PERMANENT INCOME, CONVERGENCE AND INEQUALITY AMONG COUNTRIES

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Abstract

The literature on the phenomenon of inequality has focussed on the analysis of the dispersion of indicators such as per capita annual income. This paper adopts a different approach, as it considers the life cycle dimension of inequality and convergence between economies from 1960 to 2000. On the basis of this approach various simulations are made, to determine the effect on convergence in permanent income of variables such as survival rates and the (non)existence of convergence in current income. The results indicate that although the main source of inequality in permanent income is inequality in current income, the survival rates are also important, especially when there is convergence in current income. Not to consider this source of inequality implies under-estimating the true level of inequality among economies.

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Solon set out upon his travels, in the course of which he went to Egypt ... and came on a visit to Croesus at Sardis. Croesus received him as his guest, and lodged him in the royal palace. On the third or fourth day after, he bade his servants conduct Solon over his treasuries, and show him all their greatness and magnificence. When he had seen them all, and, so far as time allowed, inspected them, Croesus addressed this question to him. "Stranger of Athens, we have heard much of thy wisdom and of thy travels through many lands, from love of knowledge and a wish to see the world. I am curious therefore to inquire of thee, whom, of all the men that thou hast seen, thou deemest the most happy?" This he asked because he thought himself the happiest of mortals

"Oh! Croesus," replied the other, "thou askedst a question concerning the condition of man.... \hat{A} long life gives one to witness much, and experience much oneself, that one would not choose. Seventy years I regard as the limit of the life of man. In these seventy years are contained, without reckoning intercalary months, twenty-five thousand and two hundred days. Add an intercalary month to every other year, that the seasons may come round at the right time, and there will be, besides the seventy years, thirty-five such months, making an addition of one thousand and fifty days. The whole number of the days contained in the seventy years will thus be twentysix thousand two hundred and fifty, whereof not one but will produce events unlike the rest. ... For thyself, oh! Croesus, I see that thou art wonderfully rich, and art the lord of many nations; but with respect to that whereon thou questionest me, I have no answer to give, until I hear that thou hast closed thy life happily. For assuredly he who possesses great store of riches is no nearer happiness than he who has what suffices for his daily needs, unless it so hap that luck attend upon him, and so he continue in the enjoyment of all his good things to the end of life. For many of the wealthiest men have been unfavoured of fortune, and many whose means were moderate have had excellent luck...'

(The History of Herodotus, Herodotus Book I, 29)

I. Introduction

This classical story of the encounter between Croesus and Solon, narrated by Herodotus in the year 440 B.C., contains all the essential elements of the approach that we intend to adopt in this paper for the analysis of the problem of inequality and convergence among economies. Firstly, to make appropriate comparisons between economies it is necessary to compare complete lives and not particular situations in specific periods of time. Secondly, for this purpose the life expectancy of individuals has to be considered as a central element of these complete lives. Thirdly, the possibility of convergence of current incomes in the future and its impact on the comparison, since "fortune" may abandon the "rich" in favour of the "poor". All these elements represent a change from the usual framework of analyses of inequality among economies.

The literature devoted to the empirical analysis of inequality has mostly used the per capita current income of the different countries and regions. Starting from measures of the dispersion of this variable, such as the standard deviation of its logarithm, the degree of inequality among economies has been quantified. The degree of convergence (or not) has been estimated by analysing the decrease (or increase) of this dispersion (known as σ -convergence). Alternatively, the existence of convergence has been studied on the basis of the relationship between the relative levels of per capita income of the economies at a particular time, and their subsequent rate of growth (known as β -convergence).

The results thus obtained are informative, useful, and expand our knowledge of the temporal evolution of the levels of per capita current income attained at any time, the differences existing between different economies, their evolution and their determining factors.

Nevertheless, this type of approach ignores the temporal and life-cycle dimension of the question. Just as Solon responded to Croesus that "*I have no answer to give, until I hear that*

thou hast closed thy life happily", the level of inequality among individuals cannot be evaluated definitively without comparing the whole of their lives. Just as for each of us this year's income is important, but less so than the total of incomes that we will obtain in the course of our life and the length of our life, when studying inequality among economies (or more precisely among individuals representative of them) the comparative study of the sum of incomes to be obtained by people in the course of their lives will be more complete.

Economics has for some time fully recognised this phenomenon, as clearly manifested if we examine the evolution of consumer theory since the studies by Friedman [1957] or Modigliani [1986] and his collaborators Ando and Brumberg [Modigliani and Brumberg, 1954; Ando and Modigliani, 1963]. In a similar way, growth theory has taken up the formulation of Ramsey [1928] and his infinite horizon growth model, in which families make their saving and consumption decisions in terms of their present and future incomes to maximise their utility, a utility which in turn depends on present and future per capita consumption.

This results in a rather peculiar situation. On the one hand, the theories used to analyse the phenomena of inequality and convergence are based on models in which individuals value all their future [and even that of their descendants]. On the other, when measuring and valuing inequality alone, attention is focussed on what is happening at a particular moment in time. Some studies have tried to overcome this limitation by also considering life expectancy or the economic value of the increases in that expectancy, to measure inequality. Dowrick, Dunlop and Quiggin [2003] propose their own index based on consumption and life expectancy, avoiding arbitrary weightings by means of the revealed preferences; Becker, Philipson and Soares [2001 and 2005] analyse inequality of welfare by giving an economic value to the gains achieved in terms of life expectancy; Philipson and Soares [2001] in this same line posit and analyse the properties of a measure of total income (*full income measure of human development*).

The aim of this study is the natural and logical next step: analysis of the inequality between economies paying attention to the set of incomes obtained throughout life (permanent income) and not to the incomes obtained at a specific moment in time (current income).

For this we will use the habitual tools of growth economics. This will permit us to recover the elements highlighted by Solon: consideration of the life-cycle income of individuals, of the life expectancy in each economy and of the existence or otherwise of economic convergence in the levels of per capita current income. The rest of the study is organised as follows. Section 2 reviews the literature on inequality and convergence. Section 3 presents the analytical framework necessary for carrying out this task. In section 4 we develop the empirical analysis in the international field, for the world as a whole and for the countries of the OECD. Finally section 5 presents the conclusions of the study.

II. Inequality and convergence: literature and empirical results

As we have seen, the literature devoted to the empirical analysis of inequality has mostly used the per capita current income of the different countries and regions. Sometimes other indicators of the standard of living have been used, relating to the per capita consumption of food or of other types of goods. However, the global nature of an indicator like per capita income and its capacity to capture, in a simple but reasonably approximate manner, the relative standard of living of countries has made it the conventional variable in this type of studies. Also, the theory of economic growth deals precisely with the long term evolution of this variable, and therefore offers a set of tools for understanding and explaining the causes of the inequality that we are measuring, to be able to predict its future evolution and to propose corrective economic policies.

Naturally, the limitations of this single indicator are recognised, and there have been attempts to overcome them by means of better measures. Thus, the United Nations Development Program (UNDP) publishes annually The Human Development Index (HDI) based on life expectancy, the degree of literacy, and per capita income, all duly weighted. Or to quote specific recent efforts, Dowrick, Dunlop and Quiggin [2003] propose their own index based on consumption and life expectancy, avoiding arbitrary weightings by means of the revealed preferences; Becker, Philipson and Soares [2001 and 2005] analyse inequality of

welfare by giving an economic value to the gains achieved in terms of life expectancy; the results indicate that countries starting with lower income tend to grow more in terms of the life expectancy component than countries starting with higher income. When the monetary values of these gains in life expectancy are computed in order to calculate the growth rate of what they call 'income equivalent compensation' they conclude that the gains in longevity totally invert the traditional result of absence of convergence obtained in the literature on growth¹. In this same line Philipson and Soares [2001] posit and analyse the properties of a measure of total income (*full income measure of human development*) which values in monetary terms certain non-monetary aspects of human development that are not reflected by a simple indicator such as income. The authors make an international comparison between HDI and full income measures, incorporating the longevity observed worldwide, arguing that the HDI may be difficult to use to assess progress in development, though it may be accurately rank countries in an ordinal fashion because many aspects of human development that it adds to income are closely correlated with

The tools used to quantify the degree of inequality at a particular time are taken in essence from the repertory of statistics that measure dispersion, e.g. the coefficient of variation, standard deviation (typically of the logarithm of the variable), the Gini index, the whole range of Theil indices, or the analysis of the whole distribution of the variable across economies [Quah, 1996]. If we wish to analyse the temporal evolution of inequality and its increase (divergence) or reduction (convergence) there are two possibilities. One option is to compare the value of these statistics over the course of time: if their value increases there is divergence, if it decreases there is convergence. In this case it is usual to speak of the existence, or not, of σ -convergence. Alternatively, we can estimate the relationship between the increases of the variable during a period and its relative starting levels. If the relationship is positive the differences and there is divergence, if the process is given by the magnitude of the parameter estimated for the said relationship. In this case we speak of the existence, or not, of β -convergence. This way of measuring convergence is closely related to the models proposed by growth theory.

income, making weighting of these aspects less important.

However, regardless of the indicator adopted and the type of analysis of convergence or the statistic used, what needs to be highlighted is that these are always comparisons of the situation at specific moments in time. In the case of per capita income, and similarly for any other indicator, we consider the per capita income at certain times. In this way, we obtain something like "still photos" corresponding to the situation in certain periods. This information is certainly useful and valuable in itself, but incomplete.

The empirical results of all this extensive literature are clear. On the one hand, when the existence of specific steady states is not controlled for (analysis of absolute convergence) it is impossible to reject the existence of convergence among the countries of the OECD, the states of the US, the prefectures of Japan, the regions of Germany, France, Britain, Italy, Canada, India, Sweden or Austria or the regions of Europe as a whole [Barrow and Sala-i-Martin, 1995]. The most surprising thing is that in all cases the rate of convergence is around 2% per year. This means that convergence exists among the economies within these areas, but that it occurs very slowly (at 2%, each economy would take about 35 years to cover half the distance). However, convergence would not exist at international level with a broad sample of countries.

On the other hand, when in the analysis we control for the differences in the steady state (analysis of conditioned convergence) the results indicate the existence of convergence in all the areas, including worldwide (e.g. Islam [1995] for the international case, or Evans and Karras [1996] for the case of the US). That is to say that the economies grow more the further they are from their steady state. Also, the rate of conditioned convergence is much greater (normally between 5% and 25%). It is also clearly rejected that the steady states are common among

¹ Nevertheless, the authors themselves recognise that their measure is incomplete, as it does not consider indirect effects, via increase in human capital, of the gains in life expectancy on economic growth.

economies, i.e. the convergence would be partial and a certain level of inequality among economies would always persist.

These two major groups of results are perfectly compatible with each other. Economies converge towards their own steady states. In the case of the countries of the OECD or of the regions of a country, we analyse similar economies with similar steady states, and convergence towards the steady state therefore means effective convergence in per capita income among the economies. However, in the worldwide case the steady states are so different (due to huge differences in the rate of saving, demographic growth, investment in human capital, etc.) that, although each economy converges towards its steady state, the differences in per capita income are not reduced because the steady states of the rich countries are much higher than those of the poor countries.

The final image of all these results is that considerable and permanent differences exist even among apparently homogeneous economies, e.g. the regions of a country. These differences are still greater and more persistent in the case of heterogeneous countries. If the important point is whether the poor economies are catching up with the rich ones, the answer seems to be clearly negative. As we have already said, all these results are very valuable, but omit the life-cycle aspect of the issue. In the following sections we will analyse inequality and convergence among economies on the basis of the total incomes that representative individuals of these economies may obtain in their lifetimes, in order to obtain a more complete image.

III. Analytical framework: general formulation

The permanent income (VP_{i0}) of a representative individual of economy *i* at time 0 is the discounted value of the income per capita at current prices (y_{it}) , taking into account also the probability of survival in each period of a person born in period 0, denoted as $S_i(t, 0)$.

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0)$$
[1]

in which we will assume a common and constant interest rate, \overline{r} . The appendix gives the details of the construction of the survival probabilities series.

Observe that, *ceteris paribus*, the economies of countries will have higher levels of permanent income:

- the higher their initial per capita incomes (y_{i0}) , since the higher the initial income, the greater the future income flows (y_{it}) given the rates of growth, $[y_{it} = y_{i0}(1 + g_i)^t]$.
- the higher their rates of growth (g_i) , since the higher the rate of growth, the higher their future per capita incomes (y_{it}) given the initial levels of per capita income, $[y_{it} = y_{io}(1+g_i)^t]$.
- the greater the survival rates in each period, $[S_i(t, t 1)]$, since this will determine that incomes will be obtained for more years and that the present value of those income flows will increase.
- the lower the rate of discount (r), since this increases the present value of future incomes.

Three factors will determine the (non-)existence of convergence in permanent income:

- the (non-)existence of convergence in the initial levels of income per capita at current prices,
- the (non-)existence of convergence in per capita future income flows,
- the (non-)existence of convergence in the survival rates of individuals

Scenarios considered for calculation of permanent incomes

We have constructed different scenarios on the basis of these three determinants of inequalities in permanent income per capita. For this we have made assumptions as to the initial levels and the evolution of the per capita current incomes of each country, as to the existence or otherwise of convergence among economies and as to the probability of survival. The different scenarios are defined below, the benchmark economy being denoted as US. Table 1 offers a summary of all the scenarios considered.

- <u>Scenario 1 (Historical base scenario)</u>: In this scenario it is considered that the per capita income of each economy in the initial period (y_{i0}) grows at the individual average rate of growth (g_i) during the period 1960-2000. The series of per capita incomes (y_{i1}) obtained in this way $[y_{i1} = y_{i0}(1 + g_i)^t]$ is used to calculate permanent income (VP_{i0}) according to expression [2].

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0) = \sum_{t=0}^{120} \frac{y_{io}(1+g_i)^t}{(1+r)^t} S_i(t,0)$$
[2]

- <u>Scenario 2 (Scenario of identical per capita incomes)</u>: In this scenario it is considered that the per capita income of each economy in the initial period is equal to that of the benchmark economy $(y_{i0} = y_{US0})$ and grows at the average rate of growth of that economy (g_{US}) during the period 1960-2000. The series of per capita incomes (y_{it}) obtained in this way $[y_{it} = y_{US0}(1 + g_{US})^t]$ is used to calculate permanent income (VP_{i0}) according to expression [3]. The only differences among the economies, therefore, are due to the differences in the survival rates.

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0) = \sum_{t=0}^{120} \frac{y_{USo}(1+g_{US})^t}{(1+r)^t} S_i(t,0)$$
[3]

- <u>Scenario 3 (Scenario without convergence in current per capita income)</u>: In this scenario it is considered that the per capita income of each economy in the initial period (y_{i0}) grows at the average rate of growth of the benchmark economy (g_{US}) for the period 1960-2000. The series of per capita incomes (y_{i1}) obtained in this way $[y_{i1} = y_{i0}(1 + g_{US})^t]$ is used to calculate permanent income (VP_{i0}) according to expression [4].

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0) = \sum_{t=0}^{120} \frac{y_{io}(1+g_{US})^t}{(1+r)^t} S_i(t,0)$$
[4]

Scenario 4 (Scenario with convergence in current per capita income): In this scenario it is considered that the per capita income of each economy in each period (y_{it}) converges towards that of the benchmark economy (y_{USt}) at a speed of convergence β . If we define the per capita income of an economy at moment *t*, relative to the benchmark economy, as $\eta_t = y_{it}/y_{USt}$ and its long term equilibrium stable value as η^* , then convergence at an annual rate of β makes $\eta_t = [\eta^* - e^{\beta t} (\eta^* - \eta_o)]$. If we further assume that there are no differences in steady state, i.e. $\eta^* = 1$, then $y_{it} = y_{USt} \cdot (1 - (1 - \eta_0)e^{-\beta t}))$. The series of per capita incomes (y_{it}) obtained in this way is used to calculate permanent income (VP_{i0}) according to expression [5]. In this scenario three rates of convergence are considered, $\beta=2\%$, $\beta=3\%$ and $\beta=5\%$.

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^{t}} S_{i}(t,0) = \sum_{t=0}^{120} \frac{y_{USt} \cdot \left(1 - (1-\eta_{0})e^{-\beta t}\right)}{(1+r)^{t}} S_{i}(t,0)$$
[5]

- <u>Scenario 5.1 (Base scenario with identical survival rates)</u>: This scenario is the same as scenario 1 with the sole exception that the per capita incomes of each economy (y_{it}) obtained as described $[y_{it} = y_{i0}(1 + g_i)^t]$ are combined with the survival rates of the benchmark economy (S_{USt}) , obtaining the permanent income (VP_{i0}) according to expression [6]. In this way we can evaluate the differences in permanent income that would persist even if the survival rates did not differ between economies.

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^{t}} S_{i}(t,0) = \sum_{t=0}^{120} \frac{y_{io}(1+g_{i})^{t}}{(1+r)^{t}} S_{US}(t,0)$$
[6]

- <u>Scenario 5.2 (Scenario with identical per capita incomes and identical survival rates)</u>: This scenario is the same as scenario 2 with the sole exception that the series of per capita incomes (y_{ii}) obtained as described $[y_{ii} = y_{US0}(1 + g_{US})^{t}]$ are combined with the survival rates of the benchmark economy (S_{USt}) and then the permanent income (VP_{i0}) is obtained according to expression [7].

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^{t}} S_{i}(t,0) = \sum_{t=0}^{120} \frac{y_{USo}(1+g_{US})^{t}}{(1+r)^{t}} S_{US}(t,0)$$
[7]

- <u>Scenario 5.3 (Scenario without convergence in per capita income and with identical survival</u> rates): This scenario is the same as scenario 3 with the sole exception that the per capita incomes (y_{it}) obtained as described $[y_{it} = y_{i0}(1 + g_{US})^t]$ are combined with the survival rates of the benchmark economy (S_{USt}) and the permanent income (VP_{i0}) is obtained according to expression [8].

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0) = \sum_{t=0}^{120} \frac{y_{i0}(1+g_{US})^t}{(1+r)^t} S_{US}(t,0)$$
[8]

- Scenario 5.4 (Scenario with convergence in per capita income and identical survival rates): This scenario is the same as scenario 4 with the sole exception that the per capita incomes (y_{ii}) obtained as described are combined with the survival rates of the benchmark economy (S_{USt}) obtaining the permanent income (VP_{i0}) according to expression [9]. As before, three speeds of convergence are considered: 2%, 3% and 5%.

$$VP_{i0} = \sum_{t=0}^{120} \frac{y_{it}}{(1+r)^t} S_i(t,0) = \sum_{t=0}^{120} \frac{y_{USt} \cdot \left(1 - (1-\eta_0)e^{-\beta t}\right)}{(1+r)^t} S_{US}(t,0)$$
[9]

	J			
	Rates of growth (g)	Initial per capita income (y _{i0})	Survival rates <i>(S)</i>	Convergence (β)
Scenario 1	g_i	${\cal Y}_{i0}$	S_{it}	-
Scenario 2	$g_{\it US}$	${\cal Y}_{US0}$	S_{it}	-
Scenario 3	g_{US}	${\cal Y}_{i0}$	S_{it}	-
Scenario 4	Convergence	${\cal Y}_{i0}$	S_{it}	2%, 3%, 5%

Table 1: Summary of scenarios

Scenario 5.1	g_i	${\cal Y}_{i0}$	S_{USt}	-
Scenario 5.2	$g_{\it US}$	\mathcal{Y}_{US0}	S_{USt}	-
Scenario 5.3	$g_{\it US}$	${\cal Y}_{i0}$	S_{USt}	-
Scenario 5.4	Convergence	\mathcal{Y}_{i0}	S_{USt}	2%, 3%, 5%

Where g_i indicates the rate of growth of each country for the period 1960-2000, g_{US} the average rate of growth of the benchmark economy for the period 1960-2000, y_{i0} the per capita income of each country in the initial period, y_{US0} the initial per capita income of the benchmark economy, S_{it} the survival rates of each economy, S_{USt} the survival rates of the benchmark economy.

IV. Empirical analysis: inequality among countries

In this section we present the results regarding the inequality among countries at two moments in time, 1960 and 2000. The comparisons were always made using United States as benchmark. All the data are taken from *World Bank Development Indicators 2002*. A detailed discussion of how the survival rates were obtained can be found in the appendix.

Table 2 offers the detailed data regarding life expectancies, per capita current incomes and permanent incomes estimated for the full set of countries², all of them in terms relative to the US. Table 3 presents the same results, but referring exclusively to the sub-set of countries of the OECD. Sections a) and b) present the results using a discount rate of 2% and 4% respectively. Unless stated otherwise, for simplicity of exposition we will refer to the results corresponding to a discount rate of 2%.

The first column presents the <u>life expectancies</u> for each country relative to the US. As can be observed, there are wide differences in the levels of life expectancy at birth of the individuals of the different countries, with a coefficient of variation always above 0.19. However, during the four decades considered there has been a reduction in the level of inequality, as this indicator has fallen from 0.23 to 0.19. Among countries of the OECD, the level of inequality has always been more moderate, being one third of the international figure in 1960. Also in this case a clear convergence can be appreciated, the coefficient of variation falling from 0.07 to 0.03.

Tables 3 and 4 and graphic 1 present the results of the analysis of σ -convergence and β convergence in life expectancy both for the total of countries and for the sub-sample of countries of the OECD. In them we observe significant convergence between 1960 and 2000 in the life expectancies at birth, of -0.63% per year for the full set of countries. For the countries of the OECD the convergence is even higher (-1.82%).

As regards convergence in current per capita incomes, the second column of table 2 presents the per capita incomes of each of the countries relative to the US. The dispersion of this indicator remains unaltered during the 40 years analysed, so there is no sign of convergence in per capita incomes across the whole set of countries. However, for the sub-set of countries of the OECD there does seem to be a clear convergence in the levels of per capita income, as a reduction from 0.58 to 0.47 occurs in its coefficient of variation. The results of the analysis of σ -convergence (by the standard deviation of the logarithm of per capita income) and of β -convergence presented in tables 3 and 4 and in figure 1, are in line with this. In them we observe

² Finally the sample consists of 89 countries for which all the necessary information was available: Algeria, Argentina, Australia, Austria, Bahamas, Bangla Desh, Barbados, Belgium, Benin, Bolivia, Botswana, Brazil, Burquina Faso, Burundi, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Republic of the Congo, Costa Rica, Ivory Coast, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, Finland, France, Gabon, Ghana, Greece, Guatemala, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Korea, Lesotho, Luxembourg, Madagascar, Malawi, Malaysia, Malta, Mauritius, Mexico, Morocco, Nepal, Holland, New Zealand, Nicaragua, Norway, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Portugal, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, South Africa, Spain, Switzerland, Sweden, Thailand, Togo, Trinidad and Tobago, United Kingdom, United States, Uruguay, Venezuela, Zambia and Zimbabwe.

significant divergence in per capita incomes of 0.29% per year for the whole set of countries. For the countries of the OECD there is significant convergence (-0.73%).

These results are well established in the economic literature. As we noted in earlier sections, although these results are informative and useful, and expand our knowledge of the temporal evolution of the levels of current per capita income attained at each moment in time, they do not offer a complete view of the problem, since they ignore the temporal and life-cycle dimension. As Solon said, the level of inequality among individuals cannot be evaluated definitively without comparing their lives as a whole, i.e. it is necessary to analyse the permanent income of the individuals of each economy.

As we have indicated, table 2 shows the situation in terms of permanent income under different assumptions. An overall view is shown in tables 3 and 4, offering synthetic indicators of the degree of inequality among countries in terms of permanent income, and of their evolution over time under the scenarios discussed in section 3.

Block a) of table 2 and figure 2 present the results of calculating permanent income on the basis of the different scenarios. <u>Scenario</u> 1, corresponding to expression [2], is the base scenario, in which each country's per capita income is considered to grow at its average rate of growth (g_i) as obtained for the period 1960-2000, and using the survival rates of each country.

In the case of the full set of countries we can observe that, both in 1960 and in 2000, inequality in terms of permanent income was considerably greater than in terms of per capita income. Thus, assuming a real interest rate of 2%, the standard deviation of the logarithm of permanent income stands at 1.889 and 2.2293, values substantially above those of per capita income (1.449 and 1.728 respectively). The same kind of qualitative results are obtained with an assumed real interest rate of 4%.

This greater degree of inequality when individuals' whole life cycle is considered is due to the shorter life expectancy in poor countries and to the divergence experienced over time by per capita current incomes. For the world as a whole the habitual measures of inequality seem to be substantially underestimating the true inequality among countries.

The β -convergence results also show an increase in inequality of permanent income over the period, as the indicators show a divergence even more intense in permanent income (0.43% per year) than in current incomes (0.29%).

As can be observed, the existence of significant differences in the life expectancies at birth of the individuals of different countries, together with the existence of significant divergence in per capita current incomes, results in greater divergence among economies in terms of permanent income (0.43%). Nevertheless, as occurred in the case of per capita current incomes, the economies of the OECD also experienced convergence in terms of permanent income (-0.21%), though to a lesser extent than in terms of current income.

Nevertheless, convergence in permanent income is greater the higher the interest rate, as in this case the present value of the higher future incomes associated with the longer life expectancies of the richer economies is less (because the rate of discount is higher). Indeed, the results indicate that at a rate of discount of 4% the convergence in permanent income of the countries of the OECD rises to-0.47%.

Section b) of tables 3 and 4 and the middle part of figure 2 present the results of calculating permanent income on the basis of expression [3] in relation to <u>scenario 2</u>, in which both countries' per capita incomes and their rates of growth are considered to coincide with those of the US. In this case, the only differences in the levels of countries' permanent incomes would be given by the differences in their survival rates.

The results permit us to appreciate how much of the inequality is attributable exclusively to differences in life expectancy. In the case of the full set of countries, and for an interest rate of 2%, the standard deviation of the logarithm of permanent income stands at 0.239 and 0.228 in 1960 and 2000 respectively. That is to say that unequal life expectancies by themselves would only lead to very low levels of inequality among countries. The major part of inequality in permanent income is due to inequality in current per capita income and to its interaction with life expectancies. In the case of the countries of the OECD, inequality attributable exclusively to differences in life expectancy is practically non-existent in 2000 (0.03).

Regarding the evolution of inequality in permanent income, under this scenario all the results point to the existence of a clear convergence in permanent income per capita due to the convergence in the levels of life expectancy among countries. Thus we observe a clear reduction in the indicators of dispersion considered (σ -convergence) during the years analysed. The analysis of β -convergence confirms that if differences of per capita income did not exist, significant convergence would have occurred in countries' permanent income levels. In this case, the results also indicate that this convergence would be greater in the sub-set of countries of the OECD (-0.64% worldwide as against -1.85% for the OECD). This result is obvious as well as expected, as under this scenario, the only differences in the levels of permanent income of countries would be explained exclusively by the differences in their survival rates. In this sense, the existence of clear convergence in countries' levels of life expectancy, greater in the case of the OECD, is the factor that explains the convergence in permanent income levels of this scenario and the higher rates of convergence of the countries of the OECD.

Section c) of tables 3 and 4, and the right-hand part of figure 2, present the results of calculating permanent income on the basis of expression [4] under <u>scenario 3</u>. This simulates the effect on permanent incomes that would occur if the economies of all the countries grew at the same rates of growth as the US In this case, therefore, we assume that the relative current incomes of the initial period considered in each case, 1960 and 2000 respectively, are maintained over time. Finally, for each country we use its own survival rate. In sum, the results will show the inequality in permanent income under the hypothesis that there is neither convergence nor divergence over time of current per capita incomes.

The results for the full set of countries show an inequality in permanent income systematically greater than that in per capita income, due to the effect of inequality in life expectancies, always shorter in the poor countries. However, the values are lower than those of scenario 1, because in the latter we are considering the impact of a moderate divergence in current incomes, in accordance with the historical experience of the period 1960-2000. In the case of the OECD the opposite occurs, because scenario 1 has been obtained in accordance with the convergence experienced within that sub-sample of countries in that period in terms of current incomes.

As for the temporal evolution, in this scenario 3 we observe divergence in the countries' levels of permanent income (0.20%), and convergence for the sub-set of countries of the OECD (-0.80\%). These results can be compared with those corresponding to the most general scenario (scenario 1), where the rate of convergence was 0.43% for all the countries and -0.21% for the sub-set of countries of the OECD.

Section d) of tables 3 and 4 and figure 3 present the results of calculating permanent income on the basis of expression [5] relating to the fourth scenario considered. In scenario 4 convergence in per capita current income is considered to exist over time at different rates (2%, 3% and 5%).

Let us focus on the case with convergence of 2%, which is the most usual value in the literature on convergence. The results of table 3 indicate what the levels of inequality in permanent income among countries would have been if there had been convergence of this type instead of the divergence in current incomes that really occurred. Thus, in 1960 the standard deviation of the logarithm of permanent income worldwide would have been only 0.509. This value is much lower than the 1.889 in scenario 1 and is much lower than the 1.449 for current per capita income, which is the most usual indicator of inequality.

When convergence exists among economies, the use of indicators that do not take into account the whole life cycle of individuals may lead to overestimation of inequality by a wide margin compared to when we do consider individuals throughout their lifetime. This effect is greater the faster the rate of convergence, as shown by the results corresponding to convergence of 3% and 5%.

The same type of results are obtained in the case of the countries of the OECD, though the variation is less intense because among these countries there has been appreciable convergence in per capita incomes as reflected in scenario 1 of table 4.

With regard to the temporal evolution of inequality, in this case we observe that the convergence assumed in the current per capita incomes of the economies, together with the

convergence verified in life expectancies, produces convergence in the levels of permanent incomes. Of course, this convergence in permanent income is the greater the faster the rate of convergence assumed. Thus, for a rate of convergence in current incomes of 2%, the convergence in permanent incomes is-0.26% for the full set of countries (and-0.33% and -0.42% for rates of convergence in current incomes of 3% and 5% respectively).

Block e) of table 4 shows the results for the four scenarios discussed above, but with the additional assumption that all the countries have survival rates identical to each other and equal in each period to that of the US. The results therefore indicate the inequality in permanent income that would have remained in each case in the absence of differences in life expectancy. Let us analyse the results scenario by scenario.

Section e.1) of tables 3 and 4, and figure 4, present the results of calculating permanent income on the basis of expression [6]relating to <u>scenario 5.1</u>. This scenario simulates the effect on the base scenario (scenario 1) that would occur if all the countries had the same survival rates as the US. Under this scenario, we observe a growth of the permanent income of the countries with lower survival rates. In general we observe growth in the mean permanent income of the full set of countries, given the lower survival rate relative to the US. However, this is not so for the sub-set of countries of the OECD, as in this case the US does not have the highest survival rates.

Comparing the results with those of scenario 1, a slight reduction of inequality in permanent income can be appreciated. Total equality of life expectancies at international level would alleviate the inequality in permanent income, but the relative reduction achieved would be small. Thus, in 1960 and for an interest rate of 2%, the standard deviation of the logarithm of permanent income would fall from 1.889 to 1.707.

With regard to convergence in permanent income, we observe that, if in scenario 1 no convergence was observed (0.43%), now the divergence is even greater (0.59%). This result is logical, since one of the sources of convergence in permanent income among countries was the convergence in their survival rates, so if this source of convergence is eliminated the divergence observed is greater. This effect is especially important for the sub-set of countries of the OECD, in which convergence existed in permanent incomes (-0.21%), whereas now, if we assume that all countries have the same survival rates, the convergence among countries would disappear (0.02%).

Section e.2) of tables 3 and 4, and figure 4, present the results of calculating permanent income on the basis of expression [7] relating to <u>scenario 5.2</u>. This scenario simulates the effect on scenario 2 that would occur if all the countries had the same survival rates as the US. Note that scenario 2 already simulated the effect on permanent incomes that would occur if all the countries had the same per capita incomes and the same rates of growth as the US, and therefore the only source of convergence was convergence in survival rates. Obviously, by also assuming in scenario 5.2 that countries have the same survival rates as the US, the permanent income of all the countries would be the same and the dispersion would be zero.

Section e.3) of tables 3 and 4, and figure 4, present the results of calculating permanent income on the basis of expression [8] relating to <u>scenario 5.3</u>. This scenario simulates the effect on scenario 3 that would occur if all the countries had the same survival rates as the US and also maintained the initial differences in relative current income per capita. Note that, as with scenario 5.1, assuming common survival rates implies growth in the levels of permanent income of the poorest countries, less inequality in permanent income and greater divergence in permanent income due to the elimination of the effect of the real convergence observed in terms of life expectancy.

Finally, section e.4) of tables 3 and 4, and figure 4, present the results of calculating permanent income on the basis of expression [9] relating to <u>scenario 5.4</u>. This scenario simulates the effect on scenario 4 that would occur if all the countries had the same survival rates and their per capita current incomes converged at 2% per year.

In this case, the assumption that all the countries have the same survival rate implies a very substantial reduction of inequality in terms of permanent income. Thus, for example, the standard deviation of the logarithm of permanent income in 1960, assuming a real interest rate of 2%, is 0.249 - less than half the value estimated in scenario 4 for the same assumptions

except that of common survival rates. This major repercussion of equality of life expectancies occurs because it permits the inhabitants of the poor countries to live to reap the full benefit of the convergence in future current incomes that we are assuming.

In this sense, equality of life expectancies by itself has very little effect on inequality in permanent income in a context where current incomes do not converge in the course of time. When such convergence does occur, however, its effect can be considerable. Naturally this effect is the greater the lower the rate of discount applicable to those future incomes, as can be appreciated by comparing the results with interest rates of 2% or 4%.

These lower levels of inequality in permanent income would, moreover, have remained basically stable between 1960 and 2000, i.e. if convergence existed at 2% in current incomes and the countries had the same survival rates as the US, this would not signify convergence in permanent incomes, but would signify a lower level of inequality in respect of this variable throughout the period.

To sum up, the effectiveness of convergence in survival rates as a factor in reducing inequality in permanent income depends crucially on its being simultaneous with convergence in annual current incomes.

V. Conclusions

The literature dedicated to the empirical analysis of inequality mostly utilizes the per capita current income of economies, either through the study of the evolution of the dispersion of this variable (σ -convergence), or through the study of the relationship between the relative levels of per capita income at an initial moment and its subsequent rate of growth (known as β -convergence).

Nevertheless, this type of approach ignores the temporal and life-cycle dimension of the issue. Just as Solon responded to Croesus that "*I have no answer to give, until I hear that thou hast closed thy life happily*", the level of inequality among individuals cannot be evaluated definitively without comparing their lives as a whole. When studying inequality among economies the comparative study of the sum of incomes obtained by people throughout their lifetimes and the length of those lives will be more complete than focusing onlyin current income.

The approach proposed has been applied to analyse the convergence in the period 1960-2000 of a broad set of countries as well as the sub-set of countries belonging to the OECD.

The results indicate that, for a real interest rate of 2%, inequality in permanent income (scenario 1) is about 30% higher than the inequality in current income in 1960 and 33% in 2000. This higher degree of inequality when the whole life-cycle of individuals is considered is due to the shorter life expectancy in poor countries and to the divergence experienced in per capita current incomes over time. Worldwide, the usual measures of inequality would seem to be substantially underestimating the true inequality among countries.

We have also obtained the results corresponding to some counter-factual scenarios. If there had been no differences in annual per capita income, but only differences in life expectancy (scenario 2), the inequality in permanent income would have been 87% less than that estimated in 1960, and 90% in 2000. If there had been neither convergence nor divergence in current income (scenario 3) the inequality in permanent income would have been 12% less in 1960 and 17% less in 2000. However, if per capita income had converged at 2% per year, the inequality in permanent income would then have been much less than that recorded in per capita current income (65% less in 1960 and 71% in 2000) or in estimated permanent income (73% and 78% respectively). If as well as this convergence of 2%, the differences of life expectancy disappeared (scenario 5.4) the reduction would have been even more intense: 83% and 85% with respect to per capita current income; 87% and 88% with respect to estimated permanent income.

These results would seem to indicate that the principal source of inequality in permanent income is the inequality in current per capita income, but survival rates seem to have also impact, especially in the case of the countries of the OECD. The effectiveness of

convergence in survival rates as a factor reducing inequality in permanent income depends crucially on it being simultaneous with convergence in annual current incomes.

References

Ando, A. and F. Modigliani [1963], "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests", *American Economic Review*, 53, marzo, 55-84.

Barro, R.J. and Sala-i-Martin, X. [1995], Economic Growth, McGraw-Hill.

Becker, G., T. Philipson and R. Soares [2001], "Growth and Mortality in Less Developed Nations". Manuscript. University of Chicago.

Becker, G., T. Philipson and R. S. Soares [2005]: "The Quantity and Quality of Life and The Evolution of World Inequality". American Economic Review 95(1), 277-291.

Dowrick, S., AND. Dunlop and J. Quiggin [2003], "Social indicators and comparisons of living standards", *Journal of Development Economics*, 70, 501-529.

Evans, P. and G. Karras [1996], "Convergence revisited", *Journal of Monetary Economics*, 37, 225-248.

Friedman, M. [1957], *A Theory of Consumption Function*, Princeton, N.J., Princeton University Press.

Herodotus [440 B.C.E], "The History of Herodotus", Book I, 29.

Islam, N. [1995]. "Growth empirics: a panel data approach", *Quarterly Journal of Economics*, 110 (4), 1127-1170.

Modigliani, F. [1986], "Life Cycle, Individual Thrift and the Wealth of Nations", American Economic Review, 76, 297-313.

Modigliani, F. and R.E. Brumberg [1954], "Utility Analysis and the Consumption Function", en K.K. Jurihara, ed., *Post-Keynesian Economics* (New Brunswick, N.J.: Rutgers University Press, 1954).

Philipson, T. and R. Soares [2001], "Human capital, longevity and economic growth: a quantitative assessment of Full Income Measures", mimeo, University of Chicago.

Quah, D.T. [1996], "Twin peaks: growth and convergence in models of distribution dynamics", *The Economic Journal*, 106, 1045-1055.

Ramsey, F.P. [1928], "A mathematical theory of saving", Economic Journal, 38 (152), 543-559.

World Bank Development Indicators 2002. The World Bank, Washington D.C.

Appendix: Construction of survival rates

The survival rates for each age are not available for a large number of countries. To calculate them, in this study we use the same procedure as in Becker, Philipson and Soares [2001], based on the data offered by World Bank Development Indicators 2002. The procedure is based on four types of information available relating to survival rates ³: infant mortality ⁴ in the first year (S(1,0)), infant mortality in the first five years⁵ (S(5,0)), the survival rate at 60 years⁶ conditional on reaching 15 (S(60,15)), and Life expectancy at birth (total years) (E_0). Using this information, together with some simplifying assumptions, it is possible to construct the survival rates of 89 countries considered in the study for ages between 1 and 120 years.

By definition we have the following relationships between the rates of survival

$$S(5,1) = \frac{S(5,0)}{S(1,0)}$$
 and $E_{60} = \overset{\text{¥}}{\underset{t=61}{\overset{\text{60}}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{\text{60}}{\overset{60}}{\overset{{60}}{\overset{{60}}{\overset{60}}{\overset{{60}}{\overset{60}}{\overset{{60}}{\overset{60}}{$

where E_{60} are the additional years of life for an individual of 60 years.

The assumptions made with regard to the rates of survival are as follows:

S(t,t-1) = S(t+1,t),for $2 \le t \le 4$; S(t,t-1)=1,for $6 \le t \le 15$; S(t,t-1) = S(t+1,t),for $16 \le t \le 59$; $S(t, 60) = e^{-(t-60)}$ for $60 \le t \le 120$; S(t+1,t) = 0for t>120

Given the information available, this information is sufficient to reconstruct all the distribution of survival. This is done as follows:

where S(t, 60) for t > 60 is obtained from $S(t, 60) = e^{-\beta(t-60)}$ and $b = \frac{1}{E_{60}}$ (from the integration of

S(t, 60) of 60 to ∞).

The assumptions adopted are not very far from the reality, and permit us to use the full potential of the information available.

³ The information provided by the WDI is presented as number of deaths (n_{ij}) per 1000 individuals, so it has had to be converted to rates S(i,j) using the following formula

 $S(i,j) = \frac{1000 - n(i,j)}{1000}.$ ⁴ Mortality rate, infant (per 1,000 live births).
⁵ Mortality rate, under-5 (per 1,000 live births).
⁶ Mortality rate, adult (per 1,000 adults). The information from the World Bank captures the mortality rate separately for men and women. In this study we consider the average.

Table 2(a): Income, permanent income and life expectancy by country. United States = 100. Discount rate = 2%.

													Р	ermanent	Income									
	Lif	fe	Inco	me -									Scena	rio 4						Scena	ario 5			
	Expec	tancy	per ca	pita	Scena	rio 1	Scena	rio 2	Scena	rio 3 🚽	β=2	%	β=3	%	β=5	%	Scenar	io 5.1	Scenar	io 5.2	Scenario	5.3	Scenar	io 5.4
	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000
Algeria	67.77	92.19	8.61	5.02	3.77	2.85	67.68	92.51	5.83	4.64	34.22	48.34	41.36	58.61	49.71	70.11	5.31	3.02	100.00	100.00	8.61	5.02	53.60	53.44
Argentina	93.39	95.84	40.96	24.79	24.65	14.91	93.53	96.00	38.31	23.80	65.05	60.13	71.50	68.55	78.84	77.91	26.05	15.39	100.00	100.00	40.96	24.79	70.03	63.13
Australia	101.37	102.42	74.15	74.50	75.57	76.68	101.44	102.41	75.22	76.30	88.15	89.72	91.21	92.76	94.65	96.11	74.50	74.87	100.00	100.00	74.15	74.50	86.88	87.50
Austria	98.54	101.51	80.11	102.40	102.16	136.97	98.63	101.49	79.01	103.92	88.64	102.68	90.93	102.39	93.52	102.08	103.79	134.70	100.00	100.00	80.11	102.40	89.90	101.17
Bahamas, The	90.80	89.91	61.40	43.53	41.00	28.86	90.81	90.40	55.76	39.35	72.55	64.02	76.62	70.02	81.28	76.86	44.57	31.04	100.00	100.00	61.40	43.53	80.41	72.32
Bangladesh	57.09	79.40	1.64	1.17	0.72	0.69	56.64	79.57	0.93	0.93	24.40	38.37	30.62	47.47	38.21	57.91	1.19	0.84	100.00	100.00	1.64	1.17	50.06	51.55
Barbados	92.48	97.87	22.11	25.88	24.01	30.11	92.64	98.14	20.48	25.40	55.53	62.18	63.97	70.69	73.56	80.13	26.03	30.77	100.00	100.00	22.11	25.88	60.45	63.67
Belgium	100.86	101.49	78.14	96.36	98.29	123.52	100.94	101.41	78.87	97.72	89.78	99.61	92.36	100.04	95.25	100.52	97.31	121.55	100.00	100.00	78.14	96.36	88.90	98.21
Benin	55.71	68.76	2.43	1.29	0.85	0.54	55.34	68.82	1.34	0.89	24.78	31.89	30.83	39.71	38.08	48.88	1.40	0.72	100.00	100.00	2.43	1.29	50.47	51.61
Bolivia	61.39	81.18	6.25	2.97	2.23	1.31	61.08	81.44	3.82	2.42	28.79	40.23	35.32	49.41	43.15	59.92	3.31	1.52	100.00	100.00	6.25	2.97	52.40	52.43
Botswana	66.92	50.57	2.60	12.35	11.20	33.99	66.53	49.81	1.73	6.15	30.21	22.94	37.52	27.54	46.25	33.40	22.04	119.09	100.00	100.00	2.60	12.35	50.55	57.03
Brazil	78.59	88.33	13.17	14.45	11.31	14.07	78.58	88.62	10.35	12.81	42.60	49.86	50.51	58.68	59.61	68.67	14.48	15.98	100.00	100.00	13.17	14.45	55.92	58.06
Burkina Faso	51.95	57.38	1.11	0.79	0.45	0.34	51.50	57.04	0.57	0.45	21.72	25.35	27.42	31.65	34.41	39.16	0.81	0.56	100.00	100.00	1.11	0.79	49.80	51.36
Burundi	59.28	54.45	0.97	0.44	0.32	0.14	58.89	54.10	0.57	0.24	25.93	22.67	32.47	28.63	40.31	35.92	0.50	0.22	100.00	100.00	0.97	0.44	49.72	51.19
Cameroon	56.56	64.94	3.92	2.11	1.42	0.84	56.12	64.74	2.20	1.37	24.94	30.08	30.96	37.23	38.29	45.65	2.27	1.19	100.00	100.00	3.92	2.11	51.22	52.01
Canada	101.93	102.42	84.60	70.45	72.13	59.71	101.94	102.35	86.25	72.11	94.04	87.66	95.88	91.18	97.93	95.06	70.92	58.48	100.00	100.00	84.60	70.45	92.18	85.51
Central African Repu	55.42	56.40	3.46	1.06	0.86	0.28	55.09	56.07	1.91	0.59	25.33	23.76	31.30	29.92	38.41	37.46	1.37	0.40	100.00	100.00	3.46	1.06	50.99	51.49
Chad	49.97	62.90	2.20	0.68	0.53	0.19	49.47	62.86	1.09	0.43	20.86	28.49	26.26	35.60	32.92	44.01	0.87	0.26	100.00	100.00	2.20	0.68	50.35	51.31
Chile	82.12	98.16	14.88	16.73	13.69	18.66	82.02	98.29	12.20	16.45	45.42	57.87	53.49	67.42	62.75	78.00	16.79	19.01	100.00	100.00	14.88	16.73	56.79	59.18
China	52.06	91.17	0.84	2.58	1.13	9.58	51.30	91.56	0.43	2.36	19.95	46.43	25.49	56.87	32.55	68.60	3.45	11.45	100.00	100.00	0.84	2.58	49.66	52.24
Colombia	81.42	92.90	8.35	7.16	5.92	5.73	81.41	93.16	6.80	6.67	41.70	49.60	50.36	59.69	60.40	71.00	7.19	6.11	100.00	100.00	8.35	7.16	53.47	54.48
Congo, Rep.	59.96	66.59	4.21	2.63	1.78	1.21	59.52	66.49	2.51	1.75	26.63	30.29	33.04	37.67	40.83	46.47	2.75	1.68	100.00	100.00	4.21	2.63	51.37	52.27
Costa Rica	88.66	100.54	14.66	12.23	10.98	10.21	88.72	100.53	13.01	12.29	49.56	57.44	58.38	67.73	68.42	79.07	12.31	10.16	100.00	100.00	14.66	12.23	56.67	56.97
Cote d'Ivoire	56.56	59.45	4.44	2.32	1.53	0.85	56.04	59.20	2.49	1.37	26.13	26.83	32.08	33.31	39.16	41.04	2.52	1.28	100.00	100.00	4.44	2.32	51.49	52.11
Denmark	103.43	99.09	123.14	120.39	124.61	116.74	103.52	99.27	127.48	119.51	115.57	109.26	112.77	106.89	109.63	104.27	120.40	117.57	100.00	100.00	123.14	120.39	111.75	110.00
Dominican Republic	74.71	87.36	5.16	6.44	4.70	7.11	74.52	87.68	3.85	5.65	35.59	45.63	43.79	55.20	53.50	66.03	6.52	8.25	100.00	100.00	5.16	6.44	51.85	54.14
Ecuador	76.50	90.31	5.87	4.45	3.53	3.12	76.46	90.70	4.49	4.04	38.11	46.57	46.44	56.70	56.10	68.14	4.52	3.38	100.00	100.00	5.87	4.45	52.21	53.16
Egypt, Arab Rep.	66.46	87.54	2.72	3.83	2.53	4.84	66.40	87.90	1.81	3.37	31.73	44.63	39.19	54.51	47.85	65.69	3.93	5.66	100.00	100.00	2.72	3.83	50.61	52.85
El Salvador	72.84	91.02	9.91	5.48	4.43	2.93	72.71	91.11	7.20	4.99	37.77	47.74	45.30	57.74	54.02	68.95	5.86	3.15	100.00	100.00	9.91	5.48	54.26	53.66
Fiji	80.33	89.82	10.59	7.49	6.39	4.95	80.17	90.31	8.49	6.76	40.91	47.08	49.24	56.91	59.07	68.11	7.67	5.32	100.00	100.00	10.59	7.49	54.61	54.65
Finland	98.22	100.52	73.86	100.09	99.73	141.88	98.31	100.60	72.61	100.69	85.11	100.65	88.11	100.64	91.52	100.62	102.18	141.15	100.00	100.00	73.86	100.09	86.73	100.04
France	100.67	102.33	80.22	93.17	94.37	112.36	100.68	102.11	80.77	95.14	90.61	98.73	92.93	99.54	95.54	100.43	93.64	109.74	100.00	100.00	80.22	93.17	89,96	96.65
Gabon	58.60	68.41	13.69	13.68	7.97	9.33	58.27	68.25	7.98	9.34	30.15	34.97	35.82	41.76	42.57	49.93	13.68	13.68	100.00	100.00	13.69	13.68	56.18	57.68
Ghana	64.81	73.80	3.40	1.29	1.10	0.46	64.48	73.93	2.19	0.95	29.82	34.90	36.86	43.32	45.23	53.10	1.54	0.56	100.00	100.00	3.40	1.29	50.96	51.61
Greece	98.68	101.10	28.87	40.96	41.76	61.85	98.66	101.22	28.48	41.46	63.33	71.99	71.51	78.98	80.68	86.67	42.10	61.08	100.00	100.00	28.87	40.96	63.89	71.05
Guatemala	65.78	84.63	7.02	4.87	3.42	2.98	65.39	84.86	4.59	4.13	31.67	43.05	38.52	52.43	46.65	63.11	5.00	3.41	100.00	100.00	7.02	4.87	52.79	53.36
Guvana	80.71	81.60	5.12	2.94	2.62	1.51	80.67	81.94	4.13	2.41	39.68	40.19	48.56	49.48	58.90	60.17	3.12	1.75	100.00	100.00	5.12	2.94	51.83	52.42
Haiti	60.79	69.08	4.13	1.15	1.09	0.33	60.40	69.05	2.50	0.79	27.37	31.68	34.00	39.47	42.02	48.66	1.54	0.41	100.00	100.00	4.13	1.15	51.33	51.54
Honduras	66.82	85.64	3.88	2.22	1.70	1.18	66.44	86.00	2.58	1.91	30.34	42.33	37.72	52.15	46.60	63.36	2.36	1.32	100.00	100.00	3.88	2.22	51.20	52.07
Hungary	97.83	92.45	11.44	16.96	17.17	24.18	97.92	92.62	11.21	15.70	53.90	53.69	64.03	62.63	75.44	72.69	17.56	26.68	100.00	100.00	11.44	16.96	55.04	59.29
Iceland	104.98	103.18	76.85	97.84	104.72	132.65	104.98	103.05	80.67	100.82	92.84	101.97	95.67	102.23	98.84	102.52	99.13	128.10	100.00	100.00	76.85	97.84	88.24	98.94
India	63.54	81.50	1.38	1.44	0.90	1.22	63.25	81.79	0.87	1.17	28.22	39.96	35.35	49.34	43.89	60.06	1.44	1.50	100.00	100.00	1.38	1.44	49.93	51.68
Indonesia	59.47	85.69	1.88	3.11	1.76	4 59	58.98	85.99	1.11	2.67	25.73	43.01	32.17	52.71	39.98	63 75	3 29	5.61	100.00	100.00	1.88	3.11	50.19	52.50
Ireland	99.80	99.05	41 29	86.70	97.84	212.00	99.99	99.37	41 29	86.16	70.17	92.84	77.03	94 38	84 76	96.10	98.38	217 71	100.00	100.00	41 29	86.70	70.20	93.48
Israel	102 74	101.70	39.74	53 34	56.27	75.81	102.75	101.73	40.83	54.27	71.76	78 59	78.99	84.13	87.07	90.23	54 30	74.37	100.00	100.00	30.74	53 34	69.41	77.13
151401	102.74	101./0	52.74	55.54	50.27	75.01	104.73	101.73	10.03	54.47	/1./0	70.39	10.99	04.15	07.07	20.23	54,39	74.37	100.00	100.00	59.74	55.54	07.41	11.13

(continues)

Table 2(a): Income, permanent income and life expectancy by country. United States = 100. Discount rate = 2%. (continuation)

	Life Income											P	ermanen	t Income					6					
	Expec	tancy	per ca	pita	0		0		0		0-0	0/	Scena	rio 4	0-5	.0/	6		8	Scena	ario 5		6	
	1060	2000	1060	2000	Scena	2000	Scena	rio 2	Scena	rio 3 2000	p=2	2000	p=3	2000	p=5	2000	Scenar	2000	Scenar 1060	2000	Scenario	2000	Scenar	2000
Tesla	1900	102.00	1900	2000	1960	2000	1960	102.09	1960	2000	74.71	2000	1960	2000	97.11	2000	1960	2000	100.00	100.00	1960	2000	74.50	2000
Italy	99.88	07.76	49.94	5 50	5.45	2.06	99.94	07.00	49.91	5 46	/4./1	52.37	50.55	63.90	87.11	95.51 75.11	6.03	2.12	100.00	100.00	49.94	5.27	74.59	52.98
Jamaica	92.27	97.76	10.49	5.58	5.62	5.06	92.25	97.90	9.07	5.40	49.78	52.57	59.57	05.10	70.26	/5.11	6.05	3.12	100.00	100.00	10.49	5.58	54.50	55./1
Japan	96.98	104.75	03.50	140.11	153.34	406.50	97.09	104.45	01.05	146.54	/8.8/	124.61	85.01	119.75	87.71	114.39	101.80	3/8.04	100.00	100.00	03.50	140.11	81.47	119.00
Kenya	64.45	60.95	1.52	1.03	0.71	0.46	64.04	00.50	0.97	0.62	28.75	26.54	35.84	33.19	44.51	41.20	1.06	0.70	100.00	100.00	1.52	1.03	50.00	51.48
Korea, Rep.	//.61	94.93	10.02	40.82	43.43	257.10	77.40	95.29	1.75	38.90	39.84	66.93	4/.81	/3.52	57.12	80.91	65.21	297.64	100.00	100.00	10.02	40.82	54.32	/0.99
Lesotho	61.97	57.04	1.27	1.72	0.99	1.25	61.31	56.66	0.78	0.98	25.77	23.83	32.70	30.07	41.26	37.79	1.76	2.42	100.00	100.00	1.27	1.72	49.88	51.82
Luxembourg	98.79	99.97	119.24	176.18	179.61	275.74	98.89	100.10	117.93	176.36	108.59	137.58	106.37	128.68	103.86	118.83	182.33	276.28	100.00	100.00	119.24	176.18	109.77	137.35
Madagascar	58.66	70.93	2.89	0.77	0.67	0.21	58.54	71.07	1.69	0.55	27.89	33.19	34.39	41.34	41.96	50.84	1.05	0.27	100.00	100.00	2.89	0.77	50.70	51.35
Malawi	54.34	50.35	0.74	0.53	0.30	0.21	53.93	49.77	0.40	0.26	24.54	19.49	30.53	24.98	37.58	31.93	0.54	0.38	100.00	100.00	0.74	0.53	49.61	51.23
Malaysia	77.83	94.13	7.37	14.99	12.06	32.54	77.56	94.46	5.72	14.16	38.53	53.97	46.73	63.35	56.35	73.87	16.83	35.97	100.00	100.00	7.37	14.99	52.97	58.33
Malta	98.26	101.25	8.90	31.95	44.81	190.66	98.38	101.24	8.76	32.35	52.62	67.61	63.10	75.65	74.94	84.50	46.99	186.60	100.00	100.00	8.90	31.95	53.75	66.64
Mauritius	85.13	93.00	8.48	13.84	11.98	22.33	85.08	93.33	7.22	12.92	43.86	52.73	52.87	62.12	63.28	72.67	14.61	24.63	100.00	100.00	8.48	13.84	53.54	57.76
Mexico	82.18	94.68	12.39	11.94	9.83	10.90	82.12	94.89	10.18	11.33	44.23	53.37	52.55	63.12	62.13	73.97	11.94	11.48	100.00	100.00	12.39	11.94	55.52	56.83
Morocco	67.25	87.55	5.27	4.28	2.98	3.09	67.00	87.89	3.53	3.76	31.65	45.02	39.00	54.84	47.74	65.93	4.32	3.47	100.00	100.00	5.27	4.28	51.90	53.08
Nepal	55.20	76.37	1.05	0.75	0.45	0.43	54.83	76.60	0.58	0.58	23.91	36.28	29.99	45.11	37.32	55.32	0.77	0.54	100.00	100.00	1.05	0.75	49.77	51.35
Netherlands	105.19	101.04	90.72	96.78	102.13	104.97	105.26	101.19	95.49	97.93	100.38	99.59	101.52	99.97	102.80	100.39	96.88	103.74	100.00	100.00	90.72	96.78	95.29	98.42
New Zealand	101.61	101.46	79.63	54.84	57.25	38.55	101.69	101.43	80.97	55.63	91.20	79.09	93.62	84.43	96.34	90.31	56.38	38.11	100.00	100.00	79.63	54.84	89.66	77.86
Nicaragua	67.85	89.38	4.82	1.46	1.43	0.51	67.63	89.72	3.26	1.31	32.13	44.70	39.50	55.02	48.21	66.67	1.89	0.54	100.00	100.00	4.82	1.46	51.68	51.69
Norway	105.21	102.00	85.60	118.62	129.00	175.80	105.22	102.02	90.07	121.02	97.66	111.28	99.43	109.07	101.41	106.63	121.49	171.88	100.00	100.00	85.60	118.62	92.69	109.13
Pakistan	62.86	81.70	1.37	1.61	0.99	1.57	62.53	82.03	0.85	1.32	27.67	40.59	34.69	50.01	43.13	60.69	1.62	1.94	100.00	100.00	1.37	1.61	49.93	51.77
Panama	87.33	96.74	11.06	10.25	8.98	9.20	87.26	96.99	9.65	9.94	46.92	53.88	55.91	64.05	66.16	75.35	10.26	9.47	100.00	100.00	11.06	10.25	54.85	56.00
Papua New Guinea	58.83	76.03	4.27	2.90	1.89	1.58	58.20	76.10	2.49	2.20	25.20	36.61	31.49	45.11	39.29	54.98	2.99	1.99	100.00	100.00	4.27	2.90	51.40	52.40
Paraguay	91.60	91.30	6.73	5.31	4.95	3.89	91.68	91.68	6.17	4.87	47.66	47.59	57.63	57.73	68.95	69.17	5.37	4.19	100.00	100.00	6.73	5.31	52.65	53.58
Peru	68.77	89.94	14.18	7.40	5.79	3.79	68.58	90.28	9.72	6.68	36.85	47.84	43.58	57.60	51.43	68.59	8.03	4.07	100.00	100.00	14.18	7.40	56.43	54.60
Philippines	76.50	89.89	5.48	3.65	2.99	2.27	76.22	90.22	4.18	3.29	36.95	46.04	45.17	56.19	54.84	67.63	3.77	2.46	100.00	100.00	5.48	3.65	52.01	52.76
Portugal	90.93	98.16	20.67	39.99	39.61	86.51	91.04	98.40	18.82	39.35	54.07	69.14	62.51	76.04	72.05	83.70	44.17	89.43	100.00	100.00	20.67	39.99	59.73	70.58
Rwanda	60.71	51.83	2.09	0.76	0.65	0.20	60.24	51.47	1.26	0.39	26.05	21.27	32.72	26.93	40.86	33.91	0.92	0.32	100.00	100.00	2.09	0.76	50.29	51.35
Saudi Arabia	64.07	94.09	28.49	21.03	13.99	14.85	63.84	94.39	18.19	19.85	39.32	57.00	44.53	65.71	50.57	75.45	21.42	15.57	100.00	100.00	28.49	21.03	63.69	61.29
Senegal	54.33	67.87	5.07	1.90	1.42	0.64	53.94	67.85	2.73	1.29	24.51	30.94	30.24	38.61	37.18	47.71	2.28	0.82	100.00	100.00	5.07	1.90	51.80	51.91
Sierra Leone	45.31	50,85	1.68	0.46	0.35	0.10	44.87	50.58	0.76	0.23	18.78	21.27	23.68	26.93	29.71	33.86	0.62	0.16	100.00	100.00	1.68	0.46	50.09	51.20
Singapore	91.27	100.76	20.23	88.23	118.01	728.90	91.28	100.84	18.47	88.97	52.92	95.02	61.38	96.41	71.12	97.94	147.76	726.40	100.00	100.00	20.23	88.23	59.50	94.23
South Africa	70.45	62.03	21.40	12.46	9.86	5.26	69.97	61.64	14.97	7.68	39.32	29.98	45.50	36.07	52.86	43.57	13.19	7.48	100.00	100.00	21.40	12.46	60.10	57.08
Spain	99.24	101.41	34.93	55.63	58.24	97.54	99.30	101.46	34.68	56.43	66.71	79.47	74.26	84.72	82.73	90.51	58.42	95.94	100.00	100.00	34.93	55.63	66.96	78.25
Sweden	104.64	103.35	99.53	97.53	102.15	98.57	104.76	103.29	104.27	100.74	104.51	102.05	104.57	102.35	104.64	102.68	97.54	95.47	100.00	100.00	99.53	97.53	99.76	98.79
Switzerland	102.20	103.42	198.42	146.07	152.08	110.64	102.33	103.22	203.04	150.77	153.23	126.22	141.45	120.68	128.21	114.61	148.83	107.84	100.00	100.00	198.42	146.07	149.97	122.59
Thailand	75.46	89.30	3.52	8.77	7.11	23.50	75.30	89.60	2.65	7.85	35.86	47.87	44.21	57.40	54.00	68.17	10.64	28.39	100.00	100.00	3.52	8.77	51.02	55.27
Togo	56.63	63.98	1.73	1.02	0.67	0.43	56.19	63.87	0.97	0.65	24.18	28.58	30.41	35.75	38.02	44 30	1.08	0.62	100.00	100.00	1.73	1.02	50.11	51.48
Tripidad and Tobacc	91.26	94 14	14 30	16.01	14.60	17.01	91.17	94 34	13.03	15.10	50.80	54.63	59.86	63.86	70.17	74.19	16.06	18 10	100.00	100.00	14 30	16.01	56.49	58.82
United Kingdom	101.42	100.34	71.79	67.72	68.81	64.04	101 55	100 51	72.91	68.06	87.02	84 58	90.37	88.37	94.15	92.56	67.76	63.70	100.00	100.00	71.79	67.72	85.68	84.17
United States	100.00	100.04	100.00	100.00	100.00	100.00	100.00	100.51	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Urnouay	97.40	96.52	20.28	10.11	19.40	12.36	97.57	96.77	28.57	18.40	62.37	57.86	70.45	67.00	79.58	77.18	10.00	12.66	100.00	100.00	20.28	10.00	64.10	60.34
Venezuela PR	85.75	95.52	29.20	10.32	11 36	4 25	85.74	05.36	20.57	0.94	52.57	52.79	50.90	62.75	68 27	73.85	12.01	12.00	100.00	100.00	29.20	10.32	63.51	56.03
Zambia	50.89	40 27	4.00	1 22	1 22	0.29	50.74	48 74	24.12	0.60	26.05	10.27	33.05	24.55	40.89	31.22	1 72	0.41	100.00	100.00	4 00	1 22	51 72	51.59
Zimbabwe	65 16	51.01	4.90	1.43	1.40	0.40	64 71	50.09	2.91	0.00	20.95	19.27	36.10	24.00	40.00	32.09	2.02	1 1 1	100.00	100.00	4.90	1.23	51.72	51.56
Dev Coef OFCD	0.07	0.02	0.54	0.47	0.49	0.09	04.71	0.98	0.60	0.99	29.09	0.22	0.22	0.17	0.16	0.12	0.46	0.60	0.00	0.00	0.54	0.47	0.25	0.21
Dev. Coef. All	0.07	0.03	1 39	1 39	1 / 2	2.03	0.07	0.03	1.49	1.42	0.29	0.23	0.25	0.17	0.10	0.12	1 37	1.07	0.00	0.00	1 39	1 39	0.25	0.21
Dev. Coel. All	0.23	0.19	1.50	1.50	1.45	2.05	0.25	0.20	1.40	1.42	0.50	0.50	0.40	0.41	0.57	0.52	1.57	1.97	0.00	0.00	1.30	1.50	0.50	0.51

Table 2(b): Income, permanent income and life expectancy by country. United States = 100. Discount rate = 4%.

	т:4	ia.	Inco										Р	ermanen	t Income									
	Expec	e tanev	Der ca	ome - apita									Scena	rio 4						Scena	ario 5			
	Enpre	uney	Pere	-p-m	Scena	rio 1	Scena	rio 2	Scena	rio 3	β=2	20/0	β=3	3%	β=5	5%	Scenar	io 5.1	Scenar	rio 5.2	Scenario	5.3	Scenar	io 5.4
	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000
Algeria	67.77	92.19	8.61	5.02	4.51	3.35	72.03	94.81	6.20	4.76	30.03	39.81	36.88	49.43	45.71	61.51	6.10	3.50	100.00	100.00	8.61	5.02	43.79	42.68
Argentina	93.39	95.84	40.96	24.79	28.28	17.30	94.99	97.26	38.90	24.11	60.28	52.80	66.25	60.62	73.80	70.40	29.63	17.70	100.00	100.00	40.96	24.79	63.69	54.61
Australia	101.37	102.42	74.15	74.50	75.37	75.96	101.30	101.60	75.12	75.69	85.23	86.05	88.02	88.84	91.54	92.29	74.40	74.76	100.00	100.00	74.15	74.50	84.10	84.61
Austria	98.54	101.51	80.11	102.40	95.36	125.76	98.93	101.00	79.25	103.42	86.83	102.45	88.92	102.19	91.57	101.87	96.44	124.35	100.00	100.00	80.11	102.40	87.76	101.45
Bahamas, The	90.80	89.91	61.40	43.53	45.83	33.04	93.15	95.21	57.20	41.45	70.71	62.04	74.50	67.79	79.33	75.06	48.83	34.28	100.00	100.00	61.40	43.53	76.26	65.92
Bangladesh	57.09	79.40	1.64	1.17	0.88	0.80	64.36	84.92	1.05	0.99	22.03	32.25	28.34	41.07	36.76	52.32	1.31	0.92	100.00	100.00	1.64	1.17	39.50	40.35
Barbados	92.48	97.87	22.11	25.88	23.28	28.93	93.84	98.98	20.74	25.62	48.71	54.60	56.50	62.48	66.34	72.29	24.85	29.25	100.00	100.00	22.11	25.88	52.09	55.27
Belgium	100.86	101.49	78.14	96.36	92.06	114.69	100.58	100.86	78.59	97.18	87.10	98.65	89.45	99.04	92.40	99.53	91.43	113.58	100.00	100.00	78.14	96.36	86.55	97.80
Benin	55.71	68.76	2.43	1.29	1.07	0.69	61.53	76.14	1.49	0.99	21.79	27.98	27.80	35.77	35.75	45.87	1.64	0.86	100.00	100.00	2.43	1.29	39.99	40.43
Bolivia	61.39	81.18	6.25	2.97	2.84	1.65	67.69	86.52	4.23	2.57	26.16	34.10	32.63	42.96	41.14	54.24	3.96	1.85	100.00	100.00	6.25	2.97	42.34	41.44
Botswana	66.92	50.57	2.60	12.35	7.41	24.68	73.27	62.21	1.90	7.68	26.40	23.93	33.62	29.05	43.13	36.17	12.67	65.91	100.00	100.00	2.60	12.35	40.09	47.10
Brazil	78.59	88.33	13.17	14.45	11.45	14.28	81.54	92.34	10.74	13.35	37.01	43.56	44.44	51.95	53.93	62.55	14.09	15.52	100.00	100.00	13.17	14.45	46.59	48.37
Burkina Faso	51.95	57.38	1.11	0.79	0.55	0.42	59.14	64.96	0.66	0.51	19.91	22.36	25.73	28.80	33.52	37.31	0.88	0.62	100.00	100.00	1.11	0.79	39.18	40.12
Burundi	59.28	54.45	0.97	0.44	0.42	0.19	65.39	64.14	0.63	0.28	22.58	21.08	29.07	27.37	37.66	35.84	0.60	0.27	100.00	100.00	0.97	0.44	39.09	39.91
Cameroon	56.56	64.94	3.92	2.11	1.81	1.08	63.73	72.05	2.50	1.52	22.79	26.24	28.89	33.41	37.03	42.77	2.65	1.41	100.00	100.00	3.92	2.11	40.90	40.92
Canada	101.93	102.42	84.60	70.45	75.27	62.57	101.08	101.45	85.52	71.47	91.56	83.46	93.22	86.68	95.31	90.68	74.58	61.76	100.00	100.00	84.60	70.45	90.53	82.17
Central African Repu	55.42	56.40	3.46	1.06	1.18	0.40	60.58	66.34	2.10	0.70	22.09	22.20	27.96	28.71	35.69	37.44	1.77	0.53	100.00	100.00	3.46	1.06	40.62	40.29
Chad	49.97	62.90	2.20	0.68	0.73	0.26	57.43	70.41	1.26	0.48	19.51	25.10	25.08	32.27	32.55	41.61	1.13	0.34	100.00	100.00	2.20	0.68	39.84	40.06
Chile	82.12	98.16	14.88	16.73	13.67	18.12	84.64	99.00	12.59	16.57	39.38	49.08	46.93	57.91	56.59	68.92	16.22	18.32	100.00	100.00	14.88	16.73	47.64	49.75
China	52.06	91.17	0.84	2.58	1.08	6.80	62.01	94.43	0.52	2.43	19.43	38.09	25.38	47.93	33.55	60.28	2.35	7.59	100.00	100.00	0.84	2.58	39.01	41.20
Colombia	81.42	92.90	8.35	7.16	6.44	6.15	85.25	95.65	7.12	6.85	35.94	41.29	44.15	50.76	54.67	62.66	7.50	6.40	100.00	100.00	8.35	7.16	43.63	43.97
Congo, Rep.	59.96	66.59	4.21	2.63	2.20	1.52	67.45	75.62	2.84	1.99	24.44	27.58	30.92	35.11	39.55	44.99	3.10	1.91	100.00	100.00	4.21	2.63	41.08	41.23
Costa Rica	88.66	100.54	14.66	12.23	11.72	10.74	90.36	100.15	13.25	12.24	42.46	47.23	50.62	56.66	60.97	68.38	12.94	10.73	100.00	100.00	14.66	12.23	47.51	47.03
Cote d'Ivoire	56.56	59.45	4.44	2.32	1.93	1.10	61.51	67.39	2.73	1.56	22.66	24.03	28.51	30.65	36.24	39.38	2.96	1.52	100.00	100.00	4.44	2.32	41.23	41.05
Denmark	103.43	99.09	123.14	120.39	124.25	118.33	102.56	99.93	126.29	120.31	117.05	112.27	114.51	110.08	111.32	107.36	121.18	118.39	100.00	100.00	123.14	120.39	114.23	112.31
Dominican Republic	74.71	87.36	5.16	6.44	4.83	6.96	80.71	91.59	4.17	5.90	31.61	38.64	39.61	47.75	49.98	59.25	6.10	7.68	100.00	100.00	5.16	6.44	41.67	43.54
Ecuador	76.50	90.31	5.87	4.45	3.95	3.48	80.19	94.14	4.71	4.19	32.44	38.86	40.34	48.45	50.48	60.54	4.87	3.67	100.00	100.00	5.87	4.45	42.10	42.33
Egypt, Arab Rep.	66.46	87.54	2.72	3.83	2.43	4.57	70.10	91.70	1.91	3.51	26.74	37.31	33.83	46.70	42.96	58.56	3.54	5.06	100.00	100.00	2.72	3.83	40.17	41.96
El Salvador	72.84	91.02	9.91	5.48	5.33	3.51	76.29	93.54	7.56	5.12	32.61	39.27	39.74	48.66	48.92	60.48	6.81	3.71	100.00	100.00	9.91	5.48	44.59	42.95
Fiii	80.33	89.82	10.59	7.49	7.41	5.67	86.35	95.21	9.14	7.13	37.00	40.83	45.08	50.25	55.53	62.16	8.41	5.88	100.00	100.00	10.59	7.49	45.01	44.16
Finland	98.22	100.52	73.86	100.09	92.36	128.55	99.44	100.65	73.44	100.74	83.37	100.70	86.14	100.69	89.63	100.68	93.20	127.71	100.00	100.00	73.86	100.09	83.92	100.05
France	100.67	102.33	80.22	93.17	89.93	105.96	100.29	101.15	80.46	94.24	88.12	97.00	90.24	97.74	92.89	98.66	89.61	104.61	100.00	100.00	80.22	93.17	87.84	95.88
Gabon	58.60	68.41	13.69	13.68	8.76	10.72	64.03	78.40	8.77	10.73	27.75	34.34	33.33	41.34	40.66	50.51	13.68	13.68	100.00	100.00	13.69	13.68	46.91	47.90
Ghana	64.81	73.80	3.40	1.29	1.46	0.61	70.52	80.48	2.40	1.04	25.97	30.04	32.88	38.32	41.95	48.98	1.92	0.72	100.00	100.00	3.40	1.29	40.58	40.43
Greece	98.68	101.10	28.87	40.96	37.13	54.99	97.83	100.98	28.24	41.36	55.22	65.10	62.64	71.51	71.95	79.47	37.83	54.39	100.00	100.00	28.87	40.96	56.25	64.37
Guatemala	65.78	84.63	7.02	4.87	4.05	3.44	71.27	89.55	5.00	4.36	27.93	36.51	34.64	45.51	43.45	56.94	5.51	3.78	100.00	100.00	7.02	4.87	42.81	42.59
Guvana	80.71	81.60	5.12	2.94	3.12	1.83	85.01	87.63	4.35	2.58	33.95	34.52	42.41	43.54	53.29	55.02	3.59	2.04	100.00	100.00	5.12	2.94	41.64	41.42
Haiti	60.79	69.08	4.13	1.15	1.50	0.46	67.70	76.92	2.80	0.88	25.12	27.84	31.76	35.66	40.52	45.85	2.03	0.55	100.00	100.00	4.13	1.15	41.04	40.34
Honduras	66.82	85.64	3.88	2.22	2.10	1 43	73.82	90.99	2.86	2.02	27.67	35.70	35.01	45.14	44.63	57.13	2.72	1 54	100.00	100.00	3.88	2.22	40.88	40.99
Hungary	97.83	92.45	11 44	16.96	15.24	22.05	97.92	95.57	11.21	16.20	44.67	46.76	53.92	55.19	65.56	65.82	15 56	23.39	100.00	100.00	11 44	16.96	45.53	49.88
Iceland	104 98	103.18	76.85	97.84	95.69	120.98	103 33	101.85	79.41	99.64	88.76	100.53	91.32	100.76	94 52	101.06	92.22	118 42	100.00	100.00	76.85	97.84	85.76	98.69
India	63.54	81.50	1.38	1.44	0.99	1.28	69.82	86.47	0.96	1.24	24.91	33.44	31.97	42.46	41.22	53.92	1.42	1.48	100.00	100.00	1.38	1.44	39.34	40.51
Indonesia	59.47	85.69	1.88	3.11	1.74	4.15	66.55	90.40	1.25	2.81	22.92	36.07	29.41	45.36	38.08	57.13	2.81	4.73	100.00	100.00	1.88	3.11	39.65	41.52
Ireland	99.89	99.05	41.29	86.70	77.26	166.60	100.04	100.25	41.31	86.92	63.97	92.19	70.24	93.62	78.12	95.41	77.26	167.54	100.00	100.00	41.29	86.70	63.89	91.97
Israel	102.74	101.70	39.74	53.34	50.65	68.45	101.32	101.21	40.26	53.99	64.10	72.82	70.63	77.90	78.81	84.20	49.76	67.51	100.00	100.00	39.74	53.34	62.94	71.84
(continues)																								

Table 2(b): Income, permanent income and life expectancy by country. United States = 100. Discount rate = 4%. (continuation)

	Life Income —											P	ermanen	t Income										
	Expect	ancv	per ca	nita						_			Scena	rio 4						Scena	rio 5			
	Enpres		P	-prin	Scena	rio 1	Scena	rio 2	Scena	rio 3	β=2	.%	β=3	%	β=5	5% 0	Scenar	io 5.1	Scenar	io 5.2 S	Scenario	5.3	Scenar	io 5.4
	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000	1960	2000
									10.10									~~		100.00				
Italy	99.88	102.09	49.94	65.27	60.90	82.05	99.31	101.37	49.60	66.17	68.88	80.23	74.19	84.01	80.86	88.70	61.20	80.77	100.00	100.00	49.94	65.27	69.21	79.04
Jamaica	92.27	97.76	10.49	5.58	6.63	3.64	93.37	98.36	9.79	5.49	41.53	42.22	50.38	52.18	61.59	64.58	7.06	3.70	100.00	100.00	10.49	5.58	44.94	43.01
Japan	96.98	104.75	63.50	140.11	121.17	298.15	98.25	102.57	62.38	143.71	76.08	127.15	79.89	122.72	84.71	117.25	124.85	285.32	100.00	100.00	63.50	140.11	77.55	124.21
Kenya	64.43	60.95	1.52	1.03	0.86	0.58	70.42	69.86	1.07	0.72	24.85	23.83	31.85	30.71	41.07	39.88	1.17	0.78	100.00	100.00	1.52	1.03	39.43	40.27
Korea, Rep.	77.61	94.93	10.02	40.82	28.93	161.19	82.10	97.71	8.22	39.89	34.81	62.40	42.45	68.58	52.33	76.34	39.80	175.29	100.00	100.00	10.02	40.82	44.65	64.29
Lesotho	61.97	57.04	1.27	1.72	1.09	1.40	70.70	67.86	0.90	1.17	24.37	23.04	31.51	29.71	41.01	38.66	1.61	2.20	100.00	100.00	1.27	1.72	39.28	40.69
Luxembourg	98.79	99.97	119.24	176.18	160.28	243.14	99.22	100.36	118.31	176.82	110.96	146.53	108.93	138.32	106.36	128.11	161.71	242.48	100.00	100.00	119.24	176.18	111.84	145.98
Madagascar	58.66	70.93	2.89	0.77	0.92	0.30	62.08	77.71	1.80	0.60	23.45	28.70	29.65	36.75	37.63	47.11	1.39	0.36	100.00	100.00	2.89	0.77	40.27	40.11
Malawi	54.34	50.35	0.74	0.53	0.35	0.27	58.21	61.80	0.43	0.33	20.44	19.67	26.24	25.72	33.84	33.96	0.59	0.42	100.00	100.00	0.74	0.53	38.95	39.96
Malaysia	77.83	94.13	7.37	14.99	10.44	26.56	82.86	97.11	6.11	14.56	33.48	46.59	41.38	55.41	51.65	66.48	13.37	28.03	100.00	100.00	7.37	14.99	43.03	48.69
Malta	98.26	101.25	8.90	31.95	29.40	117.57	98.93	100.81	8.81	32.21	43.45	59.52	53.05	66.89	65.17	76.04	30.13	115.73	100.00	100.00	8.90	31.95	43.97	58.93
Mauritius	85.13	93.00	8.48	13.84	10.86	19.72	88.64	96.07	7.52	13.30	37.49	45.38	45.99	54.21	56.90	65.32	12.54	20.85	100.00	100.00	8.48	13.84	43.71	48.00
Mexico	82.18	94.68	12.39	11.94	10.29	11.17	85.13	96.15	10.55	11.48	38.20	44.71	46.02	53.78	56.02	65.10	12.07	11.61	100.00	100.00	12.39	11.94	46.12	46.85
Morocco	67.25	87.55	5.27	4.28	3.41	3.39	73.35	91.29	3.86	3.91	28.48	37.50	35.69	46.81	45.09	58.54	4.57	3.69	100.00	100.00	5.27	4.28	41.73	42.23
Nepal	55.20	76.37	1.05	0.75	0.54	0.51	61.37	82.72	0.65	0.62	21.08	31.00	27.16	39.63	35.22	50.68	0.84	0.60	100.00	100.00	1.05	0.75	39.14	40.10
Netherlands	105.19	101.04	90.72	96.78	98.67	102.75	103.66	101.06	94.04	97.81	97.80	99.10	98.83	99.45	100.12	99.88	95.08	101.65	100.00	100.00	90.72	96.78	94.29	98.06
New Zealand	101.61	101.46	79.63	54.84	62.97	42.72	101.37	100.92	80.72	55.35	88.71	73.50	90.92	78.40	93.69	84.47	62.21	42.40	100.00	100.00	79.63	54.84	87.47	72.75
Nicaragua	67.85	89.38	4.82	1.46	1.92	0.69	73.33	93.12	3.53	1.36	28.18	36.66	35.36	46.43	44.71	58.76	2.45	0.72	100.00	100.00	4.82	1.46	41.46	40.52
Norway	105.21	102.00	85.60	118.62	114.54	156.91	103.46	101.47	88.56	120.36	94.40	112.83	95.99	110.79	97.99	108.27	110.02	154.31	100.00	100.00	85.60	118.62	91.14	111.24
Pakistan	62.86	81.70	1.37	1.61	1.05	1.56	69.46	85.84	0.95	1.38	24.54	33.64	31.52	42.61	40.72	53.95	1.55	1.84	100.00	100.00	1.37	1.61	39.33	40.62
Panama	87.33	96.74	11.06	10.25	9.37	9.50	89.27	97.97	9.87	10.04	39.65	44.69	48.00	54.12	58.63	65.89	10.48	9.69	100.00	100.00	11.06	10.25	45.29	45.83
Papua New Guinea	58.83	76.03	4.27	2.90	2.35	1.89	67.69	82.78	2.89	2.40	24.20	31.67	30.72	40.04	39.46	50.82	3.31	2.22	100.00	100.00	4.27	2.90	41.12	41.40
Paraguay	91.60	91.30	6.73	5.31	5.34	4.29	92.92	94.92	6.25	5.04	39.25	39.75	48.44	49.34	60.08	61.42	5.73	4.49	100.00	100.00	6.73	5.31	42.63	42.85
Peru	68.77	89.94	14.18	7.40	7.10	4.60	72.70	93.41	10.31	6.91	32.73	40.27	39.17	49.49	47.49	61.10	9.44	4.85	100.00	100.00	14.18	7.40	47.21	44.11
Philippines	76.50	89.89	5.48	3.65	3.52	2.61	81.71	93.45	4.48	3.41	31.94	38.10	39.90	47.70	50.25	59.78	4.19	2.76	100.00	100.00	5.48	3.65	41.86	41.85
Portugal	90.93	98.16	20.67	39.99	32.58	70.06	91.79	99.45	18.98	39.77	46.87	63.27	54.62	69.67	64.39	77.66	35.72	71.04	100.00	100.00	20.67	39.99	51.21	63.78
Rwanda	60.71	51.83	2.09	0.76	0.87	0.29	68.58	61.79	1.43	0.47	23.93	20.26	30.70	26.30	39.72	34.45	1.15	0.41	100.00	100.00	2.09	0.76	39.78	40.10
Saudi Arabia	64.07	94.09	28.49	21.03	15.94	16.50	67.43	96.54	19.21	20.30	36.52	50.01	41.47	58.16	47.87	68.38	23.23	17.00	100.00	100.00	28.49	21.03	56.01	52.34
Senegal	54.33	67.87	5.07	1.90	1.91	0.87	60.88	76.56	3.09	1.46	22.36	28.03	28.12	35.80	35.79	45.92	2.85	1.05	100.00	100.00	5.07	1.90	41.61	40.80
Sierra Leone	45.31	50.85	1.68	0.46	0.49	0.15	52.08	59.85	0.88	0.28	17.42	20.06	22.45	26.03	29.21	33.99	0.82	0.22	100.00	100.00	1.68	0.46	39.53	39.92
Singapore	91.27	100.76	20.23	88.23	76.06	419.25	94.65	100.77	19.15	88.91	47.26	93.62	55.22	94.90	65.39	96.48	87.83	416.22	100.00	100.00	20.23	88.23	50.94	92.90
South Africa	70.45	62.03	21.40	12.46	12.16	6.89	76.62	73.50	16.40	9.15	37.09	30.46	43.17	36.95	51.19	45.62	15.14	8.69	100.00	100.00	21.40	12.46	51.66	47.16
Spain	99.24	101.41	34.93	55.63	50.04	83.02	98.67	101.09	34.46	56.23	59.37	74.09	66.23	78.91	74.84	84.90	50.53	81.95	100.00	100.00	34.93	55.63	59.97	73.22
Sweden	104.64	103.35	99.53	97.53	101.59	98.13	103.59	102.17	103.10	99.65	103.29	100.66	103.34	100.93	103.41	101.26	98.10	96.07	100.00	100.00	99.53	97.53	99.71	98.51
Switzerland	102.20	103.42	198.42	146.07	164.29	119.70	101.90	101.88	202.18	148.81	163.27	130.00	152.55	124.95	139.08	118.71	161.55	117.89	100.00	100.00	198.42	146.07	160.54	127.80
Thailand	75.46	89.30	3.52	8.77	5.82	18.11	80.39	93.21	2.83	8.17	30.70	40.77	38.74	49.81	49.15	61.22	7.84	20.41	100.00	100.00	3.52	8.77	40.66	44.94
Togo	56.63	63.98	1.73	1.02	0.83	0.55	63.98	72.50	1.11	0.74	22.14	25.62	28.47	32.92	36.90	42.52	1.23	0.72	100.00	100.00	1.73	1.02	39.56	40.26
Trinidad and Tobage	91.26	94.14	14.30	16.01	14.38	16.79	92.74	96.40	13.26	15.43	43.25	46.93	51.64	55.57	62.29	66.41	15.54	17.47	100.00	100.00	14.30	16.01	47.29	49.31
United Kingdom	101.42	100.34	71.79	67.72	69.87	65.28	101.44	100.66	72.83	68.16	83.90	81.07	86.95	84.56	90.80	88.90	68.89	64.86	100.00	100.00	71.79	67.72	82.65	80.52
United States	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Uruguay	97.40	96.52	29.28	19.11	21.71	14.07	98.05	98.09	28.71	18.75	55.42	49.90	62.83	58.40	72.16	69.02	22.15	14.29	100.00	100.00	29.28	19.11	56.50	51.18
Venezuela, RB	85.75	95.18	28.13	10.32	14.59	5.49	90.44	96.82	25.44	9.99	49.40	43.98	56.26	53.26	65.06	64.87	15.65	5.61	100.00	100.00	28.13	10.32	55.79	45.87
Zambia	59.88	49.27	4.90	1.23	1.74	0.41	67.04	60.56	3.28	0.74	24.48	19.33	30.83	25.15	39.30	33.11	2.30	0.56	100.00	100.00	4.90	1.23	41.51	40.39
Zimbabwe	65.16	51.81	3.54	1.94	1.86	0.96	72.54	65.22	2.57	1.27	26.13	20.76	33.16	27.01	42.50	35.63	2.42	1.31	100.00	100.00	3.54	1.94	40.67	40.82
Dev. Coef. OECD	0.07	0.03	0.58	0.47	0.49	0.58	0.05	0.02	0.60	0.47	0.34	0.27	0.28	0.22	0.21	0.16	0.47	0.57	0.00	0.00	0.58	0.47	0.31	0.26
Dev. Coef. All	0.23	0.19	1.38	1.38	1.41	1.69	0.19	0.14	1.46	1.40	0.63	0.57	0.51	0.46	0.39	0.34	1.34	1.65	0.00	0.00	1.38	1.38	0.41	0.43

Table 3: $\beta\text{-convergence}$ and $\sigma\text{-convergence}$ in annual and permanent income. All countries.

		Year	Mean	Standard deviation	Deviation	Stand. Dev.	B-Converg	t-student	\mathbf{R}^2
		1960	54 7	12.6	0.230	0.236	p-converg.	t-student	K
Life expectancy		2000	65.9	12.0	0.195	0.219	-		
		1960-2000	-	-	-	-	-0.63%	-4.283	0.174
		1960	3,540.0	4,872.8	1.377	1.449	-	-	-
Income per capita		2000	9,686.8	13,319.8	1.375	1.728	-	-	-
		1960-2000	-	-	-	-	0.29%	2.507	0.067
Permament Incom a) Scenario 1: Individ	e lual rates	of growth (gi), i	ndividual incom	e per capita (Ypo	ci), individual su	rvival rates (Si(t,0))		
	%	1960	307,384.1	440,099.3	1.432	1.889	-	-	-
	=2	2000	1,336,720.3	2,708,232.0	2.026	2.293	-	-	-
Scenario 1		1960-2000	-	-	-	-	0.43%	4.893	0.216
	%	1960	148,320.8	208,876.3	1.408	1.766		-	-
	i=4	2000	551,305.4	932,492.7	1.691	2.128	-	-	-
		1960-2000	-	-	-		0.39%	4.276	0.174
b) Scenario 2: USA's	rate of g	rowth (gUSA), U	JSA's income pe	r capita (YpcUS	A), individual su	rvival rates (Si(t,0))		
	%	1960	776,252.2	180,741.6	0.233	0.239	-	-	-
	=2	2000	2,264,404.0	444,543.8	0.196	0.228	-	-	-
Scenario 2		1960-2000	-	-	-	-	-0.64%	-4.328	0.177
	%	1960	419,833.2	78,012.4	0.186	0.191	-	-	-
	ii 1	2000	1,179,618.1	170,693.7	0.145	0.158	-	-	-
		1960-2000	-	-	-	-	-0.83%	-6.295	0.313
c) Scenario 3: USA's	rate of gr	rowth (gUSA), in	ndividual income	e per capita (Ypc	i), individual sur	vival rates (Si(t,0))		
	<u></u>	1960	255,636.2	377,901.6	1.478	1.662	-	-	-
	=2%	2000	795,157.6	1,126,602.3	1.417	1.905	-	-	-
Scenario 3	.4	1960-2000	-	-	-	-	0.20%	1.964	0.043
Scenario 5	%	1960	132,709.7	193,678.5	1.459	1.616	-	-	-
	4	2000	397,761.6	558,164.1	1.403	1.854	-	-	-
		1960-2000	-	-		-	0.20%	1.977	0.043
d) Scenario 4: Conve	rgence to	USA at 2%, 3%	o y 5%.						
,		1960	493,408.5	276,780.7	0.561	0.509	-	-	-
	-2%	2000	1,494,834.7	752,521.3	0.503	0.500	-	-	-
Scenario 4	.4	1960-2000	-	-	-	-	-0.26%	-2.428	0.063
(β=2%)	%	1960	235,494.8	147,410.6	0.626	0.540	-	-	-
	4	2000	688,611.0	395,102.7	0.574	0.526	-	-	-
	i	1960-2000	-	-	-		-0.21%	-2.361	0.060
	%	1960	553,077.3	254,471.6	0.460	0.434			
o	i=2	2000	1,664,613.3	674,367.6	0.405	0.421			
Scenario 4		1960-2000	-	-	-	-	-0.33%	-2.844	0.085
(p-3%)	%†	1960	265,142.9	134,884.1	0.509	0.455	-	-	-
	ii	1960 2000	//0,59/.5	351,981.5	0.457	0.455	0.289/-	2 960	0.002
		1960-2000	623.015.9	229 989 4	0.369	0.362	-0.28%	-2.900	0.092
	2%	2000	1 859 378 5	592 289 6	0.319	0.346	-	-	-
Scenario 4	Щ	1960-2000					-0.42%	-3.309	0.118
(β=5%)	<u>_</u> 0	1960	303,583,3	119,289,9	0.393	0.366		-	-
	-4%	2000	875,343.6	299,237.3	0.342	0.340	-	-	-
	.11	1960-2000	-	-	-	-	-0.38%	-3.758	0.140
e) Scenario 5: Using	USA's su	rvival rates							
1. Individual vates of a	muth (ai)	individual income	er cabita (Vhci)						
inairianai raites 0j gr	(gr), i	1960	322.145.9	441 614 1	1.371	1.707	-	-	

	3 67/	1							
	Ŷ	1960	322,145.9	441,614.1	1.371	1.707	-	-	-
	-2%	2000	1,369,612.5	2,699,498.7	1.971	2.180	-	-	-
Secondo E 1	. <u>u</u>	1960-2000	-	-	-	-	0.59%	6.981	0.359
Scenario 5.1	°	1960	153,346.2	205,962.2	1.343	1.612	-	-	-
	-4%	2000	557,932.0	922,431.2	1.653	2.038	-	-	-
	.4	1960-2000	-	-	-	-	0.54%	5.736	0.274
2 USA's rate of grow	vth (gUSA),	USA's income pe	r capita (YpcUSA)					
	৾৽	1960	993,097.4	0.0	0.000	0.000	-	-	-
	=2%	2000	2,645,550.6	0.0	0.000	0.000	-	-	-
Seconda E 2	<u>.u</u>	1960-2000	-	-	-	-	-	-	-
Scenario 5.2	~	1960	512,611.9	0.0	0.000	0.000	-	-	-
	-4-	2000	1,319,627.5	0.0	0.000	0.000	-	-	-
	.::	1960-2000	-	-	-	-	-	-	-
3 USA's rate of gro	wth, individi	ual income per capi	ita (Ypci)						
	%	1960	265,789.2	365,862.0	1.377	1.449	-	-	-
	=2	2000	800,938.6	1,101,327.6	1.375	1.728	-	-	-
Scenario 5.3		1960-2000	-	-	-	-	0.29%	2.507	0.067
	%	1960	137,193.7	188,848.8	1.377	1.449	-	-	-
	4	2000	399,516.3	549,353.4	1.375	1.728	-	-	-
		1960-2000	-	-	-	-	0.29%	2.507	0.067
4 Convergence to US	6A at 2%.								
	%	1960	623,855.1	185,742.0	0.298	0.249	-	-	-
	12	2000	1,741,249.9	539,913.7	0.310	0.267	-	-	-
Scenario 5.4		1960-2000	-	-	-	-	0.00%	-0.011	0.223
00011110 014	%	1960	281,704.4	116,154.7	0.412	0.332	-	-	-
	4	2000	764,307.8	331,554.2	0.434	0.362	-	-	-
	-4	1960-2000	-	-	-	-	0.05%	0.459	0.217

Table 4: β -convergence and σ -convergence in annual and permanent income. OECD countries.

		Year	Mean	Standard deviation	Deviation coeficient	Stand. Dev. Logs	β-Converg.	t-student	\mathbf{R}^2
•••		1960	69.0	4.6	0.066	0.071		-	
Life expectancy		2000	77.5	2.2	0.029	0.029	-1.92%	-11 281	0.460
		1900-2000	9,465.4	5517.0	0.583	0.774	-1.0276	-11.201	0.405
Income per capits	1	2000	27p21.5	12¢54.2	0.468	0.630			
		1960-2000					-0.73%	-3.494	0.347
Renta permanente	-						-		
a) Scenario 1: Indiv	idual rate	es of growth (g 1960	1), individual in 870064.0	414724.6	a (prei),individu 0.477	al survival rates 0.665	(51(tŷ))		
	=2%	2000	3297046.6	2295008.9	0.696	0.758	-	-	-
Scenario 1	.4	1960-2000		-		-	-0.21%	-0.587	0.015
	%	1960	419530.4	203591.0	0.485	0.677	-	-	-
	<u>ii</u>	1960-2000	1941990.0	100			-0.47%	-1.443	0.083
þScenario 2: EAs ra	te of gro	wth (gEA),EAs	income per c	apita (BeEA),inc	lividual surviva	lrates (Si(t0))			
~	*	1960	982¢12.7	65263.8	0.066	0.076	-	-	
	2	2000	2¢60¢05.5	73345.8	0.028	0.030	-	-	-
Scenario 2		1960-2000	507111.9	26952.0	0.053	0.056	-1.85%	-12.103	
	×4-	2000	1326033.4	22#26.4	0.017	0.017	-	-	-
		1960-2000	-	-	-	-	-1.98%	-17.142	0.927
e) Scenario 3: EA5 r	ate of gr	owth (gSA),ind	lividual incom	e per capita (pe	i),individual su	rvival rates (Si(t	9))		
	2%	1960	718810.9 2263544 0	429548.9 1074026.0	0.598	0.831	-	-	-
	Ξ	1960-2000		тулчу20.0 -	v.t/t -	- 100.0	-0.80%	-3.945	0.404
Scenario 3	*	1960	369¢46.5	220122.3	0.595	0.820	-	-	-
	1	2000	1125057.0	530783.9	0.472	0.643	-	-	-
		1960-2000					-0.80%	-3.927	0.401
d) Scenario 4: Conv	rergence	to EA at 2%,3%	% y 5%.						
	%	1960	847,379.5	241587.6	0.285	0.305	-	-	-
Scenario 4	<u>1</u>	2000	2 9 63023.6	554208.5	0.225	0.239	-0.86%	-3.851	0.392
(β=2%)	ي.	1960	422071.6	142970.4	0.339	0.363		-	-
	等 止	2000	1203862.2	326981.6	0.272	0.293	-	-	-
	-	1960-2000	878077.4	197722.3	0 225	0.239	-0.79%	-3.537	0.352
	-2%	2000	2509370.0	435097.2	0.173	0.181	-	-	-
Scenario 4	.4	1960-2000		-	-	-	-0.93%	-4.223	0.437
(β=3%)	%	1960	436646.8	121718.6	0.279	0.293	-	-	-
	<u>.ii</u>	1960-2000		- 2/1/00.2	0.222	0.255 -	-0.83%	-3.680	0.371
	*	1960	912ß54.8	149223.2	0.163	0.175	-	-	-
	84 .L	2000	2560981.5	303942.6	0.119	0.123	-	-	-
(8=5%)		1960-2000	455080.3	95083.0	0 209	0.218	-1.08%	-5.016	0.523
u	×4:	2000	1,252,261.0	202860.6	0.162	0.167	-	-	-
	.4	1960-2000			-	-	-0.91%	-4.063	0.418
e) Scenario 5: Ung I	EIAb survi	ival rates							
1 Individual rates of	erowth (ei), individual inco	me ber cabita (Y	oa)					
		1960	873551.8	404739.9	0.463	0.622	-	-	
	84 11	2000	3290346.2	2283212.5	0.694	0.749	-	-	-
Scenario 5.1		1960-2000	419408.2	197084 1	0.470	0.633	0.02%	0.048	0.000
	·42/	2000	1432881.1	819313.5	0.572	0.683	-	-	
	.4	1960-2000		-			-0.30%	-0.922	0.036
2 US.A's rate of grow	vth (gUS)	4), USA's incom	e per capita (Yp	cUSA)					
	*	1960	993p97.4	0.0	0.000	0.000	-		-
	1	2000	2645550.6	0.0	0.000	0.000	-	-	-
Scenario 5.2	-	1960-2000	512611.9	- 0.0	0.000	0.000			
	2	2000	1319627.5	0.0	0.000	0.000	-	-	-
	.4	1960-2000	• •						
3 USA's rate of on	owth. india	vidual income per	cabita (Ybei)						
		1960	710681.4	414227.4	0.583	0.774			
	84 L	2000	2234232.9	1046295.0	0.468	0.630	-		
Scenario 5.3		1960-2000	366835.0	213813.9	-	0 774	-0.73%	-3.494	0.347
	-4%	2000	1114458.1	521902.6	0.468	0.630		-	-
	.11	1960-2000				-	-0.73%	-3.494	0.347
4. Comment	C 4 - 1 - 22								
4." Convergence to US		. 1960	849719.5	210296.3	0.247	0.244			
	=2%	2000	2,443,906.6	512934.6	0.210	0.216	-	-	-
Scenario 5.4		1960-2000					-0.64%	-2.566	0.223
	%#	1960	422949.9 1195800 5	131509.9 314084 7	0.311	0.313	-	-	-
	1	1960 2000	14950005	014900.7	0.203	0.2/0	-0.6184	-2 526	0 217

1960-2000

.

-0.61%

-2.526

0.217

Figure 1: Life expectancy and income per capita convergence (1960-2000)



Income per capita (1960-2000)



a) All countries













Figure 2: Permanent income per capita (1960-2000)

Figure 3: Permanent income per capita (1960-2000)

Scenario 4



Figure 4: Permanent income per capita (1960-2000) Scenario 5.1



b) OECD countries (r=2%)



Scenario 5.3

a) All countries (r=2%)







2.50% 2.45% 2.40% Rate of growth (1960-2000) 2.35% 2.30% 2.25% 2.20% 2.15% 2.10% 2.05% 2.00% 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0 log (Permanent income in 1960)

b) OECD countries (r=2%)





a) All countries (r=2%)







Scenario 5.2 a) All countries (r=2%)

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