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External shocks, household consumption and fertility in Indonesia

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External Shocks, Household Consumption and Fertility in Indonesia



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Abstract

This paper examines the impact of idiosyncratic income shocks on household consumption, educational expenditure and fertility in Indonesia, and assesses whether the investment in human capital of children and fertility are used to smooth household consumption. Using six different kinds of self-reported economic hardships, our findings indicate that coping mechanisms are rather efficient for Indonesian households that perceive an economic hardship. Only in case of unemployment we find a significant decrease in consumption spending and educational expenditure while fertility increases. These results indicate that households that perceive an unemployment shock use children as a means for smoothing consumption. Regarding the death of a household member or natural disaster we find that consumption even increases. These results are consistent with the argument that coping mechanisms even over-compensate the actual consumption loss due to an economic hardship. One important lesson from our findings is that different types of income shock may lead to different economic and demographic behavioral adjustments and therefore require specific targeted social insurance programs.

Keywords

Consumption, Insurance, Fertility and Indonesia.

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External Shocks, Household Consumption and Fertility in Indonesia

Jungho Kim and Alexia Prskawetz

1. Introduction

Recent natural disasters like the Tsunami in the Indian Ocean in December 2004 or the earthquake in Pakistan in October 2005 are the reminders that human beings are exposed to various risks. These aggregate risks are important to analyze because of their significant consequences at the aggregate as well as on the individual level. To what extent these economic shocks at the individual level (caused by natural disasters or household specific risks factors as mortality and illness) lead to a considerable loss of household income is the focus of many studies in development economics.

The household consumption in developing countries is often found to be rather smooth over the course of economic shocks. Pitt & Rosenzweig (1986) found for farm households in Indonesia only small effects of illness on farm profits. Townsend (1994) found that household consumptions were not sensitive to the risks of income, sickness or unemployment in Indian villages. Cameron & Worswick (2001) found that the crop loss did not have any significant impact on food or non-food consumption in Indonesia. Chetty & Looney (2005) also reported that the change in food consumption in response to unemployment in Indonesia was comparable to that in the U.S. From these results one may conclude that households in developing countries are able to cope with economic hardships despite the existence of imperfect financial markets and absence of universal insurance.

Several studies have indicated that there exist a variety of private informal coping mechanisms that help households to cope with economic hardship. Mechanisms identified in the literature include increasing labor supply, receiving transfers or social support from relatives, drawing on savings, etc. An extensive study of such coping mechanisms as a response to the death of a household member is illustrated in Grimm (2006). In particular Grimm stresses the importance to consider the age of the household member that died as well as to distinguish between short and long run effects of an economic hardship where he refers to long run as the time after the coping mechanisms became active. As recently shown by both Cameron & Worswick (2001) and Chetty & Looney (2005), households in Indonesia took a costly measure of reducing the educational expenditure in order to cope with the economic hardships. This leads to the possibility that with the lack of financial intermediaries households use the quality of children as a means for smoothing consumption.

The theoretical argument underlying most of the recent studies on consumption smoothing of households that are faced with various kinds of idiosyncratic risks follows the framework of optimal allocation of risk-bearing used by Townsend (1994) and Alem & Townsend (2003). The idea is to test whether the reality deviates from the benchmark case

where households should be immune to idiosyncratic shocks, once one controls for aggregate shocks to risk-sharing groups.

We follow this literature and consider how households in Indonesia adjust their consumption expenditures when faced with various kinds of economic hardship. In particular, we also test specific coping mechanisms of economic hardship that have recently been identified by Chetty & Looney (2005). We extend their analysis and not only consider the quality, but also the quantity of children, as a coping mechanism in response to idiosyncratic income shocks and test how these changes will materialize in the short versus long run. While Foster & Roy (1997) model the idea of having children for old age support in deriving the effect of family planning programs on investment of children's human capital and fertility, we focus on the income effect on those two dimensions of children as a savings device. As Schultz (1997) noted, testing whether children are substitutes for physical saving requires unusual economic and demographic information at the household and intergenerational level. We do not attempt to test this hypothesis, but rather try to find some evidence that children may play a role in smoothing consumption in the context of developing countries.

Indonesia is one of the countries with a low level of social safety net, whose social spending by the government is 0.9 percent of Gross Domestic Product (GDP) with per capita GDP US\$ 985.2 in 1998 (World Development Indicator 2000, 2004).¹ The data set used is the Indonesian Family Life Survey, which has self-reported economic hardships as a measure of income shock. While previous studies have focused on one or two kinds of economic hardships, we examine six different kinds of economic hardships: a death and sickness of any household member, crop loss, natural disaster, unemployment and income loss due to price fall. For each economic hardship we then test whether the household is able to smooth consumption over time and whether it uses a specific coping mechanism. In particular we focus on demographic coping mechanisms such as the quantity and quality of children.

It is important from a political point of view to distinguish whether private coping mechanisms such as changes in fertility and human capital investment are chosen in response to economic hardship or whether alternatively a risk sharing group absorbs the effect of idiosyncratic shocks. Moreover, the analysis also allows us to distinguish whether these effects vary across the type of economic hardship experienced by the household.

The preliminary finding is the following. Only in case of unemployment we find a significant decrease in consumption spending and educational expenditure while fertility increases. These results indicate that households that perceive an unemployment shock use children as a means for smoothing consumption. For the shocks of the death of a household member or natural disaster we find that consumption even increases. These results are consistent with the argument that coping mechanisms even over-compensate the

¹ Public expenditure on social security and welfare includes compensation for loss of income to the sick and temporarily disabled, payments to the elderly, the permanently disabled, and the unemployed; family, maternity, and child allowances; and the cost of welfare services, such as care of the aged, the disabled, and children. It excludes expenditures on important safety net categories, including subsidies and public work program costs. The per capita GDP is in terms of the constant 1995 US dollars.

actual consumption loss due to an economic hardship. One important lesson from our findings is that different types of income shock may lead to different economic and demographic behavioral adjustments and therefore require specific targeted social insurance programs.

The rest of the paper is organized as the following. The next section describes the data and the characteristics of economic hardship. Section 3 examines whether the subjective measures of economic shocks are valid. Section 4 discusses the benchmark model of risk sharing and presents empirical results. Section 5 provides the theoretical framework for testing consumption smoothing through children as a savings device under an imperfect capital market, and presents empirical results. Section 6 concludes.

2. Description of Data and Economic Hardship

Our empirical analysis is based on the Indonesian Family Life Survey (IFLS), which was collected by RAND Corporation in collaboration with UCLA, Lembaga Demografi and University of Indonesia. The IFLS consists of three waves in total, IFLS1 conducted in 1993/94, IFLS2 and IFLS2+ in 1997 and 1998, and IFLS3 in 2000. The sample represents about 83 percent of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country in 1993. IFLS1 has 7,224 households, and the subsequent waves targeted all the split-off households as well as all the original households previously interviewed. The response rates for the IFLS2 and IFLS3 were above 94 percent of the target sample. The survey contains a wealth of information collected at the individual and household level including consumption expenditure, education, labor market outcomes, migration, fertility history and health. It also contains the physical and social environment, infrastructure, employment opportunities, food prices, access to health and educational facilities, and the quality and prices of services available at those facilities at the community level.

One interesting feature of the IFLS is that it has a questionnaire on economic hardship in the past five years at the household level. The economic shocks include a death or sickness of any household member, crop loss, income loss due to natural disaster, unemployment of household members, and income loss due to price shock. This self-reported information certainly has a limitation that it cannot be conditioned on the expectation about such events. However, it measures the perceived income shocks due to those events, and we believe that it is still informative to examine how households respond to those perceived shocks in characterizing the vulnerability of the households to such risks. The basic description of each economic shock and the coping mechanisms indicated by the household follows.

Table 1 shows the extent to which households experienced a death of a household member and the various mechanisms taken to cope with it.² The proportion of households that had a death of any member over the past five years is 7 percent in 1993, 16 percent in

² This analysis follows the study of Grimm (2006).

1997 and 8 percent in 2000.³ Households took various measures in response, and it appears that using formal or informal financial institutions by taking a loan, selling assets and using savings was most widely used. Getting transfers or assistance from relatives or friends is another important measure used by more than 30 percent of the households that experienced a death of any member in 1993 and 2000. The proportion of households that cut expenditure is 6 percent in 1993 and 12 percent in 2000. This rather low value in the cut of expenditure may indicate that the households coping mechanisms like selling assets, increasing labor supply and receiving transfers are efficient. The median cost of the measure in 1993 is 236,749 rupiah (in Jakarta in 1993), which amounts to 68 percent of the median yearly food and non-food consumption expenditure per person. The median yearly income of the deceased is 225,080 rupiah or 48 percent of the consumption expenditure per person in 2000. When only the positive income of the deceased is counted, the median income becomes 278 percent of the per capita consumption. The median value of the medical or funeral cost is 65 percent of the per capita consumption expenditure in 2000. Therefore, the death of a member seems to be a substantial burden to households.

The description of the sickness of a household member is presented in Table 2. For the first and the third wave, the prevalence of sickness is higher than the death of a household member. The share of the households that experienced the sickness of any member over the past five years is 12 percent in 1993, 16 percent in 1997 and 11 percent in 2000. The composition of the measures taken and the size of the burden are similar to the case of the death of a member. Note in particular that the cut in expenditure is rather low again indicating that coping mechanisms as a response to sickness of a household member are efficient. The median cost of the measure taken in 1993 was 65 percent of the yearly per capita consumption. In 2000, the median yearly income loss due to sickness was 55 percent of the yearly consumption per person, and the median of the medical or funeral cost amounted to 72 percent of the yearly consumption per person.

Table 3 describes the characteristics of the households' response to the crop loss. The prevalence is 11 percent in 1993, 13 percent in 1997 and 14 percent in 2000. The most widely taken measure is the increase in labor supply or activities, which was taken by more than 40 percent of the households both in 1993 and 2000. Using the IFLS1, Cameron & Worswick (2003) found that the labor market is used for smoothing consumption in case of crop loss. In contrast to the cases of a death or sickness of a member, the measure of getting transfers or assistance from relatives or friends was used only by 7 percent in 1993 and 5 percent in 2000. One possible explanation is that crop loss is not household-specific but that it may affect potential source for transfer as well. The share of households that reported to cut expenses was 22 percent in 1993 and 20 percent in 2000. Therefore, the households seem to be more vulnerable to crop loss than to a death or sickness of a member in terms of consumption expenditure at least at the descriptive level. The median

³ It is worth noting that the numbers in Table 1 are slightly different from those in Table 1 in Grimm (2006), which was also based on IFLS1, IFLS2 and IFLS3. Grimm (2006) reports that the share of households with a death of any member is 10 percent in 1993 and 1997 and 9 percent in 2000. The difference is likely to do with the way the final sample was constructed. The balanced panel used in Grimm (2006) has 6,303 households, whereas the sample size in this study is 5,138. The composition of the responses and their median costs in the two tables are similar to each other. One exception is the median yearly income of the deceased (and that of those who worked), which is zero in Grimm (2006) and 229,112 rupiah here.

cost of the response amounts to 43 percent of the yearly consumption expenditure per person in 1993 and 39 percent in 2000. The major reasons for the crop loss are drought (48 percent), mouse infestation (12 percent) and pest infestation (24 percent).

The households' response to the income loss due to earthquake, fire and other natural disasters is described in Table 4. Only 2 to 3 percent of the households reported to have experienced natural disasters. The labor supply response was taken by 23 percent of the households in 1993 and by 31 percent of them in 2000. The prevalence of transfer or assistance from others in response to natural disaster was higher than in the case of a crop loss but lower than the case of death or sickness of any member. The size of the burden is reported to be larger than those of a death, sickness or crop loss. The median cost of the measure taken was 108 percent of the yearly consumption per capita in 1993 and 117 percent in 2000. The share of the households that cut expenditure is 16 percent in 1993 and 15 percent in 2000.

Table 5 presents the description of the unemployment. The proportion of the households that perceived the unemployment as an economic shock was 3 percent in 1993 and 4 percent in 1997 and 2000. The major coping means was an increase in labor supply, which was taken by 45 percent of households in 1993 and 39 percent in 2000. Cutting expenditure was also used by 18 percent in 1993 and 14 percent in 2000. The median cost of the measure was 67 percent in 1993 and 92 percent in 2000.

The income loss due to price fall is described in Table 6. The share of the households that had price fall was 5 percent in 1993, 10 percent in 1997 and 5 percent in 2000. Like for crop loss and unemployment, the labor supply response was the most widely used (35 percent of the households in 1993 and 2000). The proportion of the households that reported to have cut expenditure is higher than those in the other economic shocks (33 percent in 1993 and 26 percent in 2000). The median cost of the measure amounted to 30 percent of the yearly consumption expenditure per person in 1993 and 40 percent in 2000.

In summary, the descriptive findings show that households experienced different economic shocks at various degrees over the last five years in each wave. Sickness of a household member, crop loss and death of a household member were experienced by about 7 to 16 per cent of all households. Natural disaster, unemployment and price fall were experienced by only 2 to 10 per cent of all households. As indicated in Table 7 when all the economic shocks are counted together more than 30 percent of the households reported to have experienced any economic hardship over the previous five years in each wave.

The extend of coping mechanisms ranging from selling assets, receiving transfers and increasing labor supply were used to a different, but rather pronounced, extend across the various economic hardships. Most interestingly, the proportion of households indicating a cut in expenditures is rather low ranging from 6 percent for the households that experienced a death or sickness of a household member in 1993 to 33 percent for the households experiencing a price fall in 1993. These descriptive findings already indicate that coping mechanisms as a response to economic hardship may have been rather efficient, therefore leaving the cut in expenditures at rather low levels. In section 4 we shall test whether consumption expenditures have indeed not been significantly affected by

various economic hardships and test whether other coping mechanisms (not recorded by the household) that are related to the quantity and quality of children have been used.

The final sample includes 5,136 households with no missing values for the relevant variables over all three waves (i.e. in 1993, 1997 and 2000). The summary statistics of pooled observations are presented in Table 14 in the Appendix.

3. Validity of Subjective Measure of Economic Shock

Although the subjective measures of economic hardship are useful in understanding the households' vulnerability to various risks at the descriptive level, examining the impact of those measures on consumption in the statistical analysis exposes an issue of whether the perceived shocks are exogenous with respect to consumption. If those households that perceive economic shocks more often are more likely to have a higher (or lower) consumption in the expectation of shocks, then the observed impact of economic shock on consumption reflects the correlation between the perception of risks and consumption rather than the impact of the shock on consumption.

One way to investigate this issue is to look at whether the consumption has a predictive power on the perceived economic shock in the next period. The following linear regression model is taken in estimating the determinants of economic shocks.

$$S_{i,t+1} = \delta_0 + \delta_1 CONS_{i,t} + \delta_2 X_{i,t} + \eta_{i,t}, \quad (1)$$

where $S_{i,t+1}$ is an index for a perceived shock of a household i at time $t+1$, $CONS_{i,t}$ indicates the log of consumption of a household i at time t , $X_{i,t}$ is a vector of observable characteristics of household i at time t , and $\eta_{i,t}$ is the error term. If the perceived shock is not unexpected, it will show up as a significant coefficient on consumption ($\delta_1 \neq 0$).⁴

Table 8 presents the results on the determinants of the six different perceived economic hardships examined in the pervious section. In order to control for the huge geographical diversity in Indonesia, community fixed-effects are removed in the estimation. The coefficients on consumption expenditure are close to zero and not significant except for the cases of the sickness and price fall. According to column (2) in Table 8 those households that had higher consumption expenditure perceived the sickness of any member and income loss due to price fall in the following period more often. Therefore, we cannot rule out the possibility that households with a high expectation of sickness of any member or price fall respond to the risk in advance by increasing the level of consumption. On the other hand, the assumption that the perception of death of any member, crop loss, natural disasters and unemployment is independent to consumption is at least consistent with the data. Hence in the rest of the paper, we examine the impact of the subjective measure of these four economic hardships on consumption and fertility.

⁴ We use log of consumption rather than consumption itself in the statistical analysis in order to minimize the influence of outliers.

4. The Benchmark Model of Optimal Allocation of Risk

One useful way of assessing whether households are insured against the income shocks discussed in the previous section is to consider a benchmark case of perfect insurance used by recent studies including Townsend (1994) and Alem & Townsend (2003). The perfect insurance means that a household's consumption expenditure should not be affected by the economic shock once the aggregate income of the risk-sharing group is controlled for. In other words, it is the case where the individuals in a group pool all the income in each period and allocate among themselves based on an agreed rule. Since the risk-sharing group can be defined at any level, both the whole sample and a village are considered as the unit of the redistribution. The implication of the benchmark model is that the effect of change in income, Y , on change in consumption, $CONS$, is zero in the following specification.

$$\Delta CONS_{i,t} = \alpha_0 A_t + \alpha_1 X_{i,t} + \alpha_2 \Delta Y_{i,t} + \alpha_3 \Delta(Y_{i,t} \times Z_{i,t}) + \mu_i + \Delta v_{i,t} \quad (2)$$

where subscripts indicate a household i at time t , A is the dummy for a risk-sharing group, X denotes the demographic characteristics of a household and Z is the household specific characteristics that may affect the impact of income shock on consumption. We use the index for economic shock as a measure of income. We first examine the implication of the perfect risk sharing ($\alpha_2=0$), and then further explore whether the effect of economic shock on consumption is affected by the duration of the event and household head's characteristics (Z).

Table 9 presents the results from the estimation of the effects of economic shock on consumption. In the first column where the risk-sharing group is assumed to be the whole sample, the death of a household member increases the per capita total household consumption expenditure significantly. This is consistent with the finding of Grimm (2006) that coping mechanisms like increasing labor supply and depleting assets may overcompensate the direct loss of income due to a death of a household member. Our estimates indicate that the death increases survivors' consumption by 6 percent on average.⁵

Surprisingly, households tend to increase consumption significantly in response to natural disaster. This result may well be due to the timing effect. That is, the consumption level decreases right after the disaster, but it increases as the transfer of goods through relief efforts arrives. Again, this result indicates that coping mechanisms are rather efficient. The unemployment of a household member decreases the consumption expenditure significantly. On average, per capita consumption decreases by 7 percent due to an unemployment according to column (1) in Table 9. Using the same data set, Chetty & Looney (2005) also found that the unemployment decreases consumption by 10 percent in Indonesia.

On the other hand, households do not tend to change their consumption in response to crop loss. The results remain qualitatively the same when a village is defined as the risk-

⁵ Grimm(2006) included 13 province dummies and rural/urban areas as additional control variables.

sharing group, which was implemented by including village fixed-effects. Adding additional control variables to the estimation does not alter the results, either. The number of household members has a negative impact on consumption expenditure per person, and the impacts of children and seniors have larger magnitudes than that of adults. Household heads with more schooling have more consumption than those with less schooling.

The analysis of the average effect may hide the fact that some groups are more vulnerable than others. Therefore, we examine whether the effect of income shock on consumption depends on household specific characteristics. Table 10 presents the estimation results that include the interaction between income shock and other variables assuming that a village is the unit of risk sharing. The column (1) of Table 10 is the baseline case identical to the column (4) in Table 9. We conjecture that the effect of economic shock on consumption decreases over time if the shock is not persistent. However, there is no significant difference in the effects of shocks on consumption regarding the time that elapsed since the shock was perceived. Column (3) indicates that the vulnerability to death of a member is reduced for Muslim households, which suggests that the majority Muslim communities play a role as a risk-sharing group in case of death. According to column (4), households with female heads tend to suffer more in case of the death and unemployment. This results may reflect the fact that those households have less ability to take measures like borrowing or increasing labor supply, the major coping strategies as indicated by Table 1 and Table 3. Interestingly, column (6) suggests that the schooling of household head does not affect the vulnerability to economic hardships.

The results so far suggest that households are rather well insured against risks other than unemployment. Put differently, according to Grimm (2006) and related to our descriptive findings in section 2, the micro-economic growth regressions indicate that households are rather efficient in coping with economic hardship.⁶ In fact, since households nevertheless perceive a cut (though small) in expenditure in the descriptive findings, we may argue similar to Grimm (2006) that households underestimate the efficiency of their coping mechanisms. However, as shown by several previous studies and indicated in Table 1 through Table 7, consumption smoothing may entail substantial change in economic behavior as reducing educational and health investment in children in addition to increasing labor supply, depleting wealth or assets, etc. Such smoothing techniques may turn out to be rather inefficient for the long run development and therefore support the introduction of social safety nets. In summary, the introduction of social insurance programs is an important policy goal in developing countries not so much in order to help smooth consumption but rather to reduce inefficient smoothing mechanisms. Previous studies examined the labor supply or educational expenditure as a smoothing device (Cameron & Worswick 2003, Chetty & Looney 2005). In this paper we go beyond previous studies and investigate not only economic but also demographic behavioral responses. In the next section, we explore the possibility that households use both quantity and quality of children as an alternative measure for smoothing consumption.

⁶ In Grimm (2006) three different reactions as a consequence of death of a household member have been tested for their statistical significance. The results indicated that households indeed deplete assets and increase labor supply while no conclusive results were found for variations in transfers.

5. Children as a Savings Device

In order to illustrate the purpose of having children as a means for consumption smoothing, we take a simple two period model, where parents care about only their own consumption. The time separable utility function, $u(\cdot)$, is assumed to be the same for both periods. The time discount rate is denoted by β . Then, the objective function is the following.

$$\max u(c_1) + \beta u(c_2) \quad (3)$$

A couple is assumed to have a choice over the number of children, n_1 only at period 1, and receives a return, w_2 from each child at period 2. It is assumed that children are the only means for transferring resources from period 1 to period 2. Then, the budget constraints at both periods are the following.

$$y_1 = p_{c,1} c_1 + p_{n,1} n_1 \quad (4)$$

$$y_2 + w_2 n_1 = p_{c,2} c_2, \quad (5)$$

where the income, price of consumption good, and cost of a child at period t are denoted by y_t , $p_{c,t}$ and $p_{n,t}$, respectively. The usual first order condition follows.

$$u'(c_1) p_{n,1}/p_{c,1} = \beta u'(c_2) w_2/p_{c,2} \quad (6)$$

Equation (6) states that a couple chooses the number of children at period 1 so as to equalize the discounted values of marginal utilities in both periods. If the utility function is concave, the increase (decrease) in income at period 1 leads to an increase (decrease) in the number of children at period 1.

The basic intuition still applies to the case, where a child composite good has two dimensions. Then, a couple can choose the level of quantity and quality of children in response to an income shock to smooth the consumption intertemporally. The relative magnitudes of the effects of income on quality and quantity of children depend on the relative prices and the returns to the two dimensions of children. For the rest of the section, we estimate these income effects empirically.

We take the following linear specification of a household demand system in estimating the effect of income shock, Y , on food and nonfood consumption, $CONS-FNF$, educational expenditure, EDU , and fertility, FER .

$$CONS-FNF_{i,t} = \lambda_0 + \lambda_1 Y_{i,t} + \lambda_2 X_{i,t} + \mu_i + \theta_{i,t} \quad (7)$$

$$EDU_{i,t} = \beta_0 + \beta_1 Y_{i,t} + \beta_2 X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (8)$$

$$FER_{i,t} = \gamma_0 + \gamma_1 Y_{i,t} + \gamma_2 X_{i,t} + \mu_i + \omega_{i,t} \quad (9)$$

where the subscripts indicate household i and period t , and $X_{i,t}$ represent household characteristics. The error terms are denoted by $\theta_{i,t}$, $\varepsilon_{i,t}$ and $\omega_{i,t}$. It is plausible that households have different preferences over consumption and child good denoted by μ_i , and its correlation with other independent variables will lead to inconsistent estimation of the

parameters of interest. Therefore, the differenced equation over two periods is taken in order to remove such a correlation.

$$\Delta CONS-FNF_{i,t} = \lambda_1 \Delta Y_{i,t} + \lambda_2 \Delta X_{i,t} + \Delta \varepsilon_{i,t} \quad (10)$$

$$\Delta EDU_{i,t} = \beta_1 \Delta Y_{i,t} + \beta_2 \Delta X_{i,t} + \Delta \varepsilon_{i,t} \quad (11)$$

The timing of economic shock is one of the five years prior to survey, whereas the fertility measure in each wave (e.g. the number of children born over the previous five years) is the accumulation of fertility. Hence, estimating Equation (9) using the differenced equation induces the endogeneity issue of economic shock. In order to match the timing of economic hardship and fertility, we construct the yearly observations for each household for the five-year period prior to the survey year assuming that there is no change in the demographic structure of a household over the period. Then, a linear probability model is taken in estimating the effect of the economic shock on the conception in each year as follows.

$$\text{Prob}(FER_{i,t} > 0 | Y_{i,t}, X_{i,t}, \mu_i) = \gamma_0 + \gamma_1 Y_{i,t} + \gamma_2 X_{i,t} + \mu_i + \omega_{i,t} \quad (12)$$

The unobserved household specific characteristics, μ_i , is controlled for by using the household fixed-effects estimation.

The main coefficients of interest are λ_1 , β_1 and γ_1 , and the four different self-reported economic hardships are used as income shock. The monthly per capita educational expenditure is considered as the investment on children. The index for giving births in the next year for each year is used as a measure of fertility.⁷

Table 11 presents the main results. Since the food and nonfood consumption is 90 percent of total consumption, the effect of economic shock on consumption of food and nonfood consumption closely resembles that on total consumption. The death of any household member and the natural disaster have a positive and significant impact on the consumption goods, while the unemployment decreases food and nonfood consumption significantly.

According to column (2) of Table 11, natural disasters tend to increase educational expenditure significantly, and the unemployment tends to decrease educational expenditure significantly. The positive impact of natural disasters on educational expenditure is likely to be due to the timing of the survey after those economic shocks. The unemployment decreases educational expenditure by 17 percent, which is consistent with Chetty & Looney (2005)'s finding that the unemployment decreases the educational expenditure by around 10 percent.

As for other variables, the households with more children tend to spend more on educational expenditure, whereas those with more old members tend to spend less. The

⁷ Assuming that it takes a year to deliver a birth, the births in the following period is used as a measure of conception of the current period.

households with a highly educated household head tend to spend more on educational expenditure.

We turn to the effect of economic shocks on fertility, which is presented in Table 12. Column (1) indicates that all the economic hardships other than unemployment do not affect fertility significantly. The effect of unemployment exhibits a nonlinear pattern, which implies that households with unemployment shock increases fertility in the first period and decreases fertility afterwards. The positive impact of unemployment on fertility in the initial period may be understood as the lowered cost of childbearing due to having additional member available for childcare. The negative impact in the subsequent periods is likely to reflect the negative income effect of unemployment.

The columns (2) to (6) of Table 12 examine whether the impact of unemployment on fertility varies with other household characteristics. Being Muslim or gender and age of head does not affect the household's fertility choice in response to unemployment. The positive and significant coefficient on the interaction of unemployment and the educational attainment of household head states that households with a head having more than 4 years of schooling tend to increase fertility in the first period. It suggests that, for households whose head has high level of schooling, the increase in fertility due to lower cost of childcare outweighs the decrease in fertility due to lower income.

Regarding other control variables, the existence of children decreases the probability of giving birth, whereas households with more adults and senior members tend to give more births. Muslim households tend to have a higher fertility. Households with a female or old head tend to give birth less. Household head's education exhibits a non-linear pattern having a negative impact on fertility for less than 6 years of schooling and a positive impact for more than 6 years (not shown).

The summary of the effect of economic shocks on the components of household consumption is presented in Table 13. The death of a member increases the household food and nonfood consumption per person, which is consistent with Grimm (2006). Crop loss does not have a significant impact on consumption goods. The positive impact of natural disaster on consumption and educational expenditure can be understood as the increase in the purchase of market good related to a relief efforts or the issue of the timing of survey. The Indonesian data indicate that the relief efforts or the issue of the timing of survey. The Indonesian data indicate that the economic shocks of death and crop loss do not change the incentive for allocating resources through investment in children or fertility. On the other hand, households seem to respond to unemployment by increasing fertility and reducing investment in children's human capital.

Relating these results to the descriptive findings on the perception of economic hardships we may conclude that (a) coping mechanisms like selling assets, increasing labor supply and transfers are indeed efficient and (b) households underestimate the efficiency of those coping mechanisms and indeed may even overcompensate the consumption loss that is due to an economic hardship. By extending the analysis to also include demographic responses not reported by households as a coping mechanism we found that only for unemployment households use children to smooth consumption.

6. Conclusion

This paper examines the people's vulnerability to idiosyncratic income shock and explores the role of quantity and quality of children as a means for smoothing consumption. Using the self reported measures of the economic hardship, we estimate how different income shocks affect consumption smoothing, educational expenditure and fertility. The main finding is that coping mechanisms are rather efficient for Indonesian households that perceive an economic hardship. Only in case of unemployment we find a significant decrease in consumption spending and educational expenditure while fertility increases. These results indicate that households that perceive an unemployment shock use children as a means for smoothing consumption. For other shocks like death of a household member or natural disaster we find that consumption even increases. These results might be consistent with the argument that coping mechanisms even over-compensate the actual consumption loss due to an economic hardship.

One important message is that different types of income shock may lead to different consequences in terms of consumption, investment of children and fertility, and that they require specifically targeted social insurance programs. One conclusion from our findings so far is that social insurance against transitory shocks are mainly required in case of unemployment. The fact that the increase in labor supply was a major coping strategy in response to unemployment suggests that improving the efficiency of a local market may complement other social safety nets.

There are a few directions for further analysis. As Alem & Townsend (2003) address it, it will be interesting to evaluate the local financial institutions in terms of how much they help households' smooth consumption. It will be also interesting to study in more detail the mechanisms through which households may cope with any income shock. These include the labor market participation and the transfers between relatives or friends as indicated in the descriptive findings. Lastly, it may be worth taking a direct measure of income to conduct the analysis above since it reflects any idiosyncratic income shock.

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Appendix

The final sample in the analysis includes 5,136 households with no missing values for the relevant variables over all three waves (i.e. in 1993, 1997 and 2000). The summary statistics of pooled observations are presented in Table 14 below. All the expenditures are deflated by the CPI index by province by year so that they denote the values in Jakarta in 1993. The top and bottom one percent of the total consumption expenditure per person distribution and those of the change over two periods in expenditure distribution are trimmed in order to remove extreme values. The mean food and non-food expenditure per person is 44,386.2 rupiah, which is about 90 percent of the total expenditure. The mean per capita educational expenditure is 5,124.5 rupiah. The number of children born over the past five years is 0.43 assuming that those children were present at the time of survey. The average household size is 4.5 members, among whom about one third is under age 15 and about one tenth is above age 59.

As discussed before, there are six variables indicating the experience of economic hardship over the past five years. In the pooled sample over three waves, the proportion of households that experienced a death or sickness of any member is 10 percent and 13 percent, respectively. About 12 percent of households experienced income loss due to crop loss, while only 2 percent of households were hit by natural disaster. The unemployment and income loss due to price fall were reported to be an economic shock by 4 percent and 7 percent, respectively. In terms of household head's characteristics, 88 percent of them are Muslim, and 17 percent of them are female. On average, household head is 48 years old, and 5.25 years of schooling. About 58 percent of households reside in rural area in the sample period. The bottom half of Table 14 shows the descriptive statistics of the differenced variables over two adjacent periods.

Table 1
Economic Hardship 1: Death

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.07	0.16	0.08
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.11		0.18
Taken a loan	0.26		0.19
Sold assets	0.26		0.15
Used savings	0.19		0.15
Received transfers/assistance	0.34		0.30
Cut expenditure	0.06		0.12
Others ^c			0.26
Median cost to overcome the hardship ^{b,c}	2,367.49		
In relation to median yearly per capita expenditure	0.68		
Median yearly income of the deceased ^{a,b}			2,250.80
In relation to median yearly per capita expenditure			0.48
Median yearly income of the deceased (if worked) ^{a,b,f}			13,161.71
In relation to median yearly per capita expenditure			2.78
Median cost of medical or funeral cost ^{a,b}			3,098.25
In relation to median yearly per capita expenditure			0.65
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others. (f) 54 percent of the households with a death reported a positive income of the deceased.

Table 2**Economic Hardship 2: Sickness**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.12	0.16	0.11
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.10		0.09
Taken a loan	0.31		0.28
Sold assets	0.29		0.18
Used savings	0.22		0.18
Received transfers/assistance	0.26		0.32
Cut expenditure	0.06		0.12
Others ^e			0.19
Median cost to overcome the hardship ^{b,c}	2,287.14		
In relation to median yearly per capita expenditure	0.65		
Median yearly income loss ^{a,b}			2,615.70
In relation to median yearly per capita expenditure			0.55
Median cost of medical or funeral cost ^{a,b}			3,397.51
In relation to median yearly per capita expenditure			0.72
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 3**Economic Hardship 3: Crop Loss**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.11	0.13	0.14
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.44		0.40
Taken a loan	0.20		0.17
Sold assets	0.20		0.09
Used savings	0.05		0.02
Received transfers/assistance	0.07		0.05
Cut expenditure	0.22		0.20
Others ^c			0.29
Median cost to overcome the hardship ^b	1,507.01		1,842.89
In relation to median yearly per capita expenditure	0.43		0.39
Reason for crop loss ^{a,c,d}			
Dry/ drought/ lack water		0.48	
Wet/ flood/ storm/ waves		0.05	
Hot		0.01	
Other weather/ volcano		0.02	
Disease/ virus		0.04	
Mouse infestation		0.12	
Caterpillars		0.01	
Other pest infestation		0.24	
Wild animals		0.02	
Lack inputs		0.02	
Other		0.03	
Don't Know		0.05	
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 4**Economic Hardship 4: Natural Disaster**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.03	0.02	0.02
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.23		0.31
Taken a loan	0.29		0.18
Sold assets	0.19		0.15
Used savings	0.11		0.05
Received transfers/assistance	0.21		0.13
Cut expenditure	0.16		0.15
Others ^e			0.33
Median cost to overcome the hardship ^b	3,767.53		5,557.74
In relation to median yearly per capita expenditure	1.08		1.17
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 5**Economic Hardship 5: Unemployment**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.03	0.04	0.04
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.45		0.39
Taken a loan	0.17		0.14
Sold assets	0.16		0.12
Used savings	0.09		0.04
Received transfers/assistance	0.19		0.07
Cut expenditure	0.18		0.14
Others ^e			0.37
Median cost to overcome the hardship ^b	2,339.12		4,370.36
In relation to median yearly per capita expenditure	0.67		0.92
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 6**Economic Hardship 6: Price Fall**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.05	0.10	0.05
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.35		0.35
Taken a loan	0.20		0.18
Sold assets	0.17		0.05
Used savings	0.06		0.07
Received transfers/assistance	0.06		0.07
Cut expenditure	0.33		0.26
Others ^e			0.29
Median cost to overcome the hardship ^b	1,037.28		1,912.76
In relation to median yearly per capita expenditure	0.30		0.40
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 7**Economic Hardship 7: All**

Year	1993	1997	2000
Proportion of households that experienced the hardship over the past 5 years	0.31	0.42	0.35
Measures taken to overcome the hardship ^{b,d}			
Increased labor supply/activity	0.28		0.31
Taken a loan	0.28		0.23
Sold assets	0.26		0.14
Used savings	0.16		0.10
Received transfers/assistance	0.23		0.20
Cut expenditure	0.17		0.18
Others ^e			0.30
Observations	5,136	5,136	5,136

Source: Indonesian Family Life Survey.

Notes: All the costs are measured in 100 rupiah in Jakarta in 1993. (a) Not available in 1993 (IFLS1). (b) Not available in 1997 (IFLS2). (c) Not available in 2000 (IFLS3). (d) Multiple responses are possible. (e) The category of 'Others' includes moving, reducing business or labor activities, praying, doing nothing and others.

Table 8
The Determinants of Economic Shock (Community Fixed-Effects)

Dependent Variable	(1) Death	(2) Sickness	(3) Crop Loss	(4) Disasters	(5) Unemployment	(6) Price Fall
Log of consumption expenditure per person	0.0073 (1.40)	0.0154 (2.70)	0.0012 (0.23)	0.0011 (0.51)	0.0054 (1.61)	0.0095 (2.21)
No. of members of age 0-14	-0.0019 (0.80)	0.0064 (2.44)	0.0028 (1.10)	0.0012 (1.21)	0.0041 (2.64)	0.0063 (3.17)
No. of members of age 15-59	0.0100 (4.40)	0.0064 (2.56)	0.0100 (4.25)	0.0005 (0.51)	0.0027 (1.89)	0.0057 (3.07)
No. of members of age 60 above	0.0519 (8.37)	0.0146 (2.16)	-0.0045 (0.71)	-0.0025 (0.99)	0.0007 (0.17)	0.0031 (0.62)
Head Muslim	0.0042 (0.26)	0.0024 (0.14)	0.0021 (0.13)	-0.0022 (0.34)	-0.0017 (0.16)	-0.0035 (0.27)
Head female	-0.0233 (2.70)	-0.0027 (0.29)	-0.0325 (3.64)	-0.0018 (0.52)	0.0041 (0.75)	-0.0103 (1.44)
Head's age	-0.0007 (2.58)	0.0000 (0.04)	0.0004 (1.46)	0.0000 (0.01)	-0.0001 (0.45)	0.0000 (0.14)
Head's schooling	-0.0010 (1.16)	0.0026 (2.71)	-0.0002 (0.19)	0.0000 (0.06)	0.0003 (0.52)	-0.0006 (0.80)
Dummy for (IFLS3-IFLS2)	-0.0839 (14.58)	-0.0576 (9.15)	-0.0116 (1.95)	-0.0060 (2.53)	-0.0007 (0.20)	-0.0403 (8.53)
Constant	0.0892 (2.36)	0.0029 (0.07)	0.0652 (1.67)	0.0109 (0.69)	-0.0069 (0.29)	0.0099 (0.32)
No. of Observations	10272	10272	10272	10272	10272	10272
No. of Communities	311	311	311	311	311	311
R-squared	0.031	0.011	0.005	0.001	0.002	0.010

Source: Indonesian Family Life Survey.

Notes: Asymptotic t ratios are in parenthesis. The dependent variable is the perception of an economic hardship in the following period. In all the columns, the community fixed-effects are removed.

Table 9**The Effects of Economic Shock on Consumption I (Differenced Equation)**

	(1)	(2)	(3)	(4)
		Comm. FE		Comm. FE
<u>Dependent variable: log of consumption expenditure</u>				
Economic shock: death	0.0617 (4.28)	0.0624 (4.33)	0.0414 (2.90)	0.0409 (2.86)
Economic shock: crop loss	0.0085 (0.57)	0.0055 (0.36)	0.0120 (0.82)	0.0091 (0.62)
Economic shock: disaster	0.1083 (3.52)	0.1072 (3.44)	0.1159 (3.87)	0.1153 (3.81)
Economic shock: unemployment	-0.0774 (3.26)	-0.0711 (2.98)	-0.0654 (2.83)	-0.0602 (2.59)
No. of members of age 0-14			-0.1048 (17.29)	-0.1030 (16.80)
No. of members of age 15-59			-0.0834 (16.38)	-0.0836 (16.27)
No. of members of age 60 above			-0.1269 (8.72)	-0.1317 (9.02)
Head Muslim			0.0325 (0.44)	0.0227 (0.30)
Head female			-0.0296 (1.27)	-0.0267 (1.14)
Head's age			-0.0017 (1.98)	-0.0014 (1.60)
Head's schooling			0.0069 (2.55)	0.0075 (2.76)
Dummy for (IFLS3-IFLS2)	-0.1026 (8.15)	-0.1025 (8.20)	-0.1056 (8.58)	-0.1053 (8.62)
Constant	0.1979 (22.39)	0.1979 (22.53)	0.1932 (21.13)	0.1927 (21.19)
No. of Observations	10,272	10,272	10,272	10,272
No. of Communities		311		311
R-squared	0.010	0.010	0.070	0.070

Source: Indonesian Family Life Survey.

Notes: Asymptotic t ratios are in parenthesis. The dependent variable is the change in the per capita household expenditure per person. All the independent variables are the differenced values over adjacent two periods.

Table 10**The Effects of Economic Shock on Consumption II (Differenced Equation)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: difference in log consumption expenditure per person							
Economic shock: death	0.0409 (2.86)	0.0500 (2.50)	-0.0335 (0.84)	0.0578 (3.52)	0.0857 (1.71)	0.0643 (2.91)	0.0790 (1.08)
Death*Time elapsed		-0.0054 (0.66)					-0.0046 (0.56)
Death*Head Muslim			0.0851 (2.02)				0.0897 (2.11)
Death*Head female				-0.0643 (2.01)			-0.0802 (2.40)
Death*Head's age					-0.0009 (0.93)		-0.0011 (1.02)
Death*Head's schooling						-0.0044 (1.40)	-0.0066 (1.94)
Economic shock: crop loss	0.0091 (0.62)	0.0028 (0.15)	0.0003 (0.01)	0.0103 (0.67)	0.0177 (0.33)	0.0174 (0.80)	0.0210 (0.27)
Crop loss*Time elapsed		0.0052 (0.56)					0.0056 (0.61)
Crop loss*Head Muslim			0.0101 (0.23)				0.0102 (0.23)
Crop loss*Head female				-0.0104 (0.22)			-0.0134 (0.28)
Crop loss*Head's age					-0.0002 (0.17)		-0.0003 (0.30)
Crop loss*Head's schooling						-0.0020 (0.54)	-0.0023 (0.60)
Economic shock: disaster	0.1153 (3.81)	0.1051 (2.66)	-0.0379 (0.37)	0.1128 (3.50)	0.0043 (0.04)	0.1183 (2.33)	-0.2204 (1.25)
Disaster*Time elapsed		0.0066 (0.38)					0.0074 (0.42)
Disaster*Head Muslim			0.1684 (1.58)				0.1804 (1.67)
Disaster*Head female				-0.0104 (0.11)			-0.0164 (0.17)
Disaster*Head's age					0.0024 (1.01)		0.0030 (1.19)
Disaster*Head's schooling						-0.0003 (0.04)	0.0040 (0.53)
Economic shock: unemployment	-0.0602 (2.59)	-0.0886 (2.81)	-0.1040 (1.35)	-0.0303 (1.21)	0.0755 (0.89)	-0.0810 (1.98)	-0.0103 (0.07)
Unemployment*Time elapsed		0.0207 (1.32)					0.0193 (1.22)
Unemployment*Head Muslim			0.0483 (0.60)				0.0605 (0.73)
Unemployment*Head female				-0.2158			-0.2111

					(3.25)		(3.04)
Unemployment*Head's age					-0.0030		-0.0019
					(1.65)		(1.00)
Unemployment*Head's schooling						0.0033	-0.0023
						(0.63)	(0.41)
No. of members of age 0-14	-0.1030	-0.1030	-0.1028	-0.1025	-0.1027	-0.1029	-0.1019
	(16.80)	(16.80)	(16.76)	(16.72)	(16.75)	(16.77)	(16.61)
No. of members of age 15-59	-0.0836	-0.0835	-0.0838	-0.0831	-0.0835	-0.0836	-0.0833
	(16.27)	(16.26)	(16.31)	(16.18)	(16.25)	(16.28)	(16.21)
No. of members of age 60 above	-0.1317	-0.1322	-0.1321	-0.1307	-0.1321	-0.1315	-0.1325
	(9.02)	(9.05)	(9.04)	(8.95)	(9.02)	(8.99)	(9.05)
Head Muslim	0.0227	0.0233	0.0091	0.0224	0.0209	0.0238	0.0071
	(0.30)	(0.31)	(0.12)	(0.30)	(0.28)	(0.32)	(0.09)
Head female	-0.0267	-0.0269	-0.0279	0.0017	-0.0253	-0.0287	0.0032
	(1.14)	(1.15)	(1.19)	(0.07)	(1.08)	(1.23)	(0.12)
Head's age	-0.0014	-0.0013	-0.0014	-0.0015	-0.0011	-0.0014	-0.0013
	(1.60)	(1.57)	(1.60)	(1.80)	(1.23)	(1.63)	(1.47)
Head's schooling	0.0075	0.0075	0.0075	0.0073	0.0075	0.0082	0.0084
	(2.76)	(2.76)	(2.75)	(2.68)	(2.73)	(2.91)	(2.98)
Dummy for (IFLS3-IFLS2)	-0.1053	-0.1061	-0.1042	-0.1039	-0.1049	-0.1060	-0.1037
	(8.62)	(8.64)	(8.52)	(8.50)	(8.59)	(8.66)	(8.42)
Constant	0.1927	0.1930	0.1925	0.1924	0.1922	0.1931	0.1923
	(21.19)	(21.17)	(21.15)	(21.15)	(21.11)	(21.21)	(21.06)
No. of Observations	10,272	10,272	10,272	10,272	10,272	10,272	10,272
No. of Communities	311	311	311	311	311	311	311
R-squared	0.070	0.070	0.070	0.070	0.070	0.070	0.070

Source: Indonesian Family Life Survey.

Notes: Asymptotic t ratios are in parenthesis. The dependent variable is the change in the per capita household expenditure. All the independent variables are the differenced values over adjacent two periods.

Table 11

The Effects of Economic Shock on Consumption and Educational Expenditure
(Differenced Equation)

Dependent variable:	(1) Δ Food & Non-food Exp.	(2) Δ Educational Exp.
Economic shock: death	0.0416 (2.87)	0.0693 (1.59)
Economic shock: crop loss	0.0063 (0.42)	0.0453 (1.01)
Economic shock: disaster	0.1142 (3.71)	0.2169 (2.34)
Economic shock: unemployment	-0.0507 (2.15)	-0.1721 (2.43)
No. of members of age 0-14	-0.1097 (17.59)	0.2259 (12.05)
No. of members of age 15-59	-0.0852 (16.31)	0.0480 (3.06)
No. of members of age 60 above	-0.1229 (8.28)	-0.2078 (4.65)
Head Muslim	0.0192 (0.25)	-0.2712 (1.18)
Head female	-0.0442 (1.86)	-0.1576 (2.20)
Head's age	-0.0017 (1.91)	0.0014 (0.53)
Head's schooling	0.0052 (1.89)	0.0332 (3.99)
Dummy for (IFLS3-IFLS2)	-0.1226 (9.86)	-0.1311 (3.51)
Constant	0.2097 (22.67)	0.2723 (9.79)
No. of Observations	10,272	10,272
R-squared	311	311
No. of Communities	0.070	0.020

Source: Indonesian Family Life Survey.

Notes: Asymptotic t ratios are in parenthesis. In column (1) and (2), all the dependent and independent variables are the differenced values over adjacent two periods.

Table 12
The Effects of Economic Shock on Fertility (Linear Probability Model)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable: index for birth (conception)						
Economic shock: death	0.0048 (0.43)	0.0048 (0.43)	0.0047 (0.42)	0.0048 (0.42)	0.0046 (0.41)	0.0046 (0.41)
Death*Time elapsed	-0.0017 (0.35)	-0.0017 (0.35)	-0.0017 (0.34)	-0.0017 (0.35)	-0.0016 (0.33)	-0.0016 (0.33)
Economic shock: crop loss	-0.0049 (0.43)	-0.0049 (0.43)	-0.0049 (0.43)	-0.0049 (0.43)	-0.0049 (0.43)	-0.0050 (0.43)
Crop Loss*Time elapsed	0.0007 (0.13)	0.0007 (0.13)	0.0008 (0.14)	0.0008 (0.14)	0.0008 (0.14)	0.0008 (0.15)
Economic shock: disaster	-0.0270 (1.06)	-0.0270 (1.06)	-0.0271 (1.07)	-0.0272 (1.07)	-0.0265 (1.04)	-0.0266 (1.05)
Disaster*Time elapsed	0.0051 (0.45)	0.0051 (0.45)	0.0051 (0.46)	0.0051 (0.46)	0.0051 (0.45)	0.0051 (0.46)
Economic shock: unemployment	0.0382 (1.92)	0.0221 (0.57)	0.0408 (2.00)	0.0663 (1.65)	0.0085 (0.33)	-0.0116 (0.18)
Unemployment*Time elapsed	-0.0229 (2.45)	-0.0228 (2.43)	-0.0232 (2.47)	-0.0229 (2.44)	-0.0237 (2.52)	-0.0235 (2.50)
Unemployment*Head Muslim		0.0174 (0.48)				0.0311 (0.84)
Unemployment*Head female			-0.0168 (0.55)			-0.0074 (0.24)
Unemployment*Head's age				-0.0007 (0.80)		-0.0002 (0.23)
Unemployment*Head's schooling					0.0044 (1.80)	0.0046 (1.73)
No. of members of age 0-14	-0.0628 (46.74)	-0.0629 (46.74)	-0.0628 (46.73)	-0.0628 (46.74)	-0.0628 (46.73)	-0.0628 (46.73)
No. of members of age 15-59	0.0161 (11.29)	0.0161 (11.28)	0.0161 (11.29)	0.0161 (11.30)	0.0161 (11.30)	0.0161 (11.30)
No. of members of age 60 above	0.0168 (4.53)	0.0168 (4.53)	0.0168 (4.53)	0.0168 (4.53)	0.0169 (4.56)	0.0169 (4.57)
Head Muslim	-0.0027	-0.0030 (0.15)	-0.0028 (0.14)	-0.0028 (0.15)	-0.0026 (0.13)	-0.0030 (0.16)
Head female	-0.0096 (1.64)	-0.0097 (1.65)	-0.0095 (1.61)	-0.0096 (1.64)	-0.0096 (1.64)	-0.0096 (1.64)
Head's age	-0.0028 (13.30)	-0.0028 (13.30)	-0.0028 (13.31)	-0.0028 (13.24)	-0.0028 (13.29)	-0.0028 (13.26)
Head's schooling	0.0002 (0.24)	0.0002 (0.24)	0.0002 (0.23)	0.0002 (0.23)	0.0001 (0.15)	0.0001 (0.14)
Constant	0.2860 (13.73)	0.2862 (13.74)	0.2861 (13.74)	0.2857 (13.72)	0.2860 (13.73)	0.2864 (13.74)
No. of Observations	77,040	77,040	77,040	77,040	77,040	77,040
No. of Individuals	5,136	5,136	5,136	5,136	5,136	5,136

R-squared 0.040 0.040 0.040 0.040 0.040 0.040

Source: Indonesian Family Life Survey.

Notes: Asymptotic t ratios are in parenthesis. The dummies for the interaction of IFLS wave and year are included.

Table 13**Summary Effect of Economic Hardship on Household Consumption**

Economic Hardship	Food and Nonfood Consumption	Educational Expenditure	Fertility
Death	+	~	~
Crop Loss	~	~	~
Natural Disaster	+	+	~
Unemployment	-	-	+

Table 14
Summary Statistics of Pooled Observations

	Obs.	Mean	Std. Dev.	Min	Max
Variables					
Food expenditure per person	15,408	345.695	243.986	0.000	2,253.152
Non-food expenditure per person	15,408	98.167	152.216	0.000	2,740.458
Food and Non-food expenditure per person	15,408	443.862	330.646	14.733	2,786.701
Educational expenditure per person	15,408	51.245	120.660	0.000	2,289.453
Consumption expenditure per person	15,408	494.922	377.452	50.889	3,193.074
Economic shock: death	15,408	0.101	0.301	0	1
Year of death	1,535	1,995.100	2.886	1988	2000
Economic shock: sickness	15,408	0.129	0.335	0	1
Year of sickness	1,968	1,995.174	3.181	1988	2000
Economic shock: crop loss	15,408	0.123	0.329	0	1
Year of crop loss	1,883	1,995.599	3.077	1988	2000
Economic shock: disaster	15,408	0.022	0.148	0	1
Year of disaster	343	1,994.499	3.097	1988	2000
Economic shock: unemployment	15,408	0.038	0.191	0	1
Year of unemployment	573	1,995.703	3.127	1988	2000
Economic shock: price fall	15,408	0.067	0.249	0	1
Year of price fall	1,010	1,995.508	2.916	1988	2000
No. of children of age 0-4	15,408	0.429	0.650	0	4
No. of members of age 0-14	15,408	1.508	1.353	0	10
No. of members of age 15-59	15,408	2.653	1.463	0	17
No. of members of age 60 and above	15,408	0.405	0.646	0	3
Head Muslim	15,408	0.876	0.329	0	1
Head female	15,408	0.165	0.371	0	1
Head's age	15,408	47.893	13.985	12	105
Head's schooling	15,408	5.250	4.343	0	18
Dummy for rural area	15,408	0.577	0.494	0	1
Differenced Variables					
ΔFood expenditure per person	10,272	56.515	259.229	-1,426.547	1,620.818
ΔNon-food expenditure per person	10,272	-3.672	156.006	-2,400.593	1,862.762
ΔFood and non-food expenditure per person	10,272	52.843	316.065	-1,887.091	1,777.094
ΔEducational expenditure per person	10,272	0.815	131.808	-2,289.453	1,401.939
ΔConsumption expenditure per person	10,272	53.838	342.654	-1,316.484	1,439.391
ΔEconomic shock: death	10,272	0.006	0.437	-1	1
ΔEconomic shock: sickness	10,272	-0.005	0.461	-1	1
ΔEconomic shock: crop loss	10,272	0.015	0.413	-1	1
ΔEconomic shock: disaster	10,272	-0.007	0.201	-1	1
ΔEconomic shock: unemployment	10,272	0.008	0.261	-1	1
ΔEconomic shock: price fall	10,272	0.002	0.357	-1	1

Δ No. of children of age 0-4	10,272	-0.099	0.728	-4	4
Δ No. of members of age 0-14	10,272	-0.177	0.999	-6	6
Δ No. of members of age 15-59	10,272	0.024	1.228	-9	7
Δ No. of members of age 60 and above	10,272	0.057	0.442	-2	3
Δ Head Muslim	10,272	0.000	0.081	-1	1
Δ Head female	10,272	0.016	0.279	-1	1
Δ Head's age	10,272	2.464	7.847	-69	58
Δ Head's schooling	10,272	0.215	2.453	-17	17

Source: Indonesian Family Life Survey.

Notes: All the consumption expenditures are in 100 rupiah in Jakarta in 1993, and indicate the monthly terms. There are a few observations whose food consumption expenditure is negative. This is due to negative food transfer.

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