

## The duration of development

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**Abstract.** The author considers the problem of the duration of development and its consequences for development assistance, in the developing as well as developed countries. Emphasis is given to the influence of development aid and it is argued that the time dimension has important policy implications and requires further thoroughgoing theoretical analysis.

**Key words:** Economic development theory – Development policy – Development aid

**JEL-classification:** O1; O2; I3

### 1. Development a many-sided phenomenon

In this article some figures will be shown on an aspect of development that so far has not had the attention it deserves: the *duration of development*. Among the many aspects of development are production, the choice of technology, the education of workers, their health, location of production by town and country planning, economic policy, such as trade policy, tax policy and development co-operation, population policy; and this is only a macro enumeration. An important institution, such as the World Bank, gave attention to all these aspects and publishes statistical information about them. The present study is based on World Bank figures, especially figures on population, income (gross national product, GNP) per capita, and the rates of growth of the latter over the last decennia. Three World Development Reports, those of 1989, 1990 and 1991 have been used. They contain GNP figures for 1987, 1988 and 1989 respectively. In many respects the figures are of the same order of magnitude and so support each other, but on a few issues the 1991 Report shows changes that deserve attention.

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## 2. Poverty and migration

Development policy and co-operation are phenomena taken up after World War II. They aim at reducing the poverty prevailing in the former colonies of Western countries, which had become sovereign countries and members of the United Nations. Among the causes of international conflicts and wars differences in wellbeing play a role, which is one reason to develop poor countries. World Bank figures about the growth of GNP over recent decades show, for both 1987 and 1988, that growth has been 3.1 per cent for poor countries and 2.3 per cent for prosperous countries (both per annum). This means that, also without assistance from prosperous nations, in the long run these will be overtaken by the poor countries. From the growth figures mentioned and the figures of GNP per capita we can compute – as will be shown in Section 4 – that more than 300 years are needed to equalize incomes of the two categories of countries. It is not surprising that the more enterprising of the poor countries' citizens try to improve their situation by *migrating to the prosperous parts of the world*. Latin American workers or unemployed try to find a job in the United States. Arabs and Turks are looking for jobs in Western Europe, Pakistani try to migrate to the rich oil countries in the Middle East (Asians call this Western Asia).

The first phase of this migration process occurred at the initiative of *Western employers*, who could not find workers in their own countries for the most unpleasant and dirty jobs, unless they paid better wages. Workers from the poor countries were prepared to take these jobs for lower wages, which anyway are higher than the wages in poor countries. The second phase was that the initiative to migrate came from the migrants *themselves*, informed by those who had seen the prosperous world.

The immigrants caused problems in the prosperous world. They introduced competition with its workers on the labour market and the market for dwellings. Also differences in way of life and culture caused friction. Rightist politicians in the developed countries proposed not to admit the migrants. Along the border between the USA and Mexico a fence was erected to reduce immigrants.

A *better alternative* would be, in the opinion of liberal and radical politicians, to assist the underdeveloped countries and so create better working conditions in the poor countries, making migration less necessary; ideally even altogether unnecessary.

## 3. Impact of development assistance

In order to formulate more concrete, numerical proposals on the amount of development assistance we will estimate the impact on the development process at various levels of assistance. The levels we are going to study are (i) the present level of assistance, 0.35 per cent of GNP (cf. OECD 1988); (ii) the level of 0.7 per cent, recommended by the Pearson Commission (cf. Pearson 1969) and the Brandt Commission (cf. Brandt 1980); (iii) 3 per cent, recommended by Dr. S.L. Mansholt (previously Chairman of the European Commission), and by the American economist Prof. J.A. Yunker (Yunker 1988); 8 per cent, 21 and 29.9 per cent, the latter being the redistribution rate applied by social insurance legislation within Sweden (cf. ILO, World Labour Report 1984). The relevance of the higher percentages will be discussed in Section 5.

**Table 1.** Concepts used for estimations of assistance received per capita and duration of development process

Concepts	Poor countries	Rich countries
Income per capita (\$)	$X$	$Y$
Population (millions)	$P$	$Q$
Rate of growth of $X, Y$	$\dot{X}$	$\dot{Y}$
Developm.assist. per capita	$z_1$ (received)	$z_2$ (made available)
Duration of developm.process	$t$	

In this section the formula to be used for calculating the assistance *received by the poor countries* (per capita) and the *duration of the development* process will be presented. Table 1 shows the concepts used.

Computation of development assistance per capita received  $z_1$ :

$$z_1 P = z_2 Q \quad (1)$$

Computation of duration:

$$(X + z_1) \left( \frac{\dot{X}}{\dot{Y}} \right)^t = Y - z_2 \quad (2)$$

Equation (1) expresses that the amount of development assistance received by the poor countries is equal to the amount of assistance made available by the rich countries. Equation (2) contains  $t$  as the unknown time needed to let the per capita income of poor countries grow (at a rate  $X/Y$  per annum) to the income of rich countries.

Table 2 shows the results of the computations for all the assistance percentages mentioned.

#### 4. Some conclusions and one more question

The most striking feature is the *length of the duration of the development process*. It may be an interesting subject for research by economic historians to inquire whether the level of wellbeing of the Western countries five centuries ago was comparable to the present level of wellbeing of the underdeveloped countries.

Secondly, the duration is reduced only very little if development assistance is doubled from 0.35 per cent to 0.7 per cent of GNP. This is confirmed by a calculation of the duration in the case of no assistance at all. Then the duration is, for the years 1987, 1988 and 1989, in Table 2, 502, 511 and 825 years respectively.

Thirdly, the figures for 1989 (Table 2) are considerably *higher* still than those for 1987 and 1988. This is connected with the fact that the growth of per capita income of the poor countries over the period 1965–1989 is remarkably closer to the figure for the rich countries than it was from 1965–1987 and 1965–1988. Of course a figure for a single year may be incidental.

Anyway the concept of duration constitutes a *new aspect* or dimension to the development process of which the role has not been understood so far. The duration can be shortened by more development assistance and this leads us to the problem whether there is an *optimum duration*. In this essay only a partial answer will be given

**Table 2.** Incomes per capita, development assistance per capita and duration *t* of the development process in years, based on data 1987–1989

Year	Inc./cap.		Assist. <i>d</i>	Assist. <i>e</i>	Inc./cap. after assist.		Duration of
	rich	poor	per cap.	per cap.	rich	poor	developm. (yrs)
<b>A. Assistance 0.35 per cent</b>							
1987	14430	290	50.5	14	14379	304	495
1988	17080	320	59.8	16	17020	336	504
1989	18330	330	64.2	18	18266	348	813
<b>B. Assistance 0.7 per cent</b>							
1987	14430	290	101	28	14329	318	489
1988	17080	320	120	33	16960	353	497
1989	18330	330	128	36	18202	366	802
<b>C. Assistance 3 per cent</b>							
1987	14430	290	433	119	13997	409	453
1988	17080	320	512	139	16568	459	460
1989	18330	330	550	156	17780	486	739
<b>D. Assistance 8 per cent</b>							
1987	14430	290	1154	318	13276	608	396
1988	17080	320	1866	371	15714	691	401
1989	18330	330	1466	415	16364	745	641
<b>E. Assistance 21 per cent</b>							
1987	14430	290	3030	834	11400	1124	297
1988	17080	320	3557	975	13493	1295	301
1989	18330	330	3849	1091	14481	1421	477
<b>F. Assistance 29.9 per cent</b>							
1987	14430	290	4315	1188	10115	1478	247
1988	17080	320	4107	1117	11973	1437	273
1989	18330	330	5481	1554	12849	1884	394
<b>G. No assistance</b>							
1987	14430	290	0	0	14430	290	502
1988	17080	320	0	0	17080	320	511
1989	18330	330	0	0	18330	330	825

to that question. We need to get familiar with the concept of duration before trying completely to answer the question.

First, I want to address a simpler question formulated to me by Ambassador E. Korthals Altes in a private discussion. The introduction or the raising of development assistance is likely to reduce the average income of developed countries. After that policy change the development of productivity of production will continue.

**Table 3.** Incomes  $Y$  of developed countries before and after development assistance is given (years 0 and 1) and *recovery* time i.e. time where  $Y$  is surpassing again income before assistance  $T + 2$ 

Year % of GNP	0 Income before assistance	1 Income after assistance	Recovery time, i.e. time where after year 2 $Y > = 18330$ (take integer of $T$ only)
0.35	18330	18266	0.15
0.7	18330	18202	0.31
3	18330	17780	1.34
8	18330	16864	3.67
21	18330	14481	10.30
29.9	18330	12849	15.62

(Income figure used those of Table 1)

How long will it take until the original income is attained? We may call this the *duration of recovery*.

### 5. The duration of recovery

The introduction or raising of development assistance in year 1 will reduce income  $Y$  in that year by the amount of assistance. From year 2 on the annual rise in income (by a factor 1.023 in years 1965 to 1987 and 1988) will continue. This will recover income already in year 2 if assistance is less than 2.3 per cent. Of the cases considered these are 0.35 and 0.7 per cent. For the other cases considered the income is recovered later than year 2. The recovery duration  $T$  will be defined as the year before which the original income  $Y$  will be reached. It will be determined by the equation

$$Y = 1.023^T(Y - z_2) \quad (3)$$

where  $z_2$ , as before, is the development assistance given per capita by the rich countries. Using the figures of Table 2 we obtain in Table 3 the values of the duration of recovery attached to different levels of development assistance.

With increasing assistance the duration of recovery  $T$  rises steeply, from more than 2 to more than 16 years. This expresses in figures why and to what extent the developed countries will oppose the higher development assistance.

There is still an enormous gap between what is income redistribution *within* and redistribution *among* countries. Yet, humanity is going to be faced ever more with *world* problems and to apply to the world at large what has been successful in maintaining internal political stability. To me this seems another reason why we must get accustomed to the idea that higher percentages of development assistance will have to be given.

### 6. Using Kravis's figures; lowest levels of aid needed

An interesting additional finding of Kravis c.s. is that, in contrast to the figures of the World Development Reports (1989–1991), the rate of growth of per capita income of low-income countries is not *more* than that of high-income countries, but *less*. The

rates of growth over the whole period 1950–1977 covered are 1.01799 and 1.03137 respectively; over the period 1965–1979 (World Development Reports) 1.016 and 1.040 or (Kravis c.s.) 1.0172 and 1.0325. This means that at least development assistance of  $1.040/1.016 = 1.0236$  (or 2.36) or even  $1.03137/1.01799 = 1.031435$  (so, 3.14 per cent) was needed around 1970, when the norm of 0.7 was launched. But obviously at that time the figures just quoted were not known.

## 7. The optimal redistribution: a first step

In the preceding sections we found that the optimal amount to redistribute within or among countries may be obtained in shorter or longer periods. If a short period is chosen (“impatience”) a high amount per annum is necessary, and if a longer period is chosen (“patience”) lower amounts are possible. Let us now try to find out whether one of these possibilities is truly optimal.

In this essay only a first step will be made, which may have to be corrected later. We choose the set duration level of development assistance ( $t/z_2$ ) that maximizes the total satisfaction (or welfare, or utility – used as identical concepts) of the two groups considered. Such a maximization requires that the first derivative with regard to income received or left equals zero. Welfare is assumed to be equal to the logarithm of income (cf. Van Herwaarden and Kapteyn, 1981). For one person of the poor group this derivative as  $1/(X + z_1)$  and for one person of the prosperous group  $1/(Y - z_2)$ . For all  $P$  poor and  $Q$  prosperous members of the community (world or nation) at time 0 the first derivative is

$$\frac{P_0}{X_0 + z_{10}} + \frac{Q_0}{Y_0 - z_{20}} = 0 \quad (4)$$

At time  $t$  the populations will have grown with the rate 1.019 in the developing countries and with a rate 1.005 in the developed countries; so for year  $t$  Equation (4) will become

$$\frac{P_0}{X_0 + z_{10}} \cdot 1.019^t + \frac{Q_0}{Y_0 - z_{20}} \cdot 1.005^t = 0 \quad (5)$$

Substituting the values of the variables given in the Annex we obtain from the data of the World Development Reports

$$\frac{2823 + 61t}{340.5 + 207.4t} \times 1.019^t + \frac{777 + 7t}{14379 - 60t} \cdot 1.005^t = 0 \quad (6)$$

By trial and error the solution of (6) is found to be approximately  $t = 38.5$ . This solution can be translated into one for  $z_2$ , approximately  $z_2 = 11345$ . This yields

$$z_2/Y = 0.786 \quad (7)$$

Similarly the data based on Kravis c.s. (1982) lead to:

$$\frac{2823 + 61t}{1179.5 + 209t} \times 1.019^t + \frac{777 + 7t}{14379.5 + 437.5t} \cdot 1.005^t = 0 \quad (8)$$

From these data the solutions  $t = -28$ ,  $z_2 = 10429$  and  $z_2/Y = 0.723$  follow.

These results are amazing. For the time being they are completely unacceptable to the developed countries. What use are they?

To begin with, they need comments from the profession. Then, a further study of what "impatience" means and what other variables must be introduced into the utility function used. In the utility function sudden changes may be a separate determinant. Also the goods (houses, for instance) the citizens of the developing countries will now wish to hire or own are not available. Thirdly, an interpretation may be given. To me the figures found express the intense suffering of the underdeveloped part of the world, from hunger, diseases and working in a tropical climate; suffering understood by persons like Mother Teresa and others. Only if developed countries are left with  $1 - 0.723 = 0.277$  – somewhat more than a quarter of their income – they would be at a level of satisfaction equal to the (increased) level of satisfaction of the other part of the world. That increased level would amount to an income of  $290 + 3063 = 3353$  dollars, more than eleven times what they had in 1987. Still, the per capita income of the developed countries will be more:  $14430 - 10429 = 4001$ .

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## Annex

Data used														
Year	$z_1$	$z_2$	$z_1$	$z_2$	$P$	$Q$	$P$	$Q$	$X$	$Y$	$X$	$Y$	$X$	$Y$
I World Development Reports														
1989	14	50.5	2	9.5	2823	777	61	7	290	4430	30	2650	9	332
1990	16	60	1	4	2884	784	64	46	320	17080	10	1250	10	393
1991	17	64			2948	830			330	18330				
II Kravis et al														
1989	14	50.5	2	9.5	2823	777	61	7	1129	14430	207	2650	35	332
1990	16	60	1	4	2884	784	64	46	1336	17080	98	1250	41	393
1991	17	64			2948	830			1434	18330				

Note: Figures  $z_1, z_2, P, Q$  and short-run  $X, Y$  are differences between 1989 and 1990 figures. Long-term  $X, Y$  are 1965–1987 figures from World Development Reports. Kravis figures for  $X$  are derived from WBR figure for  $Y$  (14430) and ratio between incomes of industrial countries in 1977 (6187) and low-income countries (484):  $(484/6187) \times 14430 = 1129$