Parental Leave and Child Health Across OECD Countries

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Introduction

With the growing employment rates of mothers with very young children, various types of parental leave policies and programs have been developed in many nations. Although one of the reasons for the development of these policies is to protect children's health, there is a paucity of literature on the effects of parental leave on child health outcomes, and there have been few comparative studies on this issue.

The purpose of this research is to develop a comparative study on the effects of parental leave on child health outcomes. The research builds on the work of Ruhm (2000), which investigated the aggregate effects of statutory parental leave on child health outcomes in 16 European countries[1] from 1969 to 1994.

This study differs from Ruhm's (2000) in four respects. First, it adds two more countries, the United States and Japan, as well as recent data from 1995 to 2000 for the 16 European countries, the United States, and Japan. It is important to include recent years because there were many changes on parental leave policies between 1995 and 2000. It is also important to include the United States and Japan because they are two significant countries in the Organization for Economic Cooperation and Development (OECD). In Ruhm's (2000) analysis, the United States and Japan were excluded, since there was no mandated leave in the United States for most of his research period (1969-1994), and in Japan from 1960 to 1987 the duration of leave was constant at 12 weeks, thereafter extended to 14 weeks. However, because this study looks at the period from 1969 to 2000, it is appropriate to include these two countries in this study.

[1] Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Second, this study examines separately the effects of job-protected paid leave and the effects of other leave--including non-job-protected paid leave, unpaid leave, and leave provided at a flat rate--on infant mortality. By including the variable of other leave, I can observe the effects of unpaid leave on child health outcomes. Because weeks of other leave were also extended dramatically from 1969 to 2000, it is important to look at the effects of this leave.

Third, this study investigates whether the effects of parental leave on child health outcomes operate through other health measures, such as low birth weight and child immunizations. Because low birth weight is an important risk factor in infant mortality, and one that may be affected by parental leave, I hypothesize that when controlling for low birth weight, the effects of leave on infant mortality may be attenuated. I also examine whether the effect of parental leave might function through increased immunizations for children.

Fourth, this study includes social policy variables as controls, since they are assumed to have positive correlations to infant health outcomes. The social policy variables used in the analysis are public expenditures on family cash benefits, maternity and parental leave, and family services. Controlling for other social policies is potentially important since countries that enact more generous parental leave policies may also spend more on other programs for young children.

Background

Overview of Maternity and Parental Leave Policies in European Countries, the United States, and Japan

In this study, I use parental leave as a generic term to refer to any of a variety of leave policies, including maternity, paternity, parental, adoptive, and family leave, which allow parents to take time off work to care for a young child. Maternity Leave is job-protected leave from employment at the time of childbirth, or adoption (The Clearinghouse, 2002). In many countries, maternity leave is a combined leave of pre- and post-childbirth leave. Some countries require taking the pre-birth leave. Moreover, most OECD countries set a certain percentage of wage replacement, ranging from 50% to 100% of wages, except the United States and South Korea, which provide unpaid maternity leave, and Australia, where there is no statutory maternity leave (The Clearinghouse). Parental leave is also job-protected leave from employment, but it is a gender-neutral term. This leave usually follows maternity leave and permits mothers and fathers to share the leave or choose who will use it[2] (Kamerman, 2000a). In most OECD countries, parental leave was developed to provide either no payment or a flat rate of payment. There are also other leaves, such as paternity leave (job-protected leave from employment for fathers), child rearing leave (a supplemental leave added to maternity leave), and family leave (job- and benefit-protected leave for working parents, including maternity, paternity, parental, child-rearing, care for an ill child, or personal leave).

- *European countries*

Parental leave policies in Europe have existed since the 1880s. The first law was enacted in 1883 in Germany, which provided health insurance, paid sick leave, and paid

[2] If there is no specified maternity leave, a portion of parental leaves is usually reserved for mothers, to ensure a period of physical convalescence and recovery after childbirth. In some countries, a portion of the parental leave is reserved for fathers, on a "use it or lose it" basis, to create initiatives for the father to play a more active parenting role (The Clearinghouse, 2002) .

maternity leave (Kamerman, 2000a). It was followed by Sweden in 1891, and France in 1929 (Ruhm & Teague, 1997). In 1919, the International Labor Organization (ILO) Convention on Maternity Protection led to the establishment of maternity benefits for women working in industry and commerce. It recommended paid maternity leave of 12 weeks with a compulsory six week post-partem period. In 2000, the convention was revised to stipulate 14 weeks of recommended leave, with six weeks of compulsory leave after childbirth, and the payment was set at a minimum of two-thirds of prior earnings (Kamerman, 2000a). Though many countries did not adopt these recommendations by the ILO until the late 60s[3] (Ruhm, 1998), today the standard for the European Union (EU) and OECD countries exceeds the ILO convention. However, among these countries, Switzerland does not have national legislation on maternity benefits, though it has coverage at the canton (state) level; the United States, Australia, New Zealand, and South Korea do not provide paid leave.

Several changes have been made on leave policies in recent years. In Ireland and the UK, parental leave was introduced in 1998 and 1999, respectively. The length of parental leave is 14 weeks in Ireland, and 13 weeks in the UK. Both are provided with no payment. In Greece, parental leave was extended from 3 months to 6 months, and the weeks of maternity leave extended to 17 weeks in 2000. In Italy, Portugal, Spain, and Sweden, there have been further legislative changes in parental leave. In Italy, parental leave was extended from 6 months to 10 months in 1998, and in Portugal, it was extended to 24 months in 1998. Parental leave in both countries is also provided with no payment (Work Life Research Centre, 2003). In Switzerland, the number of weeks of maternity leave was

[3] Portugal, Spain, and Finland established employment reinstatement provisions between 1969 and 1971. Similar legislations were passed in France and the Netherlands in 1975 and 1976, respectively, followed by Denmark, Ireland, and Greece between 1980 and 1984 (Ruhm, 1998).

extended from 10 weeks to 16 weeks in 1996 (Social Security Programs Throughout the World, 1997).

- *The United States*

The Family and Medical Leave Act (FMLA), passed in 1993, requires both public and private employers to offer job-protected family or medical leave of up to 12 weeks for workers who meet specific qualifying conditions[4]. Prior to 1993, there was no family and medical leave legislation at the national level; however, in five states[5], the law of Temporary Disability Insurance (TDI), enacted in the 1940s in four states and in 1969 in Hawaii, protects workers from loss of income in case of temporary non-job-related medical disabilities (Kamerman, 1991). Due to the TDI program, companies in the five states are required to offer paid leave to new mothers just as the employers provide benefits for other employees when they are ill or temporarily disabled (Wisensale, 2000).

The Pregnancy Discrimination Act (PDA) (Public Law 95-555) promulgated in 1978, mandates that men and women must be treated equally when they are unable to work due to medical reasons. Yet, this act does not require employers to offer disability benefits to pregnant women if employers choose not to provide disability benefits for all workers. In addition, the PDA does not require employers to acknowledge workers' needs and obligations beyond the workplace that could affect their labor-force participation (Wisensale, 2000). On the other hand, the PDA encourages not only society to have an awareness of equitability in the workplace but also states to enact legislations related to

[4] The FMLA pertains to an individual working in a large firm (50 or more employees) with a minimum 12 month tenure and 1,250 working hours during that time period.
[5] TDI law was passed in Rhode Island in 1942, California in 1946, New Jersey in 1948, New York in 1949, and Hawaii in 1969.

leave. By 1988, nine states had passed laws requiring employers to provide family or parental leave under certain conditions[6] (Kamerman, 1991; Wisensale, 2000).

Nevertheless, only 12 states, and the District of Columbia enacted laws requiring firms to provide some form of maternity leave prior to the passage of the FMLA in 1993. Therefore, employees mainly depend on employers to provide maternity leave or some form of benefit for pregnancy (Waldfogel, 1999a). The Commission on Family and Medical Leave (CFML) reported in 1996 that approximately two thirds (66.1%) of the labor force, including private and public sector employees, worked in firms covered by the FMLA. It pointed that only 54.9% of workers (46.5 % of private sector workers) met qualifications for the coverage, and the length of leave taken by mothers was very short. Ninety percent of the leave takers took leave for 12 weeks or less, with the median length of leave being 10 days (CFML, 1996). Moreover, the leave benefit is unpaid, and the period is up to 12 weeks, which is limited compared to other industrialized countries (Olson, 1998).

- *Japan*

The labor force participation rate of Japanese females between 15 and 59 years old has been growing since the early 70s, and was 62.2% in 2001 (Welfare White Paper of Japan, 2001). Maternity leave legislation was enacted as a part of the Labor Standard Law in 1947. It allows all female workers to take paid leave (60% of wage replacement) for six weeks as prenatal leave and for eight weeks as postnatal leave. Because maternity benefits are financed through governmental social insurance, employers do not have to contribute funds for the leave benefits. Statistics in 1996 show that 29.0% of leave takers

[6] Each state had a different condition for providing leave. See Kamerman (1991) for details.

took more than 6 weeks before childbirth (37.1% took 36-42 days and 21.2% took 22-35 days), and 83.1% took 8 weeks after childbirth (12.0% took more than 8 weeks). Moreover, 31.6% of female workers quit their jobs at the time of childbirth in 1992, but in 1995 only 19.0% did so (Ministry of Health and Welfare of Japan, 1998).

The Child Care Leave Law was passed in May 1991 and went into effect in April 1995. It requires firms to allow employees who have children under the age of one to take parental leave and it also provides the benefit of shorter working hours to workers who have a child of pre-school age (Waldfogel, Higuchi, & Abe, 1999). In 2001, 53.5% of Japanese private companies provided child care leave, and 56.4% of female workers took advantage of the leave after childbirth and then returned to work. Yet, data indicate that while 91.8% of private companies with labor unions provide child care leave, only 43.5% of private companies without labor unions do so, and 49.4% of small companies with less than 30 workers provide leave. The rate at which individuals take leave also varies by the size of the firm: 76.3% of workers at large firms (more than 500 employees), 47.2% of workers at medium-small size firms (30–99 employees), and 55% of workers at small firms (less than 30 employees) doing so in 2001 (Ministry of Health and Welfare of Japan, 2002).

Prior Literature on the Impact of Maternity and Parental Leave on Child Health Outcomes

Although economic theory predicts that parental time is one of the direct inputs of children's health capital (Leibowitz, 2003), there have been few studies on the

relationship between parental leave policies and child health. There are three empirical studies looking at the effects of leave on child health outcomes.

By using data from 17 OECD countries in four time periods (1959, 1969, 1979, and 1989), Winegarden and Bracy (1995) looked at the effects of paid maternity-leave on infant mortality and the impact of labor-force participation of women ages 20-24 on the infant mortality rates. The research results showed that an additional week of paid maternity leave decreased the infant mortality rate by 0.5 deaths per 1,000 live births. On the other hand, the relationship between mother's labor force participation and the infant mortality rate was not clear. When the researchers excluded time specific variables to predict the relationship, they found a negative relationship; however, when they included time specific variables, the results showed a slight positive relationship, though it was statistically insignificant. Their interpretation of the results was that a mother's labor force participation could positively affect the infant mortality rate by shortening mother's time with the new born; however, it could negatively relate to child health outcomes by increasing household income to buy more goods, which is one of the factors of the child health production function (Winegarden & Bracy, 1995). Although their results suggested the positive effect of maternity leave on child health outcomes, the study did not specify the effects of leave by controlling for other related factors, such as health insurance coverage, GDP, and fertility rates.

Using data of 16 European countries, Ruhm (2000) found that job-protected paid parental leave significantly decreases the infant mortality rate. For instance, 10 weeks of leave reduced infant mortality rate by 1%-2%, whereas 20 weeks of leave and 30 weeks of leave reduced the rate by 2%-4% and 7%-9% respectively. He looked at the effects of

job-protected paid parental leave and included variables such as health insurance coverage, expenditures on health care, GDP per capita, and fertility in his model. Moreover, he measured child health outcomes by using five components of mortality rates: perinatal mortality, neonatal mortality, post-neonatal mortality, infant mortality, and child mortality. Ruhm's (2000) results showed that paid leave also reduced mortality during the post-neonatal period (between 28 days and one year) and early childhood (between one and five years). For example, a 10-week extension of paid leave could reduce post-neonatal deaths by 3.7%-4.5%, and also could decrease child mortality by 3.3%-3.5%. He found a negative effect on post-neonatal mortality and child mortality with 10 weeks and 20 weeks of leave entitlements. His interpretation of the results noted that short leave entitlements encourage new mothers to return to work early, possibly raising the mortality rates of those in early childhood.

Berger, Hill, and Waldfogel (2002) studied the relationship between maternity leave and child health outcomes by using US data (the National Longitudinal Survey of Youth 79). They found a new mother's return to work in the first 6 weeks to be significantly associated with negative child health outcomes. For example, the women in their study who returned within the first 6 weeks were significantly less likely to take their child for a well-baby visit in the first year of life. In addition, the children of these mothers were less likely to receive DPT/oral polio immunizations. Also, mothers returning to work in the first 6 weeks were less likely to breast-feed, and the period of breast-feeding was significantly shorter than other groups who returned to work between 7 to 52 weeks or did not return to work during the first year. The research results on the effect of leave

coverage on child health outcomes showed that the increased leave coverage is positively associated with breast-feeding practices (Berger, Hill, & Waldfogel, 2002).

This overview reveals several gaps in the current literature available on the effects of parental leave on child health outcomes. First, there is no comparative study after 1994, though there have been many changes on parental leave policies in these OECD countries. Second, there is no comparative study that includes the United States and Japan. Third, there is no comparative study examining health outcomes other than infant mortality rates. Finally, there is no study examining the influence of other social policies related to families with young children. Therefore, this study intends to fill these gaps in the literature on the subject of parental leave effects on child health outcomes.

Theoretical Framework

From health economic theory and the models developed by Rosenzweig and Schultz (1982) and Ruhm (2000), I theorize that an increase in weeks of leave enhances infant health capital by increasing parents' time with infants, which is an important component in the child health production function. In economic theory, health capital is considered to be one form of human capital. Like other human capital development, health capital is the stock of health increased by investment in health (Grossman, 1972)[7]. Although a person inherits an initial stock of health capital, which depreciates over time, it can be increased by his or hers investments over the life cycle. Investments in health capital are produced by household production functions, which consist of direct inputs of one's own

[7] Grossman (1972) noted that health capital should be different from other forms of human capital because a person's stock of knowledge could affect his market or nonmarket activities, while his stock of health determines the total amount of time he can spend on all activities. Due to this fundamental difference in types of human capital, the demand of health capital would differ; therefore, health capital should be differentiated from that of other types of human capital.

time, such as sleeping, as well as market goods, such as medical care, exercise, and recreation (Grossman, 1972). [8]

Rosenzweig and Schultz (1982) defined the health production functions of children by analyzing the relationship between 1) mother's demographical characteristics, behavior, and attitude towards her health during pregnancy and 2) child health outcomes. Their model assumed that the child health production function is defined by consumer goods and services, which include health-related inputs such as cigarettes, health-neutral inputs, and other purchased inputs that are allocated only for the child's health, such as medical services. Therefore, inputs to their child health production function were demographic characteristics such as mother's educational level, race, household income, and attitude and behavior towards health and health services, such as number of cigarettes smoked per day while pregnant and extent of pre-natal care. Outputs of their child health production function include birth weight and length of pregnancy in weeks. Rosenzweig and Schultz (1982) found that a delay in seeking medical care until after the first six months of pregnancy would lower birth weight by 45 grams, and an increase of one pack of cigarettes per day would lower birth weight by 279 grams.

Ruhm (2000) constructed the child health production function to look at the relationship between parental leave and pediatric health. Based on previous theories, he structured a model where parents maximize the utility function U (H, X), subjected to a budget constraint (Y=P_mM +P_xM) and a time constraint (T=R+L+V). Here, the utility function consists of child health (H) and other consumption (X). A budget constraint is the total income Y, which is equal to expenditures for medical care (P_mM) and other

[8] The household production function is related to environmental conditions, so that educational level could be one of the factors determining the efficiency of the health production process.

consumption (P_xM). *Y* is also equal to the sum of the income from earnings ($_wR$)[9], the payment during the leave ($_s L$)[10], and non-earned income (N). Time constraint (T) is the total hours of time at work (R), time on leave (L), and nonmarket time (V). Child health function (H) is assumed to be determined by baseline health (B), medical care (M), parents' time away from work (L+V), and stochastic shock (e) (Ruhm, 2000).

Leibowitz (2003) reviewed child health economic theory and specified direct inputs to the child health function. She defined child health capital as being produced through household production functions with direct inputs of parental time (t_h), child time (t_c), and household commodities (Z_c) that affect child development, such as immunizations or nutritious foods. She theorized that child health capital at time=t (H_t) is produced by the direct input elements under a condition decided by a child's genetic health endowments (G), child health capital at the beginning of the period (H_{t-1}), and the efficiency of parental time inputs in health capital production (E).

From the child health economic theories developed by Ruhm (2000) and Leibowitz (2003), parental leave policies would affect infant health outcomes by increasing the parent's time away from work (L+V), or parental time (t_h). On the other hand, parental leave policies would not affect medical care (M) or household commodities (Z_c), unless leave policies have positive effects on income. Leibowitz (2003) stated that several studies suggested that increases of income do improve child health outcomes. Baseline health (B), or child's genetic health endowments (G) would not be affected by parental leave policies. However, Leibowitz noted that genetic factors are not the only cause of differences in initial health endowments. Mother's behavior and attitudes toward health

[9] $_w$ = the wage rate
[10] $_s$ = the payment during parental leave

during pregnancy, such as smoking or frequency of prenatal care, can be associated with lower birth weight of infants. Moreover, maternity leave prior to childbirth would increase the probability and frequency to seek out prenatal care. Thus, parental leave policies could affect the initial health capital of children. Yet, since pre-birth maternal leave in most OECD countries is often short (equal or less than 6 weeks), I expect it would be difficult to see large effects of leave on low birth weight.

As an extreme case of child health outcomes, one resulting in death, Ruhm (2000) used mortality rates as a proxy for child health outcome. He considered mortality rates as the minimum level of child health capital below which death occurs. Because the child health production function is defined by a function of various inputs (H*) and stochastic shock (e), if the aggregates of the various inputs (H*) is less than the minimum level of child health capital (H_{min}), child health outcomes result in death. In other words, the probability of infant mortality is predicted by an infant health production function (H*)[11] that is less than the minimum level of infant health capital (H_{min}). Therefore, from this concept, mortality rate and health are inversely related but affected by the same inputs (Ruhm, 2000).

Data and Methodology

The regression model used in the analysis takes the following form:

$$\mathbf{HC}_{c,t} = \mathbf{ML1}_{c,t}\,\mathbf{a}_1 + \mathbf{ML2}_{c,t}\,\mathbf{a}_2 + \mathbf{X}_{c,t}\,\mathbf{a}_3 + r_c + r_t + r_{ct} + e$$

where,

$HC_{c,t}$ = child health outcomes, such as infant mortality rates in country *c*, and at time *t*

$ML1_{c,t}$ = weeks of job-protected paid leave entitlement in country *c*, at time *t*

[11] $Pr(Mortality)=Pr(e<=H_{min} - H^*)$

$ML_{2\,c,t}$ = weeks of other leave entitlement, including non-job protected paid leave, job-protected leave, and non job-protected unpaid leave, and leaves with a flat rate benefit in country *c*, at time *t*

$X_{c,t}$ = a set of other control variables relating to country *c*, at time *t*

r_c = a country-specific fixed effect relating to country *c*.

r_t = a time-fixed effect relating to year *t*

$r_{c\,t}$ = a country-specific linear time trends

e = error term

a_1, a_2, and a_3 = parameters

Outcome Variables ($HC_{c,t}$)

Following Ruhm's (2000) model, outcome variables are: 1) infant mortality rates (infant deaths under 1 year per 1,000 live births), 2) perinatal mortality rates (still births [minimum gestation period 28 weeks] and deaths within 1 week of birth per 1,000 live births and still births), 3) neonatal mortality rates (infant deaths under 28 days of age per 1,000 live births), 4) post-neonatal mortality rates (infant deaths between 28 days and 1 year of age per 1,000 live births), and 5) child mortality rates (deaths between 1 and 5 years of age per 1,000 live births). It is appropriate to use these five mortality rates because prior research has found that the effects vary by a child's age (Ruhm, 2000). Moreover, initial mortality is determined by many factors that occurred pre-birth, while later mortality would be more affected by later environmental conditions, including parental care. Therefore, while short leaves would not be expected to affect mortality rates beyond age one, since the data include several countries that provide parental leave

beyond one year, it is warranted to examine leave effects on later mortality rates. There are three countries in the period from 1969 to 2000, which have weeks of job-protected leave of one year or longer (Italy 1978-1983 and 1999-2000, Norway after 1993, and Sweden after 1980).

In addition, I include other measures as outcomes to analyze what mechanisms explain how parental leave affects infant mortality rates. In order to test these measures, I first look at the relationship between parental leave and mediators--the other measures, to know whether parental leave affects these factors. Second, I analyze the effects of parental leave on infant mortality rates, controlling for these measures to observe whether the effect of parental leave is diminished. Some factors which would explain the link between parental leave and infant mortality include low birth weight and share of children immunized. The length of leave taken by parents or the length of breast-feeding would be closely related to infant health outcomes; however, I was unable to gather data on length of leave, and could only gather data on the percentage of mothers breast feeding for a period of 3 or 6 months from two countries (Sweden and the Netherlands). Therefore, the data include two additional measures as outcome variables: 1) low birth weight (number of live births of infants weighting less than 2,500 grams as a percentage of the total number of live births and still births over 1,000 grams) and 2) percentage of children (under 1 year) immunized for DPT and measles.

Control Variables

<Main independent Variables: $ML_{1\ c,t}$, and $ML_{2\ c,t}$>

1) weeks of job-protected leave

2) weeks of other leave

As with Ruhm's (2000) model, "weeks of job-protected paid leave" is a main independent variable. This variable refers to weeks of job-protected paid maternity and parental leave, which include family leave and adoptive leave but does not include paternity or child rearing leave. Because the rate of fathers taking paternity leave is very low in most OECD countries, and there are few countries that have enacted child rearing leave in addition to maternity and parental leave, the study does not include these types of leave.

In addition, I include "weeks of other leave" as the second main independent variable. Weeks of other leave refers to weeks of non job-protected paid leave, unpaid leave, and leave provided with a flat rate benefit. This leave variable also includes maternity, parental, family and adoptive leave, but does not include paternity or child rearing leave. As mentioned in prior sections, because the length of other leave has increased over the period 1969 to 2000 in 18 OECD countries (Figure 1), it is vital to control for weeks of other leave in order to analyze the effects of the leave, including unpaid leave.

<Other control variables: $X_{c,t}$>

Once again, following Ruhm's (2000) model, other control variables are 1)fertility rate of 15-44 year old women, 2) female employment to population (EP) ratio, 3) real GDP per capita, 4) public expenditures on health care as a percent of GDP, 5)number of births in thousands, 6) share of population with health insurance coverage, and 7) number of kidney dialysis patients per 100,000 population.

The model includes fertility rates because they can be positively related to infant deaths (Ruhm, 2000). Female employment could affect infant health because higher income could increase child health outcomes, but less time with infant would decrease child health outcomes. However, Ruhm (2000) noted that fertility rate and female employment rate variables would be endogenous because parental leave policies are often extended with the goal of increasing birthrates or improving female employment opportunities. GDP, public expenditures on health care as a percent of GDP per capita, health insurance coverage rate, and number of kidney dialysis patients are assumed to be positively related to infant health outcomes. Higher GDP allows a country to allocate more money to medical care and health, and that increases child health outcomes. The number of kidney dialysis patients is not directly related to infant health. However, it is included in the model because it could be a proxy for medical technologies (e.g., neonatal intensive care) (Ruhm, 2000).

Additionally, I include three social policy variables as controls: 1) family cash benefits, 2) expenditures on maternity and parental leave, and 3) family services. They are defined by annual public expenditures per child[12]. The unit of the public expenditure is per child purchasing power parity dollars (PPP$) adjusted for inflation to 1994 US dollars. PPP$ is adjusted to the relative domestic purchasing power of the national currency as compared to the US dollar, rather than using the official exchange rate. These indicators are important because child health outcomes are assumed to be positively associated with the expenditures on social programs for families. However, there is no

[12] In order to figure out the expenditures per child, the total expenditures on family cash benefits and family services are divided by the number of children age 0-14, and the total expenditures on maternity and parental leave are divided by the number of children age 0-3, which is determined by multiplying the number of births by three.

comparative research analyzing the effects of public expenditures on health outcomes for children (Waldfogel, 2002).

<Time and year fixed effect variables: r_c, r_t, $r_{c\,t}$ >

1) country-specific fixed effect
2) year-specific fixed effect
3) country-specific linear time trend

I include country dummy variables and year dummy variables (which are defined by dichotomous variables) in order to control for specific fixed effects of each country over a time period and for specific fixed effects of each year for all countries. However, there are omitted effects, which are related to one country in one year. Assuming that many unobserved factors exhibit a monotonic trend (Ruhm, 2000), I include a "country-specific linear time trend" dummy variable. Therefore, there are 18 (number of countries included in the analysis) country specific time trend dummy variables, and each is represented by 0 or 1-32 (number of the years included in the analysis)[13].

Data

I use a dataset on parental leave of 16 European countries, the United State, and Japan from 1969 to 2000[14]. The data for 16 European countries from 1969 to 1994 was

[13] For example, a country specific time trend variable has values from 1 to 32 for data on one country, such as Austria from 1969-2000, and "0" for rest of the countries (in this case, data on all countries except Austria will be coded "0").

[14] In Ruhm's dataset, Germany has a constant value for job-protected paid leave from 1985 to 1994, since the weeks of job-protected paid leave decreased in 1986 in order to extend income support to non-workers (Ruhm, 2000). However, in my dataset, I include two versions of the job-protected paid leave variable for Germany. For the first version, I take into account any policy changes in countries; therefore, the weeks of job-protected paid leave in Germany decreased in 1986, from 32 weeks to 14 weeks. For the second version,

constructed by Christopher Ruhm by using the information obtained from the ILO's Legislative Series and 1984 Global Survey on Protection of Working Mothers, and from "Social Security Programs Throughout the World", published by the US Social Security Administration since 1958 (Ruhm & Teague, 1997; Ruhm, 1998, 2000). I extend his dataset by adding the years from 1995 to 2000 and two more countries: the United States and Japan. In order to add more variables, I utilize the OECD's social expenditure database, OECD Health Data 2002 and 2003, "European Health for All Database (HFA) 2003" by the World Health Organization (WHO), and "Maternity Protection at Work" by the ILO (1999). From the OECD data source, I compiled the information on 1) public expenditures on family assistance[15] (family cash benefits, expenditures related to maternity and parental leave, and family services), 2) percentage of children (under one year) immunized against DPT, and 3) percentage of children (under one year) immunized against measles. However, the information on public expenditures is available only from 1980 to 1998, and the information on immunization is mostly available after 1980, and there are many missing values in several countries. Table 1 summarizes definitions and descriptive statistics of all variables used in the analysis.

In this study, ordinary least squares regression (OLS) is used for the analysis in order to estimate the effect of maternity and parental leave on infant health outcomes. Because several factors are interrelated, regression analysis is an appropriate way to estimate the

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I use a constant value of weeks of job-protected paid leave in Germany from 1985 to 2000, the same as Ruhm's dataset.

[15] Expenditures related to maternity and parental leave are sub-categories of family cash benefits.

relationships. Where possible, missing values for control variables have been filled[16]. However, I did not fill values for dependent variables. Therefore, if there is a missing value to the outcome variables, such as infant mortality rates, age-specific infant mortality rates, and low birth weight, the case with missing values was dropped from the analysis.

Results

As shown in Table 1, the average number of job-protected paid leave weeks in 18 countries from 1969 to 2000 is 18.2. Although the weeks of leave differ among countries, the average weeks of leave in the 18 countries has increased over the period from 1969 to 2000 (Figure 1). Germany in 1986, and France and Spain in 1995 raise the average of other leave for all the countries due to the introduction of parental leave. Table 2 summarizes the parental leave policies in all the countries in the analysis as of 2000. In 2000, the most liberal job-protected paid leave (68 weeks) was provided in Sweden. In that year Sweden extended this leave from 450 days to 480 days. At the opposite extreme,

[16] Missing values for some variables have been filled: data on fertility rates for the United States in 1969 are assumed to be the same as in 1970; data on female EP ratios for Denmark in 1980 and Norway in 1971 are filled by using the average of the immediate year before and after the specified missing years. Values in Greece from 1972 to 1976 are assumed to have increased at a constant rate between 1971 and 1977. Values in the early years for Greece, the Netherlands, Portugal, and Spain are filled by using the first period for which data were available (1971, 1971, 1974, and 1970, respectively); health insurance coverage rates for Italy from 1998 to 2000 and Spain from 1998 and 2000 are assumed to be the same as in 1997 (the values in Italy were 100% from 1981 to 1997, and the values in Spain were 99.8% in 1996 and 1997); government spending on health care for Portugal in 1969 is filled by using a growth rate between 1970 and 1971; the numbers of kidney dialysis patients for Japan in 1969 and for the United States from 1969 to 1973 are filled, assuming a constant growth rate between 1969 and 1971 in Japan and between 1969 and 1974 in the United States. These values are missing in Belgium from 1995 to 2000, in France from 1996 to 2000, in Ireland from 1996 to 2000, in Italy from 1996 to 2000, in the Netherlands from 1997 to 2000, in Norway from 1996 to 2000, in Portugal 1995 and 1996, in Spain in 2000, in Switzerland from 1996 to 2000, in United Kingdom from 1997 to 2000, and in the United States in 1999 and 2000. Therefore, the values are filled by using the average growth rate of the five years preceding the initial missing year. Because the values did not constantly grow in past years, I did not just use the growth rate of one previous year. For example, for the missing values in Belgium from 1995 to 2000, I averaged the growth rates for five years, from 1989 to 1994 --summing each year's growth rates (1989 -1990, 1990-1991, 1991-1992, 1992-1993, 1993-1994) and dividing by 5-- and used the averaged growth rate for fill values from 1995-2000.

the United States has no national mandated job-protected paid leave and total weeks of leave has the shortest --12 weeks-- among the 18 countries. Looking at the weeks of other leave, the longest is provided in Spain, at 150 weeks. Parental leave increased in Spain in 1995, providing three years of leave including mandatory postnatal maternity leave of 6 weeks (Work Life Research Centre, 2003).

The Effect of Paid Leave on Infant Mortality

To estimate the effect of job-protected paid leave on infant mortality (the natural log of infant mortality), I not only replicated Ruhm's (2000) analysis but also extended it by adding additional years (1995 to 2000) and two countries (the United States and Japan) [17]. Following his models, model b includes four country characteristic variables, and model c is more specified by adding two variables: fertility rates and female employment-to-population ratios. All three models include country dummy, year dummy, and country-specific (linear) time trends variables. The results from model b and c in Table 3 show that weeks of paid leave significantly decrease infant mortality rates. Model c indicates that a 10-week extension in paid leave is predicted to decrease the infant mortality rate by 2.5%. A 2.5% decrease in the infant morality rate means, for instance, a drop in the infant death rate from 10.0 to 9.75 per thousand live births. Because infant mortality rates are small in absolute number, a large percentage change results in a small

[17] I ran all the models with two other cases because Germany decreased the weeks of job-protected paid leave in 1986 in order to expand income supports to nonworkers. Two cases are: 1)with a constant value for weeks of job-protected leave in Germany from 1985-2000, and 2)dropping Germany from the analysis. The results (available on request) were pretty much the same as the one presented in Tables.

absolute effect. These results are consistent with Ruhm's findings, and very close in terms of the percentage of the effect[18].

The Effects of Paid Leave and Other Leave on Infant Mortality

In Table 4, I estimate the effect of paid leave and other leave on the infant mortality rate. The model used for this analysis improves upon Ruhm's model by adding one variable, weeks of other leave, which includes non-job protected paid leave, unpaid leave, and leave with a flat rate benefit. As in the first set of models, all models include country dummy, year dummy, and country-specific (linear) time trends variables. By comparing the results of model b and c in Table 3 and Table 4, controlling for other leave does not change the effect of paid leave on infant mortality rates. The results show that other leave has no significant effect on infant mortality rates.

The Effects of Paid Leave and Other Leave on Age-Specific Infant Mortality and Child Mortality

In Table 5, the models estimate the effects of paid leave and other leave on age-specific infant mortality and child mortality rates. Here, the age-specific infant mortality rates are: 1) infant mortality rates--infant deaths under 1 year per 1,000 live births; 2) perinatal mortality rates--still births (minimum gestation period 28 weeks or minimum still birth weight of 1000g) and deaths within 1 week of birth per 1,000 live births and still births; 3) neonatal mortality rates--infant deaths under 28 days; 4) post-neonatal mortality rates--infant deaths between 28 days and 1 year per 1,000 live births; and 5)

[18] Ruhm's (2000) results indicated that paid leave decreases the infant mortality rate by 2.45% when using model c.

child mortality rates--deaths between 1 and 5 years of age per 1,000 live births. In this analysis, all models include country dummy variables, year dummy variables, and country-specific (linear) time trends. The model used for the analysis is the same as model c in Table 3 and 4. Therefore, the model includes all independent variables as controls. The complete results are shown in Appendix 5-1 (available upon request).

The results in Table 5 indicate paid leave significantly decreases all mortality rates. In particular, paid leave has the strongest effect on post-neonatal mortality rates (deaths between 28 days and 365 days) but the weaker effect on early mortality rates. The results are consistent with Ruhm's findings (2000). The weaker effects on perinatal mortality rates were anticipated due to the short period of pre-childbirth leave provided in most countries. These short periods of leave can be an important factor in early infant health. A 10-week extension in paid leave is predicted to decrease the infant mortality rates, post-neonatal mortality rates, and child mortality rates by 2.59%, 4.06%, and 3.02% respectively. A 4.06% decrease in post-neonatal morality rate means, for example, a drop in the post-neonatal death rate from 10.0 to 9.59 per 1,000 live births. The results indicate that other leave has no significant effects on any age-specific infant mortality rates.

The Effects of Paid Leave and Other Leave on Other Measures

In Table 6, the OLS model estimates the effect of paid leave and other leave on other measures, including low birth weight and immunization coverage (against DPT and measles under one year of age). Model c is employed for this analysis.

First, I examined the effects on low birth weight using the data in the sub-period of 1973 to 2000 because less than half of the countries analyzed here have data on low birth weight prior to 1973. The results show that paid leave significantly decreases low birth weight. Next, I examined the effects of leave on the percentage of immunized (DPT and Measles) children under one year of age with the same model. The results indicate no significant relationship between paid leave and the percentage of immunized children. Because the results from Table 6 indicate that parental leave does have effects on low birth weight (but not on child immunization rates), this raises the possibility that at least some of the effects of parental leave on infant mortality may operate through reductions in low birth weight. I test this possibility in Table 7.

In Table 7, the OLS model estimates the effect of parental leave on age-specific infant mortality rates, controlling for low birth weight. The results indicate that low birth weight has strong effects on most forms of infant mortality. However, controlling for low birth weight does not eliminate the effects of parental leave on infant mortality. Thus, although parental leave does reduce low birth weight, this does not fully explain the effects of parental leave on infant mortality. Other mechanisms remain to be explored.

The Effect of Paid Leave and Other Leave on Post-neonatal Mortality Rates Controlling for Social Policies

Table 8 presents the effect of leave on post-neonatal mortality rates, controlling for public expenditures on family assistance per child. I apply model c in the analysis, and the family assistance variables used in the model are: family cash benefits, public expenditures on maternity and parental leave, and family services. Data used in the

analysis are for 16 European countries, the United States, and Japan from 1980 to 1998 because social expenditure data are available only for this period. I estimated the effect of leave only on post-neonatal mortality rates because in my previous analysis of the data from 1969 to 2000, the results indicated that leave has the strongest effects on decreasing post-neonatal mortality rates (shown in Table 5).

In Table 8, the results indicate that public expenditures on maternity and parental leave and family services have significant effects on decreasing post-neonatal mortality rates. Column e presents the effect of parental leave by controlling for two social policies at the same time. Although the relationship between family services and infant mortality remains significant, these social policy variables do not diminish the effects of weeks of paid leave. Thus, both paid leave and other social policies are effective in reducing infant mortality. Moreover, the results do not allow for a determination of whether extending maternity leave or raising benefits would be more effective, since we need to cost out both options, and the costs will depend on the specific institutional framework in each country.

Conclusion

Following Ruhm's findings (2000), this research found that the extension of weeks of job-protected paid leave has significant effects on decreasing infant mortality rates (Table 3). In particular, the largest effect was found on post-neonatal mortality rates (death rates between 28 and 365 days): a 10-week extension in paid leave is predicted to decrease post-neonatal mortality rate by 4.06%.

Comparing the effect of job-protected paid leave and other leave (non job-protected paid leave, unpaid leave, and leave provided with flat rate benefits), paid leave significantly decreases infant mortality, while other leave has no significant effect. If leave is provided without payment, or at a low flat rate, parental behavior on taking leave may vary, which could result in forgoing leave provided with no payment or low payment or an early return to work. As a result, other leave would not have a significant effect on improving infant health.

The results indicate a significant relationship between paid leave and low birth weight, an important factor for infant health. Low birth weight has strong effects on most forms of infant mortality, yet controlling for low birth weight does not eradicate the effects of parental leave on infant mortality. This suggests that reduction in low birth weight does not fully explain the effects of parental leave on infant mortality; therefore, other mechanisms, which may include information on prenatal care, breast-feeding, and length of leave, need to be examined.

In the final model, I analyzed the effects of leave on post-neonatal mortality rates, controlling for the social policy variables of public expenditures on family cash benefits, expenditures on maternity and parental leave, and family services. I found that public expenditures on maternity and parental leave and family services have significant effects in decreasing post-neonatal mortality rates yet, controlling for these social policy variables, the effects of parental leave on post-neonatal mortality are not eliminated.

This research contributes to our understanding of the importance of several social policies--parental leave, governmental social expenditures on family cash benefits, and family services--in providing a better environment for infant health. To better understand

the effects of parental leave on child health outcomes, more information, such as length of leave taken by parents, duration of breast-feeding, and prenatal care, is needed. A study including such measurements requires analyzing microdata, an important direction for future research.

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Table 1: Summary of Variables used in the analysis

Variables	N	Mean	S.D
Outcome Variables			
Infant Mortality[1] (death ratio of children aged under one)	576	10.9	7.0
Perinatal Mortality[2] (death ratio of children within one week plus still births of minimum gestation period 28 weeks)	567	12.6	6.6
Neonatal Mortality[1] (death ratio of children under 28 days of age)	561	7.3	4.5
Post-neonatal Mortality[1] (death ratio of children between 28 days and 1 year of age)	521	3.6	2.7
Child Mortality[1] (death ratio of children between 1 and 5 years of age)	556	2.1	1.3
Low Birth Weight[2] (weighing less than 2,500 grams)	458	5.6%	1.2
Immunization DPT by age one	249	89.8%	10.3
Immunization Measles by age one	275	78.5%	19.8
Independent Variables			
Weeks of Job-Protected Paid Leave	576	18.2	14.8
Weeks of Other leave including (e.g. unpaid leave)	576	23.7	37.4
All leave (Sum of paid leave and other leave)	576	41.9	39.1
Fertility rate	576	1.8	0.4
Female Employment -to-Population Ratio	576	0.5	0.1
GDP per capita[3]	576	16.4	4.9
Public Expenditures on Health Care as Percent of GDP	576	7.2	1.8
Share of population with health insurance coverage	576	91.7	17.0
Number of Dialysis patients per 100, 000 population	576	21.0	22.4
Public expenditures on Family Cash Benefits per child[4]	342	960.6	830.0
Public expenditures on Maternity and Parental Leave per child [4]	342	912.5	1262.
Public expenditures on Family Services per child [4]	342	478.8	627.3

Notes:

1) Scaled per 1,000 live births
2) Scaled per 1,000 live births and still births
3) In thousands of 1994 U.S. dollars, adjusted using PPP
4) In 1994 U.S. dollars, adjusted using PPP
5) The purchasing power parity (PPP) is adjusted to the relative domestic purchasing power of the national currency as compared to the US dollar, rather than using the official exchange rate.
6) Expenditures on maternity and parental leave is a sub-category of family cash benefits.
7) In order to figure out the expenditure per child, the total expenditures on family cash benefits and family services are divided by the number of children aged 0-14, and the total expenditures on maternity and parental leave is divided by the number of children aged 0-3.

Table 2: Weeks of Maternity and Parental Leave in 16 European Countries, the US, and Japan in 2000

Country	Weeks of Job-protected Paid Leave	Weeks of Other Leave	Notes:
Austria	16	104	Parental leave introduced in 1990. Parental leave – child age up to 24 months. Maternity leave-16 weeks (pre 8 weeks and post 8 weeks)
Belgium	15	12	Parental leave introduced in 1998. Parental leave—12 weeks (full-time). Maternity leave—15 weeks (post 8 weeks).
Denmark	28	0	Parental leave introduced in 1984. Parental leave—10 weeks (full-time) (paid). Maternity leave—18 weeks (4 weeks pre and 14 weeks post).
Finland	44	0	Parental leave introduced in 1980. Parental leave- 26 weeks. Maternity leave 18 weeks (pre 5 weeks, post 10 weeks, remaining 3 weeks can take either pre or post).
France	16	146	Parental leave introduced in 1977. Further changes in 1984, 1986, 1991 and 1994. From 1991, parental leave is up to child age 36 months.
Germany	14	148	Parental leave introduced in 1986. Parental leave until a child reaches 36 months. Maternity leave 14 weeks (pre 6 weeks and post 8 weeks). Therefore, other leave is 36 month (156 weeks)-8 weeks=148 weeks.
Greece	17	26	Parental leave introduced in 1986. Parental leave is extended from 3 months (13 weeks) to 6 months (26 weeks) in 1998. Maternity leave has been also extended several times. Maternity leave in 2000 is 17 weeks.
Ireland	14	18	Parental leave introduced in 1998. Parental leave is 14 weeks. Maternity leave is 18 weeks.
Italy	64	0	Parental leave introduced in 1977. Maternity 5 months. Parental leave 6 month until 1998. After that extended to 10 months (payment 30 % of wages for parental leave). Therefore, total number of job-protected paid leave =15 months (52+12)=64 weeks.
Japan	14	44	Maternity 14 (pre 6 and post 8 weeks). Parental leave up to child age 1 year old.
The Netherlands	16	26	Parental leave introduced in 1991 and further legislation in 1997. Parental leave 6 months (26 weeks). Maternity leave 16 weeks.
Norway	52	0	No distinction between maternity and parental leave. Total paid leave 52 weeks (or 42 weeks) since 1992.
Portugal	26	104	Parental leave introduced in 1984 and further legislation in 1998. Parental leave 24 months (104 weeks) unpaid. Maternity leave 26 weeks.
Spain	16	150	Parental leave introduced in 1980. Parental leave is 156 weeks (3 years) since 1995. Maternity leave is 16 weeks (post 6 weeks is mandatory, 10 weeks can take either before or after child birth) since 1990. Therefore, total weeks of other leave= 156-6=150 weeks.
Sweden	68	10	Parental leave introduced in 1974. Total parental leave was 18 months and 450 days paid but it changed in 2000 to 480 days paid.
Switzerland	16	0	16 weeks of maternity leave
United Kingdom	18	35	Parental leave introduced in 1999. 13 weeks of parental leave. 40 weeks of maternity leave which is paid for 18 weeks. Therefore, weeks of other leave is 35 weeks (53-18 weeks).
United States	0	12	12 weeks of family leave since 1993

Data Source: Work Life Research Centre (www.workliferesearch.org)

Table 3:The Effects of Paid Leave on Log of Infant Mortality: Estimates from OLS Models for 16 European Countries, the US, and Japan, 1969-2000

	Infant Mortality		
Regressor	Model a	Model b	Model c
Paid Leave	-0.2015 (0.06) **	-0.2334 (0.06) **	-0.2535 (0.06) **
GDP		0.0169 (0.00) **	0.0096 (0.00) *
Expenditure on Health Care		0.0029 (0.01)	0.0020 (0.01)
Health Care Coverage		-0.0606 (0.07)	-0.0175 (0.07)
Dialysis		0.0003 (0.00)	0.0008 (0.00)
Fertility			0.0136 (0.02)
EP ratio			0.4786 (0.11) **
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
Time trends	Yes	Yes	Yes
N	576	576	576
R-squared	0.99	0.99	0.99

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100.
+ p-value <.1, * p-value<.05, **p-value<.01.

Table 4:The Effects of Paid Leave and Other Leave on Log of Infant Mortality: Estimates from OLS Models for 16 European Countries, the US, and Japan, 1969-2000

	Infant Mortality		
Regressor	Model a	Model b	Model c
Paid Leave	-0.1713 (0.06) **	-0.2100 (0.06) **	-0.2593 (0.06) **
Other Leave	0.0342 (0.02) +	0.0247 (0.02)	-0.0056 (0.02)
GDP		0.0165 (0.00) **	0.0095 (0.00) **
Expenditure on Health Care		0.0037 (0.01)	0.0019 (0.01)
Health Care Coverage		-0.0454 (0.07)	-0.0198 (0.07)
Dialysis		0.0002 (0.00)	0.0008 (0.00)
Fertility			0.0139 (0.02)
EP ratio			0.4908 (0.12) **
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
Time trends	Yes	Yes	Yes
N	576	576	576
R-squared	0.99	0.99	0.99

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100. Other Leave refers to the sum of weeks of unpaid leave and weeks of paid but not job-protected leave divided by 100. + p-value <.1, * p-value<.05, **p-value<.01.

Table 5:Summary of the Effects of Paid Leave and Other Leave on Log of Age-Specific Infant Mortality and Child Mortality Rate: Estimates from OLS Models for 16 European Countries, the US, and Japan, 1969-2000

Regressor	Infant Mortality	Perinatal Mortality	Neonatal Mortality	Post-neonatal Mortality	Child Mortality
Paid Leave	-0.2593 (0.06) **	-0.1788 (0.07) *	-0.2337 (0.08) **	-0.4055 (0.14) **	-0.3016 (0.11) **
Other Leave	-0.0056 (0.02)	-0.0340 (0.02)	-0.0377 (0.02)	0.0031 (0.04)	-0.0037 (0.03)
Country	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes	Yes
N	576	567	561	510	556
R-squared	0.99	0.98	0.99	0.94	0.96

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100. Other Leave refers to the sum of weeks of unpaid leave and weeks of paid but not job-protected leave divided by 100. Controls also include GDP per capita, Expenditures on Health Care, Health Care Coverage, Dialysis, Fertility, and EP ratio. + p-value <.1, * p-value<.05, **p-value<.01

Table 6:Summary of the Effects of Paid Leave and Other Leave on Log of Low Birth Weight and Percentage of Immunized Children: Estimates from OLS Models for 16 European Countries, the US, and Japan

Regressor	Low Birth Weight (1973-2000)	Immunization DPT (1981-2000)	Immunization Measles (1981-2000)
Paid Leave	-0.1576 (0.08) *	-0.0561 (0.24)	-0.1067 (1.41)
Other Leave	0.0041 (0.02)	0.0381 (0.06)	-0.3124 (0.30)
GDP	-0.0009 (0.00)	-0.0157 (0.01)	-0.0188 (0.05)
Expenditure on Health Care	-0.0011 (0.01)	0.0108 (0.01)	0.1233 (0.07) +
Health Care Coverage	-0.4510 (0.11) **	0.8963 (0.61)	3.7906 (3.44)
Dialysis	0.0003 (0.00)	-0.0008 (0.00)	-0.0187 (0.01) *
Fertility	0.0826 (0.03) **	-0.0003 (0.08)	
EP ratio	0.0988 (0.14)	0.3890 (0.44)	
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
Time trends	Yes	Yes	Yes
N	425	249	275
R-squared	0.94	0.74	0.63

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100. Other Leave refers to the sum of weeks of unpaid leave and weeks of paid but not job-protected leave divided by 100. + p-value <.1, * p-value<.05, **p-value<.01.

Table 7: Summary of the Effects of Paid Leave and Other Leave on Log of Age-Specific Infant and Child Mortality Rates with a control for Low Birth Weight: Estimates from OLS Models for 16 European Countries, the US, and Japan, 1973-2000

	Infant Mortality		Perinatal Mortality		Neonatal Mortality	
Regressor	(a)	(b)	(a)	(b)	(a)	(b)
Paid Leave	-0.4000 (0.08) **	-0.3715 (0.08) **	-0.2461 (0.09) **	-0.2405 (0.09) *	-0.2958 (0.09) **	-0.2762 (0.09) **
Other Leave	-0.0450 (0.02) *	-0.0457 (0.02) *	-0.0492 (0.02) *	-0.0493 (0.02) *	-0.0448 (0.02) +	-0.0454 (0.02) *
Low Birth Weight		0.1809 (0.06) **		0.0483 (0.06)		0.1733 (0.06) **
Country	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes	Yes	Yes
N	425	425	420	420	414	414
R-squared	0.99	0.99	0.98	0.98	0.99	0.99

	Post-neonatal Mortality		Child Mortality	
Regressor	(a)	(b)	(a)	(b)
Paid Leave	-0.5307 (0.19) **	-0.5032 (0.18) **	-0.3310 (0.16) *	-0.3347 (0.16) *
Other Leave	-0.0615 (0.05)	-0.0682 (0.05)	-0.0418 (0.04)	-0.0417 (0.04)
Low Birth Weight		0.4477 (0.13) **		-0.0230 (0.11)
Country	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes
N	385	385	415	415
R-squared	0.94	0.93	0.94	0.94

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100. Other Leave refers to the sum of weeks of unpaid leave and weeks of paid but not job-protected leave divided by 100. Controls also include GDP per capita, Expenditures on Health Care, Health Care Coverage, Dialysis, Fertility, and EP ratio. + p-value <.1, * p-value<.05, **p-value<.01

Table 8: the Effects of Paid Leave and Other Leave on Log of Post-neonatal Mortality Rates with a control for Social Policies Variables: Estimates from OLS Models for 16 European Countries, the US, and Japan, 1980-1998

	Post-neonatal Mortality				
Regressor	(a)	(b)	(c)	(d)	(e)
Paid Leave	-0.5214 (0.29) +	-0.5250 (0.29) +	-0.4295 (0.28)	-0.6014 (0.27) *	-0.5447 (0.27) *
Other Leave	-0.0424 (0.05)	-0.0310 (0.05)	-0.0308 (0.05)	-0.0616 (0.05)	-0.0535 (0.05)
Family Cash Benefits		0.0453 (0.05)			
Expenditure on Maternity and Parental Leave			-0.0806 (0.03) **		-0.0422 (0.03)
Family Services				-0.2932 (0.06) **	-0.2616 (0.06) **
Country	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Time trends	Yes	Yes	Yes	Yes	Yes
N	319	319	319	319	319
R-squared	0.93	0.93	0.94	0.94	0.94

Notes: Table shows marginal effects (with standard errors in parentheses). Paid Leave refers to weeks of job-protected parental leave divided by 100. Other Leave refers to the sum of weeks of unpaid leave and weeks of paid but not job-protected leave divided by 100. Expenditures on family cash benefits and family services per child age 0-14, and expenditures on maternity and parental leave per child age 0-3 are divided by 1000. Controls also include GDP per capita, Expenditures on Health Care, Health Care Coverage, Dialysis, Fertility, and EP ratio. + p-value <.1, * p-value<.05, **p-value<.01