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Social Welfare Policy as an Instrument for Fertility Regulation

BSc Thesis 2013-047

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January 27, 2013
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Word count: 9271

ABSTRACT

In vast majority of countries fertility rates are either too high or too low, creating serious socio-economic problems. This study assesses for a large set of countries, the impact of social welfare policies on total fertility rates (TFRs). Studied are the general effect of social welfare policy and the disaggregated effects of education expenditure and social security, consisting of old-age benefits, sickness benefits, and unemployment benefits, on TFR. Social welfare spending, in general, negatively affects TFR, as do all four disaggregated policy areas. When specifically examining low fertility rate countries a significant positive effect is found between education expenditure and fertility, while other effects are insignificant. Focusing on countries with high fertility rates significant and strongly negative effects on TFR can be found when expenditure on education is increased, or when old-age benefits or sickness benefits are to be introduced or enhanced. Hence, this study concludes that, low fertility countries can boost fertility by investing in education, while high fertility countries can temper fertility by introducing or expanding old-age, and sickness benefits and investing in education.

UNIVERSITY OF AMSTERDAM

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1. Introduction

"After the end of the Cold War, population ageing will be the greatest challenge for Europe. Yet because demographic changes come so slowly, we are in danger of overlooking them."
- Helmut Kohl, Chancellor of Germany, 1994

Abnormal fertility rates have recently raised concerns with policy makers around the globe. In vast majority of countries the total fertility rates are retained at adverse levels (See global fertility map Appendix A). The total fertility rate (TFR) represents the average "number of children that would be born to a woman if she were to live to the end of her childbearing years" (World Bank, 2010). Depending on actual mortality rates, total fertility rates lower than 2.1 in general result in a population decline, while fertility rates above this number often lead to growing populations (Espenshade, Guzman & Westoff, 2003). If current extreme low and high fertility rates are left unchanged, serious socio-economic problems will arise in the near and far future.

In all European nations fertility rates are so low that populations in these countries cannot be maintained, causing serious ageing problems (World Bank, 2010; Juurikkala, 2007). In Germany and Hungary, for instance, the total fertility rates in 2010 were 1.39 and 1.25 respectively (World Bank, 2010), resulting among others in insolvency of pensions schemes and rapid rising healthcare costs. Also in Asia and other developed and emerging economies fertility rates below the replacement rates can be observed. The total fertility rate for all developed countries has fallen sharply from 2.9 in 1960s to 1.6 in the late 1990s, well under the replacement rate (Adsera, 2004; Figure 1).

On the other hand, many low-income countries, especially those situated in Africa and Central Asia, are exposed to very high total fertility rates leading to a large population growth. In the least developed countries total fertility rates of 5 and above are not uncommon, Somalia and Uganda, for instance, have 2010

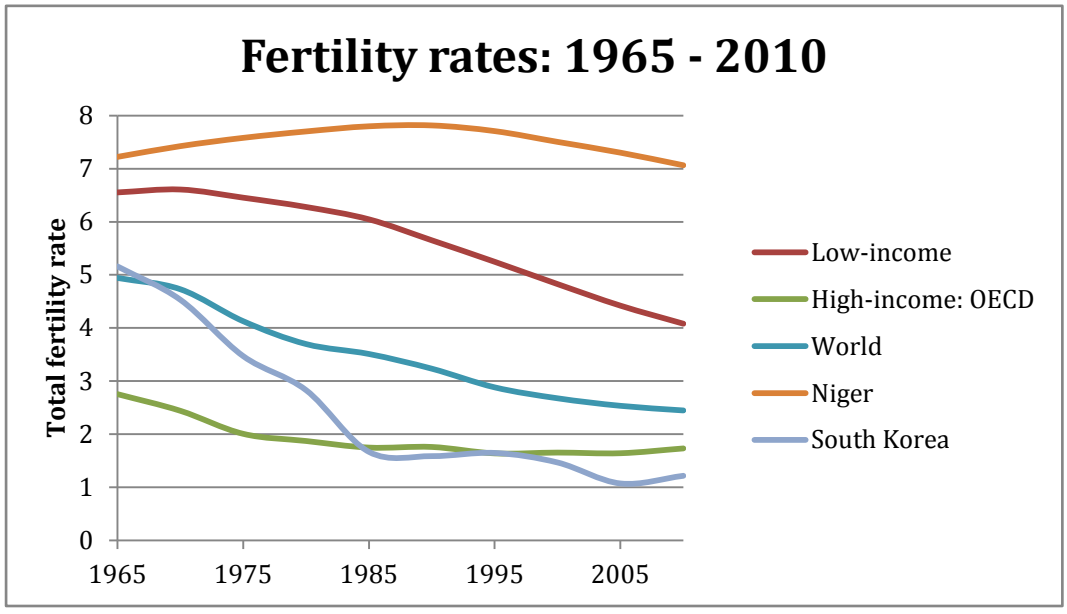


Figure 1: The change in fertility rates across the world
Source: World Development Indicators, World Bank, 2012

fertility rates of 6.34 and 6.15 respectively. Fertility rates so dramatically above the replacement rate are referred to as the 'demographic trap' as they seriously hamper social and economic development through diminishing capital amounts per person (World Bank, 2010; Sachs, 2005, p. 64 & p. 247). Although, on average fertility rates in low-income countries have fallen in last decades, the negative effects of the demographic trap are persistent, due to decreasing mortality rates and hence lower replacement rates.

Low fertility rates can have enormous effects on society through demographic change. There will be fewer young adults to care for the elderly, public expenditure on healthcare and pensions will increase significantly, while these costs need to be funded by a in number declining base of tax-paying people (OECD, 2007; Meier & Wrede, 2005). Furthermore, domestic savings might shrink and the workforce will become older and hence less adaptable (OECD, 2007). High fertility rates on the other hand are disadvantageous for the economy as it reduces the number of people of working age per capita and GDP per capita (UNPD, 2009; Sachs, 2005, p.64). Moreover, if fertility rates are reduced in high birth rate countries, higher per child investment in health and education are possible by both the family and government, leading to a higher accumulation of human capital, which is in turn beneficial for the economy (UNPD, 2009). Finally, a lower fertility rate can help to drastically increase the very low female workforce participation rates in these countries (Sachs, 2005, p 87.).

Due to these disadvantageous effects of very high or very low fertility rates, it is of uttermost importance that fertility rates should fluctuate around the replacement level. This importance is further stressed when the fact is considered that very high fertility rates as well as very low fertility rates are self-reinforcing. Due to the cumulative momentum of birth rates, as for instance fewer children today imply fewer childbearing women in 25 years, countries can become trapped in a vicious circle of a decreasing or an increasing population (OECD, 2007; Adsera, 2004, p. 5). This self-reinforcing property of fertility rates not only makes them difficult to reverse, it also signifies that deliberate policy action needs to be taken in order to adjust too high or too low fertility rates. Thus, all countries should adopt measures to control their fertility rate, as this will be utility maximizing for its people.

In recent years we have seen countries that deliberately and successfully introduced policies to boost or temper their fertility rates, such as France, Denmark, and Bangladesh, however more progress can be made. Governments can adopt direct policies that financially stimulate childbearing such as child allowance or subsidized education and childcare, or financially penalize childbearing in stead such as the one child policy in China. There are, however, also policies that indirectly affect fertility rates.

For the 34 OECD countries, public social welfare expenditure has increased tremendously over the last 50 years and in 2010 the average reached 22% of GDP (OECD, 2012). In these same countries the total fertility rate (TFR) plummeted from 3.08 in 1965 to 1.82 in 2010. At the same time, most low-income countries that have not adopted social welfare policies this extensively have remained with TFRs well above replacement levels. Do social welfare policies affect fertility rates? Several studies have shown that social security policies indeed have a significant effect on the total fertility rate of a country

(Boldrin et al, 2005; Juurikkala, 2007; Cigno & Rosati, 1996; Cigno, Casolaro & Rosati, 2002). These studies, however, have been limited in their scope, mainly focusing on the effects of pension systems on fertility. This while the questions whether other social welfare policies also affect fertility rates and if so to what extent are left unanswered. Therefore the following three research objectives will be addressed:

> *1. Do social welfare policies have a reducing effect on the total fertility rates of countries?*
> *2. Which of four policy areas of social welfare, namely old-age benefits, sickness benefits, unemployment benefits or public expenditures on education, have the greatest impact on fertility rates?*
> *3. Do the effects of these different policy areas on total fertility rates differ across countries with relatively high or relatively low fertility rates?*

First the fertility incentive assumption will be discussed, which is made in conducting the research Thereafter a theoretical background of relevant theories and previous studies will be presented, explaining the cost, benefits and externalities of childbearing and presenting arguments for causal relationships between social welfare policies and fertility. In order to address the stated research objectives the multiple ordinary least squares (OLS) regressions will be applied on data for a large cross-section of both developing and developed countries acquired from the World Bank World Development Indicators and a dataset compiled by Burgoon. The analysis will start with determining the lag of the effect of social welfare policy on TFR. In order to address the first research objective, the effect of social welfare spending on TFR will be examined while controlling for GDP per capita. The effects of the four disaggregated policy areas will be examined next, addressing the second research question. Finally all countries will be split into three TFR groups to examine the effects of the policies in low, normal, and high fertility countries. The results will be presented, interpreted, and implications for future policy will be discussed. In the analysis a clear distinction will be made between countries with relatively high and low fertility rates. Finally conclusions will be drawn and recommendations for future research presented.

2. Theoretical framework

2.1 Model assumption: economic vs. altruism

There are basically two major theories distinguished in the human drive for childbearing, one focusing on intergenerational altruism, the other emphasizing economic motives. The first approach founded by Barro in 1974 holds the assumption that individuals are motivated to have children by a special form of intergenerational altruism, also referred to as dynastic altruism (Michel, Thibault & Vidal, 2004, p. 5). Intergenerational altruism states that individuals have an "altruistic concern for their children, who in turn have altruistic feelings for their own children, and so on" (Michel et al., 2004, p.5). Individuals experience, according to Barro, is an inherent drive for childbearing as this can been seen as a continuation of their own life (Boldrin et al., 2005, p.4). This assumption is the

basis for the fertility model, developed by Barro and Becker in 1989 (Boldrin et al., 2005).

The other theory is much more economic in nature and thus holds very different assumptions about intergenerational altruism and intergenerational transfers. In this theory, developed by Caldwell in 1978, the assumption is made that children care deeply about their parents' utility and therefore will support their parents with adequate old age provisions (Boldrin et al., 2005, p. 3 & 4). The drive for individuals to have children in this approach is attributed to the economic motivation of old age security. In stead of an inherent caring for the continuation of their own life and family, this model states the less romantic motivation of old age transfers from child to parent being the main factor influencing childbearing decisions. Boldrin and Jones developed this approach into a fertility model in 2002 (Boldrin et al., 2005).

The influential article "Fertility and social security" by Boldrin et al. (2005) tests these two theories by exploring which of the two above mentioned models is consistent with the empirical findings, focusing on the negative correlations between social security provision and fertility. Boldrin et al. (2005) conclude that the Barro and Becker model of fertility, relying on intergenerational altruism, is inconsistent with the empirical findings as the effect of government social security expenditure on fertility is very small. The effect on fertility with the model by Boldrin and Jones, however, is "sizeable" and consistent with empirical findings, as this model is able to explain 80% of the observed variation between government social security expenditure and fertility rates in a broad cross-section of countries (Boldrin et al., 2005). Further evidence to support the economic old age security incentive is presented through the fact that a change in government social security expenditures has a much bigger effect on childbearing incentives in poorer households. The considerable negative effect that improved accesses to savings instruments, and higher rates of return on savings have on fertility, is another supporting argument for the economic approach (Boldrin et al., 2005, p. 35). This implies that economic considerations are stronger than altruistic ones, which is clearly supported by the fact that low-income countries which are lacking adequate public pension schemes have higher fertility rates.

2.2 Costs & benefits of childbearing on family level

Given the above assumption, stating that economic considerations is a stronger incentive for childbearing, it is important to quantify the costs and benefits of childbearing at the individual family level. It is essentially impossible to define the precise costs of a child to its parents. Measurements differ greatly on the type of costs and countries that are being considered (OECD, 2007). However these costs considerations play a pivotal role in the standard model used by economist to explain childbearing decisions. The basic implication of this model is that birth rates will fall as the costs to childbearing increase (OECD, 2007). The costs to childbearing are manifold such as expenses on food, childcare, education, clothing and housing, which are referred to as direct costs to childbearing. Besides these direct costs there are also indirect costs present in childbearing. These indirect costs refer to diminishing salary and career prospects as parents reduce working hours or quit their jobs in order to care for their children (OECD, 2007). The OECD (2007) acknowledges the frequently used estimation that "the

additional consumption necessary to support a child at the same standard of living as before is around 32% of gross household income in the case of one child and around 27% in the case of two children".

The benefits of having children on the other hand are also substantial. When the assumption is made that children will care about their parents' utility, childbearing can be an effective future investment (Miyazaki, 2011, p 2; Boldrin et al., 2005). If the parental income may decrease or completely diminish due to old age, sickness, unemployment or whatever other reason, the children can provide the necessary safety net in order to maintain their utility. Childbearing hence, can be seen as an investment in securing future income to the parents. In low-income countries, where safety nets are not adequately provided, this benefit to childrearing is much larger than in high-income countries with decent safety nets in place.

It is important to stress that the kind of costs and benefits of childbearing, including their amplitude, differ greatly across countries, especially when comparing developed and developing nations. As expenses on childrearing increase proportionately with income (Lino, 2011, p. 10), while the benefits are left unchanged, it can be stated that generally in low-income nations the costs of childrearing are lower while the benefits are equal, when compared to high-income nations.

2.3 Costs & benefits of childbearing on national level: externalities of childbearing

As stated before, relatively high and low birth rates can have a significant negative impact on national welfare. This situation can emerge when a difference exists between social en individual optimal fertility rates. The occurrence of a difference in nationwide and individual valuation of childbearing can be attributed to the externalities of childbearing (Lee & Miller, 1991). Examples of positive externalities of childbearing are among others: future taxes to be paid by a new adaptive workforce and cost sharing for public goods and social infrastructure over an increased tax base (Lee & Miller, 1991). Negative externalities of childbearing are among others: increased public costs for education, pensions and healthcare, a reduction in per capita value in forms of collective wealth as well as a reduction of wages and per capita incomes in the future (Lee & Miller, 1991). Externalities such as these can justify government policies that aim at to influence TFR for the better.

2.4 Effects of social welfare policies on fertility

Governments can influence fertility rates directly with policy measures that provide financial incentives to stimulate or depress childbearing. However, the effect of these policies is difficult to measure accurately, because they are implemented only in countries, which have either too low or too high fertility rates. Heavily subsidized childcare, for instance, might only be found in countries with very low fertility rates. However, this high negative correlation between childcare benefits and fertility rates certainly does not imply a certain causal relationship. This study focuses on the side effects of social welfare policies on fertility, not generally intended to influence birth rates. The reason is that significant proportions of government budgets are being spent on these policies and the effects on fertility rates are not yet adequately quantified.

There are many ways through which social welfare policies affect TFRs. Social welfare and expenditure is defined by the OECD, International Monetary Fund (IMF) and World Bank as

> *"the provision by public (and private) institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer."* (OECD, 2011, p. 10)

In such social welfare spending inter alia includes the following government expenditures: basic assistance to poorer families, unemployment compensation, non-contributory pension, public healthcare spending, housing subsidies, and public expenditure on education (Lindert, 2004, p.6).

The general theoretical hypothesis in this study is that as the extensiveness of social welfare policies increases, total fertility rates (TFR) will fall. Figure 2 depicts this relationship.

Figure 2: The effect of social welfare policy on TFR

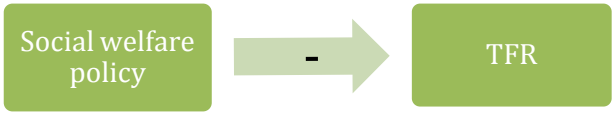
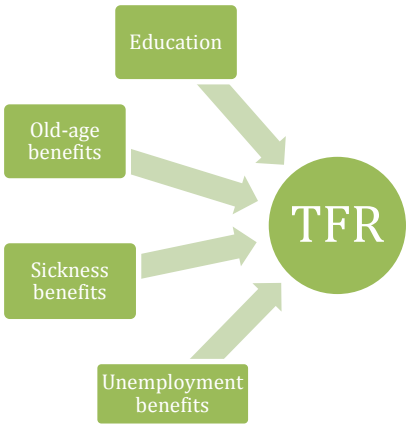


Figure 3: Disaggregated effects



Social welfare policy is a generic term for a huge set of distinct policy areas, and through many of these policy areas social welfare policy affects TFR. This study will focus on the disaggregated effects on TFR of four separate social welfare policy areas, namely old-age benefits, sickness benefits, unemployment benefits, and public expenditure on education (see figure 3). Old-age benefits, sickness benefits, and unemployment benefits are three sub measures of total social security. In the following section an in-depth theoretical framework will be presented exemplifying the effects of those four policy areas on TFR, and propose hypotheses for each. The hypotheses for old-age, sickness and unemployment benefits will be merged into one hypothesis as they are theoretically very closely linked. For education expenditure a separate hypothesis will be presented. Thereafter the effect of two other policy areas, namely public expenditure on healthcare and female labor force participation promoting policies will be discussed. All theoretical effects described in the following section combined, thus provide a theoretical understanding for the negative relationship depicted in figure 2.

2.5 Social security: old-age, sickness, and unemployment benefits

As stated above, the old-age security motive for having children is an important incentive for childbearing, especially for low and middle class families (Boldrin et al, 2005; Meier & Wrede, 2005). The reasoning behind the old-age security motive is as follows: in absence of a large social state, the family provides a safety-net, making sure that the family's elderly will receive adequate support if necessary. Providing abundant public pensions, effectively externalizes the value of having children, and thus they impose a net tax on childbearing (Juurikkala, 2005, p.53). The old-age security motive for childbearing is much stronger when the economic future is uncertain. This is the case with for instance underdeveloped capital markets, high inflation and poor implementation of and compliance with property rights, situations that are often observed in developing nations (Juurikkala, 2007, p.53). If you receive a public pension the security incentive fades, as you are ensured of a steady old age income. This results in two negative effects on TFRs, namely the substitution effect and the free-rider effect. The first effect states that as the economic motivation for childbearing is reduced a large family is no longer needed for old-age income and in such this should lead to a decline in TFRs (Juurikkala, 2007, p. 53). The free-rider effect addresses that with the externalization of the value of childbearing, individuals will decide not to have children themselves but instead free-ride on the children of others, as they will fund the public pension schemes. Hence, childbearing becomes economically penalized by the averse incentives, and unnecessary for old-age security (Juurikkala, 2007, p. 53). This negative effect of public pensions on fertility rates leads to the insolvency of the pension schemes, especially when pay-as-you-go schemes are involved. Ample previous studies have studied this negative effect of old-age benefits on fertility rates. Boldrin et al. (2005) concluded for example that the significant differences in fertility rates between the United States (US) and Europe can be largely attributed to the difference in pension schemes, which are much more extensive in Europe. Boldrin et al. (2005, p.25) have estimated with their econometric model that if pensions system size increases from 0% tot 10% of GDP the TFR will fall with a minimum of 0.7 and maximum of 1.6. Furthermore Cigno and Rosati (as cited in Boldrin et al., 2005) conclude that pension coverage has a highly significant negative effect on fertility rates in all countries studied, namely Germany, Italy, the UK and the US. Ehrlich and Kim (as cited in Juurikkala, 2007, p. 54) also report that higher pensions taxes have a negative and significant effect on fertility, and conclude that this effect is strongest in less-developed countries (LDCs) in accordance with the above theory. A solution to this side effect of pensions is suggested by Meier & Wrede (2005). They conclude that the incentive for childbearing can be internalized into the pension schemes by incorporating direct transfers from child to parent and a purely fertility related component into the pension formula. This will dramatically raise economic incentives to have children, while also encouraging parents to invest in their children's education, as part of their pension will depend on their children's income (Meier & Wrede, 2005, p. 17). In such it can be concluded that, due to the old-age security motive, old-age benefits will negatively affect TFRs.

Moving on to the effects of sickness and unemployment benefits, it is expected that those two policy areas have a negative impact on fertility rates as well. In compliance with the old-age security motive, individuals will bear

children in order to ensure themselves a safety net in case serious sickness or unemployment reduces their income. If sickness and unemployment benefits are publicly well provided, it externalizes this positive effect of childbearing, indirectly penalizing having children, resulting in lower fertility rates. The effects of sickness and unemployment benefits on fertility have so far not yet been studied.

On theoretical grounds old-age benefits are assumed to have strongest effect on TFR, while unemployment benefits will have the weakest effect. Due to the inevitability of growing old, everybody who does not expect early death therefore needs old-age income. On the other hand there is a significant smaller probability of getting long-term unemployed, may or may not be due to sickness. Therefore old-age benefits are expected to have the largest negative effect on fertility rates. Due to the tendency of individuals to be self-assured in their working capacity, and thus in such avoiding unemployment, I expect unemployment benefits to have smallest effect. Individuals tend to have little influence on falling seriously sick, and due to this higher degree of uncertainty, sickness benefits are expected to have second largest negative effect on fertility rates. From this the following hypothesis can be drawn:

H1: The total fertility rate will be negatively influenced by an increase in the availability of old-age benefits, sickness benefits, and unemployment benefits, ordered by decreasing size of effect.

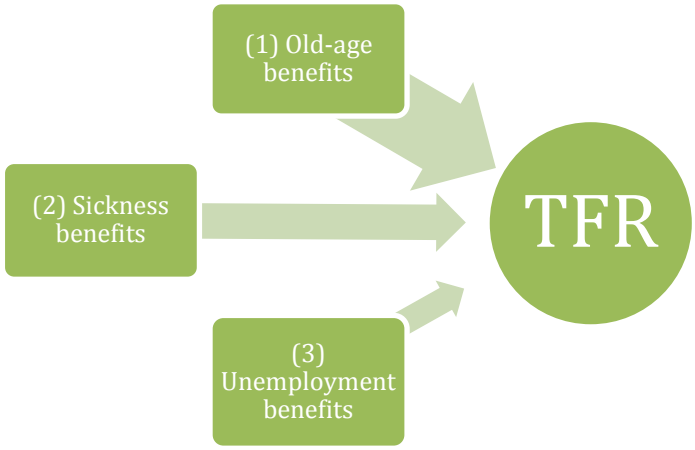


Figure 4: Social security effects on TFR
Ordered by decreasing size of effect

2.6 The effect of public education expenditure

The degree of education in a country theoretically has both positive and negative effects on TFR. An increase in effective expenditure on public education in general, results in higher national educational attainment for men, but more interestingly also for women (Jeffrey & Basu, 1996). So how does this affect fertility? Jain (1981, p. 590) concludes that in all of the eleven countries he studied, female education at the individual level is associated with a decrease in fertility rates, although magnitudes vary across countries. In some cases the effect is curvilinear: (small) increases in female education shortly, positively effects fertility before the effect turns negative. Nonetheless, in general it can be stated that female education negatively effects fertility (Jain, 1981, p. 591).

However, this outdated article presents only part of the rather complicated relationship.

Higher female educational attainment results in higher female labor force participation (Sachs, 2005, p. 87). How does this effect fertility rates? Increased female participation in the labor force results in a trade-off between having children in favor of less time-demanding alternatives (Butz & Ward, 1979). Due to a demanding job, women have simply less time to care for children. Adding to this, the higher educational attainment of women leads females to growing economic aspirations and the desire to become financially independent. In OECD countries this actually resulted in the fact that women ranked parenthood as less important among their life goals as previously (OECD, 2007). Furthermore increased female labor force participation leads to a postponement of childbearing. Although this does not necessarily result in fewer children, for many women this will eventually be the result (OECD, 2007). The total period that a woman can have children is shortened, and as procrastination is a thief of time, this will decrease TFR. Resulting in a lower number of children than initially planned and desired. Furthermore as women grow older they become less fertile (OECD, 2007). Thus, increased female labor force participation should lead to lower fertility rates.

In contrast with this theory the traditional relationship reversed for the, relatively richer and more developed, member countries of the OECD from the 1980s onward, turning the correlation between female labor activity and fertility positive (Adsera, 2004, p. 2). Adsera (2004, p. 22) concludes that this reversal is due to the desire of obtaining financial security before childbearing, as having children can have serious negative income effects. An exit from the labor market due to childbirth incurs an intertemporal loss of income that can be attributed to three factors: "forgone earnings during the time spent with the child; a lower wage growth due to forgone experience; and, finally, a potential increase in unemployment risk" (Adsera, 2004, p. 2). As the costs of childrearing in developed countries has increased significantly over the years, female employment now positively affects fertility in those countries. Institutional variations of labor market structures and fertility rates in Southern Europe, Northern Europe, and the US can further explain this contradiction. In Southern Europe, high unemployment rates and fixed-term and unstable contracts depress TFRs as women postpone and abandon childbearing as it may strongly reduce lifetime income and increase unemployment risks (Adsera, 2004, p. 22). On the other hand, in Northern European countries the presence of both large public sectors where female employment is relatively large and the mandatory provision of generous maternity leave benefits, accommodates a high female labor force participation level (Adsera, 2004, p. 23). In this way Northern European countries have managed to retain or boost fertility levels to just under the replacement level. In the US such policies are not in place, but the labor market is so flexible that the re-entry in the labor market after childbearing is likely and therefore the TFR is retained at 2.1 (Adsera, 2004, p. 23; World Bank, 2010). Thus, in high-developed nations expenditure on public education can lead via an increase in female labor force participation towards an increase in fertility.

On the contrary in low-income, high fertility rate countries the effect of female labor force participation on TFR is as it was for OECD countries before the

80s: negative (Martin, 1995; Dreze & Murhti, 2004). This is the case as the expected costs to childbearing are lower, expenditure on children rises with income, and the benefits higher, more need for a child provided safety net, in low-income countries. In such the financial security motive, as pointed out by Adsera (2004), is less influential in the childbearing decision process in low-income, high fertility countries. Hence, available time for childrearing is a more decisive factor than financial security in these countries, turning the relationship between public education, which leads to increased female labor force participation, and fertility negative.

Beside the effect of education via female labor force participation, public expenditure on education theoretically also reduces the costs of children. As the costs for education decrease, the total costs of childrearing decrease equivalently, which may result in higher fertility rates. It is expected, however, that this effect is much smaller than the effect via female labor force participation, as education costs decrease only very gently with additional public expenditure and childrearing costs only partly consist of educational expenses.

In conclusion, the relationship is twofold: an increase in education expenditure and thus in female labor force participation in high-income, low fertility nations will have a positive effect on TFR, while it will negatively affect TFR in low-income, high fertility countries.

H2: Expenditures on education affect TFR positively for high-income, low fertility countries and negatively for low-income, high fertility countries

Figure 4: The effect of education on TFR in low/high income countries
(FLFP = female labor force participation)

2.7 Female labor force participation & healthcare

Besides expenditure on education, female labor force participation is affected by social welfare policy in several other ways. Welfare states often promote gender equality by: employing relatively more women in government functions, subsidizing childcare, advocating part-time functions, and implementing liberal maternity leave programs (Adsera, 2004, p.2). This further intensifies the above-described effect of female labor force participation on fertility in countries with extensive social welfare policy.

Public expenditure on healthcare will have, ceteris paribus, a negative effect on mortality in general, and, of more importance in this case; it will reduce infant mortality. The decreasing infant mortality rates result in a larger proportion of children turning into adulthood. This means that for every child born, the probability of the child to reach income-generating years, and hence the ability to cover any old-age, sickness or unemployment related costs towards its parents, increases. Thus, better healthcare that leads to lower infant mortality rates, infers that less children are needed to obtain the same economic security. Thereby the desired number of children per couple will reduce and in such increased public expenditure on healthcare should generate lower fertility levels. However, empirical evidence on this matter is mixed. Although Boldrin et al.

(2005) do find a negative relationship between healthcare and fertility; this relationship is not statistically significant. Furthermore some economist argue that it might boost fertility rates as public healthcare reduces the costs of pregnancy, as well as the mental strain associated with it (Juurikkala, 2007, p. 53). The effect of healthcare expenditure on TFR is ambiguous and further research will be needed to create a decisive conclusion on this matter.

Summarizing the above a third and last hypotheses can be drawn, stating the effect of the extensiveness of social welfare policy in general on TFR. Although the last sub-effects are either, positive, negative or ambiguous, in general the previous negative effects are expected to be dominant.

H3: Increasing the extensiveness of social welfare policies will negatively affect TFR.

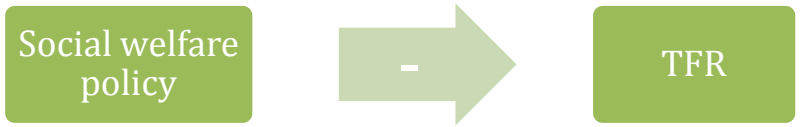
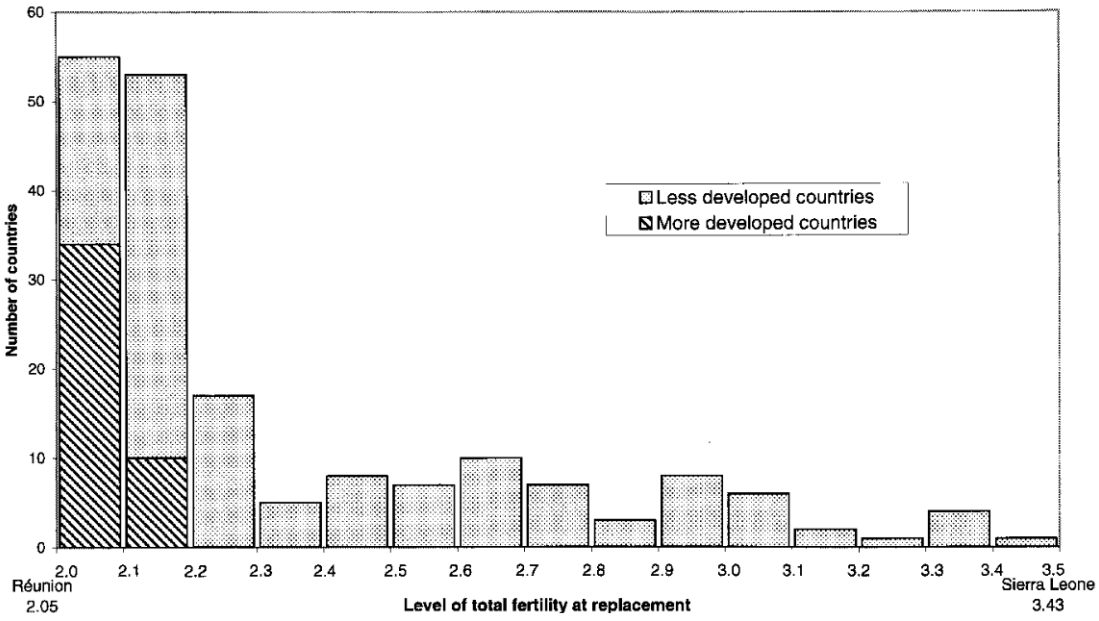


Figure 5: The effect of social welfare policy on TFR

2.8 Population replacement rates and expected lags

The general public and even some experts frequently, but incorrectly, assume that the population replacement rate approximates an average of 2.1 births per woman for every country (Espenshade et al., 2003). In reality the worldwide replacement rate ranges from 2.05 in Réunion to a staggering 3.43 births per women in Sierra Leone, as depicted in figure 6. This difference can almost entirely be attributed to differences in mortality rates across countries (Espenshade et al., 2003). In countries with high mortality rates fewer women will survive to the mean age of the fertility schedule, hence more children are to



be born in order to keep the population constant (Espenshade et al., 2003). In developed regions the average replacement rate is 2.1, while in less and least developed regions the fertility rate at replacement is 2.37 and 2.75, respectively. The world average replacement rate is 2.33 (Espenshade et al., 2003).

In order to find valid results it is important to determine the lag of the effect of social welfare on fertility rates. Boldrin et al. (2005) did not consider a lag and used equivalent years, as social welfare policy does not tent to change considerably in short time frames. However, Fenge & Scheubel (2010) conclude that, even though an immediate effect is noticed after introduction of a pension scheme, the effect is considerably bigger after 10 years. For the three policy areas concerning social security an optimum effect is expected after 10 years, while for education expenditure a considerably longer lag of 15 years is anticipated. As education has the greatest fertility effects through influencing today's children's future childbearing, the lag is substantially larger. Children in education today, ages ranging between 4 and 12 years old, will be approaching their childbearing years in 15 years.

3. Methodology

3.1 Introduction

In the following paragraphs the data and method used in this cross-section cross-country study will be discussed. The aim is to assess for a large set of nations, the impact of social welfare policies on the total fertility rate and to examine the amplitude of the affects on TFR of the disaggregated social welfare policies old-age-benefits, sickness benefits, unemployment benefits, and public expenditure on education. Lastly analyses will be made to check whether the effects of those policies will differ in countries with either relatively high or low fertility rates.

3.2 Data

In order to run the OLS regressions data from two datasets are combined, namely the World Development Indicators compiled by The World Bank and a dataset compiled and used for several publications by Burgoon. Both datasets contain a large number of countries, 214 and 198 respectively, which allows to test the impacts of social welfare on TFR for both developing and developed nations. Due to missing data on certain variables the number of countries used in the analyses varies greatly from only seven to 120. However, for all significant affects high-, middle-, and low-income countries are included in the analysis.

3.3 Dependent, independent & control variables

The dependent variable, total fertility rate (TFR), refers to "the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates" (World Bank, 2010). Quinquennial TFR data from 1965 up until 2010 is used.

The six independent variables used throughout this study are (1) social welfare expenditure, (2) index of old-age benefits, (3) index of sickness benefits, (4) index of unemployment benefits, (5) index of social security benefits, and (6) government expenditure on education. For expenditure on social welfare policies (1) the average of social security and welfare expenditures from 1990 until 1995 are used. This data is on a scale from 0 to 1, where 0.1 means 10% of GDP is spent on social security and welfare policies. Burgoon has computed the index variable 'old-age benefits' (2) by creating a latent variable out of four

quantifiable and relevant variables. These are: months of contributions or employment required for normal retirement by law, percentage of the worker's monthly salary deducted by law to cover old-age benefits, percentage of the pre-retirement salary covered by the old-age cash-benefit pensions and the difference between retirement age and life expectancy. The index variable of sickness benefits (3) is composed of: months of contributions or employment required to qualify for sickness benefits, percentage of the worker's monthly salary deducted by law to cover sickness benefits, percentage of the salary covered by sickness cash-benefits for two months of sickness, and waiting period for sickness benefits. The index of unemployment benefits (4) consist of: months of contributions or employment required to qualify for unemployment benefits, percentage of the worker's monthly salary deducted by law to cover unemployment benefits, percentage of the salary covered by unemployment benefits for one year of unemployment, and the waiting period for receiving unemployment benefits. All these index variables have a scale of 0-1, where 0 represent no benefits and 1 represents highest possible benefits. The index of social security (5) is an aggregation of the three above-described indexes, and ranges from 0 to 3. All social security data is from the year 1995. The independent variable on education (6) measures government expenditure on education in '90 as a percentage of GDP. Public education expenditure data from 1990 are used and compared with TFR of 2005, as a lag of education expenditure on TFR is expected to be 15 years. An attempt was made to construct an index variable for education by combining variables such as enrollment in primary, secondary or tertiary education with government expenditure, as these variables more directly measure the effects education has on TFR. However, this failed, as these variables did not measure the same concept due to an insignificant correlation among the standardized values.

In order to test the validity of the hypotheses in the cross-country regression analysis, a statistically control for GDP per capita at the year of the TFR data is included. The GDP per capita data is measured in constant 2000 US$. GDP per capita influences both the extensiveness of social welfare policies and the fertility rate. Countries with a higher GDP per capita are richer and often have better tax systems. Therefore these countries have the means to spend relatively more on social welfare policies. Higher GDP per capita means a higher productivity, resulting in less available time for childrearing and thus negatively influencing TFR. Controlling for GDP per capita, thus, will filter out the non causal correlations between the independent variables and TFR. Thus, while controlling for GDP per capita, a smaller but more accurate effect of social welfare policies on TFR is to be found.

3.4 Procedure

In order to examine the three above stated hypotheses, a multiple ordinary least square (OLS) regressions will be implemented. In order to determine the lag of the effect of social welfare policies on TFR, the effects of the average social welfare spending between '90 and '95 on TFRs for quinquennial years will be analyzed. Having found the optimum lag, the control variable GDP per capita will be added to the model in order to filter out the real effect of social welfare policy on TFR and improve the explained variance of the model. The disaggregated social welfare effects of education and old-age, sickness, and unemployment

benefits will be analyzed next. OLS regressions will be computed using data from 1995 for the old-age, sickness, and unemployment benefits indexes and TFRs of 2000. For public education expenditure data of 1990 is used in comparison with TFRs of 2005. This same procedure is being repeated when the data set is split in three groups: countries with fertility rates lower than 2, between 2 and 2.5, and above 2.5. This will provide insight in whether social welfare policy areas will have desirable or undesirable side effects.

4. Results

4.1 Determining the lag

To determine the lag of social welfare policy expenditure on TFR multiple cross-national regressions were run to compare the effect of the average social welfare spending between '90-'95 and the TFR of different years. The results are presented in table 1. The table shows that the effects are significantly negative for every year. It is striking, however, that the effect and explained variance grows stronger the more historical the fertility rate we compare it with. This growth in effect continues until the TFR of 1980 after which the effect slowly diminishes.

Table 1: Determining the lag of the effect of social welfare policies on TFR

	TFR '85	TFR '90	TFR '95	TFR '00	TFR '05	TFR '10
Social welfare spending	-27.98** (2.83)	-25.35** (2.80)	-22.99** (2.68)	-20.47** (2.60)	-17.76** (2.52)	-15.13** (2.37)
Constant	5.41	4.99	4.56	4.20	3.82	3.60
R^2	.46	.51	.40	.36	.31	.27
N	115	112	115	114	115	115

* $p < 0.05$ ** $p < .01$ (two tailed)

How can this be explained? Statistically controlling for GDP per capita did not make a difference as it negatively influenced the effect for all years with roughly equal amounts (+/- 40%). It is very plausible that countries implement comparable extents of social welfare policies in for instance 2000 and 1980, as political dynamics do not tend to alter this fast. In fact, running bivariate correlations between social welfare expenditures in all the years between 1975 and 2000 result in correlations between .89 and .99, which are significant at the 0.01 level for all years. This can explain similar effects of social welfare policy on TFR for previous years but it cannot explain the increasing effect. There are two possibilities: either the data are coincidently biased causing this increased effect or there must be an additional reversed effect of TFR on social welfare policy expenditures. This last option seems to be the case as Entwisle and Winegarden (1984) conclude that the relationship between pension programs and TFR is best explained as a model of mutual reinforcement. The idea is that a lower fertility rate leads to relatively more elderly in the population, which in turn will lead to more resources directed to pension programs. Entwisle and Winegarden (1984) state that the effect is small but significant, as a reduction of 1 child per female will eventually add 0.60% to the pension share of GDP. This reasoning can be extended to healthcare expenditures and sickness and unemployment benefits as the elderly disproportionately use these services. To test this hypothesisan OLS regression was done with average social welfare spending between '90-'95 as dependent variable and the TFR of '80 as independent

variable. The effect is small but significant at the 0.01 level (two tailed tested). If the TFR will fall with 1 child per woman, than the social welfare spending as % of GDP will increase with 0.017% (SD=.002, R^2=.50, N=115).

This can explain why the effect of the average social welfare spending between '90 and '95 on TFR increases in strength even when TFRs of before 1990 are being considered. High correlations among all years of social welfare spending, together with the mutual reinforcing feature of the relationship between social welfare spending and TFR, results in the observed values. As the effect of TFR on Social welfare policy is not being studied, a 5-year lag for all social security policies on total fertility rates will be considered. This is shorter than the 10-year lag Fenge and Scheubel (2010) proposed, however, their model was based on newly introduced pension schemes. The observations are mostly based on changes in existing welfare policies. Because of this difference, together with the stronger effect observed with a 5-year lag it was decided to reject the 10-year lag and adopt a 5-year optimum lag instead. For education expenditures the 15-year lag will be retained.

4.2 Controlling for GDP per capita

Table 2 shows the results of adding the control variable GDP to the model. As expected statistically controlling for GDP per capita decreases the effect of social welfare spending on TFR. Thus GDP per capita positively influences social welfare policy extensiveness and negatively influences TFR. Adding GDP per capita as a control variable also increases the explained variance of the model by 0.06. While controlling for GDP it can be stated with 95% confidence that if social welfare spending increases with 1% the total fertility rate will decrease with a rate between 0.05 and 0.19. In the coming regression analysis we will therefore control for GDP per capita. Based on these results it is concluded that H3 is in fact correct: social welfare policies negatively affect TFR.

Table 2: Controlling for GDP per capita

	Model 1	Model 2
Social welfare spending	-20.47** (2.60)	-12.45** (3.49)
GDP per capita		-5.38e-5** (0.00)
Constant	4.20	4.28
R^2	.36	.42
N	113	113

* p < 0.05 ** p < .01 (two tailed)

4.3 Determining the effects of the disaggregated policy areas on TFR

In figure 7 the scatterplot of TFR vs. the index score on social security is presented. In Appendix B scatterplots for the other four policy areas can be found, all show clear negative associations. In table 3 the regression results of education expenditure, and old-age, sickness, and unemployment benefits are presented. All disaggregated policy areas show negative and statistically significant

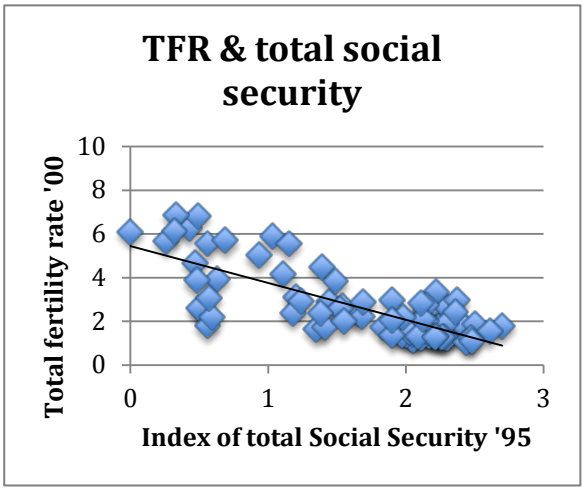


Figure 7: Scatterplot of TFR vs. social security

effects on TFR. Old-age benefits have the strongest effect, where a move from no benefits to the maximum possible index score reduces TFR with 3.72. As sickness benefits and unemployment benefits have the second and the third strongest effect, with -2.98 and -1.84 respectively, it can be stated that H1 is correct as well. A 1% increase in expenditure on education decreases TFR with 0.13. This is, however, true for all countries, developed and developing. To test H2 a distinction between high and low fertility countries will need to be made. This will be done in the next paragraph. In the 5th model all variables are entered. This does not result in any significant results and the explained variance is extremely low, as the N is relatively small for 5 independent variables.

Table 3: Determining effects of different social welfare policies on TFR

	Model 1	Model 2	Model 3	Model 4	Model 5
Old-age benefits	-3.72** (1.29)				0.001 (.90)
Sickness benefits		-2.98** (.99)			-.76 (.86)
Unemployment benefits			-1.84* (.81)		-1.79 (.97)
Education expenditure				-.13* (.060)	.011 (.063)
GDP per capita	-3.7e-5*	-4.5e-5**	-8.6e-6	-6.2e-5**	-1.2e-5
Constant	5.00 (.69)	5.03 (.81)	3.31 (.62)	3.84 (.28)	3.93 (1.08)
Adjusted R^2	.25	.24	.099	.22	.026
N	80	67	52	120	41

* p < 0.05 ** p < .01 (two tailed)

4.4 Are there differences in effects for countries with high or low TFR?

Table 4 presents the results for the four policy areas and the social security index for countries with a TFR of below 2.0, while table 5 presents the effects for countries with a TFR of 2.5 and above. The N for countries with healthy TFRs, ranging between 2 and 2.5, was too small (varying around 10) to obtain any relevant and significant results, and were thus is left out.

Social welfare policy in general has no significant effect on countries with a TFR of below 2. The aggregated effects are mixed. Old-age benefits displays an unexplicable insignificant positive relationship, while sickness and unemployment benefits do associate negatively but statistically insignificant as well. The index variable of combined social security has the strongest negative effect. However, as it is statistically insiginificant (p=0.055), it is rejected. Therefore, this study finds no support for the proposed adaptation of pension schemes by Meier & Wrede (2005) to incorporate a child benefit or even a direct transfer from children to parents into the pension formula, as no significant depressing effect of old-age benefits on TFR is found. The positive relation expected between public education expenditure and the TFR in low fertility countries, however, is found.

Although the effect is small, it is statistically significant at the 0.05 level, and the explained variance is relatively high. An increase of expenditure on education with 1% will boost fertility rates with 0.059 in countries with low TFRs. Hence the results of this study imply that low fertility countries can boost their TFR by increasing expenditure on education.

Table 4: The effects for countries with a low TFR (<2)

	Model 1	Model 2	Model 3	Model 4	Model 5
Old-age benefits	.36 (.39)				
Sickness benefits		-.39 (.32)			
Unemployment benefits			-.62 (.48)		
Combined social security				-.28 (.14)	
Education expenditure					.059* (.028)
GDP per capita	7.88e-6*	9.32e-6*	1.02e-5**	1.12e-5*	1.17e-5**
Constant	1.15	1.65	1.81	1.92	1.00
Adjusted R^2	.16	.20	.22	.23	.49
N	40	37	37	38	23
* p < 0.05 ** p < .01 (two tailed)					

Moving on to the analysis of countries with a TFR of above 2.5, the regressions point out that a statistically significant negative effect of social security and welfare expenditures on TFR is found. The disaggregated policy areas all show highly negative and statistically significant effects, except for unemployment benefits where unfortunately missing values diminish the N to a minimum. The scatterplot in Appendix B shows that this is probably due to the

Table 5: The effects for countries with a high TFR (>2.5)

	Model 1	Model 2	Model 3	Model 4	Model 5
Old-age benefits	-4.63** (1.65)				
Sickness benefits		-3.89* (1.62)			
Unemployment benefits			-.48 (.96)		
Combined social security				-1.42** (.29)	
Education expenditure					-.16* (.065)
GDP per capita	-1.19e-4	-7.80e-5	1.58e-5	4.40e-5	-7.86e-5**
Constant	6.39	6.46	2.90	5.62	4.35
Adjusted R^2	.29	.21	-.13	.47	.17
N	38	28	13	41	82
* p < 0.05 ** p < .01 (two tailed)					

fact that most low-income, high fertility countries have no unemployment benefits in place. An increase of 33⅓% on the combined variable index of social security will for instance decrease TFR with 1.42 children per woman

For education expenditure a statistically negative effect is found, as a 1% increase of expenditure decreases fertility with .16 children per women. Hence H2 is confirmed: in developed, low fertility countries increasing public expenditure on education improves fertility rates, while it depresses them in developing, high fertility countries. It can be further noted that the depressing effect for high fertility countries is about three times higher than the boosting effect for low fertility countries. In contrast to the effects of low fertility countries, controlling for GDP per capita is statistically insignificant in high fertility countries. By examining the scatterplot of GDP per capita in 2000 vs. TFR in 2000, provided in appendix C, it can be seen that there is little variation in the very low GDP per capita rates for high fertility countries. Running single regressions for high fertility countries for the effect of GDP per capita on TFR and the three social security policy areas concludes that GDP per capita does exhibit a negative significant effect on TFR. But the effect on the three old-age, sickness, and unemployment benefits indexes are not statistically significant. This explains why GDP per capita is not a significant control variable for high fertility countries. To conclude, high fertility countries can effectively decrease their TFR by expanding social security, through old-age and sickness benefits. An increased expenditure on education can also be an effective tool to reduce fertility, while simultaneously improving educational attainment and hence economic opportunities for the individual.

5. Conclusion

In the majority of countries too high or too low levels fertility rates exist, resulting in future economic and social problems. In Europe, parts of Asia, and other developed countries low fertility rates cause serious problems of an ageing population, such as exponentially growing healthcare costs and the looming insolvency of pensions schemes. On the other hand, high fertility rates in developing countries sustain the demographic trap and diminish capital per capita, which seriously hampers socio-economic development. Adjusting fertility rates, thus, should be an important policy aim for the majority of countries.

This study assessed the effects of social welfare policies on total fertility rates (TFRs) by comparing World Bank data for a large set of both developed and developing countries. Controlling for GDP per capita, it is concluded that the extensiveness of social welfare policies in general negatively affect TFRs, as a 1% increase in social welfare spending will depress TFR by 0.12 children per woman. Furthermore the disaggregated effects of four social welfare policy areas, namely public education expenditure, and old-age, sickness, and unemployment benefits, all negatively affect TFRs. The old-age benefits have the strongest and unemployment benefits have the smallest effect when comparing the three social security policy areas. These observed effects could mainly be explained by the old-age security motive. When public social security is provided, the benefits of childbearing are externalized while the costs are left unchanged.

Of great interest are the differing specific effects of these social welfare policies in countries with either high or low fertility rates. Although significant negative effects of social welfare policies are observed when comparing all countries, when specifically focusing on relatively low fertility countries the effects are mixed. The general effect of social welfare on TFR is insignificant and of the four disaggregated policy areas only expenditure on education has a significant and positive effect. A 1% increase in public expenditure on education results in a 0.06 higher TFR in low fertility nations. In high fertility countries introducing or expanding old-age benefits and sickness benefits as well as increasing expenditure on education negatively affects TFR. The expected negative and positive effect of education on TFR for low- and high-income countries is thus confirmed. Based on the results of this study it can be concluded that in order to obtain sustainable fertility rates, both high and low fertility countries should increase public education expenditures and high fertility countries should introduce or expand social security benefits.

6. Discussion and recommendations

The results help to strengthen and deepen our contemporary understanding on the relationship between social welfare policy and fertility rates. In order to improve existing results or expand our knowledge the following can and should be undertaken in future research.

Beside the indirect effect of social welfare policy, the effects of direct policy measures, such as the one-child policy in China and subsidizing childcare, should be thoroughly studied in future research. In order to adequatly boost or temper fertility rates it should be clear to governments what the size of the effects of certain policies are on fertility rates and how these differ across countries.

Further research should be carried out in order to develop our understanding of the mutual reinforcing effect of TFR and social welfare expenditures. Knowing the precise effect of fertility rates on future social welfare spending can also purify our understanding of the effect in the opposite direction. A comprehensive model recognizing mutual reinforcement of the two variables might in that case be possible to develop.

In order to quantify the effect of public education expenditure on TFR in high-income countries with more precision, future research should integrate a variable to control for maternal friendly policy. As stated earlier in high-income countries income security is an important factor in the childbearing decision process. Adsera (2004) states than in Northern Europe, Southern Europe and the US very different situations are existent concerning maternal leave possibilities. Either controlling for these differences or studying these different regions separately will yield more precise information about the positive effect of education on TFR in these high-income countries.

Several studies have shown that decommodification is a better, more holistic variable to measure the impact of social welfare policy (Burgoon, 2006; Allan Scrugs, 2006). The concept of decommodification was first adopted by Esping-Andersen (1990) and he defines the concept as a “degree to which individuals, or families, can uphold a socially acceptable standard of living independently of market participation” (Esping-Andersen, 1990, p. 37). The

considerable advantage of the decommodification index over social welfare expenditures as a percentage of GDP is that it actually measures the outcome of social welfare policies. In such, a bias obtained through cross-country differences in effectiveness of implementation of social welfare policies is filtered out. Decommodification is particularly useful for measuring the effect of social security policies, as it measures the actual social security experienced, instead of the money spent on social security benefits. Unfortunately the decommodification index is only available for a very limited set of 18 developed nations. An expansion of this index to a larger set of developed countries might be able to produce a statistically significant negative relationship with TFR. An expansion towards a more worldwide representative index could also further test the obtained results for developing nations.

Furthermore, data collection on social security policy extensiveness worldwide, and especially for developing countries, could be further enhanced. The new Aspire: Atlas of social protection database is a great move forward. However, there are still ample missing values and only few recent years of usable data available. Improvements on the collection and administration of data on these topics could seriously enhance future research.

Throughout this study the total fertility rates provided by the World Bank have been used. However, there exists a more precise and more informative fertility rate, namely the adjusted total fertility rate (adjusted TFR). The conventional total fertility rate is built up out of two components: the *tempo*, or timing of fertility and the *quantum*, or level, of fertility (Bongaarts & Feeney, 1998, p. 272). The tempo component affects TFR when the timing of childbearing changes. When childbearing is postponed, such that the mean age of childbearing increases but the number of children per woman remains unchanged, TFRs shows temporarily lower rates for years of postponement. When the mean childbearing age decreases TFRs will temporarily show higher rates. In such the tempo component reflects the expansion or shrinkage of the interval between generations, during which more or less births will fall into a calendar year (Bongaarts & Feeney, 1998, p. 285). This tempo effect can temporarily bias TFRs for countries experiencing a changing mean age of childbearing. In order to obtain a better indicator of the quantum, or level, of fertility, which we are mainly interested in, Bongaarts and Feneey (1998) developed the tempo-adjusted TFR. Using both measures in future research could determine the effect of social welfare policies on the real average number of children born per woman. Furthermore it could determine whether certain policies might have a tempo effect on fertility by affecting the average age of childbearing. Unfortunately the adjusted TFR is not been widely adopted due to the lack of female childbearing age information for certain countries and heavy disagreement on the method of correctly computing the adjusted TFR for different countries and situations (Kim & Schoen, 2000, p. 559).

Concluding from this study several policy recommendations can be inferred, such as increased spending on education in both high and low fertility nations and introducing unemployment benefits and old-age benefits in high fertility countries. However this study used very general data, and additional country-specific research needs to be conducted before an adequate policy judgment can be made. Furthermore, as mentioned before, situations of high or low fertility rates are self-reinforcing due to the cumulative momentum of birth

rates and therefore policy implementation on this issue should be handled with great precaution. The endeavor is to balance nations fertility rates around a delicate, desired equilibrium, where slightest change in cultural, economic, religious, or other social factors could disrupt this attempt. Great timing of policy implementation combined with sound future projections is required in order to successfully influence fertility rates for the better.

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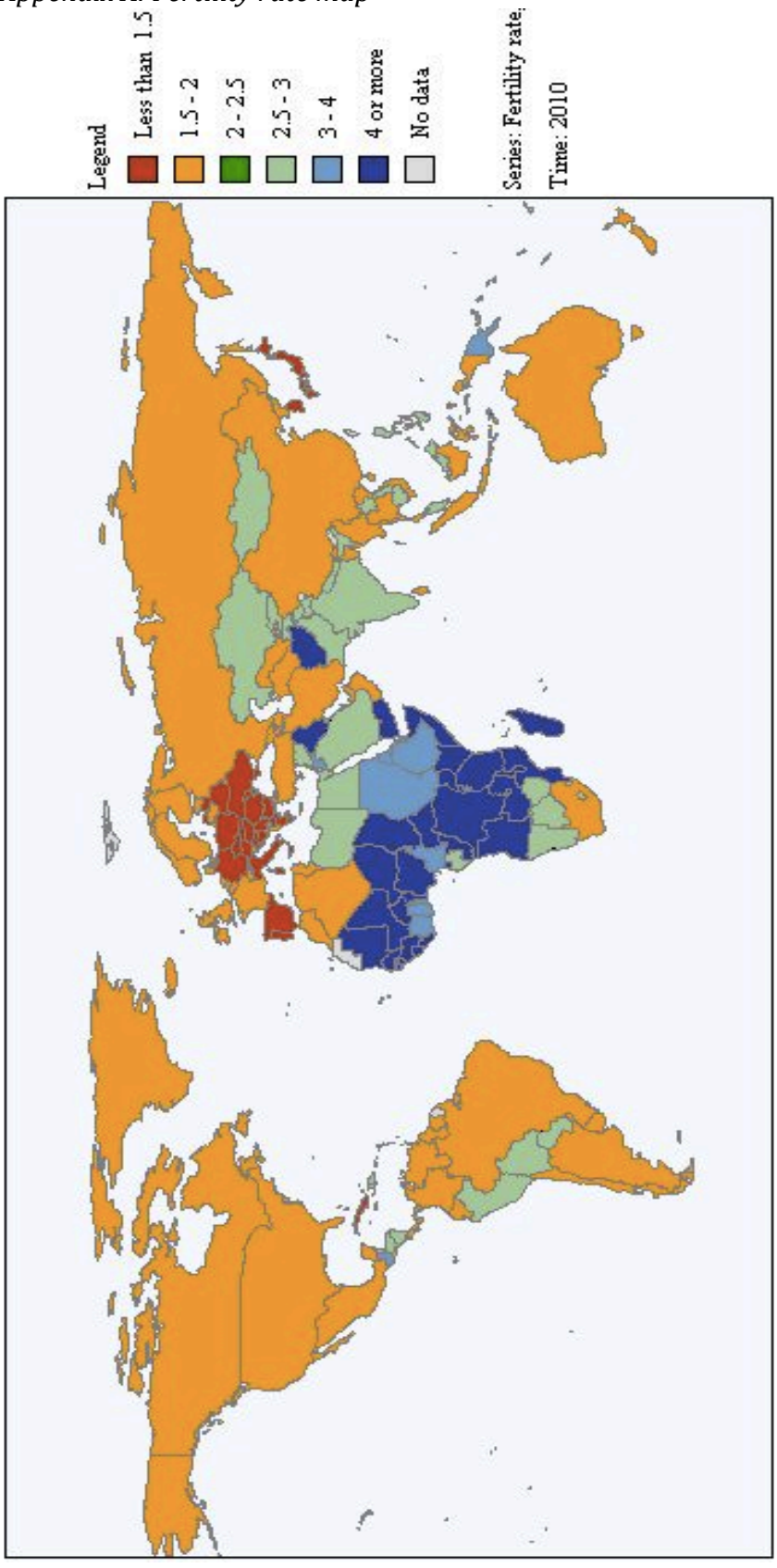
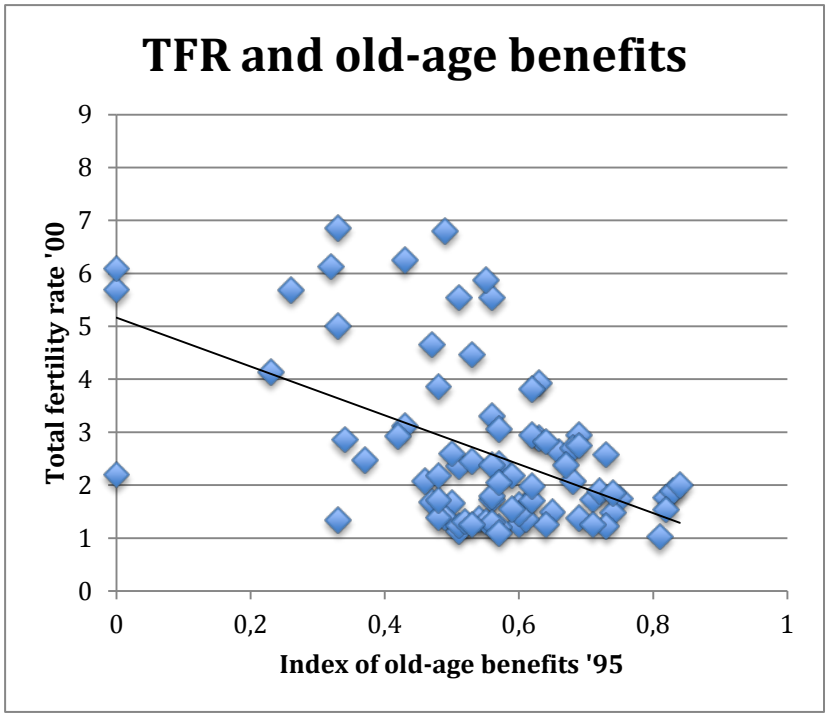
8. Appendices

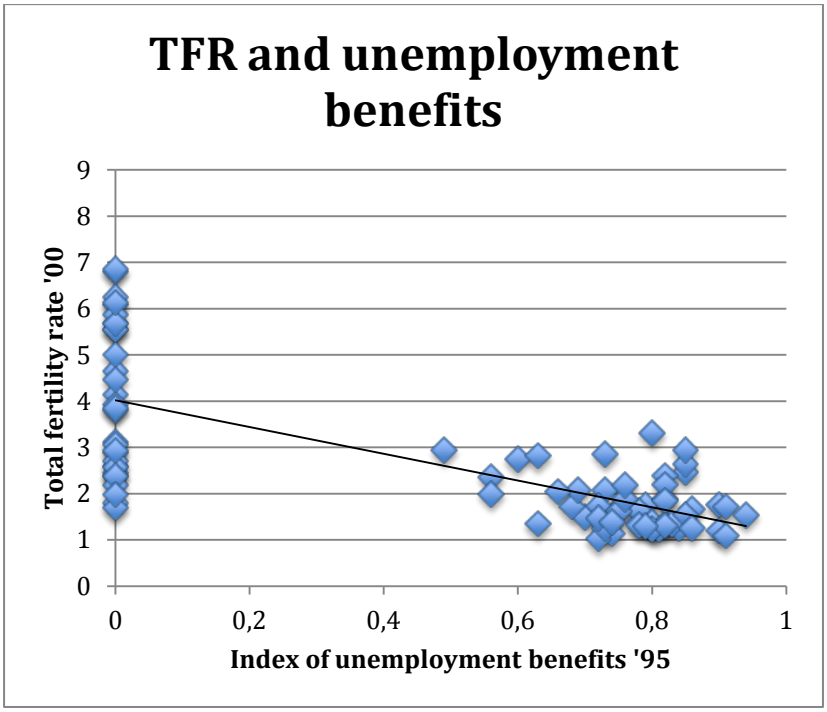
8.1 Appendix A: Fertility rate map

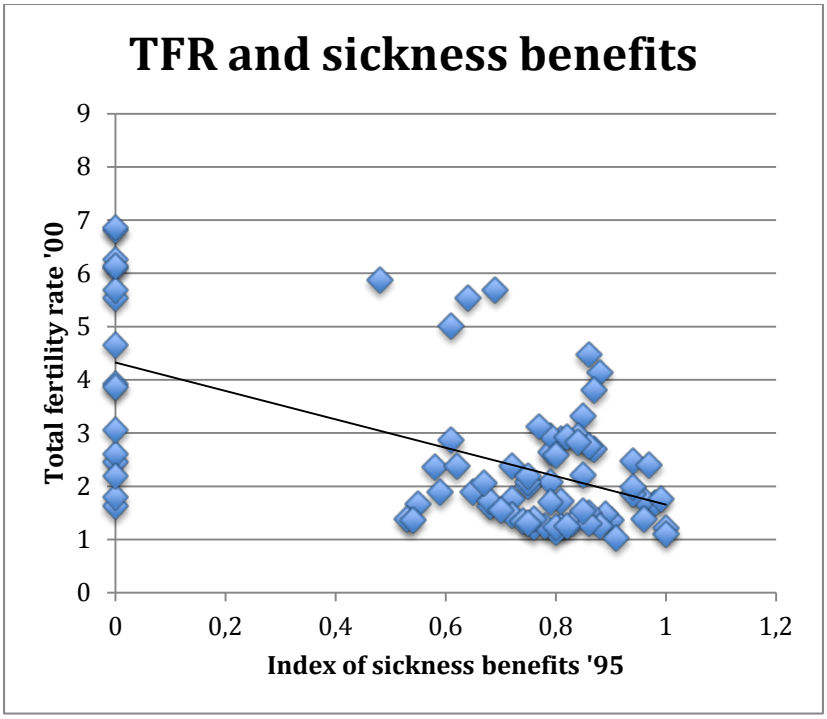


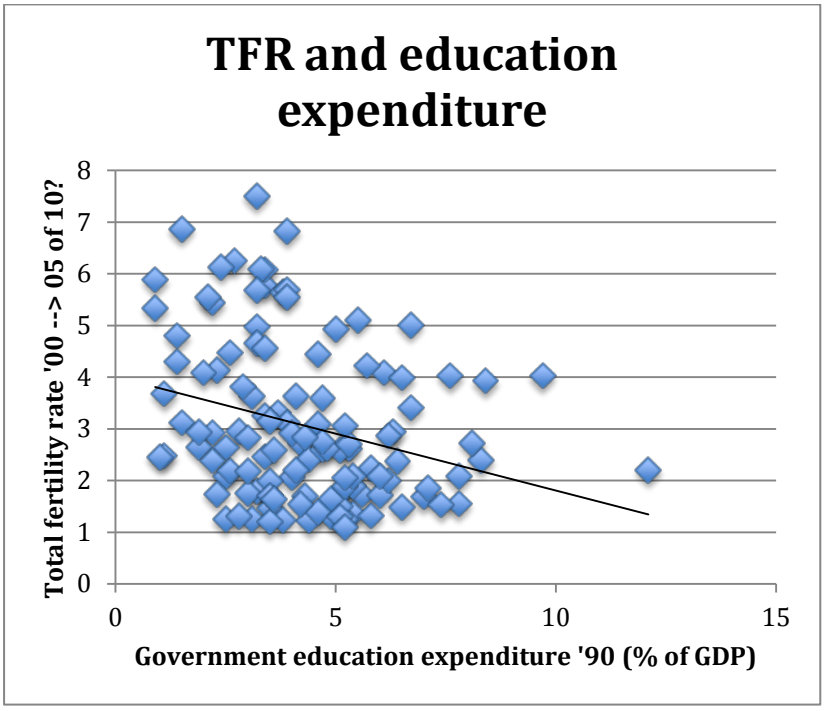
Source: World Bank World Development Indicators, 2010.

8.2 Appendix B: Scatterplots of the four aggregated effects vs. TFR

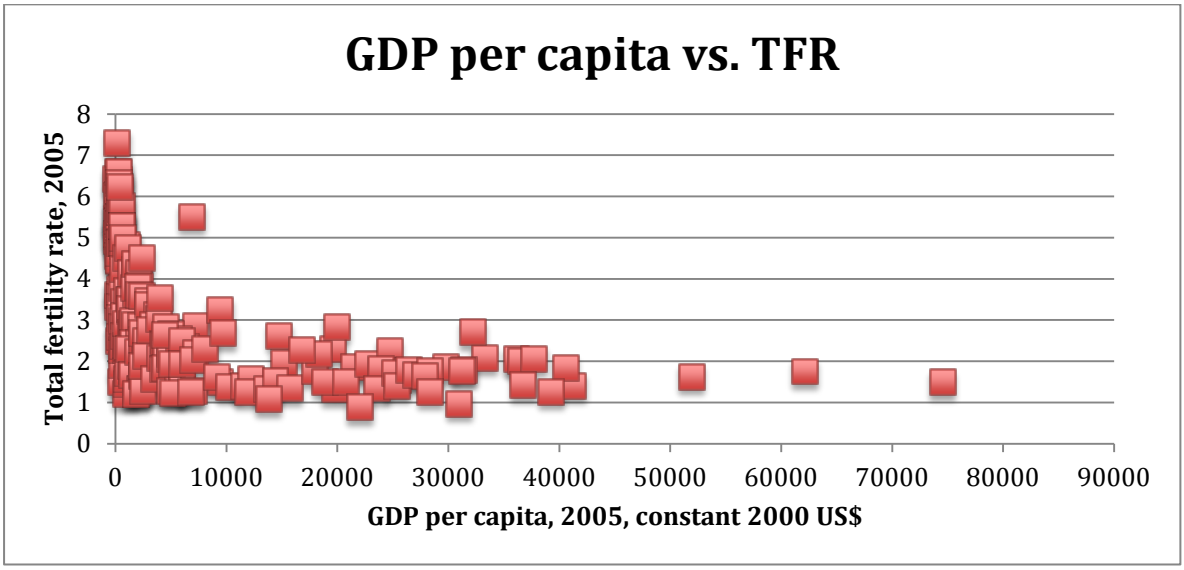





TFR and sickness benefits
Total fertility rate '00
9
8
7
6
5
4
3
2
1
0
0
0,2
0,4
0,6
0,8
1
1,2
Index of sickness benefits '95


TFR and education expenditure
Total fertility rate '00 --> 05 of 10?
8
7
6
5
4
3
2
1
0
0
5
10
15
Government education expenditure '90 (% of GDP)

8.3 Appendix C: Scatterplot of GDP per capita vs. TFR



8.4 Appendix D: Codebook

CountryName	List of all countries and specified regions on which data is available.
CountryCode	Three letter codes for the country according to the ISO 3166-1 alpha-3 as published by the International Organization for Standardization.
TFR65 – 10	Total fertility rate, represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates. Source: World Bank, World Development indicators, 2012
GDPpc65 -10	GDP per capita, is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant U.S. dollars. Source: World Bank, World Development indicators, 2012
WBedu65 – 10	Public expenditure on education, consists of current and capital public expenditure on education includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other privates entities). Source: World Bank, World Development indicators, 2012

Welf75 - 00	Social welfare spending as a percentage of GDP. Source: dataset compiled by Brian Burgoon.
Socsec91 – 95	Social security and social welfare spending as a percentage of GDP. Source: dataset compiled by Brian Burgoon, data extracted from Feng et al., 1999.
Socsecav	The average of the social security and social welfare spending over the period 1990 until 1995, as a percentage of GDP. Source: dataset compiled by Brian Burgoon, data extracted from Feng et al., 1999.
Old_age_	A score from 0 to 1 for the year 1995, measuring the difference between retirement age and life expectancy. Source: dataset compiled by Brian Burgoon.
Old_cont	A score from 0 to 1 for the year 1995, measuring months of contributions or employment required for normal retirement by law. Source: dataset compiled by Brian Burgoon.
Old_sala	A score from 0 to 1 for the year 1995, measuring the percentage of the worker's monthly salary deducted by law to cover old-age benefits. Source: dataset compiled by Brian Burgoon.
Old_cov_	A score from 0 to 1 for the year 1995, measuring the percentage of the pre-retirement salary covered by the old-age cash-benefit pensions. Source: dataset compiled by Brian Burgoon.
Index_ol	An index variable combining Old_age_, Old_cont, Old_sala, and Old_cov, to measure the total available old-age benefits, on a scale form 0 to 1. Source: dataset compiled by Brian Burgoon.
Sick_con	A score from 0 to 1 for the year 1995, measuring months of contributions or employment required to qualify for sickness benefits. Source: dataset compiled by Brian Burgoon.
Sick_sal	A score from 0 to 1 for the year 1995, measuring the percentage of the worker's monthly salary deducted by law to cover sickness benefits. Source: dataset compiled by Brian Burgoon.
Sick_day	A score from 0 to 1 for the year 1995, measuring the percentage of the salary covered by sickness cash-benefits for two months of sickness. Source: dataset compiled by Brian Burgoon.
Sick_cov	A score from 0 to 1 for the year 1995, measuring percentage of the salary covered by sickness cash-benefits for two months of sickness. Source: dataset compiled by Brian Burgoon.
Index_si	An index variable combining Sick_con, Sick_sal, Sick_day, and Sick_cov to measure the total available sickness benefits, on a scale form 0 to 1. Source: dataset compiled by Brian Burgoon.
Unem_con	A score from 0 to 1 for the year 1995, measuring months of contributions or employment required to qualify for

	unemployment benefits. Source: dataset compiled by Brian Burgoon.
Unem_sal	A score from 0 to 1 for the year 1995, measuring percentage of the worker's monthly salary deducted by law to cover unemployment benefits. Source: dataset compiled by Brian Burgoon.
Unem_day	A score from 0 to 1 for the year 1995, measuring the the waiting period for receiving unemployment benefits Source: dataset compiled by Brian Burgoon.
Unem_cov	A score from 0 to 1 for the year 1995, measuring the percentage of the salary covered by unemployment benefits for one year of unemployment. Source: dataset compiled by Brian Burgoon.
Index_Un	An index variable combining Unem_con, Unem_sal, Unem_day, and Unem_cov to measure the total available unemployment benefits, on a scale form 0 to 1. Source: dataset compiled by Brian Burgoon.
Index_Socialsec	An index variable combining Index_ol, Index_si, and Index_Un to measure total available social security, on a scale form 0 to 3. Source: dataset compiled by Brian Burgoon.
Enrol1965 – 2010	Adjusted net enrollment, represents the number of pupils of the school-age group for primary education, enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group. Source: World Bank, World Development indicators, 2012
ZWBedu95	Standardized value of WBedu95
Zenrol1995	Standardized value of enrol1995
TFRrec05	Recoded total fertility rate values in three value groups. Value 1= TFR < 2, value 2= TFR: between 2 and 2.5, value 3= TFR > 2.5. Avaialable for the years 1980, 1990, 1995, 2000, 2005, 2010.
LogGDP00	Computed log value of the GDP per capita rate of 2000.
GDPpcrec80	Recoded GDP per capita of 1980 in two value groups. Value 1= low-income country with GDP below 1000 US$, value 2= middle & high income country with GDP above 1000 US$.