Intra Marriage Bargaining Power and Fertility Decisions for Women in Developing Countries

Younoh Kim*
Eastern Michigan University
ykim18@emich.edu

Vlad Radoias*
Towson University
vradoias@towson.edu

August 6, 2014

Abstract

Two types of theoretical bargaining models can be employed to study issues on intra marriage bargaining – a competitive and a cooperative bargaining model. While many seem to support the idea that couples make their decisions together in trying to maximize household level welfare, there is no general consensus on which type of model is more appropriate. One particular result that seems to suggest that couples do actually bargain competitively is the result that links fertility decisions to bargaining power. The argument is that women prefer less children than men, and that bargaining power influences fertility. However, we argue, these studies are suffering from endogeneity issues that are not properly instrumented for. We propose instruments for bargaining power based on individual risk and time preferences which affect the threat point and bargaining power of spouses, but not the fertility decisions directly. Using this identification strategy, we show that fertility decisions do not depend on bargaining power, which supports the unitary bargaining model. We argue that the previous results were either not addressing the endogeneity issues at all, or based on invalid instruments that were not fully exogenous.

Keywords: Bargaining Power; Fertility.

JEL Classification Numbers: D13; J13.

---

*We would like to thank the CBE Faculty Development and Research Committee at Towson University for supporting this research. We also would like to acknowledge the helpful comments of conference participants at the 89th Annual Conference of the WEAI. The authors assume full responsibility for any remaining errors.

1 Introduction

Fertility decisions and the effects of intra-marriage bargaining on fertility rates have been topics of great interest and debate in the household bargaining literature. There have been contradictory results which supported both the unitary and the competitive bargaining model, depending on assumptions and data being used.

The unitary household decision making models started with the works of Samuelson (1956) and Becker (1960, 1974, 1981). These models generally assumed that family members pool their resources and make decisions as a unit, trying to maximize their joint welfare. With regards to fertility, Becker (1960) assumes that couples make these decisions together, taking into account their joint preferences and costs of having children. A major counterargument against unitary models has been a large literature, from several disciplines, focusing on both developing and developed societies, that rejected the income pooling hypothesis. Strauss and Thomas (1995) provide a comprehensive review on this strand of literature. Among the more careful econometric specifications, Schultz (1990) and Thomas (1990) manage to reject the income pooling hypothesis, while avoiding estimation problems associated with the endogeneity of income. However, it is worth noting that not pooling resources does not need to automatically translate into competitive decision making. It might very well be the case that, while household members keep full control of their individual income, they might still fully cooperate in certain decisions.

Collective bargaining models such as Chiappori (1992, 1997) distinguish between household members and take into account their different preferences. They do not assume that members pool their resources and maximize joint utility, but make other restrictive assumptions, such as assuming that the allocations are always Pareto efficient and that households maximize a weighed utility function, with the weights capturing the decision making process regardless of the type of decision being considered. They generally capture these weights from socio economic measures pointing to relative wages, relative assets, community gender equity, divorce laws, etc. Generally speaking, collective decision making models provide a general framework to study the impact of different individual preferences on family outcomes, irrespective of the nature of the decision making process. While these models find persuasive empirical evidence when things like the household labor supply (Chiappori 1992, 1997) or domestic violence (Tauchen et al. 1991) are considered, the evidence for things like fertility is not as clear. We

believe there should be no surprise that decisions where spouses are more likely to have divergent goals might better fit collective decision making models, but at the same time fertility decisions which benefit both family members are most likely reached through cooperative bargaining. In terms of policy implication, advising policy makers regarding cooperative decisions using non-cooperative models is just as bad as using unitary models when addressing decisions where spouses have opposed preferences.

This paper proposes new estimates of the effects of female bargaining power on fertility rates that seem to support the unitary model. This is in agreement with the idea that children bring satisfaction to both spouses and usually there are no major disagreements when it comes to this type of decisions. Previous opposing results found that female bargaining power is negatively correlated with fertility, which would imply that women prefer less children than men do. We argue that these findings are mainly the result of using endogenous social economic indicators as valid exogenous instruments that result in biased estimates. We propose instruments based on elicited individual risk and time preference parameters that clearly affect the threat point and bargaining power inside the household, but are exogenous to fertility decisions. Using these instruments, we find no significant effect of female bargaining power on fertility decisions.

2 Female Bargaining Power and Fertility

The main focus of this paper is on the role that female bargaining power plays in determining household outcomes, fertility in particular. The major problem in such empirical studies is constructing an appropriate measure of bargaining power. Two types of measures are widely used in the literature – determinants of bargaining power, and self-rated measures of bargaining power.

Determinants of bargaining power are generally socio-economic characteristics that are likely correlated with the wife's control of resources relative to her husband and can therefore capture her relative bargaining power. These are things such as relative income (Hoddinott and Haddad 1995), relative unearned income (Thomas 1990; Schultz 1990), share of assets brought to marriage (Thomas et al .1997), share of assets accumulated during marriage (Beegle et al. 2001), and relative education of spouses (Thomas 1994; Handa 1996). A major issue with using this type of measures is endogeneity. Relative income and asset shares depend on labor participation which is a direct outcome of the household

bargaining process which is, in turn, influenced by relative bargaining power. There is, in essence, a reverse causality that creates inconsistent estimates and valid instruments need to be used to correct these inconsistencies. An alternative is to use self-reported measures of bargaining power, which are constructed from answers to survey questions regarding the household decision making process. Mason and Smith (2003), Ghuman (2003), Ahmed (2006), Varanasi (2009) are some of the studies constructing and implementing self reported measures of female bargaining power. These measures might seem more adequate, but care still needs to be exercised. Some of the answers are still potentially endogenous and need to be properly instrumented for, measurement errors can occur, and also some questions might not actually represent real bargaining power and empowerment, but the lack of it.

As it relates to fertility decisions, the effects of female bargaining power (regardless of how it is measured) have been a source of constant disagreement among researchers. Opposition to studying fertility decisions inside a unitary model of household decision making often refers to a paper by Bankole and Singh (1998) in which a large demographic survey performed in 18 developing countries seems to show that men have higher preference for children than women. While simple economic intuition seems to support these findings [1], we believe the results should not to be taken without a dose of criticism. First of all the results of this study are purely based on opinions and stated preferences. Women and men were asked questions regarding their preferred number of offsprings. There is an obvious difference between stated preferences and actual outcomes resulting from the intra marriage bargaining process. The conclusion of this study can in no way be extrapolated to say that we should observe smaller fertility rates in household with empowered women. In particular, a severe point of contention with this paper and its findings is that in many of the subsaharan countries in the sample polygamy is legal and common. It should come at no surprise then that men state preferences for larger numbers of offsprings than women do. In conclusion, we have serious doubts that fertility outcomes, in both developed and developing countries, depend on the relative bargaining power of spouses.

Following empirical studies that try to relate bargaining power and fertility found contradicting results. Thomas (1990) finds that Brazilian women with higher non-wage income (which is a proxy

[1]The argument is that the benefits from having children are the same to husband and wife, but the costs of having children are much higher for the wife, therefore wives should have lower preference for children.

for relative bargaining power) have less children on average, which seems to prove the lower preference for children of women relative to men. On the contrary, Shultz (1990) finds the exact opposite effect for women in Thailand. Klawon and Tiefenthaler (2001) revisit the Brazilian data and confirm the previous findings. One major problem with all these papers is that income is an endogenous variable and none of these papers properly instrument for that.

Another strand of the literature that uses self reported bargaining measure finds the same contradictory results. Morgan et al. (2002) find that fertility does not depend on relative bargaining power. Mason and Smith (1999) confirm these findings and actually find positive effect in certain cases, which goes against the idea that women prefer less children. In contrast, Varanasi (2009) finds a negative effect of bargaining power on fertility. There are drawbacks to each one of these methods regarding the way the estimations are performed and the bargaining power measures are instrumented for. In particular, we believe that using community level variables to instrument for bargaining power is not correct from an econometric standpoint. Varanasi (2009) for instance, uses community level variables such as relative female to male wage at the community level, access to credit, and relative female to male education at the community level. We claim that these instruments are not satisfying the exclusion restriction assumption and are in fact correlated with the fertility decision through the bargaining power and also directly. Using them as instruments will surely result in biased estimates that overstate the female preference for less children (if any). The intuition is that although higher opportunities for women at the community level increase relative bargaining power (and are therefore relevant instruments), they also directly increases the opportunity cost of having children (and are therefore not fully exogenous). Having better career choices means that child bearing might get postponed because of career reasons and not because of lower preferences for having children. It is therefore no surprise that studies such as Abadian (1996) or Varanasi (2009), that are based on community level characteristics (whether used directly as a proxy for bargaining power, or indirectly as an instrument) find that higher bargaining power leads to having less children on average. We believe that these results are purely based on differences in opportunity cost between communities and are in no way a robust proof that women prefer less children than men or that women empowerment leads to lower fertility rates.

3 Data and Methodology

Our paper tries to provide new estimates, using correct instruments to address the aforementioned problems. We take advantage of the newest wave of the Indonesian Family Life Survey (IFLS), which contains a novel data module on elicited individual risk and time preference parameters. The IFLS is a longitudinal socio-economic survey based on a sample of households representing over 80% of the Indonesian population. The survey collects information on individual respondents, their spouses, children, and parents. It collects data on socio-economic indicators such as education, health, income, community infrastructure, etc. The IFLS has reached its fourth wave in 2007, with the previous three waves fielded in 1993, 1997, and 2000. The latest wave contains data on individual risk and time preferences, which we believe are well suited to satisfy our instrument validity tests for bargaining power. Individual risk preferences are undoubtedly correlated with relative bargaining power since risk preferences affect the threat point and the willingness to bargain competitively. In other words, more risk averse individuals are more willing to give in when faced with intra household disputes because they do not like the risk of being outside of the marriage. As with any intra marriage bargaining model, we implicitly assume that the threat point of not agreeing with your spouse is marriage dissolution. Therefore, everything else equal, less risk averse spouses should have higher bargaining power relative to more risk averse ones. A similar argument can be made regarding time preference parameters. These are both testable hypothesis for which we find clear support in our data. At the same time, the risk and time preferences do not directly affect fertility choices and so the exclusion restriction assumption is satisfied, which is the second condition for instruments validity. Again, this is a testable hypothesis which finds empirical support. Using these instruments, we find no significant effect of female bargaining power on fertility outcomes.

Our sample consists of 1542 households (married couples), out of which 1333 had children. The dependent variable in all our estimations is the number of total births[2]. Besides the bargaining power variables, we collected a number of household level and community level variables that are likely to affect fertility. At the community level, we control for the number of family planning clinics, the number

[2]As a robustness check, we also ran additional regressions using the number of live births as the dependent variable, with no significantly different results.

of visits by family planning workers to the community, the percentage of households with electricity, the percentage of households with pipe or pump water, and the number of health posts. At the household level, we control for wife's and husband's age and age squared, education level of spouses, ethnicity, religion, and household per capita expenditures (PCE)[3].

The bargaining power measure is constructed based on answers to a series of 17 questions addressing the household decision making process. Out of the total of 17 questions, two questions relate to money spent on lotteries and monthly savings. More than 60% of the respondents claimed they never spent any money on these, and so these two questions were dropped from analysis. Of the remaining 15, 2 questions relate to time spending, 2 questions relate to work and contraceptive choices, and 11 refer to household expenditures. Three of the expenditure related questions refer to child related expenditures and are only answered by women with children. To avoid a sample selection bias, we dropped these three questions from the analysis of the entire sample. At the same time, we created a subsample containing only couples with children, where we used all the expenditure related questions. We coded a dummy variable corresponding to each question with 1 if the wife participated in the decision making process, and added all these dummies to construct a measure of bargaining power. For robustness checks we constructed two separate measures of bargaining power: one from answers strictly related to expenditures, and another one from answers to all questions.

The main contribution of this paper is to introduce survey-elicited risk and time preferences[4] as valid instruments for female bargaining power. We follow Ng (2013) in constructing these variables. To elicit risk preferences, respondents were asked a series of questions in which they were asked to choose between a sure amount and a random alternative. Specifically, the questions were formulated as:

> "Suppose you are given two options of receiving income. In the first option you are guaranteed X rupiah per month. In the second option you are guaranteed Y or Z rupiah, each with equal chance. Which option would you choose?"

[3]Per capita expenditures is used here as a proxy for household income. It has been shown in Bound and Krueger (1991) that there are systematic measurement errors in household income, and PCE has been since used as a proxy for income in many papers, as it is less prone to such measurement errors.

[4]Dohmen et al.(2011) show that survey-elicited risk preferences are consistent with experimentally derived risk preferences, and Hamoudi (2006) shows that risk preferences derived with hypothetical lotteries are also consistent with risk preferences derived using real money lotteries.

Respondents were asked a series of such questions, with increasingly or decreasingly risky options, depending on their previous choices. If a respondent chose a certain outcome, the following question would present him with a less risky random choice. On the other hand, if a respondent chose the uncertain outcome, he would be presented with a riskier random choice on the following question. Based on the certainty equivalent at the end of the interview, each respondent can be classified in one of four possible groups, from the most risk averse (value 4) to the least risk averse (value 1).

Eliciting time preferences was done in a similar fashion. Each respondent was asked a series of questions formulated as:

"Suppose you have won a prize. How will you choose to be paid?"

The two options given were an amount that was to be paid today and that was kept constant throughout the entire series of questions, or a larger nominal amount to be paid at a later date. The amount for the second option was changed from question to question, in order to reflect different subjective discount rates. Respondents could therefore be classified in four distinct groups, from the most patient (value 1) to the most impatient (value 4).

The estimation strategy used is a two step Generalized Method of Moments (GMM), which is more efficient than a traditional two stage least squares. We used the previously described individual risk and time preference variables as instruments, and for comparison reasons we also used community level instruments such as female to male wage and education ratios that previously produced what we believe are incorrect estimates. Community level wage or education ratios are indeed affecting bargaining power, but also fertility rates directly, as they increase the opportunity cost of having children. On the other hand, risk and time preferences will only affect the threat point in the bargaining process and not affect fertility directly. We posit that individuals who are more risk averse have less bargaining power, and also do individuals who are more patient. These effects are evident in the first stage regression.

4 Results

The following table presents our main results. We used the entire sample, and constructed the bargaining power measure using all available questions, except those referring to children related expenditures and expenditures on lotteries and savings. The first column presents the OLS estimates,

the second column presents the estimates using community level instruments, and the third column presents the estimates using risk and time preference instruments. Not shown in the table, are controls for household PCE, percentage of households with electricity and pump water, and the number of health posts at the community level. We calculated robust standard errors.

Table 1: Full Sample Regression Results
Dependent Variable: Total Births
Bargaining Power: Expenditures and Non-expenditures Related Decisions

Explanatory Variables	**OLS Coefficients**	**IV (1) Coefficients** (community IVs)	**IV (2) Coefficients** (risk & time IVs)
Bargaining Power	0.0196	-0.453**	-0.128
	(0.0196)	(0.205)	(0.159)
Wife Age	0.0388	0.195**	0.0855
	(0.0299)	(0.0785)	(0.0607)
Wife Age Squared	0.000750	-0.00125	0.000152
	(0.000466)	(0.000105)	(0.000843)
Wife Schooling Years	-0.0308***	-0.00512	-0.0240*
	(0.0115)	(0.0161)	(0.0145)
Husband Age	0.0873***	0.140***	0.107***
	(0.0242)	(0.0397)	(0.0312)
Husband Age Squared	-0.00104***	-0.00164***	-0.00127***
	(0.000312)	(0.000484)	(0.000384)
Husband Schooling Years	-0.00958	-0.00907	-0.00761
	(0.00904)	(0.0114)	(0.00923)
Javanese	-0.366***	-0.210*	-0.313***
	(0.0753)	(0.111)	(0.0912)
Muslim	-0.145	-0.0259	-0.105
	(0.113)	(0.155)	(0.118)
Nr. of Family Planning Clinics	-0.161***	-0.0292	-0.118*
	(0.0497)	(0.0911)	(0.0715)
Nr. of Visits by FP Workers	-0.00215*	0.00118	-0.00171
	(0.00120)	(0.00182)	(0.00161)
Sample Size	1542	1542	1542
F-stat on Excluded IVs		12.465	11.499
Hansen J-stat		1.558	2.124
(p-value)		(0.2120)	(0.1450)

robust standard errors are in parentheses
*-significant at 10% level **-significant at 5% level ***-significant at 1% level

Of interest to us is the effect of bargaining power, which is represented in the table by the coefficients in the first row. Note the OLS coefficient is statistically insignificant, while the IV(1) coefficient is significant and negative, which confirms previous studies. However, we argue that using community level instruments biases the results since having better career opportunities increases the opportunity

cost of having children for women, regardless of their intra marriage bargaining power. In the third column, where instruments based on risk and time preference are used, the bargaining power effects are proven to be insignificant, which supports the unitary bargaining model for fertility decisions. Spouses decide on how many children to have together, regardless of their relative position in the family from a bargaining standpoint. All the statistical tests for instrument relevance and over identifying restrictions hold. Firstly, an F-statistic on excluded instruments shows instrument relevance, and secondly, a Hansen J-statistic is used to test the over identifying restriction. The over identifying restrictions hold for both sets of instruments, but we will show in the next section of the paper that when additional instruments are constructed and added to the estimation, only the risk and time preference instruments pass the orthogonality tests. Note that rejection of the Null for the Hansen J-statistic means the instruments do not pass the orthogonality condition – either because they are not exogenous, or because they are incorrectly excluded from the regression.

5 Robustness Checks and Instrument Validity

As a first exercise to check the robustness of the results, we estimate the same basic model using instruments based on risk and time preferences for a sub-sample of households that have at least one child, and also constructing the measure of bargaining power using different sets of questions. More specifically, Table 2 presents four different sets of coefficients, described as follows. The first column is simply a reiteration of the IV(2) coefficients from Table 1, column 4. It considers the entire sample, and constructs the bargaining power measure from questions related to expenditures and non-expenditures decisions. The second column presents the estimates for the entire sample, but the bargaining power measure is based strictly on expenditures related decisions. The third column estimates the coefficients for the sub-sample of households with at least one child, using both expenditures and non expenditures related decisions in constructing the bargaining power variable, while the fourth column addresses again the sub-sample in question, but using only expenditures related decision in constructing the bargaining power measure. Note that when estimating the results for the sub-sample, there are three additional decisions that come into play and are considered when constructing the bargaining power measure. These are decisions on child-related expenditures, that only make sense to be considered in the context

of the sub-sample of households with children. As before, we used a two step GMM estimation method with robust standard errors, and controlled for household PCE, percentage of households with water and electricity, and for the availability of health posts, family planning clinics, and visits by family planning workers. We also estimated the same regressions using a live births dependent variable, with no significant differences.

Table 2: Robustness Checks
Dependent Variable: Total Births

Full Sample/Sub-Sample **Bargaining Measure**	**Full Sample** all decisions	**Full Sample** expenditures only	**Sub-Sample** all decisions	**Sub-Sample** expenditures only
Variables				
Bargaining Power	-0.128	-0.160	0.00394	0.0118
	(0.159)	(0.212)	(0.110)	(0.146)
Wife Age	0.0855	0.0783	0.0620	0.0601
	(0.0607)	(0.0554)	(0.0554)	(0.0537)
Wife Age Squared	0.000152	0.000257	0.000327	0.000353
	(0.000843)	(0.000765)	(0.000794)	(0.000763)
Wife Schooling Years	-0.0240*	-0.0255*	-0.0379***	-0.0383***
	(0.0145)	(0.0137)	(0.0146)	(0.0146)
Husband Age	0.107***	0.105***	0.0872***	0.0864***
	(0.0312)	(0.0301)	(0.0298)	(0.0304)
Husband Age Squared	-0.00127***	-0.00124***	-0.000944***	-0.000936
	(0.000384)	(0.000367)	(0.000365)	(0.000370)
Husband Schooling Years	-0.00761	-0.00763	-0.00534	-0.00530
	(0.00923)	(0.00916)	(0.00915)	(0.00916)
Javanese	-0.313***	-0.334***	-0.334***	-0.335***
	(0.0912)	(0.0803)	(0.0891)	(0.0810)
Muslim	-0.105	-0.0797	-0.0554	-0.0584
	(0.118)	(0.127)	(0.114)	(0.121)
Sample Size	1542	1542	1333	1333
F-stat on Excluded IVs	11.499	10.29	15.548	13.326
Hansen J-stat	2.124	2.266	1.736	1.733
(p-value)	(0.1450)	(0.1322)	(0.1876)	(0.188)

robust standard errors are in parentheses

*-significant at 10% level **-significant at 5% level ***-significant at 1% level

Note that the coefficient on bargaining power is statistically insignificant in all our robustness checks, which seems to support our main finding that intra marriage bargaining power does not have any significant effect on fertility decisions which are taken by spouses collectively. Also the F-statistics and the Hansen J-statistics confirm the fact that the risk and time preference instruments are relevant and valid. In addition, we also ran additional specifications where we included risk and time preference

parameters for the husband in our list of instruments. This was done to control for the possibility that true bargaining power might depend on the relative risk aversion of wife and husband. We found no significant differences.

We now turn our attention to the more serious possibility that our instruments are not valid. We previously argued that instruments based on community level characteristics, such as female to male wage or education ratios are not valid instruments and previous studies that used such variables likely resulted in biased estimates. A difference-in-Sargan C-statistic can test for a suspect subset of the original orthogonality conditions, essentially testing the validity of a subset of instruments. However, in order for this test to work, the non-suspect instruments need to be valid. We argued intuitively that community level instruments should not be used as they are clearly affecting fertility directly. We also argued that risk and time preference parameters, as they are elicited in surveys should affect fertility only indirectly through bargaining power, if at all. We hence estimated a model using both the community level and risk and time preference instruments. In this estimation the Hansen J-statistic for over identification could not validate the entire set of instruments, and we also rejected the validity of community level instruments when tested against the risk and time preference based instruments using a C-statistics[5]. To further prove both the validity of risk and time preference instruments, and the non-validity of community level instruments, we turn to more recent developments in econometric methodology and use heteroskedasticity based instruments, following Lewbel (2012).

The method proposed in Lewbel (2012) serves to identify parameters in regressions with endogenous variables, even in the absence of external instruments[6]. This method can be used not only when no external instruments are available, but also to enhance the efficiency of the IV estimator. It is of particular interest to us, as it can be used to directly test the two different subsets of instruments without assuming the non-suspect sub-set is necessarily valid. We can test separately, using a C-statistic, each sub-set of instruments against the generated Lewbel instruments, which are valid by

[5]The value of the J-statistic was found 7.000 with a p-value of 0.0719. The C-statistic on the community level IVs was 4.898 with a p-value of 0.0864.

[6]This methodology has been found reliable by previous research. Among papers that report estimates using this methodology to be very similar to estimates using traditional instruments are Giambona and Schwienbacker (2007), Emran and Hou (2008), Sabia (2007), Rashad and Markowitz (2007), and Lewbel's own exercise of estimating Engle curves with and without external instruments.

construction. The method's assumptions are satisfied for a large class of models, including models with measurement errors, omitted variable bias, and virtually every time heteroskedasticity is present. Using a Breusch-Pagan test, we found clear evidence of heteroskedasticity with respect to the regressors in our model. We therefore apply this methodology and construct heteroskedasticity based instruments which we use in conjunction with our external instruments to solidify our previous findings.

Table 3 presents the coefficients representing the effects of female bargaining power on fertility decisions, as estimated using Lewbel instruments only and using Lewbel instruments in conjunction with the external instruments. The same controls as before have been used, but for space consideration we only report the coefficients for bargaining power. We used the full sample and two different measures of bargaining power: one based on expenditure only decisions, and one based on all available decisions. We also report the C-statstics for each subset of external instruments and their corresponding p-values.

Table 3: Instrument Validity
Dependent Variable: Total Births

Explanatory Variable	**Lewbel IV only**	**IV(1) + Lewbel IV** (community level IVs)	**IV(2) + Lewbel IV** (risk and time IVs)
Bargaining Power	-0.016	-0.045	-0.013
(Based on Expenditures Only)	(0.0441)	(0.0439)	(0.0439)
C-statstic		6.817	3.872
(p-value)		(0.0331)	(0.1442)
Bargaining Power	-0.008	-0.031	-0.009
(Based on All Decisions)	(0.0387)	(0.0385)	(0.0384)
C-statstic		8.525	3.227
(p-value)		(0.0141)	(0.1992)

none of the coefficients is significant

It is apparent from the table that when Lewbel instruments are constructed and introduced in the regression, there is no significant effect of bargaining power on fertility. Even when using community level instruments this effect is rendered insignificant. Moreover, the C-statistics presented suggest that the subset of instruments based on community level variables are not valid, while the instruments based on risk and time preferences remain valid. This is still the case, whether we use a measure of bargaining power based solely on expenditures related decisions or a more comprehensive measure based on expenditures and non-expenditures related decision.

6 Conclusions

We estimated the effects of intra marriage bargaining power on fertility decisions for women in Indonesia, using data from the fourth wave of the IFLS. We argued against using community level variables as instruments for bargaining power and proposed new instruments based on survey-elicited risk and time preferences. We found that fertility is not affected by female bargaining power, which supports the unitary model for fertility related decisions. Our results were found robust to a number of sample and variable specifications, and the risk and time preference instruments were proven valid when heteroskedasticity based instruments were constructed, following Lewbel (2012). Using the same methodology, we found that instruments based on community level variables such as female to male wage and education ratios are in fact not valid. An intuitive explanation for this, is that better opportunities for women increase the opportunity cost of having children and hence affect fertility directly, and the exclusion restriction does not hold.

The authors acknowledge the fact that community level variables are indeed correlated with bargaining power and they could potentially be used as instruments for other studies. However, when fertility is concerned the problems with using such variables are clear, and alternative instruments such as the ones we propose should be considered. We also believe that risk and time preference parameters play important roles not only in fertility or bargaining related research, but in general, and further research needs to be pursued to better understand their roles. We believe that risk and time preference variables can be easily used as instruments for a larger number of bargaining problems where endogeneity and measurement errors are present, and can also be used directly, as explanatory variables for other problems. We therefore urge experiment and survey designers to further pursue and strengthen methodologies of elicitation of risk and time preference parameters.

References

[1] Abadian, S., "Women's Autonomy and its Impact on Fertility", *World Developmend*, Vol. 24, No. 12, pp. 1793-1809, 1996.

[2] Ahmed, M., "Does Women's Empowerment Improve Child Health?", mimeo, University of Washington, 2006.

[3] Bankole, A., Singh, S., "Couples Fertility and Contraceptive Decision Making in Developing Countries – Hearing the Man's Voice", *International Family Planning Perspectives*, Vol. 24, No. 1, pp. 15-24, 1998.

[4] Becker, G., "An Economic Analysis of Fertility: Demographic and Economic Changes in Developed Countries", Princeton University Press and the NBER, Princeton, NJ, 1960.

[5] Becker, G., "A Theory of Social Interactions", *The Journal of Political Economy*, Vol. 82, Issue 6, pp. 1063-1093, 1974

[6] Becker, G., "A Treatise of the Family", Harvard University Press, Cambridge, MA, 1981.

[7] Beegle, K., Frankenberg, E., Thomas, D., "Bargaining Power Within Couples and Use of Prenatal and Delivery Care in Indonesia", *Studies in Family Planning*, Vol. 32, No. 2, pp. 130-146, 2001.

[8] Bound, J., Krueger, A., "The Extent of Measurement Error is Longitudinal Earnings Data: Do Two Wrongs Make a Right?", *Journal of Labor Economics*, Vol. 12, pp. 345-368, 1991.

[9] Chiappori, P.A., "Collective Labor Supply and Welfare", *Journal of Political Economy*, Vol. 100, pp. 437-467, 1992.

[10] Chiappori, P.A., "Introducing Household Production in Collective Models of Labor Supply", *Journal of Political Economy*, Vol. 105, pp. 191-209, 1997.

[11] Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., Wagner, G., "Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences", *Journal of the European Economic Association*, Vol. 9, Issue 3, pp. 522-550, 2011.

[12] Emran, M., Hou, Z., "Access to Markets and Household Consumption: Evidence from Rural China", unpublished manuscript, George Washington University, 2008.

[13] Ghuman, S., "Women's Autonomy and Child Survival: A Comparison of Muslim and Non-Muslim in Four Asian Countries", *Demography*, Vol. 40, No. 3, pp. 419-436, 2003.

[14] Giambona, E., Schwienbacher, A., "Debt Capacity of Tangible Assets: What is Collateralizable in the Debt Market?", unpublished manuscript, University of Amsterdam, 2007.

[15] Hamoudi, A., "Risk Preferences in Households with Families", working paper UCLA, 2006.

[16] Handa, S., "Maternal Education and Child Attainment in Jamaica", *Oxford Bulletin of Economics and Statistics*, Vol. 58, No. 1, pp. 119-137, 1996.

[17] Hoddinott, J., Haddad, H., "Does Female Income Share Influence Household Expenditures? Evidence from Cote D'Ivoire", *Oxford Bulletin of Economics and Statistics*, Vol. 57, No. 1, pp. 77-96, 1995.

[18] Klawon, E., Tiefenthaler, J., "Bargaining Over Family Size: The Determinants of Fertility in Brazil", *Population Research and Policy Review*, Vol. 20, No. 5, pp. 423-440, 2001.

[19] Lewbel, A., "Using Heteroskedasticity to Identify and Estimate Mismeasured and Endogenous Regressor Models", *Journal of Business and Economic Statistics*, Vol. 30, pp. 67-80, 2012.

[20] Mason, K., Smith, H., "Female Autonomy and Fertility in Five Asian Countries", unpublished manuscript, University of Pennsylvania, 1999.

[21] Mason, K., Smith, H., "Husband's versus Wife's Fertility Goals and Contraception Use: The Influence of Gender Context in Five Asian Countries", *Demography*, Vol. 37, No. 3, pp. 299-311, 2000.

[22] Mason, K., Smith, H., "Women's Empowerment and Social Context: Results from Five Asian Countries", Unpublished Manuscript, University of Pennsylvania, 2003.

[23] Morgan, P., Stash, S., Smith, H., Mason, K., "Muslim and Non-Muslim Differences in Female Autonomy and Fertility: Evidence from India, Malaysia, Thailand, and the Philippines", *Population and Development Review*, Vol. 28, No. 3, pp. 515-537, 2002.

[24] Ng, J., "Elicited Risk and Time Preferences: The Role of Demographics, Cognition, and Interviewers", working paper, University of Southern California, 2013.

[25] Rashad, I., Markowitz, S., "Incentives in Obesity and Health Insurance", NBER Working Paper No. W13113, 2007.

[26] Sabia, J., "The Effect of Body Weight on Adolescent Academic Performance", *Southern Economic Journal*, Vol. 73, pp. 871-900, 2007

[27] Samuelson, P., "Social Indifference Curves", *Quarterly Journal of Economics*, Vol. 70, pp. 1-22, 1956.

[28] Schultz, T., "Testing the Neoclassical Model of Family Labor Supply and Fertility", *Journal of Human Resources*, Vol. 25, pp. 599-634, 1990.

[29] Schultz, T., "Demand for Children in Low Income Countries", Handbook of Population and Family Economics, Amsterdam: Elsevier Science, 1997.

[30] Strauss, J., Thomas, D., "Human Resources: Empirical Modelling of Household and Family Decisions", Handbook of Development Economics, North Holland, 1995.

[31] Tauchen, H., Witte, A., Long, S., "Domestic Violence: A Nonrandom Affair", *International Economic Review*, Vol. 32, pp. 491-511, 1991.

[32] Thomas, D., "Intra-Household Resource Allocation: An Inferential Approach", *Journal of Human Resources*, Vol. 25, pp. 635-696, 1990.

[33] Thomas, D., "Like Father, like Son; Like Mother, like Daughter: Parental Resources and Child Height", *Journal of Human Resources*, Vol. 29, pp. 950-988, 1994.

[34] Thomas, D., Contreras, D., Frankenberg, E., "Distribution of Power Within the Household and Child Health", mimeo RAND, 1997.

[35] Varanasi, N., "Intrahousehold Bargaining and Fertility", unpublished manuscript, University of Washington, 2009.