



LUND UNIVERSITY

School of Economics and Management

Master in Economic Development and Growth

Does it matter who makes the money? An empirical analysis of women's bargaining power and child outcomes in Indonesia

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Abstract: Could an even larger push for women empowerment be a viable development strategy for developing countries? A large literature relates the bargaining power of women to improved health and education of their children (Majlesi, 2015; Qian, 2008; Bobonis, 2009; Duflo, 2003; Lundberg, Pollak and Wales, 1997). However, it remains a challenge to find a good proxy for bargaining power that truly reflects the decision-making power of the mother in the household. This thesis aims to contribute to the literature by using women's earnings, relative to that of their husband, as a proxy for bargaining power and tracking whether decisions made in the household change hands as the income of the mother rises. Using two waves of panel data from the Indonesian Family Life Survey and a fixed effects methodology, this thesis finds that women's bargaining power has a significant effect on children's health, but not on education. Mothers with a relatively high income display stronger effects for girls, while mothers with a comparatively low income prefer to invest in the health of sons. Curiously, as the income of the mother rises, her decision-making power over education increases while her influence over child health does not change significantly.

Key words: Women Empowerment; Bargaining Power; Household Decisions; Development

EKHM52

Master thesis, second year (15 credits ECTS)

June 2015

Supervisor: Tobias Axelsson

Examiner: Christer Gunnarsson

Word Count: 12811

1 Introduction

Across the developing world, there is considerable underinvestment in children, reflected in low immunization rates, child malnutrition, high drop-out rates, etc. (Majlesi, 2015). At the same time, women lagging behind men in many domains, ranging from excess mortality rates (illustrated by the "missing women" phenomenon) to labour market opportunities. A large literature relates women empowerment with improved outcomes of children (Majlesi, 2015; Qian, 2008; Bobonis, 2009; Duflo, 2003; Lundberg, Pollak and Wales, 1997). The idea is that children do better when their mothers control a larger fraction of the resources. This is the rationale behind many micro finance schemes and conditional cash transfers programmes specifically targeted at women, such as PROGRESA/Oportunidades in Mexico. However, it is tricky to identify such a relationship without knowing what underlies the decisions made by parents. Also, it remains a challenge to find a good proxy for bargaining power that truly reflects the decision-making power of the mother in the household.

This thesis aims to contribute to the literature and uses women's earnings, relative to that of their husband, as a proxy for bargaining power. This is a valid proxy if we presume that women retain control over their own earnings. Unlike most studies in the literature (an exception is Majlesi, 2015), I can observe who makes decisions on different matters within the household, such as the use of contraception and whether the woman works or not. My findings indicate that the ratio of earnings of the wife to that of the husband is positively related to women's decision-making power in the household. The key question is: does it matter who makes the money in the household? This thesis will examine this topic in the context of Indonesia.

Why Indonesia? It is an emerging economy, with average GDP growth of around 6% and currently more than 28 million people living below the national poverty line set at 292,951 rupiahs (\$24.4) per month. Another 68 million Indonesians remain vulnerable of falling into poverty, earning incomes only marginally higher than the poverty line. Despite great progress made in combating poverty ever since the recovery from the Asian Financial crisis, recently poverty reduction has slowed down. At the same time,

inequality is on the rise. In the battle against inequality and poverty, development experts suggest focusing on better nutrition, health-care and education for children from poor families (World Bank, 2014a).

Could a larger focus on women empowerment help Indonesia to reduce poverty, to fuel development and to avoid falling into the middle-income growth? In this light, this thesis will empirically investigate how women empowerment is related to relevant development indicators, namely the health and education of children. Studies indicate that early development of human capital, both in terms of knowledge and health, is vital for productivity later in life (Duflo, 2003).

Using two waves of panel data from the Indonesian Family Life Survey (IFLS) and a fixed effects methodology, this thesis finds that women's bargaining power has a significant effect on children's health, but not on education. Evaluated at the level of earnings of the median household in our dataset, our findings indicate that a rise in the yearly income of the mother from 3.250.000 rupiahs to 3.400.000 rupiahs will change the reported health status of the child from "unhealthy" to "very healthy", given that the income of the father remains unchanged. Since the information on earnings likely suffers from measurement error, which is exacerbated by the fixed effects approach, the found effects should be considered as a lower bound. Mothers with a relatively high income display stronger effects for girls, while mothers with a comparatively low income prefer to invest in the health of boys. These preferences cannot be explained by different locations of the households nor is it a catch-up effect. Curiously, as the income of the mother rises, her decision-making power over education increases while her influence over child health does not change significantly.

However, the main threat to our analysis is that women's earned income could be an outcome of the bargaining process within the household, rather than as measure of women's bargaining power itself (Doss, 2013 and Thomas, Contreras and Frankenberg, 1997). Whether a woman works and how much she works could be all outcomes of the bargaining progress. This would make labour earnings endogenous to our model. If the reason that the wife's income has increased over time is a more progressive attitude of

her husband, then the same change of attitude may also be responsible for better health and education of the children. Consequently, the independence assumption of the fixed effects model would fail.

Overall, this thesis concurs with findings from the literature that promoting women empowerment can be a promising pathway for development. This will allow developing countries to address multiple facets of the previous Millennium Development Goals at once: namely, child education, child health and gender equality. To implement this strategy, key factors that emerged are improving labour market opportunities for women and strengthening the rights of women in the realm of marriage and divorce. Future research could look at how women empowerment spills over to other fields of household decision-making that are considered important for development, like savings behaviour of poor households and investment in goods such as malaria nets. Also, it should assess how creating a level playing field for both genders can best be achieved and how cost-effective it is as a development strategy.

The rest of the paper proceeds as follows. Section 2 reveals previous empirical work regarding the topic of women's bargaining power and development. Section 3 provides the theoretical background on determinants of bargaining position of women in the household. Section 4 focuses in on the case of Indonesia regarding the bargaining position of women. Also, previous empirical findings on Indonesia are discussed. Section 5 presents the main data and reports descriptive statistics. The empirical strategy is explained in section 6. Section 7 discusses the estimation results. This is followed by sensitivity checks examining whether there are differential effects depending on the initial level of income of the mother. Finally, section 8 concludes and highlights directions for future research and policy implications.

2 Previous literature

How women empowerment is related to development outcomes has been broadly investigated in the empirical literature, both in the context of the developing world and in developed countries. The bargaining power of women in the household cannot be

observed therefore studies use different proxies. Common definitions of women's bargaining power in the household include income measures. One can look at a temporary boost in her income by conditional cash programs directed at women versus a more permanent rise in her income or opportunities on the labour market (which can also boost her bargaining power in the household, even when she is not working, as we will see). Then other studies look at assets held by women before marriage, the level of her human capital (as obtained in education) and more indirect measures of women empowerment, like the level of political representation. It can be a challenge to find a good proxy for women's bargaining power. There may be institutional changes to promote women empowerment (e.g. changes in land rights) but there is no directly observable change in the measure of bargaining power, namely the land owned by women (Doss, 2013).

Most of the reviewed studies do not have a direct measure of who makes decisions in the household. Instead, they use earnings or labour market opportunities as a proxy for bargaining power within the household. An exception is study conducted by Majlesi (2015) that directly observes whom within the couples makes the decisions on different kind of topics, such as purchase of clothing and use of contraception. He shows that changes in women's employment opportunities are indeed related to greater decision-making power within the household in the context of Mexico.

Various outcome measures of development are encountered in the literature. Since a common perception is that women care more about their children than men do, many empirical studies look at children's health outcomes such as height-for-age and weight-for-height measures (Doss, 2013). Also the educational attainment of children is frequently studied. Other papers look at consumption patterns. This is what Lundberg, Pollak and Wales (1997) do in the context of the U.K., as they investigate whether spending changes from private goods, such as men's or women's clothing, to goods that benefit the entire household, which is presumed to be children's clothing. On a more aggregate level, a study on the political representation of women in India focuses on the expenditure of public goods. Most studies are conducted in the context of the developing world, where gender equality and women empowerment are relevant topics

in the light of fueling the development process, however there is also some empirical evidence from developed countries.

A substantial number of empirical papers has found a correlation between measures of women's bargaining power and development outcomes such as children's health and education (Duflo, 2012). The problem with these studies is that they do not directly measure the bargaining power of the women. While proxies for bargaining power, such as education and income, are included in the analysis, other important factors that may directly influence child outcomes, such as family background and ability, are unobserved. Also, it could be the case that better educated or richer women are able to marry more progressive men, who care more about the outcomes of their children. Then a larger female income may not be attributed to a better bargaining position of women, but to different preferences of the husbands.

However, the main identification challenge is that families where the wife earns more, may be different from households where the woman has a relatively low income in ways that also affect investment in their children. For example, households where the wife earns more may be more progressive and therefore invest more in the well-being of their children (Duflo, 2012). Therefore, empirical studies have sought different ways to deal with this causality problem. Various approaches have been used, including natural experiments and shifts in policies, instrumental variable techniques and randomized control trials.

Since this thesis focuses on income measures as the main proxy for women's bargaining power, we will first review empirical studies on women's income and employment opportunities and how these relate to different development outcomes. Next in line, we look at empirical work that focus on female human capital and more indirect measures of women empowerment, like the level of political representation. Section 4 will specifically review empirical studies linking women empowerment to development in Indonesia.

Bargaining power through income and labour market opportunities

The majority of empirical studies focus on income of women as proxy for her bargaining power in the household. If a woman can retain some control over her earnings, then this is a valid strategy (Doss, 2013). Other papers focus on labour market opportunities, which can strengthen women's bargaining power even if she is not currently working, as this will increase her options outside the marriage. Evidence on China and Mexico show that changes in permanent income and labour market opportunities positively affect development outcomes, such as children's health (Majlesi, 2015; Qian, 2008). Other papers look at short run changes in income, such as conditional transfers directed at women. These studies are respectively on the U.K., South-Africa and Mexico and also find a positive relationship between women's bargaining power and investment in children (Bobonis, 2009; Duflo, 2003; Lundberg, Pollak and Wales, 1997).

The most influential paper in this field is the study by Qian (2008). She makes use of a policy change to investigate the relationship between female income and survival of girls as well as educational attainment of boys and girls in China. In the late 1970's, market reforms led to an exogenous change in the price of tea, which is primarily picked by women. Since this change is unrelated to unobserved differences between households, it allows us to study the effects of an increase in women's bargaining power. Qian finds that an increase in relative adult female income has an immediate and positive effect on the survival rate of girls. In rural China, during the early 1980s, increasing annual adult female income by \$7.70 (10% of average rural household income) while holding adult male income constant increased the fraction of surviving girls by one percentage point and improved educational attainment for both boys and girls by approximately 0.5 years.

A similar approach is used by Majlesi (2015) in Mexico. He relates the changes in local manufacturing industries in Mexico in 2002-2005 to the chances of being employed for women. Hereby a women's bargaining power is not defined as her actual income but as her potential employment opportunities in the place of residence. Majlesi argues that

bargaining power of married women better corresponds to how much a woman could earn in the labour market, irrespective of whether now she is working or not, hence her outside option. Another unique facet of this study is that the researcher has a direct measure of women's decision making power. The survey data used describe whether the wife or husband make decisions on a variety of matters, such as the use of contraception and children's health. Subsequently, women's aggregate relative decision making power is defined as the number of household decisions made by wife minus the number of decisions made by her husband. The main findings are that an increase in the bargaining position of women leads to women making more decisions on her own expenditures, major expenditures of the household and children's health. Most interestingly, more employment opportunities for women have a positive effect on the health of their children (especially that of girls), when controlling for other factors such as total household income.

It can be questioned whether temporary changes in women's income, induced by conditional transfer programs targeted at mothers of poor households for example, have the same impact as permanent changes in her earnings or employment opportunities. Duflo (2012) notes that state benefit programs may not increase a women's bargaining power much because after a few years women income goes back to normal so she cannot extract her power too much. In this light, Bobonis (2009), Duflo (2003) and Lundberg, Pollak and Wales (1997) look at the outcomes of children in Mexico, South-Africa and the U.K. respectively. Their empirical evidence shows that even temporary changes in women's income can strengthen their bargaining power and alter development outcomes.

While Duflo and Lundberg, Pollak and Wales exploit a change in government policy regarding state benefit programs, Bobonis makes use of a randomized controlled trial in the context of the Mexican poverty reduction program PROGRESA. This program provides income transfers to women in low-income households, conditional on children's school attendance and use of various health services. The experimental methodology helps to identify causal relationships. As the households are randomly assigned to treatment and comparison groups, on average they will be comparable in

terms of observable as well as unobservable characteristics like progressiveness, family background and ability. In this way, we can trace out the causal effects of higher female income. Findings indicate that a temporary boost in women's income leads to an increase in the expenditure of child and female clothing.

The results are supported by a study in the British context by Lundberg, Pollak and Wales. As a result of shift of payment of the universal child benefit program to the mothers instead of the fathers, the researchers find a substantial increase in spending on women's and children's clothing, relative to men's clothing. This is consistent with the idea that children do better when their mothers control a larger fraction of family resources. Although developed countries have seen rising levels of development as well as gender equality, the study was conducted around the 1970's when women's share of employment in the formal labour market was expanding.

Even transfer programs that are not specifically targeted at mothers in poor households can make a difference. Duflo (2003) has studied the reform of the pension system in South-Africa and finds that an increase in the income of grandmothers has a positive effect on the health of the children that live with her in the household, while receipt of a pension by the grandfather does not. Health indicators used are weight-for-height and height-for-age, which capture both short run and long run states of child nutrition. The finding confirms the hypothesis that female bargaining power in the household matters for development outcomes.

Female human capital and other proxies for women empowerment

A related branch of the literature looks at women empowerment in the broader sense. In particular, these papers take women's human capital and the level of political representation as proxies for the bargaining power of women. Education can lead to higher wages and improve the chances of finding a job and therefore strengthens the bargaining position of women in the household. The findings are mixed. Two papers do not find any relationship between female education and child health. The studies are respectively on Indonesia by Breierova and Duflo (2004) and on Taiwan by Chou, Liu,

Grossman and Joyce (2010).

Both studies exploit natural experiments that led to an exogenous variation in female education, namely massive education expansion programs initiated by the local government. Using a natural experiment is vital for unraveling a causal relationship, as simply comparing family outcomes of more educated women with those of less educated women would give us a biased picture, since more educated women often come from richer families and may be able to marry more progressive husbands (Duflo, 2012). Breierova and Duflo found that higher education of women is not related to lower infant mortality, while Chou, Liu, Grossman and Joyce report that female and male education both matter for child health. This implies that the assumption that education of women is more important than male education for the health of their children and for other family outcomes may need to be revised - it seems that both matter.

Another study takes political representation as a measure of women empowerment. Chattopadhyay and Duflo (2004) investigate the impact of the reservation of seats for women in the local village councils on the types of public goods provided in India. The researchers find that a higher proportion of women in the local government leads to investment in different types of infrastructure that better reflects the needs of local women. This evidence supports the notion that women empowerment can impact development outcomes and that women and men have different preferences, also on the aggregate level.

Summarizing

Summarizing, there is a large literature showing that overall women's bargaining power plays a role in development outcomes. Most studies do not observe women's decision making power directly, but instead use proxies for it, such as employment opportunities for women. Evidence from different developing countries indicates that there is significant effect of female bargaining power obtained through income and labour market opportunities. Countries examined include Mexico, China, South-Africa and

India. It is a surprising finding that women's education does not seem to affect development outcomes (according to two empirical studies), albeit human capital is expected to improve the bargaining position of a woman in the household. Also, more educated women can make better informed choices for their children.

This study aims to fill the literature gap by investigating how female earnings are related to children's health and education in Indonesia. As to yet, there is no research that relates the distribution of power in the household to the level of education of children in Indonesia. Unlike most studies in the literature (an exception is Majlesi, 2015), I have a direct measure of women's decision-making power. In this way, I am able to relate changes in women's relative income within the household to changes in their decision-making power and finally to the observed differences in measures that indicate the well-being of their children. Observing households over multiple time periods will allow me to use a fixed effects methodology and correct for unobserved differences between households that we are worried about, like progressiveness and family background.

3 Theoretical framework

In the previous section, we have found a strong empirical link between female bargaining power and development outcomes. This section will provide a theoretical framework to explain why women's bargaining power matters. The focus is on married couples. Drawing from household behavioural theories, it will focus on questions such as: do households make decisions as a single entity? If not, what are the determinants of bargaining power of husbands and wives? We will explore financial factors that emerged from the empirical studies, like earnings and labour market opportunities. But we will find that even institutional factors, such as divorce laws, influence the dynamics of intra-household bargaining.

Traditional models of household behavior assume that household members behave as a single entity and maximize a single utility function. The decisions made could be the outcome of consensus among the family members (Samuelson, 1956) or the preferences of one dominant family member (Becker, 1981). The model implies that all family

resources are pooled and then allocated to maximize a single objective function. This implies that female earnings should not matter for development - income earned by the wife should have the same effect on household decisions as income earned by the husband. In contrast, non-unitary models of the household relax this assumption and allow for differential effects.

Non-unitary models allow for bargaining over the consumption of goods and other relevant decisions within the household. In the intra-household bargaining process, the situation on the labour market plays a large role (Manser and Brown, 1980). Whether the woman can work and the size of the earnings she could make, determine her bargaining position within the household. If it is relatively hard for the woman to work and hence support herself, she does not have a strong outside option outside the marriage. In effect, this lowers her bargaining power in the household and her influence over relevant decisions. However, if the wife has many employment opportunities, she can make a credible threat to leave the marriage if the husband does not consider her opinion and preferences. This results in a large financial bargaining power and hence a large influence over decision-making. Education may enhance her bargaining power as it increases her opportunities on the labour market.

Not only employment opportunities affect women's bargaining power, but also institutional factors matter. Whether the threat to divorce is credible or not depends on local laws governing the ease of divorce and women's rights after divorce (Majlesi, 2015; Duflo, 2012). It matters whether the woman can remarry or retain some control over the assets that she brought into the marriage. All these factors shape the outside options of a woman. If both she and her husband know that divorce is not possible, this gives the husband power to impose decisions on his wife. In this way, laws and customs regarding divorce influence decision-making within the household even if the couple does not end up divorcing.

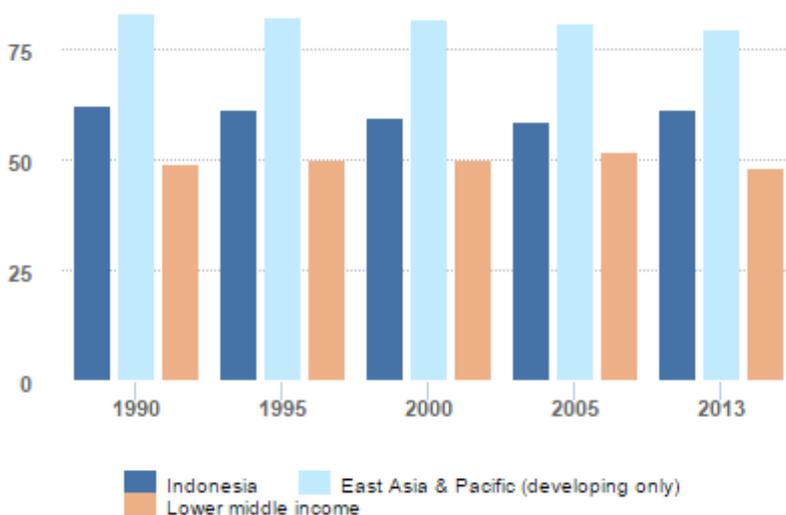
4 The context of Indonesia

A process of change - women's bargaining power in Indonesia on the macro-level

Now we can apply the theoretical framework that explains women's bargaining power to the case of Indonesia. Regarding labour market opportunities, women's participation in the labour force has been fairly constant since the 1990's as one can learn from Figure 1. In the non-agricultural sector, women only constitute 33% of the labour force. In terms of labour market access, Indonesia is still lagging behind other developing countries in South-East Asia. This limits the financial bargaining power of women, as employment opportunities are an important factor in her outside option. However, the government of Indonesia has been pushing for an expansion of education and as a matter of fact, more women complete primary education than men (World Bank Gender Statistics).

The legal and cultural framework also shape women's decision-making power in the household. Historically, in practice the right to divorce in Indonesia was exclusively reserved to men. However, due to pressure of women's rights organizations, over time it has become easier for women to file for divorce (O'Shaughnessy, 2009). Also, it matters whether women can keep the assets she brought to the marriage in case of divorce. There is a large variation in this practice across the diverse cultural contexts of Indonesia, depending on the local customs (Thomas, Contreras and Frankenberg, 1997).

Figure 1: Ratio of female to male labor force participation (in %)



Source: Gender Statistics, World Bank: <http://datatopics.worldbank.org/gender/country/indonesia>

Now we will examine previous empirical work linking women empowerment to development in Indonesia.

Previous empirical work on women's bargaining power and children outcomes in Indonesia

The most prominent data source on Indonesia is the Indonesian Family Life Survey (IFLS). It is a rich dataset on the household level with information on a variety of topics, including household decision-making, health and income. Many studies have explored the IFLS data and are on topics such as the effects of the financial crisis in 1997 and the determinants and consequences of health (an example is the long-term health effects on the next generation of Ramadan fasting during pregnancy). However there are few studies on household bargaining and children's well-being. An exception is Thomas, Contreras and Frankenberg (1997).

Thomas, Contreras and Frankenberg (1997) investigate how bargaining power within the household is related to child health outcomes. Their definition of bargaining power revolves around the value of resources that husbands and wives bring to the marriage. In the Indonesian context, traditionally in Javanese families the partners keep the resources they brought to the marriage under their control. This measure is directly related to women's outside option and could be considered as a more permanent measure of their bargaining power within the household.

The researchers explore how the value of assets of the husband versus those of the wife affect the health status of their children. In particular, whether child had experienced one of several morbidities during the four weeks prior to the survey, such as a cough, fever or diarrhea. They find that that mothers who are more powerful allocate resources towards their sons, as is reflected in their sons having fewer episodes of illness (of cough and fever) than their daughters. This holds for Java and Sumatra. However, for the rest of Indonesia, the unitary household model cannot be rejected.

As to yet, there is no research that relates the distribution of power in the household to the level of education of children in Indonesia. Also, no studies exploit the panel nature of IFLS data to correct for unobserved differences between households. Observing households over multiple time periods will allow me to use a fixed effects methodology and correct for unobserved differences between households that we are worried about, like progressiveness and family background.

The contribution of this thesis

This study aims to fill the literature gap by exploring the relationship between woman's income (which reflects financial bargaining power), her decision-making power and child outcomes using panel data. This has not been done before in the context of Indonesia. The hypotheses to be tested are as follows:

- (1) The size of the earnings of married women, relative to that of their husband, affects the health of their children
- (2) The size of the earnings of married women, relative to that of their husband, affects the level of education of their children
- (3) The size of the earnings of married women, relative to that of their husband, affects the amount of decisions they make in the household

Basically, this thesis aims to test whether children's outcomes improve as the financial bargaining power of women rises. This is what is captured by hypotheses (1) and (2). However, relative earnings is just a proxy for bargaining power. In order for female earnings to be a good proxy for women's bargaining power in the household, I need to assume that married women keep (largely) control over their own earnings. Testing whether this actually holds across the large cultural, social and economic diversity of households in Indonesia goes beyond the scope of this thesis. Instead, hypothesis (3) will examine how women's earnings are related to their decision-making power within the household. The construction of a measure of women's decision-making power is

further explained in the next section. Hypothesis (3) allows us to assess whether the income of the mother is a good proxy for her bargaining power. The key question is: do mothers get more influence over decisions made in the household as their income rises? In this way, hypothesis (3) explores the link between female earnings and the health and education of children.

A necessary condition for gender to make a difference on child outcomes is that men and women must have different preferences. Namely, women should be more willing to make investments in their children, compare to their husbands. I cannot observe these preferences, but will try to infer them by tracking difference in child outcomes as women's financial bargaining power and decision-making power change. The "inferential approach" was coined by Thomas (1990).

5 Data

To investigate how women's financial bargaining power affects the outcomes of their children, I use panel data collected from the Indonesian Family Life Survey (IFLS). The sample is representative of about 83% of the Indonesian population and contains over 30.000 individuals living in 13 of the 27 provinces in the country (Frankenberg and Thomas, 2000). A visual representation of the IFLS provinces can be found in Figure 2 below.

Figure 2: Map of Indonesian Family Life Survey provinces



Source: <http://www.rand.org/labor/FLS/IFLS.html>

For this analysis, I will use data from the two latest waves of the Indonesian Family Life Survey, conducted in 2000 and 2007/2008. There are more data available in earlier waves (conducted in 1993 and 1997) but I do not use them due to the occurrence of the Asian financial crisis. The crisis hit Indonesia in 1997 and led to extreme rates of inflation up to 65% per year (Hill, 2000). As our main variable of interest, namely female earnings, will likely be distorted in these years, I decided not to use the earlier waves of the IFLS.

The nature of the data allows me to match information on children with the data on earnings and background of the parents. I excluded children whose mother or father is no longer alive or who live away from one of their parents. I set the cut-off age for children at 25 years in 2007/2008. In this way I can capture the probability that children attend university or college as a result of increased financial bargaining power of their mother, as these children are be around 17 years old in 2000. I focus on households that are headed by a married couple. Households where the husband is married to two or more spouses and living together with them, are excluded from the analysis. The criteria result in a total of 1320 children from 668 households.

As is often the case with household survey data from developing countries, the quality of the data is not optimal. In particular, for the earnings variable there appear to be a discrepancy. Different yearly income figures are reported for the parents, depending on whether the household head answered the question or the response came from the household member him- or herself. I stick to the answer given by the household member him- or herself, but if no self-reported income information is available, I take the figure mentioned by the household head.

The characteristics of the data, which I extracted from the Indonesian Family Life Surveys, are summarized in Table 1. Table 2 shows how the values of relevant variables differ between boys and girls in 2000. A detailed description of all variables can found in Table A1 in the Appendix.

Table 1: Descriptive statistics for all children

Variables	Mean 2000	Mean 2007/2008	Mean difference	Std. dev. 2000	Std. dev. 2007/2008	Std. dev. diff.
Education level	1.989	3.106	1.117***	0.802	0.957	0.154
Health condition	3.039	3.099	0.061**	0.443	0.484	0.040
Age	8.231	15.604	7.373***	4.609	4.600	-0.009
Boy	0.541	0.542	0.001	0.499	0.498	0.000
Log earnings mother	14.345	15.319	0.974***	1.461	1.345	-0.116
Log earnings father	15.069	15.753	0.684***	1.093	1.172	0.079
Education mother	2.683	2.781	0.098**	1.151	1.194	0.043
Education father	2.893	2.922	0.029	1.173	1.198	0.025
Age mother	36.098	43.342	7.244***	5.767	5.727	-0.040
Age father	40.617	47.825	7.208***	7.079	6.826	-0.253
Household size	6.405	6.915	0.511***	2.140	2.299	0.160
Muslim	0.861	0.858	-0.002	0.346	0.349	0.002
Protestant	0.049	0.053	0.004	0.216	0.224	0.008
Catholic	0.014	0.018	0.005	0.116	0.134	0.018
Hindu	0.074	0.070	-0.005	0.262	0.255	-0.008
Buddhist	0.002	0.000	-0.002*	0.048	0.000	-0.048
Confucian	0	0.001	0.001	0	0.028	0.028
Urban location	0.441	0.498	0.058***	0.497	0.500	0.004
Wife decision-making power	3.444	3.053	-0.391***	3.608	3.887	0.279
Observations	1320	1320	2640	1320	1320	2640

Notes: A detailed description of all variables can found in Table A1 in the Appendix. All variables have observations on 1320 children per year, except for general health status which was only reported for children that are younger than 15 years. This results in a total of 1167 observations in the year 2000 and 555 observations in the year 2007/2008 for child health condition. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

One of the main variables of interest is educational attainment of children. This information is available for all children in my sample. On average, children attended elementary school in the first period of the panel and junior high school in during the second round of interviews. Accordingly, the average age of the children in my dataset is 8.2 years in 2000 and 15.6 years in 2007/2008. For a very small number of observations (6), there was an inconsistency in the information about education. Some

children reported a negative change in the level of schooling. The level of education attained or attending as reported in 2007/2008 was lower than the level reported in 2000. In these cases, I stuck to the highest value reported (which was junior high school for nearly all cases). There is no significant difference between boys and girls when it comes to schooling in 2000, although girls are slightly more educated.

The validity of this approach is supported by the fact that these children were all 22 years or older by the year 2007/2008, so it is not likely that they will go back to primary school after having attended high school (which I assume they reported correctly in 2000).

Regarding children's overall health condition, this information is only available for children under 15 years old. Their general health status is reported by mother on a scale from 1 to 4 (which corresponds to bad health and to good health). In the year 2002, the average reported health condition in my sample of analysis was 3.06 for girls and 3.02 for boys. This difference is not statistically significant. Over time, the average reported health condition for all children increases from 3.04 to 3.1, as we can learn from Table 1.

Table 2: Descriptive statistics for girls and boys for the year 2000

Variables	Boys mean	Girls mean	Mean difference	Std. dev. boys	Std. dev. girls	Std. dev. diff.
Education level	1.966	2.015	-0.048	0.799	0.806	-0.007
Health condition	3.024	3.056	-0.033	0.422	0.468	-0.046
Age	8.261	8.196	0.064	4.660	4.552	0.108
Log earnings mother	14.307	14.390	-0.083	1.500	1.413	0.086
Log earnings father	15.047	15.094	-0.047	1.087	1.099	-0.011
Household size	6.493	6.300	0.193	2.127	2.151	-0.024
Observations	714	606	1320	714	606	1320

Notes: A detailed description of all variables can found in Table A1 in the Appendix. All variables have observations on 1320 children per year, except for general health status which was only reported for children that are younger than 15 years. This results in a total of 634 observations for boys and 533 observations for girls for child health condition. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

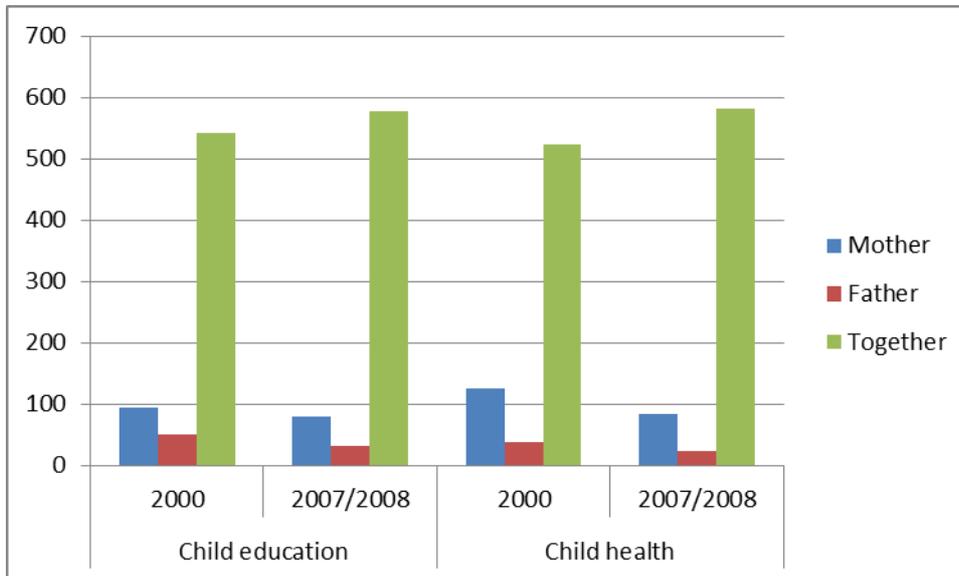
At the same, the average logarithm of yearly income of the mother increased from 14.345 to 15.319. The yearly income data are reported in rupiah. Also the yearly income of the husband sees a rise over the same period, however the increase of income of the mother is relatively larger (6,8% compared to 4,5%). This indicates that on average the financial bargaining power of women in the household may have increased.

However, in order to relate the size of the relative earnings of the mother to her bargaining power in the household, we need a way to measure women's decision-making power. In fact, the Indonesian Family Life Survey data describe who makes decisions on different matters in the household, such as the use of contraception and whether the woman works or not. Possible answers are: by the wife, by the husband, jointly or jointly with other household members. All 17 household decision-making categories are described in Table A2 in the Appendix. I make use of this information to construct a direct measure of women's decision-making power. However, it must be stressed that the information is subjective. The answers given differ depending on whether they are given by the husband or wife. It is a perception of power. For now, I stick to the information given by the mother.

To construct a measure of the decision-making power of the mother, I follow Majlesi (2015) and use the number of decisions made by the wife minus number of decisions made by the husband on household affairs. Table A1 describes how these variables were constructed. On average, the mother made 3.4 decisions more than the husband on household affairs in 2000. This number changed to approximately 3 decisions in 2007/2008.

In addition, I will look specifically at who decides on children's education and children's health.

Figure 3: Who decides on children's education and health?



Notes: the above figure shows the number of households in which respectively the mother, the father or both parents make decisions on the education and health of their children. The data are taken from the Indonesian Family Life Surveys.

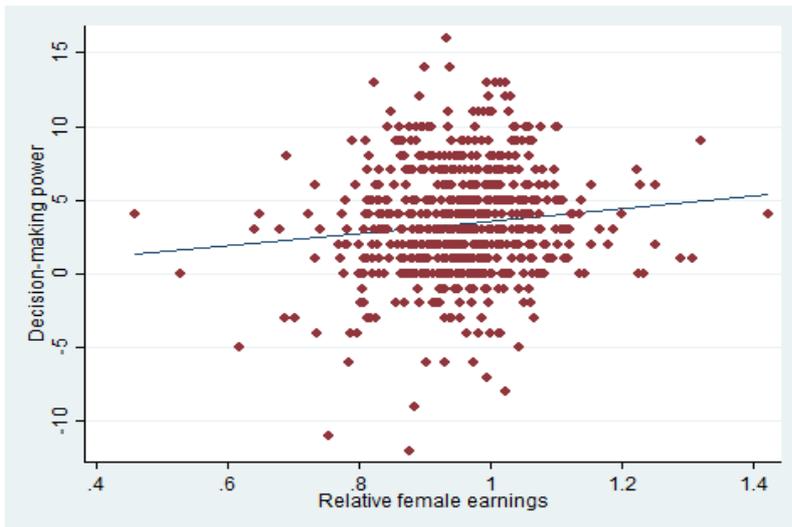
Figure 3 shows who makes decisions on child education and health for the total of 668 households in my sample. In the majority of households, the wife and the husband take the decisions on children together. However, we do not know who has the strongest say in the joint decision-making. Also, it is possible that even more household members take part in the joint decision-making (I did not construct a separate category for this). In less than 15% of the households, it is the mother who decides on the health and education of the children. In less than 5% of the households, it is the sole responsibility of the father. Compared to 2000, joint decision-making becomes more common in 2007/2008.

Exploring the data

Figure 4 shows that there appears to be a positive relationship between the ratio of wife's earnings to husband's earnings and their actual decision-making power in the household in 2000. The measure of decision-making power is constructed by taking the number of decisions made by the wife minus the number of decisions made by the husband, as reported by the wife. This indicates that the earnings ratio may be a good

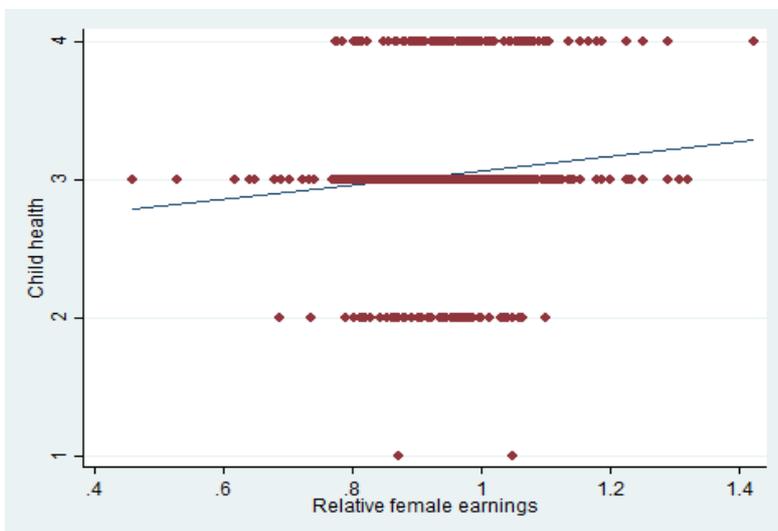
proxy for actual bargaining power in the household, albeit the correlation in the year 2007/2008 is less strong (see Figure A1 in the Appendix).

Figure 4: Relative female earnings and decision-making power of the wife in 2000



Source data: Indonesian Family Life Surveys

Figure 5: Relative female earnings and children's health in 2000

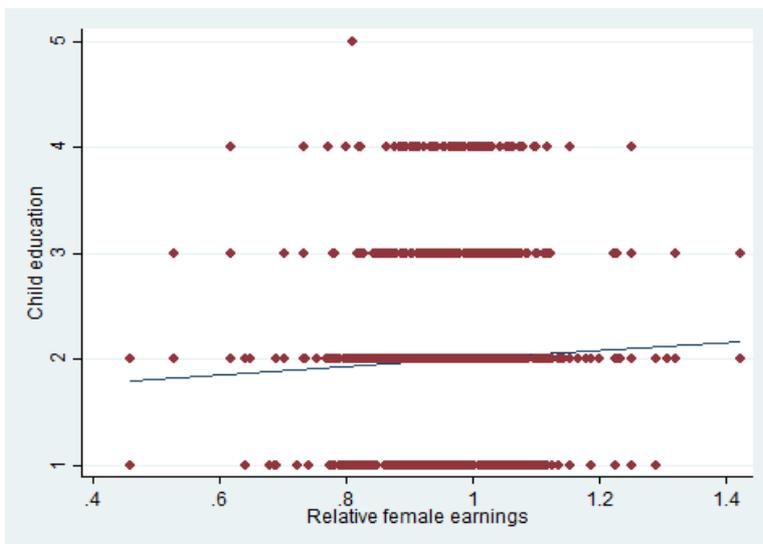


Source data: Indonesian Family Life Surveys

Figure 5 shows the relation between child's health and ratio of the logarithm of mothers earnings over the logarithm's of father's earnings in 2000. A similar picture emerges for the cross-section from the year 2007/2008 (see appendix Figure A2). There appears to

be a positive relationship between financial bargaining power of women and children's health, when not controlling for other factors. From figure 6, we can note a weak but positive association between relative female earnings and the level of schooling of children. A stronger positive correlation is found for the year 2007/2008, which is displayed in Figure A3 of the appendix.

Figure 6: Relative female earnings and children's education in 2000



Source data: Indonesian Family Life Surveys

However, the graphs give us a biased picture of a causal relationship between relative female earnings and the health and education of children. This is because households where women have relatively high earnings compared to their husband may be very different from families with low or no female earnings. Therefore, the next section outlines our strategy to control for these unobserved differences.

6 Empirical strategy

Researchers face various challenges when estimating the relationship between women's bargaining power and children's well-being, as discussed in section 2. The main challenge is that households with high female earnings relative to the husband, may be very different from households where the woman earns very little compared to the husband or the woman does not work at all. Families where the wife has more economic

power, may be more progressive, which is also reflected in how the parents support the education of the children. As this progressiveness is unobserved in the data but related to the relative size of female earnings, a simple estimation regressing child outcomes on the women's financial bargaining power will be biased.

To get around this problem, I use panel data on the earnings of wives and husbands and the health and education of their children. Observing the households over multiple time periods will allow me to use a fixed effects methodology and correct for unobserved differences between households that are constant over time. In this way we can control for factors that we are worried about, like progressiveness and family background. Furthermore, unlike most studies in the literature (an exception is Majlesi, 2015), I have a direct measure of women's decision-making power, as discussed in section 5. In this way, I am able to relate changes in women's income relative to their spouse to changes in their decision-making power and finally to differences in child health and education.

In order to estimate the effect of changes in women's bargaining power on children's outcomes, we will be running regressions of the following form:

$$(1) \quad y_{c,it} = \alpha + \gamma \text{Earningsratio}_{i,t} + \lambda X_{c,i,t} + \delta \text{Year 2007} + \epsilon_{c,i,t}$$

whereby the dependent variable $y_{c,it}$ represents the general health status of child c in household i at time t . General health status of the child is reported by the mother on a scale from 1 to 4, whereby 1 represents bad health and 4 very good health. The drawback of this measure is that it is subjective, which makes it hard to compare scores across households. However, as we use a household fixed effects approach, we will be only comparing answers given by the same mother so the subjectivity will not bias our results. Also, we run regressions with the level of schooling of child c in household i at time t as alternative indicator for children's well-being. The level of education is a reported on a scale from 1 to 5 according to different categories (more details can be found in Table A1 in the Appendix).

Earningsratio is the ratio of the logarithm of wife's earnings over the logarithm's of

husband's earnings in household i at time t . Hence the coefficient γ captures the effect of increased financial bargaining power of women on children's well-being. Most importantly, the estimation contains a dummy for each household i , capturing all factors that are constant within the household over time, such as progressiveness and family background. Hence, the model exploits variation in the variables within households, i.e. between siblings and over time.

Apart from the household fixed effects, we use set of control variables X , as indicated by the literature, that are found to influence children's outcomes. The gender and age of the child are included in the estimation. Also, information on the family background is taken on board, notably the level of education of the mother and the father and the age of the parents. More educated parents could have a better understanding of how to raise how to raise children, use contraception, and manage their homes (Duflo, 2012). Also, we control for the size of the household. If there more siblings or grandparents start living in the household, the parents may have less time or resources available for the child. Religious background is included in the estimation to control for potential differences in education and health between families from different religious background, as for example Islamic education is widespread in Indonesia and runs a different curriculum parallel to the general educational system. The estimation includes a dummy indicating whether the household is located in an urban area, as these families could have better access to health facilities and schools.

Since we use panel dataset with two periods of data, in essence the empirical specification that is estimated is the difference version of equations (1) for the two time periods. A dummy for the year 2007 is incorporated in the model to capture any potential trend in children's health and education over time. In this way, we avoid spuriously attributing overall better health or schooling of children (due to better vaccination programs, sanitation, increased school enrollment etc.) to increased relative female earnings. Finally $\mathcal{E}_{c,i,t}$ represents the error term.

Girls vs. boys and channels

Across the developing world, there is some evidence that women value daughters relatively more than men do (Duflo, 2012). Therefore, the estimation will be done separately for boys and girls. In this way, we can see whether there exist differential effects of the increase of bargaining power of women on the outcomes of sons versus daughters.

The estimation outlined above investigates the effect of changes in income of women compared to that of their husband. The earnings ratio is used as a proxy for bargaining power, however it is just that - a proxy. It is not a direct measure of power of women in the household. In order to assess whether power shifts are really the link between relative income changes and changes in children's well-being, we will empirically examine how decision-making in the household changes as the relative income of women changes. Another key question is: do decisions on children's health and education change hands as women's financial power increases? I will estimate estimation (1) again, but then use overall decision-making power of women, who makes the decision on children's health and who makes the decision on children's education as dependent variables.

Some caveats

For this analysis, we need to keep in mind that the earnings measures suffer from considerable measurement error (as discussed in more detail in section 5). Since we use a fixed effects approach, measurement error will be exacerbated. The mistakes become larger percentage-wise when we take the difference within households between the two time periods. This may lead to a bias towards zero in the regression results. We need to keep in mind that the estimate we obtain is a lower bound of the effect of women's financial bargaining power on children's outcomes and on household decision-making. This means that the true effect will likely larger be and more significant.

Also, it should be noted that my sample only includes families with women who work

and who reported an independent income, either derived from a wage job or own business. This means that there is some degree of positive selection. For example, the households in the sample could be characterized as relatively progressive households, because all women are out earning an independent income. This limits the external validity of the results, as they may not be representative for women who do not work. However, the internal validity of this study is not compromised because I correct for unobserved differences between households that are fixed over time.

7 Results

The results of our main estimations on children's outcomes are reported in Table 3 and Table 4 below. Table 5 shows how relative earnings of the mother are related to her decision-making power in the household.

Financial bargaining power and children's health

We find that the relative earnings of mothers are significantly and positively associated with the health condition of their children. Respectively, Table 3 reports a 1% change in the earnings ratio (implying that the yearly income of the wife rises by 1% while keeping the yearly income of the husband constant), will lead to an average raise of 0.650 in reported health condition for all children, keeping all other factors constant. The said effect is statistically significant at the 5% level. Evaluated at the level of earnings of the median household in our dataset, this implies that a rise in the yearly income of the mother from 3.250.000 rupiahs to 3.400.000 rupiahs will change the reported health status of the child from unhealthy to very healthy. This effect is to be expected while the earnings of the father stay constant at 5.000.000 rupiahs per year.

Another noteworthy finding is that the effect of an increase in relative female earnings on health status is about 30% larger for girls. The effect for girls is no longer statistically significant in column (3) of Table 3, but this could be due to the smaller sample size and the large measurement error in the earnings variable. My results are consistent with findings from the literature. Maljesi (2015) also finds stronger effects of women's

labour market opportunities on health for girls in the case of Mexico. In rural China, Qian (2008) finds that an increase in relative adult female income has an immediate and positive effect on the survival rate of girls and not for boys.

Table 3: The effect of women's financial bargaining power on children's health

	(1)	(2)	(3)
	All children	Boys	Girls
Relative female earnings	0.650 ^{**} (0.253)	0.559 [*] (0.310)	0.729 (0.455)
Household size	0.00198 (0.0274)	0.0519 (0.0458)	-0.0135 (0.0466)
Boy	0.00281 (0.0333)		
Age child	0.00619 (0.00452)	0.00197 (0.00744)	0.00617 (0.0103)
Urban	0.253 ^{***} (0.0827)	0.246 ^{**} (0.108)	0.267 [*] (0.159)
Education parents	Yes	Yes	Yes
Age parents	Yes	Yes	Yes
Religious dummies	Yes	Yes	Yes
No. of children	1722	931	791
No. of households	637	453	403
Adj. R ²	0.129	0.125	0.098

Notes: Robust standard errors are reported in parentheses. Estimation includes household fixed effects and a time dummy for the year 2007/2008. A detailed description of all variables can be found in Table A1 in the Appendix. The results regarding the assumptions of the panel data model for column (1) as well as a step-wise regression of the model can be found on p. 35-39 in the Appendix.

***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

It appears that mothers have a preference for girls. Could this be a catch-up effect, i.e. that mothers prefer to invest more in daughters because they were previously lagging behind in terms of health compared to sons? This does not appear to be the case since there is no significant difference between boys and girls in terms of health status in 2000, as reported in Table 2. In fact, girls had a slightly better reported health condition in 2000 on average.

The location of the household strongly predicts the health condition of the child.

Moving to an urban area from a rural area is associated with an increase of 0.253 in reported health condition for all children, *ceteris paribus*. The said effect is statistically significant at the 1% level. This may be related to differences in access and quality of health facilities, as many rural areas have small clinics rather than hospitals, with high rates of absenteeism (Banerjee and Duflo, 2005).

Financial bargaining power and children's education

Table 4: The effect of women's financial bargaining power on children's education

	(1)	(2)	(3)
	All children	Boys	Girls
Relative female earnings	-0.0315 (0.185)	-0.119 (0.244)	0.0484 (0.266)
Household size	-0.0655*** (0.0201)	-0.0469* (0.0275)	-0.0908*** (0.0304)
Boy	-0.0618** (0.0299)		
Age child	0.140*** (0.00376)	0.128*** (0.00676)	0.152*** (0.00761)
Urban	0.0688 (0.0650)	-0.0156 (0.0819)	0.116 (0.0989)
Education parents	Yes	Yes	Yes
Age parents	Yes	Yes	Yes
Religious dummies	Yes	Yes	Yes
No. of children	2640	1429	1211
No. of households	688	500	452
Adj. R ²	0.758	0.761	0.788

Notes: Robust standard errors are reported in parentheses. Estimation includes household fixed effects and a time dummy for the year 2007/2008. A detailed description of all variables can found in Table A1 in the Appendix. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Table 4 shows that women's financial bargaining power does not appear to have a significant effect on the educational attainment of children, although again the effect on girls is slightly larger compared to boys. Qian (2008) does find an effect of female income on years of educational attainment of children in rural China. However, our results do not imply that the mother's relative earnings are not related to children's

education in Indonesia. In this analysis, we use a very broad measure of level of schooling, namely educational categories that take up to 6 years to complete. It could be the case that the effect of a change in women's bargaining power on educational attainment is lagged. Once the mother has more power over the decision to send her child to school, it may take time before the child starts attending or completes a higher educational level. This may not be captured by the data we are currently using. If we would have used a more progressive measure instead, such as years of schooling or probability of dropping out of school, possibly there could be an effect.

The biggest determinant of educational attainment is the age of the child. On average, an increase in the age of the child of approximately 7 years will lead to progression to one higher educational category, keeping all other factors constant. This holds for all children. The respective educational categories are described in Table A1 in the Appendix. Given the characteristics of the average child in 2000, when the child's age increases from 8 years to 15 years, he or she moves from primary school to junior high school.

A larger household size negatively impacts schooling attainment of children, all else fixed. I conjecture that if more siblings and/or grandparents start living with the family, this may increase the chances of the child dropping out of school in order to work and contribute to the household economy. However it goes beyond the scope of this paper to further explore this empirically.

Do decisions change hands as female income rises?

So far we have found a positive and significant impact of female relative earnings on children's health, but not on education. What is the mechanism behind this relationship? Is the earnings ratio actually a good proxy for bargaining power and does it capture decision-making power in the household? Table 5 below shows the results of a panel regression of female decision-making power, as perceived by the wife, on relative female earnings. The estimation is ran on the household level. In this way, we can find out whether decisions actually change hands as women's income rises.

Overall, the results in column (1) indicate that there is a positive relationship between relative earnings and decision-making in the household. Namely, a 1% change in the ratio of female to male earnings leads to approximately 2 decisions more taken by the wife on household affairs, keeping all other factors constant. However, the said effect is not statistically significant. The effect is quite large, given that there are only 17 decisions in total in this household survey. The different decision-making categories are described in Table A2 of the Appendix and range from the use of contraception to large expensive purchases for the household. Also, an increase in the level of education of the mother are positively associated with her decision-making power, albeit not significantly so. Majlesi (2015) does find a significant effect of an improvement of the wife's labour market position on the number of decisions she makes in the household.

Table 5: The effect of women's financial bargaining power on household decision-making

	(1)	(2)	(3)
	Overall decision-making power	Who decides on child education?	Who decides on child health?
Relative female earnings	2.277 (1.710)	0.489** (0.226)	0.331 (0.228)
Education mother	0.135 (0.624)	0.0658 (0.0652)	0.0739 (0.0561)
Education father	0.0273 (0.443)	-0.0834* (0.0456)	-0.0371 (0.0466)
Household size	0.181 (0.170)	0.000395 (0.0181)	0.0142 (0.0223)
Urban	0.226 (0.475)	0.0510 (0.0524)	0.0698 (0.0549)
Age parents	Yes	Yes	Yes
Religious dummies	Yes	Yes	Yes
No. of households	688	688	688
Adj. R ²	0.188	0.099	0.114

Notes: Robust standard errors are reported in parentheses. Estimation includes household fixed effects and a time dummy for the year 2007/2008. A detailed description of all variables can found in Table A1 in the Appendix. Information on who make the decisions is reported by the wife. The dependent variable decision-making power is constructed as follows: no. of decisions made by the wife minus no. of decisions made by the husband. All 17 different decision-making categories are described in Table A2 of the Appendix. The dependent variables decisions on child education and child health are coded as follows: "1" if the mother decides, "-1" if the father decides and "0" for a joint decision.

***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Do the decisions on children in particular change hands as wives start to earn more in relative terms? The results are reported in column (2) and (3) of Table 5 and are somewhat surprising in the light of previous findings. We find that decisions on children's schooling change hands in favour of the wife as mothers earn more in relative terms. Decision-making on children's health is not significantly affected by relative female earnings. This is contrary to what we expected, as we found that women's relative income has a significant impact on children's health but not on children's education. Majlesi (2015) finds the opposite for the case of Mexico: decisions on children's health change hands as women's bargaining power rises, but decisions on education do not.

What could explain these surprising results? First of all, in the large majority of couples (more than 75%), the wife and the husband decide together on the health and schooling of their children, as shown in Figure 3. The number of households, who decide together on the health and schooling of their children, increases even further for the period 2007/2008. This means that in general, the investment in the well-being of the children is seen as a responsibility for both parents. Overall, mothers already have quite a say in the welfare of their children (as she decides together with her husband in the majority of households). A small increase in the bargaining power of the mother should not imply that it is in the interest of the family that the mother takes over the decisions completely. Nevertheless, joint decision-making does not mean that the two parents have an exactly equal influence over the decisions over the children. We do not observe whom of the two parents has the strongest say in the joint decisions. It could be the case that the mother gets a stronger voice in the decision-making as her income rises, although the couple still decides together.

Regarding children's education, an increase of 2% in the earnings of the mother compared to the income of the father, leads to a significant increase of decision-making power of the mother, all else fixed. If previously the couple decided together on child education, now the mother takes the sole responsibility. In the other case, if previously the father was the main decision-maker, now the decision-making is shifted to the

couple. Given the insignificant relationship between children's education and relative female earnings we found in the previous section, this significant effect is somewhat unexpected. It could be the case that the benefits of mother's decision-making on children's schooling are present but take longer to materialize. This could be the reason that we cannot capture the link between decision-making power, relative earnings and schooling outcomes in this analysis. For our current measure of education, we are looking at completing an entire educational level (like junior high school or senior high school). If information would be available on a more progressive measure of education, like years of schooling, it could be the case that the link is present.

As for children's health, we do not observe any significant change of hands of decisions, albeit the relationship is positive, while there is a significant relationship between changes in relative female earnings and child health. One possible explanation for this finding is that mothers are able to make more use of the power they already have. Given that the wife and the husband continue to make decisions on child health jointly, with a little extra income compared to the husband, the wife might have a stronger say in the matter than before. While we do not observe a change in the health decision-making power variable, the increase in relative earnings might just strengthen her actual bargaining power in the matter.

Overall, these, at first sight contrasting, results highlight the limitations of the decision-making power measure. In the end, it is an attempt to quantify decision-making power and to capture changes in decision-making over time. Possibly this measure is too simplistic to capture the dynamics and all dimensions of household decision-making. Especially given that the far majority of couples report making decisions on children jointly for both years, where we cannot observe whom of the two parents actually has the strongest say in the matter. This quantitative measure may not be an adequate substitute for a field study and participatory observation to investigate changes in household decision-making.

Robustness

Table 3, 4 and 5 report the average effect of women's financial bargaining power for all households in my sample. However, it can be questioned whether the effect of an increase in women's bargaining power is the same for households that start off with low level of female earnings compared to those that report already a relatively high female income in 2000. One could argue that for families that start off from a low base level of women empowerment, even larger effects are to be expected. A small increase in the women's income, while keeping the income of the husband constant, would mean a large change in their actual bargaining power within the household. Hence, we would expect large changes in the outcomes of their children. This is what we are going to investigate now. For this purpose, I split the sample into two sub-samples based on the earnings of the median mother in 2000. Subsequently, I run the estimations on child health separately for the sample of families with low female earnings and for the sample of families that have high female earnings compared to the median.

Table 6 shows the results of the estimations for the two sub-samples. We find little significant effects but this is likely due to the smaller sample size, which raises the standard errors. We do find evidence for heterogeneous effects. Overall, the effects of bargaining power on child health are much larger for households that report high female income. For these households, an increase of roughly 1% in the relative earnings of the mother compared to that of the husband leads to a rise in reported health condition of the child of nearly one category (so moving from "somewhat healthy" to "very healthy", for example), *ceteris paribus*. The same improvement in child health requires an increase of about 2.5% in relative female earnings for families that start off with relatively low female earnings in 2000.

However, if we evaluate the effects in absolute terms, we get a more nuanced picture. Given that the median mother earns 4.800.000 rupiah if she is classified as a high earner, an increase of 1% in relative earnings amounts to an increase of 48.000 rupiah on yearly basis. For the low income group, the median mother earns about 720.000 rupiah per year. So for a similar improvement in child's health, we would be looking at

rise of 18.000 rupiah per year for her earnings. Comparing how feasible these income changes are for the different groups goes beyond the scope of this paper, but the larger effect of the high earning mothers on child health is at least partly explained by the fact that we are looking at a larger absolute change in income.

Table 6: Heterogeneous effects on child health across families with high female earnings and low female earnings

	(1)	(2)	(3)	(4)	(5)	(6)
	High female earnings			Low female earnings		
	All children	Boys	Girls	All children	Boys	Girls
Relative female earnings	0.979** (0.462)	0.632 (0.623)	1.071 (0.672)	0.390 (0.305)	0.647 (0.404)	0.390 (0.629)
Household size	-0.00378 (0.00990)	0.00672 (0.0111)	-0.0169 (0.0386)	0.0337 (0.0215)	0.0542 (0.0352)	0.0118 (0.0293)
Boy	0.0109 (0.0486)			-0.00264 (0.0463)		
Age child	0.00299 (0.00654)	-0.00392 (0.0107)	0.00598 (0.0144)	0.00827 (0.00635)	0.00740 (0.0107)	0.0035 (0.0148)
Urban	0.175* (0.104)	0.147 (0.137)	0.248 (0.179)	0.357*** (0.116)	0.415*** (0.144)	0.278 (0.293)
Education parents	Yes	Yes	Yes	Yes	Yes	Yes
Age parents	Yes	Yes	Yes	Yes	Yes	Yes
Religious dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of children	868	464	404	854	467	387
No. of households	337	242	223	351	258	229
Adj. R ²	0.152	0.235	0.067	0.109	-0.017	0.164

Notes: Robust standard errors are reported in parentheses. Estimation includes household fixed effects and a time dummy for the year 2007/2008. A detailed description of all variables can found in Table A1 in the Appendix. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Descriptive statistics from Table A5 indicate that overall mothers with relatively high earnings do report a somewhat larger decision-making power in the household. This implies that mothers with low earnings indeed come from a lower base level of empowerment. On average, high income mothers make 4 decisions more than their husband on household affairs, while mothers with a lower income report making 3 decisions more than their spouse.

Also, Table 6 reveals that mothers with a high income have a very strong preference for girls, while an income increase of low income mothers has a larger impact on boys' health. This is a remarkable finding. Since we control for unobserved factors that stay constant over time, the difference cannot be due to unobserved differences between households, like progressiveness. One explanation for this result could be a different socio-economic background of the households. If households with low female earnings are located in agricultural settings where it is mostly men that generate income by working on the land, then investing in boys' health would be more economical. Descriptive statistics indicate that about 64% of families with high low earnings live in rural areas, while the same figure is 45% for families with high female earnings. However, when we run a regression dividing the sample into rural and urban households (results are in Table A7 of the Appendix), we find that an increase in the relative female earnings has a stronger effect on the health of daughters for rural households. Hence, an agricultural location is not likely to be the explanation for the observed difference in preferences.

An alternative explanation for the preference for sons among low income mothers is that it could be a catch-up effect. Are sons more deprived health-wise in families with low female earnings? Descriptive statistics in Table A6 in the Appendix do not provide strong evidence for this. Just as we saw for the entire sample in Table 2, boys are indeed slightly worse off in terms of health compared to girls in 2000, but the difference is very small and not statistically significant. Similarly, in families with high female earnings, girls are not deprived in terms of health compared to boys. In short, there is no strong evidence for a catch-up effect as an explanation for the different preferences among households with high and low female earnings.

Another option is that women with a relatively low income are indeed less empowered. It could be the case that their decisions reflect the preferences of the father more. This brings us to the question whether women really retain control over their own earnings.

8 Conclusion

This thesis aims to retrace the effect of women's financial bargaining power on the health and education of their children in Indonesian communities. (Majlesi, 2015; Qian, 2008; Bobonis, 2009; Duflo, 2003; Lundberg, Pollak and Wales, 1997). This is the rationale behind micro-finance schemes and conditional cash transfer programmes specifically targeted at women. However, it remains a challenge to find a good proxy for bargaining power that truly reflects the decision-making power of the mother in the household. Unlike most studies in the literature (an exception is Majlesi, 2015), I have a direct measure of women's decision-making. In this way, this thesis aims to track whether decisions made in the household change hands as the income of the mother rises.

Another distinct approach of this thesis is that I use a panel data model (following Majlesi, 2015). I use data from a household survey called the Indonesian Family Life Survey from the year 2000 and a second wave from the year 2007/2008. Observing the households over multiple time periods allows me to use a fixed effects methodology and correct for unobserved differences between households that are constant over time. In this way we can control for factors that we are worried about, like progressiveness and family background. The model exploits variation in the variables within households, i.e. between siblings and over time.

Coming back to the question posed in the beginning of this thesis: does it matter who makes the money in the household? This thesis provides some evidence that it does matter. When the income of the mother rises compared to that of the husband, there is a significant and positive effect on the reported health condition of her children.

Evaluated at the level of earnings of the median household in our dataset, our findings indicate that a rise in the yearly income of the mother from 3.250.000 rupiahs to 3.400.000 rupiahs will change the reported health status of the child from "unhealthy" to "very healthy", given that the income of the father remains unchanged. Since the information on earnings likely suffers from measurement error, which is exacerbated by the fixed effects approach, the found effects should be considered as a lower bound.

Also, the effect for girls is about 30% larger compared to boys. This is consistent with findings from across the developing world, that indicate that mothers have a preference for investment in girls (Duflo, 2012), possibly because girls were lagging behind in terms of health and other conditions compared to boys. This is not the case in my data. Our findings are consistent with evidence on Mexico from Majlesi (2015). He uses labour market opportunities for women as a proxy for bargaining power and finds more significant effects on child health for girls. However, we do not find any significant effect on the education of children. This could be due to the broad educational categories that this thesis uses, as opposed to a more progressive measure of schooling, such as years of schooling.

A further exploration reveals that actually the preference for daughters is driven by mothers with a relatively high income. Mothers with a relatively low income display stronger effects on reported health condition for sons instead. This is not a catch-up effect, as there are no significant differences between boys and girls in 2000, nor can the observed difference in preferences be attributed to an agricultural (rural) location. It is not clear why this difference arises. The preference issue requires further investigation.

As for mechanisms behind the found effects, we find that an increase in the income of the mother is positively but not significantly related with the total number of decisions she makes in the household. Curiously, as the income of the mother rises, her decision-making power over children's education increases, while her influence over child health does not change significantly.

However, there are several results for caution when interpreting the findings of this thesis. The entire analysis hinges on two big assumptions. The first one is that married women keep control over their own earnings. This is what makes earnings a valid proxy for women's financial bargaining power. It can be questioned how realistic this assumption is given the sheer diversity of cultures in Indonesia (to give an idea, more than 700 languages are spoken in Indonesia). The study by Thomas, Contreras and Frankenberg (1997) indicates that there is already a large variation in whether women are allowed to

retain ownership over the assets she brought to the marriage. It is necessary to further investigate the different cultural and legal contexts and how these by itself own influence women's bargaining power, suggesting large heterogeneous effects across women in different places in Indonesia. The second assumption is that mothers and fathers have different preferences, which we try to infer, but cannot really test and also requires further investigation.

Women's earned income as a proxy for bargaining power is critiqued for the fact that it is an outcome of the bargaining process within the household, rather than as measure of women's bargaining power itself (Doss, 2013 and Thomas, Contreras and Frankenberg, 1997). Whether a woman works and how much she works could be all outcomes of the bargaining progress. This would make labour earnings endogenous to our model.

Consequently, the independence assumption would fail. The main identifying assumption of the model is that the independent variables are unrelated to the error term. If the reason that the wife's income has increased over time is a more progressive attitude of her husband, then the same change of attitude may also be responsible for better health and education of the children. Hence, the fixed effects approach would fail if important unobserved factors, like progressiveness, are not fixed over time and women's earnings is an outcome of household bargaining progress, rather than an input.

Using information on household decision-making in addition is an interesting exercise, but not extremely helpful. The measure we constructed has its limitations. First of all, it is subjective, as the information is given by the wife. It is her perception of her power, which might be different from the actual situation. It could be the case that mothers just perceives themselves as more powerful as their income rises, while actual household decision-making does not change. Also, it is a simplistic, uni-dimensional measure of power as it is just the number of decisions made by the wife minus the no. of decisions made by the husband. It can be questioned whether this quantitative measure really captures the dynamics in household decision-making over time. Future investigations can improve upon this by a field study with participatory observation. In addition, one

could explore how the results differ when the answers on decision-making questions in the survey by husbands are used instead.

Also, our main dependent variable of interest is subjective. The overall health condition of the child is reported by the mother. Only comparing answers given by the same mother, helps us get rid of some of the bias, but there could still be a problem. Perhaps when women become financially better off, they perceive their children as more healthy because overall the conditions in the household are better. The measure does not tell us anything about whether parents actually invest more money in the nutrition or medicine for their children. Future research on Indonesia could incorporate weight-for-height and height-for-age measures as more objective indicators for the health of children.

However, our findings are supported by other empirical work on the topic that use an exogenous shock to women's earnings for identification. As the shock is not related to household bargaining progress, these studies get around the endogeneity problem. These studies exploit changes in demand for labour in China (Qian, 2008) and in Mexico (Majlesi, 2015). They do suggest a causal relationship between women's bargaining power and child outcomes. However, then again, this does not automatically imply that our findings are valid for Indonesia; the assumption that women's retain control over their earnings should be assessed in the each separate local context.

Overall, women empowerment seems like a promising pathway for development. This implies improving labour market opportunities for women, strengthening the rights of women in the realm of marriage and divorce and overall creating a level playing field for both genders. The idea is that improved opportunities and rights for women will give them more power in the household and will result in better outcomes for children. As early development of human capital, both in terms of knowledge and health, is vital for productivity later in life (Duflo, 2003), this seems like a viable development strategy. However, based on this analysis, we cannot really say much about the effects for women do not work. Since we already found quite different results for mothers that start off with a low income and mothers who make relatively high earnings, it seems hard to extrapolate our findings to mothers who do not report an independent income at all.

Future research could look at how women empowerment spills over to other fields of household decision-making that are considered important for development, like savings behaviour of poor households and investment in goods such as malaria nets. Also, it should assess how creating a level playing field for both genders can best be achieved and how cost-effective it is as a development strategy.

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Appendix

Table A1: Definition of socio-economic variables used in the analysis

Variables	Definition
Educational level	The highest level of school attended by children in the household. Hereby we use the following education categories: 1 = No education or kindergarten 2 = Elementary education 3 = Junior high school 4 = Senior high school and vocational education 5 = College and university.
Health condition	Health condition as reported by the mother of the child. The following categories are distinguished: 1 = Unhealthy 2 = Somewhat unhealthy 3 = Somewhat healthy 4 = Very healthy.
Age	Age of the household member in years.
Boy	A dummy variable that takes on value "0" if the child is a girl, and value "1" if the child is a boy.
Log earnings of mother and father	Logarithm of yearly income in rupiah from the primary and possibly secondary job. Earnings from both wage jobs and self-employed businesses are taken on board. As reported by the household member him- or herself. If this information was not available, I took the figure that was mentioned by the household head.
Education level of mother and father	The highest level of school attended by individuals in the household. Hereby we use the following education categories: 1 = No education 2 = Elementary education 3 = Junior high school 4 = Senior high school and vocational education 5 = College and university.
Household size	Number of people living in the household, as reported by the household head.
Muslim	A dummy variable that takes on value "1" if the religious background of the household is Islamic, and otherwise "0".
Protestant	A dummy variable that takes on value "1" if the religious background of the household is protestant, and otherwise "0".
Catholic	A dummy variable that takes on value "1" if the religious background of the household is Catholic, and otherwise "0".
Hindu	A dummy variable that takes on value "1" if the religious background of the household is Hindu, and otherwise "0".
Buddhist	A dummy variable that takes on value "1" if the religious background of the household is Buddhist, and otherwise "0".
Confucian	A dummy variable that takes on value "1" if the religious background of the household is Confucian, and otherwise "0".

Urban	A dummy variables that takes on value "0" if the household is situated in a rural area, and value "1" if the locality can be characterized as urban.
No. of decisions made by wife	This variable indicates how many decisions in the household are taken by the wife. The IFLS data reports on a total of 17 different categories, which are described in Table A2. The variable is weighted; if the decision is taken by the wife only (and possibly jointly with another household member who is not the husband), value "1" is assigned. If the decision is taken jointly by the wife and the husband (and possibly other household members), value "0.5" is assigned.
No. of decisions made by husband	This variable indicates how many decisions in the household are taken by the husband. The IFLS data reports on a total of 17 different categories, which are described in Table A2. The variable is weighted; if the decision is taken by the husband only (and possibly jointly with another household member who is not the wife), value "1" is assigned. If the decision is taken jointly by the wife and the husband (and possibly other household members), value "0.5" is assigned.
Wife decision-making power	No. of decisions made by wife minus no. of decisions made by husband. This variable intends to capture to what degree the preferences of the wife are reflected in the household decisions.
Relative female earnings	Ratio of the logarithm of the yearly income of the mother over the logarithm of yearly income of the father. A value of "1" indicates that the yearly earnings of the mother and father are the same. An increase in the relative female earnings ratio suggests a rise in the financial bargaining power of the mother in the household.

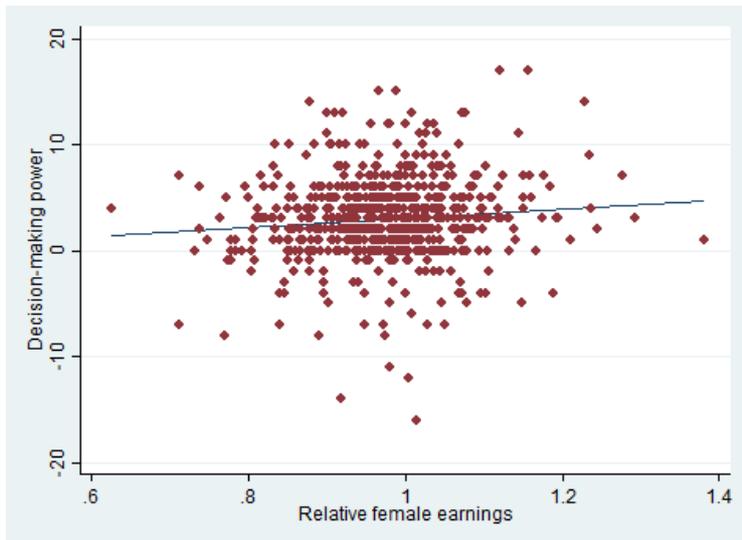
Table A2: Household decision making questions

We would like to know how your family makes decisions about expenditures and use of time. In your household, who makes decisions about:

- A1. Expenditure on food eaten at home
- B. Routine purchases for the household of items such as cleaning supplies
- C. Your clothes
- D. Your spouse's clothes
- E. Your children's clothes
- F. Your children's education
- G. Your children's health
- H. Large expensive purchases for the household (i.e., refrigerator or TV)
- I. Giving money to your parents/family
- J. Giving money to your spouse's parents/family
- K. Gifts for parties/weddings
- L. Money for monthly arisan (savings lottery)
- M. Money for monthly savings
- N. Time the husband spends socializing
- O. Time the wife spends socializing
- P. Whether you/your spouse works?
- Q. Whether you and your spouse use contraception?

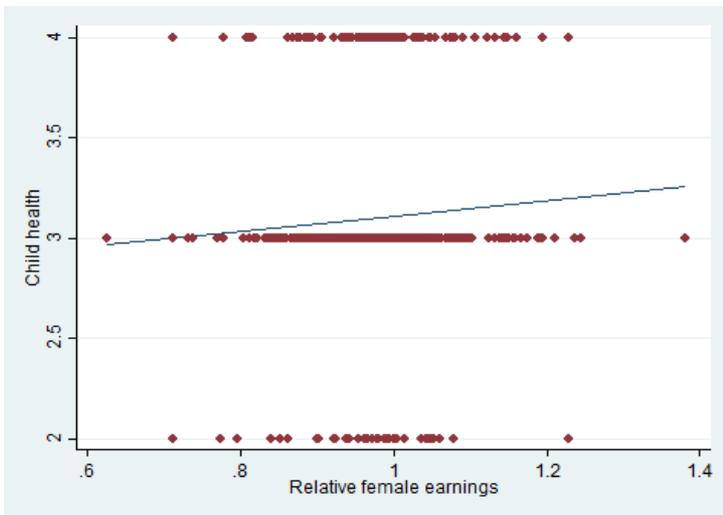
Source: IFLS 3, Book 3A, SECTION PK (HOUSEHOLD DECISION-MAKING).

Figure A1: Relative female earnings and decision-making power in 2007/2008



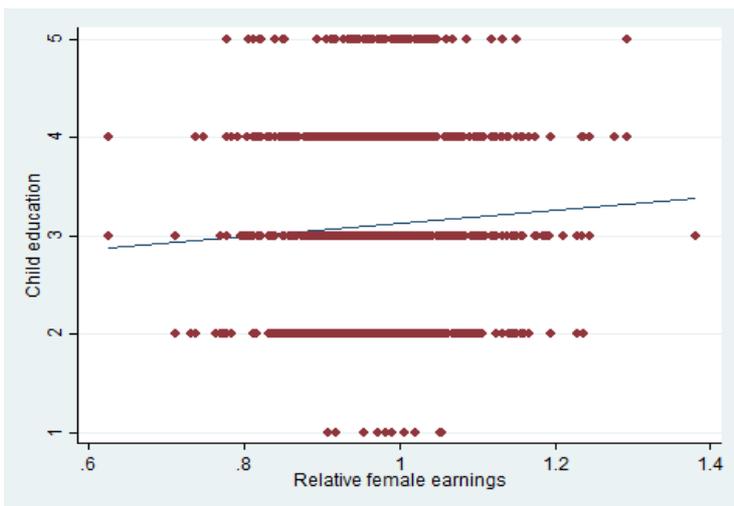
Source data: Indonesian Family Life Surveys

Figure A2: Relative female earnings and children's health in 2007/2008



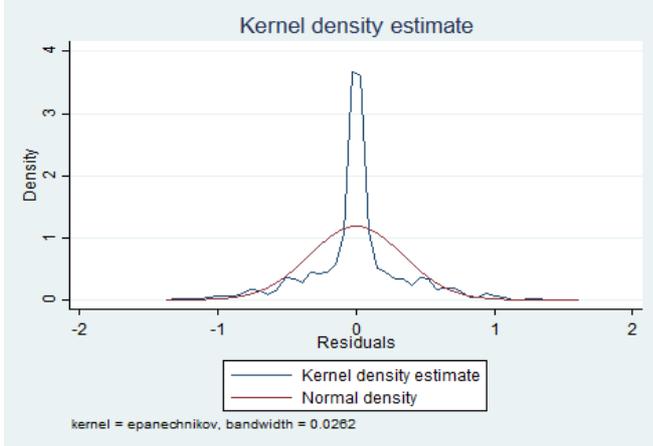
Source data: Indonesian Family Life Surveys

Figure A3: Relative female earnings and children's education in 2007/2008



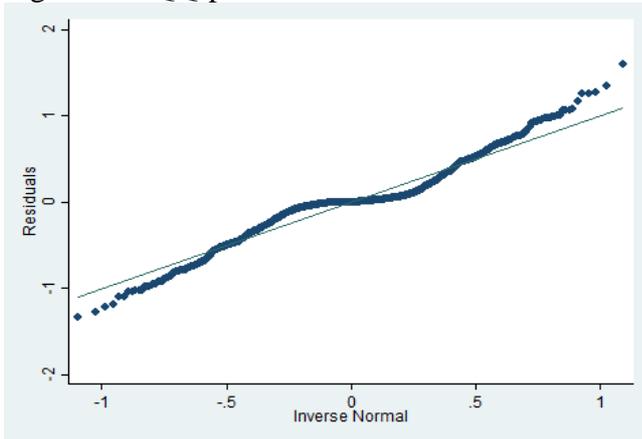
Source data: Indonesian Family Life Surveys

Figure A4: Distribution of residuals of child health



Notes: This figure displays the distribution of the residuals of the regression in column (1) in Table 3. The dependent variable is the overall health condition of the child, as reported by the mother. Normality of distribution is rejected by the Shapiro-Wilk test.

Figure A5: QQ-plot of residuals of child health



Notes: This figure displays the QQ-plot of the residuals of the regression in column (1) in Table 3. The dependent variable is the overall health condition of the child, as reported by the mother.

Table A3: VIF-values of the regression of the effect of women's financial bargaining power on children's health

Independent variables	VIF
Relative female earnings	4.15
Age child	2.50
Boy	2.23
Household size	24.47
Urban	12.70
Education mother	74.69
Education father	36.51
Age mother	101.50
Age father	87.26
Muslim	37.77
Protestant	13.60
Catholic	134.73
Hindu	1.83
Confucian	1.51
Year 2007	39.36

Notes: This table displays the VIF-values of the regression in column (1) in Table 3. The dependent variable is the overall health condition of the child, as reported by the mother. There are no high VIF values for relative female earnings nor for the household dummies. The VIF values for the household dummies are omitted due to space, but are all below 5. There are no multicollinearity issues for the main variables of interest.

Table A4: Step-wise regression of the effect of women's financial bargaining power on children's health

	(1)	(2)	(3)	(4)
Relative female earnings	0.621** (0.257)	0.613** (0.257)	0.608** (0.249)	0.650** (0.253)
Age child	0.00573 (0.00453)	0.00565 (0.00451)	0.00619 (0.00452)	0.00573 (0.00453)
Boy	0.00887 (0.0331)	0.00457 (0.0332)	0.00281 (0.0333)	0.00887 (0.0331)
Household size			0.0128 (0.0264)	0.00198 (0.0274)
Urban			0.250*** (0.0822)	0.253*** (0.0827)
Education parents	No	No	Yes	Yes
Age parents	No	No	No	Yes
Religious dummies	No	No	No	Yes
No. of children	1722	1722	1722	1722
No. of households	637	637	637	637
Adj. R ²	0.115	0.115	0.122	0.129

Notes: All estimations include household fixed effects and a time dummy for the year 2007/2008. This table displays the a step-wise version of the panel regression in column (1) in Table 3. The dependent variable is the health condition of the child as reported by the mother. The found effect appears to be very robust as the variable "relative female earnings" remains the same sign and significance level and approximately the same size, while other variables are added to the model. All children are included in the analysis. Robust clustered standard errors are reported in parentheses. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Table A5: Descriptive statistics for all children in households (HHs) with high and low female earnings

Variables	Mean HHs with high female earnings	Mean HHs with low female earnings	Mean difference	Std. dev. HHs with high female earnings	Std. dev. HHs with low female earnings	Std. dev. diff.
Education level	2.037	1.941	0.095**	0.818	0.784	0.034
Health condition	3.045	3.033	0.012	0.451	0.435	0.016
Age	8.123	8.338	-0.215	4.578	4.640	-0.062
Boy	0.536	0.546	-0.010	0.499	0.498	0.001
Log earnings mother	15.468	13.233	2.235***	0.733	1.108	-0.375
Log earnings father	15.433	14.708	0.725**	1.010	1.051	-0.042
Education mother	3.164	2.205	0.959***	1.257	0.783	0.474
Education father	3.406	2.385	1.022***	1.186	0.911	0.275
Age mother	36.268	35.931	0.337	5.207	6.271	-1.064
Age father	40.346	40.885	-0.540	6.229	7.826	-1.597
Household size	6.619	6.192	0.428***	2.225	2.031	0.194
Muslim	0.823	0.897	-0.074***	0.382	0.304	0.078
Protestant	0.087	0.012	0.075***	0.282	0.109	0.172
Catholic	0.018	0.009	0.009	0.134	0.095	0.039
Hindu	0.072	0.077	-0.005	0.258	0.267	-0.009
Buddhist	0	0.005	-0.005**	0	0.067	-0.067
Confucian	0	0	0	0	0	0
Urban location	0.548	0.335	0.213***	0.498	0.472	0.026
Wife decision-making power	3.898	2.994	0.904***	3.495	3.664	-0.168
Observations	657	663	1320	657	663	1320

Notes: A detailed description of all variables can be found in Table A1 in the Appendix. Descriptive statistics are on information for the year 2000. The total sample is split into two sub-samples based on the earnings of the median mother in 2000. Households with high female earnings are those above the median earnings of the mother, while households that are below the median are reported as households with low female earnings. All variables have observations on 1320 children per year, except for general health status which was only reported for children that are younger than 15 years. This results in a total of 584 observations for families with high female earnings and 583 observations for children who come from families with low female earnings. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Table A6: Descriptive statistics for girls and boys in households (HHs) with high and low female earnings

Variables	HHs with high female earnings			HHs with low female earnings		
	Boys mean	Girls mean	Mean difference	Boys mean	Girls mean	Mean difference
Education level	2.023	2.052	-0.030	1.912	1.977	-0.065
Health condition	3.041	3.048	-0.007	3.006	3.065	-0.058
Age	8.168	8.072	0.095	8.351	8.322	0.029
Log earnings mother	15.469	15.467	0.003	13.177	13.299	-0.122
Log earnings father	15.397	15.474	-0.076	14.706	14.710	-0.004
Household size	6.688	6.541	0.147	6.304	6.056	0.247
Observations	352	305	657	362	301	663

Notes: A detailed description of all variables can be found in Table A1 in the Appendix. All variables have observations on 1320 children per year, except for general health status which was only reported for children that are younger than 15 years. This results in a total of 634 observations for boys and 533 observations for girls for child health condition. ***, **, and * indicate statistically significant differences at the 1%, 5%, and 10% level.

Table A7: The effect of women's financial bargaining power on children's health in urban and rural areas

	(1)	(2)	(3)	(4)	(5)	(6)
	Urban areas			Rural areas		
	All children	Boys	Girls	All children	Boys	Girls
Relative female earnings	0.543 (0.481)	0.551 (0.535)	0.423 (0.822)	0.710** (0.298)	0.532 (0.399)	1.09 (0.42)
Household size	0.0148 (0.0336)	0.0961 (0.0770)	0.00913 (0.0478)	-0.0267 (0.0447)	0.0805 (0.0663)	-0.00 (0.00)
Boy	0.0464 (0.0490)			-0.0366 (0.0472)		
Age child	0.0464 (0.0490)	-0.00853 (0.0136)	0.0109 (0.0149)	0.00552 (0.00605)	0.00865 (0.00907)	0.00 (0.00)
Education parents	Yes	Yes	Yes	Yes	Yes	Y
Age parents	Yes	Yes	Yes	Yes	Yes	Y
Religious dummies	Yes	Yes	Yes	Yes	Yes	Y
No. of children	781	416	365	941	515	416
No. of households						
Adj. R ²	0.152	0.230	0.071	0.111	-0.013	0.152

Notes: Robust standard errors are reported in parentheses. Estimation includes household fixed effects and a time dummy for the year 2007/2008. A detailed description of all variables can be found in Table A1 in the Appendix.