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# **Fertility Determinants in Ukraine**

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## **Fertility Determinants in Ukraine**

Key words: demographics, fertility, household

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### **Abstract.**

This study evaluates the impact of different individual, family and regional factors on child-bearing decisions using ULMS 2003 and 2007 data and provides recommendations on fertility-enhancing policies. Specifically, we looked for the income effect, which would indicate that higher child allowance could stimulate fertility, and for the effect of childcare provision in a region. The regression analysis showed that personal characteristics, such as age, prior number of children, employment and life satisfaction have the highest impact on the child-bearing probability. Neither income nor raion-level variables turned out to be significant. Still, there are more arguments in favour of childcare provision rather than child allowance increase. Specifically, allowing a mother to return to work sooner would prevent her human capital deterioration, and thus improve her career perspectives, increase income and therefore, the amount of taxes she pays to the state.

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## **1. Introduction.**

Recently, there appeared a large literature on fertility determinants, caused partly by demand from policy-makers worried by recent fertility trends in developed countries. Bleak demographic perspectives of low-fertility countries pose a threat first of all for the sustainability of their pension systems – increasing share of elderly people paired with low birth rates implies shrinking working-age population today and in the long run, meaning that a worker will have to sustain an ever increasing number of pensioners<sup>1</sup>. To solve this problem, the governments raise pension age (but this often leads to a rise in youth unemployment), attract migrants (but this creates a problem of their cultural integration), and also implement fertility-enhancing policies. The rationale behind these policies is that children are costly: “direct” cost of children is expenditures on their feeding, clothing and sheltering, education and medical treatment, entertainment etc; “opportunity” cost of children is the value of time spent on child-rearing rather than working, and a possible loss of human capital if child-rearing implies a significant career break. Therefore, an appropriate pronatalist policy would imply reduction of these costs. To reduce the “direct” cost of children, a policy-maker could introduce, for example, lump-sum payments child-bearing or subsidies either to education/medical institutions or to students/patients themselves. Reduction of the “opportunity” cost of children is possible through development of a network of child-caring institutions (kindergartens, nurseries) and introduction of certain employment policies, for example, encouraging employers to set flexible working hours for young parents.

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<sup>1</sup> For Ukraine, this problem is even more pressing, since Ukrainian pension system has only the first level (pay as you go) with a negligible number of people participating in voluntary pension savings schemes. Transition to the second level (mandatory savings pension funds) is being constantly postponed, and the deficit of Pension fund has been rising very fast since 2004.

Ukraine is a country with low (and until recently lowest-low) fertility level<sup>2</sup>. Although fertility started to fall already at the end of 1920s, it has been relatively stable for 1960s-1980s with TFR of about 2<sup>3</sup>. In 1990s TFR started falling again reaching a minimum of 1.09 in 2001. Since 2008, TFR remains at about 1.5, so even with lately increased fertility, Ukrainian birth rate is far from replacement level of 2.1. Hence, the use of fertility-enhancing policies is justified. To form an opinion about the relative efficiency of such policies, it is important to understand the factors lying behind child-bearing decisions of families. This paper tries to explore these factors and their relative importance using the last available ULMS data from 2007. Based on the research results, policy recommendations are provided.

Although Ukrainian fertility trends are well documented and extensively discussed, these discussions are mostly qualitative. Very few studies attempt an econometric estimation of fertility determinants: Maksymenko (2009), Perelli-Harris (2005), Perelli-Harris (2008b), Vasilaky (2009). The first paper is a macro study, while the last three studies use ULMS-2003 data. Since 2003, two major changes happened: a considerable increase in fertility (TFR grew by 0.4 between 2000 and 2008) and a major policy shift (a 22-fold increase in child-birth allowance in 2005 and further increase since then). Hence, if 1990-2000 fertility decline is rather well documented and studied, the later trends remain unexplored. Having latest ULMS data from 2007, we can make a step further and re-estimate the fertility determinants with newer data, also making some inferences about the relative efficiency of different pronatalist policies, namely, child allowances versus childcare provision.

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<sup>2</sup> A low fertility level is fertility lower than replacement rate of 2.1 children per woman, the lowest low fertility rate is TFR lower than 1.3. While in the first case population declines, TFR lower than 1.3 means that population of a country will halve in less than 45 years (Kohler, Billari and Ortega, 2002).

<sup>3</sup> Source: entry [67] in the references.

Studies for other countries<sup>4</sup> do not find a significant effect of child allowances on fertility, while different measures easing child-rearing for working mothers, such as child-care, flexible working hours and adjustable schemes of maternity leave play a major role. In Ukrainian case, the authors of the UN ISPD report (2009) believe that 2005 child allowance increase has led to a shift in timing of fertility rather than fertility rise, since increase in the number of births in 2002-2008 can be attributed mostly to births of second and higher-order children, making births planned for a later time to happen earlier. However, this rise in fertility is only short-term since it does not change reproductive aspirations (the desired number of children).

A proper way to test the impact of child allowance on child-bearing decisions would be to take the data on one cohort of females (panel spanned for at least 20 years), as, for example, in Rindfuss et al (2007) and regress the dummy for childbearing on a range of individual, household-level and regional factors lagged two years (since on average 1.5-2 years pass between making a decision to have a child and actual childbirth). Unfortunately, we don't have the data to perform this kind of estimation. ULMS surveys cover only 2003, 2004 and 2007, so we could estimate the impact of 2005 child allowance increase only for women who had a baby in 2007, and their number in the sample is very small. Moreover, to estimate such a relationship, we would need household-level data for 2005, which are not available.

However, viewing child allowance as a temporary income increase, we could infer its effect from income elasticity of childbearing (i.e. if income variable is significant, then probably child allowance would also have some effect). In line with existing literature, we expect income to be insignificant, while desired number of children and family factors will play the major role. If these expectations are confirmed, and the desired number of children now is lower than, say, 20 or 40

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<sup>4</sup> See Sobotka (2011) and Gauthier (2007) for an overview of policy impact on fertility.

years ago, then partially the TFR decline could be attributed to the change in values, and these are practically insensitive to the policy impact.

This paper tests two hypotheses:

- 1) income (including child allowance) is less significant for child-bearing decision than family and personal factors (individual child-bearing aspirations, education, presence of extended family etc), and also less significant than availability of child-care institutions in a region;
- 2) there was a change in values between women of older and younger generations: the desired number of children declined.

The paper is structured as follows. The next section reviews relevant literature, the third section describes Ukrainian fertility situation, the fourth one presents estimation methodology, fifth describes the data and estimation results, and the last section concludes.

## **2. Literature review.**

There is a vast literature evaluating the impact of different factors on fertility. A keen interest in fertility research is driven by the slide of the majority of European countries into low and lowest-low fertility and resulting population shrinking and ageing (d'Addio and d'Ercole, 2005; Sobotka, 2007). Although some may think that a decline in the labour force quantity can be compensated for by its quality (e.g. higher educational spending per child can be achieved at no additional cost with lower number of children), the majority of researchers believe that current demographic situation is damaging for the long-run growth (Kravdal, 2010; Lutz, 2007). Therefore, governments express interest in fertility-enhancing factors for the purpose of development of pronatalist policies. Below we discuss such policies and the main fertility determinants usually considered in the literature. First, we describe macro studies linking fertility and economic development, and then consider more numerous micro (household-level) studies.

## *Macro studies*

The first *macro* factor usually considered in the literature is economic development (real GDP per capita or GDP growth). There is no well-established link between GDP and fertility dynamics, since the strength and direction of the relationship depends on the sample of countries and period considered. On a worldwide scale, higher fertility is associated with lower development indicators (UN Reproductive Health and Development Report 2011). However, for developed and former transition countries, the opposite is true (Billingsley, 2010; Hondroyiannis, 2009). Micevska and Zak (2002) find an inverted-U relationship between real GDP per capita and fertility rate: below certain threshold rising income leads to increased fertility since children become “affordable”, while at the high income levels further income increase lowers fertility because of rising opportunity cost of child-rearing and preference for child “quality” over quantity. Contrary to them, Luci and Thevenon (2011) show that negative relation between economic development and fertility becomes positive again after a certain threshold (the J-curve). However, in some countries fertility is higher than predicted by this model (US, France, UK, Scandinavian countries), while in others much lower (Southern and Eastern Europe, Japan, German-speaking European countries), so the exact shape of this curve is country-dependent, i.e. depends on policy, culture and traditions of a country. In line with many others, the authors believe that opportunity to reconcile work and family life is the key factor determining the relationship between economic development and fertility.

Herzer et al (2010) analyzing the relationship between fertility, mortality and GDP growth for 119 countries over the 20<sup>th</sup> century, find that during this period the relation between fertility and growth of GDP per capita can be described with a linear function – GDP growth causes fertility decline, which in turn leads to increase in GDP per capita. They further suggest that, since fertility (and mortality) cannot decline indefinitely, at some point this pattern may change, thus assuming a U-



shaped curve for fertility-economic development relation with the majority of countries now being on the downward part of the curve. In support of the U-shaped hypothesis, recent work of Myrskylä et al (2009) suggests that, at advanced levels of development, there is a threshold value of the Human Development Index, after which the fertility rises.

However, economic development itself is not the cause of demographic transition<sup>5</sup>. Rather, economic development changes the production mode (from agricultural to industrial and post industrial) and living environment (urbanization, better education and medical services etc). Higher female education and employment rate quickly decrease both desired and actual fertility – some developing countries showed a TFR decline from 7 to 2-3 over just one generation. For example, Courbage (1999) analyzing the onset of fertility transition in the Middle East and African Arab countries suggests that the main triggers of fertility decline were economic crises of 1970s-1980s, when the fall of natural resource prices undermined the generous state family support policies and pushed women into the labour force. Further factors of demographic transition were increased access to female education and international labour mobility, which brought in Western family values (higher age at marriage and at first birth, spread of families with two working adults, lower intended number of children etc).

Studies of macroeconomic fertility factors are important for inter-country comparisons but since child-bearing decisions are made by individuals or households, the majority of studies concentrate on micro-level fertility determinants.

### ***Micro studies***

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<sup>5</sup> Within the course of economic development, countries pass first through the first demographic transition (from high fertility and high mortality to high fertility and low mortality) and then through the second one – to low fertility and low mortality.

Probably the most intensively studied *micro* factor of fertility is **female education**. As with female employment, its impact is country-specific. In the less developed countries increased education usually lowers fertility by reducing the desired number of children, raising awareness of contraception methods and opportunity cost of children (e.g. Pritchett<sup>6</sup>, 1994, Imai and Sato, 2010). Bauer, Chytilová and Streblov (2007) showed that providing more years of schooling for girls lowers fertility much more effectively than distribution of contraception means. In developed countries women with higher education have both higher fertility because of income effect and higher age at first birth because they defer child bearing until the end of studies and devote some time after that to career development (Naz, 2000, Perelli-Harris, 2008a, Grogan, 2006, Bühler and Philipov, 2005).

Among other factors shown to influence fertility are family **income** (Micevska and Zak, 2002, Naz, 2000, Grogan, 2006, Amialchuk et al, 2011), **religion** (see Lehrer (2004) for an overview), availability and type of **housing** (Kulu and Vikat, 2007), **family ties** (Bühler and Philipov, 2005, Bauer, Chytilová and Streblov, 2007, Perelli-Harris, 2005). Culture<sup>7</sup> and family experience (e.g. the number of siblings a person has) also were shown to significantly impact fertility (Fernández and Fougli, 2006).

Naturally, the aim of a large share of fertility studies is evaluation of certain fertility-enhancing policies. With increasing female labour force participation, family income is not the most important fertility determinant anymore. On the contrary, higher educated and better-paid women may defer or

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<sup>6</sup> This paper showed that actual fertility is by 90% defined by desired fertility, and that reducing the demand for children (for example, providing more education to girls) is much more effective in fertility reduction than other policies, such as provision of contraception. Since then, these conclusions have been supported by a number of empirical papers, as well as by evidence of former socialist states where unavailability of modern contraception means increased abortion rather than fertility rate.

<sup>7</sup> For example, the comparative report “Reproductive, Maternal and Child Health in Eastern Europe and Eurasia” published by U. S. Department of Health and Human Services in 2003 showed that in Central Asian countries (Kazakhstan, Uzbekistan, Turkmenistan and Kyrgyz Republic) birth rates of women of European origin were 2-3 times lower than those of native origin, and close to the birth rates in the Eastern European countries.

forego either marriage or childbearing or both for the sake of career development. Hence, the higher is a woman's education/position/salary, the higher is her opportunity cost of child bearing, and the harder it is to compensate it with childcare allowances<sup>8</sup>. Instead, measures allowing recent mothers to return to work faster, such as day-care facilities, flexible labour hours etc. become more important. This conclusion follows from a number of recent fertility studies. For example, d'Addio and d'Ercole (2005) estimate a macro model for a panel of OECD countries and find that fertility is higher in countries where women are provided opportunities to combine work and child rearing rather than forced to choose between the two. This conclusion is confirmed with the experience of Nordic countries (Ervasti, 2009, Ronsen, 2004) and comparison of Eastern and Western Germany performed by Kreyenfeld (2004), who showed that Eastern Germany has not only significantly higher birth rate but also lower mean age at first birth and childlessness. In line with these studies, Piarnau (2012) showed that actual fertility in European countries is less than intended one since the most favourable time for career development (20-es to 40-ies<sup>9</sup>) falls on the age most suitable for child-bearing. Hence, policies helping to rear a child would bring actual fertility closer to intended one and thus increase TFR. To the contrast, birth intentions (the "desired" number of children), are almost impossible to change, as shown by Lindh and Hong (2011). They analyze large swings in TFR in Sweden during 1930s-1990s and arrive at the conclusion that policy measures (public expenditures for children) significantly impact only age-specific fertility rates (i.e. *timing* of births), while total completed fertility remains stable at about two.

Pronatalist policies may take different forms. The simplest one is "bribing" people to have more children, i.e. child allowances. As with other lump-sum payments (e.g. subsidies for poor families), this policy is the easiest to implement but the least efficient. Numerous papers show that child

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<sup>8</sup> Child care allowances will most probably be lower than foregone wage of a highly professional woman. Besides, maternity break in the career depletes her human capital, and hence, her wage after a maternity leave would most probably be lower than it would be had she never taken one.

<sup>9</sup> Sometime this age is called "the rush-hour of life".

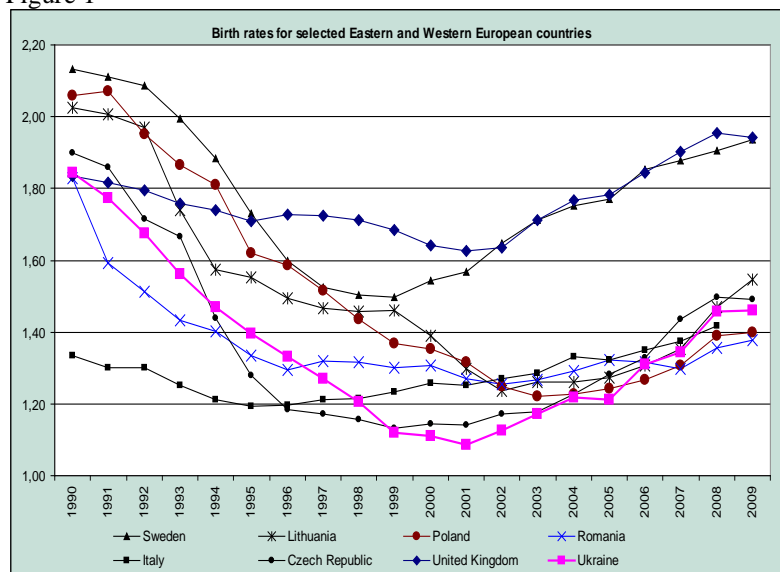
allowances play little or no role in child-bearing decisions, and when they do affect the child-bearing, this impact is not always desirable. For example, Rondinelli et al (2010) show that child allowance significantly increases probability of second and third births only for very poor women and is insignificant for others, implying that very poor people can have an additional child for the sake of allowance, whereas richer ones would have a child independently of allowance provision. Another interesting result of their study is that in the Northern Italy, where child-care facilities are more abundant, female wage has greater positive effect on the probability of second and higher-order births than in the South, thus suggesting that better day-care facilities stimulate childbearing of higher-income and, presumably, higher educated women – a result that any government would like to achieve. Sinyavskaya et al (2007) report a similar result for Russia – they find that employed women with higher education more frequently express a desire to have a(nother) child within the next two years. However, this group is also the one with the lowest fertility suggesting that birth intentions of women in this group are harder to realize than of women in other groups (unemployed and/or with lower levels of education). Hence, given an opportunity to levy some cost of child rearing either on extended family or on childcare institutions, women with higher education are likely to have more children.

Del Boca and Locatelli (2006) provide micro evidence on joint determination of **employment** and child-bearing decisions. Hence, depending on institutional settings of a particular country, female employment can have either positive (Zabel, 2006, D'Addio and d'Ercole, 2005) or negative (Hondroyiannis, 2009, Klasen and Launov, 2003, Bühler and Philipov, 2005) effect on fertility.

At the beginning of 2000s there emerged a vast literature on “fertility puzzle” of transition countries (Eastern Europe and FSU, including Ukraine). The researchers were stricken by the pace with which these countries transferred from the region’s highest to the “lowest-low” birth rates (see figure 1). With only a slight increase in the age at first birth and with very low childlessness, in transition

countries fertility decline was mainly caused by elimination of second and higher-order births (Perelli-Harris, 2008b, Balbo, 2009), especially of women with higher education (Klasen and Launov, 2003, Sinyavskaya et al, 2007). The most probable explanation for this fact is that during economic transition the population of these countries became

Figure 1



Source: Eurostat and Derzhkomstat data

much poorer, at the same time preserving traditional family values<sup>10</sup>. Hence, families were having a child they felt obliged to have but could not afford more children, which also suggests preferences for “quality” of children over quantity.

Studies of transition countries usually stress two types of causes for their low fertility:

- 1) *economic*: low income and high income uncertainty (Amialchuk et al, 2011, Perelli-Harris, 2008b, Cornia and Paniccia, 1996), insufficient child-care facilities (Klasen and Launov, 2003), unaffordable housing (Perelli-Harris, 2008b) and
- 2) *social* – transition from traditional extended families to nuclear ones, rising rates of informal marriages and extra-marital births<sup>11</sup> (Perelli-Harris, 2005, Stankuniene and Jasilioniene,

<sup>10</sup> Something like “a family without children is not a true family”.

<sup>11</sup> Changing marital values is the common European trend. As shown by Kohler, Billari and Ortega (2006) and Sobotka (2007) the positive link of marriage and fertility does not hold anymore, and neither does the negative link between fertility and divorce rates.

2008), and also traditionally high tolerance for abortion as the birth-control method<sup>12</sup> (Levchuk and Perelli-Harris, 2009, Goldberg and Serbanescu, 2001).

Frejka (2008) argues that the main cause of fertility reduction during transition was the replacement of socialism with capitalism:

“The conditions which were generally conducive for childbearing, such as job security, low-cost housing, free education, free health care, various entitlements associated with child birth and childrearing, as well as a lack of career opportunities and leisure activities; were replaced by the considerably more restraining conditions for childbearing of job insecurity, an increasing pressure to acquire more education<sup>13</sup>, expensive housing, lesser and declining birth and childrearing entitlements, as well as the availability of a variety of career opportunities, consumption attractions and leisure activities” (p. 161)

Large impact of economic conditions on child-bearing in transition countries suggests that under improved economic situation fertility would rise – most probably, this is what we observe in Ukraine and to a lesser extent in other transition countries (see Figure 1). Since the desired number of children for the majority of women remains two<sup>14</sup>, improvement of macroeconomic situation is likely to lead to realization of deferred child-bearing intentions. Some studies on transition countries suggest that it’s not the level of income but rather its uncertainty (and overall economic uncertainty) that leads to lower fertility (Amialchuk et al 2011, Rieck 2006). Others find that income is altogether an insignificant determinant of fertility, while culture and family composition are (Kumo 2010, Roshchina and Boykov 2005).

### ***Studies on Ukraine***

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<sup>12</sup> And abortions, as commonly known, are damaging for female health and may result in infecundity.

<sup>13</sup> Perelli-Harris (2008a) and Klasen and Launov (2003) study the change in impact of higher education on child birth. During the socialist times women tended to give birth right after or during the university studies because the first workplace was secured for graduates, and there were some privileges for graduates with family. Today, as in the Western countries, graduates tend to devote a few years to career development before having children.

<sup>14</sup> 67% of women under 40 report that their “ideal” number of children is two, 20% - three, and only 7% - one or zero (ULMS-2003 data).

There is only one *macro* study of fertility determinants in Ukraine: Maksymenko (2009) finds that unemployment and household money holdings explain about a third of variation in fertility.

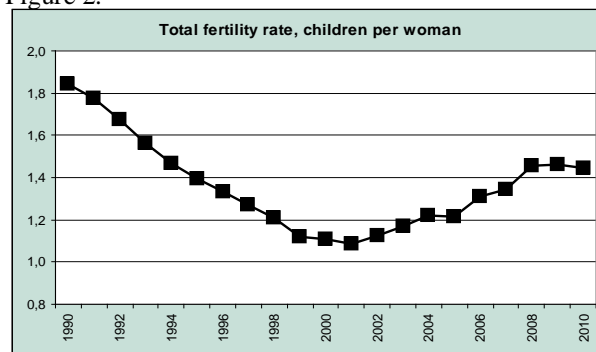
There are numerous fertility studies and surveys performed by specialists of the Institute of Demography and Social Studies of the Academy of Science of Ukraine (e.g. papers numbered 1, 63-67 in the reference list). However, these studies are mostly descriptive with some correlation analysis at best. Econometric estimates of fertility determinants were performed by Perelli-Harris (2005) and Perelli-Harris (2008a). However, she used ULMS-2003 data and hence, did not cover the fertility rise of 2000s, as well as 2005 child policy change. With ULMS-2007 data, a more up-to-date estimation of fertility determinants is possible.

### 3. Description of fertility situation in Ukraine.

During the time of economic transformation, TFR declined from almost 2 to 1.1 (the lowest in Europe), and after 2001 it started growing again (Figure 2) suggesting that macroeconomic stability plays an important role in child-bearing decision.

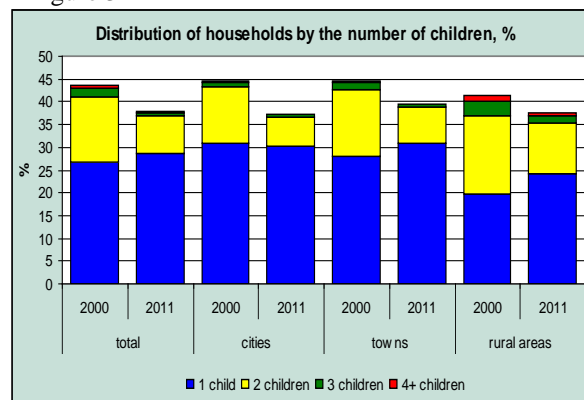
The number and share of households with children also declined (Figure 3), and the highest reduction was observed in the cities. At the same time, total number of households in cities<sup>15</sup> in 2000-2011 grew by almost 10%, while in towns it

Figure 2.



Source: Derzhkomstat data

Figure 3

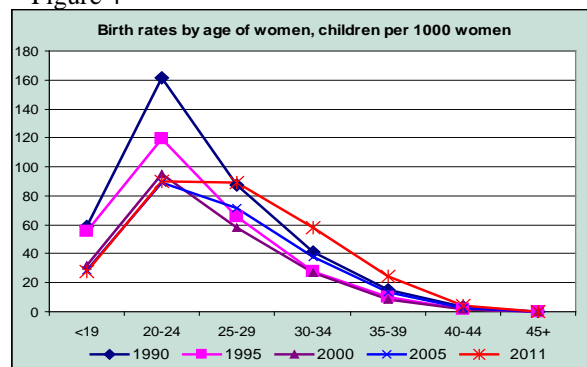


Source: Derzhkomstat data

<sup>15</sup> Cities are urban settlements with more than 100 000 people, towns are urban settlements smaller than that, and villages are settlements with number of people from a few dozen to several thousand, where a majority of people work in agriculture.

dropped by 20% and in villages by 5% reflecting relocation of unmarried youth to cities from towns and villages. Another noticeable trend is the decline in the share of households with two and more children in favour of one-child households.

Figure 4

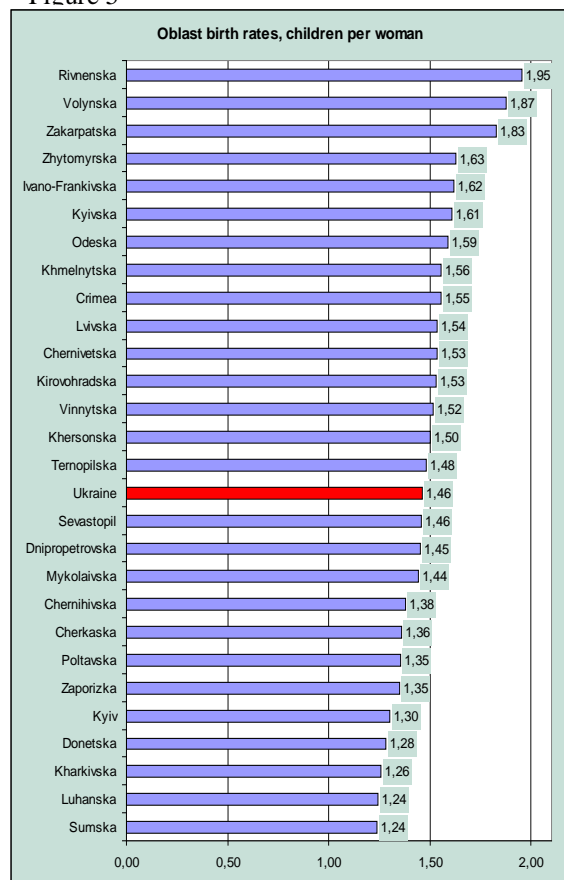


In line with European trends, Ukraine saw an increase of the age at first birth from 22.3 to 26.5 years between 2000 and 2011. Figure 4 illustrates this process over the last 20 years.

Source: Derzhkomstat data

A Ukrainian peculiarity is high regional variation of fertility (Figure 5), with higher fertility in Western and Northern oblasts and lower TFR in Eastern and Southern regions (the difference in TFR between the most fertile Rivnenska oblast and the least fertile Sumska oblast is 0.7).

Figure 5



Source: Derzhkomstat data, 2009

Despite some noticeable change in family values among Ukrainians, such as the spread of informal marriage and growth of the share of extra-marital

children, increase in the marriage age and first birth age, increase in the number of childless couples and women, Ukrainian society largely remains a traditional one, compared to other European countries. This conclusion follows from the results of the European Social Survey (ESS<sup>16</sup>), in which

<sup>16</sup> Results published by the Institute of Sociology NASU in Євген Головаха, Андрій Горбачик, Наталія Паніна. *Україна та Європа: результати міжнародного порівняльного соціологічного дослідження*. – К.: Інститут соціології НАН України, 2006 [http://i-soc.com.ua/institute/Ukr\\_ta\\_Evro\\_ukr.pdf](http://i-soc.com.ua/institute/Ukr_ta_Evro_ukr.pdf)



Ukraine took part in 2005 together with 23 other European countries. We present here the main results of the survey concerning family and children:

- Ukraine has the lowest share of people who have never been married, the highest share of married people and also the highest share of widowed people (perhaps the last result due to high mortality of middle-aged men<sup>17</sup>);
- Ukraine has on average 3,2 rooms per family (lower numbers are only in Poland, Estonia and Hungary), and Ukrainian houses are the most poorly equipped with household supplies. Hence, Ukrainian families spend almost twice more time on housework than families in other countries;
- 20% of Ukrainians have children younger than 12, which is comparable to other European countries;
- Ukraine is among countries with the highest percentage of children looked after by grandparent(s) and among countries with the lowest percentage of children looked after by a paid nanny;
- Ukraine and Hungary are the countries where the largest share of parents provide help to their grown-up children, Ukraine is the leader by the share of children providing help to their parents;
- 48% of Ukrainians said that they have the responsibility to take care of other family members (children, elderly etc) in addition to the housework (compared to 25% average for other countries);

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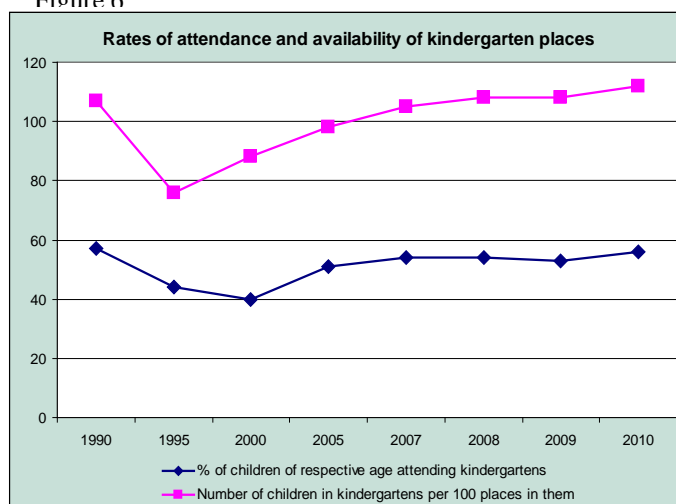
<sup>17</sup> In 2006, Ukraine was on the second place among European countries (after Russia) by the death rate of working-age population. Standardized death rate of males aged 15-29 in Ukraine was 3.4 higher, of those aged 30-44 years 5.8 times higher and of those aged 45-64 4.1 times higher than respective rates in Western European countries. Death rate of working-age females in Ukraine was almost three times higher than in the Western Europe (Source: *Смертність населення України в трудоактивному віці*. Колективна монографія. Відпов. Редактор І.М. Лібанова. ІДСД, 2007, <http://www.idss.org.ua/monografii/Smertnost2007.pdf> с.68)

- 69% of Ukrainians (and 44% of respondents from other countries) agree that a woman has to be ready to reduce her employment hours in order to take care of her family;
- 44% of Ukrainians (and 25% of people from other countries) agree that in the scarcity of workplaces men should have preferential right to take a job compared to women;
- at the same time, Ukrainian people mostly agree that men and women have to take equal responsibility for home and children;
- the report also shows that family is among the highest priorities for Ukrainians.

### State fertility policies

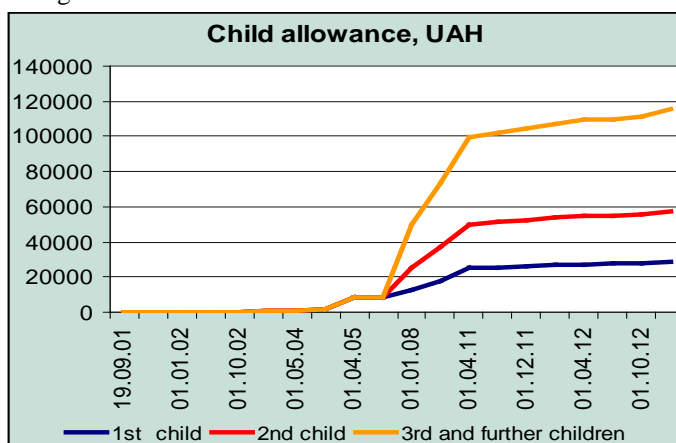
During fertility fall of 1990s, many kindergartens were closed and buildings sold to different organizations. Since construction of a kindergarten is rather expensive (Ukrainian standards of premises for children are very strict), their number does not follow the recent fertility increase, which leads to their overcrowding, especially in urban areas. Thus, in 2010 the number of kindergartens was almost 6% lower than in 2000, while the number of children in them was almost 30% higher. Figure 6 shows that although just a little over 50% of suitable-age children attend

Figure 6



Source: Derzhkomstat data

Figure 7



CM decrees

kindergartens, they are already overfilled. This leads to underemployment of women and lower socialization of children bound to stay at home.

Since 2005, Ukrainian government has increased child allowance very fast, and since 2011 it is tied to subsistence level, so it rises automatically (Figure 7). However, there are doubts that this policy is responsible for the recent fertility increase. But it is surely rather burdensome for the state budget<sup>18</sup>.

#### **4. Methodology.**

The simplest models used to study fertility determinants are probability models estimating the impact of different factors on the probability of having a(nother) child. These models are used, for example, by Micevska and Zak (2002), Imai and Sato (2010), Grogan (2006), Bühler and Philipov (2005), Amialchuk et al (2011).

Time hazard (duration) models<sup>19</sup> are also often used in fertility determinant studies. These models capture not only the number of children but also time intervals between subsequent births. Such models are estimated by Baschieri and Hinde (2007), Naz (2000), Perelli-Harris (2006), Portner (2010), Kulu and Vikat (2007) and others. Following Perelli-Harris (2006), the model equation is

$$\ln(p_i/(1-p_i)) = \mathbf{X}_i\boldsymbol{\beta} + \boldsymbol{\varepsilon}, \quad (1)$$

where  $p_i$  is the probability that a woman has a child at age  $i$  ( $i=16, 17, 18\dots35$ ),  $\mathbf{X}_i$  is a matrix of observations, and  $\boldsymbol{\beta}$  is the parameters vector. Hence, to estimate such a model, the data for quite a long time period (the reproductive age of at least one cohort of women) is needed. For example, Rindfus et al (2007) uses over 20 years of data on personal, family and regional characteristics of Norwegian women. To the contrast, Perelli-Harris (2006) expands the ULMS-2003 survey data to

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<sup>18</sup> In 2012-2013 there was anecdotal evidence that child allowance payments are delayed because of insufficient budget funding.

<sup>19</sup> Formally, these models estimate the probability that an event will happen in period  $t$  conditional on probability that it did not happen in the previous periods as a function of the variables of interest.

form a pseudo-panel (the survey has questions on individual history since 1986), but in her model she uses only individual characteristics, since household-level questions address at maximum 12 months preceding the survey. We believe that household-level characteristics are important for child-bearing decision but since we have household-level data only for the ULMS survey years (2003, 2004, 2007), we cannot estimate a time hazard (duration) model.

Finally, there is a strand of literature developing intra-household bargaining models and arguing that when modeling decision-making, a household cannot be considered as a single unit. Rather, it has to be treated as a couple of individuals engaging in a cooperative or non-cooperative game, and consumption choice of a household will then be determined by the outcome of that game (see, for example, Cherchye, De Rock and Vermeulen (2008) or Cherchye, Demuyck and De Rock, 2010). Blundell, Chiappori and Meghir (2005) provide another extension of this model allowing to determine labour supply of household members in the presence of children (taking into account expenses on childcare and desired leisure time of each household member). We don't think this model is suitable for the purpose of our research. For one reason, treating children as a consumption good is rather awkward, since we cannot precisely measure neither their price nor utility (besides, they have some features of an investment good too). For another reason, we prefer treating household as a single unit because sometimes there is only one adult member in a household (a single mother), in other instances there are more than two (grandparents and other relatives), so accounting for all these nuances, while largely complicating the analysis, would be irrelevant for the main research question.

Taking into account all of the above, we estimate the probit<sup>20</sup> model with the dependent variable equal to 1 if a woman had a child in 2004-2007 and 0 otherwise. On the RHS, we use ULMS-2003

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<sup>20</sup> We cannot use ordered probit since only 8 women of the sample had more than one (two) children in 2004-2007.

individual and household-level data, as well as raion-level data for 2003. Usage of lagged RHS variables (from 2003) allows avoiding the endogeneity problem.

### *Data.*

The ULMS survey contains a wide range of personal data – household characteristics, employment history of household members aged 15-70, a list of revenues (including child allowances) and expenditures, self-assessment of health etc. Women also answer a questionnaire on their history of births and birth intentions. This is a panel survey – in 2003, 4056 households were surveyed, and 3394 of them were surveyed again in 2004. 8641 individuals were questioned in 2003, and 6889 of them – again in 2004 while the total number of individuals questioned in 2004 was 7200. 3100 households and 6774 individuals surveyed in 2004 were surveyed again in 2007. We use the 2003 data to construct RHS variables, and observations on the same people in 2007 survey to construct the dependent variable (a dummy for a childbirth during 2004-2007). Of them we use only the data on women, so we are left with 3305 observations. We also delete a few observations with zero family income (obviously, for these observations the data on income are missing). For regressions to make sense, we need to use only the data on fertile-age women. In Ukraine, very few women have birth after the age of 45, so we use this as a cut-off point. So, summary statistics in tables 1-5 as well as regression results in table 7 are presented for women younger than 46 (1700 observations).

Raion-level data collected by regional (oblast) statistical services are added to the ULMS data. ULMS uses a stratified sample – first, a territory, such as raion or city is randomly selected (from 3 to 12 territories for each oblast, depending on the oblast population), then within that territory a city raion, town or village is randomly selected, and then in cities and towns several micro-districts (territories served by one post office) are picked and families living in these micro-districts questioned (in villages, certain number of houses are randomly selected). 2003 survey included 60

cities/towns, among them Kyiv, and villages from 77 raions – so variation in raion-level data is comparatively small<sup>21</sup>. There is no raion-level data for raions in cities, such as Kyiv, Donetsk or Kharkiv, hence, we use city averages assuming that in cities it's pretty easy to get from one raion to another. Oblast-level data can be found in the Appendix Table A1.

### ***Discussion of right-hand side variables.***

#### ***Individual-level variables***

Summary statistics for individual-level variables is presented in the Tables 1-4. Table 1 contains aggregated data, while Tables 2, 3 and 4 present the same data for women having one, two or more children respectively.

Looking at these tables, we can make several observations about the data at hand:

- share of women with one child is the highest for middle-aged women (25-39), while younger women are typically childless, and older women have more than one child;
- share of women with two and more children is increasing with age;
- for women with one and two children, average “ideal” number of children is higher than two – so perhaps they have unrealized childbearing intentions;
- among women with one or two children, those aged 25-39 are more likely to want another child; among women with 3 or more children very few express this wish;
- 62% of children born during 2004-2007 were first-order and 30% - second-order.

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<sup>21</sup> Total number of raions in Ukraine is 489.

age	15-19	20-24	25-29	30-34	35-39	40-45	Total
# of observations; of them:	273	240	207	261	357	361	1700
Had a child in 2004-2007	59	66	41	21	11	1	199
As of 2003 (time of survey):							
have 1 child	6	87	106	127	117	82	525
have 2 children	0	8	45	88	186	206	533
have 3 children	0	1	5	14	28	43	91
have 4+ children	0	0	0	2	9 <sup>22</sup>	15 <sup>23</sup>	26
Want to have a(nother) child	3	57	57	66	59	17	259
Don't want to have more children	3	34	92	159	254	257	799
Can't have children because of health	0	0	1	1	19	69	90
Average "ideal" number of children <sup>24</sup>	2.11	2.17	2.17	2.27	2.35	2.41	2.27*
Have highest degree (secondary or lower is the base category)							
Vocational	6	51	48	72	105	75	357
Professional	3	42	69	78	104	110	405
Academic	0	22	32	50	67	76	247
Still study	89	81	20	9	0	1	200
Family stance (divorced is the base category, and "widowed" is zero for women under 46)							
Single	260	123	36	21	13	11	464
Married	13	108	152	187	280	280	1020
Divorced	0	8	18	47	48	55	176
Self-estimation of life quality							
Satisfied with life	194	136	97	123	129	133	812
Self-estimation of health: good <sup>25</sup>	130	98	66	63	64	46	467
Self-estimation of health: bad	18	15	13	21	51	69	187
Have a chronic illness	108	100	90	131	208	226	863
Employed in 2003 <sup>26</sup>	13	91	98	170	252	246	870
Live with (grand)parents	162	156	107	135	149	202	911
* averages							

age	15-19	20-24	25-29	30-34	35-39	40-45	Total
# of observations; of them:	6	87	106	127	117	82	525
Had a child in 2004-2007	1	21	20	12	5	0	59
As of 2003 (time of survey):							
Want to have a(nother) child	3	55	47	55	39	8	207
Don't want to have more children	3	27	53	67	68	55	273
Can't have children because of health	0	0	0	1	13	38	52

<sup>22</sup> Of them one has 5 children

<sup>23</sup> Of them 3 have 5 children and 2 – 6 children.

<sup>24</sup> "Ideal number of children" is an answer to the question "Under perfect economic conditions, how many children would you have?" Answers of more than 10 children were considered unrealistic and changed for 10 (there were just three such answers).

<sup>25</sup> Average health (not good and not bad) is the base category.

<sup>26</sup> Employed women worked for 6 months or more in 2003.

Average “ideal” number of children <sup>27</sup>	2.33	2.19	2.02	2.07	2.1	1.99	2.08*
Have highest degree							
Vocational	1	17	25	30	31	16	120
Professional	0	18	38	39	39	25	159
Academic	0	8	15	26	28	29	106
Still study	2	11	9	6	0	0	28
Family stance:							
Single	0	5	6	5	6	6	28
Married	6	75	86	84	88	53	392
Divorced	0	6	13	35	17	18	89
Self-estimation of life quality							
Satisfied with life	4	49	51	66	47	27	244
Self-estimation of health: good	2	37	34	32	25	12	142
Self-estimation of health: bad	0	5	11	12	16	14	58
Have a chronic illness	4	32	46	71	60	57	270
Employed in 2003	0	24	50	95	91	59	319
Live with (grand)parents	4	53	51	69	47	34	258
* averages							

**Table 3. Summary statistics for individual characteristics distributed by age for women with two children**

age	15-19	20-24	25-29	30-34	35-39	40-45	Total
# of observations; of them:	0	8	45	88	186	206	533
Had a child in 2004-2007	0	1	6	4	1	0	12
As of 2003 (time of survey):							
Want to have a(nother) child	0	2	10	10	19	7	48
Don't want to have more children	0	6	34	77	152	160	429
Can't have children because of health	0	0	0	1	13	38	52
Average “ideal” number of children <sup>28</sup>	-	2.88	2.4	2.37	2.35	2.39	2.38*
Have highest degree							
Vocational	0	0	16	25	56	42	139
Professional	0	1	9	32	54	67	163
Academic	0	0	5	11	33	34	83
Still study	0	0	1	1	0	1	3
Family stance:							
Single	0	0	1	0	1	1	3
Married	0	0	41	79	157	169	446
Divorced	0	0	3	6	22	26	57
Self-estimation of life quality							
Satisfied with life	0	3	21	38	59	81	202
Self-estimation of health: good	0	4	13	14	27	26	84
Self-estimation of health: bad	0	0	0	5	30	38	73
Have a chronic illness	0	3	20	42	117	125	307
Employed in 2003	0	1	10	49	133	146	339

<sup>27</sup> “Ideal number of children” is an answer to the question “Under perfect economic conditions, how many children would you have?” Answers of more than 10 children were considered unrealistic and changed for 10 (there were just three such answers).

<sup>28</sup> “Ideal number of children” is an answer to the question “Under perfect economic conditions, how many children would you have?” Answers of more than 10 children were considered unrealistic and changed for 10 (there were just three such answers).



Live with (grand)parents	0	3	22	40	73	121	259
* averages							

**Table 4. Summary statistics for individual characteristics distributed by age for women with 3+ children**

age	15-19	20-24	25-29	30-34	35-39	40-45	Total
# of observations; of them:	0	1	5	16	37	59	118
Had a child in 2004-2007	0	0	1	1	2	0	4
As of 2003 (time of survey):							
Want to have a(nother) child	0	0	0	1	1	2	4
Don't want to have more children	0	1	5	15	35	42	98
Can't have children because of health	0	0	0	0	0	15	15
Average "ideal" number of children <sup>29</sup>	0	3	3	2.94	3.41	3.41	3.31*
Have highest degree							
Vocational	0	0	1	7	16	12	36
Professional	0	0	1	3	8	16	28
Academic	0	0	1	1	1	9	12
Still study	0	0	0	0	0	0	0
Family stance:							
Single	0	0	0	0	1	0	1
Married	0	1	5	14	31	53	104
Divorced	0	0	0	2	4	5	11
Self-estimation of life quality							
Satisfied with life	0	0	2	5	13	23	43
Self-estimation of health: good	0	4	13	14	27	26	84
Self-estimation of health: bad	0	0	0	0	4	10	14
Have a chronic illness	0	0	3	4	24	34	65
Employed in 2003	0	1	1	6	17	28	53
Live with (grand)parents	0	1	2	8	19	41	71
* averages							

Probably, the most important factor influencing child-bearing decision is a woman's age. In Ukraine, the highest share of births has only recently shifted to 25-30-aged women (see Figure 4), although age at first birth has been gradually rising for over 20 years. The majority of births are delivered before 40, so clearly the relationship between age and the probability of childbirth is nonlinear (inverted U). Age variables are included into the regression in two alternative ways – age and age squared (expecting positive and negative coefficients respectively) and age intervals (15-19, 20-24, 25-29, 30-34, 35-40, with the base category 41-45). In 2003, the highest probability of birth

<sup>29</sup> "Ideal number of children" is an answer to the question "Under perfect economic conditions, how many children would you have?" Answers of more than 10 children were considered unrealistic and changed for 10 (there were just three such answers).

was associated with women aged 20-24, so we expect this variable to have the highest coefficient among age dummies.

Current number of children also impacts the probability of childbirth, although the relationship is probably non-linear – when a family has only one child, the probability of a second birth should be higher than when it already has three. One way to deal with this non-linearity is inclusion of a quadratic term into the equation. Another possibility is running a regression with dummy variables “one child”, “two children”, “three and more children”, with “no children” being the base category. To account for child-bearing intentions, we include “ideal number of children” into the regression – either as it is or as a difference between ideal and actual number of children. We expect this variable to have a positive impact on child-bearing probability.

Impact of female education on fertility is also a priori ambiguous, although Perelli-Harris (2006) and some other studies showed that women with higher education have on average more children than women with lower degrees. The impact of education on the number of children is realized via two channels. The first one is income – higher education leads to higher earnings, which in turn means both higher resources for raising a child *and* higher opportunity cost of child-rearing<sup>30</sup>. The second channel is formation of views and values – a more educated woman can both believe that her “social duty” is to have at least two children *and* prefer “quality” of children to their quantity. Taking into account these contradicting impacts, we should not be surprised to see insignificant education variables.

We expect married women to have higher probability of childbirth than single or divorced ones.

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<sup>30</sup> Although in Ukraine education has very low returns and is considerably devalued because of a large number of low-quality institutions and a possibility to bribe someone’s way to a diploma. See, for example, Coupe, T. and G. Vakhitova (2010). *Recent Dynamics of Returns to Education in Transition Countries*, KSE/KEI Working paper.

Following the literature, we include employment variable into the regression. The variable “employed in 2003” is a dummy equal to 1 if a woman worked 6 months or more during 2003. The impact of the employment dummy is a priori unclear - on the one hand, an employed woman may not want to leave her job for child-rearing. On the other hand, she will have more resources for raising a child. Besides, while a woman is on the maternity leave, her employer is obliged to keep the workplace for her, so she will feel more secure when deciding upon the childbearing. Another occupational dummy is the variable indicating that a woman still studies (26% of women under 30). Most probably, a woman studying in 2003 will not have a child during the next few years, since she would want first to gain some work experience, so we expect a negative sign of this variable.

We also include a range of characteristics measuring happiness or confidence in the future – both dimensions favourable for child-bearing. These characteristics are self-estimation of health (good, bad or average), presence of some chronic illness, general life satisfaction (an answer to the question “are you satisfied with your life in general?”).

#### Household-level variables.

Summary statistics for households are presented in the Table 5.

In Ukraine, extended families are more common than in Western countries – both because of tradition and because of unaffordability of housing to young families<sup>31</sup>. Apparently, grandparent(s) living with a young family may provide a very valuable help in child-rearing. At the same time, insufficient living space may prevent a family from further expansion. Hence, a priori, the impact of grandparents living in the same household on child-bearing is ambiguous. One may object that

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<sup>31</sup> There is a full range of macroeconomic reasons for unavailability of mortgages, starting from overall economic uncertainty and poor investment climate to high interest rates, absence of long-term (pension) savings, “enveloped” salaries etc, but they are beyond the scope of this paper.

grandparents often help with grandchildren while not living in the same a household. Indeed, Rindfuss et al (2007) find that grandmothers living in the same neighbourhood have a positive effect on childbearing. Unfortunately, ULMS does not provide this kind of information. So, we will see no significant impact of grandparents on the probability of child-bearing if the effects of “help with grandchildren” and “insufficient living space” cancel each other out. We assume that the impact of grandparents can differ for women of different age. For example, women under 25 may still be studying or just starting their career, and so, will need the help of grandparents more, so for younger cohorts the impact of grandparents may be positive. In case of women over 35-40 grandparents may need help themselves rather than provide help, so this interaction term can be negative.

<i>Table 5. Household characteristics</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Household size	1700	3.8	1.3	1.0	13.0
# of rooms per head	1693	0.8	0.4	0.2	4.0
Square meters per head	1489	18.0	10.6	0.7	200.0
Annual per head income	1700	2 442	2 074	51	36 000
Household owns a car	400*	-	-	-	-
Household has debt for utilities or rent	584*	-	-	-	-
Household lives in a village <sup>32</sup>	621*	-	-	-	-
Household lives in a city (over 100 thousand people)	654*	-	-	-	-
Grandparents live in a household (% of HHs)	53.6				
* number of 1's for dummy variables					

Household income variable needs additional explanations. ULMS-2003 has questions on total and monetary income for the last month, as well as on the size of income received from different sources – salaries (pensions, stipends), sale of own-grown products, alimony, income from rented property etc. Also, it has a number of questions on expenditures – annual expenses on durables and property, monthly expenses on services and non-food products, and expenses on food for the last week preceding the survey. As people often underreport income, researchers usually proxy income by expenditures when working with Ukrainian data (and with data for other transition countries as

<sup>32</sup> Town (10-100 thousand) is a base category.

well). We take income as a maximum of two estimates derived from “income” questions and “expenditure” questions. At the same time, since we are trying to estimate permanent income, we don’t include into income/expenditure calculation one-time revenues (such as gifts from relatives/friends, child benefits or revenues from the sale of property) or expenditures (purchases of property or durables such as car, furniture, a fridge or a washing machine). These revenues can be obtained (or expenditures encountered) not every year. However, most probably our data still underestimate total household income: in 2002 the share of Ukrainian households with annual spending per person lower than UAH 720 was 1.2%<sup>33</sup>, while in our sample it’s 2.6%. Since it is very unlikely that a household has UAH 100 or 200 annual income per person, we use the threshold, below which a family could receive social support from the state – UAH 80 per person per month or, after rounding, UAH 1000 per year. Hence, we estimate regression models for the entire sample and for the sub-sample of households with per head annual income higher than UAH 1000 (however, the results are very similar). Income enters the regression in logs.

Besides income variable, we should include some measure of wealth/poverty into the regression - poorer households perhaps will have lower child-bearing probability. To account for housing conditions, we include “square meters per head” variable. Another poverty measure is the share of income spent on food. Also, households having debt for utilities or rent will most probably be poor. Of the last two poverty measures, the debt dummy is probably a better one because it avoids the misreporting problem of income/expenditure data discussed above. But since these measures are uncorrelated, we include them simultaneously.

### *Raion-level variables*

Summary statistics for raion-level variables is presented in the table 6.

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<sup>33</sup> Statistical yearbook for 2003.

Raion birth and death rates are proxies for both population age structure and quality of medical services. The first variable also reflects traditional family size in different regions (e.g. in the West families usually have more children). Number of doctors and places in clinics, as well as child mortality rate proxy the quality of medical services in raion, while the ratio of children to the number of places in kindergartens reflects child-care infrastructure development.

<i>Table 6. Summary statistics of raion-level variables</i>	<i>Mean</i>	<i>St.dev.</i>	<i>min</i>	<i>Max</i>
Birth rate*	0.98	0.20	0.65	2.00
Death rate*	1.00	0.24	0.31	1.65
Child mortality rate*	1.05	0.29	0.24	2.22
Childcare (number of kindergarten places per 100 suitable-age children)*	0.94	0.32	0.09	2.67
Number of doctors per 10 000 population*	0.96	0.56	0.25	6.26
Number of planned visits to clinics per shift per 10 000 population*	0.92	0.33	0.16	1.76
Average raion salary*	0.88	0.34	0.35	2.46
* normalized by Ukrainian average				

Average raion salary is a proxy for its general economic development. All raion-level variables are normalized by Ukrainian averages. We see that raions in our sample are slightly worse off than Ukrainian average. This may occur because Ukrainian averages are driven up by high salaries, number of doctors, clinics etc in big cities, while the majority of population still lives in towns and rural areas. We also include interactions of childcare variable with age intervals for the impact of childcare availability may differ depending on the age of a woman. For younger ages, perhaps, childcare availability is less important, since then grandparents, who are also younger, have more energy and desire to look for a grandchild. Women over 30 probably would be willing to return to work sooner in order not to waste their career achievements, and so would need childcare more.

## **5. Estimation results and discussion**

Regression results are presented in the tables 7 and 8 below. Columns (1) and (2) of Table 7 contain the results for continuous age variable and its square, and for number of children expressed as a single variable. Columns (3) and (4) show the results for age intervals and dummies for the previous

number of children. Columns (2) and (4) show the results for households with annual income per person above UAH 1000 while columns (1) and (3) show results for aggregate data (see discussion above about income variable). Table 8 shows the results of the same exercise where “ideal number of children” and “current number of children” were replaced by their difference, and dummies for the number of children were replaced by dummies “ideal number of children equals actual” and “ideal number of children greater than actual”, with “ideal number of children less than actual” as the base category.

All the specifications provide very similar results with respect to the main variables. Age variables have expected signs – an inverted U, and regression with age intervals shows that the majority of women have a child between ages 20 and 30. Current number of children negatively affects the probability of having another child, as expected, but positive sign of the squared term suggests that after some point this relation reverses. Looking at specifications (3) and (4), we see that women with two children have significantly lower probability to have another child than women without children, but for other numbers of children the coefficients are insignificant. Perhaps, this is a reflection of the fact that for 65% of considered sample the desired number of children is two. This is confirmed by the results of regression with the difference of ideal and actual number of children – this difference positively impacts the childbirth probability but only up to a point where actual number of children is equal to desired one.

Women having one child and childless ones have similar probabilities of childbearing because both of these categories of women are approaching their desired number of children. When deciding to have an additional child, women with 3 or more children, perhaps, are also realizing their preference for larger family. Or this could be just the artifact of the data at hand: we have 177 women with three or more children (7% of the sample), and 6 of them (5%) had a baby during 2004-2007. Note that among women who had two children in 2003, just 2% had given birth during 2004-2007.

**Table 7. Regression results. Number of children and ideal number of children included.  
Dep. var. – childbirth in 2004-2007**

	All incomes	Income >1000		All incomes	Income >1000
Variables	(1)	(2)	Variables	(3)	(4)
Age	0.0224***	0.0216***	Age 15-19	0.158	0.164
Age squared	-0.000507***	-0.000493***	Age 20-24	0.315**	0.292*
			Age 25-29	0.320*	0.302*
			Age 30-34	0.0193	0.0104
			Age 35-40	0.00139	0.0033
# of children	-0.0418***	-0.0376**	1 child	-0.00617	-0.00554
# of children squared	0.0106**	0.00898*	2 children	-0.0233***	-0.0211***
	0.00482	0.00532	3+ children	-0.000634	-0.000611
Ideal # of children	-0.0418***	-0.0376**	Ideal number of children	0.00265	0.00275
<b>Education variables</b>					
Vocational degree	0.00417	-0.000699	Vocational degree	0.00299	0.000103
Professional degree	-0.00843	-0.00924	Professional degree	-0.00223	-0.00249
Academic degree	0.0136	0.0157	Academic degree	0.0108	0.0118
<b>Occupation variables</b>					
Still study in 2003	-0.00246	-0.000638	Still study in 2003	0.000561	0.00143
Employed in 2003	0.0239*	0.0310**	Employed in 2003	0.0135*	0.0169**
<b>Marital status</b>					
Married	0.0224	0.0221	Married	0.0137*	0.0126*
Single	0.0119	0.0109	Single	0.0116	0.00877
<b>Life quality variables</b>					
Satisfied with life	0.0184**	0.0172*	Satisfied with life	0.00969**	0.00850*
Health is good	0.0198*	0.0194	Health is good	0.00985	0.00906
Health is bad	-0.0121	-0.0119	Health is bad	-0.00683	-0.00636
Has a chronic illness	0.0126	0.0112	Has a chronic illness	0.00634	0.00566
<b>Household variables</b>					
Log income per head	-0.00363	-0.00847	Log of income per head	-0.00175	-0.00401
Grandparents	0.00692	0.0101	Grandparents	-0.567***	-0.597***
Grandparents*age	-0.000377	-0.000567	Grandparents*age 15-19	0.968***	0.979***
			Grandparents*age 20-24	0.956***	0.967***
			Grandparents*age 25-29	0.961***	0.968***
			Grandparents*age 30-34	0.984***	0.988***
			Grandparents*age 35-40	0.944***	0.961***
Sq. meters per head	-8.62E-06	0.000124	Sq. meters per head	-2.74E-05	4.00E-05
Share of food spending	0.000247	0.000327	Share of food spending	0.00014	0.000179
Debt dummy	-0.00129	-0.00211	Debt dummy	-0.000119	-0.00085
Village	-0.0055	-0.00727	Village	-0.00247	-0.00314
City	-0.00892	-0.00951	City	-0.00554	-0.00581
<b>Raion-level variables</b>					
Birth rate	0.039	0.036	Birth rate	0.0189	0.0152
Death rate	0.00374	0.00344	Death rate	0.0016	0.00102
Capacity of clinics	-1.08E-05	-8.61E-06	Capacity of clinics	-6.03E-06	-1.92E-06
Average salary	0.0069	0.00805	Average salary	0.00524	0.00515
Childcare	-0.0381	-0.0344	Childcare	0.00206	0.00183
Childcare*age	0.00183	0.00182	Childcare*age15-19	-0.000285	-0.000588
			Childcare*age20-24	-0.00591	-0.00201
			Childcare*age25-29	-0.0159	-0.012
			Childcare*age30-34	0.0146	0.0188
			Childcare*age35-40	0.0208	0.0185
Observations	1,323	1,258	Observations	1,323	1,258

*Marginal effects estimated at mean shown. For dummies – marginal effect of change from 0 to 1.*



**Table 8. Regression results. Difference between ideal and actual number of children included.  
Dep. var. – childbirth in 2004-2007**

	<i>All incomes</i>	<i>Income &gt;1000</i>		<i>All incomes</i>	<i>Income &gt;1000</i>
<b>Variables</b>	(1)	(2)	<b>Variables</b>	(3)	(4)
Age	0.0215***	0.0207***	Age 15-19	0.288**	0.267**
Age squared	-0.000493***	-0.000479***	Age 20-24	0.444***	0.388**
			Age 25-29	0.467***	0.467***
			Age 30-34	0.0517	0.0203
			Age 35-40	0.0372	0.0351
Ideal – actual number of children	0.00783*	0.00832*	Ideal = actual	-0.0161***	-0.0158***
			Ideal > actual	-0.0119	-0.0103
<b>Education variables</b>					
Vocational degree	0.00596	0.000206	Vocational degree	0.00587	0.00368
Professional degree	-0.00721	-0.008	Professional degree	-0.00249	-0.00364
Academic degree	0.0167	0.0185	Academic degree	0.00896	0.00997
<b>Occupation variables</b>					
Still study in 2003	-0.00051	0.00104	Still study in 2003	0.00116	0.00249
Employed in 2003	0.0276*	0.0341**	Employed in 2003	0.0190**	0.0221**
<b>Marital status</b>					
Married	0.025	0.0235	Married	0.0133	0.0115
Single	0.0347	0.0291	Single	0.016	0.0119
<b>Life quality variables</b>					
Satisfied with life	0.0201**	0.0177*	Satisfied with life	0.0114**	0.00999*
Health is good	0.0221*	0.0212	Health is good	0.0120*	0.011
Health is bad	-0.0144	-0.0135	Health is bad	-0.0102	-0.0116*
Has a chronic illness	0.0129	0.0113	Has a chronic illness	0.00870*	0.00764
<b>Household variables</b>					
Log income per head	-0.0035	-0.00803	Log of income per head	-0.000398	-0.00368
Grandparents	0.0057	0.0115	Grandparents	-0.575***	-0.599***
Grandparents*age	-0.000283	-0.000584	Grandparents*age 15-19	0.961***	0.972***
			Grandparents*age 20-24	0.940***	0.951***
			Grandparents*age 25-29	0.955***	0.965***
			Grandparents*age 30-34	0.975***	0.982***
			Grandparents*age 35-40	0.945***	0.960***
Sq. meters per head	7.79E-05	0.000208	Sq. meters per head	-0.000106	-1.81E-06
Share of food spending	0.000305	0.000369	Share of food spending	0.000129	0.000183
Debt dummy	-0.000746	-0.00223	Debt dummy	-0.00156	-0.00166
Village	-0.00601	-0.00765	Village	-0.00363	-0.00477
City	-0.0112	-0.011	City	-0.00968	-0.0093
<b>Raion-level variables</b>					
Birth rate	0.0415	0.0361	Birth rate	0.0294*	0.0241
Death rate	0.000899	0.00123	Death rate	0.00341	0.0026
Capacity of clinics	-2.11E-05	-1.65E-05	Capacity of clinics	-1.50E-05	-1.00E-05
Average salary	0.0109	0.0106	Average salary	0.0151	0.013
Childcare	-0.0271	-0.0279	Childcare	0.0166	0.0137
Childcare*age	0.0014	0.0016	Childcare*age15-19	-0.0203	-0.0171
			Childcare*age20-24	-0.022	-0.0131
			Childcare*age25-29	-0.0341*	-0.0315*
			Childcare*age30-34	0.00519	0.0134
			Childcare*age35-40	-0.00105	-0.000768
Observations	1,323	1,258	Observations	1,323	1,258

*Marginal effects estimated at mean shown. For dummies – marginal effect of change from 0 to 1.*

Education variables are insignificant as expected, suggesting that women with different levels of education have similar preferences and/or decision-making mechanism with respect to child-bearing. The same can be said about “village” and “city” dummies. Although average number of children in villages is slightly higher than in the cities (1.7 vs 1.3), the difference is not statistically significant, suggesting that villagers and city dwellers have similar motivations and resources for family planning.

Studying in 2003 does not significantly influence the probability of child-bearing - probably because some women have a child right after or even during their studies, and others defer childbearing in order to gain some work experience after studies, so average effect is close to zero. However, employment in 2003 was positive and significant suggesting that employed women feel more secure – they already gained some work experience, they may have made some savings, they cannot be fired during pregnancy, and an employer should keep their workplace during the maternity leave.

“Being single” and “being married” are both positive but not significant (“being married”) is significant in only one specification. A possible explanation for this result is that during three years considered (2004-2007) one could manage *both* to get married and to have a child.

Life satisfaction has positive impact on child-bearing probability – perhaps, this indicator is an aggregate for satisfactory family situation, material well-being, professional and personal development etc. It is also negatively correlated with age and current number of children. Health variables have expected impact but their coefficients are only marginally significant – perhaps, because they present just a subjective evaluation of health, and chronic conditions may be not crucial for childbearing.

Neither income nor poverty measures are significant, hence, we can conclude that child allowances did not have a significant impact on the probability of child-bearing in the considered time period.

Lately, when child allowances became greater than annual per head income of about 75%<sup>34</sup> of households, they may indeed gain some effect, but we don't have the data to test this.

Grandparents living with a household don't have a significant impact on child-bearing probability in regressions with continuous age variable, which coincides with our expectations. Interaction terms of "grandparents" variables with age intervals show that for every age interval grandparents increase the childbearing probability compared to 40-45 age interval (the base category), and for every age category the size of this effect is almost the same, so we cannot conclude that for some age interval presence of grandparents is more important than for others.

Raion-level variables are not significant, suggesting that when deciding to have a child, parents hope to somehow solve the problem of her upbringing – either with the help of relatives or a nanny, or by sending their child to a kindergarten despite its overfilling. By law, a maternity leave can be extended to six years, hence, some mothers remain at home until a child goes to school. Needless to say that such a long break is damaging for career, and hence, for the future family income. Unfortunately, there is no data on women staying out of the labour force because of unavailability of childcare.

### ***Policy implications.***

We could not find econometric evidence in favour of either child allowance or childcare policy. To see the impact of expected child allowance, we would need to have the data for RHS variables for several years, preferably for the latest years, when child allowance was increasing fast. Since we don't have this kind of data (and in 2003 expected child allowance was UAH 300), we can look only at income effect. It turned out to be insignificant, hence, child allowance did not play a decisive role

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<sup>34</sup> In 2011, only 24.8% of Ukrainian households had annual per head income over UAH 23 040 (Statistical Yearbook), while child allowance for the first child grew from UAH 17 952 to UAH 26 100 during the same year.

in childbearing during the considered time period. We believe that today it does not play a decisive role either because there is no evidence on families having children in order to get an allowance. Before the initial allowance increase in 2005, many skeptics foresaw a massive increase in the number of births by poor families, who would take the money and then neglect a child. Fortunately, these fears were not confirmed – perhaps because the “cost” of child is not only material<sup>35</sup>. Greater costs are levied on a family in terms of time, change of former habits and the entire lifestyle. So whatever is the allowance, cost of raising a child is higher.

Compared with the very generous child allowance, childcare provision in Ukraine had seen much better times. First of all, there are not enough places in kindergartens, especially in urban areas, so very often they are overcrowded and, hence, cannot provide quality service to children. Second, funds provided to kindergartens are enough only for payment for communal services, staff salary (very low) and a half of cost of kids’ meals. Money for maintenance of premises and new equipment is collected from parents.

Of course, child allowance is much easier to administer, and it is “visible”, so brings quick political dividends. However, it raises family welfare only temporarily, whereas in the absence of childcare, the decline of future income of a woman because of career break and depreciation of her human capital can be permanent. The higher the qualification of a woman, the larger this income reduction effect can be. For the government, the higher the salary of a person that stays at home, the more taxes are not collected to the state budget. So, provision of childcare facilities is beneficial both for higher-earning individuals *and* for the state.

Besides allowing a mother to return to work, attending childcare is beneficial for a child too. As shown by numerous studies, children attending kindergartens socialize better and get sick less often

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<sup>35</sup> In fact, a child needs very little of material stuff in the first years of her life, and quite many things, such as furniture or clothing, can be borrowed from friends and relatives with older children

at school. In the deficit of state childcare facilities, alternative forms of childcare, such as nannies of private kindergartens, are developing. However, they are expensive, and their number is rather small. Government support to private kindergartens (for example, in a form of private-public partnership) could help solve the childcare problem and would require less state funds than construction of kindergartens from scratch. Unfortunately, overly regulation makes legal functioning of private kindergartens very expensive.

### ***Checking the second hypothesis***

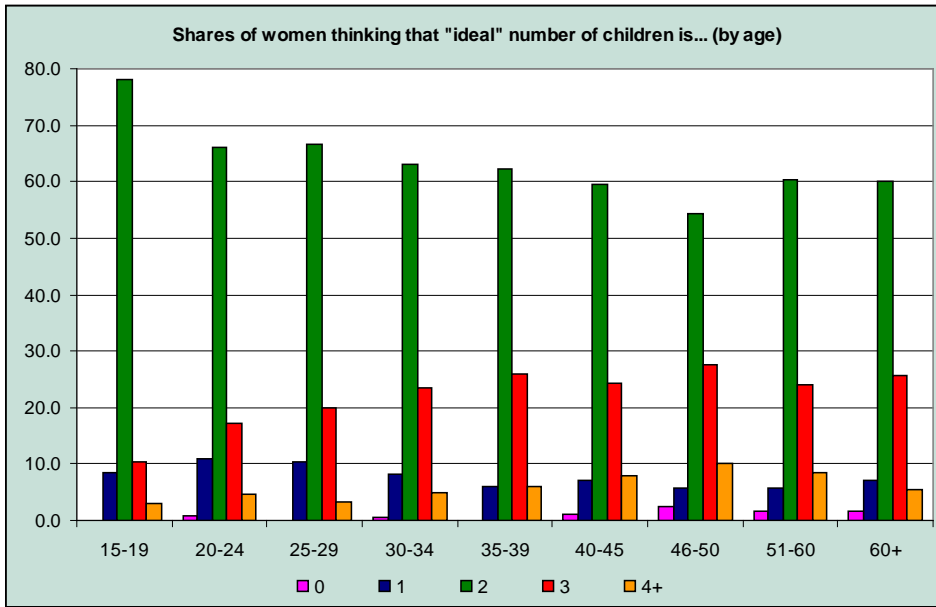
Now we check the second hypothesis on the change in values, namely, reduction of “ideal number of children” among younger women. For this purpose we construct distribution of ideal number of children by age intervals<sup>36</sup>. We see from table 9 and figure 8 that the share of women willing to have just one child among 15-25 year olds is significantly higher than among women older than 35. The share of women who think that the “ideal” number of children is two is significantly higher for 15-25 aged then for other age categories, and the share of women thinking that 3 is an ideal number of children among the youngest cohort is significantly lower. The difference between proportions of women willing to have 4 and more children is not significant.

**Table 9. Distribution of “ideal number of children” by age, %**

Age →	15-25	26-35	36-45	46+	Total
1	10.3	9.2	7.2	6.8	7.83
2	70.3	61.6	59.8	58.3	60.58
3	15.0	24.1	25.0	25.8	23.07
4+	4.4	5.1	8.0	9.1	7.3
Total	100	100	100	100	100
Average ideal # of children	2.32	2.25	2.31	2.41	2.32

<sup>36</sup> Here we show the results for 2003 sample, results from 2007 sample are very similar.

Figure 8



Source: ULMS-2003 data

Hence, the data suggest that hypothesis about the lower “ideal number of children” among younger women is correct.

## 6. Conclusions.

Using the 2003 and 2007 ULMS data, we estimated fertility determinants in Ukraine. As a dependent variable, we used the probability of having a(nother) child in 2004-2007. On the right hand side we included a number of individual, household and raion-level characteristics from 2003. Our main interest was estimation of the income effect (that would allow to make inferences about the efficiency of child allowance policy) and of the effect of childcare provision. Econometric results were inconclusive. We found that personal characteristics, such as age, current number of children, life satisfaction and employment, significantly impact the child-bearing probability, whereas household income and poverty measures, as well as raion-level variables turned out to be insignificant.

The main results are summarized below:

- age variable has expected signs and is significant. Among age intervals, 20-24 and 25-29 intervals significantly increase the probability of childbearing;
- having two children exerts a significant negative impact on the probability of birth of the next child, whereas for other numbers of children the effect was insignificant. Perhaps, this is a reflection of the fact that preferable number of children is two (regressions with the difference between ideal and actual numbers of children support this result);
- education has no significant effect on childbearing, and neither do village/city dummies suggesting that people with different education and places of living have similar values and access to family-planning techniques;
- grandparents living in the same household have no significant effect on childbearing suggesting that positive impact of “grandparents can look after a child” and negative impact of “insufficient living space” cancel each other out;
- raion-level variables are insignificant in all specifications, suggesting that families rely mostly on themselves when deciding to have a(nother) child.

Despite no econometric evidence in favour of one or another pronatalist policy, there are more arguments in favour of childcare provision rather than child allowance increase. Specifically, allowing a mother to return to work sooner would prevent her human capital deterioration, and thus improve her career perspectives, increase [permanent] income, and therefore, the amount of taxes she pays to the state. Child allowance provision, although more easily implemented and having an immediate political dividend, still has its drawbacks. First, viewing child allowance as a compensation of foregone earnings would require paying more to higher-earning individuals, which is not politically possible. Second, this policy was partly responsible for the sharp rise of prices of goods for children within the last 7-8 years. Finally, there will always be fears that in some poor

families children will be born for the sake of allowances and then neglected, which would never happen with childcare provision.

As for the second hypothesis, the data analysis suggests that the “ideal” number of children has been falling recently along with the change in family values.



## Appendix 1.

**Table A1. Ukrainian regional data. Upper number – 2002, lower number - 2006**

	population, thousand	birth rate	death rate	population growth	child mortality Av. monthly salary, UAH	number of kindergartens	number of children in them, thousand	attendance rate	children per 100 places	number of doctors per 10000 population	Number of visits <sup>37</sup>	
Ukraine	48241	8.1	15.7	-7.6	10.3	376	15300	973	48	92	47	205
	46900	9.8	16.2	-6.4	9.8	1041	15080	1081	53	102	48	215
Crimea	1968	10.1	15.4	-5.3	10.0	952	605	42	51	83	46	164
	2018	8.0	14.7	-6.7	11.5	358	655	36	45	74	47	163
Vynnytska	1770	8.6	16.7	-8.1	9.4	265	673	37	44	87	47	146
	1679	9.6	17.3	-7.7	9.3	484	652	41	53	97	50	154
Volynska	1055	11.1	10.1	1.0	10.8	253	325	19	30	94	40	173
	1038	13.2	12.9	13.5	7.6	773	390	26	42	116	39	174
Dnipropetrovska	3548	7.7	16.2	-8.5	11.6	438	1009	79	60	93	48	266
	3420	9.8	17.3	-7.5	10.5	1139	955	86	62	100	49	272
Donetska	4581	8.5	17.7	-9.2	11.0	1202	1151	108	64	103	47	206
	4072	6.5	17.1	-10.6	11.8	452	1231	105	53	86	46	186
Zhytomyrska	1389	8.9	17.1	-8.2	10.8	268	468	26	41	95	36	235
	1318	10.3	18.3	-8.0	11.1	793	1	32	50	103	37	246
Zakarpatyska	1254	11.3	11.9	-0.6	8.4	295	498	24	29	90	42	86
	1244	13.3	12.8	0.5	9.6	868	518	29	39	106	39	205
Zaporizka	1909	7.8	16.1	-8.3	14.8	445	586	43	56	102	44	167
	1847	9.3	16.5	-7.2	12.0	1091	526	46	60	109	44	182
Ivano-Frankivska	1409	9.9	12.7	-2.8	10.4	318	275	18	20	97	46	146
	1385	11.4	13.3	-1.9	10.6	923	293	22	29	106	50	153
Kyiv	2616	8.1	10.6	-2.5	9.3	643	675	68	73	90	85	311
	2718	10.4	11.1	-0.7	8.1	1729	670	74	64	99	87	307
Kyivska	1826	7.7	16.7	-9.0	9.9	378	749	44	46	96	33	193
	1745	9.9	17.9	-8.0	9.4	1058	703	47	62	107	34	205
Kirovohradska	1116	8.0	18.0	-10.0	10.1	282	526	23	45	83	35	251
	1047	9.2	18.0	-8.8	13.3	819	525	25	55	92	35	258
Luhanska	2507	6.6	17.2	-10.6	11.3	393	600	41209	45	99	39	198
	2409	8.3	17.8	-9.5	12.3	1022	575	44	52	110	39	205
Lvivska	2624	9.2	13.0	-3.8	12.3	339	477	36	26	100	54	184
	2568	10.6	13.5	-2.9	7.8	923	487	0	36	120	58	189
Mykolaiivska	1252	8.0	16.1	-8.1	7.5	398	487	29	46	89	36	181
	1212	9.7	15.9	-6.2	8.5	955	530	31	58	93	36	188
Odeska	2448	8.6	15.8	-7.2	9.7	379	766	45	41	91	47	181
	2384	10.5	16.3	-5.8	11.1	966	746	55	52	106	47	205
Poltavska	1609	7.1	18.1	-11.0	8.3	354	658	34	45	98	47	235
	1555	8.8	18.1	-9.3	7.1	961	587	36	59	107	48	249
Rivnenska	1168	11.5	13.3	-1.8	11.7	312	256	20	26	95	39	201
	1153	13.6	13.9	-0.3	9.4	888	284	25	35	107	42	210
Sevastopol	379	8.2	13.7	-5.5	10.3	391	86	10	77	95	51	196
	379	10.1	15.1	-5.0	6.3	1005	85	11	73	101	48	196
Sumska	1280	6.7	18.0	-11.3	10.0	307	425	28	50	111	36	210
	1211	8.3	18.4	-10.1	7.6	857	414	29	61	113	37	228
Ternopilyska	1134	9.2	14.4	-5.2	10.8	120	473	19	31	88	45	89
	1102	10.5	14.9	-4.4	9.4	727	448	22	41	101	47	187
Kharkivska	2914	7.1	16.0	-8.9	8.5	370	645	53	45	90	54	202
	2821	8.5	16.1	-7.6	7.7	974	614	58	46	100	57	218
Khersonska	1175	8.5	15.8	-7.3	10.7	192	506	27	43	75	35	173
	1117	10.2	15.9	-5.7	9.9	800	487	29	57	79	36	192
Khmelnyska	1431	8.5	16.2	-7.7	10.2	258	785	35	41	103	39	178
	1358	9.9	17.2	-7.3	11.7	792	802	38	60	106	41	187
Cherkaska	1387	7.4	17.6	-10.2	11.3	173	730	35	51	88	35	190
	1328	8.6	18.0	-9.4	9.9	846	683	36	66	92	35	197
Chernivetska	918	9.8	13.1	-3.3	11.4	271	253	17	33	103	51	165
	906	11.2	13.5	-2.3	13.5	819	316	22	47	109	54	178
Chernihivska	1245	7.0	20.0	-13.0	11.0	277	487	22	44	97	36	195
	1152	8.1	21.1	-13.0	8.9	790	450	23	52	101	37	209

<sup>37</sup> Planned number of visits per shift at ambulant clinics, per 10 000 population.

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