WHAT DO ECONOMISTS REALLY KNOW ABOUT
POPULATION? OR, THE BENEFITS OF COST-
BENEFIT

By

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## ABSTRACT

This paper distinguishes two approaches to the economic evaluation
of the benefits of population control, the simple cost-benefit approach and
the approach through macroeconomic models incorporating the population variable.
While indicating some advantages of the second approach, it is suggested that
the two approaches have some important common elements and some of the same
important limitations.  Various criticisms are categorised and reviewed.  It
is concluded that economists know much less than they think they know about
the rate of return on population control expenditures, and that not too much
weight or generality can be attached to the rather precise estimates made of
the costs and benefits of a prevented birth.

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This paper distinguishes two approaches to economic evaluation of the benefits of population control, the simple cost-benefit approach and the approach through macroeconomic models incorporating the population variable. While indicating some advantages of the second approach, it is suggested that the two approaches have some important common elements and some of the same important limitations. Accordingly it is suggested that economists know much less than they think they know about the rate of return on population control expenditures, and that not too much weight or generality can be attached to the rather precise estimates made of the costs and benefits of a prevented birth. Since Kenya is about to embark on a significant programme of expenditure on family planning and population control, and the population problem in Kenya is the subject of a lively current debate, it seems useful to examine in some detail the analytical basis of these general approaches to population economics.

COST-BENEFIT ANALYSIS: THE VALUE OF A PREVENTED BIRTH

The pioneer in the application of cost-benefit analysis to population control has been Stephen Enke. (See 3, 4 and 7.) He has recently admitted to the existence of weaknesses and simplifications in his earlier work, and claims these are corrected in his later formulations. However it will be useful to examine his early work as a guide to the usefulness and limitations of the general approach, and also because some elements of the earlier formulations remain in Enke's work and that of the other modern population macro-model makers.

In his 1966 article he starts by pointing out that if we wish to maximise the value of output per head, V/P, we may choose between investments which increase V and investments which reduce P. Suppose a net investment of $0.5 million were made each year in industrial plants, amounting to a total investment of $5 million over a 10 year period. If the rate of return were, say, 15 per cent, yielding an increase in the value of output each year of $0.5 \times 0.15 = 0.075$ million, the increase in the level of annual output at the end of ten years would be $\Delta v = \$ 0.75$ million. If the initial output level V was $500 million, then the proportionate increase in annual output would be

$$\frac{\Delta v}{V} = \frac{0.75}{500} = 0.0015$$

This may be compared with the same investment of $0.5 million per annum in a family planning programme for the insertion of intra-uterine devices (I.U.D.s). Enke estimates the cost of one I.U.D. insertion at $1, so that the investment covers 500,000 participants each year for 10 years. If the live births fertility per participant is 0.15 infants per annum (150 per 1000 participants), then the downward change in population over 10 years resulting from the programme would be

$$\Delta P = 0.5 \times 10 \times 0.15 = 0.75 \text{ million.}$$

Suppose the initial population were 5 million (and income per head thus equal to $100 to begin with). The proportionate change in population $\Delta P/P$ would be 0.15. Enke is therefore able to calculate what he calls the 'superior effectiveness ratio' of birth reduction over output expansion as:

$$\frac{\Delta i}{P} \Big/ \frac{\Delta v}{V} = \frac{v\Delta P}{P\Delta v} = \frac{0.15}{0.0015} = 100$$

implying that it is 100 times as effective to reduce population by investing in family planning programmes as to invest in industrial plants!

This ratio, he says, will vary depending on the fertility rates assumed for women entering the programme, f, the rates of return for industrial investment, r, and the servicing cost per participant. He provides a table, however, to indicate the sensitivity of his results to different values of f and r:

Table 1. Superior - effectiveness ratios for different f and r.

| r \ f | 0.10 | 0.15 | 0.20 | 0.25 |
|---|---|---|---|---|
| 0.20 | 50 | 75 | 100 | 125 |
| 0.15 | 67 | 100 | 133 | 167 |
| 0.10 | 100 | 150 | 200 | 250 |

The ratios range from a minimum of 50 up to 250. Doubling the cost per participant would halve the figures, still leaving a range from 25 to 125.

The superior - effectiveness ratio is essentially a rule - of - thumb, which nevertheless brings out some important aspects of the Enke approach. The basic underlying assumption is that the decrease in population, $\Delta P$, has no effect on output, that is, does not affect $\Delta v$ : the return from the population programme is measured by the effect on income per head <u>of</u> <u>removing heads</u>. This is possible only because the persons eliminated are,

for their first 15 years, only children, with no contribution to output: their later productivity as adults is not counted, because the application of a rate of discount is enough to reduce their discounted value for the period concerned to zero. We shall suggest later that it is not satisfactory to dismiss the long run in population economics in such a simple manner. But, secondly, if the application of a rate of discount is so crucial to the analysis, it is also unsatisfactory for it to appear in this disguised form: we need to make it explicit within systematic cost- benefit analysis. Finally the assumption of an infinitely elastic supply of candidates for I.U.D.s at $ 1 per time is also questionable. Again we shall discuss presently the great uncertainty which exists regarding the response factor - the extent and nature of the response to family planning programmes - and the doubt therefore surrounding any estimates of the cost of preventing a birth in a particular country. In his early cost-benefit articles Enke takes the benefits to be the sum of the amounts the prevented birth would have consumed during his or her lifetime, and the costs as the sum of contributions to national output which the person would have made. The value of a prevented birth is then given as the present value of an infant's expected stream of consumption and production. That rate of discount which makes the present value zero is the rate of return on investment in birth prevention. Alternatively, if we use as the rate of discount the market rate of return for alternative investments, then a negative present value for the birth implies that it would pay society to bribe the potential parents not to have children, up to the point where the present value goes to zero.

The cost-benefit calculation can be laid out as follows:

$$\sum_t \frac{B_t - C_t}{(1+r)^t} \geq P \tag{1}$$

where P is the cost of preventing a birth through the family planning programme, $B_t$ is the consumption saved in year t by having prevented the birth (the amount the person would consume in year t), and $C_t$ the contribution to output in year t that is lost. This is conveniently divided up into three time spans:

$$\sum_{t=o}^{14} \frac{B_t}{(1+r)^t} + \sum_{t=15}^{60} \frac{B_t - C_t}{(1+r)^t} + \sum_{t=61}^{t=65} \frac{B_t}{(1+r)^t} \gtrless P \tag{2}$$

This assumes that the person is a 'pure consumer' for the first 14 years of his life, has a working life from age 15 to 60, and enjoys a retirement period, again as a pure consumer, to age 65. If a 15 per cent rate of discount is selected (r=0.15), as done by Enke, the present values of the last two flows are negligible.

and the value is determined almost entirely by the first term comprising consumption expenditure as a child (both expenditure by the parents and social expenditures). Since by his estimate P is also negligible, of the order of one dollar, there is an overwhelming advantage in preventing the birth. It is worth noting, in anticipation of our discussion of this aspect later on, that with P = $1 the cost of the family planning programme itself is almost inevitably negligible in equation (2) compared to the values of $B_t$, $C_t$, and r, and indeed is not significantly different from P=0.

The calculation can be helpfully illustrated as in Fig.1, taken from Liebenstein.(9)   Here it is assumed that the consumption saved is constant each year at 100 units, and production also constant at 40 for the period of working life.  A logarithmic scale is used for the simplicity of
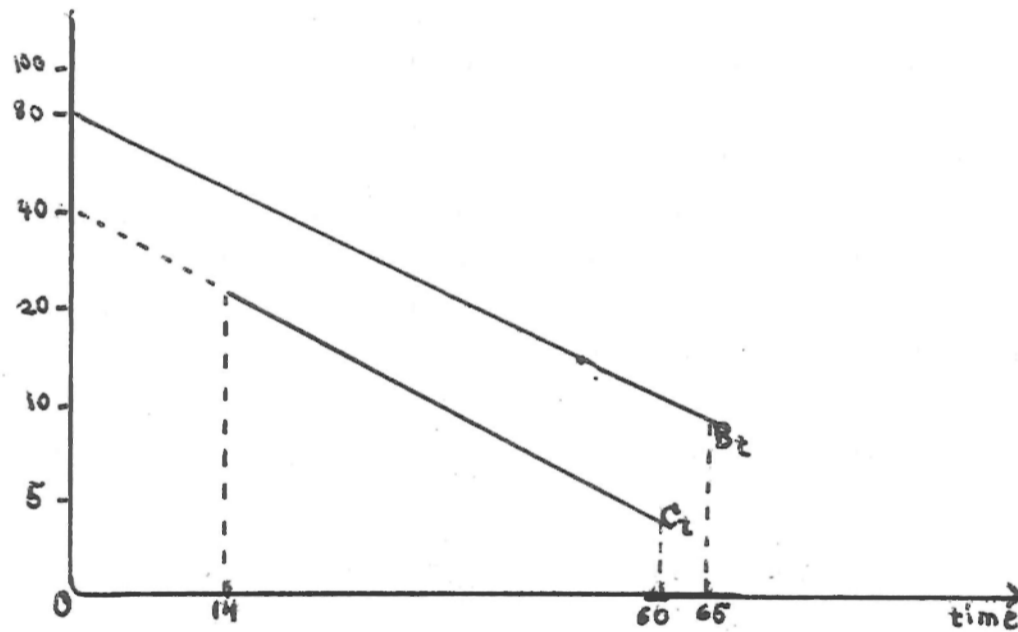


Fig. 1.  Present Value of a Prevented Birth.

working with straight lines.  The vertical distances are all present values and these diminish at a steady rate, 100 units of consumption being worth progressively less the further away in time it is.  The line for production foregone would, if extrapolated, hit the Y - axis at the 40 level.

The sum of benefits, measured in present value, is given by the area under the line $B_t$, and that for costs by the area under the line $C_t$.  As the diagram is drawn, the former are clearly dominant.  One reason for this is, of course, that the line $C_t$ lies well below $B_t$ throughout.  This reflects a particular assumption made by Liebenstein, that the extra person born will add to production an amount equal to the marginal product per period, whereas he will, as an equal member of the family which he joins, be able to consume an equal

share of consumption equivalent to the average product per household.  The
diagram implies a marginal product equal to 40 per cent of the average.  This
is a reasonable assumption for a country with a serious problem of population
pressure such as India, and proponents of the disguised unemployment thesis
might equate it to zero.  It is useful to drop this assumption both for
illustrative purposes, to focus on the second reason for the dominance of
benefits, and also to move away from the 'Asian' model of an overpopulated
developing country and to turn to the African situation where in many cases
land is not a constraint on production and constant returns in agriculture
can be assumed.

With constant returns we should have marginal product equal to the
average (though both, in Africa, at a low level) and the $B_t$ and $C_\tau$ lines
would then coincide over the middle range.  In fact it would make sense to
draw the line $C_t$ above $B_\tau$. since the average product of an adult can be
assumed to be capable of sustaining the adult himself and of providing some
amount for dependents, in exactly the same way as he was sustained in his
first 15 years by the production of adults.

This is done in Fig. 2 which focuses attention on the main reason
for Enke's result, the pure saving on consumption over the first 15 years and
the relative importance, given discounting, of these first years.  Benefits
were clearly dominant over costs in Fig. 1, which was drawn up on the
assumption of a rate of discount of only 4 per cent.  At this rate of discount,
had $C_t$ lain well above $B_t$, the result would not have been certain.  Since
Enke considers the appropriate rate of discount to be something around 15 per
cent, however, we could draw much steeper $B_\tau$ and $C_\tau$ lines as in Fig. 2 (not
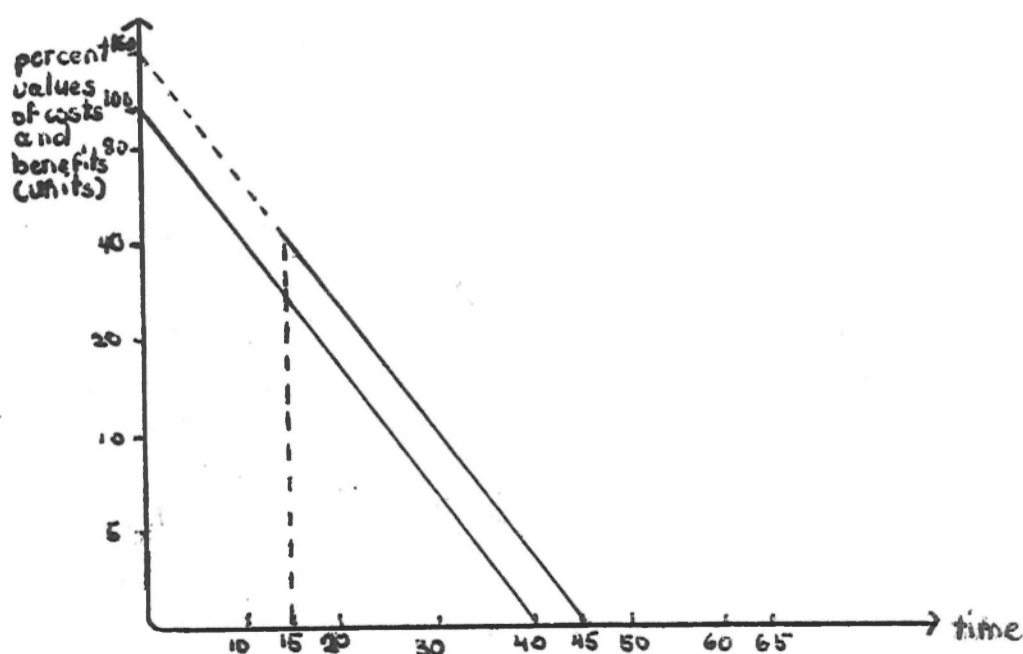


Fig. 2.  Present Value of a Prevented Birth:  New Assumptions.

precisely drawn to scale). In this diagram all costs after the fortieth year, for example, discount to zero. Here the production of an adult is given as 160 units (measured by the intercept of $C_t$ on the Y - axis: later 160's are worth less in present value terms) compared to consumption of 100. A working adult would thus produce a 'spare' 60 units each period with which to support dependents. Because of discounting, clearly, net benefits in the first 15 years easily outweigh  net costs in later periods.

This second diagram is more relevant to the African situation or generally to areas where <u>currently</u> there is no excess population involving high densities and land shortages. It is useful in taking <u>some</u> account of the long run position in that it assumes a prevented birth will mean not only some released consumption during the next 15 years but also the loss of an able - bodied man (or woman) in the longer period <u>who would have been able to produce a surplus capable of supporting some dependents</u> in exactly the same way as present adults are doing.

## Criticisms Relating to the Maximand

Having laid out the theory in the most exposed form possible, we can turn to some criticisms, first, relating to the maximand. One potentially major omission is any account of <u>the value of children to parents</u>. The objective function in Enke's analysis is taken to be simply "to maximize over time the G.N.P. per head of the existing population". This is equivalent to viewing all future additions to population as slaves. Alternatively, to use Liebenstein's amusing allusion, the sum is the same as that for an animal farm in which the farmer calculates a cow's production and consumption streams in deciding how many cows he should have. To be worth while, a child must make a net addition to G.N.P. available to the present population.

As several  observers have pointed out, the family might be quite ready to accept a decrease in their own consumption per head in favour of the extra member. We can view the latter not just as a producer good but as a consumer good, yielding services in the form of his own welcome company as a member of the family, services for which the family might be prepared to sacrifice other forms of consumption. If no externalities were involved this substitution would be an entirely private matter, and the net cost would be zero. If, on the other hand, there were externalities, the net benefit to society from preventing the birth would need to be calculated net of a bonus payment to the family concerned sufficient to provide full compensation, which payment could be very large indeed.

Liebenstein's criticism of the argument is rather different.
(9, also see 5, 6 and 10.)  The difficulty, he says, is the lack of a social
welfare function.  Neglect of the value of children to parents is in the
first place inconsistent with the welfare criterion that an action is
desirable 'if someone gains and no-one loses'..  Consider a completely
self-sufficient subsistence farming family having a third child.  If the
same aggregate consumption is now shared among five rather than four, no one
outside the family need lose from the decision: if the household prefers the
additional child to the extra consumption there will be a net gain.  However
to make a cost-benefit calculation here would, he says, require a social
welfare function "which includes children as well as consumer goods".  But
"no-one knows the appropriate substitutability between children and
consumption goods since children are not bought and sold, and do not have
monetary values".  All valuations must therefore be in utilities, he asserts.
(9, p.117) Liebenstein does not, however, elaborate this point, and is not
at all clear on it.  It is in fact quite difficult to handle.  Two aspects
must be kept distinct: the separation of private and social costs and
benefits, on the one hand, and the actual calculation of overall costs and
benefits on the other.  In the appendix we discuss how this might be
calculated if a thoroughgoing system of bonus payments were in operation,
but conclude that the problem of defining a social welfare function remains.

If, as a result of a purely informative campaign, a number of
parents decide to prevent births, it can be deduced that the psychic income
foregone from these births is less than the private net cost of the prevented
births; and the likelihood is that a fair proportion will actually be un-
desired births for which psychic income is small, zero or even negative.
Enke's calculations might be justified in respect of family planning programmes
which are purely informative and aim at preventing largely unwanted births.
Clearly it is important that the analysis distinguish between wanted and un-
wanted births, and between passive, informative campaigns and strongly
persuasive ones, using bonus payments or even compulsory methods such as
compulsory postponement of marriage: but this is a distinction which Enke
does not clearly make.

Enke does later agree that the psychic value of children to parents,
measured in money terms, should have been taken into account. (5) He is not
obviously aware, however, of the big difference this might make to the
calculation.  Nor is this incorporated into his later work with TEMPO, which
he claims avoids some of the simplifications of his earlier pioneering efforts.

In fact this factor could completely alter equation (2) (See Appendix 1.) and the illustrative diagram, since these are birth prevention costs which occur especially, though not exclusively, in the first fifteen years, and are not eliminated by discounting. This point is a very elementary one, and it will be obvious even to laymen that a balance needs to be made between the possible utility from expanded families and the internal and external costs. It is nevertheless neglected not only by Enke, but by Ohlin in his survey of population economics.(12) From the point of view of *private* costs and benefits, the balance of values of $B_\tau$ and $C_t$ *after* the first fifteen years may be more important, utilities and costs in the first period balancing out. Since there will be public costs particularly in the first years, this will not necessarily hold true for the social rate of return, where the discounting factor and dominance of the first period may be crucial: but here only external benefits from birth prevention ($EB_t$, where $B_t = PB_\tau + EB_t$) would be counted, assuming private benefits and costs balance out.

We should certainly expect on a priori grounds that a sixth or seventh child is not likely to bring the same utility to parents as the first; and this itself suggests that in general the psychic value to parents of children should not be omitted from the cost-benefit calculation. There is evidence from fertility studies that the percentage of parents not wishing to increase their families increases with family size, as indicated in Table 2 below.

Table 2.  Percentage of Parents not Wanting more Children.

| Country | No. of children | | |
|---|---|---|---|
| | 3 | 4 | 5 or more |
| Ceylon | 57 | 69 | 88 |
| Thailand | 71 | 85 | 96 |
| Turkey | 68 | 67 | 76 |
| Philippines | 56 | 68 | 85 |
| Tunisia | 44 | 68 | 87 |
| Brazil | 95 | 93 | 93 |
| Costa Rica | 67 | 78 | 86 |
| United States | 62 | 81 | 74 |

Source: (1), reproduced in (12).

Data on ideal family size as stated in response to direct questions on the issue show in a great many countries (not Kenya) an average ideal of three

or four children,[1] this also suggesting the existence of diminishing marginal utility. In addition, those taking more serious birth control measures, such as fathers offering themselves for vasectomies, are especially those with a large number of children. If therefore the utility derived from an additional birth varies within one family according to the number of children, it would seem difficult to omit parental utility from the calculation.

A second major conceptual difficulty, related to the above, is that the ex post utility derived from a birth may differ entirely from ex ante utility: even babies which parents have tried (and failed) to avoid are generally welcomed and offer the same satisfaction after the event. This implies that the value of a prevented birth may differ from the 'cost' of an unprevented birth. We may nevertheless ignore this complication with some justification on grounds that "what you don't have, you don't miss".

Enke's calculation excludes, thirdly, the utility foregone by the prevented births themselves. It is, of course, rather inconsistent to calculate the utility enjoyed by existing people whose births could have been prevented, and not those whose births actually are prevented. This is also inconsistent with practice elsewhere in economic analysis where it is generally accepted that the social rate of discount applied by the government should reflect also the interests of future generations (unlike the private discount rate), that is, of those who are not yet born. What is eliminated for prevented births is not only the consumption goods enjoyed by them, which are released for others, but even the capacity to consume: the value of life itself. This raises a measurability problem of a quite different order. Welfare economists have been willing to attempt to attach monetary values to life, for instance in relation to road investments and road accidents, but only in relation to the living, not the unborn. At the same time there is some justification in deciding to ignore this element, though this would be contested by Catholics.

Criticisms Associated with the Discounting Procedure

As indicated above, the fantastically high rates of return obtained stem from the fact that the birth yields only costs for the first 15 years, together with the operation of discounting on this. The effect of discounting is very powerful. For instance, a 15 per cent discount rate reduces income earned at age 30 to a present value of one per cent. The entire future production of an Indian baby is reduced to only $17 in the present.(16) This is a rather suspicious result. It means that the released consumption    from

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1.      Such data is reviewed by A. Molnos (11).

the prevented birth is the only matter of consequence, and that reduction by
one in the future workforce is <u>in every case</u> unimportant. It means that the
value of the prevented birth is the same for a family's first child as for
its seventh (a consequence of omitting direct parental utility). It means
that the same high rate of return to birth prevention must have applied <u>to</u>
<u>the existing population as well as to new births produced</u> by this population.
And it means that, since there is nothing in the analysis to cause the marginal
efficiency of investment in birth prevention to decline, all investment funds
should be allocated to family planning programmes.

Such implications have been commented on by other observers. Simon
points out that on Enke's argument income per head would probably be maximised
in the next 15 years if <u>no</u> babies were born in that period, but that "this
would have a cataclysmic effect starting in perhaps 25 to 30 years as the
ratio of the labour force to dependents began to fall towards zero ".(16,
p.63) If, on the other hand, a low rate of discount were taken, to give due
weight to the utilities of future generations, Enke's reasoning "immediately
falls to the ground on its own internal logic", since new babies could now have
a positive net value. A question is raised, therefore, regarding the optimum
policy spanning several generations, that is, which takes into account long
run consequences.

Liebenstein attempts to demonstrate the same kind of apparently
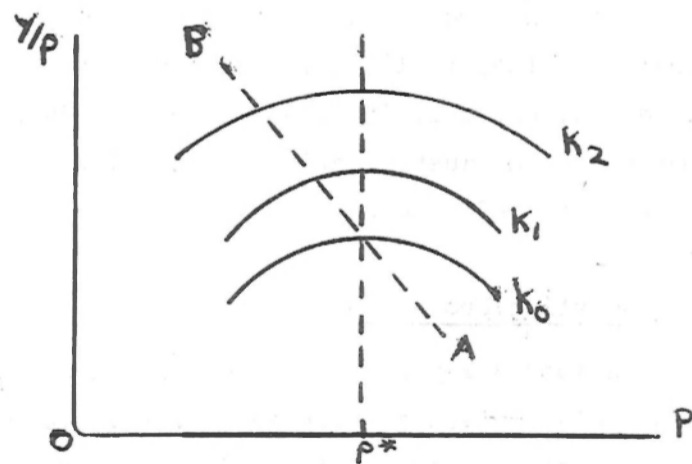peculiar result of the discounting procedure. In Fig 3 he considers a



Fig. 3. A situation in which birth control reduces per capita income.

stationary population which is at an 'optimum' in the sense of maximum income
per head at P*. He assumes further that additions to capital stock, while
shifting upwards the income per head function, does not alter the size of the
optimum population from P*. Birth control would obviously reduce income per

head below the maximum level. Yet the Enke type of calculation would still
indicate such a reduction in population as desirable: since all it requires
is that, while each person consumes what he produces over his lifetime,
consumption precedes production. To a considerable extent, Liebenstein
concludes, the benefits exceed the costs because of the discounting procedure
employed.

He does not however <u>solve</u> the apparent inconsistency. This may lie
in the fact that the picture is timeless and represents a static long run
equilibrium in which the full long run effect of population control is felt
<u>on the size of the workforce</u>; while at the same time no short run or growth
aspect is involved. This would be all right if short term changes led back
eventually to this long run position.[2] However the figure abstracts from the
dependency ratio; whereas restriction of population in the short run would
lower the dependency ratio and thus increase savings and investment. This
would result in a more rapid move from curve $K_0$ to curves $K_1$ and $K_2$, and so
on. Rather than the shifts of the curves being entirely exogenously determined,
the speed of movement would depend on birth rate reduction. The optimum path
might be something like AB, which takes into account both savings - investment
effects and longer run effects on the size of the workforce, and would
depend in part on the returns from investment (shifting the curve upwards).
There is no bias towards the present generation, and the objective function
might maximise the income per head of any one generation, or the area below AB,
spanning several generations.

If we do <u>not</u> discount future generations out of the picture, we can
take account of the compounding effect of birth control on the numbers of
women-at-risk, and thus future births. It is another uneasy result of Enke's
method that this element is lost. Suppose we have an agricultural island
economy, such as Mauritius, in which the available land may be adequate for
the present population and a bit more. If the population were increasing at
a current rate of 3 per cent per annum, doubling itself every 25 years, it
must be worth taking action <u>now</u>: and <u>because</u> of the compounding effect from
generation to generation. This is in fact the standard population problem of
increasing numbers and limited resources, which is ignored in Enke's short
run analysis: Malthus is irrelevant! It may be proper to ignore this problem
if investment is forthcoming in sufficient amount and at a sufficiently high

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2.      This inconsistency is doubly unfortunate in that Enke points out
another in a previous illustration of Liebenstein's in which he posits in-
consistently a zero marginal rate of return on capital and a positive rate
of time preference.

rate of return to expand incomes continuously:which may hold for newly
industrialising nations which have 'taken off', but not for all less developed
countries.

Enke describes elsewhere the external effects of large families
as being due to the fact that the prolific families will not stay on their
own subsistence holdings, but that young men will go off "to compete as industrial
workers and indirectly for the use of other factors of production". Simon
points out the inconsistency here, since by his own reasoning no public cost
would be involved, in present value terms, if "not many heads of government
look beyond 15 years". Apart from this inconsistency, however, the significant
thing is that Enke diverts attention to the private versus social cost aspect,
and away from the problem of reconciling short and long term aspects.

Figure 3 is useful in illustrating in an elementary way the inter-
action of these two aspects of the problem. It gives an insight, moreover,
into the fundamentals of the macroeconomic population models which we shall
be examining presently.

A second crucial assumption of Enke's, apart from the general
formulation, is the actual social rate of discount selected. It is of course,
a matter of general debate what the appropriate social rate of discount might
be in the typical less developed country. If we look briefly at the basis
of discounting, we can say that governments should not exhibit 'pure' time
preference: they should weigh equally the welfare of present and future
generations. If income per head in the future is expected to be higher than
the present level, as is likely, this would, on the other hand, justify private
and governmental discounting on grounds of diminishing marginal utility of
income. And, most important, if present income or consumption can be exchanged,
through investment, for a larger future income, then present income will be
worth more by an amount equal to the marginal rate of return on investment.

If we leave out of consideration all except the last of these, then
the social rate of discount to be used will be the marginal rate of return
on investment, that is, the rate of return on projects competitive to the one
at hand. Enke argues that the rate of return on projects in less developed
countries can be observed to be of the order of 10 to 15 per cent, and would
need to be as high to divert capital from just as profitable investment
alternatives in the developed countries. (5) Accordingly he considers a 15
per cent rate of discount to be justified.

This leads us to appreciate a crucial element in his theory the full significance of which has not been made clear by either Enke or his critics. The same element is an integral part of the later macroeconomic models of Enke and those of others. The dominance of the early period in his cost-benefit analysis depends on a high rate of discount, which can only be due to the high marginal rate or return on capital assumed, not to time preference resulting from increasing incomes. Thus although the presentation is static, the analysis is essentially dynamic: population control reduces the ratio of dependents to workers, and 'releases consumption' to provide savings for investment. The high present value of a prevented birth thus reflects the high rate of return on investment assumed. Thus the rate of return on birth control turns out to be only a proxy for the rate of return on other investments. Thus the choice is not between investment in other projects, but between consumption on the one hand and birth prevention plus investment in other projects on the other. This is clear from Figure 3, which shows the optimum path to depend on the long-run productivity of labour and on the immediate returns to investment.

Unfortunately, Enke's assumption may not be justified. It would imply firstly, that capital is the only bottleneck in developing countries, a view no longer widely supported, and secondly that there are unlimited opportunities for investment at the existing rate. Much more likely is an investment function of the form given in Figure 4.
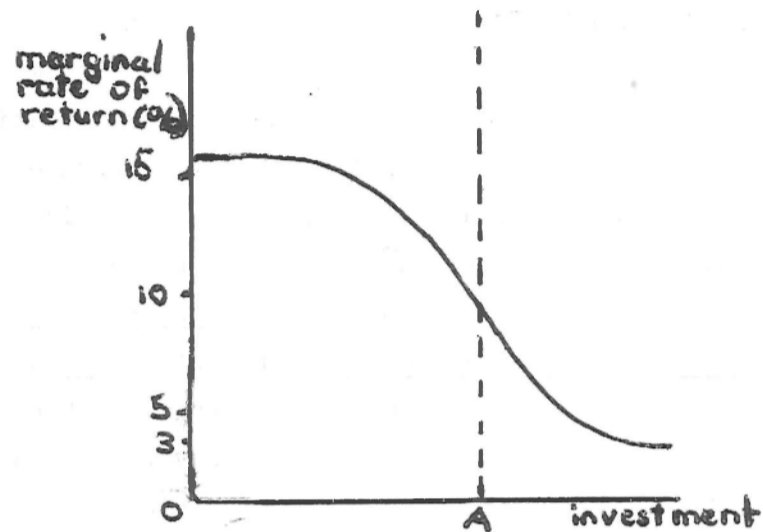
Fig. 4. <u>The marginal rate of return on investment with limited investment</u>
<u>opportunities</u>.

This depicts a situation in which there exist at any one time a definite
number of feasible investment projects yielding very good rates of return
in a developing country (the curve shifting to the right over time as
investment opportunities are developed) after which the marginal rate of
return drops sharply:[3] a mineral economy would be an extreme example, but
usefully represents the investment situation in many less developed countries.
If there were unlimited opportunities to invest in less developed countries
at a rate of 15 per cent per annum, these countries would not remain very
long underdeveloped, and the lives of development bank and other officials
looking for good projects in which to invest would be very different from
what they obviously are. Enke would appear to be confusing the <u>average</u>
and <u>marginal</u> rates of return.

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3.      A 3 per cent rate is not so low if we take into account a
discount for riskiness, as we ought:  3 per cent would be an average on
marginal projects some of which will fail and some of which will yield
more.

Looking at Fig. 4, released consumption might permit investment **either** in projects within the range OA carrying rates of return of 10 to 15 per cent **or** projects outside this range carrying only a 3 per cent rate. This has a number of implications. To the extent that Enke's 'staggering rates of return' to family planning expenditures depend on a 15 per cent discount rate, this would apply only so long as investment possibilities were in the range OA. Beyond this a 3 per cent rate would apply, and the future output of a prevented birth would not be discounted to zero. An output of $200 at age 25 would have a present value of $100, and compare favourably with consumption at age 0. The long run would once again be important: it would no longer be necessarily rational to invest all resources in family planning: only that amount sufficient to release the amount of consumption/savings which can be invested at the high rate, and to the extent that these funds cannot be cheaply obtained elsewhere.

## Criticisms Relating to the Response Factor and the Cost of Preventing a Birth

We can turn now to the last element in Enke's cost-benefit equation, the cost of preventing a birth, P. The cost-benefit approach estimates this by a simple but mechanical rule-of-thumb in an example given by Ohlin "the insertion of an I.U.D. will cost approximately $2 per person and the average I.U.D. will stay in place for approximately two years (at a cost of $1 p. a.) and since the ratio of women in the child bearing ages to the number of children born per year is approximately 5 to 1, the cost of a prevented birth is about $5". The resulting value for P is so small as to be negligible in relation to the rest of the equation. This seems to imply that the only cost is that of supplying devices to a queue of waiting women or of providing facilities for sterilisation to satisfy the demands of those desiring operations. It entirely ignores the publicity costs and the costs of **persuading** recipients to accept birth control measures. In fact if strong resistance to birth control exists in the area, the costs could be very high, even reaching infinity, if no one can be persuaded.

In fact very little is known about the costs of administering family planning programmes. According to Liebenstein, estimates vary "from a low of about $24 in Taiwan to something over $7,000 per birth prevented". (9, p. 166) Robinson also points out that very few efforts have been made to calculate costs of actual programmes. (14) In contrast with an Enke estimate for I.U.D.'s of $1.11 per birth prevented, he

quotes one detailed cost estimate in Taichung, Taiwan, made in 1963, of $6.48 per I.U.D. inserted, or roughly $25-30 per birth prevented: and in a country with unusually favourable conditions for a family planning programme.

There are a number of practical difficulties in making any estimate of the results of a family planning programme. Acceptance of a particular contraception method under the programme may represent only a 'substitution effect', recipients merely substituting this for other birth control measures already in use. 'Folk' methods of birth control such as withdrawal are historically very important and are still in widespread use. In the China - periphery countries such as Taiwan, Hong Kong and Singapore, abortion and infanticide have been practised on a wide scale, and the substitution effect here is likely to be substantial. There may also be compensating effects, such as a simultaneous reduction in the age of marriage, essentially another form of substitution. Similarly there may be 'switching' as between private channels of contraceptive assistance to the government programme, though equally there may be a 'spin-off' from programme publicity persuading parents to adopt control measures outside the programme. Finally there is considerable uncertainty regarding continuation rates. Table 3 gives first method continuation rates for selected countries. The mean rates after

Table 3.  First method continuation rates for selected countries.

| | I.U.D. Acceptors continuation rates | | Pill Acceptors continuation rates | |
|---|---|---|---|---|
| | 12 months | 24 months | 12 months | 24 months |
| Korea | 57 | 38 | 26 | - |
| Singapore | 69 | - | 56 | - |
| Taiwan | 67 | 54 | - | - |
| Mauritius | 68 | - | 53 | - |
| Hong Kong | 66 | 49 | 58 | - |
| Thailand | 76 | 56 | 71 | - |
| Bangla Desh | 74 | 66 | - | - |
| Pakistan (West) | 56 | - | 62 | 47 |
| W. Malaysia | 68 | 52 | 35 | - |
| Ceylon | 81 | 69 | 56 | - |
| Philippines | 70 | 55 | 60 | 38 |
| India | 77 | 54 | 32 | - |
| Mean | 69 | 55 | 51 | 43 |

Source:  (15).

two years are given as 55 per cent and 43 per cent for I.U.D. and pill
respectively. These figures are not, of course, too acurate, but the
order of magnitude is indicated. This factor alone could dwarf the costs
of I.U.D. insertion as calculated by Enke, since it indicates that
parents may only postpone the birth one or two years rather than
prevent it: the saving might then be only one or two years' consumption,
and not fifteen, depending on the effect on ultimate family size. The
above are, of course, only first-method continuation rates, and couples
initiated under the programme may switch to other methods. But it is clear
that it is not enough to measure programme success by numbers of pills
distributed or I.U.D.'s inserted: there may be little relation between the
cost of acceptance of contraception and the cost of a net birth prevented.

There are, therefore, a great many difficulties in assessing
what the actual cost of preventing a birth has been in a specific programme
and specific location.

It is even more difficult to estimate what the response would
be, and thus the costs per prevented birth, in a greatly expanded
programme or in new locations and countries.

We can however make two suggestions regarding responses, which
appear plausible. First it seems reasonable to hypothesise some sort of
'response function' for family planning acceptance in any particular
area. A programme will most likely tap first couples with least
resistance to adopting birth control (including those already using
some form of contraception and substituting the recommended method) but
could find it progressively more difficult and eventually almost impossible
to find new recruits. The situation might be as described in Fig. 5,
which gives the cost per prevented birth as a rising function of the
number of births prevented. This shows three phases: phase I, with a
very low cost, referring to couples looking for assistance, and to
unwanted babies; phase II to couples reluctant but capable of being
persuaded to adopt birth control, but at a higher cost in terms of
publicity; and phase III, comprising a fairly solid wall of resistors.

The second point, somewhat in contradiction to the idea of a
defined response function, is that most births are not caused or prevented
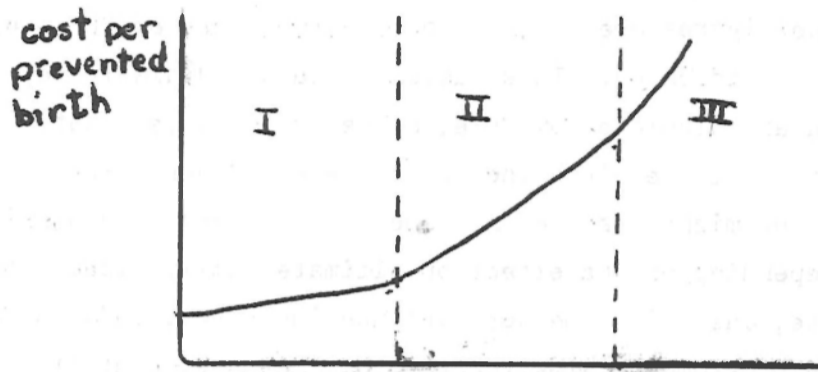according to a calculation of cost and benefit, but through a much less

Fig. 5.  A possible response function for family planning programmes

rational process.  Two pieces of evidence from Britain may be cited
in support of this.  The clear downward trend in the birth rate was
temporarily interrupted in 1958 as a result of a scare regarding the
possible side-effects of the pill.  In the winter of 1974, following the
coalminers' strike, the government ignored warnings which proved to have
substance, about the effects on the birth rate of early - evening closure
of television programmes with the aim of saving electricity.  This
evidence suggests that the category of unwanted or not positively
wanted babies may be quite wide and that the scope for persuasion may
also be greater, persuasion aimed not at preventing desired births
but at taking of proper steps to avoid non-desired births.  Such persuasion
would include making birth control facilities accessible as widely as
possible.  How important this category is in any particular situation,
of course, still needs to be discovered and could vary widely.

Enke shows very little awareness of the problem of response.
He states, for example, that his estimates "assume participants volunteer
without expensive propaganda campaigns".  In addition he calculates
resource costs for eight different birth control methods, all, except for
the pill, very small, and then proceeds to work out cost-effectiveness
ratios for each of them, finds these to vary "by a factor of 250 times
between the most and the least costly", and hence says "the choice of a
method to stress is important".  (3, p. 50)  If it is true, as Liebenstein
says, that:

> On the cost of birth prevention, the low cost of devices
> (condoms, pills, I.U.D.'s) are, of course, a trivial
> aspect of the problem. It is the 'non-device' costs -
> communication, administration, and the cost of overcoming
> psychological resistances - that can range all over the
> map. (9, p. 119)

then Enke's exercise has no meaning. It does not indicate the relative
value of withdrawal and the pill, for instance, as alternative methods.

Ohlin is more circumspect on this point, and makes modifications
to cover administrative overheads and publicity costs, but in the end
arrives at not very different figures; altogether only $5-10 per prevented
birth is required for "an effective population policy". He argues that
"it is difficult to undertake any calculation of the economic gains that
might be realized from population control which does not point to very
spectacular benefits". (12, p. 120) Simon considers the response factor
explicitly, but discards it:

> Persuasion campaigns do require real resources for salaries,
> printing, radios, etc. But even expenditures many times any
> conceivable sum for persuasion would not use up enough resources
> to make the withdrawal from other investment of any importance.
> For example, the Indian Institute of Management prepared what
> they considered a very ambitious mass advertising plan. The
> budget recommended is $2.4 million, which 'would be the largest
> promotional campaign /of any kind/, by far, even carried out
> in India'. Even a budget ten times that large would amount
> to only 5c. money cost per head. In fact persuasion costs may not
> even be much larger than the costs of contraceptive devices
> and operations. And much of the money costs of promotion are
> not real social costs. Incremental advertising is produced at
> very low marginal cost in newspapers and radio. All this argues
> that one can safely disregard the effects of resource expenditures
> for birth reduction on investment when calculating the value of
> prevented births. (15, p. 68 )

Ohlin cites data from fertility studies of desired family size in support of
his position. Thus Table 2 above shows that parents who already have
four or more children generally do not wish to increase their family
further. The fact that percentages are very similar in all countries
regardless of nationality, race and religion is significant. This
includes even the Catholic countries of Latin America.

These data appear very persuasive until one puts alongside them direct evidence of response to actual programmes and campaigns. While desired family size shows considerable uniformity, actual trends in birth rate and actual responses to campaigns vary considerably. Consider, for instance, the differential response observed in different Indian states. The 1.9 per cent total acceptance rate for India, for I.U.D.'s and sterilisation together, has been observed to hide "a great diversity of achievement". (8, p. 45) The I.U.D. target achievement in 1969-70 varied from 6-7 per cent in Maharashtra and Andhra Pradesh to 69 per cent in Punjab, and 92 per cent in Haryana. Sterilisation target achievements varied from 17 per cent in Assam to 80 per cent in Orissa. In part of course, such variation in response may be due to avoidable variation in efficiency of campaign organisation or commitment by local governments.

What the discrepancy between evidence of desired family size and actual response to programmes would indicate is that the element of non-planning in family increase is considerable. This does not necessarily mean that the proportion of unwanted births is equally great or that a high degree of responsiveness exists over the full range of unplanned births. Much more evidence is required, covering a variety of countries and situations, regarding the response function, and the relation of unplanned births to it.

## THE ECONOMIC DEVELOPMENT APPROACH TO REDUCING THE BIRTH RATE

Some population specialists have argued that major success in family planning cannot come before demographic modernisation: fundamental changes in attitudes towards desired family size. And this will in turn depend on such factors as health, social conditions, the degree of urbanisation, literacy, education and especially the provision of education and employment opportunities for women, all associated with economic development. This economic development approach is contrasted with the family planning approach: it argues that population control efforts can succeed only through changing desired family size, and that for this socio-economic change is a prerequisite.

Raulet, for example, recognising the downward demographic trend in Taiwan, South Korea, and other China-periphery countries, suggests that "the minor role of family planning programme in this total

process does have important implications for population policy", claiming
that "there is no empirical evidence so far that demographic modernization,
even with the aid of family planning programmes, moves far ahead of other
aspects of modernization". (3) Robinson also asserts that the successes
have generally been in countries which have already made substantial socio-
economic progress, death rates are typically low, female literacy high (50
per cent or more), urbanisation is advanced, and there is already some pre-
programme decline in fertility. (14) Bondestam, in a study of Kenya, takes
the same position. (2)

High-death rates may indirectly affect the birth rate in two
ways. Where there is a high loss of children through infant mortality the
tendency will be to insure against this by having larger families, and
resistance to birth control will be strong. Secondly, it may be the
case that longer life expectancy for adults will reduce fatalistic
attitudes, giving them a new desire to control their destiny and to
defend the family's income per head. Assessment of the precise importance
of this factor does, however, require much more careful statistical analysis
than has been the case so far.

Despite our earlier suggestion that a low desired family size
does not itself guarantee a successful family planning programme or a
uniform positive response, the socio-economic position is probably the major
determinant of the shape and nature of the response function. Since this will
determine the rate of return to family planning expenditures, this rate of
return is likely to vary considerably between favourable and unfavourable
countries, just as between different phases within one country. Robinson
does indeed classify high fertility developing countries into three groups. The
first, into which he puts several Latin American countries including Mexico
and Chile, are those which have already made "substantial strides towards
development". The second group shows some modernisation, though the bulk of
the population is as yet untouched by change: family planning clinics, in the
urban areas only, are likely to be successful. The third group are countries
"at the beginning of their development where prospects for family planning are
poor". In fact acceptance of family planning may well depend on too many
complex factors to permit such a facile classification, as information I have
collected in Kenya certainly indicates: the aspect which should be stressed
is the considerable variability of conditions with respect to acceptance rates
among different countries.

If we take into account the above points - the existence of a response function, the importance of non-planned births, and the dependence of these on the socio-economic situation - the need for more empirical evidence is clear. Enke's and Ohlin's estimates may be valid for some 'phase I' relating especially to unwanted births and to particularly receptive parents. The rates of return they calculate may be realistic for this group, without being valid for unlimited extension of a national programme or for indefinite decreases in birth rates.

## THE MACROECONOMIC APPROACH TO EVALUATING POPULATION CONTROL

An apparently very different approach to assessing the impact of population measures is to build a dynamic macroeconomic projection model in which the population factor interacts with a number of economic variables. Savings, investment, health and productivity, technological change and employment levels in different economic sectors may all be made to depend on population growth rates. The method consists of making several alternative projections of output per head for different birth rates, and assessing the benefits of population control only as part of a general macroeconomic exercise. Projections are generally made to span several decades up to about 30 years. The classic study in this area was published by Coale and Hoover in 1958 for India, covering the period 1956-86. Table 4 shows that a number of other such exercises have been attempted. The figures compare per capita income under declining fertility and under constant fertility for various time periods. This is the approach followed by Enke in his more recent contributions.

Table 4.  Comparison of population/economic growth models.

| Model | Country | Percentage ratio of per capita income of declining fertility case to high fertility case after: | | |
|---|---|---|---|---|
| | | 10 years | 20 years | 30 years |
| Coale and Hoover | India | 103 | 113-116 | 138-148 |
| Hoover and Perlman | Pakistan | | 114-120 | |
| Ruprecht | Philippines | 104-105 | 117-132 | 135-193 |
| Newman and Allen | Nicaragua | 105 | 115 | 125 |
| Enke, 1967, 1967, | General | 109 | 119 | 129 |
| Enke, AID/TEMPO | | 15 years | | |
| | General | 111 | | |

Source: Ruprecht, (15),    Table II.1

This more sophisticated approach, which may be considered to
represent the current wisdom on the subject, is less vulnerable to
criticism partly because some of the cruder assumptions of the  cost-
benefit approach are avoided, and partly because the assumptions made are
more heavily disguised.  As in the cost-benefit analysis, the effect of
birth rate reduction on the dependency ratio is in all cases crucial:
but the effects of this on savings and investment are now built into a
full model.  Simon summarises the Coale-Hoover model by saying that:

> Their basic observation, from which most of
> their results flow, is that the birth rate has
> a great effect on the age composition of the
> society, and upon the proportion of people in the
> labour force. Children do not enter the labour
> force for a long time after birth, and no model
> that does not embody this truth can be superior
> to Coale and Hoover's work.  (16, pp. 66-7)

The results also show a very high return to population control.  Simon,
employing the Coale-Hoover model, says:

> Enke estimated an expenditure of 10 cents per head
> to be a hundred times as productive as other
> investment; by our estimate they are perhaps
> forty times as productive - and much more so at a
> lower rate of discount. (16)

One difference, as the table demonstrates, is that the economic
impact is shown to be a long-run rather than short-run phenomenon.  The
effect is increasingly important after 15-20 years.  This is because the
models are dynamic: in addition to compounding the effect of reduced
births on further births in a later period, the investment of savings
arising out of released consumption also has a compound interest effect
on national output.  Unlike the static approach of Enke, it is possible to
take into account the Malthusian effect of increasing numbers of women-at-
risk, so that more births now mean even more births later.  Indeed the
models are based on the twin compounding effects of investment in output
(in the numerator), on the one hand, and of a reduced number of heads
(in the denominator): the latter compared to the number which would
have existed at non-reduced fertility rates.

The models are, however, open to criticism.  In the first place
too little is known at present about the relevant functional relationships
for any very satisfactory model of developing - country economic growth
to be built.  There is uncertainty regarding the determinants of saving,

regarding supply responses to multiplier effects on the demand side,
regarding the determinants of technical progress, and especially regarding
the extent of investment opportunities. Enke himself points to serious
deficiencies in the construction of his first model, TEMPO I, which he
says "could not have been more aggregative. There were no sectors, such
as rural and urban, modern and traditional, domestic and international, or
private and public." (7)

Secondly the benefits of a prevented birth depend essentially
on the uses to which savings can be put and in part on the existence
of an efficient government which can make use of funds. The rate of
return on birth prevention expenditures remains a proxy for the rate of
return on available investment opportunities. In the case of oil
economies, this could be the return on funds invested in London and other
financial centres. Against this the models do not depend on a very high
discount rate, as does Enke's analysis: a lower rate of discount in the Coale-
Hoover model gives a higher value for each prevented birth.[4]

The models also make a major unstated assumption regarding the
amount of released consumption. There are two kinds of released consumptions
from a prevented birth: private, obtained within the family, and
released public consumption. The former may turn out to be illusory if the
family expands its consumption by the equivalent amount: while this may
represent a net benefit to the family over the 'value' of the child, it is
not saved and therefore cannot contribute to the compounding effect on
which the model is built. One of the criticisms of the Lewis model of
development with unlimited supplies of labour, and of the disguised
unemployment thesis in general, is that when a migrant moves to the
modern sector there may be no savings, since those remaining in the
rural area will expand their consumption in this way. If this applies
in respect of an adult migrant, it will most certainly be the case that
the potential private consumption of a prevented birth will be taken
over by other children or by adults.

The models say nothing about the utility derived by parents from
children, or about the potential utility of the prevented births themselves.

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4.       In Simon's calculation, based on Coale-Hoover, present value is
$114 at 15 per cent and $222 at 5 per cent rate of discount.

They are not cast in utility terms at all, in ways that might draw
attention to these omissions or assumptions. The calculations are in
fact based on comparing total output and total number of heads at various
dates in the future, to derive income per head. The utility which is
maximised, therefore, is that of those who are actually born. The
calculation would again have held true in respect of the births of a very
substantial proportion of current members of the population. The only
limit to the severity of the population control programme is in fact
the possibility of increasing average product of labour (due to relative
abundance of other factors or economies of scale), and it is not evident
that this is a potentially effective constraint in the models as
constructed.

This constraint _is_ incorporated in Fig. 3, our static diagram
which we said includes the essential elements of the dynamic models.
The figure indicates the theoretical possibility of the effect of the
reduction in the work force (movement to the left exceeding the effect
of reinvestment of savings (shifting the curve upwards). Without reviewing
in detail the various models, any assumption about the relation-
ship between the size of the labour force and average productivity is likely
to be one of diminishing returns, reflecting some assumed population
pressure on the land. It would be interesting to compare an African
model assuming constant returns and an elastic supply of land: this would
focus directly on the balance between pure consumption savings over the
first 15 years and net output losses after that time.

Despite the various qualifications above, rates of return
from successful birth prevention are likely to be high simply because the
amount of released consumption spanning a period of 15 years _must_
represent a considerable volume of savings and even at a 3 per cent rate
of return must yield substantial output when compounded over such a
period. The models, however, say very little about the response factor.
They simply project the effects of different hypothesised fertility rates:
they do not discuss the possibilities of achieving these rates in any
actual country, or the costs of achieving them, which might be infinity.
Coale and Hoover, for instance, ignored costs on the grounds that
contraceptive advice would be given through established welfare facilities
already part of the government programme. The appropriate conclusion
may be only that high returns are available from limited programmes
involving information campaigns and the provision of assistance to those
who already want the service or who are producing unwanted births.

Enke does, in his 1974 model, incorporate an assumption regarding the response factor. The cost of creating acceptor demand is supposed to increase linearly from $0 at 15 per cent acceptance rate to $40 per acceptor at 50 per cent acceptance among eligible women. He thus posits a response function of similar form, implicitly, to Fig. 5. The empirical basis of his specific function is not well established, however, and the goal of 50 per cent of eligible women (or their spouses) by 1999, after 25 years, constitutes a very high target. Since $32 of the $40 is transfer payment due to bonus incentives, his response function also raises again the question of negative family allowances.

Less work has been done in Africa regarding the response factor and the possibilities of achieving any given reduction in the rate of population increase than in any other continent. In a later paper some evidence regarding response to family planning programmes in Kenya will be considered.

## APPENDIX 1:  COMPLICATIONS RAISED BY THE VALUE OF CHILDREN TO PARENTS

If a system of bonus payments were in operation, as envisaged by Enke and others, a measure of the anticipated utility derived by parents from an additional child would in principle be obtainable. Parents' decisions to prevent a birth will depend on their calculation of private costs and benefits. Let us assume the government is willing to make a bonus payment for a prevented birth: this is the equivalent of a tax on a birth which is not prevented, so we may talk about a birth tax and, for negative values, a birth subsidy. The lifetime consumption of a birth may be divided into that which is privately provided and that which is publicly provided. The cost of a birth to parents will thus equal the net private consumption of the birth (we can refer here to $PC_t$ and $PB_t$) plus the birth tax (bonus payment foregone)$T$, and this will be set against the lifetime utility derived, $U_t$, also put into present value terms. Thus parents will be induced to prevent a birth only if[5]

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5.       PC is the loss of output which would have accrued to the family, that is, total lifetime output less taxes.

$$\sum \frac{PB_t - PC_t + T}{(1 + r)^t} \geq \sum \frac{U_t}{(1+ r)^t} \tag{1}$$

which may be written more briefly as

$$NPB + T \geq U \tag{2}$$

where NPB is the net private benefit from birth prevention.

Suppose there is a purely informative family planning campaign which simply informs people of the means of preventing births and of the costs and benefits involved. For some parents, we shall have $U > NPB$, so that the campaign is not effective: these births would only be prevented if a bonus is offered. In principle there is for each family some value of T, $T_m$, which is just enough to induce them to prevent the birth, such that

$$NPB + T_m = U \tag{3}$$

This gives us a monetary measure for U. For other parents we shall have $U < NPB$, so that the purely informative campaign is effective in preventing births. The campaign here will bring a social gain, therefore, but the question is how to measure this. In principle, there is some minimum birth subsidy which would make each of this group of parents willing not to prevent the birth, that is, for which

$$U + S_m = NPB \tag{4}$$

which would measure U as

$$U = NPB - S_m \tag{5}$$

Though NPB is straightforwardly estimated, or at least as easy to estimate as the original Enke formula, the problem is that any bonus actually paid will be a uniform one, and intramarginal parents will have different $S_m$'s or $T_m$'s.[6]

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6.    Payment of bonuses would thus involve a transfer payment: this would not affect our cost-benefit calculation, but could be an undesirable side effect.

The bonuses described here probably have little to do with bonuses actually paid to date for sterilisation in India, for example. These payments have been small and perhaps more of value as publicity rather than serious inducements to offset positive anticipated utility from unborn children. If a system of realistic bonuses were in operation, it might be possible to estimate U for marginal families induced to prevent births, by varying the level of bonuses: but the nature of a family planning programme is such that it starts from a position where families lack complete knowledge of their substitution possibilities, and lack a fully defined preference map as required by (3). Because of this it would be necessary to have independent estimates of utility values: which bring us back to Liebenstein's problem.

A further conceptual problem arises where the publicity for a family planning programme aims through persuasion, rather than information, to alter desired family size: and there is probably no programme in existence which does not try to do this. Since parents' preference functions themselves are altered, welfare comparisons are not strictly valid.

We should note, again, that realistic bonus payments, while they might be useful as a means of estimating utilities, are in effect negative family allowances, and are undesirable from the point of view of income distribution.

The difficulties in estimating parents' utility from unborn children are therefore that present bonus payments, where they exist, have been only nominal publicity payments; realistic payments are socially undesirable. To the extent that family planning programmes attempt to improve knowledge, about means of contraception and private benefits therefrom, they deal with preference maps which are incompletely specified; and to the extent that they use strong persuasion they are changing preference functions. Finally, there is the problem mentioned earlier where the ex post utility to parents differs from the ex ante value.

## APPENDIX 2:  THE CASE FOR BONUS PAYMENTS

The issue of bonus payments or birth taxes may arise in relation to either of two questions. If the birth is socially undesirable, taking into account total benefits and costs both inside and outside

the family, should the society bribe the parents to prevent the birth?
Secondly, there is the equity issue: if there are net private benefits
from the birth, but external costs, should the parents be taxed up to the
value of the external costs they impose?

In the former case it will make sense for society to bribe
parents up to the value of net <u>social</u> benefit from birth prevention
(or to spend the equivalent amount in persuasion costs), and for parents
to accept a bribe up to the value of net private benefit from the birth.
Births would be prevented where net social benefits from prevention
exceed net private benefits from non-prevention. In the second case,
the object is not birth prevention but redistribution of the costs of
the birth. The birth tax would be fixed at the level of external costs.
Births might however be prevented incidentally in cases where the net
private benefits from the birth are less than the birth tax (equal to
external costs).

It is obviously essential to keep these two issues conceptually
separate, whereas Enke appears sometimes to run the two together.
However, neither he nor his critics, Liebenstein and Simon, while
debating a number of equity considerations in population control, point
out that bonus payments or birth taxes of either type are intrinsically
undesirable. This is because bonus payments to parents of smaller
families are in effect negative family allowances affecting the consumption
not just of the parents but of the children who are not party to the
decision.

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