

Institute of Economic Studies, Faculty of Social Sciences  
Charles University in Prague

# Effects of Education on Determinants of High Desired Fertility: Evidence from Ugandan Villages

Michal Bauer  
Julie Chytilová  
Pavel Streblov

IES Working Paper: 23/2006



Institute of Economic Studies,  
Faculty of Social Sciences,  
Charles University in Prague

[UK FSV – IES]

Opletalova 26  
CZ-110 00, Prague  
E-mail : [ies@fsv.cuni.cz](mailto:ies@fsv.cuni.cz)  
<http://ies.fsv.cuni.cz>

Institut ekonomických studií  
Fakulta sociálních věd  
Univerzita Karlova v Praze

Opletalova 26  
110 00 Praha 1

E-mail : [ies@fsv.cuni.cz](mailto:ies@fsv.cuni.cz)  
<http://ies.fsv.cuni.cz>

**Disclaimer:** The IES Working Papers is an online paper series for works by the faculty and students of the Institute of Economic Studies, Faculty of Social Sciences, Charles University in Prague, Czech Republic. The papers are peer reviewed, but they are *not* edited or formatted by the editors. The views expressed in documents served by this site do not reflect the views of the IES or any other Charles University Department. They are the sole property of the respective authors. Additional info at: [ies@fsv.cuni.cz](mailto:ies@fsv.cuni.cz)

**Copyright Notice:** Although all documents published by the IES are provided without charge, they are licensed for personal, academic or educational use. All rights are reserved by the authors.

**Citations:** All references to documents served by this site must be appropriately cited.

**Bibliographic information:**

Bauer, M., J. Chytilová, P. Streblov (2006). "Effects of Education on Determinants of High Desired Fertility Evidence from Ugandan Villages" IES Working Paper 239/2006, IES FSV. Charles University.

This paper can be downloaded at: <http://ies.fsv.cuni.cz>

# Effects of Education on Determinants of High Desired Fertility: Evidence from Ugandan Villages

Michal Bauer\*

Julie Chytilová\*

Pavel Streblov\*

\* IES, Charles University Prague,  
Emails: [michal.bauer@centrum.cz](mailto:michal.bauer@centrum.cz)  
[chytilov@seznam.cz](mailto:chytilov@seznam.cz)  
[streblov@hotmail.com](mailto:streblov@hotmail.com)

September 2006

## **Abstract:**

High desired fertility is an important factor contributing to the population explosion in sub-Saharan Africa. On a broad sample of 910 respondents from the rural areas of Uganda this paper assesses the impact of health risks, economic contributions from children, traditional community institutions and unequal position of women on desired fertility levels. The paper further scrutinizes how these determinants are affected by education.

The results show that fear of diseases and involvement in traditional clan institutions increase desired number of children. Interestingly, these effects can be remarkably mitigated through education that improves the individual health prevention as well as reduces the influence of clans. Economic incentives for having children seem to be less significant than other factors. In addition, a very significant difference in desired fertility between men and women emerges, nevertheless education leads both to reduction and convergence of their desired fertility levels.

All these findings suggest that education stimulates a complex change in fertility preferences and underline the importance of education as efficient tool for reducing rapid population growth.

**Keywords:** fertility, education, development., demography

**JEL:** I1, I2, J1

**Acknowledgements:**

We are grateful to T. Cahlík, J. Hlaváček, K. Kouba and M. Mejstřík from the Institute of Economic Studies, Charles University and O. Bandiera, M. Ghatak, R. Macchiavello and A. Morjaria from STICERD at LSE for helpful conversations. We would also like to thank the Uganda Czech Development Trust for its assistance with the field research and STICERD for technical assistance and intellectual support at later stages of the research. We gratefully acknowledge the financial support from MSM0021620841 - Bauer and Chytilová - and Mobility Fund of Charles University – Střelov. All errors remain with us.

## INTRODUCTION AND HYPOTHESES

Average fertility in least developed countries (LDCs) in the last 50 years has declined from more than 6 to slightly less than 3 children per woman. Fertility has declined most quickly in Latin America and Asia from 5.9 to 2.6 and less rapidly in North Africa and Western Asia, from 6.6 to 3.5 children per woman (UNFPA, 2006; Makinwa-Adebusoye, 2001). However, the demographic transition did not happen in sub-Saharan Africa. In the past thirty years, sub-Saharan Africa has become the world's region with fastest population growth. Despite high mortality levels caused by AIDS pandemics, the population more than doubled between 1975 and 2005, rising from 335 to 751 million (UNFPA, 2006). Currently, it is growing at a rate of 2.2% a year (WDI, 2004). Furthermore, sub-Saharan Africa is the world's poorest region and the only developing region which during the period 1980–2000 suffered a decline in per capita income (WDI, 2004). During this period per capita income decreased on average by more than 1 percentage point annually.

During the previous decades heated discussion on what makes the fertility to decline and its link to economic growth has taken place. Originally, the experience of increasing living standards accompanied by the decreasing birth rates in developed and successfully developing Asian and Latin American countries contributed to the understanding of economic development as the best contraceptive. When summarizing the major conclusions of the World Population Conference held in 1974 in Bucharest Finkle and Crane (1975) write: "*the basis for an effective solution of population problem is, above all, socio-economic transformation.*" This was taken to mean that economic growth would lead to change in rationale for having children and slow down population growth. Nevertheless, the challenge remains for those countries that are stuck in a situation of no growth accompanied by high fertility levels - sub-Saharan Africa being the prime example. When empirically analyzing the causes of high fertility rates this paper builds on theoretical advances of desired fertility approach (Easterlin, 1975<sup>1</sup>; Becker, 1991; Pritchett,

---

<sup>1</sup> According to Easterlin, at early stages of socio-economic development there is high demand for children and therefore there is no desire to limit fertility.

1994), which emphasizes the importance of demand for children and suggests that high fertility is predominantly a result of people's choices.<sup>2</sup>

However, in relevant literature there is no consensus on the relative importance of particular determinants behind high desired fertility and as Pritchett (1994:3) puts it "*the key question is to what extent fertility desires are determined by economic influences and to what extent by social and cultural forces.*" This is also the key question for the design of efficient policies, which would enable sub-Saharan Africa to get out of poverty. A growing body of development researchers and institutions (e.g. World Bank, 2005) has emphasized the importance of education as a factor that affects desired fertility. But still, the specific pathways through which education influences these determinants are ambiguous in the existing research (see e.g. Dreze and Murthi, 1999 or Axinn and Barber, 2001). It is the aim of this paper to contribute to this ongoing discussion by assessing the impact of key factors on the determination of individual desired fertility and to scrutinize how these factors are affected by education. The analysis will be based on the set of micro-level data collected from 910 participants of a questionnaire survey, which we have undertaken in rural areas of Uganda.

The most frequently considered forces behind high desired fertility in sub-Saharan Africa are the following. Children in rural areas may be regarded by parents as a net economic asset by providing household labor (Ntozi and Kabera, 1991). Moreover, great majority of adults in sub-Saharan Africa, particularly in rural areas, are not covered by any social security system and rely on their children for economic support in old age and in time of need (Gille, 1985; Merrick, 2002). Children in poor health environment are more likely than other children to die. As a consequence parents have large numbers of children to compensate this risk in actuarial sense (Gille, 1985; Sachs, 2004). Another group of determinants influencing desired fertility are cultural factors. Caldwell and Cadwell (1987) and Makinwa-Adebusoye (2001) emphasize traditional community institutions that favor childbearing. These remain highly influential in many developing countries bringing more prestige to those with more children. High fertility is associated with the right life, divine approval and approbation by both living and dead ancestors. The unequal position of women also plays a role. Mason and Taj (1987) discuss the impact of traditional patriarchal family systems. While men are primer decision-makers about number of children, day-to-day care is mostly the responsibility of their mother. This effect may be further reinforced by low opportunity costs of women (Becker, 1991).

The statistic and econometric research in this field of interest is usually based on datasets from World Fertility Surveys (WFS) or Demographic and Health Surveys (DHS), which do not allow to asses the relevance of above-mentioned determinants perceived by individuals. Some empirical studies at micro-level in sub-Saharan Africa and Uganda aimed to solve this drawback, however, majority of them does not focus directly on the determinants of desired fertility but rather on the use of contraceptives and its effect on fertility rates (Ntozi and Kabera, 1991; Kirk and Pillet, 1998).

Several specific effects of education through which it can influence desired fertility were identified. Firstly, besides changing attitudes or values it contributes to the reduction of economic utility of children. Education raises opportunity costs of parents' time and opens up greater opportunities for them in comparison to investment in children as a productive asset (Weinberger, 1987; Becker, 1991). Secondly, education may reduce infant and child mortality. Parents can therefore afford to plan fewer births in order to achieve a desired family size (Schultz, 1994; Martín, 1995). Thirdly, the position of women improves with higher education,

---

<sup>2</sup> For the alternative perspective that emphasize the supply side and argues that the problem lies in the lack of contraceptives in developing countries see e.g. Robey, Rutstein and Morris (1993) or Westoff and Bankole (2000).

which could alter the decision-making process of the family on the number of children (Pritchett, 1994). Finally, educated people may be more receptive to modern social norms and the effect of traditional approaches might be mitigated (Caldwell, 1980). Weinberger (1987), Martin (1995) and Kravdal (2002) used macro-level correlation between average education level and fertility rate to support the relationship. Kirk and Pillet (1998) made similar analysis focusing on sub-Saharan African countries.

This paper will test the relevance of above-mentioned determinants and the effects of education on individual level. The hypotheses are the following:

- Health risks increase the desired number of children.
- Economic contributions from children to parents increase desired number of children.
- Traditional Ugandan community institutions contribute to higher desired number of children.
- The desired number of children differs for men and women.
- Higher level of education enhances prevention and reduces the risk of diseases perceived by respondents.
- Higher level of education decreases the importance of children's economic contributions in fertility considerations.
- The influence of traditional community institutions (e.g. clans) decreases with the level of education.
- The position of woman within Ugandan family strengthens with the level of education she has.

## **SAMPLE, RESEARCH DESIGN AND MAJOR VARIABLES**

The questionnaire survey was conducted in ten villages in rural area of Mukono district (southern part of Uganda) under the auspices of the Institute of Economic Studies, Charles University in Prague and the Uganda Czech Development Trust. A total of 910 respondents participated in the study and all the questionnaires were filled in November 2005. The villages and respondents were selected so as to have representative sample with the indication of level of education, age, sex, marital status and structure of economic activities. With regard to the fact that 85% of Ugandan inhabitants live in rural areas with similar characteristics, this sample can be considered as representative also for the whole Uganda. Most of the respondents are farmers and others are students, housewives, drivers, teachers, shopkeepers, etc. Distribution of the respondents in particular villages was following: Kikube 105, Busagazi 42, Kateete 143, Buikwe 160, Nakifuma 47, Bweyogerere 95, Kasolo 89, Kygaya 58, Lugasa 122 and Kirugu 49. The questionnaires were bilingual – in English and Luganda – allowing us to approach also less educated people, who speak only Luganda.

Each respondent was asked to specify his/her desired number of children and factors which are of utmost importance for his/her decision-making about number of children. The selected factors broadly cited in the desired fertility literature were “translated” into the language understandable for all respondents in the following way. “Help of children now and their support when parents are old” was used as a proxy of economic incentives behind high fertility. “Fear from the child's fatal diseases” was used as a proxy of high child mortality argument. The opportunity to “expand the size of respondent's clan” approximates the cultural factors.

Besides the analysis of factors affecting decision-making about number of children, we have analyzed the impact of more general characteristics such as age, education level and sex. The sample was divided into five education levels: lower primary school (P1-P4), higher primary school (P5-P7), lower secondary school (S1-S2), higher secondary school (S3-S6) and above secondary school (diploma, bachelor degree or other university education). The average age of respondents is 26 years. The Table 1 summarizes the frequencies of different groups in the sample.

**Table 1: Descriptive statistics: total, by sex and age group**

	Total	Sex		Age group				
		Man	Woman	15-18	19-23	24-28	29-34	35-70
Frequency								
N	910	496	414	280	188	150	105	181
Fraction in sample	100%	55%	45%	31%	21%	17%	12%	20%
Desired number of children (mean)	6.0	7.1	4.8	5.4	5.5	5.4	5.4	8.4
Education								
Fraction who completed P4	92%	94%	91%	96%	96%	94%	90%	82%
Fraction who completed P7	69%	74%	64%	79%	79%	71%	65%	46%
Fraction who completed S2	48%	51%	45%	36%	69%	63%	53%	31%
Fraction who completed S6	7%	8%	6%	0%	3%	18%	23%	4%
Age (mean)	26	27	26	16	21	26	31	44
Family and society embeddedness								
Single	510	287	223	266	150	62	11	15
Married or divorced	400	209	191	14	38	88	94	166
Respondents with strong clan linkage	177	132	45	47	33	23	14	59

Advantages and disadvantages of this type of experimental studies noted in the literature apply to this study as well (for details see for example Benzion and Yagil, 2001). Nonetheless, the questions were examined carefully so that the risks connected to e.g. misunderstanding of particular questions from the side of respondents were limited in the highest possible extent. There were three rounds of pre-testing with 10 representatives of the expected sample, based on which the questionnaires were adjusted. In cooperation with Uganda Czech Development Trust thirty local instructors well-respected in the community were trained. The instructors not only facilitated distribution and retribution of the questionnaires but approached the respondents individually and due to their social status openness and serious approach of the respondents were ensured. Therefore, we believe that respondents were positively motivated to complete the questionnaire with necessary care and diligence even without being offered monetary incentives, which some authors claim, do not necessarily improve performance (Gneezy and Rustichini, 2000).

## STATISTICAL RESULTS

### Health risks

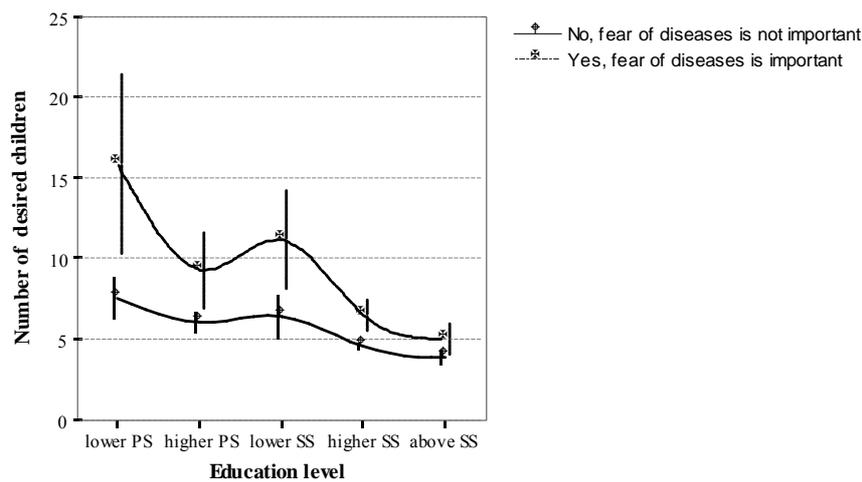
Uganda belongs among the countries with highest fertility rates in the world. Actual fertility rate in Uganda is 6.1 per woman (WDI, 2004). The mean desired fertility in our sample is equal to 6.0. It is not the primer focus of the paper to analyze the difference between actual and

desired fertility levels, but this comparison indicates that actual number of children largely reflects the people’s desires.

In Uganda mortality of children under 5 years reaches 14%. In sub-Saharan Africa in total the average is 17%, whereas in OECD countries it is 0.6% (WDI, 2004). Responses from our sample indicate that fear from child mortality contributes to higher desired fertility levels. Respondents for whom the fear of diseases was of utmost importance want to have on average 9.8 children, whereas the mean for the people without such strong fear from diseases is 5.4. According to ANOVA test of mean stability the difference is significant on 1% level.

Chart 1 suggests two interesting outcomes. Firstly, education decreases the desired fertility for both groups. Secondly, perception of poor health environment and higher child mortality increases desired fertility for all education levels. However, the difference in desired fertility between the groups tends to diminish with the education level. The effect of education is further reinforced by the change in proportion of respondents fearing the diseases, which diminishes by 15 percentage points on secondary school.

*Chart 1: Number of desired children, fear of diseases and education levels\**



\* The charts depict average values for particular groups and 95% confidence intervals.

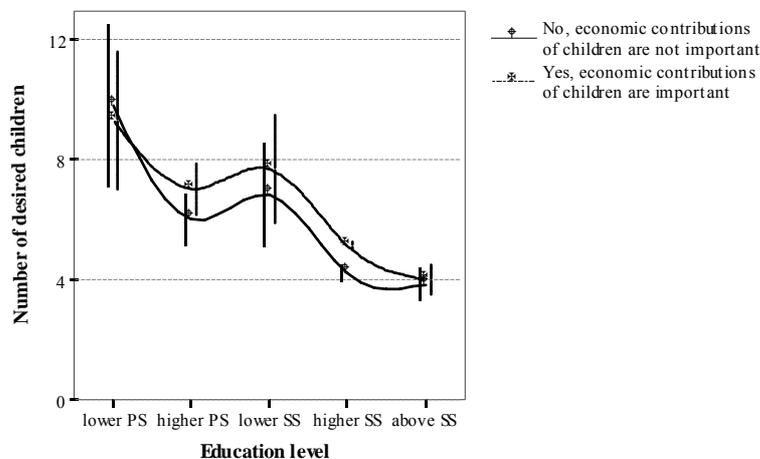
These outcomes can be attributed to the link between education and attitude to health prevention. There is considerable evidence surveyed and contributed to by Mirowsky and Ross (1998) that suggests that changes in high mortality risks are symptomatic for higher levels of education which encourage the adoption of healthy lifestyle. Malaria is responsible for a huge share of early mortality and risk of infection by this disease is very closely knit with individual prevention, especially with the usage of mosquito nets (Gyapong et al, 1996 or Choi et al., 1995). To examine the link between education and health prevention Ugandan respondents were asked, if they use mosquito net. The results indicate that the share of people who use mosquito net increases for each level of education. Only 25% of respondents with lower primary school use it in contrast to 67% of those with finished secondary school. This finding goes in line with the empirical study of Nuwaha (2001) on mosquito net usage, which was also undertaken in Uganda. Education of parents can be therefore perceived as a factor that limits risk of child being infected by malaria. Consequently, more educated parents do not need to insure so much against high child mortality in the form of additional children.

## *Economic contributions from children*

In rural areas as Mukono region, where most of the income has origin in subsistence farming, children might be perceived as a source of labor. Additionally, as in most other sub-Saharan countries the social security system is almost absent in Uganda (Reinikka and Collier, 2001) and people do not have guaranteed any social minimum as in developed countries. For many Ugandans children are their only security for the time of old age or bad health. The respondents' answers from our sample do not provide clear picture on the relevance of economic contributions from children on higher desired fertility. On one hand big share of respondents (59%) claimed that support of children is an important factor in their fertility decision-making. On the other hand, there are no significant differences in means of desired fertility between the group that highly appreciates children's economic support (6.5 children) and the group that considers this factor as unimportant (5.4 children). On 5% level we cannot refuse the hypothesis that means are the same for both groups (ANOVA test).

The possibility of child's economic support to parents does not make a big difference in desired fertility for any education level (Chart 2). This finding contrasts with the argument of Weinberger (1987) or Kravdal (2002) who claim that education significantly reduces the economic utility of children and consequently pushes down the desired number of children. Our data suggest rather weak link between education and desired fertility through the changing perception of child as an economic asset.

*Chart 2: Number of desired children, importance of economic support and education levels*

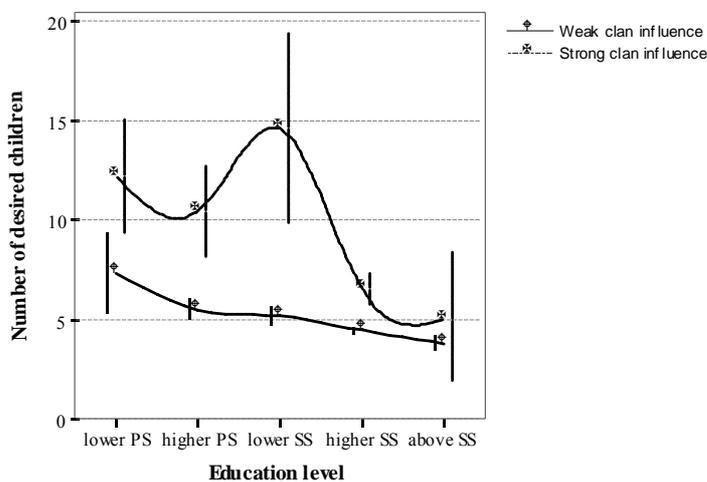


## **Traditional community institutions**

According to Makinwa-Adebusoye (2001:6) in African clan-based rural societies there is a need to ensure that fertility level is well above mortality level and the clan thus won't disappear. "Considerable expansion of membership enhances the power and prestige of the clan and reduces the likelihood of extinction through death." Therefore there is a pressure from clan leaders towards clan members to personally contribute to growth of the clan population through higher number of children. The social status of especially men in traditional Ugandan society is thus closely tied with the number children they have.

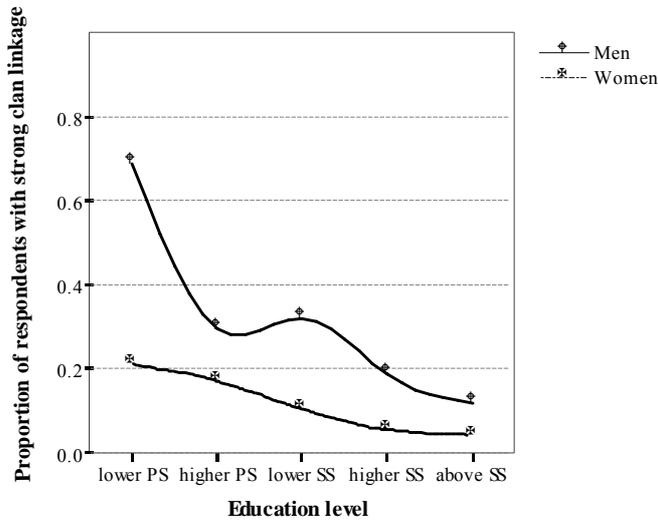
The data confirm that being embedded within the informal institutions of clan very strongly enhances the number of desired children. The people with strong clan linkage desire to have on average 10.5 children, whereas the people with weak clan linkage desire to have only 4.9 children (ANOVA significant on 1% level). Clan linkage increases the desired fertility also for each education level (see Chart 3). Though, the difference between the groups with strong and weak clan linkage is not stable. The desired fertility of respondents with weak clan linkage steadily decreases with education. Interestingly, the people with strong clan linkage want to have more than 8 children until the first half of secondary school. Their fertility preferences tend to change very rapidly at the second half of secondary school, where the number of children decreases to 5. The people with strong clan linkage seem to resist the effect of education until higher level of secondary education.

*Chart 3: Number of desired children, importance of clan and education levels*



Furthermore, the highest proportion of people with strong clan loyalty has finished less than first half of primary school. This proportion is even higher in the case of uneducated men (69%, Chart 4) as the traditional system of clans is predominantly masculine. Education very rapidly decreases the influence of the clan through reducing the proportion of people with strong clan linkage. The proportion of men with strong clan linkage decreases by 40 percentage points during higher primary school.

Chart 4: Proportion of people with strong clan linkage and education levels



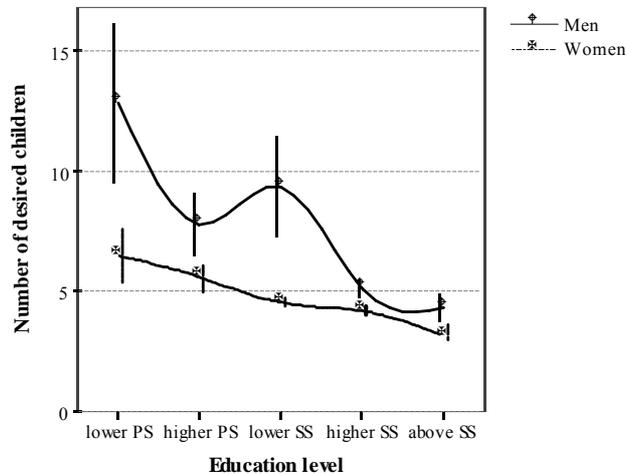
To the knowledge of authors the existing fertility studies do not offer any quantitative support for the link between desired fertility and traditional community structures. Our data suggest strong positive relationship between the clan loyalty and desired fertility and show that education has a capacity to eliminate the influence of the clan on fertility decisions.

#### *Sex and unequal position of women*

The literature on differences in desired fertility between men and women in developing countries is ambiguous. Bankole and Singh (1998) show on DHS data collected in developing countries between 1990-1996 that both men and women want to have large families and that husbands want more children than their wives. This is because women are those who take full care of children in traditional societies and thus want less of them. In their surveying article Mason and Taj (1987) analyze a variety of channels for women's desired fertility to be either lower or higher than men's desired fertility. Higher desired fertility of women under patriarchal system may arise due to their effort to insure against the risk of divorce.

Our research results support the view that women want to have less children than men. Men want to have on average 7.0 children, whereas women only 4.8. The difference is significant on 1% level (ANOVA test).

Chart 4: Number of desired children, sex and education levels



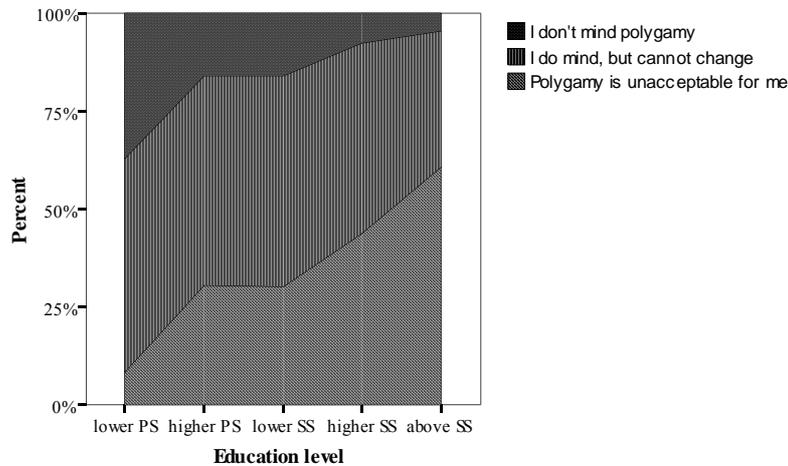
Several authors show an overall pattern of decreasing women’s desired fertility with increasing education. Martín (1995) in her study based on DHS provides the indicator of mean ideal family size according to women’s education for 26 developing countries, including 10 sub-Saharan countries. For Uganda, the results suggest that women with no education want to have on average 7.2 children, and this number is decreasing with education to 5.1 for the most educated women. Similarly, Kirk and Pillet (1998:12) show that in the group of sub-Saharan countries with the highest fertility rates, which includes Uganda, desired fertility falls down from 6.2 for women with no education to 4.0 for women with secondary education. Our data (lower line in Chart 5) are in compliance with these observations. Women’s desired fertility decreases for all levels of education - from the average of 6.8 for women having finished less than first half of primary school to 4.2 for those with higher secondary school education.

The relevant studies do not systematically account for possible differences between desired fertility of men and women. The focus is on women’s desired fertility, for example WFS relied almost exclusively on the reports of women. As mentioned earlier due to a number of socio-cultural factors women are very often voiceless and powerless in matters affecting their reproduction and men are dominant decision-makers on fertility in many African countries (Makinwa-Adebusoye’s, 2001).

The upper line in Chart 5 depicts the desired number of children for men across education levels. It shows that education changes the fertility preferences of men more considerably than of women. Uneducated men want to have more than 12 children, whereas men with higher secondary school education want to have only 5.1 children. These data outcomes together with the strong position of man in Ugandan society highlight the provision of education to men as critical measure to reduction of high fertility rate.

On the other hand the position of woman within the family alters with the level of education she has. Women in our sample were asked to what extent polygamy of their husbands is or is not acceptable for them. Chart 6 shows the results. Polygamy is remarkably less acceptable for educated women in comparison with women almost without any education. Unacceptability of polygamy increases from 10% to almost 50%.

Chart 5: Women's attitude to polygamy and education levels



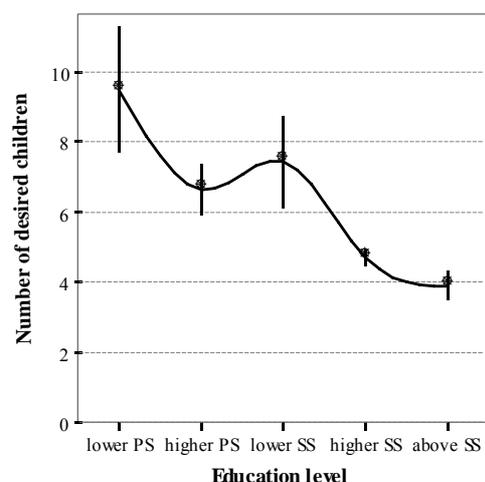
The data suggest three interesting findings resulting from sex differences. Firstly, men want to have more children than women. Secondly, education has stronger impact on man's fertility choices rather than on woman's, which is especially important in the context of patriarchal society in Uganda. Thirdly, education strengthens the position of woman within the family, which may reinforce the effect of education on lower desired fertility.

### Total effect of education

Results from Ugandan survey strongly accord with the view that education has a significant negative impact on desired fertility.<sup>3</sup> The relationship between these two variables is depicted in Chart 7. We can observe a rapid decline in desired fertility at the lower primary school; further significant decline appears at secondary school. Average desired number of children decreases from 9.5 to 6.5 at primary school and further to 4.1 at secondary school.

<sup>3</sup> Number of empirical studies warns against overestimating the effects of education on outcomes of interest when one relies solely on correlation between the two variables. This may arise due to the omission of unobserved abilities correlated with education (in the context of fertility see Breierova and Duflo, 2002). To address the omitted variable bias the level of education is usually instrumented by the exogenous accessibility of education measured by number of schools in respondent's region. We have found negative correlation between number of schools and desired number of children, which is significant on 1% level. This outcome supports the existence of causality that runs from education to fertility.

Chart 7: Number of desired children and education levels



The inverse relationship between desired fertility and education is well established. Less clear is the magnitude and pathways through which education influences desired fertility. As mentioned above according to Martín (1995) and Kirk and Pillet (1998), uneducated Ugandans want to have on average two more children than the most educated ones. We have observed stronger impact of education – the difference of five children. However if we used data for women only as the referenced studies did, similar results would be obtained. Since the role of men in decision-making process on the number of children is strong, it is important to take into account also their desired fertility when measuring the magnitude of education effect.

The types of observed effects of education are summarized in Table 5. Firstly, education decreases the fear of diseases due to improvement in prevention and thus the parents do not tend to desire additional children as an insurance against child’s death. Secondly, the economic influences are lower for more educated parents as they rely more on themselves when they are old or in the time of need. However, this effect emerged as less significant when compared to other factors. Thirdly, the influence of traditional community institutions that favor childbearing is moderated by higher education. Finally the unequal position of women improves with higher education, which can be shown on women’s attitude to polygamy. As a consequence of better position in the household, woman’s preferences about the number of children, which are in general lower than those of men, may be more respected. Education thus mitigates the importance of all four factors, which were identified as contributing to high desired fertility level in Uganda.

Table 2: Effects of education on desired fertility: summary

Factors behind desired fertility	Impact on desired fertility	Impact of education on importance of the factor	Impact of education on desired fertility
<b>Fear of diseases</b>	+	-	-
<b>Economic help of children (insignif.)</b>	+	-	-
<b>Clan linkage</b>	+	-	-
<b>Sex and unequal position of women</b>	+	-	-

## ECONOMETRIC RESULTS

The preceding statistical analysis demonstrates the impact on desired fertility of three factors: fear of diseases, clan linkage and sex. Economic support of children seemed to be positively correlated, but insignificant. Regression analyses reported below tests the hypotheses jointly and controls for the effects of other particular factors. OLS estimation was used to analyze the data, assuming a normally distributed error term.

In regression form we can model hypotheses in the following way:

$$F = b_0 + b_1D + b_2H + b_3C + b_4S + e \quad (1)$$

where F = desired fertility, D = fear of diseases, H = economic help of children, C = clan linkage, S = sex. B's are the OLS coefficients, and e is the error term. The hypotheses are the following:  $b_1 > 0$ ,  $b_2 = 0$ ,  $b_3 > 0$  and  $b_4 < 0$ . Table 3 presents the econometric results for the whole sample. The level of relationship is an average for this type of experimental studies, R Square is equal to 0.21 and the significance level is below 1%.

**Table 1: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the whole sample.**

	Whole sample Rsq=0.21 Adj Rsq=0.20
Intercept	5.84 *** (9.59)
Fear of diseases (important=1)	3.03 *** (6.03)
Child's support (important=1)	1.32 *** (3.77)
Clan linkage (important=1)	4.71 *** (10.37)
Sex (man=1, woman=2)	-1.36 *** (-3.84)

Dependent variable: Desired fertility

\* Indicates statistical significance at the 10% level.

\*\* Indicates statistical significance at the 5% level.

\*\*\* Indicates statistical significance at the 1% level.

The findings re-establish the impact of above analyzed factors on desired fertility.<sup>4</sup> In contrast to statistical testing the results of overall regression suggest the positive impact of child's economic support being significant on 1% level.

The sample was divided on more educated half and less educated half of respondents in order to compare the coefficients for the two sub-samples (see Table 4). The coefficients of explanatory variables show lower slopes for educated half of respondents than for the less educated half (differences significant on 1% level). These results comply with the hypothesis, that education mitigates the effect of all analyzed determinants of high fertility and thus contributes to reduction of desired fertility. In addition, intercept for more educated half is lower by almost 3.8 children.

<sup>4</sup> To deal with the fixed effects of specific villages where the data were collected we have also included clustering into the OLS regression. The resulting standard errors and significance levels did not emerge substantially altered from those of simple OLS in Table 3.

**Table 4: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for more educated and less educated half of respondents.**

	Education			
	Less educated half		More educated half	
	Rsq=0.22	Adj Rsq=0.22	Rsq=0.18	Adj Rsq=0.17
Intercept	8.21 ***	(7.23)	4.52 ***	(12.84)
Fear of diseases (important=1)	3.24 ***	(4.07)	1.55 ***	(4.29)
Child's support (important=1)	1.27 **	(1.98)	0.95 ***	(4.66)
Clan linkage (important=1)	5.54 ***	(7.48)	1.71 ***	(5.44)
Sex (man=1, woman=2)	-2.55 ***	(-4.02)	-0.56 ***	(-2.68)

Besides the regression model in equation (1) we have undertaken series of OLS regressions for different sub-samples to observe how the variables interact. The slopes for different sub-samples are in Table 5 and Table 6.

**Table 2: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the sub-samples divided according importance of fear of diseases and child's support.**

	Diseases				Child's support			
	Unimportant		Important		Unimportant		Important	
	Rsq=0.13	Adj Rsq=0.12	Rsq=0.22	Adj Rsq=0.21	Rsq=0.26	Adj Rsq=0.25	Rsq=0.19	Adj Rsq=0.18
Intercept	5.54 ***	(9.59)	11.07 ***	(4.64)	5.73 ***	(8.89)	7.22 ***	(8.53)
Fear of diseases (important=1)					2.37 ***	(4.40)	3.48 ***	(4.40)
Child's support (important=1)	1.09 ***	(3.22)	2.14	(1.56)				
Clan linkage (important=1)	4.17 ***	(9.04)	6.03 ***	(4.31)	4.16 ***	(8.56)	5.09 ***	(7.09)
Sex (man=1, woman=2)	-1.00 ***	(-2.97)	-3.71 **	(-2.6)	-1.13 ***	(-2.83)	-1.49 ***	(-2.81)

Dependent variable: Desired fertility

Model of desired fertility - controlling for diseases factor (left side):

$$F = b_0 + b_2H + b_3C + b_4S + e$$

Model of desired fertility - controlling for child's support factor (right side):  $F = b_0 + b_1D + b_3C + b_4S + e$

**Table 3: Determinants of desired fertility in experiment. OLS estimates (t-statistics in parenthesis) for the sub-samples divided according importance of clan linkage and sex.**

	Clan linkage				Sex			
	Weak		Strong		Men		Women	
	Rsq=0.10	Adj Rsq=0.09	Rsq=0.08	Adj Rsq=0.06	Rsq=0.19	Adj Rsq=0.19	Rsq=0.20	Adj Rsq=0.19
Intercept	5.49 ***	(15.09)	12.54 ***	(4.86)	3.98 ***	(7.77)	3.78 ***	(19.13)
Fear of diseases (important=1)	2.10 ***	(6.05)	4.54 ***	(2.76)	4.05 ***	(4.97)	1.38 ***	(3.66)
Child's support (important=1)	1.03 ***	(4.76)	1.97	(1.27)	1.60 ***	(2.66)	0.86 ***	(3.55)
Clan linkage (important=1)					5.32 ***	(7.71)	3.06 ***	(7.87)
Sex (man=1, woman=2)	-0.94 ***	(-4.46)	-3.60 **	(-2.05)				

Dependent variable: desired fertility

Model of desired fertility - controlling for clan linkage factor (left side):  $F = b_0 + b_1D + b_2H + b_4S + e$

Model of desired fertility – separately for men and women (right side):

Three observations from this analysis are worth noting. Firstly, fertility decision-making of the respondents who perceive one factor as important for number of children is in general more affected by other determinants as well. For example, people with strong clan linkage reflect the fear of diseases more strongly in their desired number of children than people with weak linkage. Secondly, all intercepts are substantially higher for the groups perceiving particular

factors with higher importance. Thirdly, men and women have similar intercept, but men have higher coefficients of all determinants than women.

## CONCLUSIONS

Rapid population growth in sub-Saharan Africa is one of the critical forces that undermine economic growth prospects of the region. It would have to grow by more than 2.2% annually in order to only keep the living standards on the same level, not mentioning the convergence to more developed countries. There is substantial literature on possible causes of high desired fertility in poor countries. We have classified these factors on four broad types: health risks, economic contributions from children, traditional community institutions and unequal position of women in the society. Usually observed correlation between education and fertility based on aggregate data does not allow assessing if and to what extent the importance of these factors changes with education. In contrast to most existing studies this paper analyzes more detailed individual-level data from a questionnaire survey among 910 respondents from villages in Mukono district, Uganda. Quantification of the influence of particular factors on desired number of children and decomposition of the education impact are the key results of the research.

The average number of desired children in the sample amounts to 6.0 which is almost identical to actual fertility rate in Uganda, which reaches 6.1 children per woman. We have found that fear of diseases motivates respondents to desire higher number of children. The results also suggest that more educated people put higher emphasis on prevention and reduction of health risks, which were measured by mosquito net usage. As a consequence, more educated respondents attributed to health risks substantially lower importance in their fertility decisions than their less educated counterparts and their final desired number of children was lower.

The data draw attention to the fact that traditional community institution of clan may substantially increase the desired number of children, on average by as much as 5.6 children. At the same time the data provide rare quantitative support for the role of education in the reduction of clan influence on fertility. This effect takes place both on primary and also secondary level education.

Another interesting finding stems from the analysis of different fertility preferences of men and women. The decline in desired fertility of women due to education shows in our sample similar pattern as in other comparable studies which measure the impact of education on fertility. However, these studies predominantly consider women's fertility preferences as decisive and often omit the role of men. Remarkably high impact of education on men's desired fertility draws education of men as being equally important as it is in the case women.

Economic contributions of children emerged to be important for majority of respondents, but statistical tests did not provide clear picture on the significance of this factor in altering desired fertility.

In general, it seems that it is not just one specific pathway through which education influences desired number of children as often assumed. Rather the responses indicate that education stimulates a complex change in preferences and fertility attitudes. The change in perceptions of respondents ranges from health and economic to cultural influences behind high desired fertility. We hope that our findings provide a sharper picture as to why education should be considered as the most appropriate contraceptive and that the foreign aid focusing on mitigating rapid population growth should have the form of widespread education provision until the secondary education level equally available for women and men.

## REFERENCES

- Axinn, William G. and Jennifer S. Barber. 2001. "Mass Education and Fertility Transition." *American Sociological Review* 66: 481-505.
- Bankole, Akinrinola and Susheela Singh. 1998. "Couple's Fertility and Contraceptive Decision-Making in Developing Countries: Hearing the Man's Voice." *International Family Planning Perspectives* 24(1): 15-24.
- Becker, Gary S. 1991. *A Treatise on the Family*. London : Harvard University Press.
- Benzion, Uri and Joseph Yagil. 2001. *Decisions in financial economics: An experimental study of discount rates* [online]. Available from: <http://econ.bgu.ac.il/papers/166.pdf> [Accessed 24 August 2006].
- Breierova, Lucia and Esther Duflo. 2002. "The Impact of Education on Fertility and Child Mortality: Do Fathers really Matter less than Mothers?" *NBER Working Paper* 10513 [online]. Available from: <http://www.nber.org/papers/W10513> [Accessed 24 August 2006].
- Caldwell, John C. 1980. "Mass Education as a Determinant of the Timing of Fertility Decline." *Population and Development Review* 6 (2): 225-255.
- Caldwell, John C. and Pat Caldwell. 1987. "The Cultural Context of High Fertility in sub-Saharan Africa." *Population and Development Review* 13 (3): 409-437.
- Choi, H.W. et al. 1995. "The Effectiveness of Insecticide-impregnated Bed Nets in Reducing Cases of Malaria Infection: A Meta-analysis of Published Results." *American Journal of Tropical Medicine and Hygiene* 52 (5): 377-382.
- Dreze, Jean and Mamta Murthi. 2001. "Fertility, Education and Development: Evidence from India." *Population and Development Review* 27 (1): 33-63.
- Easterlin, Richard A. 1975. "An Economic Framework for Fertility Analysis." *Studies in Family Planning* 6 (3): 54-63.
- Finkle, Jason L. and Barbara B. Crane. 1975. "The Politics of Bucharest: Population, Development, and the New International Economic Order." *Population and Development Review* 1 (1): 87-114.
- Gille, Halvor. 1985. "The World Fertility Survey: Policy Implications for Developing Countries." *International Family Planning Perspectives* 11 (1): 9-17.
- Gneezy, Uri and Aldo Rustichini. 2000. "Pay Enough or Don't Pay At All." *Quarterly Journal of Economics* 115: 791-811.
- Gyapong, J.O. et al. 1996. "Rapid Community Diagnosis of Lymphatic Filariasis." *Acta Tropica* 61: 65-74.
- Kirk, Dudley and Bernard Pillet. 1998. "Fertility Levels, Trends, and Differentials in Sub-Saharan Africa in the 1980s and 1990s." *Studies in Family Planning* 29 (1): 1-22.
- Kravdal, Oystein. 2002. "Education and Fertility in Sub-Saharan Africa: Individual and Community Effects." *Demography* 39 (2): 233-250.
- Makinwa-Adebusoye, Paulina. 2001. "Sociocultural Factors Affecting Fertility in Sub-Saharan Africa." *Workshop on Prospects for Fertility Decline in High Fertility Countries*, July 2001, United Nations Population Division.
- Martín, Teresa Castro. 1995. "Women's Education and Fertility: Results from 26 Demographic and Health Surveys." *Studies in Family Planning* 26 (4): 187-202.

- Mason, Karen Oppenheim and Anju Malhotra Taj. 1987. „Differences between Women’s and Men’s Reproductive Goals in Developing Countries.” *Population and Development Review* 13 (4): 611-638.
- Merrick, Thomas W. 2002. “Population and Poverty: New Views on an Old Controversy.” *International Family Planning Perspectives* 28 (1): 41-46.
- Mirowski, John and Catherine E. Ross. 1998. “Education, Personal Control, Lifestyle and Health – A Human Capital Hypothesis.” *Research on Ageing* 20: 415-449.
- Ntozi, James P.M. and James B. Kabera. 1991. “Family Planning in Rural Uganda: Knowledge and use of modern and traditional methods in Ankole.” *Studies in Family Planning* 22 (2): 116-123.
- Nuwaha, F. 2001. “Factors Influencing the Use of Bed Nets in Mbarara Municipality in Uganda.” *American Journal of Tropical Medicine and Hygiene* 65: 877-882.
- Pritchett, Lant H. 1994. “Desired Fertility and the Impact of Population Policies.” *Population and Development Review* 20 (1): 1-55.
- Reinnika, Ritva and Paul Collier. 2001. *Uganda’s Recovery: The Role of Firms, Markets and Government*. Washington, D.C.: World Bank.
- Robey, Bryant, Shea O. Rutstein and Leo Morris. 1993. “The Fertility Decline in Developing Countries.” *Scientific American* 269 (6): 60-66.
- Sachs, Jeffrey et al. 2004. „Ending Africa’s Poverty Trap.” *Brookings Papers on Economic Activity* 1: 117-240.
- Schultz, T. Paul. 1994. “Human Capital, Family Planning, and Their Effects on Population Growth.” *American Economic Review* 84 (2): 255-260.
- United Nations Population Fund (UNFPA). 2006. *Annual Report 2005*. New York.
- United Nations. 2004. *World Development Indicators*. New York.
- Weinberger, Mary Beth. 1987. “The Relationship Between Women’s Education and Fertility: Selected Findings From the World Fertility Surveys.” *International Family Planning Perspectives* 13 (2): 35-46.
- Westoff, Charles F. and Akinrinola Bankole. 2000. “Trends in the Demand for Family Limitation in Developing Countries.” *International Family Planning Perspectives* 26 (2): 56-62.
- World Bank. 2005. *Opening doors – Education and the World Bank* [online]. Available from: <http://www1.worldbank.org/education/pdf/OpenDoors.pdf> [Accessed 24 August 2006].

# IES Working Paper Series

## 2005

10. Roman Horváth: *Exchange Rate Variability, Pressures and Optimum Currency Area Criteria: Implications for the Central and Eastern European Countries*
11. Petr Hedbávný, Ondřej Schneider, Jan Zápál: *A Fiscal Rule That Has Teeth: A Suggestion for a "Fiscal Sustainability Council" Underpinned by the Financial Markets*
12. Vít Bubák, Filip Žikeš: *Trading Intensity and Intraday Volatility on the Prague Stock Exchange: Evidence from an Autoregressive Conditional Duration Model*
13. Peter Tuchyňa, Martin Gregor: *Centralization Trade-off with Non-Uniform Taxes*
14. Karel Janda: *The Comparative Statics of the Effects of Credit Guarantees and Subsidies in the Competitive Lending Market*
15. Oldřich Dědek: *Rizika a výzvy měnové strategie k převzetí eura*
16. Karel Janda, Martin Čajka: *Srovnání vývoje českých a slovenských institucí v oblasti zemědělských finance*
17. Alexis Derviz: *Cross-border Risk Transmission by a Multinational Bank*
18. Karel Janda: *The Quantitative and Qualitative Analysis of the Budget Cost of the Czech Supporting and Guarantee Agricultural and Forestry Fund*
19. Tomáš Cahlík, Hana Pessrová: *Hodnocení pracovišť výzkumu a vývoje*
20. Martin Gregor: *Committed to Deficit: The Reverse Side of Fiscal Governance*
21. Tomáš Richter: *Slovenská rekodifikace insolvenčního práva: několik lekcí pro Českou republiku*
22. Jiří Hlaváček: *Nabídková funkce ve vysokoškolském vzdělávání*
23. Lukáš Vácha, Miloslav Vošvrda: *Heterogeneous Agents Model with the Worst Out Algorithm*
24. Kateřina Tsolov: *Potential of GDR/ADR in Central Europe*
25. Jan Kodera, Miroslav Vošvrda: *Production, Capital Stock and Price Dynamics in a Simple Model of Closed Economy*
26. Lubomír Mlčoch: *Ekonomie a štěstí – proč méně může být více*
27. Tomáš Cahlík, Jana Marková: *Systém vysokých škol s procedurální racionalitou agentů*
28. Roman Horváth: *Financial Accelerator Effects in the Balance Sheets of Czech Firms*
29. Natálie Reichlová: *Can the Theory of Motivation Explain Migration Decisions?*
30. Adam Geršl: *Political Economy of Public Deficit: Perspectives for Constitutional Reform*
31. Tomáš Cahlík, Tomáš Honzák, Jana Honzáková, Marcel Jiřina, Natálie Reichlová: *Convergence of Consumption Structure*
32. Luděk Urban: *Koordinace hospodářské politiky zemí EU a její meze*

## 2006

1. Martin Gregor: *Globální, americké, panevropské a národní rankiny ekonomických pracovišť*
2. Ondřej Schneider: *Pension Reform in the Czech Republic: Not a Lost Case?*
3. Ondřej Knot and Ondřej Vychodil: *Czech Bankruptcy Procedures: Ex-Post Efficiency View*
4. Adam Geršl: *Development of formal and informal institutions in the Czech Republic and other new EU Member States before the EU entry: did the EU pressure have impact?*

5. Jan Zápál: *Relation between Cyclically Adjusted Budget Balance and Growth Accounting Method of Deriving 'Net fiscal Effort'*
6. Roman Horváth: *Mezinárodní migrace obyvatelstva v České republice: Role likviditních omezení*
7. Michal Skořepa: *Zpochybnění deskriptivnosti teorie očekávaného užítku*
8. Adam Geršl: *Political Pressure on Central Banks: The Case of the Czech National Bank*
9. Luděk Rychetník: *Čtyři mechanismy příjmové diferenciacie*
10. Jan Kodera, Karel Sladký, Miloslav Vošvrda: *Neo-Keynesian and Neo-Classical Macroeconomic Models: Stability and Lyapunov Exponents*
11. Petr Jakubík: *Does Credit Risk Vary with Economic Cycles? The Case of Finland*
12. Julie Chytilová, Natálie Reichlová: *Systémy s mnoha rozhodujícími se jedinci v teoriích F. A. Hayeka a H. A. Simona*
13. Jan Zápál, Ondřej Schneider: *What Are Their Words Worth? Political Plans And Economic Pains Of Fiscal Consolidations In New Eu Member States*
14. Jiří Hlaváček, Michal Hlaváček: *Poptávková funkce na trhu s pojištěním: porovnání maximalizace paretovské pravděpodobnosti přežití s teorií EUT von-Neumanna a Morgensterna a s prospektovou teorií Kahnemana a Tverského*
15. Karel Janda, Martin Čajka: *Státní podpora českého zemědělského úvěru v období před vstupem do Evropské unie*
16. Nauro F. Campos, Roman Horváth: *Reform Redux: Measurement, Determinants and Reversals*
17. Michal Skořepa: *Three heuristics of search for a low price when initial information about the market is obsolete*
18. Michal Bauer, Julie Chytilová: *Opomíjená heterogenita lidí aneb Proč Afrika dlouhodobě neroste*

All papers can be downloaded at: <http://ies.fsv.cuni.cz>.



Univerzita Karlova v Praze, Fakulta sociálních věd  
Institut ekonomických studií [UK FSV – IES] Praha 1, Opletalova 26

E-mail : [ies@fsv.cuni.cz](mailto:ies@fsv.cuni.cz)

<http://ies.fsv.cuni.cz>