

## Population Growth - a Child-Cost Perspective

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One of the principle concerns of developing countries is the exponential growth in their population size since World War Two and the ensuing environmental and social pressures it has caused. Ronnie O'Toole surveys the history of population growth and discusses the concept of "child-costs" as an explanatory factor behind the process of fertility determination.

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### I Introduction

And God blessed them, saying: Increase and multiply, and fill the earth, and subdue it, and rule over the fishes of the sea, and the fowls of the air, and all living creatures that move upon the earth: Genesis

And so they did. In fact, they continued to do so with such an evangelical zeal that the world's population increased by a factor of 10,000 over the space of 10,000 years. The principal cause of this can be attributed to populations undergoing the "fertility transition" - i.e. from the point where there is a drop in the death rate due to greater institutional organisation and improved technology to the time when the benefits of development start to reduce the fertility rate.

I will start by placing the current experience of lesser developed countries (LDC) in relation to the fertility transition in perspective by examining the history of its development in the western world. I will then show what effect the current wave is having on world population and what particular problems that the explosion in population over the last half century is causing.

In the second section I will focus on the concept of "child costs" as a useful framework to try and explain many of the causes of perpetually high fertility and what factors ultimately lead to its demise. While this concept does not capture all factors, it does provide a useful analytical tool to give vague notions a more concrete and ultimately measurable dimension. However, the largest advantage of the "child costs" method is that the factors that it explains tend to lend themselves more readily to direct external intervention, presumably by the government. As economists our goal must ultimately be to advise policy in a practical way.

Finally I will briefly examine some population control measures and comment on their success (or otherwise) and try to suggest what might have been done differently.

## **II A Brief History of the Fertility Gap**

### *The colonisers....*

What is fascinating about this phenomenon is the degree to which the experience of countries as regards the fertility transition has varied. Among some early developing countries there was virtually no gap between the decline in death and birth rates (indeed, in some countries falling fertility preceded a fall in mortality). This could be ascribed to "frontier conditions" whereby fertility was high at the outset and fell as the process of settlement proceeded. This group includes the US, Canada, Argentina, Chile, Australia, New Zealand and the Russian empire.

### *....and the rest*

On the other hand, a large swathe of other early developers had a much more protracted fertility transition. The reduction in fertility in England and Wales only became pronounced 75 years after the sharp fall in mortality witnessed in the early 1800's. Interestingly, this period was one in which the balance of power shifted somewhat away from capital in favour of labour with the delegalisation of trade unions, the regulation of factory conditions, and perhaps most critically, the Reform Bills of 1832 and 1867 which gave the vast majority of adult males the vote. Similarly, the Scandinavian countries spent over a century in demographic quarantine to emerge at roughly the same time as the British.

An interesting example is that of Japan whose sustained fall in fertility only took place following defeat in WW II. Prior to this, however, birth-rates were noticeably low (only 23 per thousand in the early 1870's compared to 41, 47 and 35 in the US, Russia and the UK respectively). This is despite the fact that the modern Japanese economic miracle only began to take root following the signing of the treaties opening the country to external influences, the first of which was signed in 1854 under pressure from Americas "envoy" Commodore Matthew C. Perry. Subsequently during the Meiji and Taisho eras (1868 - 1925) birth rates rose considerably, though all this data must be treated with some caution given the possibility of prior under-registration of births and infant deaths. The decline in the birth rate since 1945 has also been particularly sharp, falling to 9.6 per thousand in 1995. The Japanese experience would seem to confirm the intuitive belief in the importance of institutional factors (e.g. religion) in fertility determination, which act independently of the level of development.

*The Third World Experience*

The third chapter in the history of the fertility lag is the one that currently preoccupies development economics - the third world experience. What differentiates the current wave from the earlier developers is the fact that the lag in the fertility fall in LDCs is much more common and the resultant rate of natural population increase much larger than was previously the case.

The sociological problems identified with this increase (poverty, malnutrition, etc.), coupled with the increased awareness of the probable effects of development on the global environment have combined to intensify the urgency with which the population problem is considered. The problem is exacerbated by "population momentum" whereby high population growth will continue for a significant period after the fall in birth rates, as (simplistically) the last of the large generations reach and pass child bearing age.

It is rare that an examination of faceless statistics gives the reader a true sense of the scale and impact of a phenomenon: population growth, due to the explosive course it has followed since the turn of the century, is one of those exceptions.

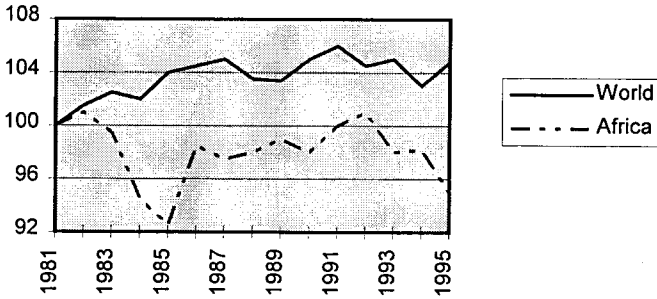
Year	Estimated World Population in 000,000's	Estimated Annual % increase
10,000 B.C.	5	
1	250	0.04
1650	545	0.04
1750	728	0.29
1800	906	0.45
1850	1,171	0.53
1900	1,608	0.65
1950	2,576	0.91
1970	3,698	2.09
1980	4,448	1.76
1990	5,292	1.73
2000	6,260	1.70

This level of population growth has obvious repercussions:

- **Food Supply:** Currently there are 840 people suffering from chronic hunger or malnutrition. While food production per person has been

rising, distribution remains an ongoing problem. In Africa, it is estimated that 43% of the population is undernourished.

**Food Production (per person index)**



- **Unemployment:** It is estimated that 1 billion people or 30% of the world's workforce are either jobless or underemployed. With a heavily skewed demographic profile due to the population explosion, the world's economies are having difficulty providing jobs for a large number of the new entrants onto the market (net of the relatively small number of exits due to increases in life expectancy). The whole question of the degree of urbanisation due to population growth also merits mention.
- **Child Labour:** Child Labour has recently been estimated at 250m. While most working children are in Asia (153m), the highest incidence is in Africa where 40% of all children work. Irrespective of the causative effects of large population growth on the incidence of child labour (which is debatable), the raw absolute figures in themselves must be a cause for concern. Even more worrying, a survey in the Philippines found that 60% of working children are exposed to chemical and biological hazards, and 40% experienced serious injuries or illnesses.

### **III The Main Causes of Population Growth**

#### *Introduction*

The concept of "child cost" is a means of explaining changes in levels of fertility in a peculiarly economic mode of analysis. In essence, the idea is that as children are perceived to become more expensive due to either an increase in costs (such as education) or a reduction in the child's ability to earn income (such as an increased number of years in schooling) then parents will reduce their desire for offspring.

As would be expected, empirical confirmation or refutation of the results of such an analysis is a virtual impossibility given the need for time-series investigations. This, by the very nature of population growth (a long term phenomenon) and lesser developed countries (poor historical data due in part to the change over time in the degree of infiltration of a standard unit of account<sup>1</sup>) is problematic. The principal means employed by economists, therefore, has been the use of piecemeal surveys which by their nature are also quite unsatisfactory. For this and other reasons I will only present the logic behind child-cost analysis rather than present a set of results as a fait accompli.

This mode of analysis can be used to examine a number of factors thought to influence demand for children, namely:

- 1) Female/child participation in the work force
- 2) The desire for support in old age
- 3a) Opportunity cost: Other consumer goods
- 3b) Opportunity cost: Capital accumulation
- 4) Costs of education

*But first, a caveat....*

At this stage it must be admitted the child cost analysis does not pretend to cover all aspects of fertility determination. Some of the factors that are not included are:

- Given a family's desire for a particular number of children they must have access to family planning education and contraceptives so as to realise their preference.
- The effect of reducing infant mortality is not considered. This might be important due to risk aversion - parents are concerned with the number of 'lives' rather than the number of actual births. In a world of high infant mortality, this might manifest itself by people having more births than was necessary as an insurance policy against an unusually large number of deaths (in practice, this does seem to be a very real phenomenon).
- At the household level, differences in fecundity are not considered.

Perhaps a more fundamental flaw is that child cost analysis is microeconomic by design. If a society's need for children is less than the collective sum of the need of all households (as with a country in the process of development) then it might evolve socio-economic mechanisms of a non-economic nature to

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<sup>1</sup> In its broadest sense.

influence decisions on fertility. Such defence mechanisms could only be possible to detect on the macro level.

Two alternative, though complementary, angles on the whole issue of fertility determination can be identified as follows:

- The threshold of economic consciousness: This early model suggests that before a certain (and generally unspecified) threshold, the only upper bound on family size is the traditional norms as regards intercourse, breast-feeding, etc., and that *Homo economicus* does not emerge until afterwards. Price movements and incentives are simply not perceived.
- A slight refinement on the above is that, prior to a threshold, children are supply-determined, subject only to social and biological constraints. As development progresses, a point is reached where fertility increases due to relaxed marriage restrictions, improvements in fecundity and lower child mortality. Only when demand falls below potential supply can it be said that the threshold has actually been reached.

#### *Child Costs and Fertility Determination*

To aid brevity, the discussion to follow will occasionally make use of two polar societies as comparisons:

Type I: A stagnant, traditional, agrarian society with very low marginal productivity of both capital and labour - i.e. very early stages of development.

Type II: A progressive community with growing income, growing demand for labour and capital and where tastes are being developed for a wider range of consumer goods - i.e. more mature state of development

Most LDCs could be placed somewhere in the continuum between these two extremes.

#### **1) Female/child participation in the work force**

As a society moves from Type I to Type II, the effect of an extra child on total costs depends on:

- The status of women/children: There might be, in classical parlance, an income effect with development making manual labour more or less socially acceptable.
- Wage rate and the labour market: The price effect whereby the higher wage might overcome the income effect for women and/or children.

Tautologically, one of four circumstances will pertain as development proceeds:

Labour Effect	Child Cost Effect	Conclusion	Example
<i>Case 1.</i>			
Mothers Work Less	Lowers Child cost	Lowers child cost	Egypt
Children Work More	Lowers Child cost		
<i>Case 2.</i>			
Mothers Work Less	Lowers Child cost	Ambiguous	Taiwan in 60's
Children Work Less	Increases Child cost		
<i>Case 3.</i>			
Mothers Work More	Increases Child Cost	Ambiguous	?
Children Work More	Lowers Child Cost		
<i>Case 4.</i>			
Mothers Work More	Increases Child Cost	Increases child cost	Ireland
Children Work Less	Increases Child Cost		

Therefore the effect that development has on child costs depends on the stage of development, the structure of the labour market, social institutions (education, child benefit, etc.), cultural norms and the past education opportunities for women (see part 4.).

## 2) The desire for support in old age

The desire for children as a safety net in old age would imply a low (or possibly negative) discount rate due to the fact that the high costs incurred in the child's early development would be offset by the benefits of support many years hence. The argument goes that there are two ways to accumulate the reserve required to provide old age security - by the state, through coercive taxation, or by the household itself. In the absence of state involvement, a household in a Type I society cannot readily accumulate capital by investment in water pumps, irrigation, etc. (see section 3b). The only means open to them is capital accumulation by investment in additional children.

However, can this logic, which is widely accepted among development economists, stand up to closer examination? There are a number of reasons why I think not.

Firstly, it must be remembered that this discussion focuses on additional children over and above the first two or three whose production is wholly non-economic in nature (as the limiting case of modern western society attests) due to the basic (Darwinian?) desire to propagate the species. The first three children are not significant for our purposes either - it is the additional children which create the problem. How much additional children can add to old age support is surely quite restricted.

One of the principal means by which it is restricted is societal inheritance norms. If land is typically inherited by the first male and parents live on that same plot until death, then the desire for children over and above three would not be significantly welfare enhancing in old age. In Ireland at the time of the famine this "first-born" inheritance trend was evident across the economic spectrum, from small farm owners (< 5 acres) to the landed gentry. To stress the point, it should be remembered that emigrants from Ireland in the 1840's were disproportionately composed of younger children. With increased migration flows in LDCs from rural to urban centres, this point might be equally relevant to the third world. While admittedly there were large transfers from the US to Ireland by expatriates, the income differential between urban and rural regions of LDCs is generally not as pronounced<sup>2</sup>, therefore limiting the extent of intergenerational wealth transfers.

There are also two good reasons why additional children might detract from old-age welfare. Firstly, it could be argued that additional children (and thus additional grandchildren) could be seen as competitors for limited resources when old age is reached. Secondly, the tradition of the dowry is still prevalent in many LDCs, and having additional children increases the risk of a large payout at a time when the parents would be approaching retirement.

Why then has the research that has been carried out which shows consistent support for the idea of old age security as an important factor in fertility determination wrong? The evidence shows that when asked what the advantages of having children (note, not *additional* children) were, the old age security response fell as income rose. However, the introduction of old age security in many countries was only one of many measures introduced. The respondents' answers merely reflect the 'state of things' which depends on the capabilities of a society at a particular point in time. It takes a huge leap of faith to interpret from this as evidence of a causal relationship between old age security and the actual deterministic process of choosing family size by young couples. A more practical problem with many of these surveys is that they are frequently conducted in the presence of the children making it in the parents interest to stress the importance of old age security. This seems like a very basic error on the part of the researchers but, in practice, it is frequently unavoidable given the extent of co-habitation and the fact that the interviews are conducted orally due to wide spread illiteracy.

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<sup>2</sup> Noting in particular the belief that an increase in urban employment in LDCs will result in a substantially larger increase in urban unemployment due to the attraction of the new jobs to rural dwellers. The Irish were never in a position to swell the ranks of the US labour market to a significant extent.



In conclusion, I doubt whether the need for protection in old age is a factor which young couples consider as significant when deciding optimal family size.

### 3a) Opportunity cost: Other consumer goods

For a Type I community, the range of consumable alternatives to children is very limited. As the community progresses to Type II, where real income and productivity are substantially higher, the possible alternative bundles of consumption rise in quality, quantity and range. Therefore the opportunity cost of children has also risen.

There is some disagreement as to whether this factor should be measured as absolute child costs (i.e. in terms of £'s and time foregone) or as a relative concept. The latter has the attraction that it goes some way to isolating the effect of changes in relative price as a determining factor. The former is the most commonly employed, however, given that it is easy to measure and that direct comparison between quantities (both resources and time), as well as prices, is sometimes a necessity. Absolute cost is affected more directly by the quality of child a couple feel they must have.

### 3b) Opportunity cost: Capital accumulation

As has already been noted, households of Type I have few (if any) potential investments into which capital can be accumulated other than children. As development proceeds, a farmer has the option of investing in fertiliser, irrigation, etc., and an additional child becomes a competitor for such resources. In essence, the opportunity cost of a child rises due to the new found alternative investments whose discount rate might significantly exceed that of a child. Note that capital accumulation *per se* is treated differently than the desire to provide for a specific event (e.g. for old age) due to the former being essentially a passive phenomenon.

## 4) Costs of Education

The costs of education are one of the key factors that raise child costs as development proceeds. They can be more precisely identified as:

a) *Loss of child working hours*: This should be further subdivided into work inside and outside the home. In relation to the latter, this will only become significant at a fairly advanced level of development (Type II) as only when education becomes common after age 10 - 12 will outside work be adversely affected. The former, however, will affect household income at all stages of development as outside work by the mother may have to be sacrificed to allow for time lost due to the children's schooling. The relevant importance

of this factor depends on the wage rate which the mother and the child could command in the outside world.

*b) Fee Cost:* A factor that is sometimes easy to overlook but which can in itself be a significant burden on the family (Kenya would be a good example).

*c) Higher Future earnings:* If the reasons for parents to have their children educated are purely economic then the higher earnings they might command would obviously be of critical importance to the decision of whether to send children to school or not. The importance of this can be related back to the discussion on old age security and more specifically the extent of inter-generational wealth transfers in practice.

While the education of girls in particular is not of real relevance to the child cost debate, it is in itself of crucial importance, and therefore merits mention. The education of girls is often neglected due to the traditional male bias of many societies, a fact that has obvious repercussions as these girls reach child bearing age. In India, for example, female adult illiteracy is almost double that of males. In response to this, a scheme called the District Primary Education Programme (DPEP) has been introduced at a cost of \$1.2bn over six years with the aim of both improving education standards for both sexes and reducing gender inequality. It plans to do the latter by both updating the curriculum and starting community based projects to educate people as to the benefits of female education.

### **Perception vs. Reality?**

As an aside, all this logic presupposes a strong link between real and perceived costs. It would be unreasonable to assume that every family could calculate with actuarial rigour all future possibilities - a calculation that would necessitate an ability at economic projection beyond that of most economists. The gap dividing the two can be explained by the temporal and psychic weightings that people ascribe to particular costs or benefits.

The following points are of interest in relation to this 'reality gap':

- Do parents act rationally or adaptively when determining family size?
- Given the relative infancy and limited scope of active government in many LDCs, are their actions perceived as being permanent or transitory?
- Do violent short to medium term fluctuations in prices - a typical state of affairs for many agrarian societies - in any way blur the underlying trend, hence resulting in a shortening of agents planning horizons?

#### IV. Conclusion

As has already been mentioned, it would be virtually impossible to validate the above argument empirically. However we can broadly say that there are a number of policies which would seem to be advisable on the basis of common sense.

- a) Create employment opportunities for women outside the home: As in the example of the DPEP programme in India, this factor is of crucial importance in that having additional children greatly reduces the household's income. At a more short term level, limiting maternity leave to a maximum of 2 children (as in Singapore) and reducing tax relief on additional children will encourage women already in employment not to have further children.
- b) Old age security: The widespread belief in old age security as one of the key planks in reducing fertility should be re-examined. The scarce resources that it uses up might be better directed at education, health or infrastructural spending.
- c) Minimum-age child labour laws: As an objective this is clearly desirable, especially in light of the ILO survey (see page 3). Care must be taken, however, to ensure that the medium term prosperity of the country is not endangered by the imposition of over rigorous controls in a very short time period. The use of such an argument as a trade weapon (as is currently being witnessed through the WTO) should also be avoided.

Action aimed at reducing population growth should also vary according to the stage that has already been reached. Some determining factors will exhibit "diseconomies of scale" (e.g., the old age security added by the seventh child is very small relative to that added by the first) while others will have a constant level of importance (e.g. a child's ability to earn income outside the home). Put simply, the medicine prescribed should reflect the extent of the symptoms.

In conclusion, the success or otherwise of non-economic attempts to reduce fertility will ultimately founder if the basic reasons why people choose to have large families are not tackled. Quite apart from its relative efficacy, using economic incentives is a more humane way of controlling population than direct coercive methods such as enforced sterilisation. Perhaps a close examination of the Chinese experience over the next ten years will, if not answer all the questions, at least provide ever greater clues.

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