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An Overview of Contemporary Theories of Fertility

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Introduction

The idea of “demographic transition” does not belong to one author only. Numerous precursors dealt with that term in population research [Laundry 1945, Thompson 1929, Blaker 1949]. Nowadays, that theory is analyzed, verified, and in most cases, authors refer it to a particular country, society or ethnic group [Kazmer and Konrad 2001, Lesthaeghe and Neels 2001, Kurkiewicz 1998]. The demographic transition deals with changes in the level of reproduction. The transition process starts from the modern society with a high level of fertility and mortality and goes to the industrial society described by a low level of fertility and high mortality.

The last twenty-five years of the 20th century showed that a new trend appeared. The changes refer to the societies of highly developed countries. Firstly, birth rates were beneath the replacement level; secondly, death rates declined. The analysis of the new situation let demographers; D.J. van de Kaa [1987] and R. Lesthaeghe [1991] describe and formulate the foundations of a model, which they called the Second Demographic Transition model (the STD model).

Nowadays, demographers, economists as well as statisticians analyze and describe changes in the level of fertility in numerous countries [Entwisle et al. 1982, Alfonso 2000, Kurkiewicz 1992, Kohler et al. 2003, Pinnelli and de Rose 2001]. Lappegård [2000] in his work focuses on a pattern of fertility, both in regard to the timing of the first childbirth and the number of children born in Norway. Andersson [2000] describes trends and childbearing in neighboring Norway and Sweden. Many studies deal with fertility determinants. Gupta and Mahy [2003] examine whether increased years of schooling have a consistent impact on delayed childbearing in sub-Saharan Africa; Vikat [2004] employs a longitudinal register data set to analyze the impact of women’s economic activity and earnings on childbearing. There are studies, which refer to population and its changes in demographic literature as well. Schoen [2002] presents the concept that high proportion of rural population is also a

source of significant population growth. Ediev [2001] presents trends and projects Russian population since 1897 to the end of 21st century.

Many scientists such as demographers, sociologists, psychologists and economists, as well as governments of many countries, have been trying to find an answer to the following question: what factors determine population growth? It is very important to recognize, gather and describe major behavior of individuals because the number of individuals with respect to sex and group of age determines many aspects of economy such as medical care, pension scheme or education. The number of births and deaths considerably influences population growth. The conclusion seems to be obvious. Once we determine what factors have an impact on the level of fertility and level of mortality, we will be able to define the determinants of population growth. It is known that the factors that determine the level of fertility and mortality differ from one society to another.

The study consists of two parts. The first section focuses on demographic transition models that describe changes in population growth. The changes are brought about by fluctuations in the level of birth and death rates within many generations, from high rates to low rates. The second part describes the following theories of fertility: the hypothesis of R.A. Easterlin, the theory of fertility decline formulated by J. C. Caldwell and, finally, the theory of new home economics elaborated by G.S. Becker. These theories have made a generous contribution to demography and to fertility studies specifically. The fertility theories have focused on determinants of fertility changes. The authors of these theories have tried to formulate and describe social, economic, cultural, anthropological and geographical factors affecting the level of fertility. In most cases their analyses refer to a particular society or ethnic group.

1. Demographic transition models

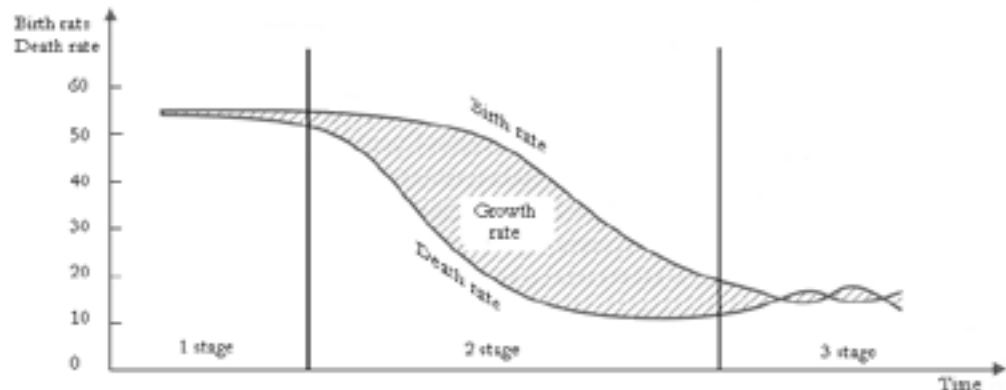
The concept of demographic stages was first presented by A. Laundry, [1909] whereas the author who formulated and described the demographic stages was C. P. Blaker [1949]. K. Davis [1945] was the first who applied the term of "demographic transition". Demographic transition models tend to explain transformations that focus on shifting from high birth and death rates to low birth and death rates. The transition began in the 18th century in developed countries and it continues nowadays. Less developed countries began the transition later and are still in the midst of earlier stages of the model.

There are two known demographic transition models. The first is composed of three stages while the other – most approved – consists of four stages. Both models are based on the changes in crude birth rates and crude death rates over time.

1.1 Three- and four-stage demographic transition models

The most overall demographic transition model amounts to three stages (Graph 1.1). The authors who follow the three-stage demographic transition model are A. Laundry [1934] and F. Notestein [1945].

Graph 1.1 Demographic transition model (three-stage)



Source: Description based on J. Z. Holzer, *Demografia*, PWE, Warszawa 2003.

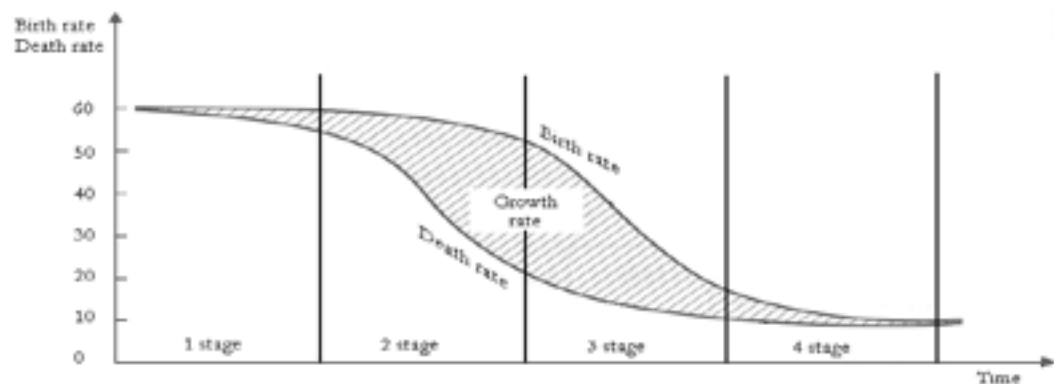
The characteristic features of the three-stage demographic transition models are high level of fertility and mortality in the first stage, the stage of transition with declining birth and death rates and family planning in the third stage. The first phase is typical of traditional societies, where there is no birth control. The third phase is attributed to modern societies with conscious birth control [Holzer 2003, Kurkiewicz 1998, Kotowska 1999]. The most common demographic transition model is composed of four stages (Graph 1.2). That model is more appropriate to show changes in population growth. Moreover, it allows understanding the transition between stages regarding more details [Holzer 2003, Kurkiewicz 1998, Kotowska 1999, Montgomery 2004, Sommestad and Malmberg 2000, Cieślak 1992].

The first phase of the model distinguishes a very high level of birth and death rates. It is possible that the level of fertility is equal to the level of mortality, or the level of mortality even exceeds the level of fertility. The reasons for high birth rates are lack of family planning, religious beliefs and considering children as an economic asset (each child being treated as an investment – an additional pair of hands to work in agriculture). The determinants of high level of death rates are lack of clean water and sanitation, lack of education, health care at a very low level, famine, wars and a big number of rats as a source of diseases. The number of children born by a woman aged 15-49 comes to six and an average life span is less than 45 years. The population growth is very slow and fluctuating. This stage refers to the economic development of Britain as it was in the 18th century and to the least economically developed countries nowadays.

The second phase is characterized by declining death rates as a result of improved medical care. Birth rates are still high because it is more difficult to change people's habits, attitudes and consciousness with respect to reproduction than provide medical care or sanitation. Death rates fall as a result of improved health care (vaccinations), improved quality of water and sanitation, improved production, storage and transport of food. The number of children per a woman at a reproductive age (between 15-49 years) is from 4.5 to 6 and an average

life span ranges from 45 to 65 years. The population begins to rise steadily. That stage links countries like Bangladesh and Nigeria today or Britain of the 19th century.

Graph 1.2 Demographic transition model (four-stage)



Source: Description based on M. Cieślak, (ed.), *Demografia: metody analizy i prognozowania*, PWN, Warszawa 1992.

In the third phase birthrates fall faster than death rates. The decline of birth rates is a result of the following factors: family planning and changes which apply to the status of women, higher standard of living and low level of infant mortality. Moreover, mechanization and new agricultural tools and machines reduce the demand for workers. The maximum birthrate appears between the second and the third phase. The number of children born by a woman aged 15-49 ranges from 3 to 4.5 and an average life span is between 55 and 65 years. The population rises. This phase was typical for Britain at the end of 19th and beginning of 20th century and for China and Brazil today.

In the fourth phase the level of fertility reaches the level of mortality. Owing to widespread medical and social care intensity of mortality reaches low values. The number of births is below 2.5 children per a woman between 15-49 and an average life span is longer than 65 years. This stage refers, for instance, to the USA, Sweden, Japan and Britain today.

It is obvious that the above-described model cannot be applied to each society and has its limitations. First of all, it can be observed that birth rates fall below death rates in many countries like Sweden, Germany or Poland today. This results in population decline, which could suggest that there is a need to add a fifth stage to the four ones analyzed above. Secondly, the analyzed model could suggest that all countries and societies go through the same four stages in the same period of time. Still it is rather unlikely. The major factor is the economic and social potential of the analyzed countries. Countries like Singapore [Cheung 1989] or Malaysia [Peng 2002] are being squashed as they develop at a much faster rate than the early-industrialized countries did. Then, countries with a high level of immigration, the USA [Fehr et al. 2003], Australia or Canada did not go through the early stages of the presented model because population growth was fed by immigrants. Finally,

even though the decline of death rates seems to be a consequence of industrialization, it is, in my opinion a result of improved and easily accessible health care, sanitation and higher standard of life.

1.2 The second demographic transition model

D. J. Van de Kaa [1991] formulated foundations of the theory of the Second Demographic Transition (the STD). The theory is based on an analysis of changes in marital attitudes and fertility patterns among European countries. Nowadays, numerous demographers and social scientists relate to this theory in their studies [Surkyn and Lesthaeghe 2002, Atoh et al. 2004, van de Kaa 2002, Leiwen 2002] The major assumptions of the SDT can be divided into four groups: marriage, fertility, contraception and lifestyle [Kotowska 1999, Kurkiewicz 1998]. The major symptoms of the SDT with respect to the 'marriage' variable are: postponement of marriage, an increase in the age of the first marriage (from 23.0 years in 1990 to 23.7 years in 2000 in Poland¹), prevalence of nonmarital cohabitation (so-called LAT, Living-Apart-Together unions), an increase in the number of divorces (from 27.0 thousand in 1993 to 45.0 thousand in 2002 in Poland) and an increase in the number of couples with one child (the first birth in total live births increased from 40.0 in 1990 to 48.0 percent in 2000; the average order of birth dropped from 2.11 to 1.90 between 1990 and 2000 in Poland).

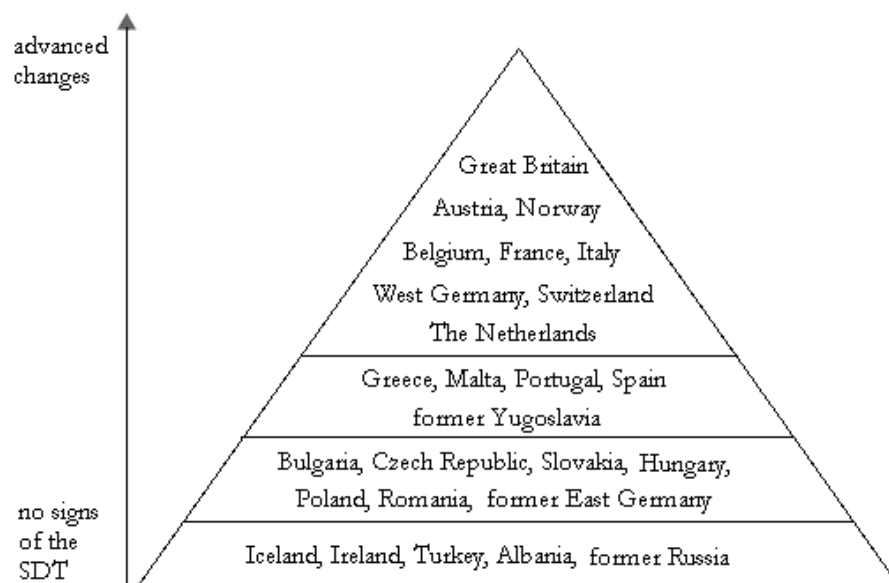
The changes in 'fertility' field are as follows: declining fertility near-replacement level or beneath replacement level which influences population growth, changing fertility pattern which is expressed by two factors: first – the age of having the first child increased, second – maximum fertility moved from one age group to another (from the group of age between 20-24 years to the group of age between 25-29 years in Poland), increased the number of nonmarital births which is a result of increasing Living-Apart-Together unions [Snauwaert et al. 1998] (the nonmarital births doubled, from 6.0 to 12.0 percent in total live births between 1990 and 2000 in Poland).

The crucial evidence as to the area of 'contraception' is widespread accessibility to contraception and birth control methods. It helps parents to plan the optimal moment for conceiving a child and to decide on the number of children they wish to have.

The last group of symptoms of the SDT pertains to the changes of lifestyle that determine mortality level; especially to women aged 18-60 and men aged 18-65 as well as a diet and physical effort.

All the above-mentioned changes have taken place in European countries but the progress of changes differs from one country to another. Table 1.1 shows countries with the advanced SDT and countries which are still in the process of changes from primitive to modern reproduction.

Table 1.1 The Second Demographic Transition – progress of changes among European countries.



Source: Description based on J. Kurkiewicz, *Modele przemian płodności w wybranych krajach europejskich w świetle koncepcji drugiego przejścia demograficznego*, Zeszyty Naukowe AE, nr 131, Kraków 1998.

The newest investigation on the SDT was launched from 1999 to 2001. The European Values Study (EVS) was a well-established network of moral, religious, societal, political, economic and social attitudes, goals, beliefs and values of mass publics in Europe to explore similarities, differences, and changes in these orientations. The investigation covered 33 European countries Austria, Byelorussia, Belgium, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxemburg, Latvia, Malta, Northern Ireland, the Netherlands, Poland, Portugal, Romania, Russia, Spain, Sweden, Slovakia, Slovenia, Turkey, and the Ukraine. An important goal of the most recent investigation was to examine whether the emerging concept of one common European cultural identity had an empirical basis [Luijckx et al. 2003]. The outcome of the European Values Study was presented in the work of J. Surkyn and R. Lesthaeghe [2002]. According to the authors, single living, premarital cohabitation and progression to parenthood within cohabiting unions have steadily gained ground in Europe. These symptoms of the SDT occurred in many regions of Europe such as Scandinavia during the 1960s, Western Europe in the 1970s, the Iberian populations in the mid-1980s and apparently expanded to central Europe. The main conclusions of the investigation conducted by J. Surkyn and R. Lesthaeghe are presented in the following way. First of all, childless cohabitants are not conformists in the values referring to secularization, ethics, civil morality, egalitarianism, anti-authoritarianism, expressive values in a work and socialization, tolerance, world orientation etc. Secondly, married parents who had never cohabited have the lowest nonconformist score of all. Finally, married parents who had cohabited are always more

nonconformist than their counterparts who never cohabited. This suggests that earlier cohabitation experience has a lasting effect operating in the non-conformist direction. The authors indicated that single living is associated with very high non-conformist people.

2. Fertility theories

The level of fertility is affected by many determinants. The major source of changes could be social, economic, cultural, anthropological or geographical [Josipovič 2003] factors, which influence the level of births in a given society. The one theory, which would link socio-economic transitions with changes of fertility, has not been formulated yet. On the other hand, fertility theories have the same core component – they all describe changes in the level of fertility. The theories presented below respond to the question referring to changes in the level of births. The main field for differentiation among them is the source of changes.

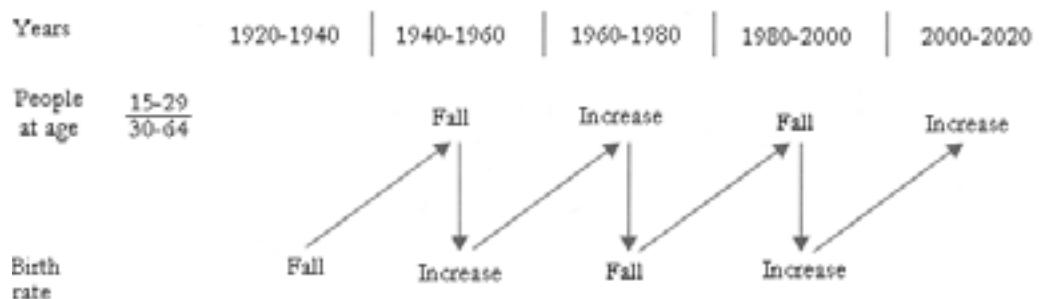
2.1 The Easterlin Hypothesis

The demographic transition models presented above suggest the decline of fertility from high levels in pre-industrial civilizations to low levels in postindustrial societies. Nowadays, most of developed countries have experienced fertility decline and one of the possible scenarios is a constant but low fertility level in the future.

The Easterlin hypothesis points out a link between fertility level and relative cohort size. The analyzed relationship is determined by the level of current or potential income of young people and their material aspirations.

The model is based on a cyclical pattern of fertility supported by socio-economic mechanism. Namely, a small cohort size (in comparison to the previous generation) creates better conditions in terms of labor market opportunities and high wages. It allows the cohort to realize the desired fertility. On the other hand, constraining desired fertility and postponement of fertility and marriage are the result of less desirable economic conditions when the cohort is large relatively to the parental generation. (Kurkiewicz 1998, Cieślak 1992)

Table 1.2 Cyclical pattern of fertility.



Source: Description based on J. Z. Holzer, *Demografia*, PWE, Warszawa 2003.

A cyclical pattern of fertility is based on a concept of Kuznets cycle, a cycle of economic activity lasting between 15 and 20 years. [Schön 2004] The Kuznets cycle is strictly related to investment in housing and building, capital formation, income and real estate markets.

There are two versions of the Easterlin hypothesis. One version assumes that fertility is a result of relative income, the second deals with a dynamic process where the past level of fertility is negatively correlated with the current fertility level. [Bonneuil 1990 in: Waldorf and Franklin 2002]

The Easterlin hypothesis is widely accepted in social science literature. Macunovich (1998) in her empirical tests based on aggregate North American data proves supporting evidence in the majority of these studies. However, this model fails to match the pattern in the United States fertility data after 1954 [McNown and Rajbhandary 2003]. The Easterlin effect is restrained among European countries by social and institutional features affecting influence of relative cohort size on fertility. High rate of female labor force is the most important feature, which reduces an impact of relative cohort size on fertility. This factor is connected with social security programs widespread in the United States, but not existing in European countries. Besides, the second factor is a degree of trust in government's financial support. However, it is very difficult to measure its impact on the analyzed phenomenon [Pampel 1993].

The analytical technique and the period covered can be the crucial factors while testing the Easterlin hypothesis evidence in populations. Artzrouni and Easterlin [Macunovich, 1998] applied the OLS technique (ordinary least squares technique) to Danish population data covering the period from 1951 to 1981. The analysis indicates a significant positive relationship between total fertility rate (TFR) and relative cohort size, whereas Wright [Macunovich, 1998] verified this concept between 1950 and 1985 applying Granger causality test. The author came up with an inversed relationship between these two variables.

Moreover, it is evident that the structure of population by age and sex, regional differences across a country, prevalent religion can determine rejection or acceptance of the Easterlin hypothesis.

Waldorf and Franklin [2002] tested the Easterlin hypothesis with respect to regional differences in Italy. Their variables comprised the fertility norms and values across the space and movements between labor markets. The study provides three findings. First, space-time is a very important and significant variable in regional analysis. Second, fertility within one region has an impact on the neighboring regions and thus cannot be ignored in any fertility study. Third, the effects of relative cohort size on the level of fertility vary between regions and time periods.

2.2 The fertility decline theory

The fertility decline theory was formulated by J.C. Caldwell in 1982. His aim was to construct a model of the African society, which would be able to generate ideas about

changes in sexual behavior. Given this, a model can explain population and fertility pattern. Furthermore, Caldwell, his wife and collaborators conducted investigations on fertility behavior in the Asiatic populations. His investigation shows that there is a contrast between the African and Eurasian sexuality. The African system is internally coherent and evolves around lineage organization based on reproduction and descent. The polygamy and divorce are common because a conjugal bond is emotionally very weak. Both a husband and wife retain links with their natal lineages and share few mutual interests. Having different economic responsibilities, the conjugal household is not a unit for economic purposes. Typically, a wife and children form an entity whose interests are opposed to that of a husband, a father. [Heald 1995]

By contrast, the Eurasian system, which focuses on inheritance, seeks for ways to control marriage and female sexual behavior. In addition, this system is based on mortality and theology, whereas the African system does not locate the aspects of sexual behavior in the center of their moral and social systems. What is more, most of sub-Saharan societies do not consider premarital or extramarital sex as an immoral activity. The sexual relationship is not a subject of moral control and sex is seen as an otherworldly activity. Consistently, a large majority of the African countries note total fertility rates between six and seven children per woman. [McDevitt 1998] Besides, sex is seen as a service which a woman contributes to a man in return for cash or support. It is difficult to recognize prostitution in Africa in the same way as in the West where sex has always a potentially commercial aspect. [Heald 1995]

The central point of the Caldwell theory is the transfer of goods, money, and services between generations. This stream is called 'supporting flow'. Furthermore, his theory states that any economic activity should be followed by social goals. An economic success and satisfaction are not possible without a social element. What is more, Caldwell says that fertility decline is not affected by the level of economic development of a country or the level of industrialization. He claims that economic growth is accelerated by fertility decline. It is evident that the level of economic development influences the fertility. The case of the Polish population shows that TFR (total fertility rate) was 2.3 children per woman in 1980 and moved towards 1.2 in 2003². The changes in decline of TFR were accompanied by the changes in economic background of Poland, the transition from the communism to a free market economy. It is evident that the level of economic development stimulates changes in fertility behavior.

Caldwell discussed two types of society with respect to changes in the level of fertility. First, a society with symptoms of fertility reduction and second, a society without symptoms of fertility decline. The level of fertility and family size are determined by economic and social benefits. When there are no economic stimuli to restrain reproduction, children can be a source of trouble for parents. The level of reproduction and family size are mainly determined by the costs of living and by advantages of having children. [Holzer 2003]

The lineage organizations and inheritance can refer to many different sexual behaviors that take place in the African societies. First of all, it is a greater sexual access to women.

There are many East African people such as the Nuer, the Gisu, the Luo for whom it is not a dishonor to commit adultery with a brother's wife, and no compensation can be demanded. On the contrary, for the Iteso in Kenya, it is seen as disgrace and violation of the husband's individual rights. Besides, a cult of ancestors does not have to be strictly linked with lineage reproduction and continuity. The Gisu are Bantu-speaking agriculturists living in Kenya and Uganda. In their religious system no cult is devoted to any particular ancestors. They postulate recycling of life force that they call *bulamu*. The life force of the dead returns to a newborn child. [Heald 1995]

2.3 The New Home Economics theory

The Becker's model is known as the New Home Economics theory and is based on family and household [Ferber and Birnbaum 1977, Headey 1993, Grossbard-Shechtman 2001, Katz 1997]. This economic theory of fertility links many variables such as income and expenditure, quality of children, constraints in terms of time and opportunity cost with respect to births. Opportunities are connected strictly with better education, better food and buying more goods.

The Becker's model provides parents utility function depending on their consumption and utility of a child. Parents make choices between utility of durable goods (consumption) and utility of children (satisfaction). Consumption and number of relatives within generations is called a dynasty utility function. Welfare of all generations is closely related to the above mentioned variables, such as consumption, income and number of relatives in a dynasty. It is obvious that the heads of generations tend to maximize a dynasty utility function. On the other hand, maximization requires an equilibrium between the marginal benefit of an additional child and the net costs of producing a child. The costs are determined by the life-span earnings of children, bringing up the children and the parents' investment in human capital. The Author states that the costs of bringing up descendants are constant over the time. Assuming the constant level of the costs the Becker's theory says that the level of fertility depends on the interest rates (positively), time preference factor (positively), degree of altruism (positively), and growth of net costs between generations (negatively) [Becker 1988].

There were many studies dealing with a negative relationship between the level of education and the number of children. Analyses meet many limitations; the studies are limited to visual inspection and, therefore, conclusions based on the correlation analysis cannot find a casual link between variables. These works do not consider relationship between fertility and its determinants. Finally, many studies apply the regression models, but although these analyses contribute a lot, they attempt to make correlation equal causality. [Diebolt and Doliger 2005]

The Granger's causality test was applied to French population data for all above-mentioned inconveniences. The test showed the level of education affected that fertility decline significantly. Low fertility rates go with an increase in woman labor force participation. Women changed their behavior under the influence of new possibilities

of investment and opportunities related to education and labor market. What is more, changes in sexual behavior of women should be perpetuated by the changes in economic role of women. This phenomenon can be referred to the young couples that decide not to have children in order to increase the standard of living or to maintain it at a high level.

Conclusions

The above-presented theories focus on determinants and variables affecting the level of fertility in populations. The major aim of these theories is to explain changes in the level of fertility, whereas the assumptions and approaches are different.

The Easterlin's theory deals with the level of fertility and changes in relative income. The assumptions are verified among developed countries and they are referred to the whole population. (macro scale)

The Caldwell's considerations are connected with changes in the level of fertility and type of economy among peasant societies. Caldwell verified his theory in the African and Asiatic countries. He focuses on family level (micro scale) and intergeneration flow.

The Becker's approach refers the level of fertility to women's labor market opportunities connected with the level of education. The major parts of his theory are changes in an economic role of women and mostly are referred to the young people. The author provides an intergeneration maximization of welfare utility function.

Reliability of the theories depends on analysis technique, demographic rates applied in the analysis, economic background of a country and structure of population.

Nowadays, the most important is the theory of the SDT. This model is crucial because we still do not know the final outcomes of changes in the level of fertility caused by demographic fluctuations. What seems essential is that changes began among the Scandinavian populations in the 50's and spread very fast throughout the western Europe in the 60's and to southern Europe in the 70's. Firstly, the changes are permanent and irreversible. Secondly, the changes referred to the marital fertility at the beginning and then to marriage (dissolution and cohabitation instead of marriage). So far, population studies and research have not formulated a new compact theory. The studies and analyses did not present a coherent set of direct and indirect determinants of demographic changes. That part is still a subject of analyses and investigation. According to Kotowska [1999] we can hardly speak about the theory of the SDT but rather about its initial approach.

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(Footnotes)

¹ Rates based on Polish Population Office data.

² Rates based on Polish Statistical Office data.

