuing Households' Unpaid Work in Canada, 1992 and 1998: Trends and Sources of Change." *Statistics Canada Economic Conference*. <http://www.statcan.gc.ca/conferences/econ2003/valuing-valeur3c-eng.pdf>.
- Konrad, Kai A., and Kjell Erik Lommerud. 1995. "Family Policy with Non-Cooperative Families." *The Scandinavian Journal of Economics*: 581–601.
- . 2000. "The Bargaining Family Revisited." *Canadian Journal of Economics* 33 (2): 471–487.
- Kottelenberg, Michael J., and Steven F. Lehrer. 2013. "New Evidence on the Impacts of Access to and Attending Universal Child-Care in Canada." *Canadian Public Policy* 39 (2) (June 1): 263–286. doi:10.3138/CPP.39.2.263. <http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CPP.39.2.263>.
- Lefebvre, Pierre, and Philip Merrigan. 2008. "Child-care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada." *Journal of Labor Economics*. <http://www.jstor.org/stable/10.1086/587760>.
- Lefebvre, Pierre, Philip Merrigan, and Matthieu Verstraete. 2009. "Dynamic Labour Supply Effects of Childcare Subsidies: Evidence from a Canadian Natural Experiment on Low-Fee Universal Child Care." *Labour Economics* 16 (5)

- (October): 490–502. doi:10.1016/j.labeco.2009.03.003.
<http://linkinghub.elsevier.com/retrieve/pii/S0927537109000323>.
- Lefebvre, Pierre, and Francis Roy-desrosiers. 2011. “Costs and Benefits of Québec’s Childcare Policy.”
- Leuthold, JH. 1968. “An Empirical Study of Formula Income Transfers and the Work Decision of the Poor.” *Journal of Human Resources* 3 (3): 312–323.
<http://www.jstor.org/stable/145103>.
- Lundberg, Shelly, and RA Pollak. 1993. “Separate Spheres Bargaining and the Marriage Market.” *Journal of Political Economy* 101 (6): 988–1010.
<http://www.ifpri.org/sites/default/files/pubs/pubs/jhu/households/intrahhresch05.pdf>.
- McFarlane, S, Roderic Beaujot, and Tony Haddad. 2000. “Time Constraints and Relative Resources as Determinants of the Sexual Division of Domestic Work.” *Canadian Journal of Sociology* 25 (1). <http://www.jstor.org/stable/3341911>.
- Milligan, Kevin. 2005. “SUBSIDIZING THE STORK : NEW EVIDENCE ON TAX INCENTIVES AND FERTILITY.” *Review of Economics and Statistics* 87 (August): 539–555.
- Powell, LM. 1998. “Part-Time versus Full-Time Work and Child Care Costs: Evidence for Married Mothers.” *Applied Economics* (30): 503–511.
<http://www.tandfonline.com/doi/abs/10.1080/000368498325769>.
- Puhani, PA. 2012. “The Treatment Effect, the Cross Difference, and the Interaction Term in Nonlinear ‘difference-in-Differences’ Models.” *Economics Letters* 115 (1): 85–87. <http://core.kmi.open.ac.uk/download/pdf/6715602.pdf>.
- Stalker, Glenn, and Michael Ornstein. 2013. “Quebec, Daycare, and the Household Strategies of Couples with Young Children.” *Canadian Public Policy* 39 (2) (June 1): 241–262. doi:10.3138/CP.39.2.241.
<http://utpjournals.metapress.com/openurl.asp?genre=article&id=doi:10.3138/CP.39.2.241>.

Chapter 4. Labour supply of Australian men and women before and after divorce

Abstract

Marital dissolution leads to the emotional and financial distress of men and women and negatively affects their well-being. Using rich longitudinal data from twelve waves of an Australian Household, Income and Labour Dynamics Survey (HILDA) we estimated if the expectations of upcoming divorce create incentives for men and women to change their labour supply. We also evaluated the changes in the labour supply of divorced men and women over the years after marital dissolution. The estimation results showed that men in general tend not to change labour force participation and weekly hours worked before and after divorce. Women's expectations of divorce are positively correlated to their labour supply. Moreover, in the year of divorce women increase labour participation and hours worked and continue to do so in subsequent years.

JEL-Codes: J12, J20, J21

Keywords: Labour supply, labour force and employment, marital dissolution

4.1. Introduction

The key question in this study is related to the labour force supply of men and women before and after divorce. Existing literature shows that in general, economic reasons play an important role in decisions about marital separation and divorce. Research also found that men and women experience a negative impact of divorce on household and per-person income, which is more severe for women rather than men. Studies of the labour market reported that divorced women tend to work more, while divorced men tend to work less compared to their married counterparts. This study employs rich Australian longitudinal household survey data to analyze the dynamic effect of divorce on the labour supply of men and women. The twelve waves of the Australian Household, Income and Labour Dynamics Survey (HILDA) allow us to identify a substantial number of men and women affected by divorce and follow their labour force participation decisions before and after marital dissolution. Panel data techniques are used to focus on the following question: Do men and women change their labour supply when expecting marital disruption, during the legal divorce procedure or after divorce?

In Australia both the procedure and timing of divorce are regulated by the Family Law Act of 1975 and administered by the Family Court of Australia¹⁴. To be able to apply for divorce Australian couples are required to be separated for at least twelve months before the application. Separation is defined when a married couple experiences the disruption of the relationship including the management of finances and housework duties, social interactions and physical contact. After at least twelve months of marital

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<http://www.familylawcourts.gov.au/wps/wcm/connect/FLC/Home/Separation+and+Divorce/Divorce/>

separation, the couple may choose to enter the second stage of marital dissolution by making an official application for divorce. The procedure of divorce takes a minimum of four months in cases of agreement between the parties and may take longer under some circumstances¹⁵. After the Court finalizes a divorce there exists a one month waiting period for the divorce order to take effect. The divorce order does not determine the issues of child custody, property division, and spousal and child maintenance. The necessary applications have to be done within one year after the court divorce decision becomes final.

We use the knowledge about legal divorce procedures to make several assumptions about the timing of separation, divorce and post-divorce adjustment stages. We use the panel nature of the data to investigate the labour supply decisions of those individuals who are going to divorce (expecting to divorce) within the next year and the next one to two, two to three and three to four years. The individuals are defined as “expecting divorce at time t ” if they reported that they were married at time t and divorced at subsequent time periods. The time period of one to two years before divorce is assumed to be a separation stage according to the requirements of Australian Family Law. We also determine the time periods of post-divorce adjustment, and estimate individual labour supply in the year of divorce and one to two, two to three, three to four, four to five and more than five years after divorce. The individuals are defined as “divorced for n years at time t ” if they reported that they were married at time $(t-n-1)$ and divorced between time $(t-n)$ and time t . We assume that during the second or third year

¹⁵ The divorce procedure is less complicated and faster when both spouses apply for divorce jointly. When divorce application is done unilaterally by one spouse, or in the case of presence of children in the family, the divorce may require more time.

after divorce, the issues related to the child custody, financial and property management are resolved for the majority of divorced individuals.

Previous studies investigated both pre-divorce and post-divorce income and labour supply outcomes. Özcan and Breen (2012) summarized findings from the pre-divorce literature and admitted that in a majority of cases the data used in the research was taken from 1988-1992 National Survey of Families and Households in the United States. Both studies of pre- and post-divorce periods employed either cross-sectional or short-term longitudinal settings and could not provide a long term dynamic analysis (for example Robert Schoen et al. 2002; Sayer and Bianchi 2000; de Regt, Mortelmans, & Marynissen 2012; Smock 1993, 1994; Poortman 2000; Bianchi et al. 1999; McKeever & Wolfinger 2001). To our knowledge there is no research that combines analysis of labour market outcomes of individuals both before and after divorce. Our study adds to the literature by updating existing research using a current twelve-wave HILDA dataset. It analyzes the labour supply of those individuals who expect divorce within the next one to four years and of those individuals who go through the divorce adjustment phase for one to five years.

The paper is structured as follows. Section 4.2 includes an overview of existing literature on the determinants and consequences of divorce and its effect on the labour supply of divorced individuals. Section 4.3 provides the description of sample selection and summary statistics. Section 4.4 focuses on the methodology used in the empirical analysis. The regression results are presented in Section 4.5. The conclusions are provided in section 4.6.

4.2. Literature review

Our research studies male and female labour supply outcomes before and after divorce. Table 4.1 summarizes existing literature related to pre-divorce income and labour supply outcomes. Prior research of the pre-divorce period mainly was concerned with economic factors predicting the odds of marital dissolution, suggesting that increasing labour supply of women has a negative effect on marital stability. Few authors questioned the causality of this relationship and investigated whether individuals change labour supply preferences during divorce anticipation.

Insert Table 4.1 here

Two major theories offered opposing frameworks to explain the correlation between employment of married couples and the probability of marital dissolution. The first theory, the independence hypothesis, suggested that working wives create marital imbalance and inefficient allocation of resources within families. Economic independence of working wives provides incentives for women to exit marriage instead of working out marital disputes (Becker, Landes, and Michael 1977). The second theory, the flexibility hypothesis, argued that working women improve economic well-being in the family which causes their marriages to be more stable. Single-earner couples are more exposed to financial and economic risks such as loss of the major income-earner and tend to separate more often (Oppenheimer 1997; Cooke and Gash 2010).

The top part of table 4.1 summarizes works that studied partners' incomes and labour supply as factors leading to divorce. In this context authors were interested in the relationship between absolute and relative incomes earned by women and the probability of divorce. The results of empirical investigation did not provide clear support for either the independence or flexibility theories. Some studies showed positive correlations

between female income and the probability of divorce supporting the independence theory (Becker, Landes, and Michael 1977; d'Amico 1983; Ono 1998). Other studies showed positive correlations between female income and the probability of more stable marriage supporting the flexibility theory (Hoffman and Duncan 1995; Cooke et al. 2013). Some studies did not find any significant relationships between the two (Sayer and Bianchi 2000; Burgess, Propper, and Aassve 2003b; Cooke et al. 2013; Cooke and Gash 2010). Male income and labour force participation was found to have a negative effect on the probability of divorce, while male hours of work did not have significant impact (Hoffman and Duncan 1995; Becker, Landes, and Michael 1977; Burgess, Propper, and Aassve 2003b; Ono 1998; Sayer and Bianchi 2000). Some authors used happiness variables to control for expectation of marital separation. They found that in happy marriages, an increase in wives' employment does not have a significant impact on the probability of divorce (Robert Schoen et al. 2002; R. Schoen 2006).

The bottom panel of table 4.1 summarizes the literature that investigated the labour supply outcomes of women who anticipated divorce. The findings were more consistent, with authors reporting that the expectation of marital dissolution had a positive impact on the labour force participation and earnings of women (Johnson and Skinner 1986; Papps 2006; Austen 2004).

While there is a significant amount of literature devoted to the determinants and expectations of divorce, the analysis of the post-divorce labour market transition is scarce. The majority of studies focus on the cross-sectional comparison of labour force participation between divorced and non-divorced individuals, as well as the post-divorce household income outcomes. However, there is a lack of detailed analysis of male and

female labour force supply in a dynamic context. The section below provides the overview of existing economic research devoted to the consequences of divorce. Table 4.2 summarizes relevant existing literature on the consequences of divorce.

Insert Table 4.2 here

Economic studies showed that marital separation has a negative effect on the welfare of both men and women. As a result, the labour supply of both divorcees may change to reflect new living arrangements and financial situations. At the same time, men and women enter the post-divorce phase with different endowments of resources that can affect their employment options and their decision to change labour market status.

Several factors may affect the labour supply decisions of divorced individuals, including a decline in household income, labour supply history, accumulated human capital during marriage, and the redistribution of resources related to the custody of children after divorce. It was found that post-divorce women are more financially vulnerable compared to their ex-husbands (de Regt, Mortelmans, & Marynissen 2012; Smock 1993, 1994; Poortman 2000; Bianchi et al. 1999; McKeever & Wolfinger 2001). While female income per person and income adjusted for living costs fall after divorce, many studies reported that men experience an increase in income per person after marital separation (de Regt, Mortelmans, and Marynissen 2012; Smock 1993; Smock 1994; Poortman 2000; Peterson 1996; Bianchi, Subaiya, and Kahn 1999). Parents who gain child custody, more often women, experience the biggest financial loss after separation compared to men and women without children (Andress et al. 2006). Negative changes in the household income of divorcees, especially parents, create positive incentives towards higher labour supply. Public policy supporting single parents might have an ambiguous

effect on labour supply. While government provision of childcare can stimulate labour supply, the availability of social transfers weakens the labour supply of lone parents in the short-run and reduces the probability of well-being improvement in the long-run.

Work history and human capital accumulated during marriage also affect the labour supply outcomes of divorced individuals. Partners who do not participate in the labour market or who work part-time during marriage (more often women) have stronger incentives to get a job or increase their hours of work after marital dissolution. At the same time, non-working individuals are affected by the depreciation of human capital and have a disadvantage in the labour market and lower earnings compared to those with longer work experience (McKeever and Wolfinger 2001).

The studies of post-divorce labour supply are mostly focused on the analysis of labour force participation and change in labour force status. In the majority of cases women increase labour force participation in post divorce years. An increase in the proportion of divorced women with full-time employment was recorded by de Regt et al. (2012), Parr (2012), Gray, De Vaus, Qu, & Stanton (2010), Gilfillan & Andrews (2010), Duncan & Hoffman (1985) and others. While separation does not impact a lot of women with long-term employment, short-term employed women are likely to find long-term jobs after separation (Bonnet, Solaz, and Algava 2010). Studies showed that single mothers' labour force participation is the least stable (Renda and Baxter 2009; Bradbury 2006; Fok, Jeon, and Wilkins 2012).

Many studies found insignificant changes in male labour supply due to divorce (Jarvis and Jenkins 1999; Finnie 1993; Mueller 2005). At the same time, it has been shown that the proportion of men with a full-time job falls after separation (de Regt,

Mortelmans, and Marynissen 2012; Andress et al. 2006), and employment mobility is negatively affected (Kalmijn 2005). Mueller (2005) used Canadian data to study the effect of divorce on labour supply, explicitly testing such variables as labour force participation, annual weeks, annual hours, days per week, and hours per day. The author found that after divorce men tend to reduce their labour supply (on four out of five measures, excluding days per week) over time and compared to married men.

As discussed earlier, economic literature studied the relationship between divorce and economic, financial and labour market outcomes either before or after divorce. Clark et al. (2008) estimated the effect of divorce and other life events (marriage, widowhood, child birth, and job loss) on self-reported life satisfaction both before and after marital disruption. The authors found that anticipation of divorce negatively affects life satisfaction of men and women, but five years after divorce both men and women return to their baseline levels of life satisfaction. Similar approach is adopted in this paper to study the effect of divorce on the labour force participation of men and women and their hours worked per week. The description of data, methodology and estimation results is presented in the next sections.

4.3. Sample Selection and Summary Statistics

The data for empirical analysis was drawn from the Household, Income and Labour Dynamics in Australia Survey (HILDA). The HILDA Project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (Melbourne Institute). The findings and views

reported in this paper, however, are those of the author and should not be attributed to either FaHCSIA or the Melbourne Institute.

HILDA is a household-based longitudinal survey that, among other things, captures the dynamics of Australian household labour supply and income distribution over 12 years since 2001. The subsample was chosen to represent women between 24 and 60 years of age and men between 24 and 65 years of age who have ever been married and who responded to the survey for at least four years. We consider common-law relationships as marriage similar to Andress et al. (2006), Jansen, Mortelmans, and Snoeckx (2009), and de Vaus et al. (2014). Individuals in common-law (or *de facto* relationships in Australia) do not have to seek a Court divorce order in case of marital dissolution. However, disputes about children and finances of de-facto couples where the relationships have broken down are resolved in the same way as disputes of divorced couples¹⁶. In this paper we rely on self-reported marital status as a primary information source for identification of an individual as divorced. We treat married and common-law couples as similar family units and assume that married and common-law couples report a divorced marital status after the break-down of their relationship¹⁷.

Persons never married or divorced/separated during all survey years and persons ever widowed were dropped from the sample. We focused our attention on men and women who reported being married for at least two years and then divorced at some point

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<http://www.familylawcourts.gov.au/wps/wcm/connect/FLC/Home/Separation+and+Divorce/De+facto+relationships/>

¹⁷ For simplicity we use term “partner” talking about a person in married or common-law relationship. We also use terms “husband” and “wife” to specify the sex of a partner.

in time, while married and never-divorced individuals represented the control group¹⁸. Individuals who were divorced in the year of their first interview were dropped from the data. The sample includes 12.25% of divorced men and 9.45% of divorced women who re-partner sometime after divorce. We keep these individuals in the initial empirical analysis and drop them from the sample for robustness check.

The restrictions resulted in an unbalanced panel data set that contained 38,244 person-year observations for women and 37,181 person-year observations for men. While not all respondents were represented in each wave, the proportion of individuals participating in all 12 waves of the survey was 50.75%. We expect that men and women have different labour market outcomes before and after divorce; therefore, the estimation was conducted separately by sex.

The HILDA attrition rates for earlier waves were quite high: 13.2% for wave 2, 9.6% for wave 3, 8.4% for wave 4. The attrition rates gradually declined from 5.6% in wave 5 to 3.8% in wave 12. The proportion of Wave 12 respondents who were successfully interviewed in Wave 11 is 96.2%. To account for attrition in the empirical analysis we use cross-sectional responding person weights from each wave as recommended by the Melbourne Institute¹⁹. More information on HILDA survey design and attrition rates could be found in (Watson and Wooden 2004; Watson 2012)

Table 4.3 summarizes the demographic characteristics of married, separated and divorced men and women in the pooled HILDA sample. On average divorced people tend

¹⁸ The procedure of divorce is different for couples married for less than two years. Before couples married for less than two years can apply for divorce they must attend family counselling or seek permission of the Court to apply for divorce.

¹⁹ <http://www.melbourneinstitute.com/hilda/doc/datafaq.htm#FAQ4>

to be older, less educated, have less children and have older children compared to their married counterparts. The demographic characteristics of divorced individuals were similar to those of separated individuals; however, both men and women tend to be separated at a younger age. The age difference is natural since separation is usually a prerequisite for divorce. Moreover, the sample of divorced individuals in this paper includes those who were divorced at some point in time and may continue to be divorced for as long as 10 years. Separated individuals were likely to report separation status for a short number of years and then change their marital status to divorced or back to married.

Insert Table 4.3 here

Table 4.3 reports that divorced or separated men and women had smaller household incomes compared to their married counterparts. The divorced and separated women reported lower household income compared to divorced and separated men (by 18% and 11% respectively), while married men and women reported similar household incomes. These numbers are in line with the literature, which indicated that women experience a more severe decline in household and per person household incomes after divorce compared to men (de Regt, Mortelmans, and Marynissen 2012; Smock 1993; Smock 1994; Poortman 2000; Bianchi, Subaiya, and Kahn 1999; McKeever and Wolfinger 2001). While personal income was smaller for divorced and separated men compared to their married counterparts, divorced and separated women reported personal income higher than married women. The labour force participation rate of divorced and separated men was 91% compared to 88% of married men. The working hours of married, separated and divorced men did not differ much. For women, the labour force participation rate was highest among divorced women, but lowest among married

women. Separated women and divorced women reported two and four weekly working hours more than those of married women. An increase in female labour force participation and weekly labour supply as a result of marital dissolution is a well-recorded fact in economics literature, especially for women who gain custody over children after divorce (de Regt et al. 2012, Parr 2012, Gray, De Vaus, Qu, & Stanton 2010, Gilfillan & Andrews 2010, Duncan & Hoffman 1985). Lower labour force participation rates of separated women compared to divorced women could be the result of stress related to the break-down of relationships. On the other hand, the data could reflect previous findings that poor economic situations in families make a couple more vulnerable and lead to a break-up (Sayer and England 2011).

The static descriptive analysis leads to the following conclusions. First, divorced and separated men have higher labour force participation rates, but similar working hours compared to their married counterparts. At the same time, divorced and separated men report smaller household and personal incomes compared to their married counterparts. Second, the labour market participation of divorced women exceeds the participation of married and separated women by six and five percentage points. Divorced women work four and two hours per week more than their married counterparts. Third, the household income of divorced and separated women is almost half the household income of married women, but their personal income exceeds the personal income of married women by \$10,000-13,000.

Our analysis focuses on the dynamic changes of two labour supply variables such as labour force participation and weekly hours usually worked in all jobs. The variables were derived from the respective HILDA questions. We follow the methodology of

Clark, Diener, Georgellis and Lucas (2008) by introducing a set of time variables indicating the respondents' expectations of upcoming divorce and the number of years elapsed since the year of divorce. The variables of divorce expectations were identified from the panel data by employing the information about respondents' marital status in the current year and their marital status in subsequent years. Someone who reported that he or she was married in the current year and divorced the next year was identified as a respondent expecting to be divorced in the next year. Someone who reported that he or she was married in the current year and the next year, but divorced the year after was identified as respondent expecting to be divorced in one to two years from now. Variables indicating respondents expecting to be divorced in two to three and three to four years from now were constructed in a similar manner.

The variables of divorce duration were constructed by looking at the respondents' marital status in the current year and their marital status in previous years. Someone who reported that he or she was divorced in the current year, but married or separated the year before was identified as a respondent divorced within the last year. Someone who reported that he or she was divorced in the current year and the year before, but married or separated two years before was identified as a respondent divorced for one to two years. Variables indicating longer divorce durations were constructed analogously. The last divorce duration category included respondents who divorced five or more years ago.

Table 4.4 reports labour force participation, weekly hours worked and the number of individuals included in each divorce expectation and divorce duration time category. Potentially we can track individuals for eleven years before or after divorce, since HILDA includes 12 waves. However, we restrict our analysis to shorter time periods due

to the decreasing sample of divorced respondents. As reported in table 4.4 the number of divorcees drops as we increase the time gap between the year of divorce and the year of survey (both before and after divorce). The number of observations falls more dramatically for our post-divorce analysis. This could happen because after divorce individuals may re-partner and start reporting “married” or “common law” marital status again. Due to small sample size we keep divorced individuals who could re-partner after their divorce.

Insert Table 4.4 here

Further analysis summarizes labour force participation and weekly hours worked in all jobs and hourly wages earned for divorced men and women in a dynamic context. Figures 4.1 and 4.2 report the average values of the variables of interest for nine years: four years before divorce, the year of divorce and four years after divorce²⁰. The means of the variables of interest are reported in full in table 4.4.

Figure 4.1 depicts the labour force participation rates of men and women before and after marital dissolution. Men’s labour force participation was, on average, 89% over the nine-year period and reached the minimum of 86% two to three years before divorce, but increased to 89% in the year of divorce. The male labour force participation steadily declined for three years after divorce, reached 84% and restored to 90-91% four or more years after divorce. Women increased their labour force participation from 75% four years before divorce to 80-81% in the year of divorce and two years after that. In the period of three to four years after divorce female labour force participation reached a

²⁰ We do not display graphically the category of individuals who were divorced for five years or more; rather, we focus on the labour supply outcomes up to four years after divorce.

peak of 85% and declined to 75% after that. The labour force participation of men and women the second year after divorce could be sensitive to the likelihood of divorce finalization, in particular resolving the issues of financial and equity separation, child custody and child maintenance. In this case women's income could be supplemented by spouse or child maintenance, while men would have to pay out alimony. In addition the changes in labour participation may be caused by re-partnering. In the case of re-partnering, women could start receiving additional financial support from a new partner or husband while men would have to provide financial support to their new families.

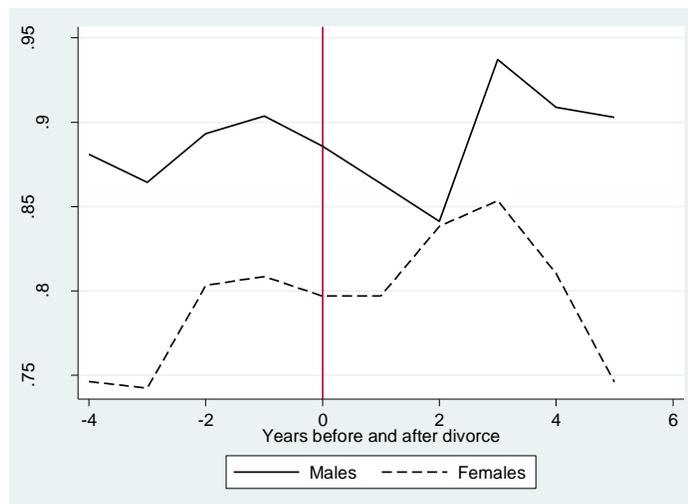


Figure 4.1. Labour force participation before and after divorce

Source: Table 4.4

Figure 4.2 depicts the labour supply of men and women expressed in weekly hours worked in all jobs. Men's working hours fluctuated around an average of thirty-nine hours per week during the nine-year period. There is a visible decline in hours worked by men in the year of divorce which continued until two to three years after divorce. Women continuously increased their working hours during pre-divorce years from 24 to 28 hours. Women worked 2 hours less during the two next years after divorce,

but on the third and fourth year after divorce they increased labour supply to 30-32 hours per week, Weekly working hours decline to 26 hours for those women who had been divorced for five years or more.

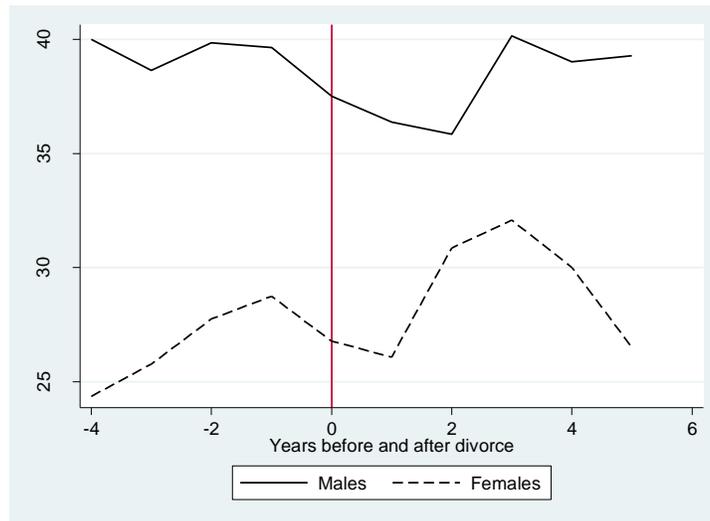


Figure 4.2. Weekly hours worked before and after divorce

Source: Table 4.4

The descriptive analysis of means of labour supply indicators over time does not provide us with the full insight on changes in labour force participation and working hours of divorced individuals. The multivariate analysis presented in the next section controls the labour supply outcomes for personal and demographic characteristics.

4.4. Model Specification

We estimate the expectation and adaptation to divorce using two separate equations that include appropriate time dummies.

The following equation is used to measure expectation of divorce similar to Clark et al. (2008):

$$Y_{it} = \alpha_i + \beta'X_{it} + \theta_{-1}DF_{1it} + \theta_{-2}DF_{2it} + \theta_{-3}DF_{3it} + \theta_{-4}DF_{4it} + \varepsilon_{it} \quad [4.1]$$

Here, Y_{it} represents the set of variables of interest including labour force participation and weekly hours usually worked in all jobs. The probability of labour force participation was estimated using the Probit model. Weekly working hours were estimated using the Tobit model to take into account individuals reporting zero hours of work. X_{it} is a set of standard control variables including age and education level, presence of children in the family, dummy variables indicating if the individual was Australian-born, lived in a major city or had a work limitation. The series of dummy variables DF_{1it} , DF_{2it} , DF_{3it} , and DF_{4it} indicate in how many years the person will be divorced. We expect to see significant coefficients when individuals change their labour supply due to anticipation of divorce. It is more likely that the periods of time closer to the year of divorce would impact labour supply decisions the most. Equation [4.1] is estimated only for those individuals who are currently married and subsequently report a divorced status within one to four years.

The following equation is used to measure adaptation to divorce similar to Clark et al. (2008):

$$Y_{it} = \alpha_i + \beta'X_{it} + \theta_0DL_{0it} + \theta_1DL_{1it} + \theta_2DL_{2it} + \theta_3DL_{3it} + \theta_4DL_{4it} + \theta_5DL_{5it} + \varepsilon_{it} \quad [4.2]$$

Here variable D_{0it} indicates recently divorced individuals (divorced in the current year, but married in the previous year). Variables DL_{1it} to DL_{5it} allow us to split divorced individuals into groups by the duration of divorce. For example, dummy DL_{1it} indicates individuals divorced for one to two years (divorced in the current year, divorced in the previous year, but married the year before); dummy DL_{2it} indicates

individuals divorced for two to three years and so on. Dummy D_{5it} indicates those men and women who were divorced for five years or more by the year of the survey. We expect that if divorced men and women experienced immediate changes in labour market characteristics in response to divorce, θ_0 would be a significant coefficient. If the divorce had a short-term effect on labour supply outcomes, the θ coefficients would lose significance with time. In the case of a longer-term impact of divorce on the variables of interest, the θ coefficients would remain significant and might become smaller with adjustment of the individual to the state of divorce. In this setting the model measures adaptation to divorce only for those individuals who remain divorced. For example, if the person remarries within two years after divorce, his or her adaptation is measured in the model for only two years.

4.5. Regression Results

Tables 4.5 and 4.6 summarize the outcomes of regression analysis. Models [4.1] and [4.2] were estimated in two ways. First, the models were controlled only for age and work limitations of respondents, and results are reported in columns 1, 2, 5 and 6 in tables 4.5 and 4.6. Second, we added variables characterising respondents' education level, presence of children, place of birth (Australian-born vs. foreign-born) and place of living (urban vs. rural) and reported the results in columns 3, 4, 7 and 8 in tables 4.5 and 4.6.

Insert Table 4.5 here
Insert Table 4.6 here

The marginal effects of divorce expectations on the probability of labour force participation is reported in the even-numbered columns of table 4.5. It seems the

expectation of divorce did not have any impact on the labour force participation of women two to four years before divorce. The probability of women participating in the labour force was positively affected by short-term anticipation of divorce. Those women who were currently married, but divorced within next one to two years or within next year, had 30-36% higher likelihood of being in the labour force. The probability of being in the labour force remained positive and significant at 1% significance level for women, divorced for one to four years. This result shows not only that divorced women have higher probability of labour force participation, but also that women start increasing their labour force participation during separation stage (one to two years before divorce). The labour force participation of men was affected neither by expectation of divorce, nor by adaptation to it. Men were likely to increase labour force participation only three to four years after divorce. The odd-numbered columns of table 4.5 report that the duration of divorce was positively associated with female labour participation. Controlling regressions for education level and the presence of children reduced the size of the coefficients of interest and the level of significance, but post-divorce women continued to have higher participation rates compared to their non-divorced counterparts. There is no evidence that men changed labour force participation during the first three years after divorce, but they became more active on the labour market in three to four years and five or more years after divorce.

Table 4.6 reports that the expectation of divorce does not seem to be associated with the weekly working hours of both men and women. The post-divorce effect

remained insignificant for men in the short-run, but men increased their working hours in three to five or more years after divorce²¹.

There was a positive and significant correlation between the duration of divorce and female weekly hours supplied. Moreover, women increased their hours in the labour market as the number of years since divorce increased. The estimation that controlled for education of women and the presence of children was characterized by smaller coefficients on the duration of divorce, but they remained significant.

4.6. Conclusion

Our research investigated if men and women change their labour supply before and after divorce. Our study expanded the existing literature by updating the analysis of the labour supply of divorced individuals using Australian data from 2001-2012. Employing twelve years of longitudinal household survey we defined married individuals who were expected to be divorced in one, two, three and four years from the year of the survey. We derived expectation of divorce variables by looking at individuals who reported that they were married in the year of current survey, but divorced in subsequent years. Similarly we defined individuals who were divorced in the year of the survey, or continued to be divorced for one, two, three, four, and five or more years. We derived adaptation to divorce variables by looking at individuals who reported that they were divorced in the year of current survey, but married at some point in time before the year

²¹ It is important not to forget that the increase in the number of years before or after divorce negatively affected the sample size of divorced individuals and the coefficients should be interpreted with caution (see table 4.4).

of this survey. The outcomes of the study estimated the reaction of men and women to divorce in a long-term dynamic framework.

The empirical investigation resulted in the following findings. First, the anticipation of upcoming divorce had a positive effect on female labour supply. Female labour participation increased for those who expected to divorce in one to two years. Women increased working hours two to three years before divorce. Those women who worked full-time before divorce were more likely to sustain their labour supply preferences (Bonnet, Solaz, and Algava 2010). Those women who did not work or worked part-time may have expected to rely on financial support from the husband (especially when children were presented in the family) or possibly denied the reality that their marriage could dissolve.

Second, there was no strong evidence that men changed their labour supply preferences before divorce except for the time period of two to three years before marital dissolution. The drop in the male labour force participation just before the separation stage could have been caused by lack of incentives to provide for a family on the verge of splitting up.

Third, women increased their labour supply one to two years prior to the divorce and continued to work more in years subsequent to the divorce. Controlling the estimation for women's education level and the presence of children did not remove the significance of the coefficients, but made them smaller.

Fourth, men changed neither labour participation nor weekly working hours after divorce in the short-run. However, in three to four years after divorce some evidence of increasing labour supply was found. The positive changes in the post-divorce labour

supply of men could be related to finalization of financial and property division, child custody and alimony issues.

The results of our study did not support the outcomes of previous research on the positive influence of expected divorce on the female labour supply (Papps 2006; Austen 2004; Johnson and Skinner 1986). The estimation outcomes supported the conclusions that women increase labour supply as a consequence of divorce (de Regt, Mortelmans, and Marynissen 2012; Parr 2012; Gray et al. 2010; Gilfillan and Andrews 2010b; Duncan and Hoffman 1985). The study filled the gap in the literature by estimating male labour supply indicators during expectations of divorce and found no correlation between the two. It also found that men's labour supply remains insensitive during adaptation to divorce and stayed in line with previous works (Mueller 2005; Jarvis and Jenkins 1999; Finnie 1993).

In order to specify practical implications of this study, deeper analysis must be done. Women and men with different educational backgrounds and work experiences could have different reactions to divorce. Child custody arrangements and child maintenance, as well as government support of single parents could affect labour supply decisions. Men and women making a sole application for divorce may have different incentives to exit marriage and change labour supply compared to those who make joint applications. Addressing more narrow personal and household characteristics of divorcees is an important area for future research.

4.7. Tables

Table 4.1. Literature summary: Expectation of divorce

Income and labour supply outcomes predicting the probability of divorce		
Outcome	Direction	Authors
Female income	positive	d'Amico 1983; Becker 1977; Ono 1998;
	negative	Hoffman and Duncan 1995;
	insignificant	Sayer and Bianchi 2000; Burgess, Propper, and Aassve 2003; Schoen et al. 2002
Female earnings share	negative	Sayer and Bianchi 2000; Heckert, Nowak and Snyder 1998;
Female labour participation	positive	Cooke and Erola 2013; Kalmijn 2007; Poortman and Kalmijn 2002; Sayer et al. 2011;
	negative	Cooke and Erola 2013;
	insignificant	Cooke and Erola 2013; Cooke and Gash 2010;

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Table 4.1 - *continued*

Outcome	Direction	Authors
Female labour supply (hours/weeks)	insignificant	Sayer and Bianchi 2000; Burgess, Propper and Aassve 2003;
Male income	positive	Sayer and Bianchi 2000;
	negative	Hoffman and Duncan 1995; Becker 1977; Burgess, Propper and Aassve 2003; Ono 1998;
Male labour participation	negative	Ono 1998;
Male labour supply (hours/weeks)	insignificant	Sayer and Bianchi 2000;
Earnings gap	positive	Astrom et al. 2011;
Smaller working hours	negative	Jacobs and Gornick 2002;

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Table 4.1 - *continued*

Income and labour supply outcomes of those expecting divorce

Outcome	Direction	Authors
Female income	positive	Johnson and Skinner 1986;
Female labour participation	positive	Papps 2006; Austen 2004; Johnson and Skinner 1986;
Female labour supply (hours/weeks)	positive	Johnson and Skinner 1986;
	insignificant	Sen 1999;

Table 4.2. Literature summary: Consequences of divorce

Consequences of divorce		
Outcome	Direction	Authors
Women's household income per person	Negative	de Regt, Mortelmans, & Marynissen 2012; Smock 1993, 1994; Poortman 2000; Bianchi et al. 1999; McKeever & Wolfinger 2001
Men's household income per person	Positive	de Regt et al. 2012; Smock 1993, 1994; Poortman 2000; Peterson 1996; Bianchi et al. 1999
Female labour supply (participation)	Positive	de Regt et al. 2012; Parr 2012; Gray, De Vaus, Qu, & Stanton 2010; Gilfillan & Andrews 2010; Duncan & Hoffman 1985.
Male labour supply (participation)	None	Mueller 2005; Jarvis and Jenkins 1999; Finnie 1993;
Female employment transition (from ST to LT)	Positive	Bonnet et al. 2010
Male employment mobility	Negative	Kalmijn 2005

Table 4.3. Sample statistics: Married vs. divorced or separated ^a. HILDA, pooled sample.

	Men			Women		
	Married	Separated	Divorced	Married	Separated	Divorced
Age	44.59	43.94	45.60	41.83	41.71	44.14
B.A. or higher	0.25	0.19	0.15	0.28	0.18	0.19
Number of children	1.19	0.49	0.35	1.35	1.60	1.35
Age of youngest child	10.27	16.39	15.15	10.53	11.43	13.54
Lives in a major city	0.66	0.66	0.61	0.66	0.65	0.66
Born in Australia	0.70	0.69	0.63	0.70	0.72	0.74
Immigrant from English-speaking country	0.12	0.11	0.13	0.09	0.11	0.08
Immigrant from non-English-speaking country	0.16	0.18	0.21	0.19	0.15	0.17
Work limitation	0.15	0.16	0.18	0.13	0.19	0.24
Household income	106,772	75,313	68,461	104,751	61,213	60,671
Personal income	65,893	61,364	58,229	35,793	44,562	46,538
In the labour force	0.88	0.91	0.91	0.72	0.73	0.78
Hours worked at all jobs	39.75	40.68	39.76	23.25	25.32	27.58
count	35,972	968	1,032	36,830	1,155	1,236

^a Here separated individuals are those who declared their separation status on the survey. We do not include those individuals who are assumed to be separated at least for twelve months before the divorce.

Table 4.4. Labour force participation and weekly hours worked in all jobs:
Divorce expectation and divorce duration. HILDA, pooled sample.

	Men			Women		
	In the labour force	Weekly hours worked in all jobs	N	In the labour force	Weekly hours worked in all jobs	N
Currently married, but divorced in 3-4 years	0.88	40.00	136	0.75	24.37	155
Currently married, but divorced in 2-3 years	0.86	38.65	160	0.74	25.78	190
Currently married, but divorced in 1-2 years	0.89	39.86	197	0.80	27.75	236
Currently married, but divorced within the next year	0.90	39.64	246	0.81	28.75	278
Divorced for 0-1 years	0.89	37.51	249	0.80	26.78	278
Divorced for 1-2 years	0.86	36.38	157	0.80	26.09	186
Divorced for 2-3 years	0.84	35.84	96	0.84	30.87	125
Divorced for 3-4 years	0.94	40.15	59	0.85	32.09	89
Divorced for 4-5 years	0.91	39.01	41	0.81	30.01	58
Divorced for 5 or more years	0.90	39.29	55	0.75	26.51	79

Table 4.5. Regression results: Effect of divorce on labour force participation

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Currently married, but divorced in 3-4 years		-0.23 (0.20)		-0.22 (0.20)		0.09 (0.12)		0.12 (0.13)
Currently married, but divorced in 2-3 years		-0.20 (0.15)		-0.19 (0.16)		0.08 (0.11)		0.17 (0.11)
Currently married, but divorced in 1-2 years		0.01 (0.15)		0.04 (0.16)		0.30*** (0.10)		0.33*** (0.11)
Currently married, but divorced within the next year		0.18 (0.14)		0.23 (0.15)		0.36*** (0.10)		0.38*** (0.11)
Divorced for 0-1 years	0.09 (0.13)		0.13 (0.13)		0.31*** (0.11)		0.23** (0.11)	
Divorced for 1-2 years	0.12 (0.14)		0.13 (0.15)		0.34** (0.13)		0.25* (0.15)	
Divorced for 2-3 years	-0.01 (0.22)		0.03 (0.22)		0.52*** (0.16)		0.43** (0.18)	
Divorced for 3-4 years	0.80*** (0.28)		0.85*** (0.27)		0.60*** (0.17)		0.57*** (0.21)	
Divorced for 4-5 years	0.50 (0.31)		0.53* (0.32)		0.48** (0.21)		0.33 (0.22)	
Divorced for 5 or more years	0.54** (0.25)		0.61** (0.24)		0.22 (0.17)		-0.05 (0.17)	

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Table 4.5 - *continued*

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	-0.04*** (0.00)	-0.04*** (0.00)	-0.05*** (0.00)	-0.05*** (0.00)	-0.00** (0.00)	-0.00** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)
Work limitation	-1.47*** (0.03)	-1.47*** (0.03)	-1.43*** (0.03)	-1.42*** (0.03)	-0.78*** (0.02)	-0.78*** (0.02)	-0.82*** (0.03)	-0.82*** (0.03)
Bachelor degree or higher			0.48*** (0.04)	0.48*** (0.04)			0.80*** (0.03)	0.80*** (0.03)
Other post-graduate studies			0.34*** (0.03)	0.34*** (0.03)			0.48*** (0.02)	0.48*** (0.02)
Graduated from high school			0.30*** (0.05)	0.30*** (0.05)			0.26*** (0.03)	0.26*** (0.03)
0-4-year-old children present			-0.21*** (0.04)	-0.21*** (0.04)			-1.11*** (0.02)	-1.12*** (0.02)
5-14-year-old children present			0.12*** (0.03)	0.12*** (0.03)			-0.11*** (0.02)	-0.10*** (0.02)
15-24-year-old children present			0.26*** (0.04)	0.26*** (0.04)			0.14*** (0.02)	0.14*** (0.02)
25-year-old children present			-0.06 (0.06)	-0.06 (0.06)			-0.13** (0.05)	-0.12** (0.05)

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Table 4.5 - *continued*

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Australian-born			0.17***	0.17***			0.31***	0.31***
			(0.03)	(0.03)			(0.02)	(0.02)
Lives in a major city			0.03	0.03			0.02	0.02
			(0.03)	(0.03)			(0.02)	(0.02)
Constant	3.76***	3.77***	3.34***	3.35***	0.81***	0.81***	1.41***	1.41***
	(0.09)	(0.09)	(0.11)	(0.11)	(0.04)	(0.04)	(0.06)	(0.06)
Observations	37,004	37,004	37,004	37,004	38,066	38,066	38,066	38,066

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

Table 4.6. Regression results: Effect of divorce on working hours

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Currently married, but divorced in 3-4 years		0.16 (1.91)		0.02 (1.92)		1.72 (2.12)		3.27* (1.79)
Currently married, but divorced in 2-3 years		0.06 (1.93)		0.08 (1.87)		3.65 (2.26)		5.40*** (1.77)
Currently married, but divorced in 1-2 years		1.08 (1.45)		1.48 (1.45)		7.39*** (2.63)		7.43*** (2.57)
Currently married, but divorced within the next year		2.20 (1.41)		3.11** (1.41)		8.56*** (1.94)		8.27*** (1.91)
Divorced for 0-1 years	0.45 (1.26)		1.27 (1.25)		6.76*** (1.62)		5.30*** (1.48)	
Divorced for 1-2 years	0.71 (1.70)		1.41 (1.74)		8.13*** (2.18)		6.03*** (1.89)	
Divorced for 2-3 years	0.30 (2.54)		0.85 (2.53)		12.36*** (2.39)		10.62*** (2.35)	
Divorced for 3-4 years	7.13*** (2.26)		7.75*** (2.25)		13.07*** (3.63)		11.59** (4.52)	
Divorced for 4-5 years	3.14 (2.91)		3.59 (2.85)		11.17*** (2.92)		8.33*** (2.87)	
Divorced for 5 or more years	3.74 (2.50)		4.26* (2.51)		7.84*** (3.02)		4.09 (2.97)	

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Table 4.6 - *continued*

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	-0.40*** (0.01)	-0.40*** (0.01)	-0.41*** (0.01)	-0.41*** (0.01)	-0.07*** (0.02)	-0.06*** (0.02)	-0.43*** (0.02)	-0.43*** (0.02)
Work limitation	-25.35*** (0.54)	-25.34*** (0.54)	-24.46*** (0.53)	-24.45*** (0.53)	-17.81*** (0.60)	-17.77*** (0.60)	-16.90*** (0.55)	-16.88*** (0.55)
Bachelor degree or higher			3.37*** (0.40)	3.37*** (0.40)			14.68*** (0.41)	14.70*** (0.41)
Other post-graduate studies			3.08*** (0.38)	3.09*** (0.37)			9.06*** (0.42)	9.11*** (0.42)
Graduated from high school			1.93*** (0.48)	1.93*** (0.48)			5.56*** (0.52)	5.57*** (0.52)
0-4-year-old children present			-0.79*** (0.28)	-0.80*** (0.28)			-23.57*** (0.40)	-23.68*** (0.40)
5-14-year-old children present			2.61*** (0.23)	2.61*** (0.23)			-5.19*** (0.30)	-5.13*** (0.30)
15-24-year-old children present			4.76*** (0.33)	4.75*** (0.33)			2.43*** (0.37)	2.42*** (0.37)
25-year-old children present			-1.78** (0.89)	-1.80** (0.89)			-1.83* (1.03)	-1.69 (1.04)

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Table 4.6 - *continued*

	Men				Women			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Australian-born			2.86***	2.86***			3.27***	3.28***
			(0.29)	(0.29)			(0.40)	(0.40)
Lives in a major city			-1.25***	-1.26***			0.41	0.40
			(0.26)	(0.26)			(0.29)	(0.29)
Constant	60.05***	60.03***	55.53***	55.51***	24.39***	24.17***	36.01***	35.83***
	(0.53)	(0.53)	(0.73)	(0.73)	(0.73)	(0.73)	(0.96)	(0.96)
Constant	18.41***	18.41***	18.13***	18.13***	24.46***	24.48***	21.79***	21.80***
	(0.13)	(0.13)	(0.13)	(0.13)	(0.14)	(0.14)	(0.14)	(0.14)
Observations	36,142	36,142	36,142	36,142	37,141	37,141	37,141	37,141

Standard errors in parentheses

* p<0.1 ** p<0.05 *** p<0.01

References

- Andress, H.-J., B. Borgloh, M. Brockel, M. Giesselmann, and D. Hummelsheim. 2006. "The Economic Consequences of Partnership Dissolution - a Comparative Analysis of Panel Studies from Belgium, Germany, Great Britain, Italy, and Sweden." *European Sociological Review* 22 (5) (August 18): 533–560. doi:10.1093/esr/jcl012. <http://esr.oxfordjournals.org/cgi/doi/10.1093/esr/jcl012>.
- Austen, Siobhan. 2004. "Labour Supply and the Risk of Divorce : An Analysis of Australian Data." *The Australian Economic Review* 37 (2): 153–65.
- Becker, GS, EM Landes, and RT Michael. 1977. "An Economic Analysis of Marital Instability." *The Journal of Political Economy* 85 (6): 1141–1187. <http://www.jstor.org/stable/10.2307/1837421>.
- Bianchi, S M, L Subaiya, and J R Kahn. 1999. "The Gender Gap in the Economic Well-Being of Nonresident Fathers and Custodial Mothers." *Demography* 36 (2) (May): 195–203. <http://www.ncbi.nlm.nih.gov/pubmed/10332611>.
- Bonnet, Carole, Anne Solaz, and Elisabeth Algava. 2010. "Changes in Labour Market Status Surrounding Union Dissolution in France." *Population (english Edition)* 33 (0): 251–284. http://www.cairn.info/resume.php?ID_ARTICLE=POPE_1002_0251.
- Bradbury, Bruce. 2006. "Disadvantage among Australian Young Mothers." *Australian Journal of Labour Economics* 9 (2): 147–171.
- Burgess, Simon, Carol Propper, and Arnstein Aassve. 2003. "The Role of Income in Marriage and Divorce Transitions among Young Americans." *Journal of Population Economics* 16 (3) (August 1): 455–475. doi:10.1007/s00148-003-0124-7. <http://link.springer.com/10.1007/s00148-003-0124-7>.
- Clark, Andrew E., Ed Diener, Yannis Georgellis, and Richard E. Lucas. 2008. "Lags And Leads in Life Satisfaction: A Test of the Baseline Hypothesis*." *The Economic Journal* 118 (529) (June): F222–F243. doi:10.1111/j.1468-0297.2008.02150.x. <http://doi.wiley.com/10.1111/j.1468-0297.2008.02150.x>.
- Cooke, L. P., J. Erola, M. Evertsson, M. Gahler, J. Harkonen, B. Hewitt, M. Jalovaara, et al. 2013. "Labor and Love: Wives' Employment and Divorce Risk in Its Socio-Political Context." *Social Politics: International Studies in Gender, State & Society* 20 (4) (September 15): 482–509. doi:10.1093/sp/jxt016. <http://sp.oxfordjournals.org/cgi/doi/10.1093/sp/jxt016>.
- Cooke, L. P., and V. Gash. 2010. "Wives' Part-Time Employment and Marital Stability in Great Britain, West Germany and the United States." *Sociology* 44 (6) (December

- 23): 1091–1108. doi:10.1177/0038038510381605.
<http://soc.sagepub.com/cgi/doi/10.1177/0038038510381605>.
- d'Amico, R. 1983. "Status Maintenance or Status Competition? Wife's Relative Wages as a Determinant of Labor Supply and Marital Instability." *Social Forces* 61 (4): 1186–1205. <http://sf.oxfordjournals.org/content/61/4/1186.short>.
- De Regt, S., D. Mortelmans, and T. Marynissen. 2012. "Financial Consequences of Relationship Dissolution: A Longitudinal Comparison of Formerly Married and Unmarried Cohabiting Men and Women." *Sociology* 47 (1) (November 5): 90–108. doi:10.1177/0038038512453793.
<http://soc.sagepub.com/cgi/doi/10.1177/0038038512453793>.
- De Vaus, D., M. Gray, L. Qu, and D. Stanton. 2014. "The Economic Consequences of Divorce in Australia." *International Journal of Law, Policy and the Family* 28 (1) (February 6): 26–47. doi:10.1093/lawfam/ebt014.
<http://lawfam.oxfordjournals.org/cgi/doi/10.1093/lawfam/ebt014>.
- Duncan, G J, and S D Hoffman. 1985. "A Reconsideration of the Economic Consequences of Marital Dissolution." *Demography* 22 (4) (November): 485–97. <http://www.ncbi.nlm.nih.gov/pubmed/4076480>.
- Finnie, Ross. 1993. "Women , Men , and the Economic Consequences of Divorce : Evidence from Canadian Longitudinal Data." *The Canadian Review of Sociology and Anthropology*. 30 (2): 205–241.
- Fok, Y. K., S.-H. Jeon, and R. Wilkins. 2012. "Does Part-Time Employment Help or Hinder Single Mothers' Movements into Full-Time Employment?" *Oxford Economic Papers* 65 (2) (October 9): 523–547. doi:10.1093/oep/gps035.
<http://oep.oxfordjournals.org/cgi/doi/10.1093/oep/gps035>.
- Gilfillan, Geoff, and Les Andrews. 2010a. "Labour Force Participation of Women over 45." *Available at SSRN 2006226*. Canberra.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2006226.
- . 2010b. "Labour Force Participation of Women Over 45." Productivity Commission Staff Working Paper. Canberra.
- Gray, Matthew, David De Vaus, Lixia Qu, and David Stanton. 2010. "Divorce and the Wellbeing of Older Australians." *Ageing and Society* 31 (03) (November 26): 475–498. doi:10.1017/S0144686X10001017.
http://www.journals.cambridge.org/abstract_S0144686X10001017.
- Hoffman, Saul D, and Greg J Duncan. 1995. "The Effect of Incomes , Wages , and AFDC Benefits on Marital Disruption." *The Journal of Human Resources* 30 (1): 19–41.

- Jansen, Mieke, Dmitri Mortelmans, and Laurent Snoeckx. 2009. "Repartnering and (Re) Employment : Strategies to Cope with the Economic Consequences of Partnership Dissolution." *Journal of Marriage and Family* 71 (December): 1271–1293.
- Jarvis, Sarah, and Stephen P. Jenkins. 1999. "Marital Splits and Income Changes: Evidence from the British Household Panel Survey." *Population Studies* 53 (2) (January): 237–254. doi:10.1080/00324720308077. <http://www.tandfonline.com/doi/abs/10.1080/00324720308077>.
- Johnson, WR, and Jonathan Skinner. 1986. "Labor Supply and Marital Separation." *The American Economic Review* 76 (3): 455–469. <http://www.jstor.org/stable/10.2307/1813362>.
- Kalmijn, Matthijs. 2005. "The Effects of Divorce on Men's Employment and Social Security Histories." *European Journal of Population / Revue Européenne de Démographie* 21 (4) (December): 347–366. doi:10.1007/s10680-005-0200-7. <http://link.springer.com/10.1007/s10680-005-0200-7>.
- McKeever, Matthew, and Nicholas H. Wolfinger. 2001. "Reexamining the Economic Costs of Marital Ddisruption for Women." *Social Science Quarterly* 82 (1) (March): 202–217. doi:10.1111/0038-4941.00018. <http://www.blackwell-synergy.com/links/doi/10.1111/0038-4941.00018>.
- Mueller, Richard E. 2005. "The Effect of Marital Dissolution on the Labour Supply of Males and Females: Evidence from Canada." *The Journal of Socio-Economics* 34 (6) (December): 787–809. doi:10.1016/j.socec.2005.07.023. <http://linkinghub.elsevier.com/retrieve/pii/S1053535705000387>.
- Ono, Hiromi. 1998. "Husbands' and Wives' Resources and Marital Dissolution." *Journal of Marriage and the Family* 60: 674–689.
- Oppenheimer, V K. 1997. "Women's Employment and the Gain to Marriage: The Specialization and Trading Model." *Annual Review of Sociology* 23 (January): 431–53. doi:10.1146/annurev.soc.23.1.431. <http://www.ncbi.nlm.nih.gov/pubmed/12348280>.
- Özcan, Berkay, and Richard Breen. 2012. "Marital Instability and Female Labor Supply." *Annual Review of Sociology* 38 (1) (August 11): 463–481. doi:10.1146/annurev-soc-071811-145457. <http://www.annualreviews.org/doi/abs/10.1146/annurev-soc-071811-145457>.
- Papps, Kerry L. 2006. "The Effects of Divorce Risk on the Labour Supply of Married Couples." 2395. IZA Discussion Papers. http://www.researchgate.net/publication/45122741_Regional_integration_among_developing_countries__opportunities_obstacles_and_options/file/e0b49517e38e223ec0.pdf.

- Parr, Nick. 2012. "Trends in Differentials in the Workforce Participation of Mothers with Young Children in Australia 2002–2008." *Journal of Population Research* 29 (3) (June 22): 203–227. doi:10.1007/s12546-012-9089-2. <http://link.springer.com/10.1007/s12546-012-9089-2>.
- Peterson, Richard R. 1996. "A Re-Evaluation of the Economic Consequences of Divorce." *American Sociological Review* 61 (3): 528–536.
- Poortman, Anne-Rigt. 2000. "Sex Differences in Theeconomic Consequences of Separation: A Panel Study of the Netherlands." *European Sociological Review* 16 (4): 367–383.
- Renda, Jennifer, and Jennifer Baxter. 2009. "Stability of Lone Mothers ' Employment : Using HILDA Calendar Data to Examine Work Transitions." In .
- Sayer, L. C., and S. M. Bianchi. 2000. "Women's Economic Independence and the Probability of Divorce: A Review and Reexamination." *Journal of Family Issues* 21 (7) (October 1): 906–943. doi:10.1177/019251300021007005. <http://jfi.sagepub.com/cgi/doi/10.1177/019251300021007005>.
- Sayer, LC, and Paula England. 2011. "She Left, He Left: How Employment and Satisfaction Affect Men's and Women's Decisions to Leave Marriages." *AJS: American Journal of ...* 116 (6): 1982–2018. <http://www.ncbi.nlm.nih.gov/pmc/articles/pmc3347912/>.
- Schoen, R. 2006. "Wives' Employment and Spouses' Marital Happiness: Assessing the Direction of Influence Using Longitudinal Couple Data." *Journal of Family Issues* 27 (4) (April 1): 506–528. doi:10.1177/0192513X05283983. <http://jfi.sagepub.com/cgi/doi/10.1177/0192513X05283983>.
- Schoen, Robert, Nan Marie Astone, Kendra Rothert, Nicola Standish, and Young Kim. 2002. "Women ' S Employment , Marital Happiness , and Divorce." *Social Forces* 81 (2): 643–662.
- Smock, Pamela. 1993. "The Economic Costs of Marital Disruption for Young Women over the Past Two Decades." *Demography* 30 (3): 353–371. <http://link.springer.com/article/10.2307/2061645>.
- . 1994. "Gender and the Short-Run Economic Consequences of Marital Disruption." *Social Forces* 73 (1): 243–62.
- Watson, Nicole. 2012. "Longitudinal and Cross-Sectional Weighting Methodology for the HILDA Survey" (2). <http://flosse.dss.gov.au/fahcsiajspui/handle/10620/3920>.
- Watson, Nicole, and Mark Wooden. 2004. "Sample Attrition in the HILDA Survey." *Australian Journal of Labour ...* 7 (2): 293–308.

<http://search.informit.com.au/documentSummary;dn=072513245159945;res=IELBUs>.

Chapter 5. Conclusion

The purpose of this dissertation is to empirically analyze some important issues of the economics of labour and the family. In particular, the dissertation focuses on the labour supply and division of unpaid labour in households. The dissertation consists of three papers. The first two papers study the allocation of housework and childcare in Canadian families. The first paper sheds light on the difference between housework and childcare time allocation in Canadian-born and foreign-born families. The second paper studies the effect of government childcare policy on the allocation of housework and childcare in two-parent Canadian households. The second and third papers investigate the effect of external and internal factors on labour market outcomes of men and women. The second paper measures the effect of the family policy reform on the labour participation and hours supplied by mothers and fathers of pre-school children. The third paper analyzes the effect of anticipated marital dissolution on the labour supply and the adjustment of labour supply to divorce in Australian households.

The first paper (chapter2) analyzes the patterns of time use in Canadian households with the emphasis on the difference between Canadian-born and foreign-born families. The empirical investigation showed that such factors as age, education and income share of husbands have an influence on the relative amount of hours husbands spend on housework compared to their wives. Moreover, it was found that foreign-born husbands have a lower share of housework compared to their Canadian-born counterparts. Immigrants living in Canada for a long time are more likely to adjust themselves to a Canadian style of living and allocate more time to housework compared

to recent immigrants. Also, it was found that second generation immigrants allocate time to housework and childcare similarly to their immigrant parents.

The second paper (chapter 3) estimates the impact of the Quebec universal child care policy on labour supply and time allocation in two-parent families. The results of the study showed a positive impact of the policy reform on labour force participation, weekly hours and annual weeks worked for mothers of zero- to five-year-old children. The comparison of mothers of zero- to five-year-old children with the mothers of six- to seventeen-year-old children did not reveal a significant difference, implying that the policy change affected not only mothers of pre-schoolers, but also mothers of school-age children. The estimation revealed an insignificant response of fathers' labour supply outcomes to the policy reform. The analysis of housework and childcare time allocation showed that mothers and fathers reduced hours spent on domestic production activities, but mothers ended up doing a higher proportion of housework and childcare in response to the policy reforms.

The third paper (chapter 4) investigated if men and women change labour supply before and after divorce. The results of this study revealed that neither men nor women change their labour force participation and the weekly working hours in anticipation of divorce. Further, the estimation outcomes concluded that women increase their labour force participation and the working hours as a consequence of divorce, but men's labour force participation and working hours remain insensitive during adaptation to divorce.

This PhD dissertation addresses an identified literature gap in scholarly works and:

- Provides a detailed comparison of time allocation strategies between Canadian-born and Foreign-born individuals.

- Studies the effect of subsidized childcare policy on the allocation of time between paid and unpaid work in Canadian families

- Studies the effect of anticipation of marital dissolution on the labour force participation, weekly hours worked and hourly wages earned by Australian men and women and the adjustment of these labour supply variables after divorce.

This PhD dissertation contributes to the empirical literature on the allocation of time and labour supply. This dissertation demonstrates that the study of time use allocation may improve the knowledge about the balance between paid and unpaid work, and effect of internal and external factors on this relationship. The better understanding of the economic and non-economic activities and the linkage between them, can aid to formulate and improve welfare-oriented public policies.