DEPARTMENT OF ECONOMICS

WORKING PAPER SERIES

2016-06

McMASTER UNIVERSITY

Department of Economics
Kenneth Taylor Hall 426
1280 Main Street West
Hamilton, Ontario, Canada
L8S 4M4

<http://www.mcmaster.ca/economics/>

Family Policies and Female Employment in Japan*

Shintaro Yamaguchi[†]

June 13, 2016

Abstract

This paper discusses how childcare and parental leave policies affect female employment by reviewing the international evidence and recent papers on Japan. These papers estimate causal effects of policies by exploiting policy changes, which is a more credible identification strategy than earlier observational studies. The literature on parental leave finds that a more generous leave package tends to delay mothers' return to work, but it does not have detrimental effects on maternal labor supply in the medium to long run. Some papers also find that job protection around one year can increase maternal employment, but longer job protection has little additional effects. The literature on childcare policies finds that maternal employment does not necessarily increase, because the expansion of childcare may crowd out informal childcare arrangements, such as care provided by grandparents. Findings by recent papers on Japan are largely consistent with the international evidence.

Keywords: childcare; parental leave; maternal employment; nuclear family; three-generation family

JEL Codes: J13, J21, J24

1 Introduction

Family policies are intended to improve the social and economic environment for families. While there are many family policies, this paper discusses the effects of parental leave (PL) and childcare

*The author is thankful for the comments from participants at the invited lecture at the spring meetings of Japanese Economic Association on May 23rd, 2015. I deeply appreciate insightful and constructive comments from an anonymous referee. A major part of the research is conducted while I visited the Joint Usage and Research Center, Institute of Economic Research, Hitotsubashi University. This study uses the data from Japanese Panel Survey of Consumers conducted by the Institute for Research on Household Economics.

[†]Department of Economics, McMaster University, 1280 Main St. W., Hamilton, ON, Canada L8S 4M4. Email: yamtaro@mcmaster.ca.

policies on female labor supply by reviewing the international evidence and recent findings from Japan.

Family policies, particularly childcare and PL policies, target young families that make up only a small fraction of the population. Nevertheless, these policies may benefit the whole society for at least two reasons. First, family policies can contribute to economic growth and the sustainability of the social security system by raising working population. This is important for aging societies like Japan. Family policies are intended to promote market work by women and raise the fertility rate, which increases the aggregate labor force. Second, family policies can contribute to gender equality in the labor market. Gender equality is often deemed as “an intrinsic value and a right in itself” (see International Labour Office (2014)). Hence, family policies and female employment are important not only for the economic reasons, but also for the non-economic ones as well.

Whether family policies are welfare-improving or not has been unclear from the perspective of economic theory, but Schoonbroodt and Tertilt (2014) have recently provided an economic rationale for family policies. Their key insight is that parents, while bearing the costs of having children, cannot make a claim on income earned by their children, because in modern societies parents do not “own” children. This lack of ownership of children makes the private benefit of having children smaller than the social benefit.

Applying the efficiency concepts allowing for endogenous population proposed by Golosov, Jones, and Tertilt (2007), Schoonbroodt and Tertilt (2014) show that equilibrium fertility is inefficiently low, because the incentive for having children is misaligned. They also show that this finding holds true even when children are consumption goods and parents are altruistic.

One might think that a pay-as-you-go (PAYG) pension system can be used to implement efficient allocations, because it enforces intergenerational income transfers, from children to parents. Indeed, this argument is supported by overlapping-generations models in which fertility is exogenous. However, this is not true when fertility is endogenous, because the costs and benefits of having children are still not aligned. Schoonbroodt and Tertilt (2014) show that a fertility-dependent PAYG system (pension depends on the number of children) or fertility subsidies financed by government debts to be paid by children’s generation enable the efficient fertility level. Family policies include various forms of subsidies for raising children and hence, they may improve welfare by correcting misaligned incentives for parents.

I begin by reviewing the international evidence on the effects of PL and childcare policies in Section 2. Earlier papers attempt to estimate the policy effects by comparing PL takers and non-takers or childcare users and non-users, but their estimates may suffer a bias because PL takers and non-takers (and childcare users and non-users) are likely to be systematically different in terms of unobserved characteristics. Recent papers avoid this self-selection bias by exploiting policy variations that are more plausibly exogenous.

The literature on PL finds that a generous PL package tends to delay mothers' return to work after childbearing in the short run, but it does not hurt their employment and earnings in the medium to long run. Note that the purpose of PL expansions in some European countries (e.g. Germany) was to increase mothers' time with children, because it is considered to improve child development. Hence, the findings for these countries confirm that the intended goals were successfully achieved in these countries. This is different from the purpose of PL policies in Japan, where the primary purpose is to increase female employment. Some of the papers also find that job protection for about one year can increase maternal employment, but a longer job protection has little additional employment effects.

The literature on childcare policies finds mixed evidence: expansion of subsidized childcare increased maternal employment in some countries, while not in others. However, the literature seems to agree that expansion of subsidized childcare programs often crowds out informal childcare arrangements, such as grandparental care, which accounts for why maternal employment does not necessarily increase.

In Section 3, I describe institutions and family policies in Japan and compare them with those in other countries. Particularly important is the history of changes in PL and childcare policies, because these policy changes are exploited to identify the causal effects of family policies by recent papers.

In Section 4, I review recent papers that estimate causal effects of family policies in Japan by exploiting policy changes. Asai (2015) estimates the effects of cash benefits of PL by exploiting the PL policy changes in 1995 and 2001. She finds that these reforms had very little effect on maternal employment rates. Yamaguchi (2016) estimates a structural model of female labor supply and fertility decisions by exploiting a series of policy changes from 1995 to 2007. The estimated model is used to conduct counterfactual simulations for evaluating a further PL reform. His counterfactual simulations indicate that one-year job protection increases maternal labor supply, but extending the duration of job protection from one to three years has little effect.

Asai, Kambayashi, and Yamaguchi (2015) estimate the effects of expansion of subsidized childcare in Japan from 1990 to 2010 by exploiting the difference in the growth of childcare availability across regions. They find that the expansion did not increase maternal employment, because it crowded out grandparental care. Asai, Kambayashi, and Yamaguchi (2016) update their 2015 papers and show a detailed analysis and an extensive robustness check.

I conclude in Section 5 and suggest some promising directions for future research.

2 International Evidence

2.1 Parental Leave Policies

Earlier papers in the literature attempt to estimate the effects of eligibility for or take-up of PL on the labor supply of mothers by comparing mothers by eligibility or take-up. This approach is likely to result in biased estimates, because eligibility assignment and take-up are non-random. Those who have stronger labor force attachment may self-select into eligible employment and take up a PL.

Later papers estimate causal effects by using policy variations that are more plausibly exogenous. Waldfogel (1999) and Baum (2003) estimate the effects of Family and Medical Leave Act (FMLA) introduced in the U.S. in 1993. Because some states have had a mandated PL before FMLA, these states can be used as a control group whereas other states are treated states. They find little effects of FMLA on labor supply, perhaps because FMLA mandates unpaid leave only for 12 weeks, which may be too short to be effective.

More generous PL that lasts about one year or longer seem to affect the labor supply of mothers. Baker and Milligan (2008) estimate the effects of PL up to 70 weeks in Canada by the Difference-in-Differences (DID) estimator. Their identifying variation is differential timing of the introduction/expansion of PL across provinces. Lalive and Zweimüller (2009) and Schönberg and Ludsteck (2014) estimate the policy effects in Austria and Germany, respectively, by Regression Discontinuity Designs (RDD). They compare mothers who gave birth right after a policy change and those who did so before a policy change. The former is affected by the policy, while the latter is not. The identifying assumption is that mothers do not manipulate the timing of birth to become eligible for more generous policies. These authors find that mandated PL delays return to work so that mothers stay at home until the leave is exhausted.

Despite the delay, the literature finds that PL is not detrimental to their medium- to long-term labor market outcomes. Indeed, PL up to about a year seems to have increased maternal employment in some countries. Ruhm (1998) estimates the effects of PL policies in 9 European countries in 1969-1993 by DID, exploiting differential timing of the introduction/expansion of PL across countries. Although the duration was relatively short and between 14-64 weeks at that time, he finds that the provision of paid leave has increased female employment. Evidence from Austria also suggests that one-year PL increases the employment rate of mothers in the medium-run. Lalive, Schlosser, Steinhauer, and Zweimüller (2014) find that two-year job protection increases the employment rate in the medium-run compared with no job protection, while Lalive and Zweimüller (2009) find that extending job protection from one to two years did not affect the maternal employment in the medium-run. Combining these two results, the introduction of one-year PL is expected to increase the employment rate of mothers in the medium-run. In Germany, Schönberg and Lud-

steck (2014) find that extending PL from 6 to 10 months did not change maternal employment after PL exhaustion. Lalive and Zweimüller (2009) and Schönberg and Ludsteck (2014) find that a longer PL, which exceeds a year, does not affect medium- to long-term labor market outcomes, while it increased mothers' time with children during the leave.

Note that the goal of PL policies in Europe is to increase mothers' time with children, because being off work and with children may be beneficial for mothers' health and the development of the new-borns. The literature generally finds that more generous leave successfully achieved this goal without sacrificing their medium- to long-term labor market outcomes. Lalive, Schlosser, Steinhauer, and Zweimüller (2014) find that job protection and cash benefits are complements and that combining both makes the policy most successful. They find that job protection alone does not increase mothers' time with children very much, while cash benefit alone deteriorate maternal employment in the medium- to long-term.

2.2 Childcare Policies

Earlier studies including Blau and Robins (1988), Connelly (1992), Michalopoulos, Robins, and Garfinkel (1992), and Kimmel (1998) estimate the elasticity of maternal labor supply with respect to the price of childcare services. These papers construct a price of childcare from observed expenditures, either at the household level or at the regional level. This approach may suffer a bias because the constructed childcare price variable is likely to be endogenous. For credible identification of causal effects, plausible exogenous variations should be used.

As far as I know, Gelbach (2002) is the first to avoid this endogeneity bias and estimate the causal effects, using the quarter of birth of five-year-old children as a source of exogenous variation. Depending on the cut-off date, some children are barely eligible for kindergarten, while others are not. Using the 1980 U.S. Census, Gelbach (2002) identifies the effects of the eligibility for kindergarten on maternal employment by comparing those who are barely eligible and those who are not as they were born shortly after the cut-off date. Fitzpatrick (2010) applies a similar approach to a newer cohort using the 2000 U.S. Census. Goux and Maurin (2010) also exploit an age-dependent eligibility rule for childcare enrollment and identify the causal effect in France.

Another exogenous variation used in the literature is the differential pace of childcare expansion across regions in a given country. In Canada, Quebec introduced universal childcare which is known as the five-dollars-a-day childcare policy, while the rest of Canada did not expand their childcare subsidies. This difference in childcare policies provides a natural experiment to identify the causal effects of universal childcare provision. Lefebvre and Merrigan (2008) and Baker, Gruber, and Milligan (2008) estimate the policy effects on maternal employment by applying the DID estimator.

Similar natural experiments are found in other countries. In these countries, childcare expansion policies are decided at the national or federal level, but its actual implementation is at the discretion of local governments, which generates variations in the growth of childcare provision across regions in a given country. Berlinski and Galiani (2007), Havnes and Mogstad (2011), and Nollenberger and Rodriguez-Planas (2015) estimate the policy effects by using this exogenous variation for Argentina, Norway, and Spain, respectively.

The literature finds that the provision of childcare does not necessarily increase maternal employment, although it increases childcare usage. Maternal employment increased in the U.S. in the 1980's (Gelbach (2002)), Argentina (Berlinski and Galiani (2007)), Canada (Lefebvre and Merri-
gan (2008), Baker, Gruber, and Milligan (2008)), and Spain (Nollenberger and Rodriguez-Planas (2015)), but it did not increase in the U.S. in the 1990's (Cascio (2009), Fitzpatrick (2010, 2012)), France (Goux and Maurin (2010)), and Norway (Havnes and Mogstad (2011)). Many of these papers in both groups find that the provision of subsidized childcare increased its usage, but it also crowded out informal and/or private childcare arrangement. Maternal employment increases only when this crowding out effect is sufficiently small. In other words, if working mothers simply substitute subsidized childcare for other informal and/or private arrangement, maternal employment rate does not change. This crowding out effect may exist in Japan, because informal childcare by grandparents is common.

3 Institutional Background for Japan

3.1 Parental Leave Policies

PL was first enforced in 1992 in Japan. It offered a job protection until the child reaches age one and no cash benefit. To be eligible for the mandated PL, individuals must be on indefinite term contract and working at a firm that employs 30 or more workers.

In 1995, this eligibility condition on the employer size was removed and all workers on an indefinite term contract became eligible for the mandated leave. At the same time, cash benefits were first introduced and the replacement rate was 25%. In addition, PL takers were exempted from the social security tax. Because the benefits are paid from the employment insurance, individuals must have been employed for at least one year in the past two years.

After the raise of the cash benefit replacement rate to 40% in 2001, the next major PL reform took place in 2005. In 2005, workers on a limited-term contract became eligible for the mandated leave if they had been employed for a year or more and were expected to be employed after the date when the child reaches age one. The replacement rate of the cash benefit was also raised to 50%. Table 1 summarizes the history of PL policies in Japan.

Table 1: Changes in Parental Leave Policies

Years	Eligible Employment		Replacement Rate
	Infinite Term	Limited Term	
1992-1994	✓		0%
1995-2000	✓		25%
2001-2004	✓		40%
2005-2006	✓	✓	40%
2007-2012	✓	✓	50%

Ministry of Health, Labour and Welfare publishes a PL take-up rate based on Basic Survey of Gender Equality in Employment Management. According to the survey, the take-up rate was 83.0% in 2013, however, this is likely to be upward-biased for attrition. The published take-up rate is the fraction of PL takers among those who were employed and gave birth between one and two years before the survey date, and hence, it does not account for those who quit a job for childbearing.

To avoid the attrition bias, I calculate a PL take-up rate using the data from the Japanese Panel Survey of Consumers 1994-2013. Table 2 reports this PL take-up rate along with other related statistics. The sample is divided in two periods, 1994-2004 and 2005-2013, because the major PL reform took place in 2005. The survey is conducted in every October, and the respondents report their childbearing since the last interview and their current employment status.

Among those who gave birth in the last 12 months, 26% answered that they were employed 12 months ago and 11% answered that they took PL in 1994-2004. In 2005-2013, the employment rate before childbearing and the PL take-up rate rose to 41% and 22%, respectively. How is this PL take-up rate compared internationally? Schönberg and Ludsteck (2014) estimate that about 55% of German mothers signed up for maternity leave in 1993, which is much higher than the take-up rate in Japan even in 2013.

The next three lines show employment choices of those who were employed before their childbearing. Among those who were employed 12 months ago and gave birth during the past 12 months, 39% took PL in 1994-2004. The PL take-up rate rose to 49% in 2005-2013, presumably because the cash benefits increased and some of limited-term contract workers became eligible for the mandated PL since 2005. In contrast, the proportions of those who continue to work without taking PL and those who quit the job decreased. In 1994-2004, 17% continued to work without PL and 43% quit the job and stayed at home. In 2005-2013, these proportions decreased to 11% and 37%, respectively.

The PL take-up rate reported here is 49% in 2005-2013 and much lower than the “official” take-up rate of 83%. The difference is almost fully accounted for by the attrition bias. When those who quit their jobs are excluded from the sample, the PL take-up rate increases to 82% (= 49 /

$(49+11) * 100$) for the 2005-2013 period.

The low take-up rate may seem odd, because it implies that many people leave money on the table. The low take-up rate may be due to the fact that individuals must be expected to return to the pre-leave job under the Japanese system. If individuals do not intend to return to the pre-leave job at the completion of PL, they cannot apply for PL and receive the cash benefit. This is an important difference from other countries such as Germany, Austria, and Canada, because individuals in these countries can receive cash benefits without the requirement to return to work. Note that the purpose of PL policies in Japan is to increase job continuity. For this reason, cash benefits must be applied through employers.

There is no penalty for not returning to the pre-leave job, except that a small part of cash benefits was paid upon return to the job until 2010. Nevertheless, vast majority of leave takers return to work. The last row of the table shows that 89-91% of leave takers were employed a year after childbearing.

Table 2: PL Take-Up Rate and Employment Rate after PL		
	1994-2004	2005-2013
Among Child-bearers		
% Employed Before Childbearing	26% (1.1)	41% (1.8)
% Took PL	11% (0.8)	22% (1.5)
Among Those Employed Before Childbearing		
% Took PL	39% (2.5)	49% (2.8)
% Work	17% (1.9)	11% (1.8)
% Quit and Stay at Home	43% (2.6)	37% (2.7)
Among PL Takers		
% Employed 1 Year After Childbearing	91% (2.4)	89% (2.6)

Source: Japanese Panel Survey of Consumers.

Note: Standard errors are reported in percentage point in parenthesis.

3.2 Childcare Policies

The most common mode of childcare in Japan is center-based childcare. According to the Comprehensive Survey of Living Conditions, 92-93% of childcare centers were accredited and the remaining 8% were non-accredited in 1998-2010.¹ Accredited childcare centers must satisfy the criteria for capacity, area, the number of teachers per pupil, etc. They also receive subsidies by the national and municipal governments. Non-accredited childcare centers are generally of lower quality. Some of them receive subsidies from municipality governments if they satisfy certain

¹See Table 40 in Volume 2 for 1998, Table 24 in Volume 3 for 2001, and Table 18 in Volume 3 for 2004, 2007, and 2010.

Table 3: Coverage and Enrollment Rates for Accredited Childcare

	1990	1995	2000	2005	2010
Coverage Rate	0.248	0.265	0.270	0.303	0.338
Enrollment Rate	0.205	0.220	0.251	0.294	0.326

Source: Census and Report on Social Welfare Administration and Services.

Note: The childcare coverage rate is the number of spots in accredited childcare per children age 0-5. The enrollment rate is the proportion of children age 0-5 enrolled in accredited childcare.

criteria, but not from the national government. Because of the difference in subsidy, the fees are significantly different between accredited and non-accredited childcare. The average monthly fee for accredited childcare is 25,556 JPY (about 250 USD),² although different fees are charged depending on regions and the household income. The fee for non-accredited childcare is 46,330 JPY (about 460 USD) for child age 0 and 34,161 JPY (about 340 USD) for child aged 5.³

While quality is high and the price is low, the accredited childcare service is not available for all households in need due to excess demand. To increase the supply of accredited childcare service, the Japanese government implemented a series of policies since the mid 90's. The goal of these policies is to raise the fertility rate by removing obstacles for mothers to work and raise their children. The Angel Plan (1994-1998) and the New Angel Plan (1999-2003) include an expansion of childcare capacity, extension of childcare service hours including weekends and holidays, and subsidies to promote the take-up of PL and shorter working hours. In 2003, the Japanese government enacted the Basic Act for Measures to Cope with Society with Declining Birthrate, in order to increase the capacity of the accredited childcare centers.

Table 3 shows how availability of accredited childcare and the enrollment rate changed over time. The availability of childcare is measured by the ratio of capacity to the population of children under age 6, which is referred to as the coverage rate in the literature. The coverage rate was 0.248 in 1990 and gradually increased to 0.270 in 2000. The growth of the coverage rate was accelerated in the 2000's and increased to 0.338 in 2010. The enrollment rate for accredited childcare has also increased during the same period. In 1990, it was 0.205 and increased to 0.326 in 2010. Yet another noticeable change during the two decades is that the gap between the coverage rate and enrollment rate narrowed, implying that accredited childcare is getting more and more utilized.

Although the expansion policy was decided at the national level, its implementation was at the discretion of each municipality. The actual growth of childcare capacity varied across municipalities depending on their financial status and policy priority. It should also be noted that reducing capacity is difficult for municipalities for two reasons, even when the child population is decreasing. First, there is a regulation that the minimum capacity of an accredited childcare be

²See Table 7 on page 8 of Ministry of Health, Labour and Wealth (2009)

³See Table 12 on page 14 of Ministry of Health, Labour and Wealth (2009)

60 children.⁴ This minimum capacity requirement directly prevents the operators of the childcare centers from downsizing. Second, the Japanese dismissal law strongly protects workers, which prevents childcare centers from firing them to reduce their capacity.⁵ These factors generate variations in the growth of childcare availability across regions, which offers an opportunity to identify the causal effects of childcare availability.

While the formal or center-based childcare is most prevalent mode of childcare, informal childcare arrangement is also not negligibly small. In Japan, childcare by grandparents is the most prevalent form of informal childcare arrangement. Longitudinal Survey of Newborns in the 21st Century asks who is the main caregiver for children under 3.⁶ According to the survey, among children who are looked after by someone else but their parents, 73.3% of them are enrolled in childcare centers, 25.9% are looked after by grandparents, and only 0.9% are under other informal childcare arrangements including babysitters and nannies.

The share of childcare by grandparents does not seem very different from other developed countries, although the statistics are not directly comparable. Blau and Currie (2006) report that 28.9% of employed mothers of children age 0-4 use childcare by relatives in 1999. According to the OECD family database, 26.8% of mothers of children age 0-2 use informal (unpaid) childcare by relatives in 2013 on average across 27 EU countries. The usage rate of the informal childcare tends to be higher in eastern and southern EU countries, while it is low in Nordic countries.

4 Evidence from Japan

4.1 Parental Leave Policies

Most of the previous studies from Japan including Higuchi (1994), Shigeno and Ookusa (1998), Suruga and Cho (2003), Imada and Ikeda (2006), and Sato and Ma (2007) have found the PL provision increased female employment. They use variation in leave availability across employers or leave-taking by employees, but their estimates are likely to suffer biases due to the self-selection into PL take-up and/or employers that offer a generous PL. In other words, mothers who have access to or apply for PL may have stronger labor force attachment than mothers who do not, which biases upward the estimated effects of PL on female employment. More plausibly exogenous variation in the PL policies has not been used.

Asai (2015) is the first paper that takes advantage of the series of PL policy reforms in Japan. She estimates the effects of the introduction of PL cash benefit in 1995 and the raise of the replace-

⁴Nihon-Jidou-Mondai-Chousakai (1978) documents how the minimum capacity is determined.

⁵See p. 512 in Yamakawa (2007)

⁶The survey also collects the information on the main caregiver for children age 3 and above, but it is not comparable to that for children under 3.

Figure 1: Employment Rate Around Childbearing

Note: Cited from Asai (2015). The employment rates for those who were employed 3 years before childbearing. Those on PL are considered as employed. The treatment group is mothers who gave birth in 2001 after the PL reform that increased the replacement rate from 25% to 40%. The control group is mothers who gave birth in 2000 before the PL reform.

ment rate in 2001. Because no other aspects of the PL legislation changed, Asai (2015) isolates the effects of the cash benefit.

The new policies were enacted and known by the public a year before enforcement. Given that the pregnancy period is for 9-10 months and PL follows two months of post-pregnancy leave, Asai (2015) argues that it is unlikely that mothers postponed pregnancy and childbearing to benefit from the new policies. This implies that the new policies are exogenous to the labor supply of mothers.

Asai (2015) compares the employment rate of mothers who gave birth right after the policy changes and that of mothers who gave birth right before the policy changes. The former are affected by the new policies, while the latter are not. They are comparable to each other except for the PL policies, provided that there was no significant change in other policies or economic environment at the time. Indeed, she confirms that they are similar in observed characteristics. This identification strategy is essentially the same as the RDD adopted by Lalive and Zweimüller (2009), Lalive, Schlosser, Steinhauer, and Zweimüller (2014), and Schönberg and Ludsteck (2014), although Asai (2015) uses annual, not monthly, data from the Employment Status Survey in 1997 and 2002.

Figure 1 shows the transition of employment rates around childbearing for those who were employed 3 years before childbearing. The treatment group is mothers who gave birth in 2001

after the PL reform that increased the replacement rate from 25% to 40%. The control group is mothers who gave birth in 2000 before the PL reform. There is no significant difference in employment rates from 2 years before to 1 year after childbearing between the two groups. This result is robust to alternative control groups. Asai (2015) also estimates the policy effects by the DID method in which the control group is either fathers or women with no children, but she finds null effects. She suspects that the change of the replacement rate by 15 percentage point was not large enough for more mothers to take PL to stay employed, although whether one takes a PL or not is not observed in the data.

Most previous contributions take the reduced-form estimation approach that uses the RDD and/or DID estimators. The advantage of the reduced-form approach is to offer transparent and credible identification of the effects of a policy that has been already implemented in the past, but it does not allow one to evaluate the effects of a policy that has never been implemented in the past (i.e. *ex ante* policy evaluation). On April 19, 2013, the Japanese prime minister Shinzo Abe proposed an extension of the duration of unpaid leave from 1 to 3 years, in order to promote female employment and raise the fertility rate. Mr. Abe's proposal led to a heated policy debate, but the reduced-form approach is unable to predict the likely outcomes.

Another limitation of the reduced-form approach is that the underlying mechanisms that PL policies affect female employment is often unclear. The theory predicts that several factors including labor market frictions, human capital depreciation, and childcare cost influence the effectiveness of PL policies, but their relative importance is not well-understood.

Taking the structural approach, Yamaguchi (2016) attempts to overcome these limitations. He constructs a model of employment and fertility choice using the structural dynamic discrete choice framework. In each period, a woman decides on whether she becomes pregnant or not and chooses one among four employment choices: staying at home, working in the regular employment sector, working in the non-regular employment sector, or taking a PL. PL is defined as a state in which a woman does not work, but maintains the employment contract so that she can return to the pre-leave job at the completion of the PL.

Work increases her income (and hence, consumption), but decreases her time for leisure and home production. The value of leisure and home production is the opportunity cost of work and changes with the number of children and the age of the youngest child. Due to labor market frictions, a woman has to pay an entry cost to an employment sector when she starts working or switches to another employment sector. Human capital is accumulated through learning-by-doing, but it also depreciates while she does not work in the employment sector.

A take-up cost for PL exists, because those who apply for PL have to make an arrangement so that their (possibly unwilling) colleagues can take over the tasks while on leave, which is consistent with the fact that many women eligible for PL quit their jobs and leave money on the table. For

some women, PL may be worth more than the take-up cost. Job protection removes the entry cost to employment sectors when PL takers want to return to their jobs after the completion of the leave. Cash benefits also offers incentives to take up the PL by raising income of PL takers.

Yamaguchi (2016) estimates the structural model using the Japanese Panel Survey of Consumers 1993-2012. He shows evidence that the model fits the data in terms of the employment transition probabilities and the life-cycle profiles of labor market and fertility outcomes. The structural parameter estimates indicate that the entry costs to employment sectors are large. They also indicate that the opportunity cost of work is very high when the child is younger than one year old, but it dramatically drops when the child grows to age one. This high opportunity cost of mothers' work in the first year of a child's life may be rationalized if mothers believe that their time is valuable for the development of the child in the first year.

The estimated structural model is used to conduct counterfactual policy simulations. In the simulations, PL policies change in 2010 and no further changes will take place thereafter. The employment and fertility paths from 2010 on are simulated for women who were employed and pregnant in 2009. This group of women is chosen, because they are most directly affected by the policy changes. Figure 2 shows how earnings respond to 3 different policies: (1) no job protection, (2) 1-year job protection, and (3) 3-year job protection. In all policies, no cash benefit is paid, but the results are robust to different replacement rates. Compared with no job protection, 1-year job protection substantially increases earnings from one year after childbearing. Moreover, the policy has a lasting effect: The earnings increase by about 25% by 1-year job protection even 10 years after childbearing.

Figure 2 also indicates that extending job protection from 1 to 3 years has little additional effects on earnings. The expansion places women on leave for a longer period, but it does not increase their employment or earnings in the medium to long term. Yamaguchi (2016) argues that the effects of job protection vary by the duration because the opportunity cost of work are very different before and after the child grows to age one. When the child is younger than one, the opportunity cost of work is very high, which makes job protection valuable for the mothers. However, the cost of work is much lower when the child grows to one, which decreases the value of job protection after the first year of a child's life. This finding implies that PL should protect jobs for the period when the opportunity cost of work is high and a longer job protection does not necessarily have an additional effect if the cost of work is low for older children. Finally, counterfactual simulations show that human capital depreciation is not a very important factor that influences the policy effects.

The limitations of Yamaguchi (2016) should also be noted. First, the analysis does not account for the demand side or market equilibrium. Mandating a longer job protection may lead to a higher cost of hiring women, which decreases the demand for female labor. This implies that the partial

Figure 2: Effects of Job Protection on Earnings Around Childbearing Asai (2015)

Note: Simulated earnings for those who were pregnant and worked in 2009. Counterfactual policy changes take place in 2010 and there is no further change. No cash benefit is paid in the simulations. The label on the vertical axis is annual earnings in mil. JPY (= 10,000 USD) and the label on the horizontal axis is years relative to policy change and childbearing in 2010.

equilibrium analysis that considers the labor supply only provides an upper bound for policy effects on female employment. The equilibrium female employment is likely to be less than the prediction by the partial equilibrium analysis due to the adverse effects on demand. Second, identification of the model is not transparent due to the model's nonlinearity. This is a usual criticism to a structural model, and Yamaguchi (2016) is not an exception. However, it is important to note that his model is identified not solely by the functional form assumptions, but also by the series of policy changes in Japan.

4.2 Childcare Policies

Most previous studies from Japan find that more availability of accredited childcare results in better female labor market outcomes. Examples include, but are not limited to, Shigeno and Ookusa (1999), Higuchi, Matsuura, and Sato (2007), Unayama (2011), and Abe (2013). They use variation in childcare availability across regions at a point in time, but their estimates are likely to suffer an upward bias due to omitted variables. Maternal labor supply and childcare availability are influenced by traditional family values and preference for women working, but they are hard to observe. The positive correlation between childcare availability and female employment may be driven by

the unobserved characteristics, rather than indicating a causal relationship. More plausibly exogenous variation in the availability of childcare is necessary for credible identification.

Asai, Kambayashi, and Yamaguchi (2015) is the first paper that uses the expansion of accredited childcare in Japan starting in the 1990's as an exogenous variation. Following the literature, they measure childcare availability by the coverage rate (= capacity of accredited childcare per population of children age 0-5). They identify the causal effects of childcare availability using differential growth of the coverage rates across regions. This approach allows them to remove region fixed effects to avoid omitted variable biases. The unit of region in their paper is the prefecture that is the first level of jurisdiction and administrative division. Japan consists of 47 prefectures.

The importance of the omitted variable biases is best understood from Figure 3. The left panel shows a clear and strongly positive relationship between the coverage rate and the maternal employment rate in 2010: the estimated slope is 0.617 with the standard error of 0.067. Although this strong relationship is interesting, it does not necessarily reflect the causal relationship. For example, it may be the case that preference for women's work varies across prefectures and influences both maternal employment and childcare availability.

To address this concern, examine the relationship between the changes of the coverage rate and those of the maternal employment rate from 2005 to 2010. By looking at the changes, instead of the levels, one can remove any time-invariant factors at the prefecture level such as preference for women's work. As shown in the right panel of Figure 3, no clear relationship can be seen: the estimated slope is 0.036 and the standard error is 0.083. Note that standard errors are in comparable scale in the left and right panel, although the point estimates are very different. This graph casts doubt on the previous findings that the expansion of childcare increased maternal employment. The comparison of the two graphs also suggests a large upward bias in estimates from a regression based on cross-sectional data.

Asai, Kambayashi, and Yamaguchi (2015) regress the employment rate of mothers with children age 0-5 on the coverage rate and time and prefecture dummy variables along with other control variables. They find no effects of childcare availability on maternal employment for families with children age 0-5. They argue that the increase of childcare availability did not increase maternal employment, because families substitute accredited childcare for informal childcare by the grandparents.

Asai, Kambayashi, and Yamaguchi (2016) update their 2015 paper and provide a more detailed analysis for understanding why childcare availability did not increase maternal employment. Table 4 summarizes their main results in which all 6 models share the same set of explanatory variables including the coverage rate, parents' age, paternal employment rate, local unemployment rate, and year and prefecture dummies. Column (1) shows the regression result for the enrollment rate for childcare. The result indicates that one more spot in accredited childcare turned into

Source: Census 2005 and 2010.

Note: Unit of observation is the prefecture. On the left panel, the horizontal axis shows the coverage rate, while the vertical axis shows the maternal employment rate. The right panel shows the 5-year changes in these variables. The radii of the circles reflect the number of two-parent households with children aged 0-5. The fitted lines are based on the bivariate weighted regressions.

Figure 3: Childcare Availability and Maternal Employment

0.862 new child enrolled in accredited childcare. However, the rise in childcare enrollment did not translate into the rise of maternal employment. Column (2) shows the regression result for the employment rate of mothers with children aged 0-5. The coefficient is small at -0.147 and statistically insignificant.

To understand the reason for the null result, Asai, Kambayashi, and Yamaguchi (2016) examine the joint determination of maternal employment and household structure. The census does not include the choice of childcare mode, but co-residence with grandparents can be used as a proxy for the availability or use of informal childcare by grandparents. Column (3) shows the result for the regression of the joint probability that the mother is employed and the household is a nuclear household. The coefficient is positive and significant, which implies that the coverage rate increased the fraction of nuclear household with working mother. The result in Column (4) is in sharp contrast with this. Column (4) shows the result for the regression of the joint probability that the mother is employed and the household is a three-generation household. The coefficient is negative and significant, which implies that the coverage rate decreased the fraction of three-generation households with working mothers. Columns (5) and (6) show the results for the fractions of nuclear and three-generation households with stay-at-home mothers. They are not affected by childcare availability.

The results in Columns (3) and (4) indicate that young families of working mothers were shifting from forming a three-generation household to forming a nuclear household. Given that many working mothers in three-generation households use informal childcare by grandparents, these re-

Table 4: Effects of Childcare Availability on Maternal Employment and Household Structure

	(1) Enrl.	(2) Empl.	(3) Empl-NHH	(4) Empl-3HH	(5) Home-NHH	(6) Home-3HH
Childcare Avail.	0.862*** (0.062)	-0.147 (0.110)	0.434*** (0.056)	-0.581*** (0.135)	0.085 (0.115)	0.062 (0.075)
Mother's Age	0.000 (0.015)	-0.001 (0.032)	0.008 (0.019)	-0.010 (0.040)	0.071* (0.039)	-0.070*** (0.023)
Father's Age	-0.013 (0.016)	0.015 (0.028)	-0.018 (0.021)	0.033 (0.037)	-0.078** (0.032)	0.063*** (0.022)
Unemp. Rate	-0.113* (0.064)	0.164 (0.144)	0.306** (0.127)	-0.144 (0.226)	0.279 (0.213)	-0.436*** (0.111)
Pat. Empl. Rate	0.199 (0.169)	-0.235 (0.544)	-0.732*** (0.250)	0.492 (0.714)	0.210 (0.787)	0.042 (0.424)
Year FE	✓	✓	✓	✓	✓	✓
Prefecture FE	✓	✓	✓	✓	✓	✓
R ²	0.995	0.984	0.990	0.971	0.987	0.970
Num. obs.	235	235	235	235	235	235

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: Census 1990-2010

Note: Cited from Asai, Kambayashi, and Yamaguchi (2016). The number of households is used as weight. Standard errors are clustered at the prefecture level.

sults imply that the expansion of accredited childcare crowded out informal childcare by grandparents. This crowding out has been found in other countries including Norway (Havnes and Mogstad (2011)), France (Goux and Maurin (2010)), and the U.S. (Fitzpatrick (2010, 2012)).

Asai, Kambayashi, and Yamaguchi (2016) show evidence for robustness of their results in many respects. First, they assessed if time-varying unobserved factors bias their estimates. Although time and prefecture fixed effects and local unemployment rate are controlled, other factors influencing female employment may be correlated with childcare availability. Demand shocks specific to female labor is an example. If the unobserved demand shocks are correlated with the coverage rate, the estimated effect of the coverage rate is biased. Asai, Kambayashi, and Yamaguchi (2016) conduct a falsification test to see if such unobserved factors are correlated with the coverage rate by estimating the regression models above using the sample of households with children age 6-14. Their rationale is that the unobserved demand shocks are likely to affect not only mothers of children age 0-5, but also mothers of children age 6-14, because they have similar labor market skills. If such unobserved demand shocks are not correlated with the coverage rate, the estimated coefficient for the coverage rate is zero for the sample of families of children age 6-14, because children age 6-14 cannot be enrolled in accredited childcare centers. However, if the unobserved demand shocks are correlated with the coverage rate, the estimated coefficient is non-zero. Asai, Kambayashi, and Yamaguchi (2016) find that the coefficient is not significantly different from zero in models (2)-(6) above for families of children age 6-14. They conclude that their estimates are unlikely to be biased due to the demand shocks.

Another possible source of bias is migration for childcare between prefectures. If mothers who want to work move to prefectures where childcare is more available, the estimated effects are upward biased. However, Asai, Kambayashi, and Yamaguchi (2016) show evidence that only 0.8% of the mothers moved from other prefectures for “childrearing and education” in the Employment Structure Survey 2002. They conclude that migration for childcare between prefectures is rare, and hence, it is unlikely to bias the estimates.

Asai, Kambayashi, and Yamaguchi (2016) also show that the main results are robust to an alternative definition of coverage rate. Unayama (2011) proposes the use of the potential coverage rate defined as the ratio of capacity to population of women aged between 20 to 44, rather than the population of children under 6. This is because the child population may potentially be affected by childcare availability. Despite the concern, the results are very similar between the two definitions.

Although Asai, Kambayashi, and Yamaguchi (2016) conduct extensive robustness check, there remain other potential sources of bias. An example is demand and/or supply shocks specific to mothers of children age 0-5. Such shocks cannot be detected by the falsification test above. However, it is hard to imagine demand or supply shocks specific to the young families. For the demand side, there are few reasons to treat mothers of children age 0-5 and those of children age 6-14 differently. The traditional family value and social norm may have changed to increase female labor supply generally, but it is unlikely that only mothers of children age 0-5 are affected, while those of children age 6-14 are not.

5 Conclusion

This paper reviewed the literature on the effects of PL and childcare policies on female employment. For PL, a generous package tends to increase mother’s time with children by delaying their return to work, but it does not hurt mother’s medium to long term labor market outcomes. Some papers also find job protection for about one year has a positive effect on maternal labor supply after the completion of PL. For childcare policies, the literature finds that the expansion of subsidized childcare does not necessarily increase maternal employment, because it often crowds out informal childcare arrangement such as grandparental care. Although Japanese institutions are different from other developed countries, recent findings confirm that Japan is not an exception and findings about Japan are largely consistent with the international evidence.

One of the promising future research agendas is the interaction of PL and childcare policies. These two policies are closely related, but they cover different periods of children’s life and hence, have different roles. Although economists are aware that effects of PL policy is affected by childcare policies and vice versa, previous papers often study them in isolation. This is presumably because identification of the interaction effects is hard due to lack of policy variations. Neverthe-

less, better understanding of the interaction of these two policies will contribute to designing a more effective family policy package.

A related literature that is not discussed in this paper is the literature on child development. PL and childcare policies can increase maternal labor supply and decrease their time with children. This change ultimately affects the health and development of children as well as well-being of parents. This is a huge literature, but very few papers study the effects of family policies on child development and parental well-being in Japan. Better understanding on this issue will go a long way toward evaluating welfare effects of the family policies.

References

- ABE, Y. (2013): “Regional variations in labor force behavior of women in Japan,” *Japan and the World Economy*, 28, 112 – 124.
- ASAI, Y. (2015): “Parental leave reforms and the employment of new mothers: Quasi-experimental evidence from Japan,” *Labour Economics*, 36(C), 72 – 83.
- ASAI, Y., R. KAMBAYASHI, AND S. YAMAGUCHI (2015): “Childcare Availability, Household Structure, and Maternal Employment,” *Journal of the Japanese and International Economies*, 38, 172–192.
- (2016): “Crowding-Out Effect of Subsidized Childcare,” McMaster University.
- BAKER, M., J. GRUBER, AND K. MILLIGAN (2008): “Universal Child Care, Maternal Labor Supply, and Family Well-Being,” *Journal of Political Economy*, 116(4), 709–745.
- BAKER, M., AND K. MILLIGAN (2008): “How Does Job-Protected Maternity Leave Affect Mothers’ Employment?,” *Journal of Labor Economics*, 26(4), 655–691.
- BAUM, C. I. (2003): “The effect of state maternity leave legislation and the 1993 Family and Medical Leave Act on employment and wages,” *Labour Economics*, 10(5), 573–596.
- BERLINSKI, S., AND S. GALIANI (2007): “The effect of a large expansion of pre-primary school facilities on preschool attendance and maternal employment,” *Labour Economics*, 14(3), 665 – 680.
- BLAU, D., AND J. CURRIE (2006): *Pre-School, Day Care, and After-School Care: Who’s Minding the Kids?* Elsevier, vol. 2 of *Handbook of the Economics of Education*, chap. 20, pp. 1163–1278.

- BLAU, D. M., AND P. K. ROBINS (1988): "Child-Care Costs and Family Labor Supply," *The Review of Economics and Statistics*, 70(3), 374–81.
- CASCIO, E. U. (2009): "Maternal Labor Supply and the Introduction of Kindergartens into American Public Schools," *Journal of Human Resources*, 44(1).
- CONNELLY, R. (1992): "The Effect of Child Care Costs on Married Women's Labor Force Participation," *The Review of Economics and Statistics*, 74(1), 83–90.
- FITZPATRICK, M. D. (2010): "Preschoolers Enrolled and Mothers at Work? The Effects of Universal Prekindergarten," *Journal of Labor Economics*, 28(1), 51–85.
- (2012): "Revising Our Thinking About the Relationship Between Maternal Labor Supply and Preschool," *Journal of Human Resources*, 47(3), 583–612.
- GELBACH, J. B. (2002): "Public Schooling for Young Children and Maternal Labor Supply," *American Economic Review*, 92(1), 307–322.
- GOLOSOV, M., L. E. JONES, AND M. TERTILT (2007): "Efficiency with endogenous population growth," *Econometrica*, 75(4), 1039–1071.
- GOUX, D., AND E. MAURIN (2010): "Public school availability for two-year olds and mothers' labour supply," *Labour Economics*, 17(6), 951–962.
- HAVNES, T., AND M. MOGSTAD (2011): "Money for nothing? Universal child care and maternal employment," *Journal of Public Economics*, 95(11), 1455–1465.
- HIGUCHI, Y. (1994): *Empirical Analysis of Parental Leave Legislation* University of Tokyo Press, Modern Families and Social Security.
- HIGUCHI, Y., T. MATSUURA, AND K. SATO (2007): "Effects of Regional Factors on Fertility and Employment Continuity of Wives," RIETI Discussion Paper No. 07-J-012 (in Japanese).
- IMADA, S., AND S. IKEDA (2006): "Effects of Parental Leave Legislation on Employment Continuity for Mothers and Work-Life Balance," *Nihon Rodou Kenkyu Zasshi*, 553, (in Japanese).
- INTERNATIONAL LABOUR OFFICE (2014): "Resource guide on Gender issues in employment and labour market policies," Instructional Material.
- KIMMEL, J. (1998): "Child Care Costs As A Barrier To Employment For Single And Married Mothers," *The Review of Economics and Statistics*, 80(2), 287–299.

- LALIVE, R., A. SCHLOSSER, A. STEINHAEUER, AND J. ZWEIMÜLLER (2014): “Parental Leave and Mothers’ Careers: The Relative Importance of Job Protection and Cash Benefits,” *Review of Economic Studies*, 81(1), 219–265.
- LALIVE, R., AND J. ZWEIMÜLLER (2009): “How does Parental Leave Affect Fertility and Return to Work? Evidence from Two Natural Experiments,” *The Quarterly Journal of Economics*, 124(3), 1363–1402.
- LEFEBVRE, P., AND P. MERRIGAN (2008): “Child-Care Policy and the Labor Supply of Mothers with Young Children: A Natural Experiment from Canada,” *Journal of Labor Economics*, 26(3), 519–548.
- MICHALOPOULOS, C., P. K. ROBINS, AND I. GARFINKEL (1992): “A Structural Model of Labor Supply and Child Care Demand,” *Journal of Human Resources*, 27(1), 166–203.
- MINISTRY OF HEALTH, LABOUR AND WEALTH (2009): “Summary of the Survey of Local Child Welfare Services,” available from <http://www.mhlw.go.jp/toukei/saikin/hw/jidou/09/dl/80.pdf>.
- NIHON-JIDOU-MONDAI-CHOUSAKAI (1978): *Jidou Fukushi Sanjuu Nennno Ayumi (30 Years of Child Welfare)*. Division of Children and Family, the Ministry of Welfare.
- NOLLENBERGER, N., AND N. RODRIGUEZ-PLANAS (2015): “Full-time universal childcare in a context of low maternal employment: Quasi-experimental evidence from Spain,” *Labour Economics*, 36, 124 – 136.
- RUHM, C. J. (1998): “The Economic Consequences Of Parental Leave Mandates: Lessons From Europe,” *The Quarterly Journal of Economics*, 113(1), 285–317.
- SATO, K., AND X. MA (2007): *Effects of Parental Leave Reform on Female Employment* Keio University Press, vol. 4 of *Dynamics of Household Behavior in Japan*.
- SCHÖNBERG, U., AND J. LUDSTECK (2014): “Expansions in Maternity Leave Coverage and Mothers’ Labor Market Outcomes after Childbirth,” *Journal of Labor Economics*, 32(3), pp. 469–505.
- SCHOONBROODT, A., AND M. TERTILT (2014): “Property rights and efficiency in OLG models with endogenous fertility,” *Journal of Economic Theory*, 150(C), 551–582.
- SHIGENO, Y., AND Y. OOKUSA (1998): “Effects of Parental Leave Legislation on Marriage and Employment Continuity,” *Nihon Roudou Kenkyu Zasshi*, p. (in Japanese).

- (1999): “The Effects of Childcare Policy on Fertility and Employment,” *Kikan Shakai Hosho Kenkyu*, 35, 192–207 (in Japanese).
- SURUGA, T., AND K. CHO (2003): “Effects of Parental Leave Legislation on Childbearing and Female Employment,” *Kikan Kakei Keizai Kenkyu*, 59, (in Japanese).
- UNAYAMA, T. (2011): “Compatibility of Marriage, Fertility, and Work and Childcare Availability,” *Nihon Keizai Kenkyu*, 65, 1–22 (in Japanese).
- WALDFOGEL, J. (1999): “The impact of the family and medical leave act,” *Journal of Policy Analysis and Management*, 18(2), 281–302.
- YAMAGUCHI, S. (2016): “Effects of Parental Leave Policies on Female Career and Fertility Choices,” McMaster University.
- YAMAKAWA, R. (2007): *From Security to Mobility? Changing Aspects of Japanese Dismissal Law* University of Washington Press, pp. 483–520.