



LUND UNIVERSITY

School of Economics and Management

Master programme in Economic Demography

## The Relationship between Family Policies and Total Fertility Rate in East Asian countries, 1995-2009

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*Abstract: East Asia has experienced a substantial decline in fertility over past few decades. Japan and Korea touched lowest level of fertility, which is 1,26 and 1,08 children per woman respectively in 2005. However, Taiwan continued to decline until 2010 when the fertility rate was 0,90 children per woman. Population growth is also declining steadily in these countries. Population loss has already started in Japan and soon it will begin in Korea and Taiwan. Ratio of population aging is increasing gradually. These countries have also experienced rapid economic growth, in parallel increased female education, high female labor force participation remarkably. Governments of East Asian countries implemented different family policies to cope with fertility decline issue. The investments of government expenditure per capita on family policies have been increasing over time. Our objective, in this thesis, is to determine significance of these policies on fertility. There are numerous factors, which influence childbirth decision. In this study, we investigate how these policies effect fertility decision while supporting working parents. We also take into account traditional social culture to analyze its impact on these policies. We use aggregated data for Japan, Korea and Taiwan period from 1995 to 2009 and regression analysis is performed to answer chosen hypotheses.*

*Key words:* Fertility, Family Policies, East Asia

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## 1. Introduction

The purpose of this paper is about changes in fertility rates and ongoing fertility decline to below replacement level in East Asian countries. We are particularly motivated to examine the impact of family policies on total fertility rate, which are developed and initiated in response to below replacement level fertility rates in that region. These policies includes, entitlement of maternity or parental leaves, direct financial transfers, and benefits in kind including spending on of childcare services.

In contemporary time, many women have less or no children. The fertility rate or decision to have a child is affected by several factors, for instance, women education and their labor force participation, easy access and use of contraceptive, delay in marriages or no marriages, high standards of living that increased the cost of living and the economic conditions.

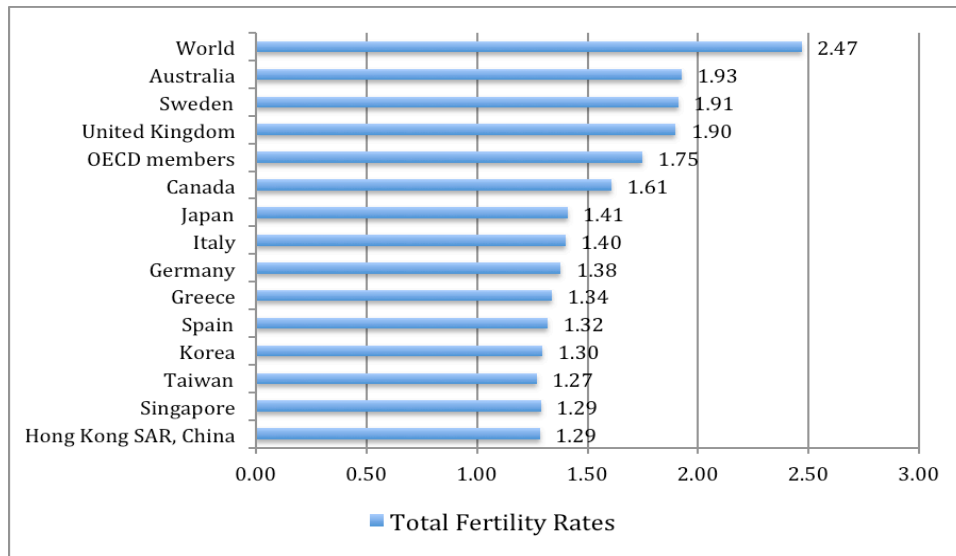
A trend of decline in fertility rates is observed in most OECD countries since 1970, with differential pace of decline. Considering, Nordic and English speaking countries where fertility decline was observed earlier, are now stabilized and reversed, while in other countries where the fertility transition started later, fertility rates dropped just with in a few decades and currently these countries are generally at bottom level (OECD ,2003), however East Asian countries altogether are experiencing lowest fertility rates.

Figure 1, displayed total fertility rates of selected countries of Nordic; English speaking, western European and East Asian region. The situation in East Asian countries looks serious and urgent. It is therefore; many East Asian countries government took specific initiatives or considering taking specific measures, to address low fertility issue.

Our focus will remain to three East Asian countries Japan, Republic of Korea and Taiwan, China. (For the linguistic simplicity, hereafter we will use Korea for Republic of Korea and Taiwan for Taiwan, China). Considering, their economic success, social and culture context they have been clustered in same regime of East Asian welfare model (Gough, 2002) The uniqueness of the regions also motivate this study to investigate the significance of policy measures adopted by these countries to cope with low fertility issue.

Hong Kong SAR China, Singapore are also experiencing the low fertility, however the unavailability data is an important factor, which limit us to focus on three selected countries in East Asia countries.

**Figure 1. Total fertility rates of selected countries, 2012**



Source: World Bank, *Fertility Rates, Total (Birth per woman)*

For Taiwan data is taken from Ministry of Interior.

<http://data.worldbank.org/indicator/SP.DYN.TFRT.IN>

The spectacular economic growth and modernization are attained by these countries in the past half century, for a very short period of time, though issues related to low fertility rates and population ageing have been started to be realized and considered as an obstacle for further economic growth and development.

The consequences of low fertility are widely discussed in research literature and acknowledged at institutional and government level. Japan is the first country among East Asian nations that experienced industrialization and economic development and also confront the negative effect on age structure on its economic development therefore; Japanese government initiated policies to cope with the issue of low birth rates in early 1990s (Suzuki, 2012). Korea announced comprehensive policies to encourage high birth rates in 2005. Taiwan implemented policies which are intended to improve fertility in 2006. Though these efforts have not come up with any noticeable improvement in fertility rates even after twenty years since policies were implemented (OECD, 2011), similarly Korea and Taiwan are still standing among countries which have lowest-low fertility rates.

Modernization generally came up with the economic, social and cultural changes in industrialized countries, issue of low birth rates had become and experienced by almost every industrialized country. However these changes had occurred in East Asian countries in different manner than of those of other OECD countries.

In Europe, the industrialization and economic development emerged and grew in a very prolong manner, in addition changes developed in age structure comparatively over long time frame. Therefore these countries had sufficient time to be prepared to handle such issues.

In East Asia the fertility decline and the changes in population structure took place over a very short period of time, which made difficult to realize and initiate comprehensive polices to deal with the problems ignited by change in population structure.

A national Family Planning program is also considered one of the main reasons for the current low fertility rates. This program previously were associated with family polices. In Japan family planning policies were promoted as the part of mother and child health that were basically aimed to control the population growth with in the framework of reproductive heaths and rights. Japanese government encouraged people to have small family size and allow abortion for the economic reason (Chiu and Wong, 2009).

Likewise, in Korea the aggressive family planning program were initiated in 1960 aimed to control rapid population growth, which legalized abortions and provide free services that increased widespread use of contraceptives. (Foreit, Koh and Suh, 1980)

In Taiwan, National family planning program were implemented in 1960s, which strongly effected fertility rates and slower down the rate of increase in population growth and brought Taiwan in the lowest fertility ranking. Although social and economic advancement contributed important role in decline in fertility but national family program expedite it these three countries.

East Asian countries are also defined as family –reliant welfare states and they share the Confucian culture(Goodman & Peng, 1996). Taking care of children and elderly relatives is the integral part of their family structure. Families have key role to provide social welfare services instead of government.

These changes in social attributes considered as negative signal for traditional social structure and alarming for the sustainability of the state. Nevertheless, these countries see two or more children as the ideal number of the children parent should have which reflect that these countries still believe that families are centered by children (OECD ,2013 )

These countries have experienced rapid economic growth almost at same period. In parallel a significant increase in education, especially female education, has also been observed. The trend of delaying marriages and the shift of mean age at first childbirth to late30s and 40s is because people want to become settled in their career first and accumulate some human capital. (Jones , 2007) which automatically shorten the chance of more children.

Boost in economically active females are not only fulfilling much needed requirement of labor supply, but also mothers have more opportunities to provide material wealth for example to their children. (OECD, 2011)

Female labor force participation in these countries has increased remarkably. By culture in East Asia, the female contribution to household responsibilities is more than male; it becomes increasingly more difficult for female to balance their employment and family role with the existence of unequal gender role at home (United Nation, 2011). Such structure may support further decline in marriages and childbearing in East Asian countries (Tsuya, Choe and Wang 2009). Although the decline in fertility to low level has been observed since many years back but no serious steps had been made by governmental level to address this issue until recent years and the fertility reached to below replacement.

Changes in these demographic attributes alarmed East Asian countries. To ensure the sustainability of economic development and perpetuity of the population of the country, governments take action to respond fertility decline. At the turn of the century East Asian countries adopted new family polices to increase fertility rates. This study is aimed to examine and analyzing

the effectiveness of the policies that have been implemented in response of low birth rates by anticipating the recent trend of low fertility rates.

### **1.1 Thesis outline**

This paper is arranged in the following manner. This first section of present and motivate the topic of research, the aim of study and describe research questions. Section two provides a comprehensive details background of East Asian low fertility, along with the recent developments in several family policies introduced by aimed to countering low fertility rates in the region. In third section is about theoretical framework and previous research where will discuss related theories and studies before presenting the hypotheses. Forth section will provide information of data and sources, which have been used in this study. Fifth section will explain methods and statistical models and description of variables used in analysis. In sixth section empirical analysis and results will be presented. In seventh and last section study findings, discussion and conclusion will be drawn.

### **1.2 Aim and Scope**

In this study we will focus on ongoing changes in total fertility rates of East Asian countries, in light of increasing investments in social polices over time, our focus will remain policies related to family polices that are related to childrearing and bearing. To analyze the efficiency of polices we used cross-country panel analysis from 1995 to 2009. Data has been collected from different reliable databases.

A detailed discussion has been done in background and theory sections before considering different factors account to explore proposed hypotheses.

East Asia is a large reign consist of many countries, however we consider three East Asian countries that is Japan, Korea and Taiwan, while the reason of not taking in to account other countries in this study is already discussed in introduction section. The significant limitation for this analysis and its results, are the data availability and methods which we used.

### 1.3 Research Questions

This thesis is an investigation into the possible relationship that exists between family policies and fertility behavior. East Asian countries provide a unique opportunity to study as they share common regime of welfare system, which may be missing from other cross country analysis, that is the common cultural background, collectively experiencing the lowest fertility rates, and in to tackle this issue they also share parallel process of development and design of family policies. The main research question will be investigated here is what is the impact of family policies (cash transfers, maternity related benefits and so forth) on fertility rates for Japan, Korea and Taiwan.

As all three countries also consider as family reliant welfare state and with the increasing female labor force participation, we will be explored whether the increasing investment in benefits in kind influenced fertility in East Asia.

Further we will also explore whether the social trends, such as marriage and rates have any influence on fertility.



## 2. Background

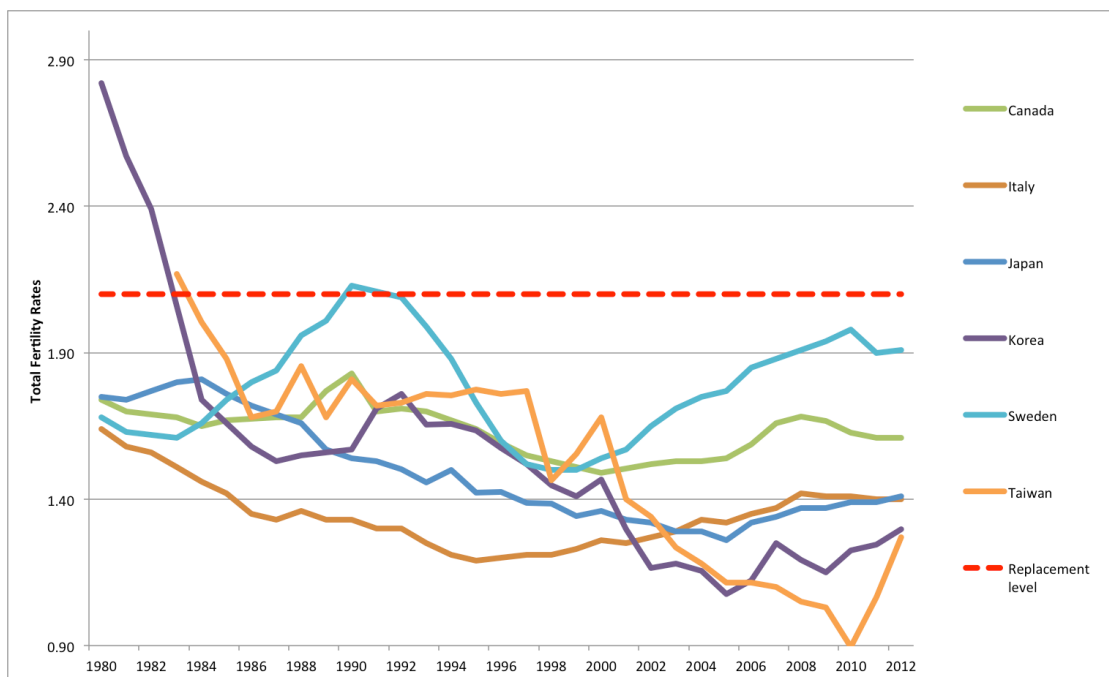
### 2.1 East Asian Fertility trends

In Asia many countries have experienced substantial decline in fertility rates since past few decades. In the beginning of 21st century, many East Asian countries had left behind the fertility level of European countries, which have total fertility rate below 1.3 children per woman. This trend of low fertility is characterized as “lowest-low fertility” by (Kohler, Billari and Ortega 2002).

According to (United Nations, 2012) estimates, altogether, there are nineteen countries in Asia that lie below replacement fertility level (that is 2.1 children per woman). During 1950-1955 the total fertility rate was 5.83 children per woman in Asia, which fell off by more than half to 2.25 children per woman in 2005-2010. The recent decline in fertility is more noticeable, and rapid in a number of East Asian countries.

As represented in figure 2, historical trend of fertility rates of high income group East Asian along with other OECD countries pertaining low fertility from 1980 to 2010.

**Figure 2: Historical trend of TFR of high income and low fertility countries, 1980-2012, Taiwan (1983-2012)**



Source: World Bank, Fertility Rates, Total (Birth per woman)

For Taiwan data is taken from Ministry of Interior.

After 1980s, most of the East Asian countries were heading towards lowest low fertility like other OECD countries, and the continual decline in fertility rates brought these countries in to their lowest level of TFR.

Hong Kong SAR China, one of East Asian country pertaining lowest fertility rates, already reached to below replacement level of fertility in 1980s, after Japan.

Japan and Korea touched lowest point of fertility at level of 1.26 and 1.08 respectively in 2005, However in case of Taiwan, fertility rates continued to decline until 2010 with fertility rates 0.90.

In 2000s gain in fertility rates was observed in most of European countries. It is the time, when East and Southeast Asian countries were at their lowest level of fertility (2004-05). Since then, modest increase is observed in East Asian countries except Taiwan, where fertility decline until 2010 and then slight recovery is observed in 2011-2012. After reaching to its lowest level of TFR, only Japan regain and maintain the level of TFR above 1.3.

In East Asia the TFR recovery is slower than in West, TFR were increasing by 0.2 and 0.3 units in many European countries, however, many East Asian countries were recovering with 0.1 unit. (United Nation 2011)

If this modest increase of fertility in East Asian countries since 2004-05 is placed, particularly in framework of the widespread increase in fertility rates in Europe since after 2003, it may intimate a more significant improvement in fertility (Goldstein, Sobotka and Jasilioniene 2009)

## **2.2 Consequences of low fertility**

Fertility in East Asian countries is at lowest among low fertility countries, if it sustained, eventually initiated the negative population momentum. This causes imbalance in population age structure and shrink the population over coming period of time due to the fact that below replacement fertility reduces the number of potential parents.

If countries continuously follow this declining fertility trend and negative population momentum prolong, it decreases the population size and intensify the ratio of aging population.

The ratio of 65 and above population is increasing in Japan, Korea and Taiwan and it is projected to increased steeply, The estimates s based on

recent trends anticipated that the in 2050 approximately more one third of the population will be in-group of elderly population. It is alarming for governments and institutions when the old age population group will increase the load on economically active population, which will be lesser in proportion in term of financial, and personal care support. Policymakers are more concern how to sustain public pension health care and other social structure in such scenario.

If below replacement fertility continues, it will ultimately reach to the population loss. Same is the case of East Asia, In 2012 fertility in Japan (1.41) Korea (1.30) and Taiwan (1.27) are below replacement and if they sustain the below replacement level of fertility all three countries will ultimately reduced by approximately one third per generation in every 30 years.

Population growth rate of the East Asian region has been declining gradually. However the trend is of population growth is slightly vary by country. The population growth rate of Japan has already turned in to negative since 2006. The growth rate has been also declining in Korea and reached to 0,42% in 2013. In Taiwan the population growth rate dropped to an average 0,18% in 2010, though it rose to an average 0,39% in 2012.

In Japan population shrinkage has already started in 2006, projections provided by (United Nation, 2008), Population loss will be begin around 2025 -2030 in Korea, Estimates in 2009 by Taiwan Council for Economics Planning and development, suggests that population loss in Taiwan will begin in 2027. The social and economical consequence are very alarming for both government and institutional level. Increase in migration is generally indicated as one of the possible solutions of population loss however, if these countries allow substantial immigration, when the one third of population is declining in each generation and if this gap is recovered by the immigrants then after two generations, foreign born will have one half share of the total population. It may not be consider realistic because political implication to changed entire population with foreign population.

The reason why government putting serious efforts on policies which are aimed to increase fertility of the region.

*Table 1: Percentage population of age 65 and above*

Years	2000	2020	2050
Japan	17.2	28.5	37.8
Korea	7.2	15.6	38.2
Taiwan	8.6	16.2	35.9

*Source: for Japan and Korea United Nations (2008,) for Taiwan Council for Economics Planning and development (2008) for Taiwan 2020 and 2050 Taiwan Council for Economics Planning and development (2009)*

### **2.3 Family Policies**

In (Neyer and Andersson, 2008), the authors argue that due to the diversity and variety of family policies related to family and well being of children, it has become difficult for authors to agree upon common definition. These policies includes, direct and indirect financial support for childbearing and childrearing, , maternity and parental leaves, arrangement of childcare and family laws.

These policies have effected families in such a way that they shaped life of families by providing education, health care facilities define the criteria of social benefits etc., in other words policies describe roles, rights and responsibilities of society. (Gauthier, 2000) categorized family policy definition into two ways according to their targeted group. First the narrow definition where family policies are entirely aimed to target families with children. These polices included, financial benefits such as cash transfers or benefits in kind, tax relief for parents with children Maternity related benefits and child care availability. Other definition, is in broader sense, includes over all well being of the society including housing, food safety, public transport facilities, elder care family law etc. , which may possible effect the family wellbeing as well. However, most research specially while studying the effect of family polices on fertility behavior, narrow definition generally been selected. (Gauthier, 1996a); (Kamerman and Kahn, 1978, 1996).

(Gauthier, 2007) suggested that these policies are used to encourage or discourage certain type of family structure by either giving favor or making unfavorable constrains which an individual can face while combining family and work roles and responsibilities. Such polices, generally have very much importance, specially when majority of women are in employment force, various policies may reduced the intensity of conflict between family and work. When policies help to maintain balance between work and childbearing responsibilities, and supported the decision to have children, any delay in childbearing may be followed by recuperation at higher age (OECD 2005).

Our discussion limited to the policies which are developed to support and impact fertility therefore, we will not cover the policies which effect other demographic determinants like , mortality, immigration and emigration.

We also limit our discussion to the policies that are structured for families with children for example cash benefits, benefits in kind and child related leaves.

## **2.4 Family polices in East Asian countries**

### **2.4.1 Government spending on family polices in East Asia Countries**

In order to examine the changes occurred over time in government spending on families and children in Japan, Korea and Taiwan, the following data represents government expenditure on cash benefits and benefit in kind expenditure per capita in USD. Data for Japan and Korea has been collected from OECD Social expenditure data. Taiwan data has gathered form National Bureau of Statistics .Conversion is been done as per OECD definition<sup>1</sup>. As defined by OECD the cash benefits included financial allowance to families, payment regarding maternity and paternity leaves and other financial benefits provided in term of cash. Benefits in kind comprised with facilities for child care services and other benefits, which receive indirectly to the families. We have not included data related to tax benefits du to the unavailability of data for Taiwan.

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<sup>1</sup> Referred formula has been picked from OECD iLibrary.

Source: [http://www.oecd-ilibrary.org/sites/gov\\_glance-2011-en/03/04/index.html?itemId=/content/chapter/gov\\_glance-2011-10-en](http://www.oecd-ilibrary.org/sites/gov_glance-2011-en/03/04/index.html?itemId=/content/chapter/gov_glance-2011-10-en)

The changes show an increasing pattern of public spending on families as table 2. describing government expenditure per capita in East Asian countries over time. In specific, each country varies by their spending on each policy type. In Japan, share of cash benefits has increased as the government expended childcare allowance in 2007, however, the benefits in kind expended with very modest increase. Unlike Japan, Korean government expanded the spending on childcare facilities, which automatically increased the share of benefits in kind. Similarly in Taiwan the noticeable expansion in services has been occurred in 2008 under Mega warmth social welfare program, which mainly expended comprehensive childcare services to overcome the family-work conflict.

The share of public spending in East Asian countries is quite below than the average spending of spending on family policies in 33 OECD countries that is 2,3% of their GDP in 2009. However, large variation exists country wise. Some countries like Ireland and Luxembourg spent high share of their GDP high as above 4% , on family policies , on other hand countries like Poland and Mexico are spent around 1% of their GDP in 2009. Generally most countries for example Ireland, Hungary , Austria , provided more cash benefits than spending on benefit in kind like Japan. Beside these countries, Iceland, Denmark and Sweden spent more on services than cash benefit likewise in Korea and Taiwan.

**Table 2 : A review of public expenditure on family policies by type, USD per capita (1995-2009)**

	Benefit Type	1995	2000	2002	2004	2006	2008	2009
<b>Japan</b>	<b>Cash Benefit</b>	47	65	83	102	126	155	166
	<b>Benefit in kind</b>	70	102	118	129	129	135	144
<b>Korea</b>	<b>Cash Benefit</b>	0,3	0,5	1,2	2,4	4,3	9,3	11
	<b>Benefit in kind</b>	8	19	27	50	138	192	206
<b>Taiwan</b>	<b>Cash Benefit</b>	10	8	12	13	17	20	32
	<b>Benefit in kind</b>	20	26	44	41	47	59	101

*Sources: For Japan and Korea OECD Social Expenditure(2013)*

*For Taiwan National Statistics Republic of China ( Taiwan)*

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### 2.4.2 Direct Financial Transfers

Like many other industrialized countries, Japan also provides different kinds of child related benefits, which support families with children.

Child Allowance and Child Rearing Allowance are two major types of cash transfers to the household and single mother respectively.

The Child Allowance is the most common and universal type of direct financial support provided to every child. This benefit was mean tested since implemented until 2010, however it has been again. Formerly, it was implemented in 1972, initially the third child of the family was eligible for this benefits afterwards changes have been made over time and then in 1994 every child below age three became eligible for this allowance, further amendments were made in 2000 by expanding child age limit up to six years. In 2006, cash benefits were increased from 5000 yen to 10,000 yen a month. According to most recent expansion of policy in 2010, currently all children under age two receive 15000 yen and children aged 3 to 12 years have been provided according to the number of births, first two births obtain 10000 yen per month and third and more children obtain 15000 yen a month.

Other type of cash benefit is Child Rearing allowance, which initially was provided to the single mothers, to support low income single parents that have income below than certain threshold and to support disable children(National Institute of Population and Social Security Research, 2011). Children should have below age 18 to receive amount of 41720 yen per month for second and third child the amount is increased by 5000 and 3000 yen a month respectively as per 2010. Another part of Child rearing allowance is provided to the families with have disable child under age 20.

Korea adopted new approach of population polices in response to continues decline in fertility in 1996, however the potential goal of those polices were to encourage society to maintain fertility levels, to tackle the difference sex ratio at birth, discouraged abortions and by increasing opportunities for woman to participate in labor force and so forth. In 2006, Korean government were alarmed by the low fertility rates and changes in other demographic behaviors an announced polices which ultimately shifted the paradigm in family policy as per universal concept. These polices are designed to cerate favorable

environment for parents for instance , expansion of maternity and childcare leaves , financial support through different subsidies cost for childrearing , daycare facilities are also subsidized according to the level of income, to encourage larger family size and more children , tax become lower for such households. In 2009 government initiated to provide children below age two, 100,000 won a month to toddlers below 1 year of low-income families. According to the most recent changes children up till age 5 received amount from 200,000 to 100,000 won a month according to their age, disability and urban -rural classification. To support and protect children Korean government also offer cash allowance for the adopted children , to handicapped children and the children who belongs to family of single parent. In Korea the cash benefits is more focused to support the low-income household with children.

Taiwan withdrew its family planning polices initially in 1992 in response of continual decline of fertility levels. These revisions are considered demographer efforts, which highlighted the consequences of low birth rates and aging population in Taiwan in 1980s (Lee, 2009) . Though family polices indented to increase fertility have not been initiated until 2006 when population policy guideline has revised and emphasized the requirement to change the social structure into favorable for the parents . the amendment in 2008 which is basically the continuation of Population Policy guidelines 2006, proposed to provide children allowance to the families have children age below six years.

### **2.4.3 Child Related Leaves Policies**

As defined by ILO maternity protection convention 2000. Employed women are eligible for at least 14 weeks of maternity leaves around the time of childbirth additionally they are also entitled for the cash benefits which should not less then two third of her pervious earning or similar amount. The basic aim is to provide this amount to ensure that these women can take care of themselves and their child during the absence of routine earning additionally their jobs are protected during the absences from work and also to ensure that they have equal access and rights of employment .



Parental leaves are also employment protected and generally they are the continuation maternal leaves are taking .

Currently all three East Asian countries providing paid maternity leaves of form 8 to 12 weeks. Though this system has taken place gradually in East Asian countries and the generousness of the policies may differ country to country.

In early 1970s maternity leaves system was adopted very first time, later Korea implemented maternity leaves policy in 1987 .

Paternal leaves policy differs in these countries, likewise other OECD countries one-year parental leaves are available following maternity leaves in Japan and Korea. Taiwan placed this system in 1947 (Feng and Han, 2010)

Japan, After the World War II initiated maternity leaves policy that has to be consume with in five months after the birth of child. The gradual expansion have been done over the time, in late 1960s. Employed females were become entitled for the 12 weeks of maternity holidays including 60% of salary were paid during absence formwork. In 1980s the length of maternity holidays were more expended to 14 weeks. The proportion of pay received during childcare leave was increase from 40 percent to 50 percent in 2007. (OECD Family database). In 1991 unpaid leave for childcare were implemented first time. It enables employed parents to utilized leaves without pay after the childbirth until the child grows up one year. Both parents were eligible to use parental leaves

To promote more births government instituted the “Angle Plan” in 1994, which encouraged parents for childrearing.it also assisted them by providing counseling and promoting equal role of father in raising children.

In mid 1990s certain percentage wages were provided during the parental leaves to support childrearing of children under age 1. As per most recent expansion of policy made in 2010 , the child age is extended to 14 months and both parents are allowed to take parental leaves .

To discourage the social disapproval of taking childcare leave , government promote the atmosphere where parent are encouraged to take childcare leave for which they are entitled and supports the return of mother to the labor market. According to Population Reference Bureau a small gain in fertility rates has been observed in 2008 . slight gain in birth rates are also

been observed overall in all childbearing ages ,though it was higher for females age group 35 to 39. Contrariwise (Tsuya et al., 2005) argue that due to the small role male in sharing household tasks and in taking care of children the burden is shifted to the working wives and without making any changes and creating balances in gender relation , it could be difficult approach to increase fertility. For further detailed discussion see, (Ogawa, Retherford & Matsukura, 2009; Suzuki, 2009).

Korea implemented 8 weeks of paid maternity leaves in 1987, which were expended to 12 weeks recently in 2011. In 2013 by the Act of labor standard employer is responsible to give first 8-week pay to the mother on maternity leaves and rest 4 weeks government will be responsible to provide wages. (OECD Family database, 2013).

Parental leaves policy implementation in Korea is as old as maternity, both policy were legislated at the same time however the parental leave provided was unpaid and employed mother were eligible to use after maternity leave and before the child turned one year. In mid 1990s fathers were also become eligible to take parental leave

Government strengthen family friendly culture and gender equality by growing number of childcare facilities .From 2008, fathers are eligible to take three days leave after childbirth. Fathers are also eligible to take childcare leave, which previously eligible for mothers only. Reference to further detailed discussion see (Lee, 2009)

In Taiwan all employed mothers are entitled for maternity leaves before and after child birth for a combined period of 8 weeks of paid maternity leaves, however only those employed mother who have been working less than six months are entitled for half pay during maternity leaves. After completing one-year employment , employee become qualified to take parental leave for one year, this leave should be utilized before the child turn three years old . A parental leaves benefit is on individual basis , both mother and father can take parental leaves. Parental leaves are partially paid , allowance equal to 60% of the pervious wage is granted. Though this allowance is been provided maximum 24 weeks.

#### 2.4.4 Participation in Formal Childcare by Children

To response low fertility issue, East Asian countries implemented series of policies one of the them is the expansion of childcare facilities by developing more childcare centers subsidies have been increased for the eligible children. Japan introduced five year childcare plan first in 1994 Angle plan and then in 1999 the New Angel plan. These five year plan were basically centered to lighten the responsibilities of childcare from families. These plans considerably increased number of childcare services and the enrollment rates at child care centers.

The problem with the Japanese childcare centers is highlighted in (OECD , 2013). Japanese childcare centers can be separated by three types that is authorized , unauthorized and kindergarten.

Kindergarten is basically half-day facility so it is mostly preferred by the non-employed or part time working mothers. The authorized childcare meet minimum standard of childcare facilities that have been defined by Ministry. For example ratio of student and teacher , minimum area required for facilities etc, however unauthorized facilities like facility available at work place and baby hotel which have not been subsidized by government. To increase and maintain the autonomy and quality of childcare facilities government provided subsidies for meeting and maintaining facilities defined standards.

In 2010 government came up with amendment five years plan for child rearing. one of the major objects of this amendment is to increase the number of enrollments of children under age 3 in authorized childcare facilities form 24% to 35% during five years.

In contrast with other European countries, in Japan the enrollment rate of children age between 0 to 2 years was 26% in 2010, which was blow OECD average 32,6% and higher than some countries like Germany and Austria which had 23% and 14% enrollment rate respectively

Korea offered two types of child care facilities that are kindergarten and nurseries under two different ministries. Kindergarten facilitates children between age 3 to 5 years and nurseries deal with children form age 0 to 5 years.

Until recent both facilities were following different standards for childcare. For better harmonization government implemented equal standards in 2013. In 1990, approximately 2000 child care facilities were available, in first stage number of child care facilities increased remarkably 10 times in 2000, with the more expansion in the program these facilities increased two times in 2012 as of 2000. This substantial could not be possible with government interest and investment for childcare facilities. The major portion of the benefits in kind has been utilized to improve subsidized childcare services. These majors boost enrollment rates of children at childcare facilities

In Korea the enrollment rate of children age 0 to 2 was 50,5%, which is higher than the average of OECD countries, was 32,6%. In Taiwan, daycare facilities were operated by two different entities before 2011. Day care centers were organized by social welfare institution and Kindergarten worked under the ministry of education. The difference between both facilities were the quality standards that included teachers training standard of curriculum etc. Accordance to the Early Childhood Education and Care Act in 2011, both facilities were reformed to new and one system of pre school. However, spending on childcare facilities have increased the number of childcare facilities over time but it was not very helpful to increased number of children. The enrollment rate fluctuated over time. Researchers showed concerns over the effectiveness of spending on childcare services and suggested to improve the weak areas. (Chiu & Wei, 2011). According to Taipei Times 2012, the government trained nannies are available for only 5% of the total Taiwanese children, however grandparents take care about 40% of children, by contrast. Mega warmth social welfare program was introduced and in 2008 white paper on population policy to tackle population issues including initiative which effect fertility. These initiatives were included comprehensive childcare facilities to share the burden of parents to reduce the conflict between family and work. and providing subsidies to the low-income family to lower the financial burden of childcare.

### 3. Theoretical Framework and Previous Research

#### 3.1 Previous research

There are considerable amount of cross-country empirical studies are available that examine the linkage of family polices on fertility rate, however none of these comparative studies addressed specifically East Asian countries (Gauthier, 2007).

Some studies we already used to support theoretical framework however some recent studies are as below:

A study conducted by Blanchet and Ekert , provided an overview the family allowance over fertility in two levels that is micro and macro approaches. In fist part they analyzed how family polices influenced the plan of individual to have successive births of children. In later part of paper macro level influence is been empirically studied using least square regression and analyzed the impact of family benefits on fertility rates of eleven Western European countries from 1969 to 1983. This study provides an empirical evidence of positive association of fertility and family allowance , though it suggest moderate but positive impact (Blanchet and Ekert ,1994) .

Same result is found by Gauthier and Hatzius ,who addressed the question that does higher support of government for families to promote parents to have more children increased fertility? They examined 22 industrialized countries for the time period of 1970 to 1990 by applying time series regression analysis and conclude that the decision to have a child is positively related to the cash benefits found statistically significant , increase in paid leaves found positive impact on fertility but has statistically insignificant (Gauthier and Hatzius ,1997).

A study done by Castles examining various measures of family polices impact on fertility by applying Ordinary Least Square regression model on 20 OECD countries for 1998 , results suggest that the formal child care provision is the only measure of family policies which is strongest relationship and positive impact on fertility. Japan was also included in this study along with other European countries (Castles ,2003).

A recent paper by Luci and Thévenon studied empirically the effect of several family policies setting on fertility rates. They also applied Ordinary Least

Square regression model on 18 countries of OECD during time period of 1982 to 2007. They concluded that every measures of the family policy that is cast benefits, maternity benefits and child care provision , have positive impact on fertility though the magnitude of significance differs. Periodic cash benefits and child care provision covers strong potential impact on fertility than paid leaves and birth grants. In this study Japan and Korea were also included and the studied distinctly with in the framework of their unique social and cultural nature(Luci and Thévenon ,2011),

Adsera assessing the effectiveness of the employment stability and security to return to pervious job ( maternity benefits) on fertility by uing 28 OECD countries from 1960 to 1997 and found positive association with fertility . Results also suggest that maternity benefits boost fertility specially in 25-29 and 30-34 age group of Scandinavian women. (Adsera, 2004 )

Similar results are also found in previous study done by Walker perform time series analysis on Sweden for time period 1955 to 1990 and where the study proposed that different family policy measures like child care provision ,cash benefits and parental benefits have pronatalist effects in fertility (Walker, 1995).

### **3.2 Theoretical Framework**

A combination of different theories will now be discussed ,these theories are based on economic, social and psychological concepts, and additionally empirical cases will also be reviewed. In this section our focus will remain to the theory that is related to the hypotheses that will be presented later section.

To study the relationship between polices and fertility many authors used New Home Economics (Backer, 1960) framework, like other researchers ,we will also draw significantly from Home Economics theory of fertility to support theoretical argument and analysis regarding the efficiency of the family polices in East Asian countries.

By using same theoretical framework of economic theory of fertility assumption , that decision to have a child is the matter of a utility maximization process where parents have perception of the cost and

benefits, children can be considered as commodities within this framework. (Weeks, 2008, 214).

Rationality of the individual and availability and accessibility to all information in their decision making process, is the basic assumption of classical economic theory. In more recent time, the importance of opportunity cost of children become more significant in this trade-off. Child rearing is time-required activity just as work and leisure and fertility decision is also dependent upon the quality investment made in children. Therefore having children acquires visible and invisible cost (Becker, 1960).

Couples consider the costs and benefits of childbearing and rearing against their income, professional expectations and the demand of child appears within the time money quality and quantity framework. Economic theory helps to understand the prevalence of factors, which bound people to have a child or children. Upbringing of children and competing demands of household work both require expenditure of parental time and money.

In recent times, female exposure to education has been significantly increased which consequently increased female employment rates, which delay the decision of having child. (Rindfuss et al, 1988) suggested that increase in female education postpone childbirth to the higher ages than those who have less education, this phenomena naturally decrease the opportunities of further births.

Another explanation describe by (Becker, 1991) that these advancement increases the opportunity cost of maternity. Having children also incurs opportunity cost. The time which parents spend for childrearing could be use to generate financial gain, human capital such as skills and knowledge.

When opportunities for higher education, prestigious employment and high wages were not generally in access to woman, the absence of such thing were not consider as the opportunity cost of having child.

(Becker, Murphy and Tamura, 1990) argue that as in rapid technological progress period, people are more likely to invest more in human capital. Parents find it more favorable to have few children, so they can provide each of them a high level of human capital. Hence higher fertility narrow the opportunities to provide high level of human capital to children. Contrariwise, higher human capital lower demand of children, as it increases the cost of time to required for childcare. (Becker, Murphy and Tamura, 1990)

With more human capital individual have high opportunities to receive high wages and higher chances of accumulating physical and human capital this is how the cost of time required for child raising increased with high human capital.

Moreover, better economy also leads an increase in relative wages of woman specially for those who also have advantage of average increase in their education attainment (Galor and Weil ,1996).

Female labor force participation increased with the high rates of earning and reduced rates of births, which eventually increased the wealth per capita. Therefore, the higher earning of women is the product of increase in economic growth and decrease in population growth.

Furthermore, increase in female education attainment and female labor force proportion is also account for the declining trend of fertility. (Castles, 2003) this decline is usually express as the trade-off between work and parenthood.

Before starting a family, generally people want to establish their careers, which affect and increase the mean age of mother at first childbirth. It also increases the chances to have few children than previous generation. Motherhood has its own demands as working life. For example, it is difficult for mothers with children to continue busy full time job, similarly it is very difficult to give complete time as required to family and work for a woman at executive level. For people especially for parents it is difficult to balance between work and family as it always revolve around either- or options.

Same has been argued by (Luci, Thévenon and others ,2011) that economic improvement is considered as a main factor which effect fertility decision directly, which means that economic progression will lead to a raise in income per capita. According to the one of economic model assumptions, raise in income per capita means higher wages and children are more affordable with high income. It is expected that with the increase in income demand of child also be accelerated. But empirical studies suggest economic development decreases the birth rates though it also shows small positive effect at certain level of GDP even the access to control the birth is available(Myrskylä, Kohler and Billari., 2009).

Nordic countries provide good example for their family polices, by which these countries achieved high rate of female work force participation without dropping fertility level to the low levels (Gupta, Smith and Verner, 2006).



Unlike other western societies East Asian countries are family-reliant countries, where families have main role to provide services instead of government, In last decade of 20th century, the economic growth of most East Asian countries turned slow. Under such economic scenario it become more difficult to maintain traditional family structure mainly because of demographic changes like, rapid population ageing, very low birth rates and the falling off rates of marriages. (Chiu and Wong, 2009 ) East Asian countries are also having very low non-marital births, (OECD, 2011).

These all trends may refer to the increase in female labor force participation and female empowerment. If subsidized child care service available, female employees are more comfortable to balance their work and children similarly they feel safer while leaving employment temporarily for child bearing. It makes them more confident if they entrance to the labor market is confirmed and temporarily unavailability at work is compensated by parental leave. Flexible working hours or part time jobs can make working and family life balance in case of unavailability of parental leave. (Rindfuss and Brewster, 1996) argue that availability of childcare would have pronatalist effects and it also provide female labor force great opportunity to balance between working and family life, similarly (Day ,2004) also suggest that fertility decline may happened , when the opportunities and availability of maternal care alternative is not available.

Other empirically proved variant that can influence fertility are society attribute towards female role. Social norms paly important role (Feyrer, Sacerdote and Stern, 2008) suggest that after free access to economic empowerment of females in developed countries , difference in fertility behavior is effected by social norms and government policies. For example the burden of child care and child rearing that has been bearded by mother only. They also conclude that the share of participation rate of male at household work is much lower in Japan than other developed countries . Social indicators like Marriage and divorce rates also have vital role specially where the childbirth rates, with out legal marriages rates are noticeably low. The postponement of child birth in to higher ages due to the higher education attainment is important factor which influence fertility specially in countries where fertility is strongly linked with marriages (D'Addio & Mira,

2005) . Rate of childbirth with outside marriage is still lower in East Asian countries as compared to other developed countries. Japan, Korea and Taiwan<sup>2</sup> have proportion of birth outside the marriage are 2,1%, 2% and 2,7% respectively as compared to other developed countries where average OECD average is 36,3% in 2010 (OECD Family database). This reflects strong traditional association between marriage and childbirth. Generally it is considered that the family policies can effect only fertility decision of those people who are seriously willing to have a child or children, in short -medium term (Klüsener, 2009). These policies are normally structured to reduce factors, which bound the fertility decision of people with the childbirth intention by helping them financially and through other support in childbearing and childrearing.

The theories and pervious research discussed above has aimed to support related hypotheses and variables of interest in this paper . More explanation and clarification of theories and previous research will added as the paper further proceed

### 3.3 Hypotheses

Based on our study of interest, pervious research and the theoretical framework provided, we will proceed by analyzing following hypotheses:

- *A positive relationship exists between increasing investment of family policy expenditure per capita and total fertility rate.*

Since 1995 we can observe an increasing pattern of government investment on family policies per capita in East Asian countries. On the same time these countries are also experiencing lowest fertility among other developed countries. In response East Asian governments implemented different family policies ,here we are interested to explore how this set of family policy, including cash benefits, benefit in kind and child related leaves entitlement , impact of fertility rates in this region. By considering pervious research for other countries we do expect that these policies have positive impact on fertility rates.

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<sup>2</sup> National Statistics, Republic of China (Taiwan )

- *Rising investment of benefits in kind per capita are positively correlated with fertility among employed female.*

Benefits in kind contain major portion of expenditures related to the subsidies for childcare facilities or other expenses to ensure the availability of childcare center. Through this hypotheses, we will investigate whether increasing investment of benefit in kind motivate and support female labor force to have children. We expect that policies which are made to support work and family life have positive effect on fertility.

- *Social norms are strongly correlated with fertility.*

As we discussed in theory section, childbearing outside the marriage is noticeably low in East Asian culture. By using variables, such as marriage and divorce rates, we examine how and to what extent these variable affect fertility.

#### 4. Data, Sample, and Sources

A comprehensive list for all data and related sources that has been used in this study are available in Appendix 1. Data has been gathered from different but reputable and reliable International databases like The World Bank, World Economic Outlook (WEO) data, IMF, United Nations, International Organization of labor and OECD. However for Taiwan vast majority of data has been collected from various catalogues of National Statistics Republic of China (Taiwan), despite concern of excessively reliance on single source for Taiwan, the National Bureau of Statistics generally consider most reliable institution for such kind of data information, additionally in most cases, data for Taiwan as individual origin is unavailable on other institutional databases.

Family policy data for Taiwan from 1995 to 2009 was pieced together from two different catalogues within Taiwan's National Statistics.

Data of family policies for Japan and Korea has been drawn in unit of total expenditures in national currency. Afterwards we calculated per capita expenditure in USD by using definition provided by OECD.

The reason that motivates us to recalculate these values, though these are available at OECD social expenditure database, is to align family policy data for Taiwan, with Japan and Korea. Population estimations used has come from United Nation for Japan and Korea and for Taiwan we used its federal government estimates.

GDP per capita is sourced from IMF for all three countries to align the calculation of per capita expenditures.

Marriage and divorced rates used study for this is also been collected from National statistics except Korea where we patched United Nations data for 2008 and 2009.

For female tertiary education data provided by UNSICO institute of statistics is used for Japan and Korea

We used average working hour per week and these figures have been taken from ILO, though over variable of interest was female average working hours but I could not locate female average working hour in Taiwan data for certain period which we believe that have clear implication on fertility, this is the reason we used best nearest averages and used average working hours data

for male and female both, which might not provide the exact information but certainly reliable to provide information which support our study.

The strength of the data used is that all sources those have been used to gather data is well recognized and consider reputable. A careful handling is done while transferring data in Stata and Excel files with honest intentions that no error occurred.

Hopefully more comprehensive and addition years data for family policy data will be available soon for Taiwan and rest of East Asian countries to encourage further study . A preferable way of performing this analysis would be to consider micro level data by observing individual responses. Although this study is aimed at macro level data ,which we hope to done with the available data.

## 5.0 Method

In order to conduct this study and to test our hypotheses, we run regressions in two steps. In first stage we only run ordinary least square regression analysis for three explanatory family policy specific variables to estimate the family policy effect on East Asia. In second stage, other than family policy variables, we also introduced few control variables, such as female labor force participation rates, female tertiary education attainment rates, unemployment rate. These control variables have main influence on fertility, as we have already observed in the previous research.

We follow the similar regression model that has been used in recent study done by Luci &Thevenon in 2011, though independent variables that we presume to have influence are different, we hope that we will be able to compare results of both studies .

Results provided in (Luci &Thevenon, 2011), study is the most recent results available so far by covering many developed countries. Additionally it also covers the time period of our study of interest.

The Endogenous variable or dependent variable in my analysis will be the total fertility rates. Independent variables that we have considered to have influence on birth rates are included, GDP per capita ,female labor force participation , female tertiary education attainment , weekly average working hours (both male and female), unemployment rate (both male and female), marriage and divorce rates. Variables have been selected based on theoretical framework, data availability, and according to hypothesis, which we aimed to test.

### 5.1 Statistical Models

We start our regression analysis with Ordinary Least Squares (OLS) regression using pooled data one three East Asian countries from 1995 to 2009. In our case multiple regression using Ordinary Least Squares (OLS) is written as

For policy specific variables, in static setting

$$\ln TFR_t = \alpha + \beta_1 \text{cash\_benefit}_{it-1} + \beta_2 \text{benefit\_inkind}_{it-1} + \beta_3 \text{leaves}_{it-1} + \varepsilon_i$$

(where  $\varepsilon_i$  is the error term)

Additionally, we are interested in analyzing the impact of independent variables that changes over time, if exists. We use fixed effect model that provides most theoretical approach. Fixed effect model provides an opportunity to control those variable that have no impact over the years while differing between countries. We perform, a Hausman test for confirmation that the model best defined in fixed effect setting not as random effect. The model for the fixed effect while performing multivariate linear regression is stated as follows.

$$\ln TFR_{it} = \alpha_i + \delta_i + \beta_1 \text{cash\_benefit}_{it-1} + \beta_2 \text{benefit\_inkind}_{it-1} + \beta_3 \text{leaves}_{it-1} + \varepsilon_i + u_{it}$$

(where  $\varepsilon_i$  is the error term)

Fixed effect model provided feasibility to control those factors, which are time invariant across countries such as culture, gender, religion etc., and it also provide control for the variables that are variant over time. This Fixed effect model contain  $\alpha_i$  is providing information about unobserved country fixed effect, common example are institutional or historical factors of countries.

Sigma\_i ( $\delta_i$ ) symbolized for common time effect across all countries at any given year though time variant. Finally,  $u_{it}$  is reflecting error term in model.

And our final model which describe how these policy variable impact on fertility in presence of other variable that have influence on childbearing. The OLS regression model including other control variables will be define as:

$$\ln TFR_{it} = \alpha + \beta_1 \text{cash\_benefit}_{it-1} + \beta_2 \text{benefit\_inkind}_{it-1} + \beta_3 \text{leaves}_{it-1} + \beta_4 \text{female\_employment}_{it-1} + \beta_5 \text{female\_tertiary}_{it-1} + \beta_6 \text{unemployment}_{it-1} + \varepsilon_i$$

(where  $\varepsilon_i$  is the error term)

TFR is treated as a dependent variable, we applied natural log to TFR so we

can define percentage change per unit increase or decrease of independent variable, while discussing the results. Each independent variable has been lagged ( $t-1$ ), in order to consider their delayed influence. We take one year lagged to capture this delay, it may consider approximate time to decide about having a child, and moreover available data allow us to take lagged not more than one year.

The explanatory variables include cash and in kind benefits per capita, and child related leaves which serves as important factors for this study. GDP per capita used for this study is provided in USD current prices and PPPs (gdp) is an other important dimension which explain the economic health of the country, so the unemployment rate unemployment which also explain the economic health and market uncertainty these characteristics are effect the decision of childbearing. Female labor force participation, female education used to capture the influence of woman economic empowerment which is consider and empirically proven, one of the factors which delayed childbearing. To capture the and finally we added marriage rates and divorce rates to see the influence of social changes on fertility. The limitation of this model is that only 15 years of data from 1995 to 2009 available. While applying one lagged of independent variables reduces data further to 14 years.

## **5.2 Definition of Variables**

### **5.2.1 Dependent Variable:**

#### **Total Fertility Rates**

Dependent variable in this empirical study is total fertility rates, which has been used in logged term. The reason of taking logged is to see the percentage change of impact of independent variable. A total fertility rate is most commonly available and used measure to see the birth rates of any country on yearly bases.

### **5.2.2 Independent Variables**

First factor is family policy that addressed low fertility. These measures includes reducing direct costs of children through financial incentives to parents with children, provided time that can be withdrawal form the employment around childbirth and to care child and other indirect spending



on childcare.

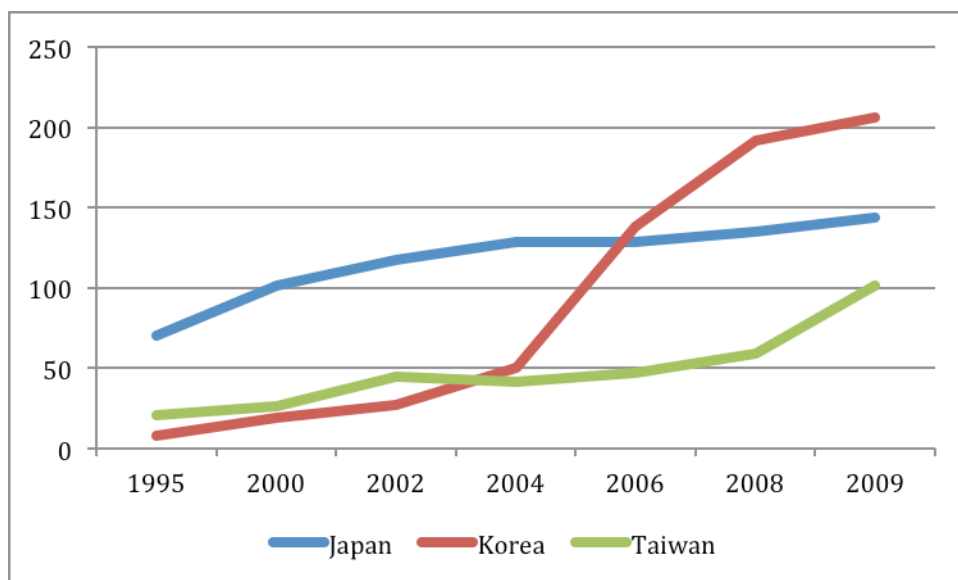
Family policies can make this option less difficult. (Castles, 2003) noted that broad range of policies are available under this heading but in literature are more concern about the identification of those factors which encourage high rates of female employment.

We have empirical findings which we will also discussed in previous research section also predict that family policy measures increase the level of fertility by providing families additional cost for having child , maternity benefits day care provision and promote woman employment by balancing work and family needs on (Luci and Thévenon, 2011)

### Cash Benefits

As per OECD definition cash benefits may included all direct financial transfer to the families with children , in form of childcare allowance, payments during time of child related leaves like maternity and parental leaves, birth grants and income support to low-income and single parents families (in some cases). The unit we have used in this study is spending in USD per capita per year.

**Figure 3 A review of government spending on Cash benefits USD per cap (1995-2009)**



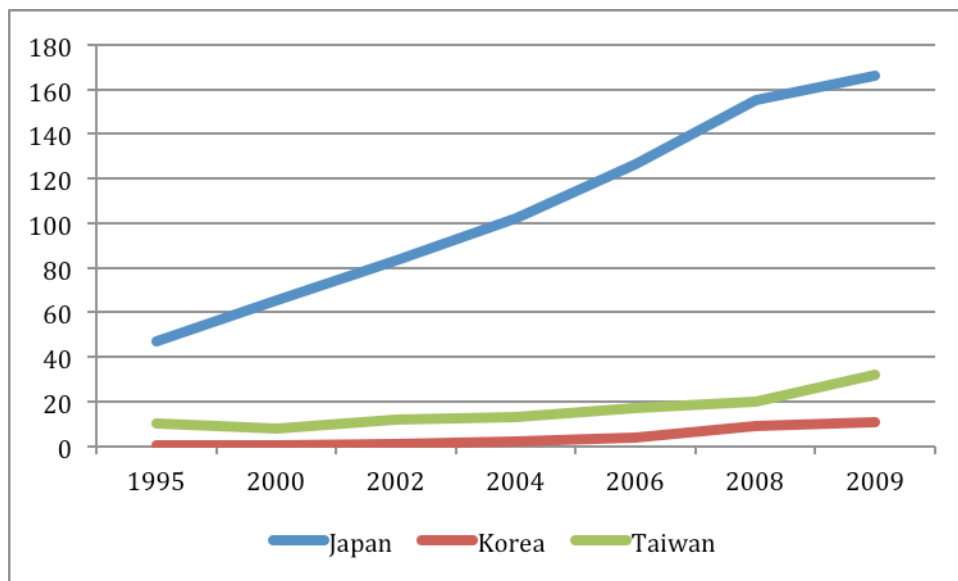
Sources: For Japan and Korea OECD Social Expenditure(2013)

For Taiwan National Statistics Republic of China ( Taiwan)

### Benefits in kind

Benefits in kind included direct financial support to childcare facilities provider, subsidies public childcare through reduced payment to parents as defined by OECD. Figure 4, representing the fact that the trend of spending on benefits in kind has increased, noticeably in Korea. Though in contrast they are lower than other developed countries, the average of public spending on benefits in kind in OECD countries was approximately 1%. The unit we have used for empirical analysis is spending in USD per capita per year.

**Figure 4 A review of government spending on Benefit in kind USD per cap (1995-2009)**



Sources: For Japan and Korea OECD Social Expenditure(2013)

For Taiwan National Statistics Republic of China ( Taiwan)

### Child related leaves

Leaves that have been granted to parents around the time of child birth includes maternity, paternity and parental leaves. They are conditional to

previous employment. There are noticeably cross country differences in child related leaves entitlement not even in East Asian countries but in other developed countries. Additionally, these entitled leaves are not always fully availed by the parents, specially in case of fathers , they are more often hesitant to avail their leaves entitlement and not being present form work for long time , which may hinder their employment and career growth. In Japan and Korea less than 2 fathers for 100 mother avail parental leaves (OECD Family Database). Leaves entitlement is empirical analysis is defined in weeks.

### **GDP(PPP) per capita**

Next, fertility decision is effected individuals preferences and standards that are mainly influenced by range of factors in including labor market condition.

GDP per capita is a measure that generally used to see the economy health and countries prosperity. We use GDP (PPP) as it also take in to account the relative living cost and rate of inflation in a country. This variable is measured in USD current prices and PPPs.

### **Female labor force participation rate**

Labor force participation rate percentage of person who are economically active, in our case we consider female labor force participation rates that describe the percentage of female economically active population.

### **Female Tertiary education rates**

This is another indicator which represent female empowerment in the society. Education provide by universities , institute of higher education is normally consider as tertiary education. As we discussed in theoretical section, the postponement of child decision due to the higher education attainment increased the mean age of the first child birth. Other factor are also include that with higher education more opportunities of higher wages , prestigious employment and status are also available which increase the cost of having a child. Female tertiary education used in study is percentage change in a year.

### **Total Unemployment Rate change**

(Blossfeld, Klijzing, Mills, and Kurz 2005) suggest that decision to have children highly affected by the stability and security in labor market. Under this framework fertility decision will also have been impacted by the unemployment rates that make labor market more insecure.

(Adsera 2004 ) conducted study on OECD countries and found empirical evidence that high rates of unemployment compressed fertility rates though this postponement comes due to the uncertainty of economy not being jobless specifically.

We use variable total unemployment rates for our study as it describe the economic insecurities which may have negative effect on fertility rates as parents may delay or postpone the decision of having a child.

### **Marriage and Divorce Rates**

Third social context, it is difficult to understand the families polices without putting them it to the East Asia social context. Ratio child without legal marriages is still very low than other countries , in same context divorce rates also effect fertility decision in newly married couples. All three East Asian countries witnessed a increase in divorce rates and now become static since after around 2004. When the country's fertility rate is decaling at the same time the decreasing pattern of marriages and increasing pattern of divorce rates may have negative effect on population growth..

## 6. Empirical Analysis and Results

Table 3 is representing results form the OLS regression model while using specifically three variables of family policy that is investment in cash benefits per cap, benefit in kind per cap and child related leaves. Results included in row order , estimates of the parameter associated with each variable, the percentage change, related t-value and significance value is indicated by steric(s).

**Table 3: OLS and Fixed effect estimates ( family policy specific ) of total fertility rate : 1995ß-2009**

Variables	OLS	Country Fixed Effect
(Cash benefits per capita)t-1	0,0009901 (0,013)*	0,0046084 (0,000)***
(Benefit in kind per capita) t-1	0,00105218 (0,0560)*	0,0017048 (0,0000)***
(Child related leaves) t-1	-0,0021627 (0,0100)**	0,0004853 -0,48
Linear time trend	Yes	Yes
No, of observations	42	42
R2 overall	0,7075	0,8978
Adj R-squared	0,6759	0,8803
p(F)	0	0

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ , p-value in parentheses.

*Note: - The natural logarithm of total fertility rate, i.e,  $\ln(TFR)$ , is considered in all cases.*

The first model presenting results of family policy specific variables from period 1996 to 2009 by performing pooled Ordinary Least Square regression. Test was performed to confirm whether heteroscedasticity is not a problem in this case.

We introduced linear time trend in our model. Linear time trend absorb all time invariant effect , which helps us to control time specific fluctuation in fertility rates. These year specific fluctuation trends contain risk of estimating biased results for family policy parameters. (Luci & Thévenon,

2010) for example, during a period when fertility decline rapidly in response government increased investment and expand policies, similarly when birth rates are high, more expenditure on maternity benefits, family benefits for child bearing and rearing, more financial transfers, may account for extension of government policies.

In second column we perform fixed effect model to capture within country variation. Fixed effect model basically wipe off unobserved variable that are time invariant. Fixed effect model provides an opportunity to detach the effect of policy change over time by country invariant factors, which influence fertility rates.

We used time-lagged exogenous variables to perform Ordinary Least Squares (OLS) regression and fixed effect model in order to reduce the risk of inverse causation, such as inverse causation of dependent and independent variables may provide biased and unreliable results. For example total fertility rates of year 2008 can not be used to see the impact of maternity benefits in year 2006, conversely, change in fertility rates due to spending on maternity benefits appears after few time. We use one year time lagged to control the endogeneity problem. Additionally, it also captures the possible time delay of fertility response. For example, after the policy implementation, the time those parents have taken for decision to have child. We decided to take one year lagged taking in to account the data availability. Though it can be a good exercise to capture how long a region delay to response family policies.

Table 3 is presenting results that how overall these family policy variables effect fertility. The OLS regression model defined overall R-sq value is 0,707, which reflect that explanatory variables that are selected are responsible 70.7% variation in the dependent variable that natural logarithm total fertility rates  $\ln(\text{TFR})$ . The p-values of this model is zero, which suggest that all selected independent variables are significant and have correlation with the dependent variable. All individual variables are significant but at different level of significance.

We may explain this situation as the different variable are responsible for some variation of  $\ln(\text{TFR})$ , but the significant which can be observed from p-value is high for some variables, the overall significance is distributed among every independent variables.

According OLS regression model, all variables of family policy variables have significant impact on overall fertility of East Asian countries at different level of significance .

The fixed effect model reflect some different results, variables cash benefits and benefit in kind increased their significance , however child related leaves lost its significance in fixed effect model. This model produces an f-test value equal to zero, which reflects that model is well structured. R-square value is 0,897, suggesting all three family policy variables are responsible of 89.7 % variation in this model.

Fixed effect not only increases the significance of family policy variable but also its impact. This reflects that some unobserved factors within country were effecting these estimates.

Cash benefits comes with the strongest yield among family policy variables, an increase in USD benefit per capita increases, total fertility increases 0,099%, fixed effect model make it more significant and coefficient of variable become increased to 0,46%.

Similarly our other variable of interest Benefit in kind paly significant impact on over all fertility. Significance and coefficient have increased in fixed effect model from 0,10% (OLS results) to 0,17%.

Child related leaves entitlement are negatively associated with the fertility rates and also statistically significant. However, in fixed effect model childcare related leaves are positively correlated with fertility but statistically insignificant.

**Table 4 OLS Regression estimates of total fertility rate with control variables : 1995 -2009**

	Model 1	Model 2	Model 3	Model 4	Model 5
(Cash benefits per capita) <sub>t-1</sub>	0,00131 (0,000)***	0,0012 (0,000)***	0,0011 (0,002)***	0,00048 0,176	0,0015 (0,000)***
(Benefit in kind per capita) <sub>t-1</sub>	0,00097 (0,007)***	0,001 (0,008)***	0,0007 0,107	-0,00007 0,872	0,0016 (0,003)***
(Child related leaves) <sub>t-1</sub>	-0,00227 (0,002)***	-0,0023 (0,003)***	0,0004 0,557	0,00147 (0,059)**	-0,0005 0,609
(Female labor force participation rate) <sub>t-1</sub>	-0,01881 (0,014)**	-0,0182 (0,025)**	-0,0325 (0,000)***	-0,03761 (0,000)***	
(Female tertiary education rate) <sub>t-1</sub>	-0,00588 (0,000)***	-0,0064 (0,000)***			
(Unemployment rate) <sub>t-1</sub>	-0,01808 (0,018)**				
(GDP per cap) <sub>t-1</sub>					-2,13 e <sup>-4</sup> (0,003)***
(Marriage rate) <sub>t-1</sub>			0,058 (0,001)***	0,04738 (0,003)***	
(Divorced rate) <sub>t-1</sub>				-0,11054 (0,004)***	
Linera Time trend	yes	yes	yes	yes	yes
R-Sq	0,895	0,876	0,845	0,88	0,771
adj R-Sq	0,873	0,855	0,819	0,855	0,739
p(F)	0	0	0	0	0

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ ,  $p$ -value in parentheses.

Note: - The natural logarithm of total fertility rate, i.e,  $\ln(TFR)$ , is considered in all cases.

In table 4, we run OLS regression model with control variables which we described in statistical model section. In this model incorporate other control variables, as we discusses in theories section that fertility not only be influenced by family polices there are numerous social and economical



factors which are necessary to understand while observing the impact of these specific policies.

We start with introducing maximum control variables with family policies to observe how and at what level these variables have impact on fertility change. Other models are variant of the initial model that is model 1.

Estimates of OLS regression model suggest that family policies variables while controlling woman empowerment and economic uncertainty variables. Every variable is statistically significant in this model which follow that our selection of factors does have significant impact on overall change in fertility. R-sq value reflecting that these variable are responsible for 89.5% variation in the model. In the combination of family policy, economy health and female status variables, an increase in USD per cap in Cash benefits and benefits in kind is associated with 0,1 % and 0,09% increase in fertility rates. The coefficient of these variable gain some weight as compared to static setting results. Child related leaves female labor force participation, female education and economic uncertainty all are negatively associated with fertility, and statically significant.

Second model that is variant of model 1, we only control female empowerment by adding only female labor force participation rates and female tertiary education attainment rates. Though we increase a degree of freedom but the coefficient of determination decreases slightly from 89% to 87%. Which suggest that economic uncertainty not explaining noticeable variation on fertility rates, additionally coefficient of benefit in kind gained its weight.

In Model 3, we introduced social indicator to analyze the impact of social changes on fertility, such as add marriage rate as control variable. The results show that female labor force participation has negative association on fertility in this model women empowerment variable comply with the theoretical expectation. Cash benefit retains its significance and weight. Benefit in kind become insignificant with very close margin the p-value is 0,107.

Child related turned too positive but statistically insignificant. Marriage rates are statically significant and have strong positive association with total fertility rates, another social indicator we add in model 4 that is divorce rates which have strong negative correlation with fertility and statistically significant. In this combination except child related leave variable all become

insignificant, however child related leaves increase coefficient weight and become positive.

Finally in Model 5, we take economy into account by exploring impact of GDP per cap with family policies. We noticed GDP per capita return with a negative association on fertility though very minor and statically significant.

We also explore the impact of gdp with different other variables, in most of the cases it does not show its significance and are normally negatively associated with very small correlation.

One possible explanation provided by (Luci & Thévenon, 2010) that effect of economic growth alone, on fertility is lesser. The economic development incompletely explains the impact on fertility as countries fertility rates often differ though they are comparable by economy. With this economic combination of variable cash benefit and benefit in kind have positive association with TFR though statistically have significance, child related leaves are negatively correlated but insignificant.

Finally, we are also interested to analyze the impact of unobserved variables if they exist and have any significant impact on our estimates. By following procedure, we run Hausman test, which help us to select whether our model is best define by fixed effect or random effect model. Result refer us to consider random effect model. Which return with almost same findings as of OLS regression. This may indicate that OLS is sufficient and can be considered as a suitable model.

## 7. Conclusion and Discussion

Japan, Korea and Taiwan, all three countries are sharing a common problem that is change in reproductive behavior. During the time of economic growth, these countries experienced significant decline in fertility rates. Governments invest in different family policies in order to response this issue.

The basic aim of this empirical study is to explore the association between fertility and the family polices in East Asian countries implemented by these government. As we discussed already that the data availability is a significant limitation for this empirical analysis. However our results suggested that increasing investment in family polices in East Asian countries have over all positive association with the total fertility rates. Our result explore that an increase per USD per person in cash benefits increases 0.9% fertility rates, though its significance increases to 0.4%, as we imply control for the unique factors which may impact our dependent and independent variable estimates.

Our results support most of the pervious empirical researches and theoretical arguments that direct financial support for the families with children reduce the financial burden on parents, and is positively associated with total fertility rates.(Gauthier & Hatzius ,1997); ( D'Addio & Mira, 2005);(Luci & Thévenon , 2011). Our analysis found that cash benefit has larger positive effect on fertility among other policy variables, though this impact is not noticeably large.

Same is the case for benefits in kind, in OLS model an increase of per USD in government spending per person on benefit in kind yield 0.1% increase in fertility rates. This effect has been increased by 0.10% in fixed effect model. This variable is quite large in nature we have included spending on childcare facilities and other indirect spending in this variable (limitation of data availability). It may possible that result may become more significant if we investigate the individual effect of each type of indirect spending. It could be an interesting direction for further detailed study.

Child related leaves have negative significant impact while in fixed effect it has positive association but statistically insignificant. Though these results are not surprisingly different previous research suggest mix empirical findings, (D'Addio & Mira, 2005) found negative impact of duration of child related leaves on fertility rates. The negative association between children related

leaves and fertility can possibly explain as maternity and than parental leaves are quite long in period. During this period mothers are normally away from the labor mark to take care of child, which may cause lessening the opportunities for career growth as compared to those who are on job. The percentage of wages provided during childcare related leaves is normally certain percentage of pervious earnings, which is not affordable.

It is interesting to observe that as we introduced control variable for female empowerment the coefficient of cash benefits increased as well as its significance. Similarly benefit in kind where does not increased its weight but only significance, this may suggest that these policies are important to increase fertility among employed and more educated females.

However when we incorporate marriage rates only cash benefits remain its significance which may indicate that direct financial transfers are helpful to rise fertility among employed females and married couple.

Female labor force participation significant negative impact on fertility when we incorporate social indicators marriage and divorce rates, which explain the fertility decrease as the female employment increases. It also suggest the conflict between employment and family life. Except cash benefits all other policy variable lost their significance. Benefit in kind that includes factor of spending on childcare is not effective. Woman role in family, her responsibilities, facilities and quality of childcare services available, are also important factors. They may effect the decision of fertility. As we discussed above that Japan has childcare system including authorized and unauthorized childcare facilities, government has not funded unauthorized facilities, which transfer financial burden on parents, and similarly in Korea subsidies for childcare facilities are available only for low- income families.

In Taiwan government trained nannies to care child at childcare facilities, available only for the 5% of total Taiwan's children.

Estimates of female tertiary education attainment rate are negatively associated with childbirth decision, which comply with the previous empirical studies and our expectation. The longer educational attainment among females delayed the age at first birth and it has been consider important factor in countries where the association between marriage and childbearing are strong (D'Addio & Mira, 2005).

Our key findings are that increasing investment on family polices in East Asian

countries returned positively correlated with fertility, although its impact is small in scale. Decreasing marriages and increasing pattern of divorce rates found strongly correlated to fertility decision. Traditional linkage of marriages and child birth may have strong impact of on fertility than these policies.

Due to limited availability of data, the study provides some support to empirical analysis. However, one may consider as a future direction, a micro level study and gather more data to assess relevant hypotheses.

## 8. Appendix

### Appendix 1: List of data and sources used in this study

Country	Variable	Period	Source	Note
Japan / Korea	TFR	1995-2009	The World Bank	<a href="http://data.worldbank.org/indicator/SP.DYN.TFRT.IN">http://data.worldbank.org/indicator/SP.DYN.TFRT.IN</a>
Japan / Korea	Cash benefits	1995-2009	OECD	
Japan / Korea	Benefits in kind	1995-2009	OECD	
Japan / Korea	Childcare related leaves	1995-2009	OECD	
Japan / Korea	Female Employment rates	1995-2009	The World Bank	
Japan / Korea	Female Tertiary Education	1995-2009	UNSICO institute of statistics	
Japan / Korea	Unemployment rates	1995-2009	The World Bank	
Japan / Korea / Taiwan	GDP per capita PPP	1995-2009	World Economic Outlook (WEO) data, IMF	
Japan / Korea	Population	1995-2009	United Nations	
Japan	Marital rates	1995-2009	Statistics Bureau, Ministry of Internal Affairs	<a href="http://www.stat.go.jp/english/data/nenkan/1431-02.htm">http://www.stat.go.jp/english/data/nenkan/1431-02.htm</a>

			and Communications	
Japan	Divorce rates	1995- 2009	Statistics Bureau, Ministry of Internal Affairs and Communications	<a href="http://www.stat.go.jp/english/data/nenkan/1431-02.htm">http://www.stat.go.jp/english/data/nenkan/1431-02.htm</a>
Korea				
Korea				
Taiwan	TFR		National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/public/data/dgbas03/bs2/yearbook_eng/y014.pdf">http://eng.stat.gov.tw/public/data/dgbas03/bs2/yearbook_eng/y014.pdf</a>
	Cash benefits	1995- 1999	The National Development Council, Taiwan, R.O.C (NDC)	<a href="http://www.ndc.gov.tw/encontent/m1.aspx?sNo=0014864#.U9tjzYCSxfA">http://www.ndc.gov.tw/encontent/m1.aspx?sNo=0014864#.U9tjzYCSxfA</a>
	Cash benefits	2000- 2009	National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/mp.asp?mp=5">http://eng.stat.gov.tw/mp.asp?mp=5</a>
	Benefits in kind	1995- 1999	The National Development Council, Taiwan, R.O.C (NDC)	<a href="http://www.ndc.gov.tw/encontent/m1.aspx?sNo=0014864#.U9tjzYCSxfA">http://www.ndc.gov.tw/encontent/m1.aspx?sNo=0014864#.U9tjzYCSxfA</a>
	Benefits in kind	2000- 2009	National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/mp.asp?mp=5">http://eng.stat.gov.tw/mp.asp?mp=5</a>
	Childcare related leaves	1995- 2009	World Bank	
	Female Employe	1995- 2009	National Statistics Republic of China	

	nt rates		( Taiwan)	
	Female Tertiary Education		National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/fp.asp?xItem=15761&amp;ctNode=1609">http://eng.stat.gov.tw/fp.asp?xItem=15761&amp;ctNode=1609</a>
	Unemploy ment rates		National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/point.asp?index=3">http://eng.stat.gov.tw/point.asp?index=3</a>
	Populatio n		National Statistics Republic of China ( Taiwan)	<a href="http://eng.stat.gov.tw/lp.asp?ctNode=1629&amp;CtUnit=779&amp;BaseDSD=7&amp;mp=5">http://eng.stat.gov.tw/lp.asp?ctNode=1629&amp;CtUnit=779&amp;BaseDSD=7&amp;mp=5</a>
	Marital rates		National Statistics Republic of China ( Taiwan)	
	Divorce rates		National Statistics Republic of China ( Taiwan)	



**Appendix 2 : Summary Descriptive Statistics of all variables used in analysis**

Variables	Observation	Mean	Standard Deviation	Minimum	Maximum
Intfr	42	,2715522	.1332282	.0295588	.5709795
year	42	2002,5	4.079993	1996	2009
grp	42	2	.8263939	1	3
cash_benifit	42	33.38649	43.24289	.3377359	155.45
benifit_inkind	42	66.16663	47.80583	7.940701	191.7768
leaves	42	33.45952	25.28052	8.5	64.4
female_employment	42	48.46524	1.503366	45.34	50.4
female_tertiary	42	43.18894	8.946976	29.78373	67.36868
unemployment	42	3.907857	1.102451	1.9	7
gdp	42	22934.02	5980.516	12287.91	34014.09
marrige_rate	42	6.817595	.9238448	5.7	9.4
divorce_rate	42	2.292143	.4506231	1.5	3.49

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