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The Mother's Role in Child Development: The Effect of Maternal Employment on Cognitive Development

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ABSTRACT

This research discussed the effects of maternal employment on child cognitive development using the IFLS's data on children aged between 7-10 years old. The results indicated the negative effects of maternal employment when children were between 0-3 years old. Yet, maternal employment on children aged between 7-10 years old was positively associated with children's cognition. The accumulated additional hours of the working mother when children were older than 3 years also affected the children's cognition positively. Furthermore, this development was also affected by other factors, such as the child's inputs, the mother's inputs, and the family's inputs.

Keywords: Child development, cognitive development, maternal employment

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INTRODUCTION

The mother takes on an important role as the primary caretaker of the family, both for managing household production and for nurturing children so that they can stimulate the children's cognition (Stevens, 1971; Youngberg, 2011). Cognitive skill is one child outcome that can be used as a predictor of children's achievement and wage in the future (Bernal, 2008; Heckman et al., 2006). Therefore, parents pay attention and give their best effort to aid their children's

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physical and cognitive development. The mother's presence at home, focusing on the family and children, is one form of family investment aimed at ensuring the children's welfare in the future. That is why traditionally mothers tend to choose to stay at home.

However, there have been more mothers deciding to participate in the labor market. In the Indonesian context, in 2013, 50% of married women aged 17-70 worked outside their homes to build their career. This trend is in contrast to the construct of maternal employment, which is related to the mother's time allocation for children. Less time allocation for children tends to reduce potential interactions between mother and child and has an impact on the children's cognitive development (Blau & Grossberg, 1990; Rapoport & Le Bourdais, 2008; Stewart, 2010). Previous studies have also shown that maternal employment in early childhood lowers children's cognition potentially (Bettinger et al., 2014; Bernal, 2008; Blau & Grossberg, 1990; Gold & Andres, 1978; Künn-Nelen et al., 2015; Ruhm, 2004; Waldfogel et al., 2002). However, maternal employment has the potential to improve child cognition when children get older (Waldfogel et al., 2002).

The increasing number of women participating in the labor market has intensified the potential of the Indonesian economy. Even so, women's role as mothers to create qualified human resources (qualified children) is undeniable also. Therefore, this study was conducted to observe patterns of maternal employment and its effect on child cognition at ages between 7-10 years old. Furthermore, this study also aimed at analyzing the impact of input changes that children have received at different ages. Moreover, this study can see the possible effect of maternal employment when children are aged 0-3 years and when aged 7-10 years on children's cognitive ability when aged between 7-10 years old, as well as the possibility of other factors that affect the children's cognition.

Literature Review

Cognitive development is defined as a pattern of change of mental ability for learning, concentration, memory, language, thinking, reasoning, and creativity. Things that can affect cognitive development include the child's condition, the home environment, interaction, parenting style, and social condition.

This study was based on two cognitive theories. The first is Piaget's cognitive development theory that emphasizes cognitive development as a mental process that allows children to become the primary determinant of their own development. Secondly, it is a sociocultural theory that emphasizes cognitive development as a collaborative process, in which the environment and people around children affect child development.

Psychologically, maternal employment affects child cognitive development as it relates to the interaction between mother and child. The interaction between mother and child has a direct impact on a child's cognitive development (Papalia & Martorell, 2014;

Stevens, 1971). This interaction creates bonds and affection to build a sense of self, of others and trust. In early childhood, the trust provides a sense of security for children to learn, explore, and socialize in the future. Therefore, interaction, affection, and trust are essential for children's cognitive development (Brooks-gun et al., 2010).

From an economic point of view, Leibowitz (1974) stated that cognitive outcomes depicted the measurement of human capital stocks just like wages. Becker's (2009) human capital theory explained that wage rates changed when persons got older because of the accumulation of human capital (because of time and resource investment). Alongside this theory, it said that cognitive skill was the stock of human capital at a certain age obtained from the accumulation of capital, goods, and time at a previous age (in the past). Todd and Wolpin (2007) defined cognitive skill also as an accumulation process of current and prior inputs which combined with a genetic ability for achieving cognitive outcomes. In Becker's (2009) family economic theory, the higher the outcomes that parents expect for their children, the investment to allocate will be higher as well. Investments can be time and goods/service inputs.

MATERIALS AND METHODS

Data

This study employed the fourth and fifth waves of the Indonesian Family Life Survey (IFLS). The IFLS provides cognitive assessment data of children aged between 7-14 years old. These data were used to assess children's general cognitive intelligence. This study aimed to determine the effect of maternal employment and the impact of input changes received by children, as they got older. The unit of analysis was children aged between 7-10 years on the fifth wave of the IFLS. The final sample for this study was 1,061 children. The estimation method used OLS regression with cross-sectional data.

Data characteristics of this study included children aged between 7-10 years in the IFLS fifth wave so that when children aged between 0-3, the data were recorded on the fourth wave of the IFLS. The children's mothers had to participate in the labor market. The definition of mothers who participate in the labor market is a mother who spends most of her time working or at least working one hour per week, a mother who is on leave, or a mother who is looking for a job. The mother is neither a single mother nor a divorcee because single mothers or divorcees tend to choose to participate in the market labor (Bernal, 2008). The age of 7-10 years was selected from data availability, while the input when the child was 0-3 years was selected because the first three years of life was the peak of the children's rapid growth, both physically and cognitively. At this age stage, the brain is growing in complexity and sensitivity to environmental influences (Papalia & Martorell, 2014). Early child growth interventions can improve the quality of children's development.

Dependent Variable. The dependent variable was children's cognitive development, which is reflected by cognitive skill and is measured by the cognitive score. Information about the cognitive score was obtained from the book of fifth wave of the EK1 IFLS, which provides cognitive evaluation information for children aged between 7-15 years. The cognitive score was the result of calculating the correct answers successfully answered by respondents, with scores ranging between 0-100. The total number of questions that had to be answered by the respondents was 17.

Independent Variables. The main independent variable of this study was the mother's working hours per week. The mother's working hours when the child age 0-3 years old obtained from the fourth wave of the IFLS. Meanwhile, the mother's working hours when the child age 7-10 years old obtained from the fifth wave of the IFLS. This study used the difference of the mother's working hours for seven years, that is, when the children were in their first three years of life and when the children age 7-10 years. The purpose of this approach is to enable the change of mother's working hours between two waves of data.

Control Variables. Children's cognitive development is not influenced by one input at a time, but many inputs. There are three inputs as control variables. First, children's inputs consist of the children's age, sex, school participation, and nutritional status (proxied by Body Mass Indeks - BMI). This input based on Piaget's theory of cognitive development. The second is the mother's inputs, consisting of the mother's education, birth age, breastfeeding, and pregnancy checkup since mothers have held prominent roles as the basis of children's cognitive development. The final input is the family's input, comprising the father's education, changes in the father's working hours, the number of family members in one household, per capita family expenditure, and living area. The family's inputs show the children's socioeconomic condition. For family income, this study used family expenditure as a proxy for anticipating underestimation or overestimation income data. This study used a cumulative model developed by Leibowitz (1974) where the cognitive score was a function of current and previous received inputs by children as well as genetic ability. Todd and Wolpin (2003) showed the function in the following equation:

$$C_{ija} = X_{ija}\alpha_1 + X_{ija-1}\alpha_2 + \cdots + X_{ij1}\alpha_\alpha + \beta_a \mu_{ija} + e_{ij\alpha} \quad (1)$$

C_{ija} denoted the cognitive score of child i in household j at age a and X_{ija} applied as family's input for child i in household j at age a, while μ_{ija} denoted the inherited intelligence (genetic ability) from parents, which proxied by the parents' education. This model shows children's cognitive score influenced by the family's inputs and inherited intelligence.

However, the use of this model was not the same as the original. Specifically, this study not only analyzed children's cognitive development as influenced by the mother's working hours with control variables such

as the children's inputs, the mothers' inputs, and the family's inputs, but also the effect of accumulated input (change of the mother's working hours per week within seven years). The analysis was done using two different models. The first model (2a) was intended to see how inputs at two different times (present and past) could affect the children's cognitive ability. By using the first model, there was a potential for bias since the data utilised cross-sectional data for observing two different times (Bernal, 2008; Blau & Grossberg, 1990; Künn-Nelen et al., 2015). This study modified the second model. The second model (2b) was intended to see the process of input accumulation and its effect on children's cognitive ability. The model is shown in the following equation:

Model 1

$$C_{7-10} = \beta_0 + \beta_1 X_{0-3} + \beta_2 X_{7-10} + \beta_3 A + \beta_4 I + \beta_5 K + \varepsilon_1 \quad (2a)$$

Model 2

$$C_{7-10} = \alpha_0 + \alpha_1 \Delta X + \alpha_2 A + \alpha_3 I + \alpha_4 K + \varepsilon_2 \quad (2b)$$

where,

$C_{7\text{-}10}$ = Cognitive score of children aged between 7-10 years old

$X_{0\text{-}3}$ = Mother's working hours per week when children aged between 0-3 years

$X_{7\text{-}10}$ = Mother's working hours per week when children aged between 7-10 years

ΔX =Difference of mother's working hours per week for seven years (2014-2007)

A = Children inputs, such as age, sex, school participation, and nutritional status

I = Mother's inputs, such as education, birth age, breastfeeding, and pregnancy checkup

K = Family's inputs, such as father's education, father's working hours, per capita expenditure, and living area

RESULTS AND DISCUSSIONS

Descriptive Analysis

Figure 1 shows working mothers with children aged 0-3 tended to have low working hours. However, when children got older, most of mothers would increase their working hours. Overall, the average of mother working hours per week, when those mothers had children aged 7-10 is about 43.49 hours per week. The average of mother working hours per week when her children aged 0-3 is about 35.74 hours per week.

Based on Table 1, data suggests that the higher the cognitive score, the lower the average mother's working hours. The higher the cognitive score, the longer the parents' educational period, and the higher the family expenditure.

DISCUSSION

Table 2 provides estimation result of Model 1, which shows the effect of mother's working hours input at two different times (at age 0-3 and 7-10 years old) and children's input on children's cognition at age 7-10

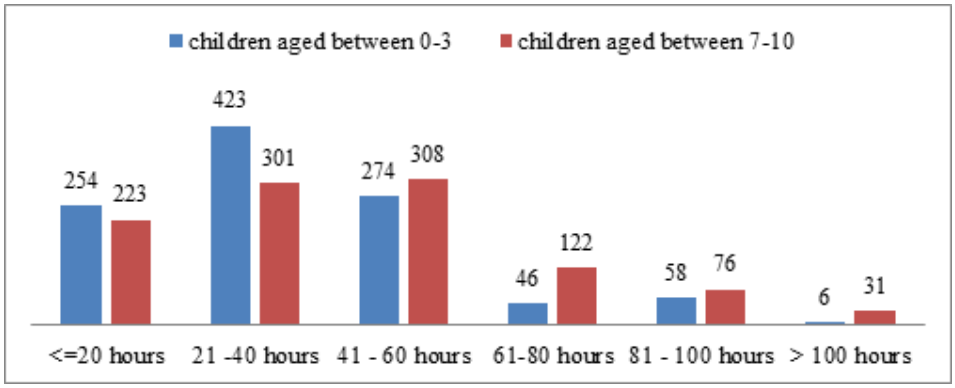

Figure 1. Mother's working hours per week

Table 1

Descriptive statistics based on range of cognitive score

Variable	Cognitive score			
	0-25	26-50	51-75	76-100
Mother's working hours per week when child was aged between 0-3	46.84	36.01	37.08	32.35
Mother's working hours per week when child was aged between 7-10	42.98	42.22	47.79	37.92
Delta mother's working hours per week	-3.86	6.21	1.07	5.57
BMI	15.81	15.11	15.93	16.11
Mother's year of education	6.41	8.10	9.67	11.09
Father's year of education	7.98	8.30	9.52	11.27
Delta father's working hours per week	-4.69	-6.32	-1.56	-0.44
Per capita family expenditure when child aged between 0-3	391,308.7	380,996	545,322	522,972
Per capita family expenditure when child aged between 7-10	546,627.7	548,110	826,623	976,663
Delta per capita family expenditure	155,319	167,114	281,301	453,691

Table 2

Regression result of model 1

Independent & control variables	Dependent variable: Cognitive score		
	Estimation 1	Estimation 2	Estimation 3
Working hours (age 0 - 3 years)	-0.0820**(0.007)	-0.0694**(0.010)	-0.0856**(0.002)

Table 2 *(Continued)*

Independent & control variables	Dependent variable: Cognitive score		
	Estimation 1	Estimation 2	Estimation 3
Working hours (age 7 - 10 years)	0.0251(0.300)	0.0358(0.100)	0.0302(0.161)
Age	4.158***(0.000)	4.563***(0.000)	5.152***(0.000)
Sex (male)	0.964(0.412)	1.773(0.114)	1.781(0.103)
School participation	55.69**(0.003)	47.60***(0.000)	44.83***(0.000)
BMI	0.960***(0.000)	0.403(0.087)	0.174(0.453)
Mother's years of education		1.368***(0.000)	0.625***(0.001)
Age of giving birth		0.226*(0.032)	0.197(0.063)
Breastfeeding		21.41***(0.000)	21.58***(0.000)
Pregnancy checkup 1-4		0.719(0.594)	0.942(0.473)
Delta father's working hours			0.0547*(0.019)
Father's years of education			0.896***(0.000)
Number of family member			0.373(0.302)
Delta per capita family expenditure			3.094***(0.000)
Living in urban area			6.254***(0.000)
Constant	-46.65*(0.015)	-75.51***(0.000)	-80.78***(0.000)
N	1061	1061	1061
Prob>F	0.000	0.000	0.000
R-squared	0.097	0.195	0.251

Note: Robust standard errors are in parentheses; significant at ***1%, **5%, and *10%

years**.** The model also extended to include mother's inputs (column 2) and family inputs (column 3).

The first column of the dependent variable (Estimation 1) shows regression results of four inputs that significantly affect children's cognitive development at ages 7-10 without considering mother or other family aspects. These inputs include maternal employment when children aged 0-3 years, children's age, children's school participation, and children's nutritional

status. Based on the regression results, every extra working hour for the mother per week when children aged 0-3 years tended to lower children's cognitive scores when they aged 7-10 years old by about 0.08 point. This may be due to the decreasing potential time mothers had to spend with children at home: this resulted in interactions between mothers and children also tended to decrease (Blau & Grossberg, 1990; Papalia & Martorell, 2014; Rapoport & Le Bourdais, 2008; Stewart, 2010). Mother and child interactions during the first three years are an essential process for children's development because it is the beginning of knowledge for learning and socializing in the future.

Meanwhile, children's age, children's school participation, and children's nutritional status tended to raise child's cognitive score. As children aged each year, their cognitive score managed to rise also by about 4.2 points. It suggests that the accumulation of input occurs in children when they get older so that the cognitive ability of children keeps changing over time. School participation has the most significant effect on child cognition. Children who attend school tend to have cognitive scores that are higher by about 55.7 points than children who do not attend school. Attending school can improve children's mental abilities and filter out the adverse effects of family or social environment (Neisser et al., 1996; Parcel & Dufur, 2001). Improvement in nutritional status increases the children's cognitive score by about 0.96 points.

In column 2 of the dependent variable (Estimation 2), the mother's inputs added to the model as a control variable. These mother's inputs variables include mother's years of education, age of giving birth, breastfeeding and pregnancy check-up. The regression result of maternal employment (measured by working hours) and children's inputs in column 2 do not differ much compared with the result in column 1 of the dependent variable. However, in column 2 the effect of nutritional status (measured by BMI = 0.403) is no longer significant for children's cognitive score. Furthermore, column 2 shows a significant positive impact of the length of the mother's education (1.368) and breastfeeding on children's cognitive score at age 7-10 years old (21.41). The parameter estimate indicates that every additional one year of mother's education tended to increase the child's cognitive score by about 1.37 points. Children who breastfed managed to have cognitive scores that were about 21.4 points higher than children who were not breastfed by their mothers.

In column 3 (Estimation 3), other family's inputs added to the model as control variables along with the mother's inputs. These inputs include differences (delta) in father's working hours between two waves, father's years of education, number of family members, differences (delta) per capita family expenditure between two waves, and whether children live in urban area. The estimation results in column 3 also provide similar results compared with results in column 1 and 2. The coefficient estimated of working hours (aged 0-3

years old) is -0.085 which indicate that every additional hour added to the working mother's hours per week when children aged between 0-3 years old tended to lower children's cognitive score at age 7-10 years by about 0.085 points. The coefficient of children age is 5.152 which indicate that as children aged each year, their cognitive score also managed to rise by about 5.2 points. Children who attended school (see coefficient estimated of variable school participation in column 3) tended to get higher cognitive score by about 44.8 points compared with children who did not participate in school. One additional year to mother's years of education tended to increase the child's cognitive score by about 0.6 points. Children who breastfed managed to get cognitive scores that were higher by about 21.6 points compared with non breastfed children. Data from Estimation 3 also shows the significant positive effects of the alteration of the father's working hours, father's years of education, accumulation per capita of family expenditure and the children's living area on the children's cognitive score at age 7-10 years. Increasing the father's working hours by one hour each week may raise children's cognitive scores at age 7-10 years by about 0.05 point. Every one year added to father's years of education increased the child's cognitive score by about 0.9 points. Increasing one rupiah differences in per capita family expenditure between year 2007 and 2014, raised the child's cognitive score by about 3.1 points. Children who lived in the urban area tended to have cognitive scores that were higher by about 6.3 points than children who lived in rural areas.

In Model 2 (see Table 3), the accumulation of the mother's working hours-measured by differences (delta) in mother's working hours between year 2007 and 2014 also positively and significantly affected children's cognitive development. It means that, after the first three years of the child's life, the addition of the mother's working hours (or returning to work) had the potential to improve children's cognitive ability. The effect of differences (delta) of mother's working hours only marginally significant when mother's inputs (Estimation 5) and other family aspects (Estimation 6) were included. Therefore, the result would be further explained from column 3 (Estimation 6).

Table 3

Regression result of model 2

Independent & control variable	Dependent variable: Cognitive score		
	Estimation 4	Estimation 5	Estimation 6
Delta mother's working hours	0.0427(0.058)	0.0459*(0.021)	0.0459*(0.021)
Age	4.219***(0.000)	4.602***(0.000)	5.179***(0.000)

Table 3 *(Continued)*

Independent & control variable	Dependent variable: Cognitive score		
	Estimation 4	Estimation 5	Estimation 6
Sex (male)	1.212(0.300)	1.912(0.088)	1.987(0.070)
School participation	55.20**(0.003)	46.89***(0.000)	43.86***(0.000)
BMI	0.913***(0.000)	0.367(0.115)	0.118(0.605)
Lenght mother's education		1.386***(0.000)	0.680***(0.000)
Age of giving birth		0.211*(0.045)	0.171(0.105)
Breastfeeding		21.60***(0.000)	21.71***(0.000)
Pregnancy checkup 1-4		0.685(0.610)	0.969(0.458)
Delta father's working hours			0.862***(0.000)
Lenght father's education			0.0587*(0.012)
Number of family member			0.317(0.386)
Delta per capita family expenditure			3.253***(0.000)
Living in urban area			6.039***(0.000)
Constant	-48.22*(0.012)	-75.82***(0.000)	-80.54***(0.000)
N	1061	1061	1061
Prob>F	0.000	0.000	0.000
R-squared	0.093	0.194	0.248

Note: Robust standard errors are in parentheses; significant at ***1%, **5%, and *10%

In the third column of the dependent variable (Estimation 6), increasing one hour per week differences of mother's working hours between year 2007 and 2014 could increase the child's cognitive score at age 7-10 years by about 0.05 point. The potential to increase the cognitive ability by adding working hours is due to several factors. First, the addition of the mother's working hours is related to the possibility of additional family income. When the mother works, the family can increase consumption related to stimulating children's cognition, i.e., through nutritious food, education, and so on. Second, the interaction between mother and child will no longer be disturbed by the mother's working hours. This is because, after the first three years of children's life, children begin to follow activities outside the home, such as early childhood education,

a playgroup, or kindergarten. In these situations, when the mother goes to work, their children will go to school.

Moreover, children begin to interact with friends, teachers, or others around them; hence, the mother is no longer the centre of the child's interactions. For control variables, such as the children's inputs, the mother's inputs and the family's inputs, the regression results in Estimation 6 of Table 3 also show similar results with the regression result on Table 2 (Estimation 3).

The goodness of fit for all regression results measured by R-squared shows evidence that the variation of the dependent variable explained by the variation of all independent variables. In model 1, the R-squared is 0.097 or 9.7% of the variation in the dependent variable can be explained by the variation of six independent variables (see Estimation 1). The R-squared rise into 0.195 or 19.5%after analyzing ten independent variables (see Estimation 2). After more control variables added to the analysis, the R-squared is getting higher up until 0.251 or 25.1% of the variation in the dependent variable can be explained by the variation of the independent variables (see Estimation 3). Similarly, the R-squared in model 2 indicates 0.248 or 24.8% of the variation in the dependent variable can be explained by the variation of the independent variables after more control variables added to the analysis (see Estimation 6).

CONCLUSIONS

Since the adverse effects of maternal employment in early childhood are relatively smaller compared against the other positive inputs, the results of this study consider that the negative impact of maternal employment in early childhood can be compensated for by adding the mother's working hours when children aged between 7-10 years. Furthermore, other inputs can stimulate children's cognitive development, such as formal education and expenditure on nutritious food or health. There are also some policy suggestions from the results of this study including flexible working hours for mothers with children aged 0-3 years old and providing daycare in working areas. These initiatives allow the mother to maintain her interactions with her child, even amid in her work obligations.

Limitations

This study has several limitations. First, the study considered neither the mother's working sector nor whether the mother or father was the main caretaker of the children in the family. This study also discussed the influence of input partially and did not take children's early cognitive abilities as an input. The research only addresses the relation between cognitive scores and inputs, not its causality. Finally, the results of this study do not compare the cognitive abilities of children from working mothers against children from stay-at-home mothers.

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