Université de Nantes
Faculté des sciences économiques et de gestion

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# Economie du développement

*Chapitre 1. Introduction générale*

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# Contents

# 1 Premières définitions

## 1.1 Le développement

- Développement $\longrightarrow$ prospérité économique $\longrightarrow$ bien-être
- Un objectif prioritaire au niveau national (des états) et international (structures internationales d'aide au développement)
- Difficultés
  1. Définir le développement et son absence (= sous développement)
  2. Définir les moyens de le promouvoir (= évaluation des politiques économiques)

  $\Rightarrow$ Les objectifs de l'économie du développement

## 1.2 Economie du développement

- Définition 1
  - Economie du développement = économie des pays en développement
    $\Rightarrow$ Qu'est ce qu'un pays en développement ?
  - Plusieurs critères . historique / politique (tiers monde, colonisation ...), comptable (un seuil de revenu par tête*), critères socio-économique (richesse, égalité, pauvreté, éducation ....)
- Définition 2
  - Economie du développement = économie des inégalités internationales
    $\Rightarrow$ Pourquoi certains pays connaissent une certaine prospérité économique et d'autres des situations de pauvreté persistante?

*Low income, $875 or less; lower middle income, $876 - $3,465; upper middle income, $3,466 - $10,725; and high income, $10,726 or more

- Une proposition : pour comprendre le développement il faut tenir compte
  1. des facteurs internes (spécificités des économies en développement par rapport aux économies riches)
  2. des facteurs externes (importance de la dimension internationale)

## 1.3 Objectif du cours

1. Introduction générale à l'économie du développement
2. Les enseignements des théories de la croissance sur la question du développement
3. Les modèles spécifiques de l'économie du développement
4. L'évaluation des politiques d'aide au développement

# 2 Croissance, richesse et développement

- Croissance et niveau de la richesse (= production par habitant)
  - un critère dominant mais non suffisant pour caractériser le développement

## 2.1 L'importance de la croissance

Texte joint : Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Introduction section I.1)

1. De l'importance des petites différences de taux de croissance
   - Etats-Unis : production par tête $\times$ 10 entre 1870 et 2000 $\longrightarrow$ 1.8% par an en moyenne. Les conséquences d'une croissance
     - de 0.8% $\longrightarrow$ 45ème place mondiale en 2000 (Mexique Pologne)
     - de 2.8% $\longrightarrow$ le niveau de vie en 2000 de celui prévue pour 2074

2. L'ampleur des écarts de richesse et leur persistance

- Un classement assez stable
  - Les Etats-Unis ne sont jamais premiers (!) mais second après la Suisse (en 1960) et le Luxembourg (en 2000)
  - La Tanzanie est toujours le pays le plus pauvre
  - Persistance des pays européens dans le haut du classement
    * exclusivement en 1960
    * avec quelques pays d'Asie et d'Amérique Latine en 2000
  - Des écarts de grandes ampleurs
    * Avec le taux de croissance moyen 1.8%, 235 sont nécessaires pour que la Tanzanie atteigne le niveau de richesse actuel des Etats-Unis

- Une dispersion des niveaux de richesse en augmentation
  - écart type de 0.89 à 1.12, ratio richesse max / min de 39 à 69
  - significativité?
- Les différences de taux de croissance
  - statistique descriptive : moyenne (1.8), écart type (1.7), min (-3.4), max (6.2)
  - conséquences : multiplication par 13 pour Taiwan et par 0.3 pour le Zaïre
- La dynamique comparée des régions

3. Remarque : une vision *très* néoclassique

## 2.2 Aspects méthodologiques

### 2.2.1 Arithmétique de la croissance

1. Le calcul du temps nécessaire pour doubler le revenu : $T$ solution de l'équation :

$$y_0 \times (1+g)^T = 2 \times y_0$$

soit :

$$T = \log(2) / \log(1+g)$$

avec $\log(2) \sim 0.7$ et $\log(1+g) \sim g$ pour des faibles valeurs de $g$ :

$$T \sim 0.7/g$$

soit pour $g = \{0.05, 0.025, 0.001\}$ : $T\{14, 28, 70\}$

### 2.2.2 Mesurer la mobilité des pays

- L'utilisation des matrice de mobilité (Danny Quah, 1993)
- Objectif: distinguer 'mobilité' et 'inégalité' (une distribution stable $\nrightarrow$ absence de mobilité)
- Méthodes
  1. créer des classes selon la valeur de $x_i = y_i/Y$
  2. Les seuils retenus pas Quah $z = \{1/4, 1/2, 1, 2, \infty\}$
     $z_i = 2$ signifie que $x_i \in [1, 2]$
     $z_i = \infty$ signifie que $x_i > 2$
     $z_i = 1/4$ signifie que $x_i < 1/4$
  3. Procéder aux classements des pays à deux dates différentes et calculer le % de pays étant passé d'une classe à une autre

- Résultats pour 1962-1984

| 1962 1984 | 1/4 | 1/2 | 1 | 2 | $\infty$ |
|---|---|---|---|---|---|
| 1/4 | 76 | 12 | 12 | 0 | 0 |
| 1/2 | 52 | 31 | 10 | 7 | 0 |
| 1 | 9 | 20 | 46 | 26 | 0 |
| 2 | 0 | 0 | 24 | 53 | 24 |
| $\infty$ | 0 | 0 | 0 | 5 | 95 |

- Que sont devennus : les plus pauvres, les moins pauvres, les riches et les plus riches?
  1. Persistance des extrêmes, surtout en haut
  2. Une certaine mobilité au milieu
  3. La difficulté de sortir du bas de la distribution

- Conclusion : malgré une stabilité de la distribution des richesses, existence d'une certaine mobilité, fortement dépendante des conditions initiales

### 2.2.3 La construction de séries comparables de richesse

- Réaliser de telles comparaisons nécessite de résoudre le problème de comparaison de richesse.
- Difficulté : richesse = une mesure relative, nécessité de comparaison internationale
  - la richesse produite est mesurée dans des monnaies différentes
  - nécessité de conversion en une monnaie commune
- Les différentes méthodes
  1. L'utilisation de taux de change directs ou transformés
  2. L'utilisation de la parité des pouvoirs d'achats
  3. Les principales bases de données internationales homogènes
     (a) World Bank
     (b) Penn World Table
     (c) OCDE

# 3 Les multiples aspects du développement

- Au-delà de la richesse : les multiples aspects du développement

  La richesse (et sa croissance) compte mais elle n'est pas le seul aspect du développement

## 3.1 Les inégalités

- Les inégalités (au sein des pays)
  - Les inégalités intra-pays comme signe de développement
    - des inégalités plus ou moins fortes selon le niveau de développement
  - Débats majeurs sur les liens inégalités – développement (cause, conséquence, nécessité...)
    - un aperçu du phénomène
    - la pluralité des formes d'inégalités

1. Les inégalités de revenus : la distribution des revenus dans les pays (selon le niveau de développement)
   - Un critère retenu par les organisations internationales (WB, ONU) : "Income share held by lowest 20% "
   - Des inégalités les plus fortes dans les pays à revenu intermédiaire
2. Les inégalités peuvent affecter d'autres variables que la seule richesse : les indicateurs de "développement humain"

## 3.2 Mesurer le développement humain

- Le développement un concept "institutionnel" autour du PNUD

  - "The basic purpose of development is to enlarge people's choices. In principle, these choices can be infinite and can change over time. People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more secure livelihoods, security against crime and physical violence, satisfying leisure hours, political and cultural freedoms and sense of participation in community activities. The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives." Mahbub ul Haq (1934-1998)

  - Human development is about much more than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. People are the real wealth of nations. Development is thus about expanding the choices people have to lead lives that they value. And it is thus about much more than economic growth, which is only a means if a very important one of enlarging people s choices.

- Les indicateurs du développement humain
  1. mode le calcul : note technique issu du rapport 2005 PNUD
  2. comparaison internationale : tableau issu du rapport 2005 PNUD

- Inégalité, richesse et développement humain : deux propositions
  1. Des niveaux de richesse par habitant très différent peuvent conduire au même niveau de développement humain
  2. Des différences dans la distribution du revenu peuvent s'accompagner de niveaux de richesse proches , mais de développement humain différent

## 3.3 Autres caractéristiques structurelles

1. Une démographie plus dynamique
2. Un poids encore important du secteur agricole (avec des migrations rapides des zones rurales vers les zones urbaines)
3. Des pays exportateurs de matières premières et de produits à faible valeur ajoutée

# 4 L'économie du développement dans la théorie économique

- Conclusion : "HPE" et relation entre l'économie du développement et les autres disciplines des sciences économiques
- Référence Pranab Bardhan (1993 JEP)

## 4.1 La naissance de l'économie du développement

1. Tous les économistes classiques sont des économistes du développement
   - Smith, Ricardo, Malthus, Marx : "Richesses de nation", "Corn Laws", "Population"...
   - Comment créer les conditions de la croissance et de la prospérité ?

2. La naissance du domaine

   (a) Colin Clark (1939) "Conditions of Economic Growth"; étude quantitative qui montre les écartes entre pays et régions du monde

   (b) Paul Rosenstein- Rodan (1943 EJ) ""Problems of Industrialization of Eastern and South- Eastern Europe"

   (c) Kurt Mandelbaum (1947) "Industrialization of Backward Areas" [Europe]

3. Contexte

   - L'économie du développement débute par un rejet de modèle de concurrence parfaite
     - modèle très critiqué pour les pays riches depuis la crise des années 1930
     - modèle encore plus critiqué pour les pays pauvres dont le fonctionnement semble encore plus éloigné
   - Spécialisation de la science économique (développement de modèles et de base de données spécifiques)

## 4.2 L'âge d'or de l'économie du développement

- Les bases de l'économie du développement (années 50/60)
- Contexte
  1. La décolonisation, "terrain" d'application de l'économie du développement
  2. Création des institutions internationales (FMI 1944, Banque mondiale 1944, Club de Paris 1956, PNUD 1965...)

1. Paul Rosenstein- Rodan (1943 EJ) "Problems of Industrialization of Eastern and South- Eastern Europe" [big push, croissance équilibrée]
2. Theodore W. Schultz* (1945) "Agriculture in an Unstable Economy" [Importance de l'agriculture ]
3. Walt Rostow (1960) "Stages of Economic Growth" [linéaire]
4. Simon Kuznet* ($1960^s$) [empirique, des conditions initiales différentes]
5. Ragnar Nurkse (1953) "Problems of Capital-Formation in Underdeveloped Countries" [Epargne et accumulation, cercles vicieux]
6. Arthur Lewis* (1954) "Economic Developement with Unlimited Supplies of Labour" [Economie duale]
7. Gunnar Myrdal* (1957) "Economic Theory and Underdeveloped Regions" [Processus cumulatif, "poverty breeding poverty"]...

- Un domaine privilégie pour les économistes orthodoxes
  - Motivations :
    1. Le rejet de cadre de la concurrence parfaite
    2. Une volonté de pluridisciplinarité
  - Albert O. Hirschmann (1958) " The Strategy of Economic Development" [Ecole structuraliste]

## 4.3 La nouvelle économie du développement

- Contexte
  1. L'économie du développement s'est profondémment renouvelée avec l'apport des nouveaux outils de la NEK
     - NEK = fondements microéconomiques des défaillances de marché
  2. La persistance du sous-développement et les échecs de politique d'aide (les crises de la balance de paiements des années 1980, Mexique 1982)
     (a) Regain d'intérêt de la théorie économique Stiglitz* (1989) " A study of LDC's is to economics what the study of pathology is to medicine; by understanding what happens when things do not work well, we gain insight into how they work when they do function as designed. The difference is that in economics, pathology is the rule: less than a quarter of mankind lives in the developed economies."

     (b) Renouveau des évaluations des politiques économiques

- Des modèles d'économie du développement avec imperfections de marché et fondements microéconomiques
  1. La théorie du salaire d'efficience $\rightarrow$
  2. Les externalités et le processus de développement $\rightarrow$ "Big Push" Murphy, Shleifer and Vishny (1989)
  3. Les trappes de sous-développement $\rightarrow$ "History vs. expectationsé Krugman (1991)
  4. Les problèmes d'information $\rightarrow$ Akerlof* (1970) Spence* (1972) Stiglitz* (1975)

     ...

- Des évaluations plus fines des politiques d'aide au développement
  1. L'utilisation de données agrégées disponible pour plusieurs pays sur longue période
  2. L'utilisation de données microéconomiques
     - microéconométrie appliquée : Steven Levitt et Michaël Kremer pour l'économie du développement

- Conclusion
  1. Un sujet d'intérêt évident
  2. Une théorie riche avec des fortes confrontations en matière de prescription de politique économique
  3. Une importante littérature empirique structurant les débats théoriques

## 1 Indicateur du développement humain

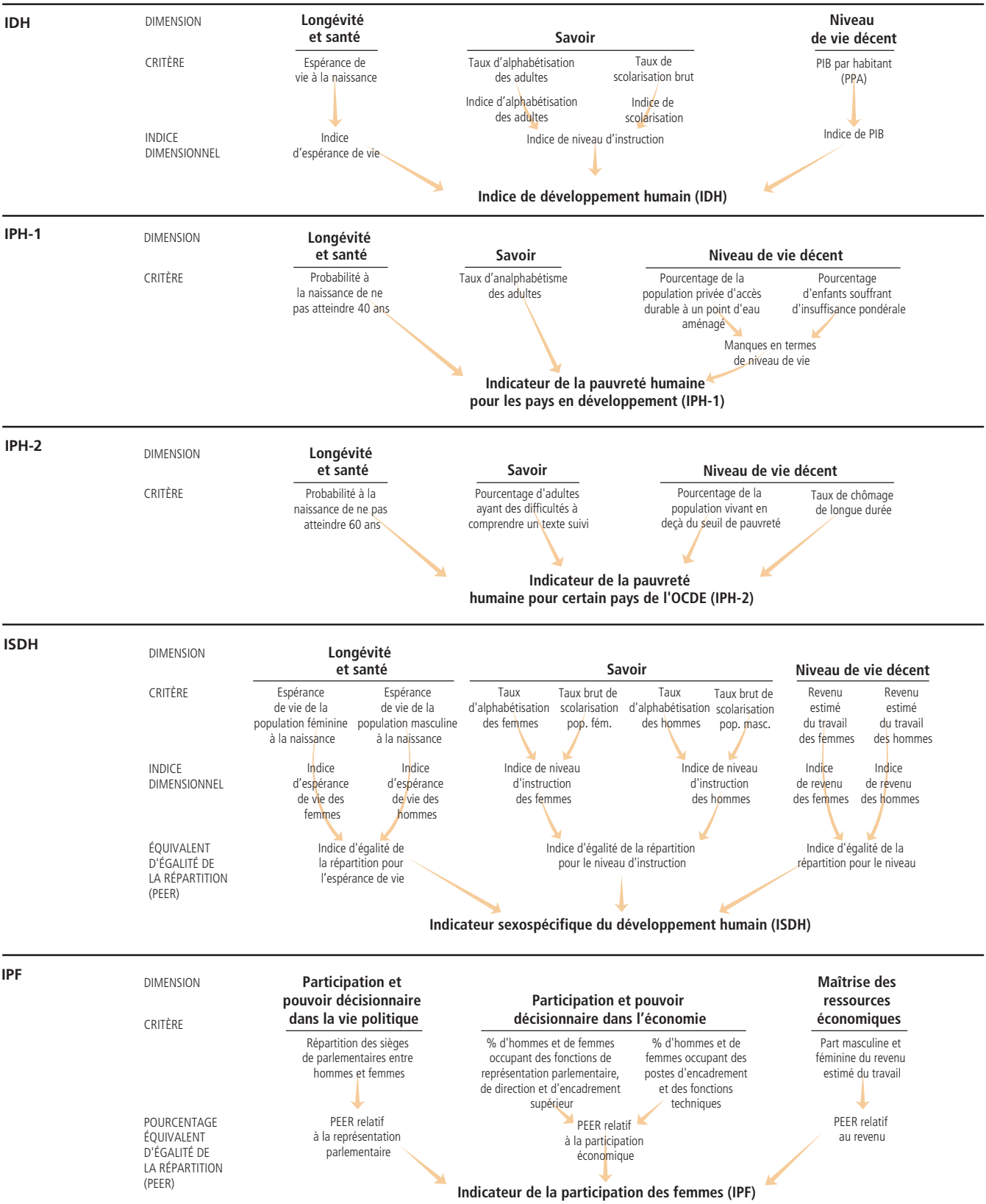
MESURER LE DÉVELOPPEMENT HUMAIN : ACCROÎTRE LES CHOIX ...

| Classement selon l'IDH [a] | Espérance de vie à la naissance (années) 2002 | Taux d'alphabétisation des adultes (% des 15 ans et plus) 2002 [b] | Taux brut de scolarisation combiné (du primaire au supérieur) (%) 2001/02 [c] | PIB par habitant (en PPA) 2002 | Indice d'espérance de vie | Indice de niveau d'instruction | Indice de PIB | Valeur de l'indicateur du développement humain (IDH) 2002 | Différence de classement selon le PIB par habitant (en PPA) et l'IDH [d] |
|---|---|---|---|---|---|---|---|---|---|
| Pays en développement | 64,6 | 76,7 | 60 | 4 054 | 0,66 | 0,71 | 0,62 | 0,663 | .. |
| Pays les moins avancés | 50,6 | 52,5 | 43 | 1 307 | 0,43 | 0,49 | 0,42 | 0,446 | .. |
| Pays arabes | 66,3 | 63,3 | 60 | 5 069 | 0,69 | 0,61 | 0,65 | 0,651 | .. |
| Asie de l'Est et Pacifique | 69,8 | 90,3 | 65 | 4 768 | 0,75 | 0,83 | 0,64 | 0,740 | .. |
| Amérique latine et Caraïbes | 70,5 | 88,6 | 81 | 7 223 | 0,76 | 0,86 | 0,72 | 0,777 | .. |
| Asie du Sud | 63,2 | 57,6 | 54 | 2 658 | 0,64 | 0,57 | 0,55 | 0,584 | .. |
| Afrique sub-saharienne | 46,3 | 63,2 | 44 | 1 790 | 0,35 | 0,56 | 0,48 | 0,465 | .. |
| Europe centrale et orientale et CEI | 69,5 | 99,3 | 79 | 7 192 | 0,74 | 0,93 | 0,72 | 0,796 | .. |
| OCDE | 77,1 | .. | 87 | 24 904 | 0,87 | 0,94 | 0,92 | 0,911 | .. |
| Pays de l'OCDE à revenu élevé | 78,3 | .. | 93 | 29 000 | 0,89 | 0,97 | 0,95 | 0,935 | .. |
| Développement humain élevé | 77,4 | .. | 89 | 24 806 | 0,87 | 0,95 | 0,92 | 0,915 | .. |
| Développement humain moyen | 67,2 | 80,4 | 64 | 4 269 | 0,70 | 0,75 | 0,63 | 0,695 | .. |
| Faible développement humain | 49,1 | 54,3 | 40 | 1 184 | 0,40 | 0,50 | 0,41 | 0,438 | .. |
| Revenu élevé | 78,3 | .. | 92 | 28 741 | 0,89 | 0,97 | 0,94 | 0,933 | .. |
| Revenu intermédiaire | 70,0 | 89,7 | 71 | 5 908 | 0,75 | 0,84 | 0,68 | 0,756 | .. |
| Revenu faible | 59,1 | 63,6 | 51 | 2 149 | 0,57 | 0,59 | 0,51 | 0,557 | .. |
| Monde | 66,9 | .. | 64 | 7 804 | 0,70 | 0,76 | 0,73 | 0,729 | .. |

NOTE TECHNIQUE 1

## CALCUL DES INDICATEURS COMPOSITES DU DÉVELOPPEMENT HUMAIN

Les diagrammes ci-dessous présentent un aperçu synthétique de la composition des cinq indicateurs composites du développement humain utilisés dans le *Rapport mondial sur le développement humain*. Ils mettent ainsi en exergue leurs points communs comme leurs différences. Le texte des pages suivantes fournit par ailleurs une explication détaillée de cette composition.

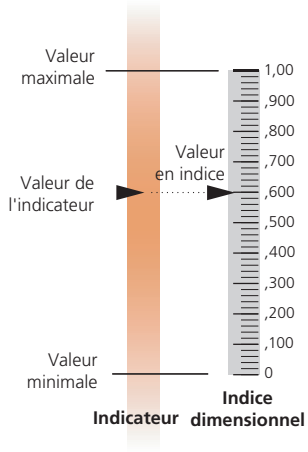


## L'indicateur du développement humain (IDH)

L'IDH est un outil synthétique de mesure du développement humain. Il chiffre le niveau moyen atteint par chaque pays sous trois aspects essentiels :

- Longévité et santé, représentées par l'espérance de vie à la naissance.
- Instruction et accès au savoir, représentées par le taux d'alphabétisation des adultes (pour deux tiers) et par le taux brut de scolarisation, tous niveaux confondus (pour un tiers).
- Possibilité de disposer d'un niveau de vie décent, représentée par le PIB par habitant (en PPA).

Avant de calculer l'IDH lui-même, il faut établir un indice pour chacune de ces dimensions. La détermination de ces indices dimensionnels – c'est-à-dire correspondant à l'espérance de vie, au niveau d'instruction et au PIB – passe à chaque fois par la définition d'une fourchette de variation, avec un minimum et un maximum.




Les résultats obtenus dans chaque dimension sont exprimés par une valeur comprise entre 0 et 1 selon la formule générale suivante :

$$\text{Indice dimensionnel} = \frac{\text{valeur constatée} - \text{valeur minimale}}{\text{valeur maximale} - \text{valeur minimale}}$$

L'IDH correspond à la moyenne arithmétique de ces indices dimensionnels. L'encadré ci-contre illustre le calcul de l'IDH pour un pays témoin.

### Valeurs minimales et maximales pour le calcul de l'IDH

| Critère | Valeur maximale | Valeur minimale |
|---|---|---|
| Espérance de vie à la naissance (années) | 85 | 25 |
| Taux d'alphabétisation des adultes (%) | 100 | 0 |
| Taux brut de scolarisation combiné (%) | 100 | 0 |
| PIB par habitant (en PPA) | 40 000 | 100 |

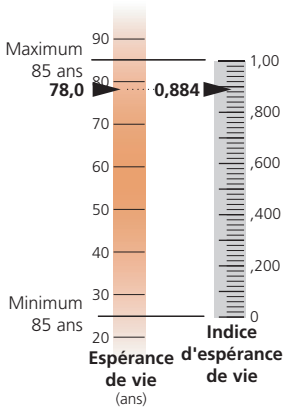
### Calcul de l'IDH

Pour illustrer le calcul de l'IDH, nous utiliserons des données concernant le Costa Rica.

#### 1. Calcul de l'indice d'espérance de vie

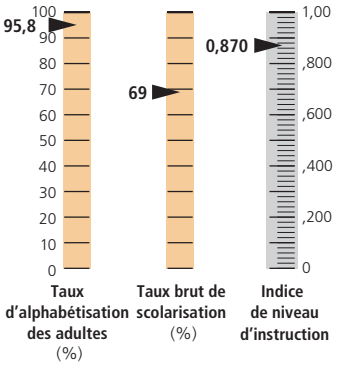
L'indice d'espérance de vie mesure le niveau atteint par le pays considéré en termes d'espérance de vie à la naissance. Pour le Costa Rica, l'espérance de vie était de 78,0 ans en 2002, soit un indice d'espérance de vie de 0,884.

$$\text{Indice d'espérance de vie} = \frac{78{,}0 - 25}{85 - 25} = \mathbf{0{,}884}$$




#### 2. Calcul de l'indice de niveau d'instruction

L'indice de niveau d'instruction mesure le niveau atteint par le pays considéré en termes d'alphabétisation des adultes et d'enseignement (taux brut de scolarisation combiné dans le primaire, le secondaire et le supérieur). La procédure consiste, tout d'abord, à calculer un indice pour l'alphabétisation des adultes et un autre pour la scolarisation. Ces deux indices sont ensuite fusionnés pour donner l'indice de niveau d'instruction, dans lequel l'alphabétisation des adultes reçoit une pondération des deux tiers et le taux brut de scolarisation d'un tiers. Au Costa Rica, où le taux d'alphabétisation des adultes atteignait 95,8 % en 2002 et le taux brut de scolarisation combiné 69 % pour l'année scolaire 2001/02, l'indice de niveau d'instruction est de 0,870.



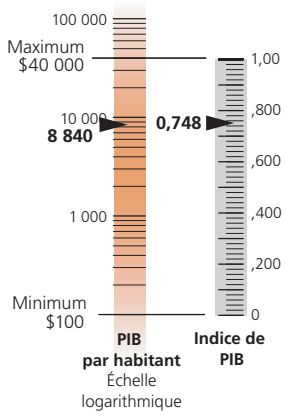

$$\text{Indice d'alphabétisation des adultes} = \frac{95{,}8 - 0}{100 - 0} = 0{,}958$$

$$\text{Indice de scolarisation} = \frac{69 - 0}{100 - 0} = 0{,}690$$

$$\text{Indice de niveau d'instruction} = 2/3\ (\text{indice d'alphabétisation des adultes}) + 1/3\ (\text{indice de scolarisation})$$
$$= 2/3\ (0{,}958) + 1/3\ (0{,}690) = \mathbf{0{,}870}$$

#### 3. Calcul de l'indice de PIB

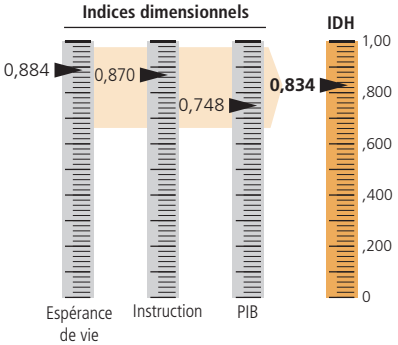
L'indice de PIB est calculé sur la base du PIB par habitant corrigé (en PPA). Le revenu intervient dans l'IDH afin de rendre compte de tous les aspects du développement humain qui ne sont pas représentés par la longévité, la santé et l'instruction. Son montant est corrigé parce qu'un revenu illimité n'est pas nécessaire pour atteindre un niveau de développement humain acceptable. Le calcul s'effectue donc à partir d'un logarithme du revenu. Pour le Costa Rica, dont le PIB par habitant était de 8 840 dollars (PPA) en 2002, l'indice de PIB s'établit à 0,748.




$$\text{Indice de PIB} = \frac{\log(8{,}840) - \log(100)}{\log(40{,}000) - \log(100)} = \mathbf{0{,}748}$$

#### 4. Calcul de l'IDH

Une fois les trois indices dimensionnels calculés, il ne reste plus qu'à déterminer leur moyenne arithmétique pour parvenir à l'IDH.




$$\text{IDH} = 1/3\ (\text{indice d'espérance de vie}) + 1/3\ (\text{indice de niveau d'instruction}) + 1/3\ (\text{indice de PIB})$$
$$= 1/3\ (0{,}884) + 1/3\ (0{,}870) + 1/3\ (0{,}748) = \mathbf{0{,}834}$$

# FIGURES ET TABLEAUX ISSUS DE RAY (1998)

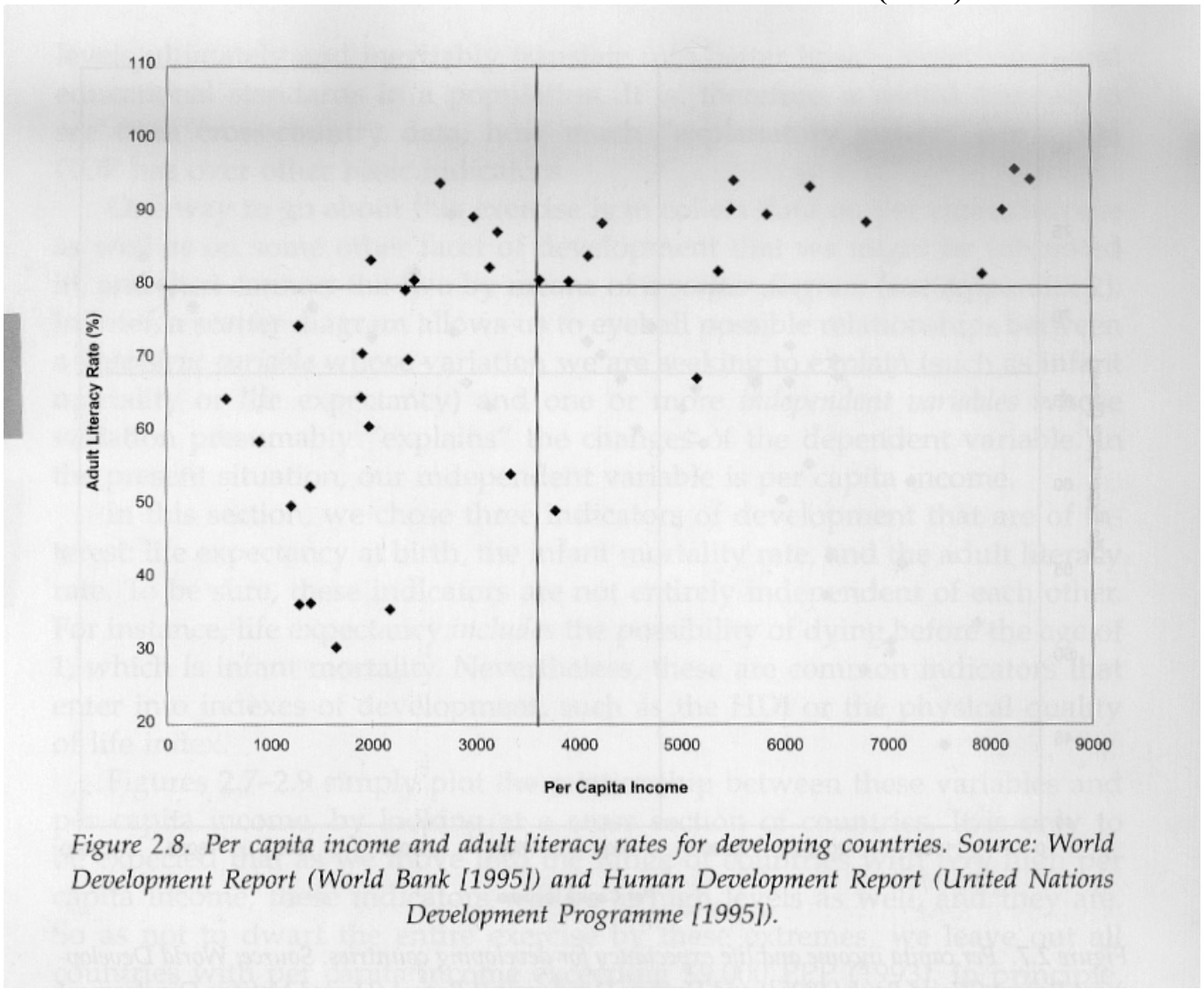



*Figure 2.8. Per capita income and adult literacy rates for developing countries. Source: World Development Report (World Bank [1995]) and Human Development Report (United Nations Development Programme [1995]).*

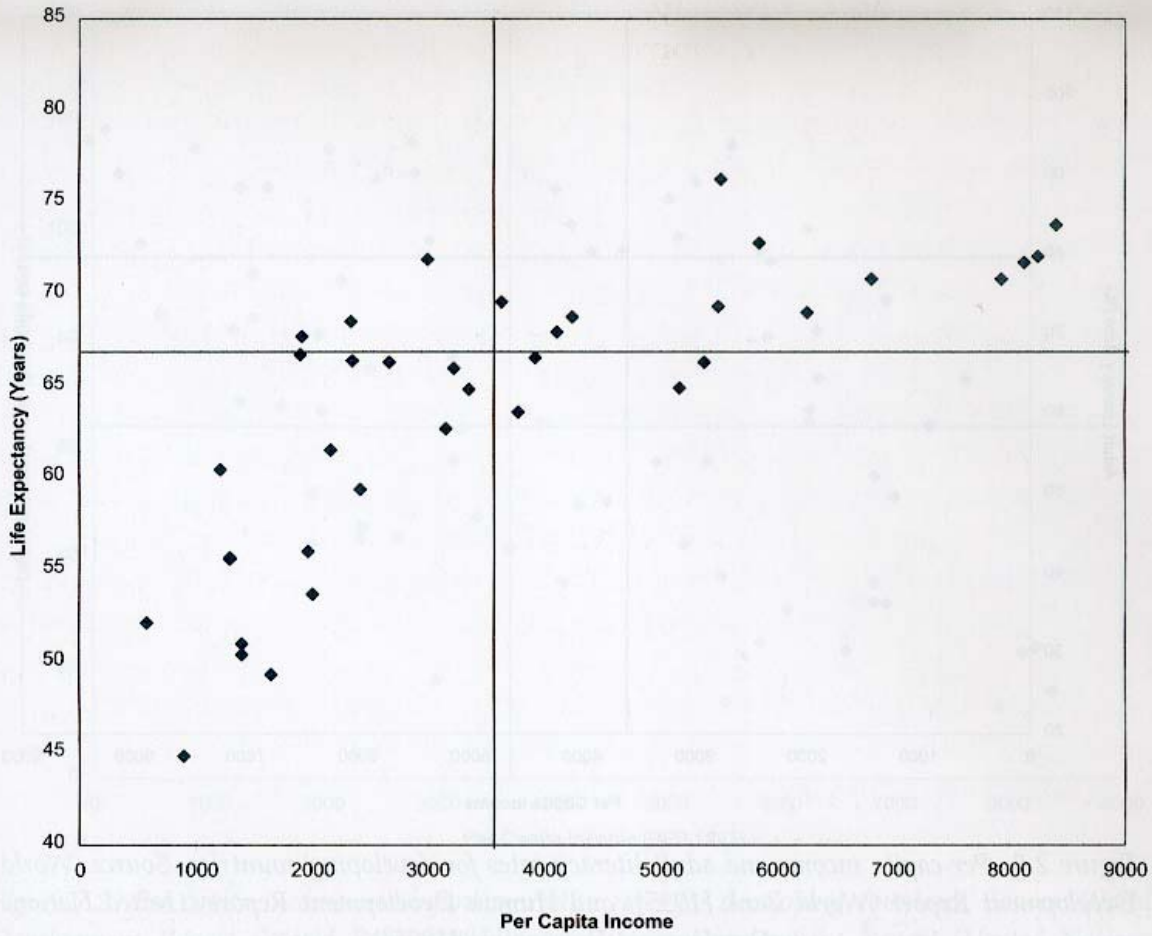



*Figure 2.7. Per capita income and life expectancy for developing countries. Source: World Development Report (World Bank [1995]) and Human Development Report (United Nations Development Programme [1995]).*

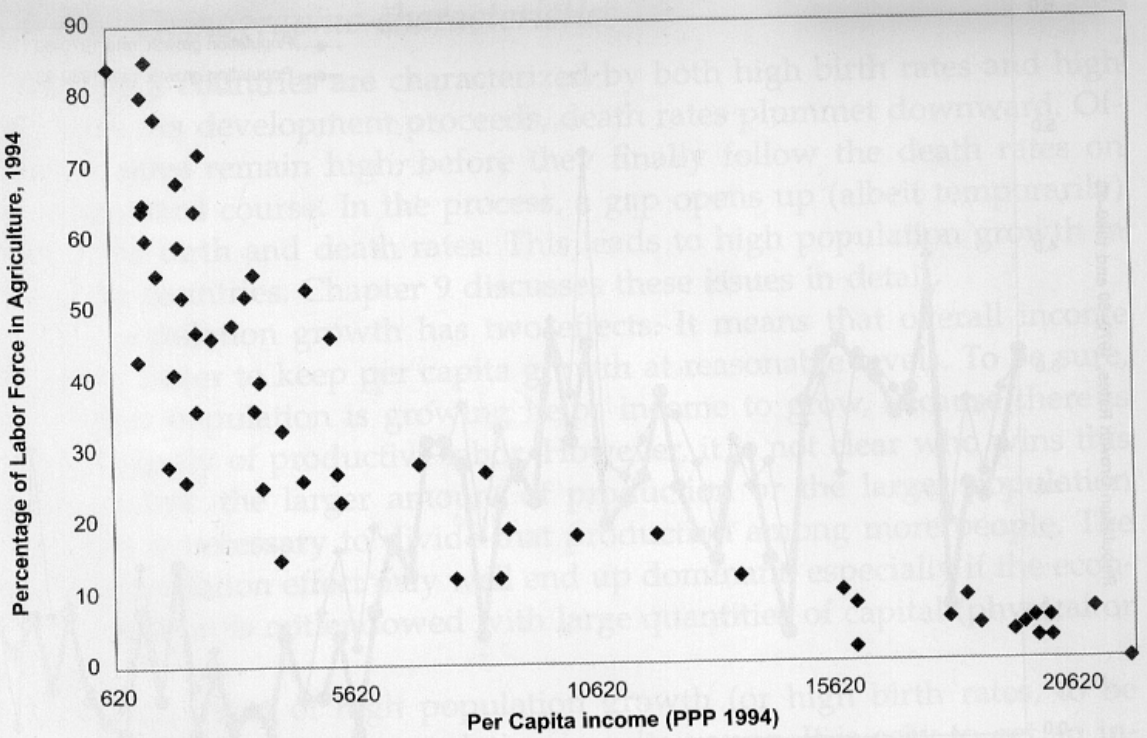



*Figure 2.11. Fractions of the labor force in agriculture. Source: World Development Report (World Bank [1996]).*

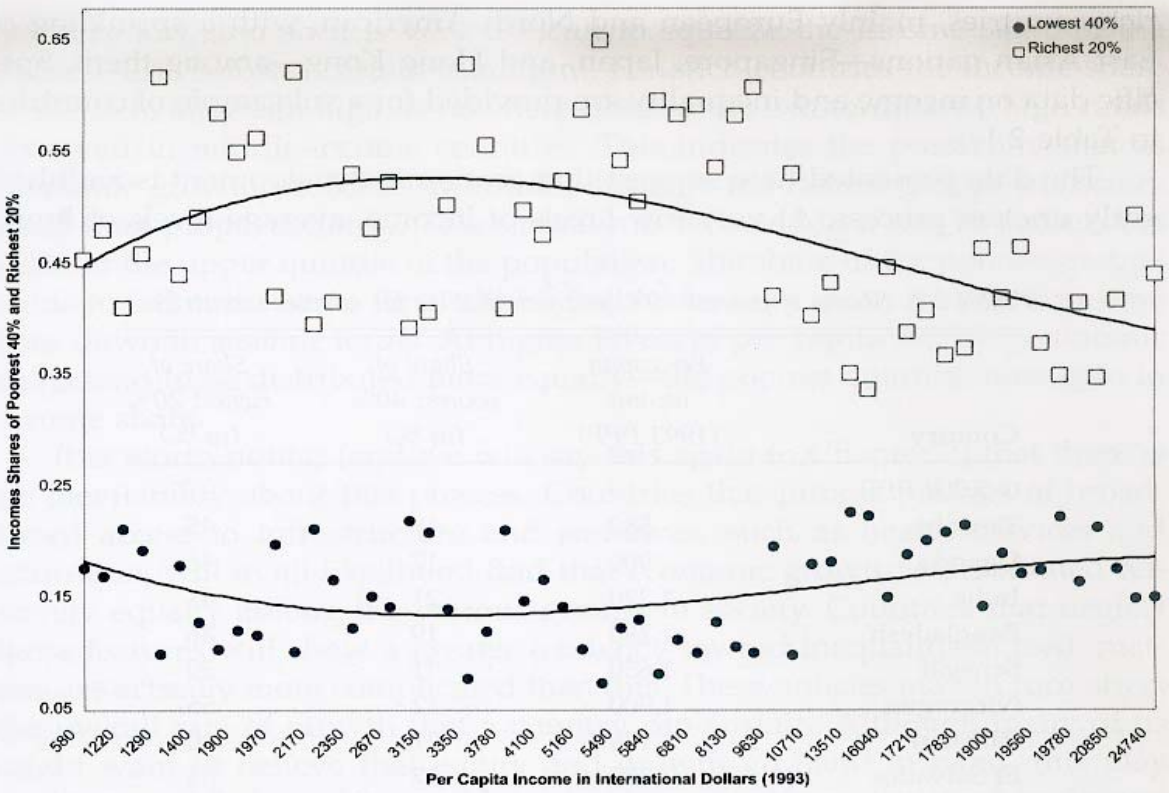



*Figure 2.6. Income shares of poorest 40% and richest 20% for fifty-seven countries arranged in order of increasing per capita income (PPP). Source: World Development Report (World Bank [1995]) and Deininger and Squire [1996a].*

*Table 2.2. Shares of poorest 40% and richest 20% for Sri Lanka and Guatemala.*

| Country | Per capita income (1993 PPP) | Share of poorest 40% (in %) | Share of richest 20% (in %) |
|---|---|---|---|
| Sri Lanka | 2,990 | 22 | 39 |
| Guatemala | 3,350 | 8 | 63 |

Source: *World Development Report* (World Bank [1995]) and Deininger and Squire [1996].

*Table 2.3. Indicators of "human development" for Sri Lanka and Guatemala.*

| Country | Life expectancy (years) | Infant mortality rate (per 1000) | Access to safe water (% of pop.) | Adult literacy rate (%) |
|---|---|---|---|---|
| Sri Lanka | 72 | 18 | 60 | 89 |
| Guatemala | 65 | 48 | 62 | 54 |

Source: *Human Development Report* (United Nations Development Programme [1995]).
Note: All data are for 1992, except for access to safe water, which is the 1988–93 average.

# Introduction

## I.1 The Importance of Growth

To think about the importance of economic growth, we begin by assessing the long-term performance of the U.S. economy. The real per capita gross domestic product (GDP) in the United States grew by a factor of 10 from $3340 in 1870 to $33,330 in 2000, all measured in 1996 dollars. This increase in per capita GDP corresponds to a growth rate of 1.8 percent per year. This performance gave the United States the second-highest level of per capita GDP in the world in 2000 (after Luxembourg, a country with a population of only about 400,000).[1]

To appreciate the consequences of apparently small differentials in growth rates when compounded over long periods of time, we can calculate where the United States would have been in 2000 if it had grown since 1870 at 0.8 percent per year, one percentage point per year below its actual rate. A growth rate of 0.8 percent per year is close to the rate experienced in the long run—from 1900 to 1987—by India (0.64 percent per year), Pakistan (0.88 percent per year), and the Philippines (0.86 percent per year). If the United States had begun in 1870 at a real per capita GDP of $3340 and had then grown at 0.8 percent per year over the next 130 years, its per capita GDP in 2000 would have been $9450, only 2.8 times the value in 1870 and 28 percent of the actual value in 2000 of $33,330. Then, instead of ranking second in the world in 2000, the United States would have ranked 45th out of 150 countries with data. To put it another way, if the growth rate had been lower by just 1 percentage point per year, the U.S. per capita GDP in 2000 would have been close to that in Mexico and Poland.

Suppose, alternatively, that the U.S. real per capita GDP had grown since 1870 at 2.8 percent per year, 1 percentage point per year greater than the actual value. This higher growth rate is close to those experienced in the long run by Japan (2.95 percent per year from 1890 to 1990) and Taiwan (2.75 percent per year from 1900 to 1987). If the United States had still begun in 1870 at a per capita GDP of $3340 and had then grown at 2.8 percent per year over the next 130 years, its per capita GDP in 2000 would have been $127,000—38 times the value in 1870 and 3.8 times the actual value in 2000 of $33,330. A per capita GDP of $127,000 is well outside the historical experience of any country and may, in fact, be infeasible (although people in 1870 probably would have thought the same about $33,330). We can say, however, that a continuation of the long-term U.S. growth rate of 1.8 percent per year implies that the United States will not attain a per capita GDP of $127,000 until 2074.

1. The long-term data on GDP come from Maddison (1991) and are discussed in chapter 12. Recent data are from Heston, Summers, and Aten (2002) and are also discussed in chapter 12.

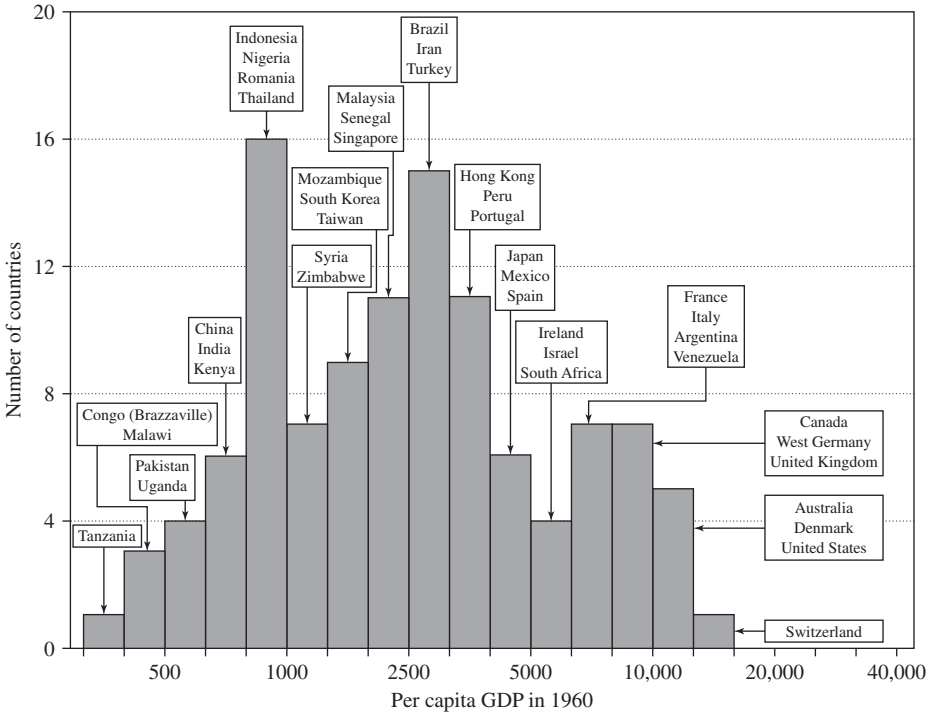



**Figure I.1**
**Histogram for per capita GDP in 1960.** The data, for 113 countries, are the purchasing-power-parity (PPP) adjusted values from Penn World Tables version 6.1, as described in Summers and Heston (1991) and Heston, Summers, and Aten (2002). Representative countries are labeled within each group.

The comparison of levels of real per capita GDP over a century involves multiples as high as 20; for example, Japan's per capita GDP in 1990 was about 20 times that in 1890. Comparisons of levels of per capita GDP across countries at a point in time exhibit even greater multiples. Figure I.1 shows a histogram for the log of real per capita GDP for 113 countries (those with the available data) in 1960. The mean value corresponds to a per capita GDP of $3390 (1996 U.S. dollars). The standard deviation of the log of real per capita GDP—a measure of the proportionate dispersion of real per capita GDP—was 0.89. This number means that a 1-standard-deviation band around the mean encompassed a range from 0.41 of the mean to 2.4 times the mean. The highest per capita GDP of $14,980 for Switzerland was 39 times the lowest value of $381 for Tanzania. The United States was second with a value of $12,270. The figure shows representative countries for each range of per capita GDP. The broad picture is that the richest countries included the OECD and

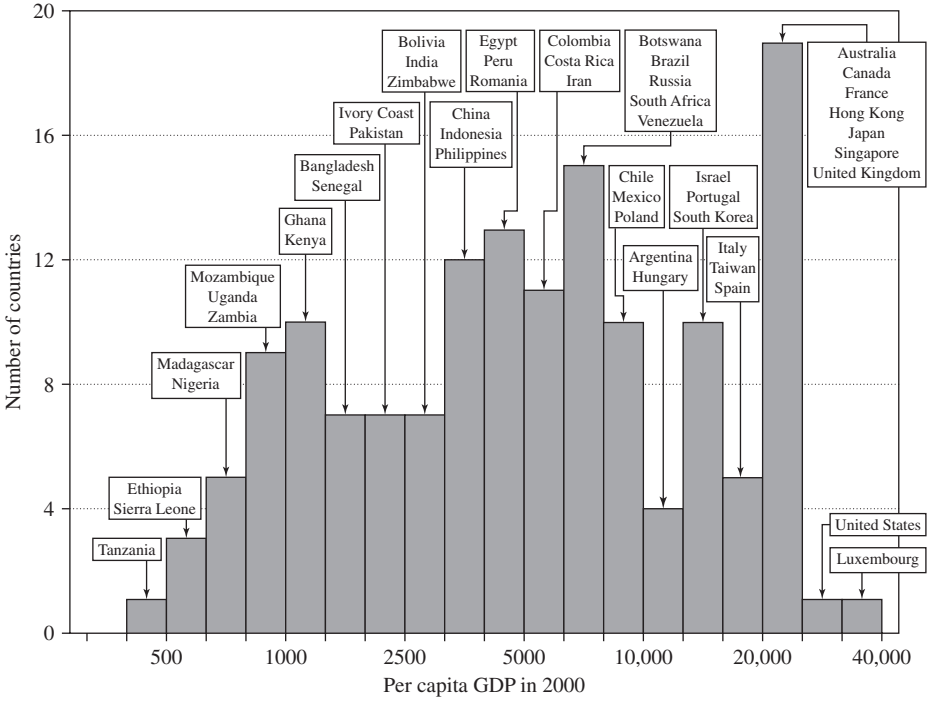



**Figure I.2**
**Histogram for per capita GDP in 2000.** The data, for 150 countries, are from the sources noted for figure I.1. Representative countries are labeled within each group.

a few places in Latin America, such as Argentina and Venezuela. Most of Latin America was in a middle range of per capita GDP. The poorer countries were a mixture of African and Asian countries, but some Asian countries were in a middle range of per capita GDP.

Figure I.2 shows a comparable histogram for 150 countries in 2000. The mean here corresponds to a per capita GDP of $8490, 2.5 times the value in 1960. The standard deviation of the log of per capita GDP in 2000 was 1.12, implying that a 1-standard-deviation band ranged from 0.33 of the mean to 3.1 times the mean. Hence, the proportionate dispersion of per capita GDP increased from 1960 to 2000. The highest value in 2000, $43,990 for Luxembourg, was 91 times the lowest value—$482 for Tanzania. (The Democratic Republic of Congo would be poorer, but the data are unavailable for 2000.) If we ignore Luxembourg because of its small size and compare Tanzania's per capita GDP with the second-highest value, $33,330 for the United States, the multiple is 69. Figure I.2 again

marks out representative countries within each range of per capita GDP. The OECD countries still dominated the top group, joined by some East Asian countries. Most other Asian countries were in the middle range of per capita GDP, as were most Latin American countries. The lower range in 2000 was dominated by sub-Saharan Africa.

To appreciate the spreads in per capita GDP that prevailed in 2000, consider the situation of Tanzania, the poorest country shown in figure I.2. If Tanzania were to grow at the long-term U.S. rate of 1.8 percent per year, it would take 235 years to reach the 2000 level of U.S. per capita GDP. The required interval would still be 154 years if Tanzania were to grow at the long-term Japanese rate of 2.75 percent per year.

For 112 countries with the necessary data, the average growth rate of real per capita GDP between 1960 and 2000 was 1.8 percent per year—coincidentally the same as the long-term U.S. rate—with a standard deviation of 1.7.[2] Figure I.3 has a histogram of these growth rates; the range is from −3.2 percent per year for the Democratic Republic of Congo (the former Zaire) to 6.4 percent per year for Taiwan. (If not for missing data, the lowest-growing country would probably be Iraq.) Forty-year differences in growth rates of this magnitude have enormous consequences for standards of living. Taiwan raised its real per capita GDP by a factor of 13 from $1430 in 1960 (rank 76 out of 113 countries) to $18,730 in 2000 (rank 24 of 150), while the Democratic Republic of Congo lowered its real per capita GDP by a factor of 0.3 from $980 in 1960 (rank 93 of 113) to $320 in 1995—if not for missing data, this country would have the lowest per capita GDP in 2000.

A few other countries had growth rates from 1960 to 2000 that were nearly as high as Taiwan's; those with rates above 5 percent per year were Singapore with 6.2 percent, South Korea with 5.9 percent, Hong Kong with 5.4 percent, and Botswana with 5.1 percent. These countries increased their levels of per capita GDP by a multiple of at least 7 over 40 years. Just below came Thailand and Cyprus at 4.6 percent growth, China at 4.3 percent, Japan at 4.2 percent (with rapid growth mainly into the 1970s), and Ireland at 4.1 percent. Figure I.3 shows that a number of other OECD countries came in the next-highest growth groups, along with a few countries in Latin America (including Brazil and Chile) and more in Asia (including Indonesia, India, Pakistan, and Turkey). The United States ranked 40th in growth with a rate of 2.5 percent.

At the low end of growth, 16 countries aside from the Democratic Republic of Congo had negative growth rates of real per capita GDP from 1960 to 2000. The list (which would be substantially larger if not for missing data), starting from the bottom, is Central African Republic, Niger, Angola, Nicaragua, Mozambique, Madagascar, Nigeria, Zambia,

2. These statistics include the Democratic Republic of Congo (the former Zaire), for which the data are for 1960 to 1995.

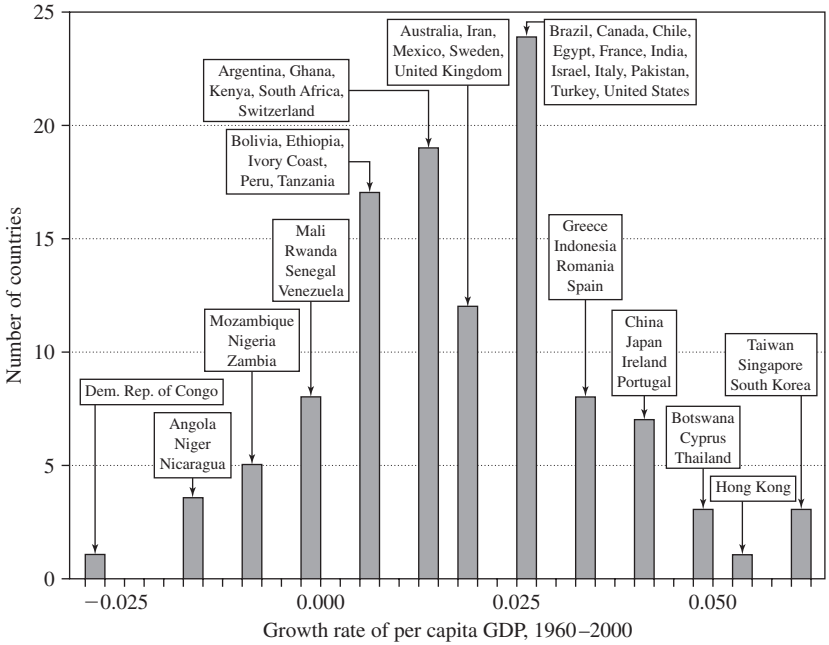



**Figure I.3**
**Histogram for growth rate of per capita GDP from 1960 to 2000.** The growth rates are computed for 112 countries from the values of per capita GDP shown for 1960 and 2000 in figures I.1 and I.2. For Democratic Republic of Congo (former Zaire), the growth rate is for 1960 to 1995. West Germany is the only country included in figure I.1 (for 1960) but excluded from figure I.3 (because of data problems caused by the reunification of Germany). Representative countries are labeled within each group.

Chad, Comoros, Venezuela, Senegal, Rwanda, Togo, Burundi, and Mali. Thus, except for Nicaragua and Venezuela, this group comprises only sub-Saharan African countries. For the 38 sub-Saharan African countries with data, the mean growth rate from 1960 to 2000 was only 0.6 percent per year. Hence, the typical country in sub-Saharan Africa increased its per capita GDP by a factor of only 1.3 over 40 years. Just above the African growth rates came a few slow-growing countries in Latin America, including Bolivia, Peru, and Argentina.

As a rough generalization for regional growth experiences, we can say that sub-Saharan Africa started relatively poor in 1960 and grew at the lowest rate, so it ended up by far the poorest area in 2000. Asia started only slightly above Africa in many cases but grew rapidly and ended up mostly in the middle. Latin America started in the mid to high range, grew somewhat below average, and therefore ended up mostly in the middle along with Asia.

Finally, the OECD countries started highest in 1960, grew in a middle range or better, and therefore ended up still the richest.

If we want to understand why countries differ dramatically in standards of living (figures I.1 and I.2), we have to understand why countries experience such sharp divergences in long-term growth rates (figure I.3). Even small differences in these growth rates, when cumulated over 40 years or more, have much greater consequences for standards of living than the kinds of short-term business fluctuations that have typically occupied most of the attention of macroeconomists. To put it another way, if we can learn about government policy options that have even small effects on long-term growth rates, we can contribute much more to improvements in standards of living than has been provided by the entire history of macroeconomic analysis of countercyclical policy and fine-tuning. Economic growth—the subject matter of this book—is the part of macroeconomics that really matters.

## I.2 The World Income Distribution

Although we focus in this book on the theoretical and empirical determinants of aggregate economic growth, we should keep in mind that growth has important implications for the welfare of individuals. In fact, aggregate growth is probably the single most important factor affecting individual levels of income. Hence, understanding the determinants of aggregate economic growth is the key to understanding how to increase the standards of living of individuals in the world and, thereby, to lessen world poverty.

Figure I.4 shows the evolution of the world's per capita GDP from 1970 to 2000.[3] It is clear that the average person on the planet has been getting richer over time. But the positive average growth rate over the last three decades does not mean that the income of all citizens has increased. In particular, it does not mean that the incomes of the poorest people have grown nor that the number of people whose incomes are below a certain poverty line (say one dollar a day, as defined by the World Bank) has declined.[4] Indeed, if inequality

3. The "world" is approximated by the 126 countries (139 countries after the breakup of the Soviet Union in 1989) in Sala-i-Martin (2003a, 2003b). The individuals in these 126 countries made up about 95 percent of the world's population. World GDP per capita is estimated by adding up the data for individual countries from Heston, Summers, and Aten (2002) and then dividing by the world's population.

4. The quest for a "true" poverty line has a long tradition, but the current "one-dollar-a-day" line can be traced back to World Bank (1990). The World Bank originally defined the poverty line as one dollar a day in 1985 prices. Although the World Bank's own definition later changed to 1.08 dollars a day in 1993 dollars (notice that one 1985 dollar does not correspond to 1.08 1993 dollars), we use the original definition of one dollar a day in 1985 prices. One dollar a day (or 365 dollars a year) in 1985 prices becomes 495 dollars per year in 1996 prices, which is the base year of the Heston, Summers, and Aten (2002) data used to construct the world income distributions. Following Bhalla (2002), Sala-i-Martin (2003a) adjusts this poverty line upward by 15 percent to correct for the bias generated by the underreporting of the rich. This adjustment means that our "one-dollar-a-day" poverty line represents 570 dollars a year (or 1.5 dollars a day) in 1996 dollars.

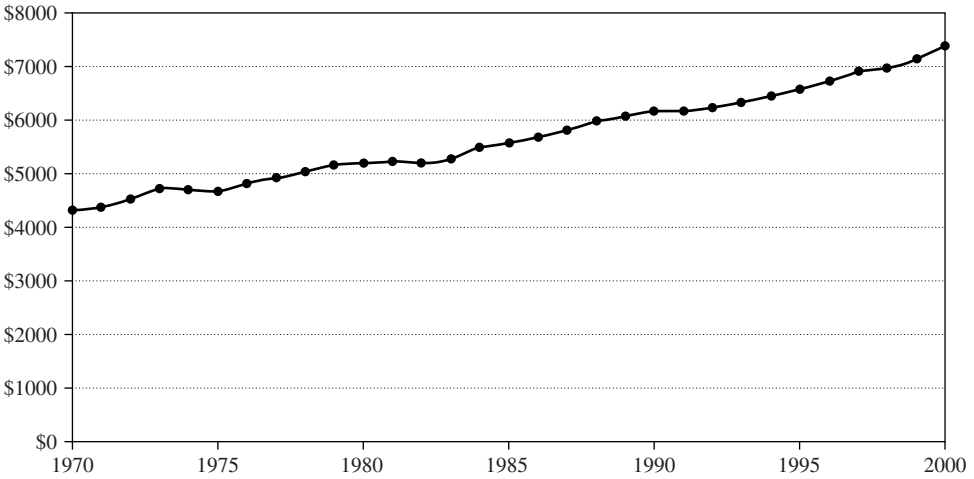



**Figure I.4**
**World per capita GDP, 1970–2000.** World per capita GDP is the sum of the GDPs for 126 countries (139 countries after the collapse of the Soviet Union) divided by population. The sample of 126 countries is the one used in Sala-i-Martin (2003a) and accounts for 95 percent of the world's population.

increased along with economic growth, it is possible for the world to have witnessed both positive per capita GDP growth and an increasing number of people below the poverty line. To assess how aggregate growth affects poverty, Sala-i-Martin (2003a) estimates the world distribution of individual income. To do so, he combines microeconomic survey and aggregate GDP data for each country, for every year between 1970 and 2000.[5] The result for 1970 is displayed in figure I.5. The horizontal axis plots the level of income (on a logarithmic scale), and the vertical axis has the number of people. The thin lines correspond to the income distributions of individual countries. Notice, for example, that China (the most populated country in the world) has a substantial fraction of the distribution below the $1/day line. The same is true for India and a large number of smaller countries. This pattern contrasts with the position of countries such as the United States, Japan, or even the USSR, which have very little of their distributions below the $1/day line. The thick line in figure I.5 is the integral of all the individual distributions. Therefore,

5. Sala-i-Martin (2003b) constructs an analogous distribution from which he estimates the number of people whose personal consumption expenditure is less than one dollar a day. The use of consumption, rather than income, accords better with the concept of "extreme poverty" used by international institutions such as the World Bank and the United Nations. However, personal consumption has the drawbacks of giving no credit to public services and saving.

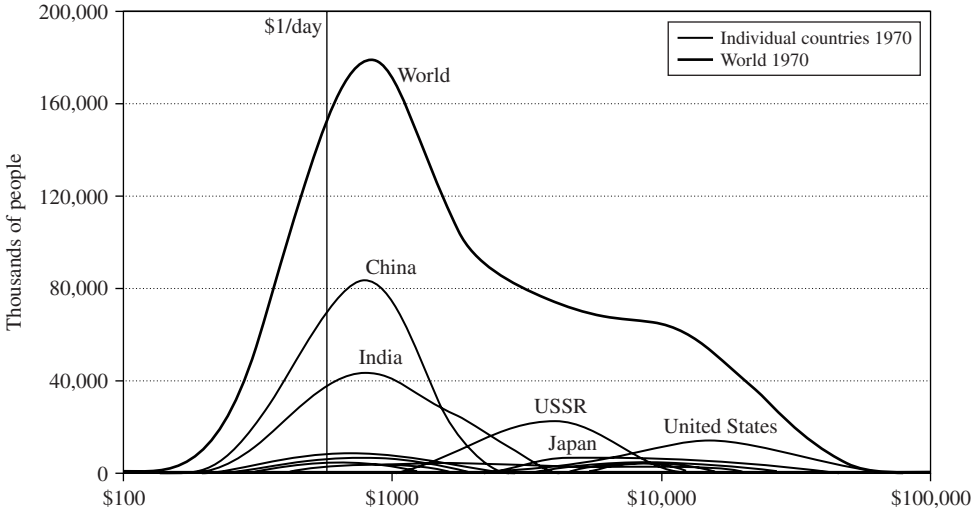



**Figure I.5**
**The world distribution of income in 1970.** The level of income is on the horizontal axis (on a logarithmic scale), and the number of people is on the vertical axis. The thin curves correspond to the income distributions of individual countries. The thick curve is the integral of individual country distributions and corresponds to the world distribution of income. The vertical line marks the poverty line (which corresponds to one dollar a day in 1985 prices). Source: Sala-i-Martin (2003a).

this line corresponds to the world distribution of income in 1970. Again, a substantial fraction of the world's citizens were poor (that is, had an income of less than $1/day) in 1970.

Figure I.6 displays the corresponding distributions for 2000. If one compares the 1970 with the 2000 distribution, one sees a number of interesting things. First, the world distribution of income has shifted to the right. This shift corresponds to the cumulated growth of per capita GDP. Second, we see that, underlying the evolution of worldwide income, there is a positive evolution of incomes in most countries in the world. Most countries increased their per capita GDP and, therefore, shifted to the right. Third, we see that the dispersion of the distributions for some countries, notably China, has increased over this period. In other words, income inequality rose within some large countries. Fourth, the increases in inequality within some countries have not been nearly enough to offset aggregate per capita growth, so that the fraction of the world's people whose incomes lie below the poverty line has declined dramatically.

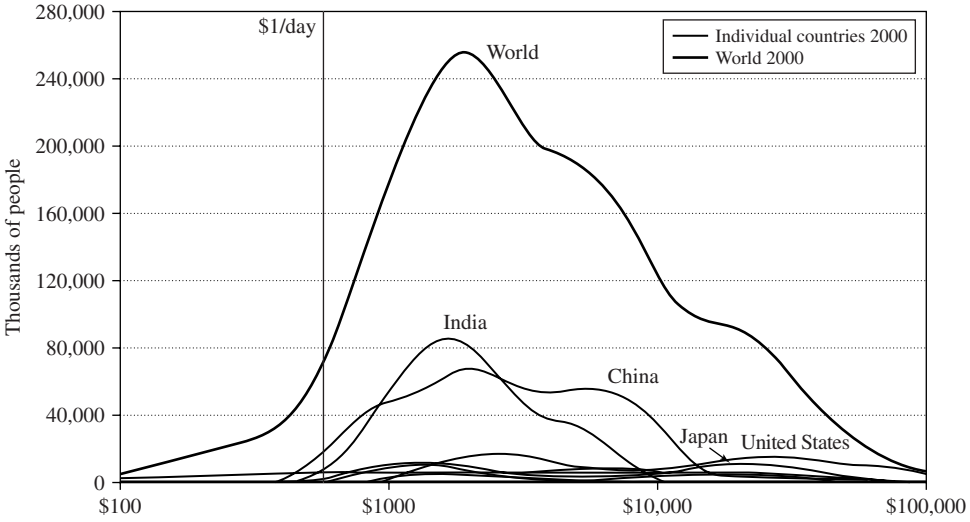



**Figure I.6**
**The world distribution of income in 2000.** The level of income is on the horizontal axis (on a logarithmic scale), and the number of people is on the vertical axis. The thin curves correspond to the income distributions of individual countries. The thick curve is the integral of individual country distributions and corresponds to the world distribution of income. The vertical line marks the poverty line (which corresponds to one dollar a day in 1985 prices). Source: Sala-i-Martin (2003a).

The exact fraction of the world's citizens that live below the poverty line can be computed from the distributions estimated by Sala-i-Martin (2003a).[6] These poverty rates, reported in figure I.7, have been cut by a factor of 3: whereas 20 percent of the world's citizens were poor in 1970, only 7 percent were poor in 2000.[7] Between 1970 and 1978, population growth more than offset the reduction in poverty rates. Indeed, Sala-i-Martin (2003a) shows that, during that period, the overall number of poor increased by 20 million people. But, since 1978, the total number of people with income below the $1/day threshold declined by more than 300 million. This achievement is all the more remarkable if we take into acount that overall population increased by more than 1.6 billion people during this period.

6. The World Bank, the United Nations, and many individual researchers define poverty in terms of consumption, rather than income. Sala-i-Martin (2003b) estimates poverty rates and head counts using consumption. The evolution of consumption poverty is similar to the one reported here for income although, obviously, the poverty rates are higher if one uses consumption instead of income and still uses the same poverty line.

7. Sala-i-Martin (2003a) reports cumulative distribution functions (CDFs) for 1970, 1980, 1990, and 2000. Using these CDFs, one can easily see that poverty rates have fallen dramatically over the last thirty years regardless of what poverty line one adopts. Thus, the conclusion that aggregate growth has reduced poverty is quite robust.

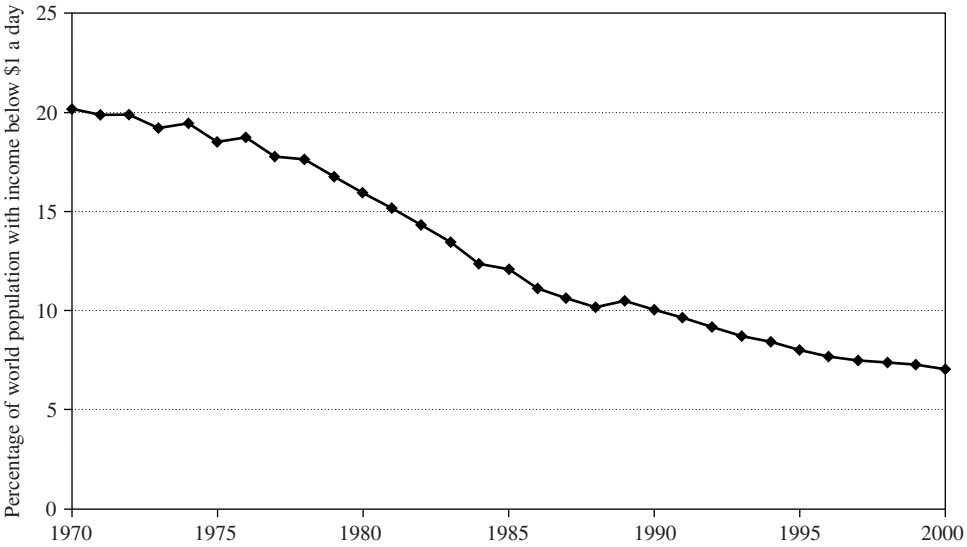



**Figure I.7**
**World poverty rates.** The graphs show the fraction of overall population with income below the poverty line. Source: Sala-i-Martin (2003a).

The clear conclusion is that economic growth led to substantial reductions in the world's poverty rates and head counts over the last thirty years. As mentioned earlier, this outcome was not inevitable: if aggregate growth had been accompanied by substantial increases in income inequality, it would have been possible for the mean of the income distribution to increase but also for the fraction of the distribution below a specified poverty threshold to also increase. Sala-i-Martin (2003a) shows that, even though this result is theoretically possible, the world did not behave this way over the last thirty years. Moreover, he also shows that world income inequality actually declined slightly between 1980 and 2000. This conclusion holds whether inequality is measured by the Gini coefficient, the Theil Index, the mean logarithmic deviation, various Atkinson indexes, the variance of log-income, or the coefficient of variation.

Sala-i-Martin (2003a) decomposes the world into regions and notes that poverty erradication has been most pronounced in the regions where growth has been the largest. Figure I.8 reports poverty rates for the poorest regions of the world: East Asia, South Asia, Latin America, Africa, the Middle East and North Africa (MENA), and Eastern Europe and Central Asia. In 1970, three of these regions had poverty rates close to or above 30 percent. Two of them (East Asia and South Asia) have experienced substantial reductions in poverty

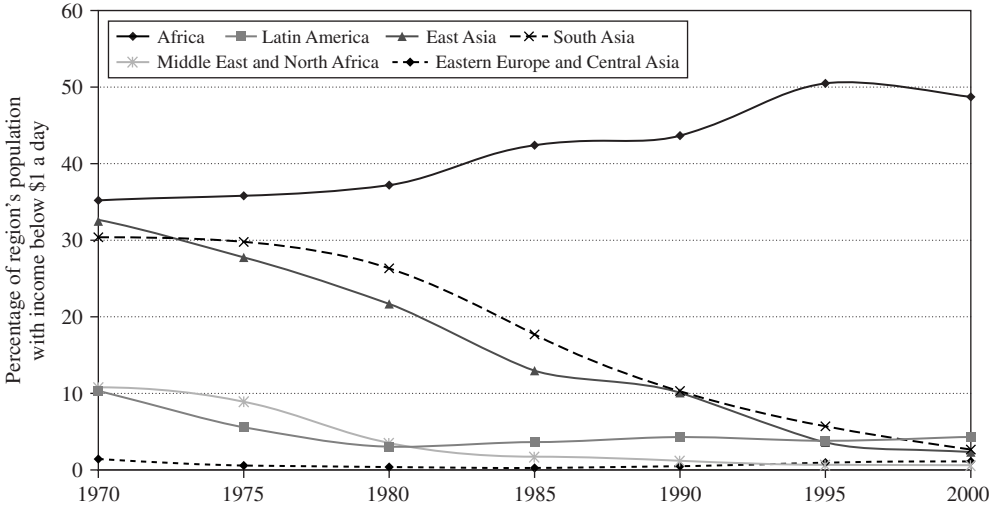



**Figure I.8**
**Regional poverty rates.** The graphs show the fraction of each region's population with income below the poverty line. The regions are the ones defined by the World Bank: East Asia, South Asia, Latin America, Africa, the Middle East and North Africa (MENA), and Eastern Europe and Central Asia. Source: Sala-i-Martin (2003a).

rates. These are the regions that also experienced large positive aggregate growth rates. The other region (Africa) has witnessed a dramatic increase in poverty rates over the last thirty years. We also know that per capita growth rates have been negative or close to zero for most countries in Africa. Figure I.8 also shows that two regions had poverty rates near 10 percent in 1970: Latin America and MENA. Both have experienced reductions in poverty rates. Latin America witnessed dramatic gains in the 1970s, when growth rates were substantial, but suffered a setback during the 1980s (the "lost decade," which featured negative growth rates). Poverty rates in Latin America stabilized during the 1990s. Poverty rates in MENA declined slightly between 1970 and 1975. The decline was very large during the high-growth decade that followed the oil shocks and then stabilized when aggregate growth stopped.

Finally, Eastern Europe and Central Asia (a region that includes the former Soviet Union) started off with very small poverty rates. The rates multiplied by a factor of 10 between 1989 and 2000. There are two reasons for the explosion of poverty rates in Eastern Europe and Central Asia. One is the huge increase in inequality that followed the collapse of the communist system. The second factor is the dismal aggregate growth performance of these countries. Notice, however, that the average levels of income for these countries remain far above the levels of Africa or even Asia. Therefore, even after the deterioration

in mean income and the rise of income dispersion, poverty rates remain relatively low in Eastern Europe and Central Asia.

### I.3 Empirical Regularities about Economic Growth

Kaldor (1963) listed a number of stylized facts that he thought typified the process of economic growth:

1. Per capita output grows over time, and its growth rate does not tend to diminish.
2. Physical capital per worker grows over time.
3. The rate of return to capital is nearly constant.
4. The ratio of physical capital to output is nearly constant.
5. The shares of labor and physical capital in national income are nearly constant.
6. The growth rate of output per worker differs substantially across countries.[8]

Fact 6 accords with the cross-country data that we have already discussed. Facts 1, 2, 4, and 5 seem to fit reasonably well with the long-term data for currently developed countries. For discussions of the stability of the long-run ratio of physical capital to GDP in Japan, Germany, Italy, the United Kingdom, and the United States, see Maddison (1982, chapter 3). For indications of the long-term stability of factor shares in the United States, see Denison (1974, appendix J) and Jorgenson, Gollop, and Fraumeni (1987, table 9.3). Young (1995) reports that factor shares were reasonably stable in four East Asian countries—Hong Kong, Singapore, South Korea, and Taiwan—from the early or middle 1960s through 1990. Studies of seven developed countries—Canada, France, Germany, Italy, Japan, the Netherlands, and the United Kingdom—indicate that factor shares are similar to those in the United States (Christensen, Cummings, and Jorgenson, 1980, and Dougherty, 1991). In some Latin-American countries considered by Elias (1990), the capital shares tend, however, to be higher than those in the United States.

Kaldor's claimed fact 3 on the stability of real rates of return appears to be heavily influenced by the experience of the United Kingdom; in this case, the real interest rate seems

8. Kuznets (1973, 1981) brings out other characteristics of modern economic growth. He notes the rapid rate of structural transformation, which includes shifts from agriculture to industry to services. This process involves urbanization, shifts from home work to employee status, and an increasing role for formal education. He also argues that modern growth involves an increased role for foreign commerce and that technological progress implies reduced reliance on natural resources. Finally, he discusses the growing importance of government: "The spread of modern economic growth placed greater emphasis on the importance and need for organization in national sovereign units. . . . The sovereign state unit was of critical importance as the formulator of the rules under which economic activity was to be carried on; as a referee . . . ; and as provider of infrastructure" (1981, p. 59).

to have no long-run trend (see Barro, 1987, figures 4 and 7). For the United States, however, the long-term data suggest a moderate decline of real interest rates (Barro, 1997, table 11.1). Real rates of return in some fast-growing countries, such as South Korea and Singapore, are much higher than those in the United States but have declined over time (Young, 1995). Thus it seems likely that Kaldor's hypothesis of a roughly stable real rate of return should be replaced by a tendency for returns to fall over some range as an economy develops.

We can use the data presented in chapter 12 to assess the long-run tendencies of the growth rate of real per capita GDP. Tables 12.10 and 12.11 contain figures from Angus Maddison for 31 countries over periods of roughly a century. These numbers basically exhaust the available information about growth over very long time intervals.

Table 12.10 applies to 16 currently developed countries, the major countries in Europe plus the United States, Canada, and Australia. These data show an average per capita growth rate of 1.9 percent per year over roughly a century, with a breakdown by 20-year periods as shown in table I.1. These numbers are consistent with Kaldor's proposition that the growth rate of real per capita GDP has no secular tendency to decline; in fact, the periods following World War II show growth rates well above the long-run average. The reduction in the growth rate from 3.7 percent per year in 1950–70 to 2.2 percent per year in 1970–90 corresponds to the often-discussed *productivity slowdown*. It is apparent from the table, however, that the growth rate for 1970–90 is high in relation to the long-term history.

Table 12.11 contains figures for 15 currently less-developed countries in Asia and Latin America. In this case, the average long-run growth rate from 1900 to 1987 is 1.4 percent per year, and the breakdown into four subperiods is as shown in table I.2. Again, the post–World War II period (here, 1950–87) shows growth rates well above the long-term average.

**Table I.1**
Long-Term Growth Rates for Currently Developed Countries

| Period | Growth Rate (percent per year) | Number of Countries |
|---|---|---|
| **1830–50** | 0.9 | 10 |
| **1850–70** | 1.2 | 11 |
| **1870–90** | 1.2 | 13 |
| **1890–10** | 1.5 | 14 |
| **1910–30** | 1.3 | 16 |
| **1930–50** | 1.4 | 16 |
| **1950–70** | 3.7 | 16 |
| **1970–90** | 2.2 | 16 |

*Source:* Table 12.10.
*Note:* The growth rates are simple averages for the countries with data.

**Table I.2**
Long-Term Growth Rates for Currently Less-Developed Countries

| Period | Growth Rate (percent per year) | Number of Countries |
|---|---|---|
| **1900–13** | 1.2 | 15 |
| **1913–50** | 0.4 | 15 |
| **1950–73** | 2.6 | 15 |
| **1973–87** | 2.4 | 15 |

*Source:* Table 12.11 in chapter 12.
*Note:* The growth rates are simple averages for the countries with data.

The information depicted in figures I.1–I.3 applies to the behavior of real per capita GDP for over 100 countries from 1960 to 2000. We can use these data to extend the set of stylized facts that was provided by Kaldor. One pattern in the cross-country data is that the growth rate of per capita GDP from 1960 to 2000 is essentially uncorrelated with the level of per capita GDP in 1960 (see chapter 12). In the terminology developed in chapter 1, we shall refer to a tendency for the poor to grow faster than the rich as $\beta$ convergence. Thus the simple relationship between growth and the starting position for a broad cross section of countries does not reveal $\beta$ convergence. This kind of convergence does appear if we limit attention to more homogeneous groups of economies, such as the U.S. states, regions of several European countries, and prefectures of Japan (see Barro and Sala-i-Martin, 1991, 1992a, and 1992b, and chapter 11). In these cases, the poorer places tend to grow faster than the richer ones. This behavior also appears in the cross-country data if we limit the sample to a relatively homogeneous collection of currently prosperous places, such as the OECD countries (see Baumol, 1986; DeLong, 1988).

We say in chapter 1 that *conditional* $\beta$ convergence applies if the growth rate of per capita GDP is negatively related to the starting level of per capita GDP after holding fixed some other variables, such as initial levels of human capital, measures of government policies, the propensities to save and have children, and so on. The broad cross-country sample—that is, the data set that does not show $\beta$ convergence in an absolute sense—clearly reveals $\beta$ convergence in this conditional context (see Barro, 1991; Barro and Sala-i-Martin, 1992a; and Mankiw, Romer, and Weil, 1992). The rate of convergence is, however, only about 2 percent per year. Thus, it takes about 35 years for an economy to eliminate one-half of the gap between its initial per capita GDP and its long-run or target level of per capita GDP. (The target tends to grow over time.)

The results in chapter 12 show that a number of variables are significantly related to the growth rate of per capita GDP, once the starting level of per capita GDP is held constant. For example, growth depends positively on the initial quantity of human capital in the form of educational attainment and health, positively on maintenance of the rule of law and the

**Table I.3**
Ratios to GDP of Gross Domestic Investment and Gross National Saving (percent)

| Period | Australia | Canada | France | India | Japan | Korea | United Kingdom | United States |
|---|---|---|---|---|---|---|---|---|
| | | | | **1. Gross Domestic Investment** | | | | |
| **1870–89** | 16.5 | 16.0 | 12.8 | — | — | — | 9.3 | 19.8 |
| **1890–09** | 13.7 | 17.2 | 14.0 | — | 14.0 | — | 9.4 | 17.9 |
| **1910–29** | 17.4 | 19.8 | — | 6.4 | 16.6 | 5.1[a] | 6.7 | 17.2 |
| **1930–49** | 13.3 | 13.1 | — | 8.4 | 20.5 | — | 8.1 | 12.7 |
| **1950–69** | 26.3 | 23.8 | 22.6 | 14.0 | 31.8 | 16.3[b] | 17.2 | 18.9 |
| **1970–89** | 24.9 | 22.8 | 23.2 | 20.2 | 31.9 | 29.1 | 18.2 | 18.7 |
| | | | | **2. Gross National Saving** | | | | |
| **1870–89** | 11.2 | 9.1 | 12.8 | — | — | — | 13.9 | 19.1 |
| **1890–09** | 12.2 | 11.5 | 14.9 | — | 12.0 | — | 13.1 | 18.4 |
| **1910–29** | 13.6 | 16.0 | — | 6.4 | 17.1 | 2.38 | 9.6 | 18.9 |
| **1930–49** | 13.0 | 15.6 | — | 7.7 | 19.8 | — | 4.8 | 14.1 |
| **1950–69** | 24.0 | 22.3 | 22.8 | 12.2 | 32.1 | 5.9[b] | 17.7 | 19.6 |
| **1970–89** | 22.9 | 22.1 | 23.4 | 19.4 | 33.7 | 26.2 | 19.4 | 18.5 |

*Source:* Maddison (1992).
[a] 1911–29
[b] 1951–69

ratio of investment to GDP, and negatively on fertility rates and the ratio of government consumption spending to GDP.

We can assess regularities in investment and saving ratios by using the long-term data in Maddison (1992). He provides long-term information for a few countries on the ratios of gross domestic investment to GDP and of gross national saving (the sum of domestic and net foreign investment) to GDP. Averages of the investment and saving ratios over 20-year intervals for the eight countries that have enough data for a long-period analysis are shown in table I.3. For an individual country, the table indicates that the time paths of domestic investment and national saving are usually similar. Domestic investment was, however, substantially higher than national saving (that is, borrowing from abroad was large) for Australia and Canada from 1870 to 1929, for Japan from 1890 to 1909, for the United Kingdom from 1930 to 1949, and for Korea from 1950 to 1969 (in fact, through the early 1980s). National saving was much higher than domestic investment (lending abroad was substantial) for the United Kingdom from 1870 to 1929 and for the United States from 1930 to 1949.

For the United States, the striking observation from the table is the stability over time of the ratios for domestic investment and national saving. The only exception is the relatively low values from 1930 to 1949, the period of the Great Depression and World War II. The United States is, however, an outlier with respect to the stability of its investment and saving

ratios; the data for the other seven countries show a clear increase in these ratios over time. In particular, the ratios for 1950–89 are, in all cases, substantially greater than those from before World War II. The long-term data therefore suggest that the ratios to GDP of gross domestic investment and gross national saving tend to rise as an economy develops, at least over some range. The assumption of a constant gross saving ratio, which appears in chapter 1 in the Solow–Swan model, misses this regularity in the data.

The cross-country data also reveal some regularities with respect to fertility rates and, hence, rates of population growth. For most countries, the fertility rate tends to decline with increases in per capita GDP. For the poorest countries, however, the fertility rate may rise with per capita GDP, as Malthus (1798) predicted. Even stronger relations exist between educational attainment and fertility. Except for the most advanced countries, female schooling is negatively related with the fertility rate, whereas male schooling is positively related with the fertility rate. The net effect of these forces is that the fertility rate—and the rate of population growth—tend to fall over some range as an economy develops. The assumption of an exogenous, constant rate of population growth—another element of the Solow–Swan model—conflicts with this empirical pattern.

## I.4 A Brief History of Modern Growth Theory

Classical economists, such as Adam Smith (1776), David Ricardo (1817), and Thomas Malthus (1798), and, much later, Frank Ramsey (1928), Allyn Young (1928), Frank Knight (1944), and Joseph Schumpeter (1934), provided many of the basic ingredients that appear in modern theories of economic growth. These ideas include the basic approaches of competitive behavior and equilibrium dynamics, the role of diminishing returns and its relation to the accumulation of physical and human capital, the interplay between per capita income and the growth rate of population, the effects of technological progress in the forms of increased specialization of labor and discoveries of new goods and methods of production, and the role of monopoly power as an incentive for technological advance.

Our main study begins with these building blocks already in place and focuses on the contributions in the neoclassical tradition since the late 1950s. We use the neoclassical methodology and language and rely on concepts such as aggregate capital stocks, aggregate production functions, and utility functions for representative consumers (who often have infinite horizons). We also use modern mathematical methods of dynamic optimization and differential equations. These tools, which are described in the appendix at the end of this book, are familiar today to most first-year graduate students in economics.

From a chronological viewpoint, the starting point for modern growth theory is the classic article of Ramsey (1928), a work that was several decades ahead of its time. Ramsey's

treatment of household optimization over time goes far beyond its application to growth theory; it is hard now to discuss consumption theory, asset pricing, or even business-cycle theory without invoking the optimality conditions that Ramsey (and Fisher, 1930) introduced to economists. Ramsey's intertemporally separable utility function is as widely used today as the Cobb–Douglas production function. The economics profession did not, however, accept or widely use Ramsey's approach until the 1960s.

Between Ramsey and the late 1950s, Harrod (1939) and Domar (1946) attempted to integrate Keynesian analysis with elements of economic growth. They used production functions with little substitutability among the inputs to argue that the capitalist system is inherently unstable. Since they wrote during or immediately after the Great Depression, these arguments were received sympathetically by many economists. Although these contributions triggered a good deal of research at the time, very little of this analysis plays a role in today's thinking.

The next and more important contributions were those of Solow (1956) and Swan (1956). The key aspect of the Solow–Swan model is the neoclassical form of the production function, a specification that assumes constant returns to scale, diminishing returns to each input, and some positive and smooth elasticity of substitution between the inputs. This production function is combined with a constant-saving-rate rule to generate an extremely simple general-equilibrium model of the economy.

One prediction from these models, which has been exploited seriously as an empirical hypothesis only in recent years, is conditional convergence. The lower the starting level of per capita GDP, relative to the long-run or steady-state position, the faster the growth rate. This property derives from the assumption of diminishing returns to capital; economies that have less capital per worker (relative to their long-run capital per worker) tend to have higher rates of return and higher growth rates. The convergence is conditional because the steady-state levels of capital and output per worker depend, in the Solow–Swan model, on the saving rate, the growth rate of population, and the position of the production function—characteristics that might vary across economies. Recent empirical studies indicate that we should include additional sources of cross-country variation, especially differences in government policies and in initial stocks of human capital. The key point, however, is that the concept of conditional convergence—a basic property of the Solow–Swan model—has considerable explanatory power for economic growth across countries and regions.

Another prediction of the Solow–Swan model is that, in the absence of continuing improvements in technology, per capita growth must eventually cease. This prediction, which resembles those of Malthus and Ricardo, also comes from the assumption of diminishing returns to capital. We have already observed, however, that positive rates of per capita growth can persist over a century or more and that these growth rates have no clear tendency to decline.

The neoclassical growth theorists of the late 1950s and 1960s recognized this modeling deficiency and usually patched it up by assuming that technological progress occurred in an exogenous manner. This device can reconcile the theory with a positive, possibly constant per capita growth rate in the long run, while retaining the prediction of conditional convergence. The obvious shortcoming, however, is that the long-run per capita growth rate is determined entirely by an element—the rate of technological progress—that is outside of the model. (The long-run growth rate of the level of output also depends on the growth rate of population, another element that is exogenous in the standard theory.) Thus we end up with a model of growth that explains everything but long-run growth, an obviously unsatisfactory situation.

Cass (1965) and Koopmans (1965) brought Ramsey's analysis of consumer optimization back into the neoclassical growth model and thereby provided for an endogenous determination of the saving rate. This extension allows for richer transitional dynamics but tends to preserve the hypothesis of conditional convergence. The endogeneity of saving also does not eliminate the dependence of the long-run per capita growth rate on exogenous technological progress.

The equilibrium of the Cass–Koopmans version of the neoclassical growth model can be supported by a decentralized, competitive framework in which the productive factors, labor and capital, are paid their marginal products. Total income then exhausts the total product because of the assumption that the production function features constant returns to scale. Moreover, the decentralized outcomes are Pareto optimal.

The inclusion of a theory of technological change in the neoclassical framework is difficult, because the standard competitive assumptions cannot be maintained. Technological advance involves the creation of new ideas, which are partially nonrival and therefore have aspects of public goods. For a given technology—that is, for a given state of knowledge—it is reasonable to assume constant returns to scale in the standard, rival factors of production, such as labor, capital, and land. In other words, given the level of knowledge on how to produce, one would think that it is possible to replicate a firm with the same amount of labor, capital, and land and obtain twice as much output. But then, the returns to scale tend to be increasing if the nonrival ideas are included as factors of production. These increasing returns conflict with perfect competition. In particular, the compensation of nonrival old ideas in accordance with their current marginal cost of production—zero—will not provide the appropriate reward for the research effort that underlies the creation of new ideas.

Arrow (1962) and Sheshinski (1967) constructed models in which ideas were unintended by-products of production or investment, a mechanism described as learning by doing. In these models, each person's discoveries immediately spill over to the entire economy, an instantaneous diffusion process that might be technically feasible because knowledge is nonrival. Romer (1986) showed later that the competitive framework can be retained in this

case to determine an equilibrium rate of technological advance, but the resulting growth rate would typically not be Pareto optimal. More generally, the competitive framework breaks down if discoveries depend in part on purposive R&D effort and if an individual's innovations spread only gradually to other producers. In this realistic setting, a decentralized theory of technological progress requires basic changes in the neoclassical growth model to incorporate an analysis of imperfect competition.[9] These additions to the theory did not come until Romer's (1987, 1990) research in the late 1980s.

The work of Cass (1965) and Koopmans (1965) completed the basic neoclassical growth model.[10] Thereafter, growth theory became excessively technical and steadily lost contact with empirical applications. In contrast, development economists, who are required to give advice to sick countries, retained an applied perspective and tended to use models that were technically unsophisticated but empirically useful. The fields of economic development and economic growth drifted apart, and the two areas became almost completely separated.

Probably because of its lack of empirical relevance, growth theory effectively died as an active research field by the early 1970s, on the eve of the rational-expectations revolution and the oil shocks. For about 15 years, macroeconomic research focused on short-term fluctuations. Major contributions included the incorporation of rational expectations into business-cycle models, improved approaches to policy evaluation, and the application of general-equilibrium methods to real business-cycle theory.

After the mid-1980s, research on economic growth experienced a boom, beginning with the work of Romer (1986) and Lucas (1988). The motivation for this research was the observation (or recollection) that the determinants of long-run economic growth are crucial issues, far more important than the mechanics of business cycles or the countercyclical effects of monetary and fiscal policies. But a recognition of the significance of long-run growth was only a first step; to go further, one had to escape the straitjacket of the neoclassical growth model, in which the long-term per capita growth rate was pegged by the rate of exogenous technological progress. Thus, in one way or another, the recent contributions determine the long-run growth rate within the model; hence, the designation *endogenous-growth* models.

The initial wave of the new research—Romer (1986), Lucas (1988), Rebelo (1991)—built on the work of Arrow (1962), Sheshinski (1967), and Uzawa (1965) and did not really introduce a theory of technological change. In these models, growth may go on indefinitely because the returns to investment in a broad class of capital goods—which includes human

9. Another approach is to assume that all of the nonrival research—a classic public good—is financed by the government through involuntary taxes; see Shell (1967).

10. However, recent research has shown how to extend the neoclassical growth model to allow for heterogeneity among households (Caselli and Ventura, 2000) and to incorporate time-inconsistent preferences (Barro, 1999).

capital—do not necessarily diminish as economies develop. (This idea goes back to Knight, 1944.) Spillovers of knowledge across producers and external benefits from human capital are parts of this process, but only because they help to avoid the tendency for diminishing returns to the accumulation of capital.

The incorporation of R&D theories and imperfect competition into the growth framework began with Romer (1987, 1990) and included significant contributions by Aghion and Howitt (1992) and Grossman and Helpman (1991, chapters 3 and 4). In these models, technological advance results from purposive R&D activity, and this activity is rewarded by some form of ex post monopoly power. If there is no tendency for the economy to run out of ideas, the growth rate can remain positive in the long run. The rate of growth and the underlying amount of inventive activity tend, however, not to be Pareto optimal because of distortions related to the creation of the new goods and methods of production. In these frameworks, the long-term growth rate depends on governmental actions, such as taxation, maintenance of law and order, provision of infrastructure services, protection of intellectual property rights, and regulations of international trade, financial markets, and other aspects of the economy. The government therefore has great potential for good or ill through its influence on the long-term rate of growth. This research program remained active through the 1990s and has been applied, for example, to understanding scale effects in the growth process (Jones, 1999), analyzing whether technological progress will be labor or capital augmenting (Acemoglu, 2002), and assessing the role of competition in the growth process (Aghion et al., 2001, 2002).

The new research also includes models of the diffusion of technology. Whereas the analysis of discovery relates to the rate of technological progress in leading-edge economies, the study of diffusion pertains to the manner in which follower economies share by imitation in these advances. Since imitation tends to be cheaper than innovation, the diffusion models predict a form of conditional convergence that resembles the predictions of the neoclassical growth model. Some recent empirical work has verified the importance of technological diffusion in the convergence process.

Another key exogenous parameter in the neoclassical growth model is the growth rate of population. A higher rate of population growth lowers the steady-state level of capital and output per worker and tends thereby to reduce the per capita growth rate for a given initial level of per capita output. The standard model does not, however, consider the effects of per capita income and wage rates on population growth—the kinds of effects stressed by Malthus—and also does not take account of the resources used up in the process of child rearing. Another line of recent research makes population growth endogenous by incorporating an analysis of fertility choice into the neoclassical model. The results are consistent, for example, with the empirical regularity that fertility rates tend to fall with per capita income over the main range of experience but may rise with per capita income

for the poorest countries. Additional work related to the endogeneity of labor supply in a growth context concerns migration and labor/leisure choice.

The clearest distinction between the growth theory of the 1960s and that of the 1990s is that the recent research pays close attention to empirical implications and to the relation between theory and data. However, much of this applied perspective involved applications of empirical hypotheses from the older theory, notably the neoclassical growth model's prediction of conditional convergence. The cross-country regressions motivated by the neoclassical model surely became a fixture of research in the 1990s. An interesting recent development in this area, which we explore in chapter 12, involves assessment of the robustness of these kinds of estimates. Other empirical analyses apply more directly to the recent theories of endogenous growth, including the roles of increasing returns, R&D activity, human capital, and the diffusion of technology.

## I.5 Some Highlights of the Second Edition

This second edition of *Economic Growth* includes changes throughout the book. We mention here a few of the highlights. In this introduction we already described new estimates of the distribution of income of individuals throughout the world from 1970 to 2000.

Chapter 1 has been made easier and more accessible. We added a section on markets in the Solow–Swan model. We also discussed the nature of the theoretical dissatisfaction with neoclassical theory that led to the emergence of endogenous growth models with imperfect competition.

Chapter 2 expands the treatment of the basic neoclassical growth model to allow for heterogeneity of households. There is an improved approach to ruling out "undersaving" paths and for deriving and using transversality conditions. We also include an analysis of models with nonconstant time-preference rates.

Chapter 3 has various extensions to the basic neoclassical growth model, including an expanded treatment of the government sector. The framework allows for various forms of tax rates and allows for a clear distinction between taxes on capital income and taxes on labor or consumption.

Chapters 6 and 7 discuss models of endogenous technological progress. The new material includes an analysis of the role and source of scale effects in these models. We refer in chapter 6 to Thomas Jefferson's mostly negative views on patents as a mechanism for motivating inventions. Chapter 7 has an improved analysis of models where technological advances take the form of quality improvements. We have particularly improved the treatment of the interplay between industry leaders and outsiders and, hence, of the role of outside competition in the growth process.

Chapter 8 has a model of technological diffusion. The basic model is improved, and the theoretical results are related to recent empirical findings.

Chapter 9 has an extended treatment of endogenous population growth. Chapter 10 has an improved analysis of growth accounting, including its relation to theories of endogenous technological progress. Chapter 11, which deals with regional data sets, extends the analysis of U.S. states through 2000.

In chapter 12 we include an updated treatment of cross-country growth regressions, using the new Summers–Heston data set, Penn World Tables version 6.1, which has data through 2000 (see Heston, Summers, and Aten, 2002). We also discuss in this chapter various issues about the reliability of estimates from cross-country regressions, including ways to assess the robustness of the results.

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# Economie du développement

*Chapitre 2. Les enseignements des théories de la croissance*

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# 1 Les faits stylisés de la croissance

## 1.1 La croissance : un phénomène "moderne"

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- Un phénomène mesurée par les praticiens de l'histoire économique quantitative
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- Figures et tableaux issus de Galor (2004) sur la période (0–2000)
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  2. La grande divergence
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## 1.2 Les faits stylisés de Kaldor (1963)

1. Per capita output grows over time, and its growth rate does not tend to diminish
2. Physical capital per worker grows over time
3. The rate of return to capital is nearly constant
4. The ratio of physical capital to output is nearly constant
5. The shares of labor and physical capital in national income are nearly constant
6. The growth rate of output per worker differs substantially across countries

- Remarques
  1. ils concernent la croissance moderne
  2. ils ont été confirmés depuis
  3. ils structurent la théorie économique

# 2 Les modèles de croissance

- Pourquoi des théories? Réponse de Robert E. Lucas (1993 ECTA) "Making a miracle" Econometrica

"Why did it happen in Korea and Taiwan, and not in the Phillipines?"

"But simply advising a society to 'follow the Korean model' is a little like advising an aspiring basketball player to 'follow the Michael Jordan model'. To make use of someone else's successful performance at any task, one needs to be able to break this performance down into its component parts so that one can see what each part contributes to the whole, which aspects of this performance are imitable and, of these, which are worth imitating. One needs, in short, a theory."
Robert Lucas 1993.

## 2.1 Le modèle de croissance néoclassique

Quelques repères "historiques"

1. XVIII-XIX : tous les économistes classiques sont des économistes de la croissance (Smith, Ricardo, Malthus, Marx ...)

2. Fin XIX : la révolution néoclassique (Jevons 1871, Menger 1871, Walras 1874 [Edgeworth 1881, Pareto 1906])
   $\Rightarrow$ Allocation (néoclassique) vs. reproduction – accumulation (classique)

3. 1936 : La Théorie générale de l'emploi, de l'intérêt et de la monnaie de John Maynard Keynes
   $\Rightarrow$ Inefficacité du marché dans le processus de l'allocation, défaillance des marchés

4. Pas de théories de la croissance comme discipline jusqu'au milieu des années 1950, malgré de grandes oeuvres (Schumpeter, Ramsey, ...)

## Les modèles keynésiens de croissance

- Tentative de fonder une théorie de la croissance sur des bases keynésiennes
  - Analyse dynamique des défaillances de marché

1. Keynes (TGE) : le plein-emploi est un cas particulier, le sous-emploi est la règle
2. Roy Harrod et Evsey Domar : la croissance stable est une coïncidence ("fil du rasoir"), l'instabilité est le plus probable

- La condition de croissance stable chez Harrod et Domar :

$$k_{t+1} = (1 - \delta)\, k_t + s_t$$

hypothèses : $s_t = s y_t$ et $k_t = \theta y_t$

$$\theta y_{t+1} = (1 - \delta)\, \theta y_t + s y_t$$

soit le taux de croissance

$$\theta\,(1 + g) = (1 - \delta)\, \theta + s$$

et la condition de croissance

$$g = s/\theta - \delta$$

- La condition de croissance n'est pas nécessairement vérifiée ? $\longrightarrow$ Nécessité de la coordination des agents
- Réponse néoclassique : existences de marges d'ajustement négligées par Harrod et Domar
  1. $\theta$ est variable à long terme et peut s'ajuster (Solow 1956)
  2. $s$ est endogène et peut s'ajuster (Cass 1965, Koopman 1965, [Ramsey 1928])

## Une croissance stable (Solow 1956)

- L'opposition Solow et Harrod – Domar = une différence de fonctions de production
  - Fonction de production à facteurs complémentaires

$$y_t = \min\left\{\frac{k_t}{a}, \frac{\ell_t}{b}\right\} \Rightarrow \theta_t = \frac{k_t}{y_t} = a = \theta$$

  - Fonction de production à facteurs substituables

$$y_t = k_t^{\alpha}\ell_t^{1-\alpha} \Rightarrow \theta_t = \frac{k_t}{y_t} = \frac{k_t}{k_t^{\alpha}\ell_t^{1-\alpha}} = \left(\frac{k_t}{\ell_t}\right)^{1-\alpha} = \theta\left(k_t\right)$$

- La condition d'accumulation du capital physique devient

$$k_{t+1} = (1-\delta)\,k_t + s_t = (1-\delta)\,k_t + sk_t^{\alpha}\ell_t^{1-\alpha}$$

1. La croissance auto-entretenue du capital : si $(k_{t+1}/k_t) > 1$, $k_t \to \infty$, est-ce possible ?

$$\lim_{k_t \to \infty} \frac{k_{t+1}}{k_t} = (1-\delta) + \lim_{k_t \to \infty} \left( s k_t^{\alpha-1} \ell_t^{1-\alpha} \right) = (1-\delta) < 1$$

2. Introduction d'une croissance exogène :

$$y_t = k_t^{\alpha}\left(g^t \ell_t\right)^{1-\alpha} \Rightarrow \theta_t = \frac{k_t}{y_t} = \frac{k_t}{k_t^{\alpha}\left(g^t \ell_t\right)^{1-\alpha}} = \left(\frac{k_t}{g^t \ell_t}\right)^{1-\alpha} = \theta\left(k_t\right)$$

l'équation d'accumulation est

$$k_{t+1} = \left(1-\delta\right) k_t + s_t = \left(1-\delta\right) k_t + s k_t^{\alpha}\left(g^t \ell_t\right)^{1-\alpha}$$

3. La croissance auto-entretenue du capital : si $\left(k_{t+1}/k_t\right) > 1$, $k_t \to \infty$, est-ce possible ?

$$\lim_{k_t \to \infty} \frac{k_{t+1}}{k_t} = \left(1-\delta\right) + \lim_{k_t \to \infty}\left[s\left(\frac{k_t}{g^t}\right)^{\alpha-1}\left(\ell_t\right)^{1-\alpha}\right]$$

si $\left(k_{t+1}/k_t\right) > g$ : croissance explosive, $\left(k_{t+1}/k_t\right) < g$ : croissance implosive, $\left(k_{t+1}/k_t\right) = g$ cela donne

$$g = \left(1-\delta\right) + s\widetilde{k}^{\alpha-1}\ell^{1-\alpha}$$

où $\widetilde{k}_t$ est la valeur de régime permanent du capital stationnarisé assurant la croissance équilibrée à taux constant $g$

- Analyses du modèle de Solow
  1. Marchés concurrentiels
  2. Représentation graphique
  3. Statique comparative et règle d'or
  4. Dynamique transitionnelle et convergenec

## Une croissance optimale (Cass 1965, Koopman 1965, [Ramsey 1928])

- Choix intertemporels de consommation $\rightarrow$ taux d'épargne endogène et optimal
- Le programme des ménages : maximisation de l'utilité intertemporelle

$$\max_{\{c_t\}} \sum_{t=0}^{\infty} \beta^t u\left(c_t\right)$$

sous contrainte de revenu (où $s_t = x_t$)

$$x_t + c_t = w_t \ell_t + r_t k_t$$

et d'accumulation

$$k_{t+1} = \left(1 - \delta\right) k_t + x_t$$

- Les entreprises

$$\max_{k_t, \ell_t} \quad \pi_t = f\left(k_t, \ell_t\right) - r_t k_t - w_t \ell_t$$

- Remarque : il est équivalent de faire accumuler des titres financiers par les ménages et le capital par les entreprises

- Résolution par méthode d'optimisation intertemporelle sous contrainte donne le système dynamique d'équilibre à deux dimension $\{c_t, k_t\}$ solution de

$$\begin{aligned} k_{t+1} &= (1-\delta)\, k_t + f(k_t, \ell_t) - c_t \\ u'(c_t) &= \beta \left[ u'(c_{t+1}) (r_t + 1 - \delta) \right] \end{aligned}$$

- Analyses
  1. Optimalité du comportement de consommation
  2. Dynamique transitionnelle de $k_t$ et de $c_t/y_t$
  3. Diagramme des phases
  4. Equation de croissance pour $u(c_t) = \log(c_t)$

$$\frac{c_{t+1}}{c_t} = \beta (r_t + 1 - \delta)$$

- L'absence de croissance auto-entretenue (comme chez Solow)

$$g_t = \frac{c_{t+1}}{c_t} = \beta\left(r_t + 1 - \delta\right)$$

où $r_t = f'\left(k_t\right)$ est le prix de location du capital physique, $g_t$ est la croissance et la constante dépend du taux de dépréciation du capital physique entre autres

- Situation initiale

$$k_0 << k \rightarrow f'\left(k_0\right) >> 0 \rightarrow r_0 >> 0 \rightarrow g_0 >> 0 \rightarrow k_1 > k_0$$

et ainsi de suite avec

$$\frac{dk_t}{dt} > 0 \rightarrow \frac{d}{dt}\left(f'\left(k_t\right)\right) < 0 \rightarrow \frac{dr_t}{dt} < 0 \rightarrow \frac{dg_t}{dt} < 0$$

jusqu'à

$$k_t = k/r_t = cst, g_t = 0$$

- le processus endogène d'accumulation du capital s'étouffe et ne peut pas de lui-même s'autoreproduire sauf à introduire une croissance exogène

## 2.2 Les modèles de croissance endogène

Croissance exogène et structure de marché

- La relation entre RE et croissance auto-entretenue à partir de $y_t = k_t^{\alpha} (a_t n_t)^{\rho}$
  1. Avec des RE constant (=CPP) et $a_t = a$, il ne peut pas y avoir de croissance $\rho = 1 - \alpha$

$$r_t = \alpha k_t^{\alpha-1} (a n_t)^{1-\alpha}, \quad \lim_{k_t \to \infty} r_t = 0$$

  2. Avec des RE croissant $\alpha = 1$ et $\rho > 0$ et $a_t = a$, il peut y avoir de croissance mais plus CPP dans le secteur de production donc plus optimalité

$$r_t = (a n_t)^{\rho}, \quad \lim_{k_t \to \infty} r_t = r \to g = \beta \left[ (a n_t)^{\rho} - cst \right]$$

- Trois solutions pour échapper obtenir une croissance endogène auto-entretenue

Les sources de la croissance endogène

1. Solution de Paul Romer (1986) : externalité *agrégée* liée au capital
   $\rightarrow$ croissance + CP mais sous optimalité

   $r_t = \alpha k_t^{\alpha-1} (a_t n_t)^{1-\alpha}$, sachant $A_t = \mathbf{k}_t \rightarrow r_t = \alpha (n)^{1-\alpha}$ $\lim_{k_t \rightarrow \infty} r_t > 0$

2. Solution de Robert Lucas (1988) : $a_t$ = capital humain détenu par les travailleurs

   $$y_t = k_t^{\alpha} (a_t \phi n_t)^{\beta}, \quad \text{et } a_{t+1} = a_t + (1-\phi) n_t a_t$$

   Productivité marginale constante dans le secteur de la production du capital humain $\rightarrow$non-essouflement de $r_t \rightarrow$ croissance endogène et optimale

3. Solution de Paul Romer (1990) et Ph. Aghion et Peter Howitt (1992) : expliciter la création du progrès technique par l'innovation

$$y_t = k_t^{\alpha} \int_0^{a_t} (\phi n_{it})^{1-\alpha} \, di, \quad \text{et } a_{t+1} = a_t + (1-\phi)\, n_t a_t \text{ : R90}$$

$$y_t = k_t^{\alpha} \int_0^{1} a_{it} \, (\phi n_{it})^{1-\alpha} \, di, \quad \text{et } a_{it+1} = A_{it} + (1-\phi)\, n_{it} a_{it} \text{ : AH90}$$

fondements microéconomiques de l'innovation issus de l'économie industrielle (investissement en R&D, brevets, concurrence imparfaite, externalités) dans un modèle macroéconomique de croissance

# 3 Applications empiriques

## 3.1 La convergence

### 3.1.1 Les différentes formes de convergence

- Convergence absolue et conditionnelle
- $\beta-$convergence et $\sigma-$convergence
- Convergence sur les niveaux et/ou les taux

### 3.1.2 Les résultats empiriques

- Deux propositions
  1. La pertinence de la convergence pour les pays riches (ou qui le sont devenus)
  2. Le faible pouvoir analytique de la convergence conditionnelle pour les pays pauvres

## 3.2 Les théories de la croissance s'applique-t-elle aux PVD

### 3.2.1 Le miracle asiatique : un cas particulier

- Débats sur les sources de la croissance:
  1. Point de départ "comptabilité de la croissance"

$$y_t = a_t k_t^{\alpha_t} h_t^{\rho_t} \rightarrow \frac{\dot{y}_t}{y_t} = \frac{\dot{a}_t}{a_t} + \alpha_t \frac{\dot{k}_t}{k_t} + \rho_t \frac{\dot{h}_t}{h_t}$$

  2. L'accumulation des facteurs (capital humain et physique) suffit-elle à expliquer la croissance observée des pays ?
  3. Sinon, comment expliquer l'importance de la TFP?
  4. Enjeux sur l'orientation des politiques économiques

- Résultats empiriques
  - Divergence à l'échelle internationale : Mankiw Romer Weil (1992) vs. Esterly et Levine (2001), Prescott (1998)
  - Consensus sur le miracle asiatique : Young (1995)
    1. L'accumulation explique la majeure partie du miracle
    2. L'origine des obstacles à l'accumulation dans les pays en développement?

### 3.2.2 Pourquoi le capital ne va-t-il pas dans les pays pauvres ?

- Le calcul de Lucas (1990) "Why doesn't capital falow from rich to poor countries", American Economic Review vol. 80.
- Soit $y$ et $k$ la production et le capital par tête et la fonction de production

$$y = Ax^{\beta}$$

la productivité marginale du capital est

$$r = A\beta x^{\beta-1}$$

exprimé en capital par tête avec $x = (y/A)^{1/\beta}$

$$r = A\beta \left(\frac{y}{A}\right)^{(\beta-1)/\beta} = A^{\frac{1}{\beta}}\beta y^{(\beta-1)/\beta}$$

- Observables aux Etats-Unis et en Inde ?
  1. $\beta = 0,4$ (part moyenne du capital dans le revenu)
  2. $y^{usa} = 15y^{inde}$
  - Implications sur le rapport des productivités marginales

- le rapport des productivités marginales est très important

$$\frac{r^{inde}}{r^{usa}} = \left(\frac{y^{inde}}{y^{usa}}\right)^{(\beta-1)/\beta} = \left(\frac{1}{15}\right)^{-0.6/0.4} = 15^{1.5} = 58!$$

- Une telle différence devrait faire fuire les capitaux des Etats-Unis vers l'Inde.
  - Ce n'est pas le cas, pourquoi ? Quel élément a été omis ?

1. Le capital humain
   - Anne Krueger (1968) : mesure du capital humain au niveau international et calcul de la taille relativement aux Etats-Unis
   - Résultat : capital humain d'un américain $= 5 \times$ celui d'un indien
   - Le rapport des production par unité de travail effective ($=$ capital humain) est $\div$ par 5
   - Le différentiel de productivité devient

$$\frac{r^{inde}}{r^{usa}} = 3^{1.5} = 5$$

     – C'est mieux au sens où l'écart est moins grand, mais encore assez important.

2. Le capital humain avec ses externalités

   - La fonction de production devient

     $$y = Ax^{\beta}h^{\gamma}$$

     où $\gamma \geq 0$ mesure la présence des externalités liées au capital humain $h$

   - La productivité marginale du capital physique devient

     $$r = A\beta x^{\beta-1}h^{\gamma} = \beta A^{1/\beta}y^{(\beta-1)/\beta}h^{\gamma/\beta}$$

   - Edward Denison (1962) estime $\gamma = .36 \sim 0.40$

     $$\frac{r^{inde}}{r^{usa}} = \left(\frac{y^{inde}}{y^{usa}}\right)^{(\beta-1)/\beta}\left(\frac{h^{inde}}{h^{usa}}\right)^{\gamma/\beta} = 3^{1.5} \times 5^{-1} = 1.04$$

     – L'écart de productivité marginae du capital a disparu... reste à ajouter d'autres facteurs comme l'imperfection des marchés financiers et les différents risques pour comprendre pourquoi les capitaux ne vont pas vers les pays pauvres.

3. Peut-on calculer le taux de rendement du capital dans un PVD ? Banerjee et Duflo (2002)

### 3.2.3 Retour sur la TFP et le rôle de la R&D

- Structure de marché et croissance : une prédiction contre-factuelle des modèles de R&D
- L'importance des coûts de R&D par rapport aux coûts d'adoption technologique (20 pour 1 aux Etats-Unis, Jovanovic 1997)
- Apprentissage, productivité et technologie

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**Faculté des sciences économique et de gestion**

**Master EGDD**

**Economie du développement (M1)**

**Cours de M. Tripier**

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# Documents joints au chapitre 2

**Source : Oded Galor (1994) "From stagnation to growth: unified growth theory" in the Handbook of Economic Growth edited by Ph. Aghion et S. Durlauf, North-Holland, 2. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=562085**

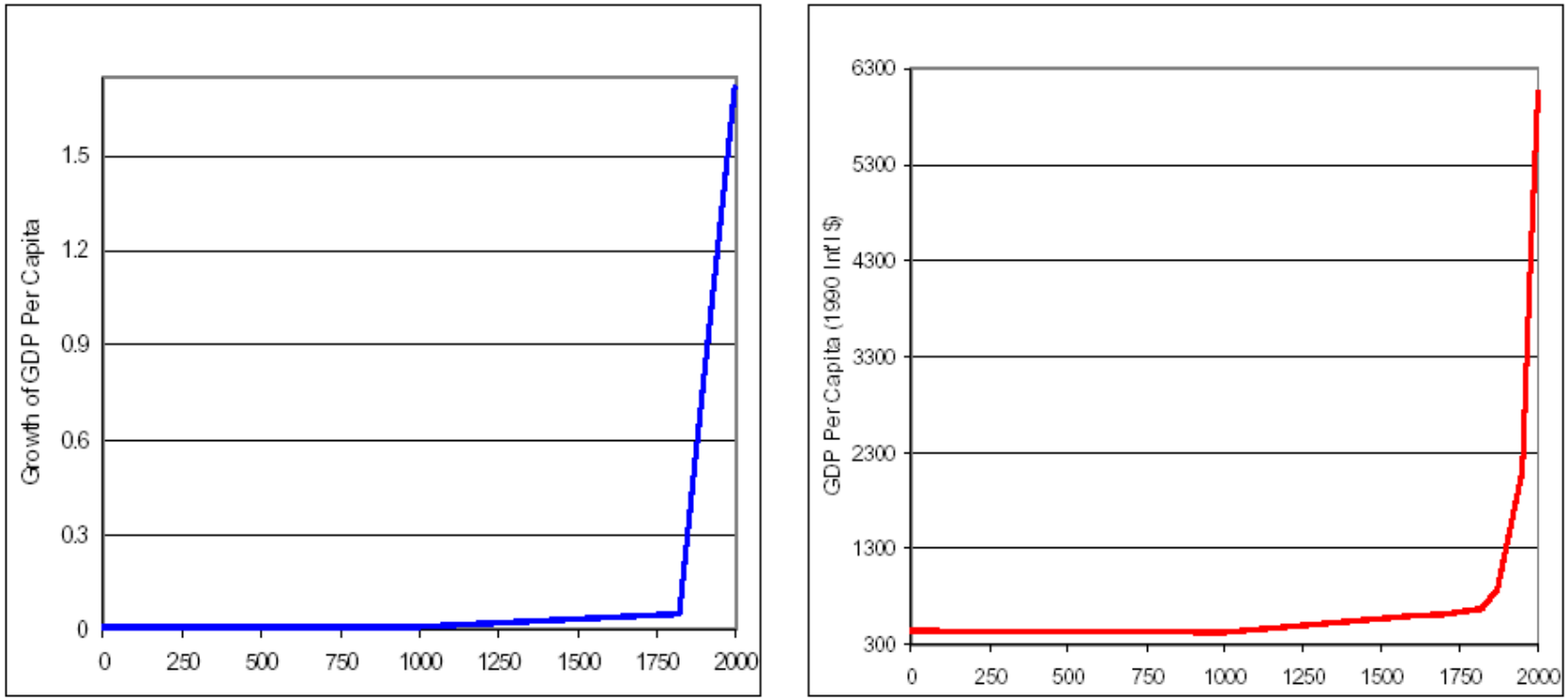



Figure 2.1. The Evolution of the World Income Per Capita over the Years 1-2001
Source: Maddison (2001, 2003)

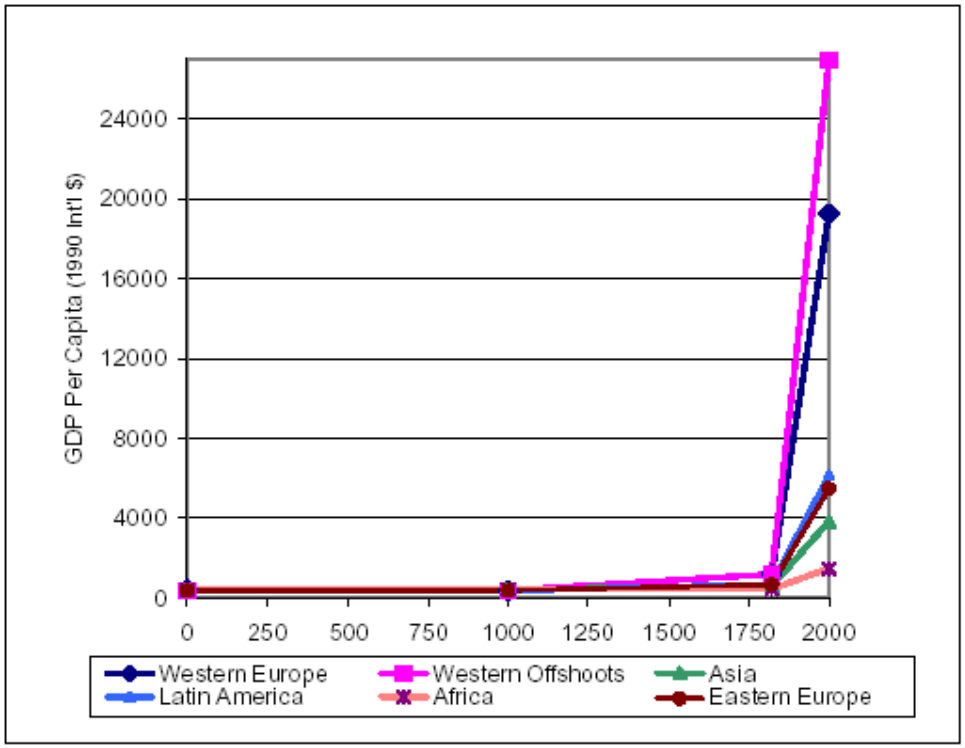



Figure 1.1. The Evolution of Regional Income Per Capita over the Years 1 - 2001

Sources: Maddison (2003)[2]

[1]The ratio of GDP per capita between the richest region and the poorest region in the world was only 1.1:1 in the year 1000, 2:1 in the year 1500, and 3:1 in the year 1820. In the course of the 'Great Divergence' the ratio of GDP per capita between the richest region (Western offshoots) and the poorest region (Africa) has widened considerably from a modest 3:1 ratio in 1820, to a 5:1 ratio in 1870, a 9:1 ratio in 1913, a 15:1 ratio in 1950, and a huge 18:1 ratio in 2001.

[2]According to Maddison's classification, "Western Offshoots" consist of the United States, Canada, Australia and New Zealand.

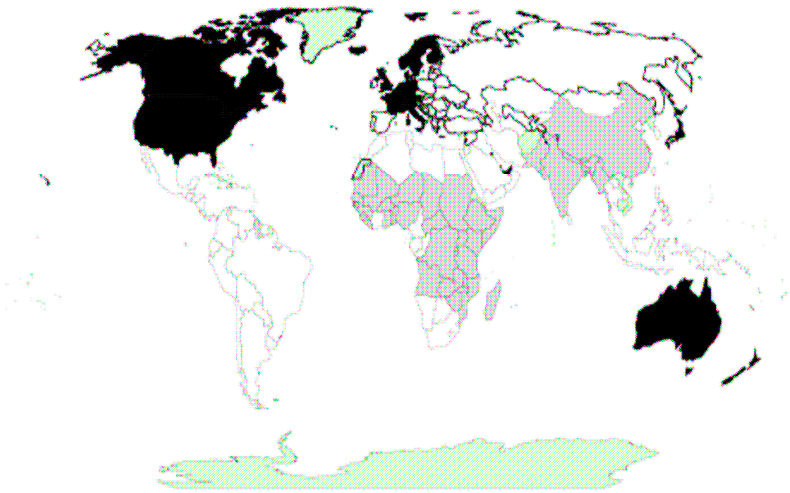
Table 1–2. **Level and Rate of Growth of GDP Per Capita: World and Major Regions, 0–1998 A.D.**

| | *0* | *1000* | *1820* | *1998* | *0–1000* | *1000–1820* | *1820–1998* |
|---|---|---|---|---|---|---|---|
| | *(1990 international dollars)* | | | | *(annual average compound growth rate)* | | |
| Western Europe | 450 | 400 | 1 232 | 17 921 | –0.01 | 0.14 | 1.51 |
| Western Offshoots | 400 | 400 | 1 201 | 26 146 | 0.00 | 0.13 | 1.75 |
| Japan | 400 | 425 | 669 | 20 413 | 0.01 | 0.06 | 1.93 |
| Average Group A | 443 | 405 | 1 130 | 21 470 | –0.01 | 0.13 | 1.67 |
| Latin America | 400 | 400 | 665 | 5 795 | 0.00 | 0.06 | 1.22 |
| Eastern Europe & former USSR | 400 | 400 | 667 | 4 354 | 0.00 | 0.06 | 1.06 |
| Asia (excluding Japan) | 450 | 450 | 575 | 2 936 | 0.00 | 0.03 | 0.92 |
| Africa | 425 | 416 | 418 | 1 368 | –0.00 | 0.00 | 0.67 |
| Average Group B | 444 | 440 | 573 | 3 102 | –0.00 | 0.03 | 0.95 |
| World | 444 | 435 | 667 | 5 709 | –0.00 | 0.05 | 1.21 |

*Source:* Appendix B.

**William Easterly and Ross Levine "It's Not Factor Accumulation: Stylized Facts and Growth Models" World Bank Econ Rev 2001 15: 177-219**

Map 1: The Rich and the Poor



The countries in black contain 15% of world population but produce 50% of world GDP. The countries in gray contain 50% of world population but produce 14% of world GDP.

**Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Chapter1)**

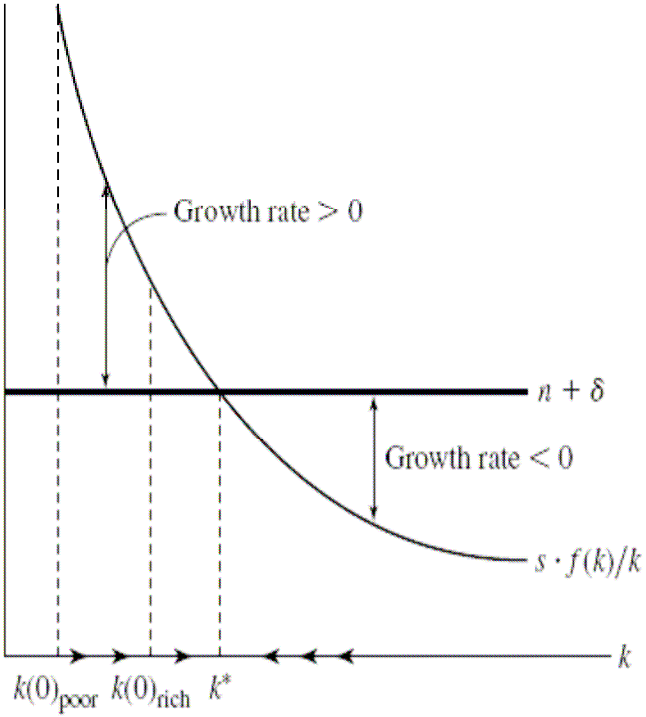



**Figure 1.4**
**Dynamics of the Solow–Swan model.** The growth rate of $k$ is given by the vertical distance between the saving curve, $s \cdot f(k)/k$, and the effective depreciation line, $n + \delta$. If $k < k^*$, the growth rate of $k$ is positive, and $k$ increases toward $k^*$. If $k > k^*$, the growth rate is negative, and $k$ falls toward $k^*$. Thus, the steady-state capital per person, $k^*$, is stable. Note that, along a transition from an initially low capital per person, the growth rate of $k$ declines monotonically toward zero. The arrows on the horizontal axis indicate the direction of movement of $k$ over time.

**Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Chapter1)**

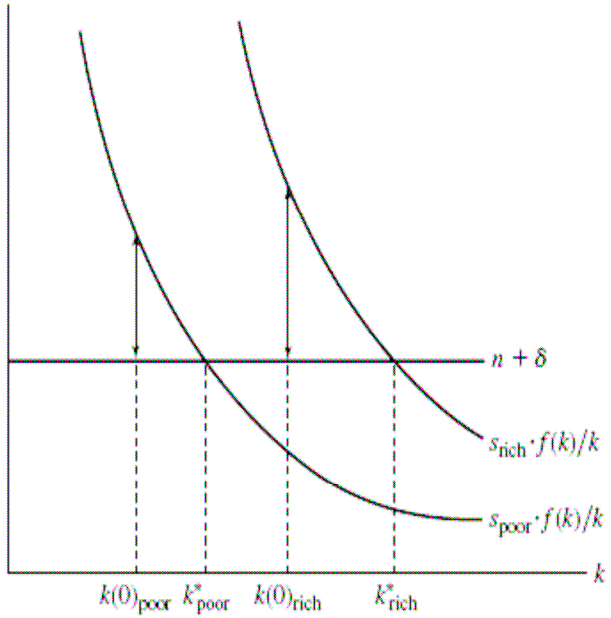



**Figure 1.10**
**Conditional convergence.** If a rich economy has a higher saving rate than a poor economy, the rich economy may be proportionately further from its steady-state position. In this case, the rich economy would be predicted to grow faster per capita than the poor economy; that is, absolute convergence would not hold.

**Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Chapter1)**

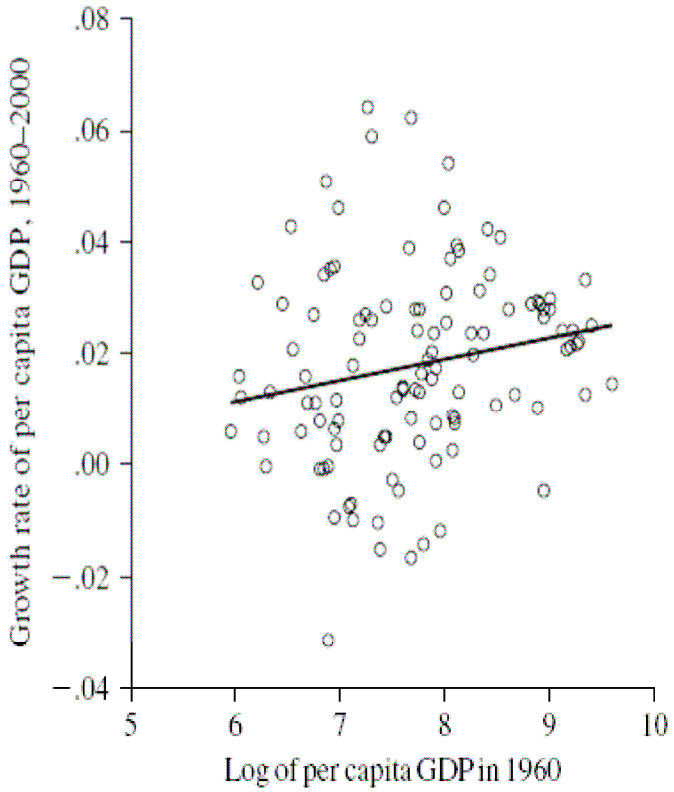



**Figure 1.7**
**Convergence of GDP across countries: Growth rate versus initial level of real per capita GDP for 114 countries.** For a sample of 114 countries, the average growth rate of GDP per capita from 1960 to 2000 (shown on the vertical axis) has little relation with the 1960 level of real per capita GDP (shown on the horizontal axis). The relation is actually slightly positive. Hence, absolute convergence does not apply for a broad cross section of countries.

**Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Chapter1)**

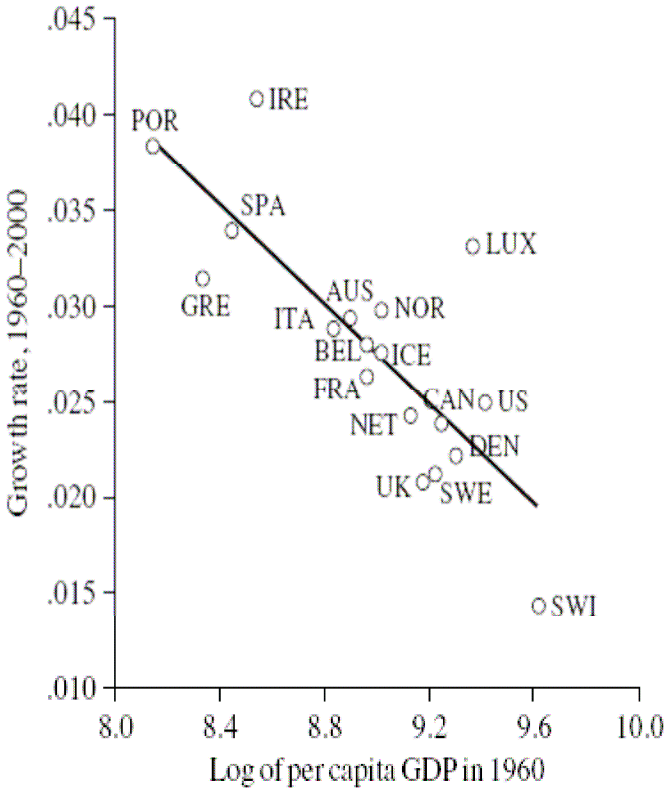



**Figure 1.8**

**Convergence of GDP across OECD countries: Growth rate versus initial level of real per capita GDP for 18 OECD countries.** If the sample is limited to 18 original OECD countries (from 1961), the average growth rate of real per capita GDP from 1960 to 2000 is negatively related to the 1960 level of real per capita GDP. Hence, absolute convergence applies for these OECD countries.

**Robert J. Barro and Xavier Sala-i-Martin, Economic Growth, 2nd Edition MIT Press, 2003. (Chapter1)**

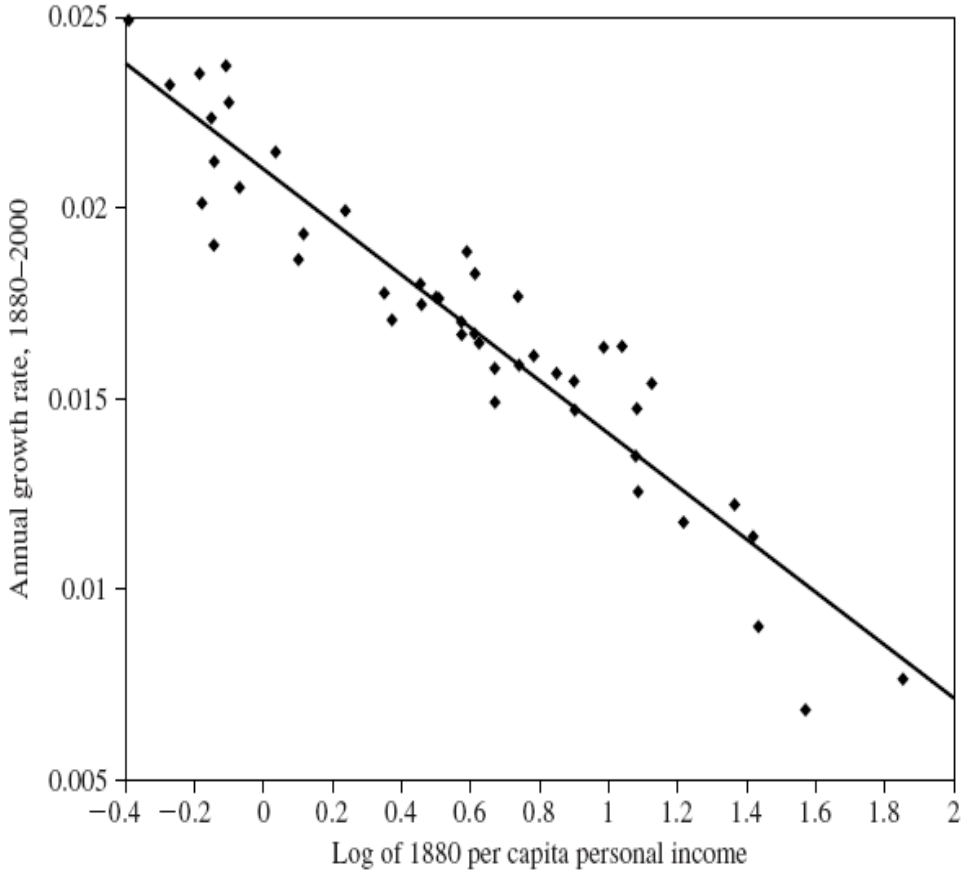



**Figure 1.9**
**Convergence of personal income across U.S. states: 1880 personal income and income growth from 1880 to 2000.** The relation between the growth rate of per capita personal income from 1880 to 2000 (shown on the vertical axis) is negatively related to the level of per capita income in 1880 (shown on the horizontal axis). Thus absolute convergence holds for the states of the United States.

Table 1: Selected Growth Accounting Results for Individual Countries

| | α | GDP Growth | Share Contributed by: Capital | Labor | TFP |
|---|---|---|---|---|---|
| **OECD 1947-73** | | | | | |
| France | 0.40 | 5.40% | 41% | 4% | 55% |
| Germany | 0.39 | 6.61% | 41% | 3% | 56% |
| Italy | 0.39 | 5.30% | 34% | 2% | 64% |
| Japan | 0.39 | 9.50% | 35% | 23% | 42% |
| United Kingdom | 0.38 | 3.70% | 47% | 1% | 52% |
| United States | 0.40 | 4.00% | 43% | 24% | 33% |
| **OECD 1960-90** | | | | | |
| France | .42 | 3.50% | 58% | 1% | 41% |
| Germany | .40 | 3.20% | 59% | -8% | 49% |
| Italy | .38 | 4.10% | 49% | 3% | 48% |
| Japan | .42 | 6.81% | 57% | 14% | 29% |
| United Kingdom | .39 | 2.49% | 52% | -4% | 52% |
| United States | .41 | 3.10% | 45% | 42% | 13% |
| **Latin America 1940-1980** | | | | | |
| Argentina | 0.54 | 3.60% | 43% | 26% | 31% |
| Brazil | 0.45 | 6.40% | 51% | 20% | 29% |
| Chile | 0.52 | 3.80% | 34% | 26% | 40% |
| Mexico | 0.69 | 6.30% | 40% | 23% | 37% |
| Venezuela | 0.55 | 5.20% | 57% | 34% | 9% |
| **East Asia 1966-90** | | | | | |
| Hong Kong | 0.37 | 7.30% | 42% | 28% | 30% |
| Singapore | 0.53 | 8.50% | 73% | 32% | -5% |
| South Korea | 0.32 | 10.32% | 46% | 42% | 12% |
| Taiwan | 0.29 | 9.10% | 40% | 40% | 20% |

OECD figures from Christenson, Cummings, and Jorgenson (1980) and Dougherty (1991)
Latin American figures from Elias (1990).
East Asia figures from Young (1994).

**Alwyn Young "The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience" The Quarterly Journal of Economics, Vol. 110, No. 3. (Aug., 1995), pp. 641-680.**

TABLE XV

RECONCILING NAIVE AND DETAILED ESTIMATES OF PRODUCTIVITY GROWTH

| | Hong Kong | Singapore | South Korea | Taiwan |
|---|---|---|---|---|
| (1) Naive estimate: $0.6(\hat{Q} - \hat{P})$ | **3.4%** | **4.1%** | **4.1%** | **4.0%** |
| Adjustment for participation: $0.6(\hat{P} - \hat{L})$ | −0.6% | −1.6% | −0.7% | −0.8% |
| (2) Naive estimate: $0.6(\hat{Q} - \hat{L})$ | **2.8%** | **2.5%** | **3.4%** | **3.3%** |
| Focus on Nonagricultural sector: $0.6[(\hat{Q}_{NA} - \hat{L}_{NA} - (\hat{Q} - \hat{L})]$ | NA | NA | −0.4% | −0.4% |
| Adjustment of Public Sector Output: $0.6(\hat{Q}_{adj} - \hat{Q}_{NA})$ | NA | NA | NA | −0.3% |
| (3) Naive Nonagricultural estimate: $0.6(\hat{Q}_{NA} - \hat{L}_{NA})$ | **2.8%** | **2.5%** | **3.0%** | **2.6%** |
| (4) Using actual factor shares: $\overline{\Theta}_L(\hat{Q}_{NA} - \hat{L}_{NA})$ | **2.9%** | **2.2%** | **3.5%** | **3.2%** |
| Weighting of labor: $\overline{\Theta}_L(\hat{L}_{NA} - \hat{H}_{NA})$ | −0.3% | −0.6% | −0.7% | −0.2% |
| Capital deepening: $\overline{\Theta}_K(\hat{Q}_{NA} - \hat{C}_{NA})$ | −0.1% | −1.0% | −0.8% | −0.8% |
| Weighting of capital: $\overline{\Theta}_K(\hat{C}_{NA} - \hat{K}_{NA})$ | −0.1% | −0.3% | −0.2% | −0.1% |
| (5) Estimated total factor productivity growth | **2.3%** | **0.2%** | **1.7%** | **2.1%** |

Circumflexes (^) denote logarithmic growth rates. $Q$, $P$, $L$, $H$, $C$, and $K$ denote output, population, workers, weighted labor input, aggregate capital, and weighted capital input, respectively. The subscripts NA and adj. denote nonagricultural and "adjusted." $\overline{\Theta}_K$ and $\overline{\Theta}_L$ denote the average (interperiod) share of capital and labor, as in equation (3) earlier.

**Robert E. Lucas "Making a Miracle", Econometrica, Vol. 61, No. 2. (Mar., 1993), pp. 251-272.**

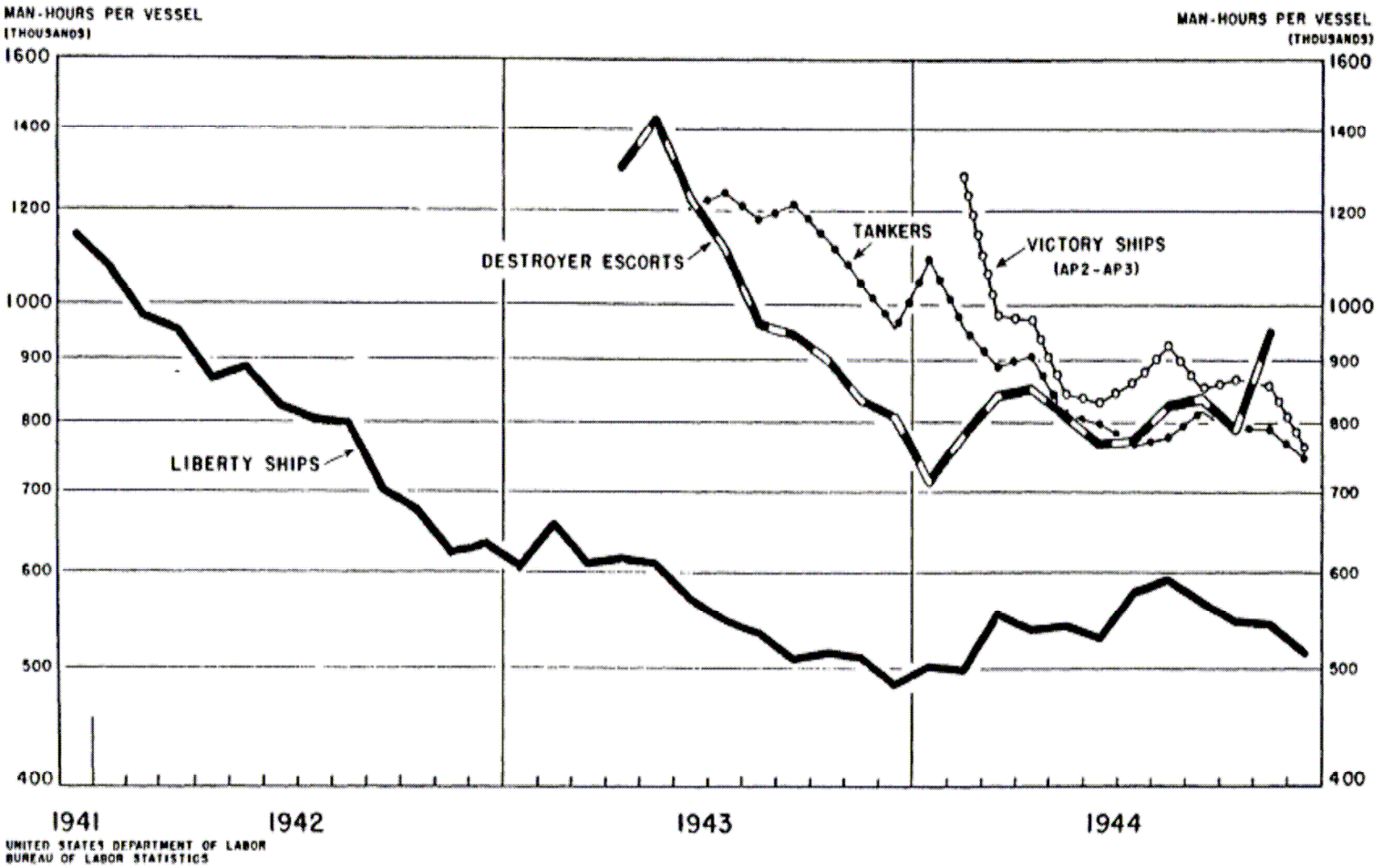



FIGURE 2.—Unit man-hour requirements for selected shipbuilding programs. Vessels delivered December 1941–December 1944.

| | | |
|---|---|---|
| | | • Knack and Keefer (1997) (+,*) |
| | Groups – as defined by Putnam (1993) | • Keefer and Knack (1997) (-,_), |
| | Groups - as defined by Olson (1982) | • Keefer and Knack (1997) (+,_), |
| | Institutional Performance | • Helliwell and Putnam (2000) (+,*) (Italy) |
| | Civic Community (index of Participation newspaper readership, political behavior) | • Helliwell and Putnam (2000) (+,*) (Italy) |
| | Trust | • Granato, et al. (1996) (+, *)<br>• Helliwell (1996) (,_)(Asia)<br>• Knack and Keefer (1997) (+,*),<br>• La Porta et al (1997) (+, *)<br>• Beugelsdijk and van Schalk (2001) (,_)<br>• Zak and Knack (2001) (+,*) |
| | Social Development Index | • Temple and Johnson (1998) |
| | Extent of Mass Communication | • Temple and Johnson (1998) |
| | Kinship | • Temple and Johnson (1998) |
| | Mobility | • Temple and Johnson (1998) |
| | Middle Class | • Temple and Johnson (1998) |
| | Outlook | • Temple and Johnson (1998) |
| | Social capital (WVS) | • Rupasingha, Goetz and Freshwater (2000) (+,*) |
| | Social capital (WVS) | • Whiteley (2000) (+,*) |
| | Social Achievement Norm | • Granato, et al. (1996b) (+,*)<br>• Swank (1996) (-,*) |
| | Capability | • Temple and Johnson (1998) (+,*) |
| Trade Policy | Import Penetration | • Levine and Renelt (1992) (?,not |



| | | |
|---|---|---|
| | | robust) |
| | Leamer's Intervention Index | • Levine and Renelt (1992) (-,not robust) |
| | Years-Open 1950-1990 | • Sachs and Warner (1996) (+,*)<br>• Sala-i-Martin (1997a,b) (+,*) |
| | Openness Indices (growth) | • Harrison (1996) (+,*) |
| Indices | Openness Indices (level) | • Levine and Renelt (1992) (?,not robust)<br>• Sachs and Warner (1995) (+,*)<br>• Harrison (1996) (+,*)<br>• Wacziarg and Welch (2003) (+,*) |
| | Outward Orientation | • Levine and Renelt (1992) (?,not robust)<br>• Sala-i-Martin (1997a,b) (?,_) |
| | Tariff | • Barro and Lee (1994) (-,_)<br>• Sala-i-Martin (1997a,b) (?,_) |
| | Fraction of Export/Import/Total-Trade in GDP | • Levine and Renelt (1992) (+,not robust)<br>• Easterly and Levine (1997a) (?,_)<br>• Frankel and Romer (1999) (+,*)<br>• Dollar and Kraay (2003) (+,_)<br>• Alcala and Ciccone (2004) (+,*)<br>• Rodrik et al. (2004) (+,_) |
| Trade Statistics | Fraction of Primary Products in Total Exports | • Sachs and Warner (1996) (-,*)<br>• Sala-i-Martin (1997) (-,*) |
| | Growth in Export-GDP Ratio | • Feder (1982) (+,*)<br>• Kormendi and Meguire (1985) (+,*)<br>• 20+ studies others |
| | FDI inflows relative to GDP | • Blomstrom, et al. (1996) |
| | Machinery and Equipment Import | • Romer (1993) (+,*) |
| Volatility of Shocks | Growth Innovations | • Kormendi and Meguire (1985) (-,*)<br>• Ramey and Ramey (1995) (-,*) |

| | | |
|---|---|---|
| | | • Levine and Renelt (1992) (-,not robust)<br>• Mankiw, et al. (1992) (-,*)<br>• Barro and Lee (1994) (+,_)<br>• Kelley and Schmidt (1995) (-,*)<br>• Bloom and Sachs (1998) (-,*) |
| Price Distortions | Consumption Price | • Easterly (1993) (+,_)<br>• Harrison (1996) (-,*) |
| | Investment Price | • Barro (1991) (-,*)<br>• Easterly (1993) (-,*) |
| Price Levels | Consumption Price | • Easterly (1993) (+,_) |
| | Investment Price | • Easterly (1993) (-,*)<br>• Sachs and Warner (1995) (-,*) |
| Real Exchange Rate | Black Market Premium | • Levine and Renelt (1992) (-,not robust)<br>• Barro and Lee (1994) (-,*)<br>• Barro (1996) (-,*)<br>• Harrison (1996) (-,*)<br>• Easterly and Levine (1997a) (-,*)<br>• Sala-i-Martin (1997a,b) (-,*) |
| | Distortions | • Dollar (1992) (-,*)<br>• Easterly (1993) (-,_)<br>• Harrison (1996) (-,_)<br>• Sala-i-Martin (1997a,b) (-,*)<br>• Acemoglu, et al. (2002) (-,_) |
| | Variability | • Dollar (1992) (-,*) |
| Regional Effects | Absolute Latitude | • Barro (1996) (+,*) |
| | East Asia Dummy | • Barro and Lee (1994) (+,_)<br>• Barro (1997) (+,_) |
| | Former Spanish Colonies Dummy | • Barro (1996) (-,*) |
| | Latin America Dummy | • Barro (1991) (-,*)<br>• Barro and Lee (1994) (-,*)<br>• Barro (1997) (-,_)<br>• Easterly and Levine (1997a) (-,*)<br>• Sala-i-Martin (1997a,b) (-,*) |



| | | |
|---|---|---|
| | Sub-Saharan Africa Dummy | • Barro (1991) (-,*)<br>• Barro and Lee (1994) (-,*)<br>• Barro (1997) (-,_)<br>• Easterly and Levine (1997a) (-,*)<br>• Sala-i-Martin (1997a,b) (-,*) |
| Religion | Buddhist | • Barro (1996) (+,*) |
| | Catholic | • Sala-i-Martin (1997a,b) (-,*)<br>• Masters and Sachs (2001) (+,*) |
| | Confucian | • Barro (1996) (+,*) |
| | Muslim | • Barro (1996) (+,*)<br>• Sala-i-Martin (1997) (+,*)<br>• Masters and Sachs (2001) (+,_) |
| | Protestant | • Barro (1996) (+,*)<br>• Sala-i-Martin (1997) (-,*)<br>• Masters and Sachs (2001) (+,*) |
| | Religious belief | • Barro and McCleary (2003) (+,*) |
| | Attendance | • Barro and McCleary (2003) (-,*) |
| Rule of Law Indices | | • Barro (1996) (+,*)<br>• Acemoglu, et al. (2001) (+,*)<br>• Easterly and Levine (2001) (-,*)<br>• Dollar and Kraay (2003) (+,_)<br>• Alcala and Ciccone (2004) (+,_/*)<br>• Rodrik et al. (2004) (+,*) |
| Scale Effects | Total Area | • Barro and Lee (1993)<br>• Sala-i-Martin (1997a,b) (?,_) |
| | Total Labor force | • Barro and Lee (1993)<br>• Sala-i-Martin (1997a,b) (?,_) |
| Social Capital and Related | Social "Infrastructure" | • Hall and Jones (1999) (+,*) |
| | Citizen Satisfaction with Government | • Helliwell and Putnam (2000) (+,*) (within Italy) |
| | Civic Participation | • Helliwell (1996) (,_) (within Asia) |

| | | |
|---|---|---|
| | Improvement in Terms of Trade | • Easterly, et al. (1993) (+,*)<br>• Fischer (1993) (+,*)<br>• Barro (1996) (+,*)<br>• Caselli, et al. (1996) (+,*)<br>• Barro (1997) (+,*)<br>• Blattman, et al. (2003) (+,*) ( |
| Money Growth | | • Kormendi and Meguire (1985) (+,_) |
| Neighboring Countries' Education Proxies, Initial Incomes, Investment Ratios and Population Growth Rates | | • Ciccone (1996) (*) |
| Political Instability Proxies | | • Barro (1991) (-,*)<br>• Barro and Lee (1994) (-,*)<br>• Sachs and Warner (1995) (-,_)<br>• Alesina, et al. (1996) (-,*)<br>• Caselli, et al. (1996) (-,*)<br>• Easterly and Levine (1997a) (-,*) |
| Political Rights and Civil Liberties Indices | Civil Liberties | • Kormendi and Meguire (1985) (+,_)<br>• Levine and Renelt (1992) (?,not robust)<br>• Barro and Lee (1994) (-,*) |
| | Overall | • Sachs and Warner (1995) (+,*) |
| | Political Rights | • Barro (1991) (?,_)<br>• Barro and Lee (1994) (+,*)<br>• Sala-i-Martin (1997a,b) (+,*) |
| Political Institutions | Constraints on Executive | • Acemoglu, et al. (2001) (+,*) |
| | Judicial Independence | • Feld and Voigt (2003) (+,*) |
| Property Rights | ICRG index | • Knack (1999) (+,*) |
| | Expropriation Risk | • Acemoglu, et al. (2001) (+,*)<br>• Macarthur and Sachs (2001) (+,*) |
| Population | Density | • Sachs and Warner (1995) (+,_) |
| | Growth | • Kormendi and Meguire (1985) (-,*) |



| | | |
|---|---|---|
| | | • Li and Zou (2002) (-,*) |
| | Variability | • Levine and Renelt (1992) (-,not robust)<br>• Fischer (1993) (-,*)<br>• Barro (1997) (+,_)<br>• Sala-i-Martin (1997a,b) (?,_) |
| Infrastructure Proxies | | • Hulten (1996) (+,*)<br>• Easterly and Levine (1997a) (+,*)<br>• Esfahani and Ramirez (2003) (+,*) |
| Initial Income | | • Kormendi and Meguire (1985) (-,*)<br>• Barro (1991) (-,*)<br>• Sachs and Warner (1995) (-,*)<br>• Harrison (1996) (?,_)<br>• Barro (1997) (-,*)<br>• Easterly and Levine (1997a) |
| Investment Ratio | | • Barro (1991) (+,*)<br>• Barro and Lee (1994) (+,*)<br>• Sachs and Warner (1995) (+,*)<br>• Barro (1996) (+,_)<br>• Caselli, et al. (1996) (+,*)<br>• Barro (1997) (+,_) |
| Investment Type | Equipment or Fixed Capital | • DeLong and Summers (1993) (+,*)<br>• Blomstrom, et al. (1996) (-,_)<br>• Sala-i-Martin (1997a,b) (+,*) |
| | Non-Equipment | • DeLong and Summers (1991) (+,*) |
| Labor | Productivity Growth | • Lichtenberg (1992) (+,*) |
| | Productivity Quality | • Hanushek and Kimko (2000) (+,*) |
| | Labor Force Part. Rate | • Blomstrom, et al. (1996) (+,*) |
| Luck | External Debt Dummy | • Easterly, et al. (1993) (-,_) |
| | External Transfers | • Easterly, et al. (1993) (mixed,_) |

| | | |
|---|---|---|
| | | robust) |
| Growth Rate | of the G-7 Countries | • Alesina, Ozler, Roubini, and Swagel (1996) (+,*) |
| | in the Previous Period | • Easterly, et al. (1993) (+,_)<br>• Alesina, et al. (1996) (+,*/_) |
| Health | Life expectancy | • Barro and Lee (1994) (+,*)<br>• Bloom and Malaney (1998) (+,*)<br>• Bloom and Sachs (1998) (+,*)<br>• Bloom and Williamson (1998) (+,*)<br>• Hamoudi and Sachs (1999) (+,*)<br>• Gallup et al. (2000) (+,*) |
| | Change in Malaria Infection Rate | • Gallup, Mellinger and Sachs (2000). |
| | Adult Survival Rate | • Bhargava et al. (2001) |
| Industrial Structure | % Small and Medium Enterprises | • Beck, et al. (2003) (+,_) |
| | Ease of entry and exit | • Beck, et al. (2003) (+,*) |
| Inequality | Democratic Countries | • Persson and Tabellini (1994) (-,*) |
| | Non-Democratic Countries | • Persson and Tabellini (1994) (+,_) |
| | Overall | • Alesina and Rodrik (1994) (-,*)<br>• Forbes (2000) (+,*)<br>• Knowles (2001) (-,*) |
| Inflation | Growth | • Kormendi and Meguire (1985) (-,*) |
| | Level | • Levine and Renelt (1992) (-,not robust)<br>• Levine and Zervos (1993) (?,not robust)<br>• Barro (1997) (-,+) (in the range above 15%)<br>• Bruno and Easterly (1998) (-,*)<br>• Motley (1998) (-,*) |



| | | |
|---|---|---|
| | Land locked | • Easterly and Levine (2001) (-,* |
| | Coastline (length) | • Bloom and Sachs (1998) (+,*)<br>• Masters and Sachs (2001) (+,*)<br>• Bloom, et al. (2003) (+,*) |
| | Arable land | • Masters and Sachs (2001) (+,*) |
| | Rainfall | • Masters and Sachs (2001) (+,*)<br>• Bloom, et al. (2003) (+,*) |
| | Variance of Rainfall | • Bloom, et al. (2003) (-,*) |
| | Maximum Temperature | • Bloom, et al. (2003) (-,*) |
| Government | Consumption (growth) | • Kormendi and Meguire (1985) (+,_) |
| | Consumption (level) | • Barro (1991) (-,*)<br>• Sachs and Warner (1995) (-,*)<br>• Barro (1996) (-,*)<br>• Caselli, et al. (1996) (+,*)<br>• Barro (1997) (-,*)<br>• Acemoglu, et al. (2002) (-,_) |
| | Deficits | • Levine and Renelt (1992) (-,not robust)<br>• Fischer (1993) (-,*)<br>• Nelson and Singh (1994) (+,_)<br>• Easterly and Levine (1997a) (-,*)<br>• Bloom and Sachs (1998) (+,*) |
| | Investment | • Barro (1991) (+,_)<br>• Sala-i-Martin (1997a,b) (?,_)<br>• Kelly (1997) (+,*) |
| | Various Expenditures | • Levine and Renelt (1992) (-,not robust) |
| | Military Expenditures | • Aizenman and Glick (2003) (-,*)<br>• Guaresma and Reitschuler (2003) (-,*) |
| | Military Expenditures under threat | • Aizenman and Glick (2003) (+,*) |
| | Various Taxes | • Levine and Renelt (1992) (?,not |

| | | | |
|---|---|---|---|
| | | | • Demetriades and Law (2004) (+,*) |
| | Competition*development | | • Claessens and Laeven (2003) (+,*) |
| | Repression | | • Roubini and Sala-i-Martin (1992) (-,*)<br>• Easterly (1993) (-,*) |
| | Sophistication | | • King and Levine (1993) (+,*)<br>• Levine and Zervos (1993) (+,robust)<br>• Easterly and Levine (1997a) (+,*)<br>• Sala-i-Martin (1997a,b) (?,_) |
| | Credit | Growth rate | • Levine and Renelt (1992) (+,not robust)<br>• De Gregorio and Guidotti (1995) (+,*) |
| | | Volatility | • Levine and Renelt (1992) (+,not robust) |
| Foreign Direct Investment | | | • Blonigen and Wang (2004) (+,_) |
| Fraction of mining in GDP | | | • Hall and Jones (1999) (+,*) |
| Geography | Absolute Latitude | | • Sala-i-Martin (1997a,b) (+,*)<br>• Bloom and Sachs (1998) (+,*)<br>• Masters and McMillan (2001) (+,_)<br>• Easterly and Levine (2001) (+,*)<br>• Rodrik et al. (2004) (+,*) |
| | Disease Ecology | | • McCarthy, et al. (2000) (+,*)<br>• McArthur and Sachs (2001) (+,*)<br>• Easterly and Levine (2002) (-,*)<br>• Sachs (2003) (-,*) |
| | Frost days | | • Masters and McMillan (2001)(+,*)<br>• Masters and Sachs (2001) (+,*) |



| | | | |
|---|---|---|---|
| | Overall (level) | | • Azariadis and Drazen (1990) (+,*)<br>• Barro (1991) (+,*)<br>• Knowles and Owen (1995) (+,_)<br>• Easterly and Levine (1997a) (+,*)<br>• Krueger and Lindahl (2000) (+,*)<br>• Bils and Klenow (2000) (+,*) |
| | Primary Level | | • Sachs and Warner (1995) (+,_)<br>• Barro (1997) (-,_) |
| | Secondary Level | | • Sachs and Warner (1995) (+,_) |
| | Initial Income * Male Schooling | | • Barro (1997) (-,*) |
| | Proportion of Engineering Students | | • Murphy, et al. (1991) (+,*) |
| | Proportion of Law Students | | • Murphy, et al. (1991) (-,*) |
| Ethnicity and Language | Ethno-Linguistic Fractionalization | | • Easterly and Levine (1997a) (-,*)<br>• Sala-i-Martin (1997a,b) (?,_)<br>• Alesina, et al. (2003) (-,*) |
| | Language Diversity | | • Masters and McMillan (2001) (-,*/_) |
| Fertility | | | • Barro (1991) (1996) (1997) (-,*)<br>• Barro and Lee (1994) (-,*) |
| Finance | Stock Markets | | • Levine and Zervos (1998) (+,*)<br>• Beckaert, et al. (2001) (+,*)<br>• Beck and Levine (2004) (+,*) |
| | Banks | | • Beck and Levine (2004) (+,*) |
| | Dollarization | | • Edwards and Magendzo (2003) (+,_) |
| | Depth | | • Berthelemy and Varoudakis (1995) (+,*)<br>• Odedokun (1996) (+,*)<br>• Ram (1999) (+,_)<br>• Rousseau and Sylla (2001) (+,*)<br>• Deidda and Fattouh (2002) (+,_) |

**Appendix 2: Variables in Cross-Country Growth Regressions**

+/- = sign of coefficient in the corresponding growth regression
? = sign not reported
* = claimed to be significant
_ = claimed to be insignificant

| R.H.S. Variables | | Studies |
|---|---|---|
| Capitalism | | • Hall and Jones (1999) (+,*) |
| Capital account liberalization | | • Eichengreen and Leblang (2003) (+,*) |
| Corruption | | • Mauro (1995) (-,*)<br>• Welsch (2003) (-,*) |
| Democracy | Minimum levels | • Barro (1996) (1997) (+,*) |
| | ...Higher levels | • Barro (1996) (1997) (-,*) |
| | Overall | • Alesina et al. (1996) (?,_)<br>• Minier (1998) (+,*) |
| | 'Voice' | • Dollar and Kraay (2003) (-,*) |
| Demographic Characteristics | Share of Population 15 or below | • Barro and Lee (1994) (-,*) |
| | Share of Population 65 or over | • Barro and Lee (1994) (?,_) |
| | Growth of 15-65 population share | • Bloom and Sachs (1998) (+,*) |
| Education | College Level | • Barro and Lee (1994) (-,_) |
| | Female (level) | • Barro and Lee (1994) (-,*)<br>• Barro (1996) (1997) (-,*)<br>• Caselli, et al. (1996) (+,*)<br>• Forbes (2000) (-,*) |
| | Female (growth) | • Barro and Lee (1994) (-,*) |
| | Male (level) | • Barro and Lee (1994) (+,*)<br>• Barro (1996) (+,*)<br>• Caselli, et al. (1996) (-,*)<br>• Forbes (2000) (+,*) |
| | Male (growth) | • Barro and Lee (1994) (+,*) |

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# Economie du développement

*Chapitre 3. Le sous-développement résultat d'une trappe de pauvreté*

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# Contents

# 1 La notion de trappe de pauvreté

## 1.1 Définition

- La trappe de pauvreté signifie que la pauvreté s'auto-entretient empêchant le processus de développement de s'engager.
  - L'économie des trappes de pauvreté : mécanismes, politiques, pertinence empirique
  - L'enjeu: Costas Azariadis; Allan Drazen (1990 QJE)

> One explanation, of course, is that persistent differences in national economic performance are due entirely to systematic variations across countries in culture, religion, national economic policies, or broadly defined social institutions, that is, to economically "exogenous" factors. This paper explores the alternative possibility that sustainable differences in per capita growth rates could appear even among economies with *identical* structures.

## 1.2 Relations avec la théorie économique

### 1.2.1 Relations avec les théories des la croissance

1. Continuité : un modèle commun à l'ensemble des pays
2. Rupture : équilibres multiples

### 1.2.2 La notion d'équilibres multiples

1. Microéconomie $\longrightarrow$ théorie des jeux ("jeux du rendez–vous")
2. Macroéconomie $\longrightarrow$ nouvelle économie keynésienne[1]
   - équilibres multiples ordonnés au sens de Pareto $\Leftarrow$ complémentarités stratégiques + effets de report
3. Interprétation des équilibres multiples
   - Positive : pluralité des issues
   - Normative : intervention publique

[1] Diamond (1982, JPE) "Aggregate Demand Management in Search Equilibrium" , Cooper et John (1988, QJE) "Coordinating Coordination Failures in Keynesian Models"

## 1.3 Une notion fondatrice de l'économie du développement

- La notion de trappe de pauvreté est fondatrice de l'économie du développement

### 1.3.1 Expliquer l'absence de convergence

- Objectif : expliquer le maintien de fortes disparités
- Point de départ : double insatisfaction du principe de convergence (absolue et conditionnelle)
- Explication alternative dans le cadre d'équilibres multiples: défaut de coordination, rôle de l'histoire et des anticipations, nécessité de politique économique

### 1.3.2 Trappe de pauvreté, big push et décolage ("take-off")

- Paul Rosenstein–Rodan (1943 EJ): "Problems of Industrialisation of Eastern and South-Eastern Europe"
  - La complémentarité stratégique dans la création d'industrie / entreprise (et l'exemple de l'industrie de la chaussure) : coordonner la structure de la production à la structure de la demande
- Politique économique: Rosenstein–Rodan (1943) Big Push & Balanced growth vs. Albert O. Hirschmann (1958) " The Strategy of Economic Development" Unbalanced growth (industry linkages)
- Concepts liés
  - Take-off concept $\longrightarrow$ Walt Rostow (1960) "Stages of Economic Growth"
  - Cercle vicieux de la pauvreté $\longrightarrow$ Ragnar Nurkse (1953) "Problems of Capital-Formation in Underdeveloped Countries"

## 1.4 Une notion au coeur des politiques actuelles de développement[2]

2005 was the Year of the Big Push.

Escaping the trap requires: "A big push of basic investments between now and 2015 in public administration, human capital (nutrition, health, education), and key infrastructure (roads, electricity, ports, water, and sanitation, accessible land for affordable housing, environmental management).". UN Millennium Project, Overview Report, 2005.

Jeffrey Sachs[3] 2005 book The End of Poverty said: "A combination of investments well attuned to local needs and conditions can enable African economies to break out of the poverty trap.

[2]Citations tirées de William Easterly "Reliving the 1950s: the big push, poverty traps, and takeoffs in economic development", J Econ Growth (2006) 11:289-318. Professor of Economics at New York University. Former Research Economist at the World Bank (sixteen years). "The Elusive Quest for Growth: Economists' Adventures and Misadventures in the Tropics" (MIT, 2001). Notes et soulignement ajoutés.

[3]Director of The Earth Institute, Professor at Columbia University. From 2002 to 2006, he was also Director of the UN Millennium Project and Special Advisor to UN Secretary-General Kofi Annan.

These interventions need to be applied systematically, diligently, and jointly since they strongly reinforce one another." (p. 208)

The United Nations Development Program, in its flagship Human Development Report 2005 overseen by an advisory panel that includes prominent economists, similarly postulated that Aid provides governments with a resource for making the multiple investments in health, education and economic infrastructure needed to break cycles of deprivation.

British Prime Minister Tony Blair likewise called at the World Economic Forum in Davos in January 2005 for a big, big push forward in Africa. The report, summarized its findings as:"The actions proposed by the Commission constitute a coherent package for Africa. The problems they address are interlocking. They are vicious circles which reinforce one another. They must be tackled together. To do that Africa requires a comprehensive big push on many fronts at once. (...) An essential part of this big push will be a major increase in investment." Nicholas Stern[4]

[4]He was the Chief Economist and Senior Vice-President of the World Bank from 2000 to 2003, and is now a civil servant and government economic advisor in the United Kingdom. "The economics of climate change".

The UNCTAD[5] issued its September 2006 Economic Report on Africa, entitled Doubling aid: making the Big Push work. The United Nations Economic and Social Council, headed by well-respected Colombian development economist José Antonio Ocampo[6], wrapped up its latest meeting in July 2006 with a call for large-scale aid, which is crucial for breaking the poverty trap of least developed countries.

[5] Conférence des Nations Unies sur le Commerce et le Développement (CNUCED). Conférence des États membres qui se réunit tous les quatre ans. La Conférence est un organe subsidiaire de l´Assemblée générale des Nations Unies.

[6] Head of the UN Department of Economic and Social Affairs Formely: Professor of Economics, Minister of Finance in the Government of Colombia, Executive Secretary of the UN Economic Commission for Latin America and the Caribbean.

It is remarkable how little language has changed over 50 years. The first World Bank mission ever, to Colombia in 1951, concluded: "Only through a generalized attack through the whole economy on education, health, housing, food, and productivity can the vicious circle of poverty.. ill health and low productivity be decisively broken. But once the break is made, the process of economic development can become self-generating with the knowledge of the underlying facts and economic processes, good planning in setting objectives and allocating resources, and determination in carrying out a program for improvements and reforms, a great deal can be done to improve the economic environment..."

# 2 Fondements théoriques

- Plusieurs mécanismes à l'origine des équilibres multiples
  1. Un modèle illustratif (issu de Barro Sala–i–Martin 2003)
  2. Un introduction aux modèles complets

## 2.1 Rendements croissants dans la production avec épargne exogène

- Référence: Barro Sala–i–Martin (2003) chapter 1.

- Hypothèses

$$\left\{ \begin{array}{l} Y_A = AK^{\alpha}L^{1-\alpha} \\ Y_B = BK^{\alpha}L^{1-\alpha}, \quad B > A \end{array} \right. \Rightarrow \left\{ \begin{array}{l} y_A = Ak^{\alpha} \\ y_B = Bk^{\alpha} - b, \quad b > 0 \end{array} \right.$$

- Changement de technique pour

$$y_B > y_A \Rightarrow \widetilde{k} > \left[ b/\left( B - A \right) \right]^{1/\alpha}$$

- Dynamique

$$\frac{\dot{k}_t}{k_t} = sf\left( k \right)/k - \left( \delta + n \right) = \left\{ \begin{array}{ll} sf_A\left( k \right)/k - \left( \delta + n \right), & k < \widetilde{k} \\ sf_B\left( k \right)/k - \left( \delta + n \right), & k > \widetilde{k} \end{array} \right.$$

soit

$$\frac{\dot{k}_t}{k_t} = \left\{ \begin{array}{ll} sAk^{\alpha-1} - \left( \delta + n \right), & k < \widetilde{k} \\ s\left( Bk^{\alpha-1} - b/k \right) - \left( \delta + n \right), & k > \widetilde{k} \end{array} \right.$$

- Relation entre $k$ et $sf(k)/k$

$$\frac{\partial}{\partial k}\left(sAk^{\alpha-1}\right) = (\alpha-1)\,sAk^{\alpha-2} < 0 \quad \forall k$$

et

$$\frac{\partial}{\partial k}\left(sBk^{\alpha-1} - b/k\right) = (\alpha-1)\,sBk^{\alpha-2} + b/k^2$$

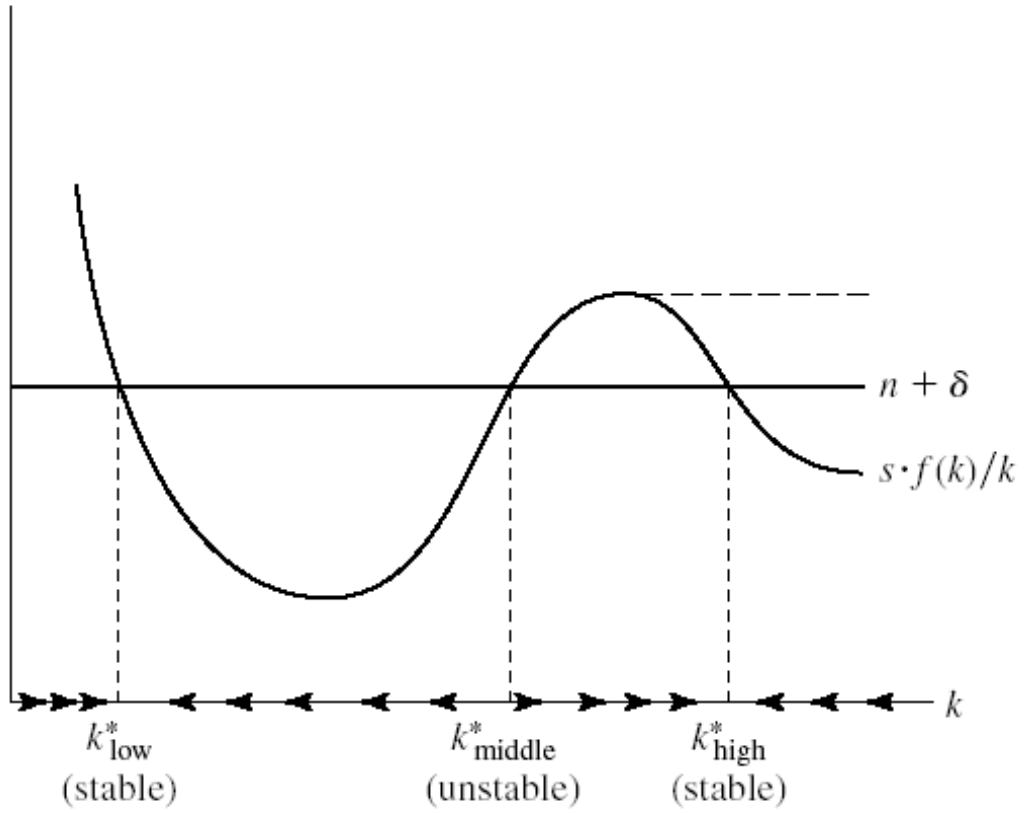
$$\Rightarrow \frac{\partial}{\partial k}\left(sBk^{\alpha-1} - b/k\right)\begin{cases} < 0, & k > \widetilde{\widetilde{k}} = \left(b/\left[(1-\alpha)\,sB\right]\right)^{1/\alpha} \\ > 0, & k < \widetilde{\widetilde{k}} \end{cases}$$

- Deux points de flexions ($\widetilde{k}$ et $\widetilde{\widetilde{k}}$) et trois équilibres dont deux stables

$$k^*_{low} \quad / \quad sA\left(k^*_{low}\right)^{\alpha-1} - (\delta+n) = 0 \rightarrow k^*_{low} = \left(\frac{sA}{\delta+n}\right)^{1/(1-\alpha)}$$

$$\left\{k^*_{middle}, k^*_{high}\right\} \quad / \quad s\left(B\left(k^*_{high}\right)^{\alpha-1} - b/k\right) - (\delta+n) = 0$$

- Figure 1.19 (legende)



- Propriétés des trappes de pauvreté
  1. L'histoire compte
     - Les conditions initiales déterminent la performance à long terme
     - La croissance est positivement corrélée à la richesse initiale
  2. Des effets permanents de politique transitoire
     - Big push = augmentation "exogène" du stock de capital

## 2.2 L'externalité de demande agrégée

- Kevin Murphy, Andrei Shleifer, Robert Vishny "Industrialization and the Big Push" (1989 JPE)
- Rosenstein–Rodan's idea : "the small size of the domestic market"
- Modelisation : équilibres multiples, externalités pécuniaires (via les prix) $\leftarrow$ concurrence imparfaite $+$ coûts fixes $+$ rôle de demande
- Un continuum de biens de consommation finale

$$\int_0^1 \log(x_i)\, di$$

pour chaque bien $i$ il existe une technologie accessible à tous $x_i = \ell_i$ et une accessible à une seule entreprises : $x_i = \alpha \ell_i$ avec $\alpha > 1$ (innovation au coût $F$)

- Avec $y$ la demande agrégée le profit est

$$\pi = \frac{\alpha - 1}{\alpha} y - F = ay - F$$

- L'équilibre sur le marché des biens introduit une relation entre $y$ et $n$ :

$$y(n) \Rightarrow \pi = \pi(n) \text{ avec } \pi'(n) > 0$$

- L'incitation à innover dépend du nombre d'innovateurs par la demande adressée à chacun (conséquences sur le développement et le cycle économique)

- Propriétés des trappes de pauvreté (par rapport au modèle précédent)
  - L'histoire compte, mais aussi les anticipations ($\Leftarrow$ comportements microéconomiques)
  - Politique économique de soutien de la demande

## 2.3 Autres mécanismes

### 2.3.1 Capital humain

- Costas Azariadis; Allan Drazen "Threshold Externalities in Economic Development" (1990, QJE), Externalité dans l'accumulation du capital humain

$$x_{i,t+1} = x_t h\left(\tau_t^i, x_t\right), \quad x_t = \int_0^1 x_{i,t} di$$

solution

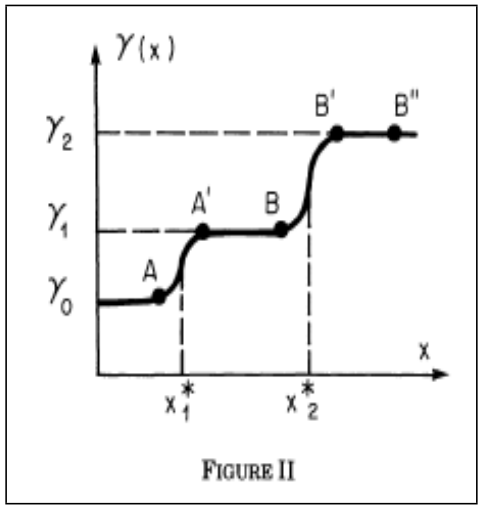


FIGURE II

### 2.3.2 Marchés financiers

- Financement du capital : consommation de subsistance ou capital humain (Galor Zeira 1993 Review of Economic Studies)

# 3 Analyse empirique

## 3.1 La bimodalité ("twin-peaks")

- La distribution des niveaux de richesse est-elle unimodale ou bimodale ?
- Les résultats de Danny Quah dans les années 1990 = la bimodalité est un phénomène nouveau
- La bimodalité = une preuve de l'existence de trappe de sous-développement

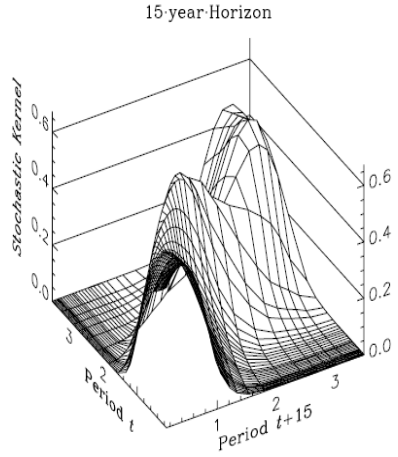



**Fig. 11a: Relative Income Dynamics across 105 Countries, 1961–1988**
For clarity, this stochastic kernel is one taken over a fifteen-year transition horizon. The kernel can be viewed as a continuum version of a transition probability matrix. Thus, high values along the diagonal indicate a tendency to remain. A line projected from a fixed value on the *Period* $t$ axis traces out a probability density over the kernel, describing relative likelihoods of transiting to particular income values in *Period* $t + 15$. The emerging twin-peaks feature is evident here, now without the aliasing possibilities in discrete transition probability matrices.

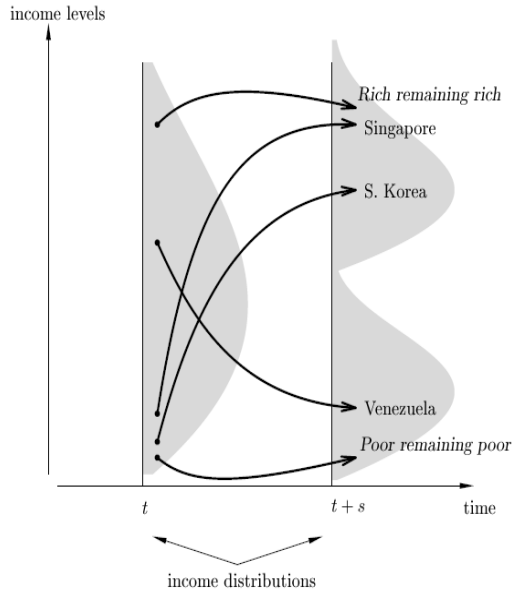
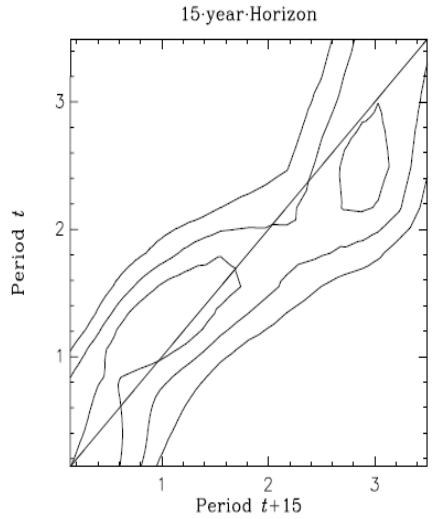



**Fig. 1: Evolving cross-country income distributions** Post-1960 experiences projected over 40 years for named countries are drawn to scale, relative to actual historical cross-country distributions.




Contour plot at levels 0.2, 0.35, 0.5

**Fig. 11b: Relative Income Dynamics across 105 Countries, 1961–1988. Contour Plot** This figure is just the view from above of Fig. 11a, where contours have been drawn at the indicated levels and then projected onto the base of the graph.

## 3.2 Les non-linéarités

Aart Kraay, Claudio Raddatz "Poverty traps, aid, and growth" Journal of Development Economics 82 (2007) 315–347.

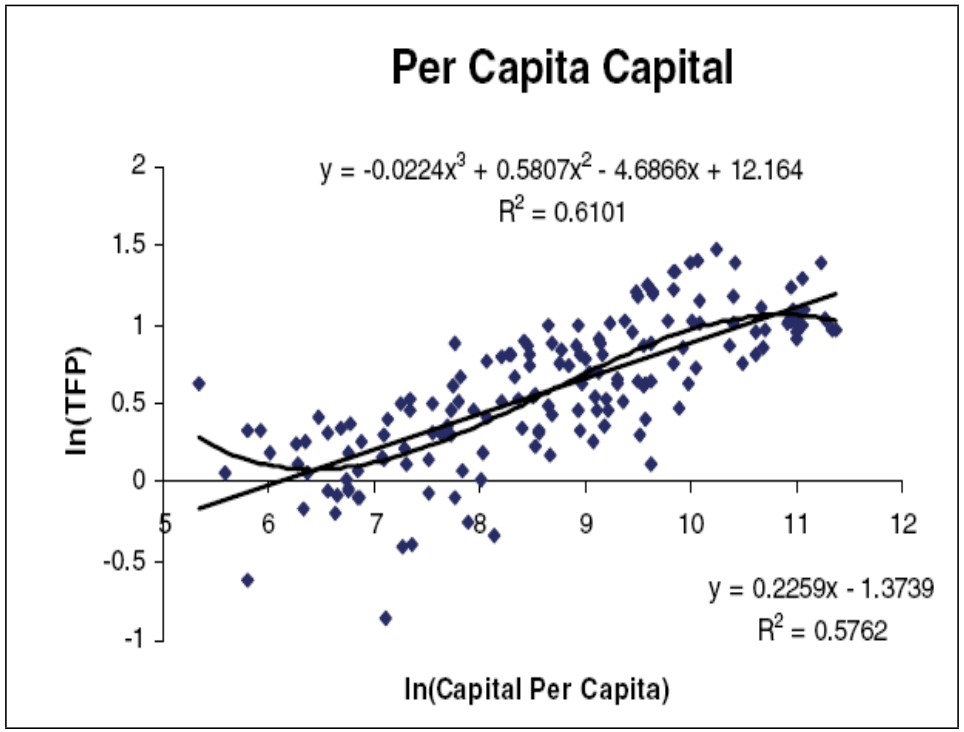
### 3.2.1 Dans le secteur de la production

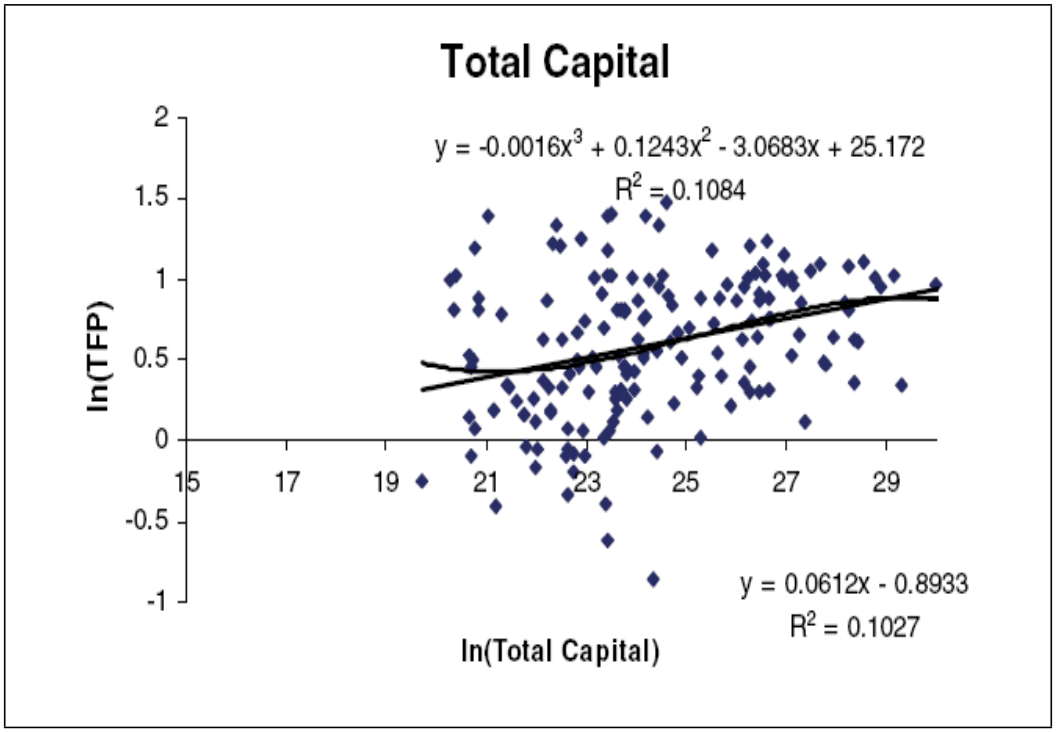


Table 4
Estimates of increasing returns in literature

| Source | Sample of countries | Estimated degree of returns to scale |
|---|---|---|
| Harrigan (1999) | OECD | ≤1 |
| Paul et al. (1999) | US | 1.3 |
| Tybout (2000) | Asia, LAC, MENA | 1.05–1.1 |
| Tybout and Westbrook (1995) | Mexico | 1 |
| Van Biesebroeck (2005) | SSA | 1–1.14 |
| Levinsohn and Petrin (1999) | Chile | 1.2–1.44 |
| Hallward-Driemeier et al. (2002) | East Asia | 1.01–1.18 |
| Antweiler and Trefler (2000) | 71 countries | 1–1.2 |

LAC stands for Latin America and the Caribbean, MENA for Middle East and North Africa, SSA for Sub-Saharan Africa, US for the United States of America, and OECD for the countries that belong to the Organization for Economic Cooperation and Development.


Per Capita Capital
y = -0.0224x3 + 0.5807x2 - 4.6866x + 12.164
R2 = 0.6101
y = 0.2259x - 1.3739
R2 = 0.5762
ln(TFP)
ln(Capital Per Capita)
2
1.5
1
0.5
0
-0.5
-1
5
6
7
8
9
10
11
12


Total Capital
y = -0.0016x3 + 0.1243x2 - 3.0683x + 25.172
R2 = 0.1084
y = 0.0612x - 0.8933
R2 = 0.1027
ln(TFP)
ln(Total Capital)
2
1.5
1
0.5
0
-0.5
-1
15
17
19
21
23
25
27
29

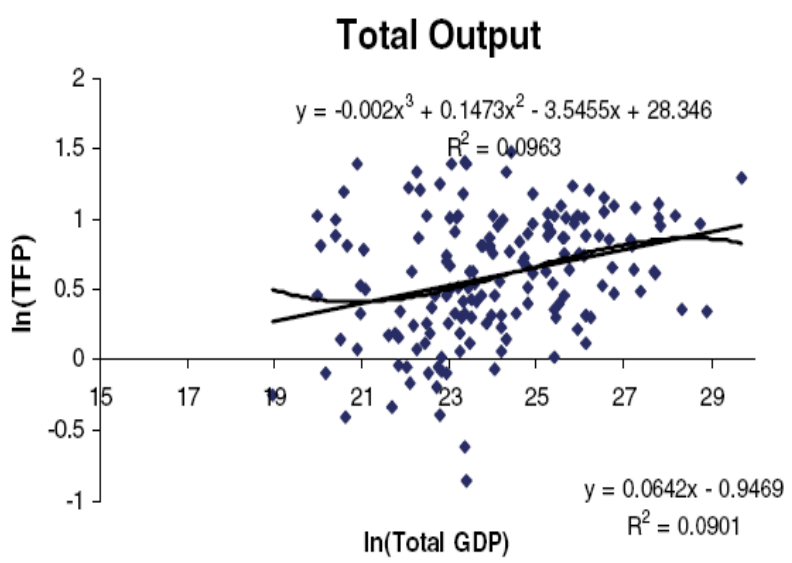



Fig. 9. Cross-country relation between TFP and capital.

### 3.2.2 Dans le comportement d'épargne

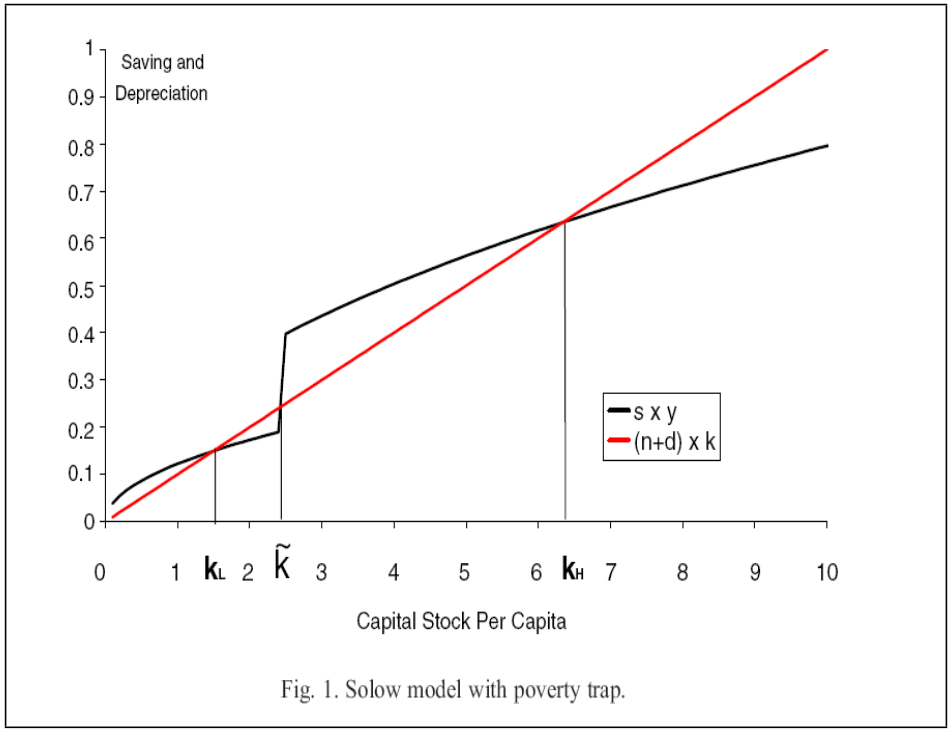
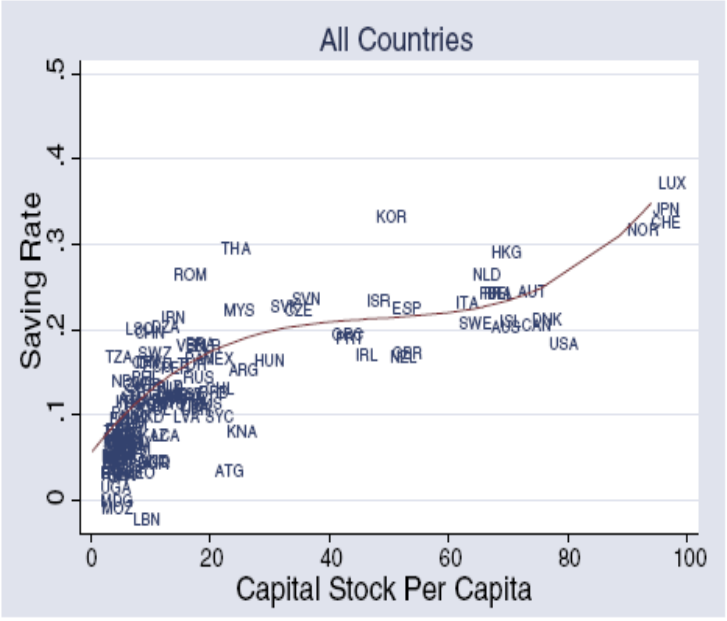



Fig. 1. Solow model with poverty trap.

# Empirical Evidence



## 3.3 Les épisodes de décollage

- Les modèles stochastiques de trappe

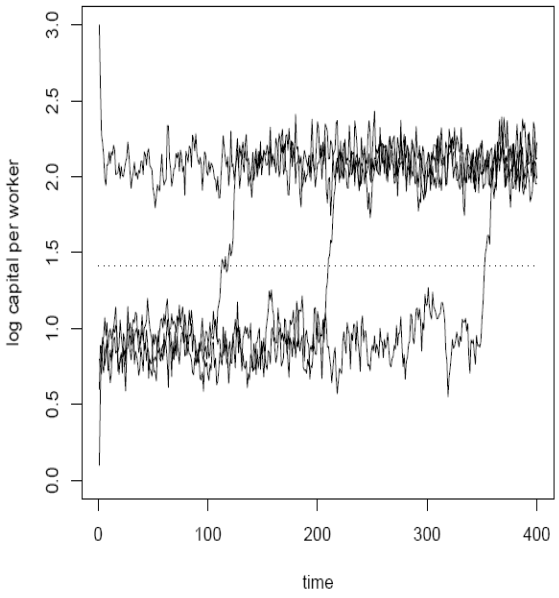



Fig. 10. Time series of 4 countries, high variance

- Histoire économique : peu de take-offs, plutôt une croissance graduelle

**Table 5** Take-offs in rich countries (per capita growth from 2003, Maddison)

| | 1600–1700(%) | 1700–1820(%) | 1820–1870(%) | 1870–1913(%) | 1913–1960(%) | 1960–2001(%) | 1820–2001(%) |
|---|---|---|---|---|---|---|---|
| Australia | | | 3.7 | 0.9 | 1.1 | 1.8 | 2.1 |
| Austria | 0.2 | 0.2 | 0.8 | 1.4 | 1.3 | 2.8 | 1.6 |
| Belgium | 0.2 | 0.1 | 1.4 | 1.0 | 1.1 | 2.7 | 1.5 |
| Canada | | 0.6 | 1.3 | 2.2 | 1.4 | 2.3 | 1.6 |
| Denmark | 0.2 | 0.2 | 0.9 | 1.6 | 1.7 | 2.4 | 1.8 |
| Finland | 0.2 | 0.2 | 0.8 | 1.4 | 2.3 | 2.9 | 1.6 |
| France | 0.1 | 0.2 | 1.0 | 1.4 | 1.6 | 2.5 | 1.6 |
| Germany | 0.1 | 0.1 | 1.1 | 1.6 | 1.6 | 2.2 | 1.6 |
| Greece | 0.1 | 0.2 | 0.6 | 1.4 | 1.4 | 3.4 | 1.8 |
| Ireland | 0.2 | 0.2 | 1.4 | 1.0 | 1.0 | 4.1 | 1.6 |
| Italy | 0.0 | 0.0 | 0.6 | 1.2 | 1.8 | 2.9 | 1.9 |
| Japan | 0.1 | 0.1 | 0.2 | **1.5** | **2.2** | **4.0** | 1.4 |
| Netherlands | 0.4 | −0.1 | 0.8 | 0.9 | 1.5 | 2.4 | 1.7 |
| New Zealand | | | 1.2 | 1.4 | 1.2 | | |
| Norway | 0.2 | 0.2 | 0.5 | 1.3 | 2.3 | 3.0 | 1.5 |
| Portugal | 0.1 | 0.1 | 0.1 | 0.6 | 1.8 | 3.8 | 1.5 |
| Spain | 0.0 | 0.1 | 0.4 | 1.2 | 0.9 | 4.0 | 1.6 |
| Sweden | 0.2 | 0.2 | 0.7 | 1.4 | 2.2 | 2.1 | 1.7 |
| United Kingdom | 0.2 | 0.3 | 1.3 | 1.0 | 1.2 | 2.1 | 1.4 |
| United States | 0.7 | 1.3 | 1.8 | 1.5 | 2.3 | 1.7 | |
| *Median growth of rich countries* | *0.2* | *0.2* | *0.8* | *1.3* | *1.6* | *2.7* | *1.6* |

**Table 6** Looking for take-offs in developing country regions (per capita growth rates from 2003, Maddison)

| Region | 1820–1870(%) | 1870–1913(%) | 1913–1950(%) | 1950–1975(%) | 1975–2001(%) |
|---|---|---|---|---|---|
| Africa | 0.3 | 0.6 | 0.9 | 1.8 | 0.2 |
| Caribbean countries (24) | −0.3 | 1.8 | 1.4 | 3.2 | 1.0 |
| East Asian countries (16 ) | −0.1 | 0.5 | −0.1 | **3.5** | **3.4** |
| East European Countries (7) | 0.6 | 1.4 | 0.6 | 3.7 | 0.4 |
| Latin America | 0.0 | 1.8 | 1.4 | 2.5 | 0.8 |
| West Asian countries (15) | 0.4 | 0.9 | 1.3 | 4.4 | 0.2 |

# 4 Conclusion

- Notion forte et populaire
- Principales difficultés
  1. Identifier un mécansime, prouver sa pertinence empirique et dégager une politique associée.
  2. Distinguer la situation de trappe d'autres explications comme les clubs de convergence (conditionnelle)
- Principale critique "The recent stagnation of the poorest countries appears to have more to do with bad government than with a poverty trap, contrary to the well-governed poverty trap hypothesis... it does contradicts the specific hypothesis that reasonably well governed countries are stuck in a trap just because they are poor.". Easterly (2006)

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# Economie du développement

*Chapitre 4. Inégalités et développment*

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**Fabien Tripier**
**Professeur Université de Nantes**

# Contents

# 1 Introduction

- Inégalités = échelle individelle ( $\neq$ croissance)
- Problématique
  1. L'égalité comme objectif économique *en soi* (incitation, héritage)
  2. L'égalité et ses conséquences économiques (sur la croissance principalement)

- Précautions
  1. un concept à la rencontre de la philosophie et de l'économie
  2. les multiples formes des inégalités
- Restriction : égalité dans la distribution des ressources entre les individus
  1. Ressources = flux (revenu) ou stock (richesse) ? Mobilité
  2. Egalité dans la distribution des moyens d'accès aux ressources (= des facteurs de production) ? Activité macroéconomique

# 2 Mesurer les inégalités

- Une ressource des individus
  - $n = 2$ : $\{0.50, 0.50\} \succ \{0.40, 0.60\} \succ \{0.70, 0.30\}$ ...
  - $n = 3$ : $\{0.33, 0.33, 0.33\} \succ \{0.20, 0.30, 0.50\} \prec ? \succ \{0.22, 0.22, 0.56\}$ ...
- Réponse : indicateurs d'inégalité *relative* permettant des comparaisons (temps, espace)
  - difficulté: pluralité des indicateurs avec des réponses pouvant différer (importante littérature)
  - point de départ: des critères de cohérence interne

## 2.1 Les quatre critères d'un indicateur

- Notations: $i = 1, ..., n$ individus, $y_i$ l'allocation d'un individu $i$, la distribution des allocations $\{y_i\}_{i=1}^{i=n} = (y_1, y_2, ..., y_i, ..., y_{n-1}, y_n)$

1. Anonymat (l'indicateur est invariant à une permutation des allocations entre les individus)
2. Population (l'indicateur est invariant à une modification de la population)
3. Relativité (l'indicateur est invariant à une modification exactement proportionnelle de toutes les allocations)
4. Le principe de Dalton (1920) : $\{\widetilde{y}_i\}_{i=1}^{i=n} = \{y_i \pm \tau\}_{i=1}^{i=n}$ : la distribution $\widetilde{y}$ peut être déduite de la distribution $y$ avec des transferts régressifs implique que $\widetilde{y}$ est plus inégale que $y$
   - transfert régressif $\tau$ : $\left\{y_j + \tau, y_{j'} - \tau\right\}$ avec $y_{j'} \leq y_j$

- Formellement

$$\{y_i\}_{i=1}^{i=n} = (y_1, y_2, ..., y_i, ..., y_{n-1}, y_n), \quad y_i \leq y_{i+1}$$

$$I = I(y_1, y_2, ..., y_i, ..., y_{n-1}, y_n)$$

$$I(y_1, ..., y_n) = I(y_1, , ..., y_n; y_1, ..., y_n)$$

$$I(y_1, y_2, ..., y_i, ..., y_{n-1}, y_n) = I(\lambda y_1, \lambda y_2, ..., \lambda y_i, ..., \lambda y_{n-1}, \lambda y_n)$$

$$I(y_1, y_2, ..., y_i, ..., y_{n-1}, y_n) < I\left(y_1, ..., y_j - \tau, ..., y_{j'} + \tau, ..., y_n\right)$$

## 2.2 La courbe de Lorenz

- La courbe de Lorenz est représentée dans le pla $(x, y)$ où $x$ est le % cumulé de la population et $y$ le % cumulé de la richesse
  - $(20, 15)$ : 20% de la population détient 15% de la richesse
- Propriétés de la courbe de Lorenz
  - la courbe de Lorenz passe nécessairement par les points (0,0) et (100,100)
  - la courbe de Lorenz est nécessairement en dessous de la 1er bissectrice
  - la courbe de Lorenz est nécessairement croissante
  - la courbe de Lorenz se confond avec la 1er bissectrice en cas de distribution parfaitement égalitaire
  - la pente de la courbe de Lorenz mesure la contribution marginal de l'individu au revenu total

- Le critère de Lorenz
  - la distribution $L_1$ est plus inégalitaire que la distribution $L_2$ si $L_1$ se situe en dessous de $L_2$ pour tout $x$ $[y_1(x) \leq y_2(x)\ \forall x]$
  - un indicateur d'inégalité qui satisfait les quatre critères de cohérence ci-dessous satisfait aussi le critère de Lorenz
    $\Rightarrow$ le critère de Lorenz contient les quatre précédents !

## 2.3 Autres statistiques

- L'étendue : $(y_n - y_1)$ ou $(y_n - y_1)/\mu$ avec $\mu = (1/n)\sum_{i=1}^{n} y_i$ (ne satsfait pas le critère de Dalton)
- Les ratios de Kuznets : rapports des parts du revenu (90/10, 80/20 ...)
- L'écart moyen à la moyenne $\left(\sum_{i=1}^{n} |y_i - \mu|\right)/\mu$ (ne satsfait pas le critère de Dalton pour des transferts au–dessus de la moyenne)
- L'écart type = racine carré de la variance $(1/n)\sum_{i=1}^{n} (y_i - \mu)^2$ (satisfait le critère de Lorenz)
- Le coefficience de Gini $(2n\mu)^{-1}\sum_{i=1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right|$ (satisfait le critère de Lorenz)

- Remarques
  1. L'écart type et de le coefficient de Gini sont les meilleures (données complètes)
  2. Etendu et ratio de Kuznets (moins contraignants)
  3. L'indice de Gini est le double de l'aire entre la 1er bissectrice et la courbe de Lorenz
  4. Gini et écart type évoluent dans le même sens... sauf en cas de croisement de courbes de Lorenz
     - Exemple table 6.1

# 3 Inégalités et développement

- Croissance et inégalités sont liées par la distribution des facteurs de production et la dynamique d'accumulation

## 3.1 Le développement entraîne-t-il des inégalités?

### 3.1.1 La proposition de Simon Kuznets

- Deux études 1955 avec 5 pays et 1963 avec 18 pays. Rapport de la part du revenu des 20% les plus riches sur les 60% les plus pauvres
- Interprétation dynamique : le développement s'accompagne d'abord d'une augmentation des inégalités qui diminuent ensuite
- Explication: modèle à deux secteurs
  - secteur agricole à faible revenu et secteur industriel à revenu plus élevé
  - développement = transition / transfert d'un secteur à l'autre $\longrightarrow$ inégalités

### 3.1.2 Les résultats des analyses en coupe

- Idéal: séries chronologiques (longues) de niveau de vie et d'inégalités contenant les phases de développement, quelques pays seulement...
- Les premières études sont en coupe (de Kuznets au années 1990)
- Première illustration : Figure 7.1 tirée de Ray (1998) et Figure 2 de Frazer (2006)
  - existence, variabilité, significativité ? Tests économétriques de la relation entre $s_x$ (part du revenu de la catégorie $x$) et $y$

$$s_x = A + by + cy^2 + D + \varepsilon$$

  - Sachant

$$\frac{\partial s_x}{\partial y} = b + 2cy$$

    Signe de $b$ et de $c$ si $x = 20\%$ les plus riches ? Et pour $x = 20\%$ les plus pauvres ?

- Des premiers résultats favorables à la courbe en U-inversé (Ahluwalia 1976)

| Income share | $b$ | $c$ |
|---|---|---|
| Top 20% | 89.95 (4.48) | $-17.56$ (4.88) |
| Lowest 20% | $-16.97$(3.71) | 3.06 (3.74) |

### 3.1.3 Les résultats des analyses en séries temporelles

- Critiques:
  1. Interprétation du test biasée par le *Latin effect*
  2. Un test plus contraignant que la proposition de Kuznets (identité de la courbe U-inverse)

- Exemples de formes de courbes différents
  1. Différences des paramètres

$$s_x = A + by + cy^2 + D + \varepsilon; \quad s_x = A + dy + ey^2 + D + \varepsilon$$

  2. Différences des formes

$$s_x = A + by + cy^2 + D + \varepsilon; \quad s_x = A + by + c\,(1/y) + D + \varepsilon$$

- Tests en données de panels : "New ways of looking at old issues: inequality and growth" Klaus Deiningern and Lyn Journal of Development Economics 1998
  1. Cross-country : validité de la courbe de Kuznets (table 1)
  2. Panels et séries chronologique : rejet de la courbe de Kuznets !

- Tests de l'équation

$$GINI_{it} = A_i + b_i y_{it} + c_i y_{it}^2 + D + \varepsilon;$$

- Relation en $U$-inversé $b < 0$ et $c < 0$
  - avec les effets fixes $A_i$ les coefficients $b$ et $c$ n'ont plus les bons signes et son peu significatifs...
- Les résultats cross-country sont imputables à quelques pays et ne sont pas confirmées par les chroniques disponibles
  - Table 7 de Deininger et Squire et Figure 9 et Table 2 de Frazer (la diversité des expériences nationales)

- Remarque : les nouvelles inégalités
  - Les données de Frazer mettent en lumière une hausse des inégalités chez les pays riches : de nouvelles inégalités économiques
  - Explication technologique: nouvelles technologies $=$ biais

## 3.2 L'influence des inégalités sur la croissance

- Les inégalités influencent-elles la croissance ?

### 3.2.1 Mécanismes théoriques

- Mécanismes à l'origine d'un impact + des inégalités sur la croissance :
  - épargne, financement indivisibilité, incitation
  - vision traditionnelle
- Mécanismes à l'origine d'un impact − des inégalités sur la croissance
  - instabilité politique, demande de politique de redistribution financée par un impôt progressif , imperfections des marchés financiers (qui ne corrigent pas la distribution inégale des richesse)
  - vision plus récente

### 3.2.2 Tests empiriques

- Problèmes d'identification
  - endogénéité, facteurs inobservables, disponibilité des données
  - tests pratiqués (forme réduite)
- Régression à la Barro (cf. document chapitre précédent) avec inégalités à la date intiale:
  - Alesina, A. et D. Rodrik, 1994. Distributive Politics and Economic Growth. Quarterly Journal of Economics, 465-485.
  - Deiningern and Lyn Squire "New ways of looking at old issues: inequality and growth" Journal of Development Economics vol. 47 1998
- Commentaires
  - Les inégalités initiales affectent négativement la croissance
  - Amérique Latine vs. Asie

- Résultats contestés (débats techniques sur les méthodes économétriques): Barro (2000, JEG), Forbes (2000, AER), Banerjee et Duflo (2003)
- Banerjee et Duflo (2003): une relation non-linéaire entre croissance et valeurs passées de l'indice de Gini :
  - une variation de l'indice de Gini (quel que soit le signe) diminue la croissance

# 4 Conclusion

- L'importance des inégalités individuelles (et comment la mesurer)
- Inégalités et développement
  1. Rejet de la relation U-inverse de Kuznets (des relations plus complexes)
  2. Les inégalités ne favorisent pas nécessairement le développement (théorie et empirique)

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# Documents joints au chapitre 4

**Debraj Ray, "Development economics", 1998. Princeton University Press.**

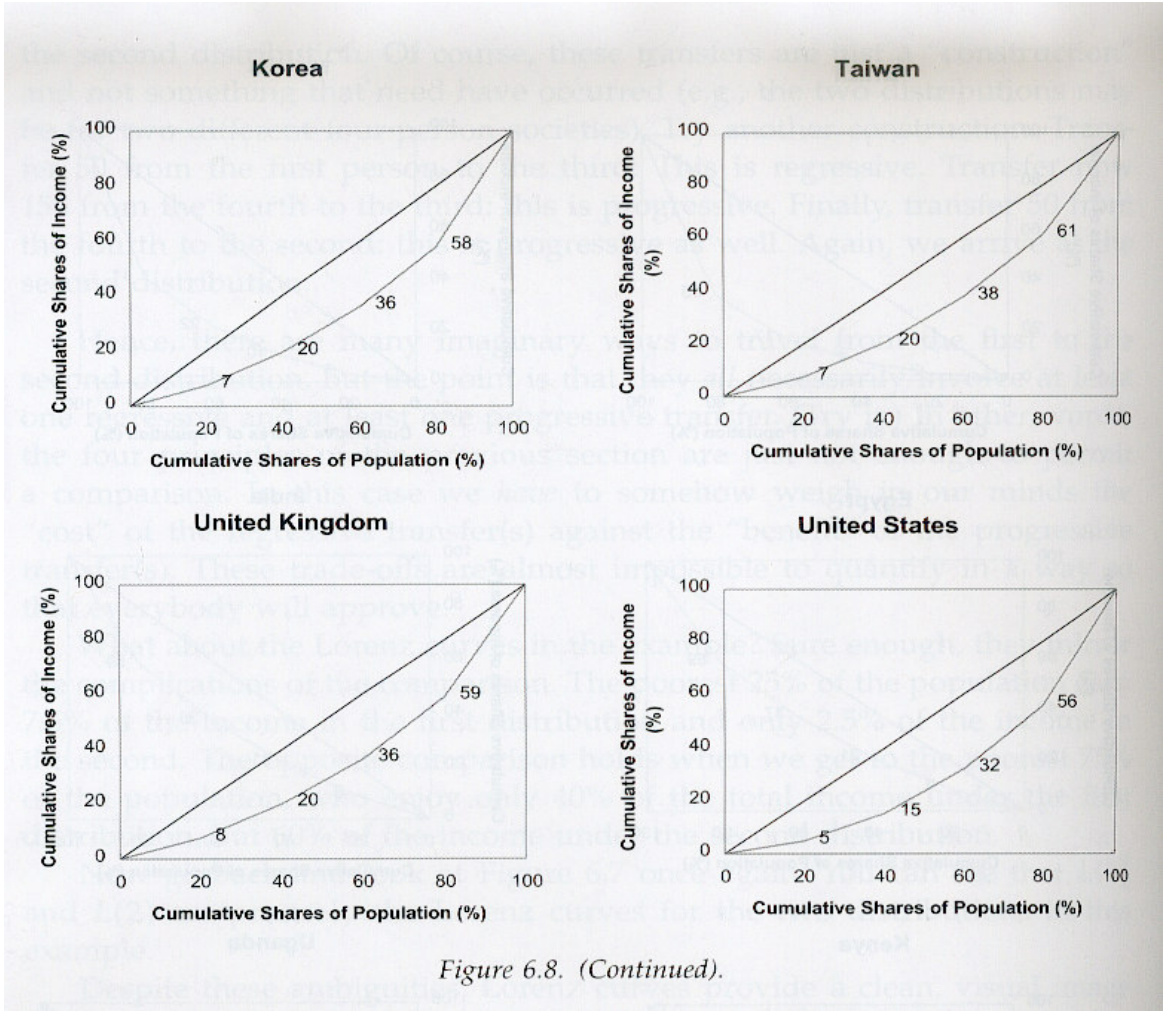


*Figure 6.8. (Continued).*

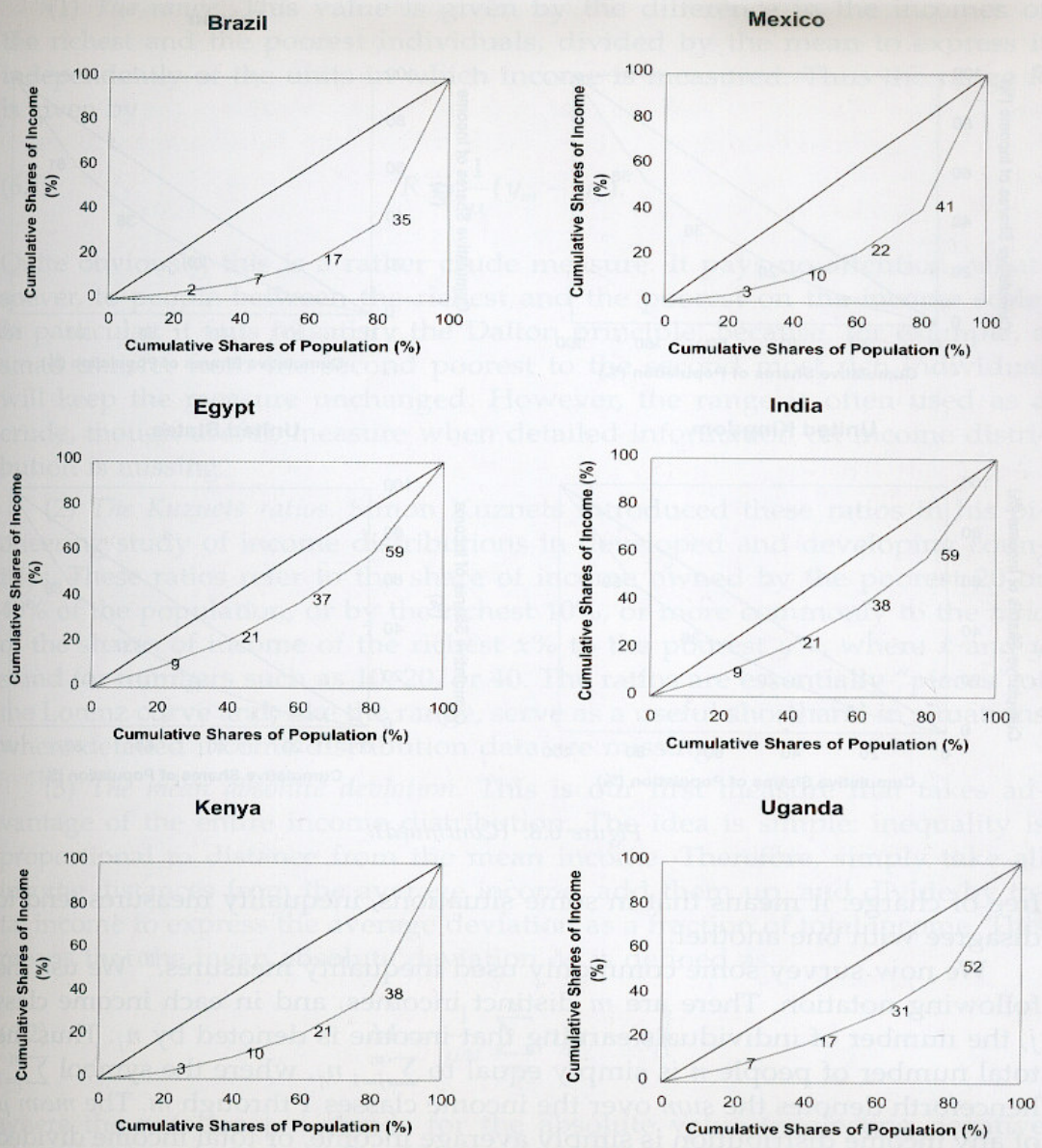


*Figure 6.8. Lorenz curves for different countries. Source: Deininger–Squire data base; see Deininger and Squire [1996a].*

ity by a *number*, something that is more concrete and quantifiable than a

*Table 6.1. Changes in inequality in Puerto Rico, Argentina, and Mexico.*

| *Country/date* | *Gini* | *Coeff. of variation* | *Income share of richest 5% (%)* | *Income share of poorest 40% (%)* |
|---|---|---|---|---|
| Puerto Rico | | | | |
| 1953 | 0.415 | 1.152 | 23.4 | 15.5 |
| 1963 | 0.449↑ | 1.035↓ | 22.0↓ | 13.7↑ |
| Argentina | | | | |
| 1953 | 0.412 | 1.612 | 27.2 | 18.1 |
| 1959 | 0.463↑ | 1.887↑ | 31.8↑ | 16.4↑ |
| 1961 | 0.434↓↑ | 1.605↓↓ | 29.4↓↑ | 17.4↓↑ |
| Mexico | | | | |
| 1950 | 0.526 | 2.500 | 40.0 | 14.3 |
| 1957 | 0.551↑ | 1.652↓ | 37.0↓ | 11.3↑ |
| 1963 | 0.543↓↑ | 1.380↓↓ | 28.8↓↓ | 10.1↑↑ |

Source: Fields [1980]. Note: First arrow indicates a change in inequality from the previous observation; the second arrow indicates the change in inequality from two observations ago.

*Table 2.1. Shares of poorest 40% and richest 20% for selected countries.*

| Country | *Per capita income (1993 PPP)* | *Share of poorest 40% (in %)* | *Share of richest 20% (in %)* |
|---|---|---|---|
| *0–3,000 PPP* | | | |
| Tanzania | 580 | 18 | 45 |
| Uganda | 900 | 17 | 48 |
| India | 1,220 | 21 | 41 |
| Bangladesh | 1,290 | 19 | 46 |
| Senegal | 1,650 | 11 | 59 |
| Nicaragua | 1,900 | 12 | 55 |
| Pakistan | 2,170 | 21 | 40 |
| El Salvador | 2,350 | 12 | 53 |
| Sri Lanka | 2,990 | 22 | 39 |
| *3,000–9,000 PPP* | | | |
| Peru | 3,220 | 14 | 50 |
| Guatemala | 3,350 | 8 | 63 |
| Brazil | 5,370 | 7 | 65 |
| Colombia | 5,490 | 12 | 54 |
| Costa Rica | 5,520 | 13 | 50 |
| Panama | 5,840 | 8 | 60 |
| Thailand | 6,260 | 11 | 59 |
| Mexico | 6,810 | 10 | 60 |
| Malaysia | 7,930 | 13 | 54 |
| Venezuela | 8,130 | 11 | 59 |
| *9,000+ PPP* | | | |
| Rep. Korea | 9,630 | 20 | 42 |
| Portugal | 10,710 | 18 | 40 |
| Mauritius | 12,420 | 18 | 43 |
| Spain | 13,510 | 23 | 35 |
| United Kingdom | 17,210 | 20 | 41 |
| France | 19,000 | 19 | 42 |
| Japan | 20,850 | 18 | 42 |
| United States | 24,740 | 15 | 44 |

Source: *World Development Report* (World Bank [1995]) and Deininger and Squire [1996a].

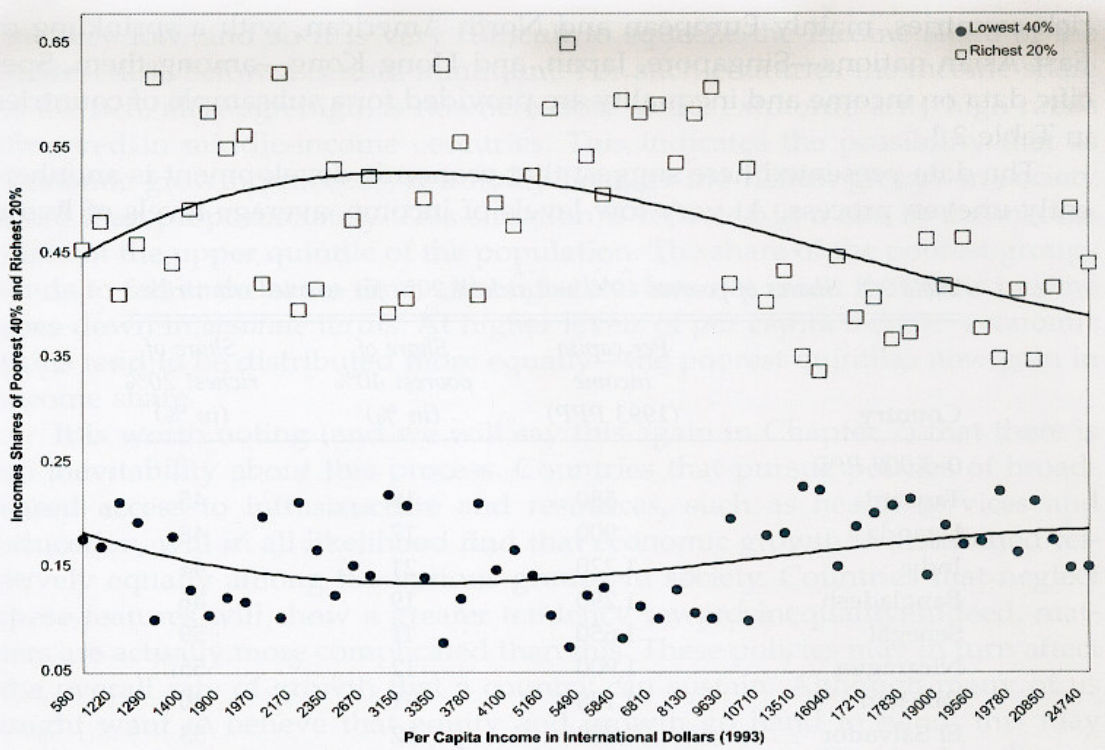


*Figure 2.6. Income shares of poorest 40% and richest 20% for fifty-seven countries arranged in order of increasing per capita income (PPP). Source: World Development Report (World Bank [1995]) and Deininger and Squire [1996a].*

**Garth Frazer "Inequality and Development Across and Within Countries"**

**World Development Vol. 34, No. 9, pp. 1459–1481, 2006**

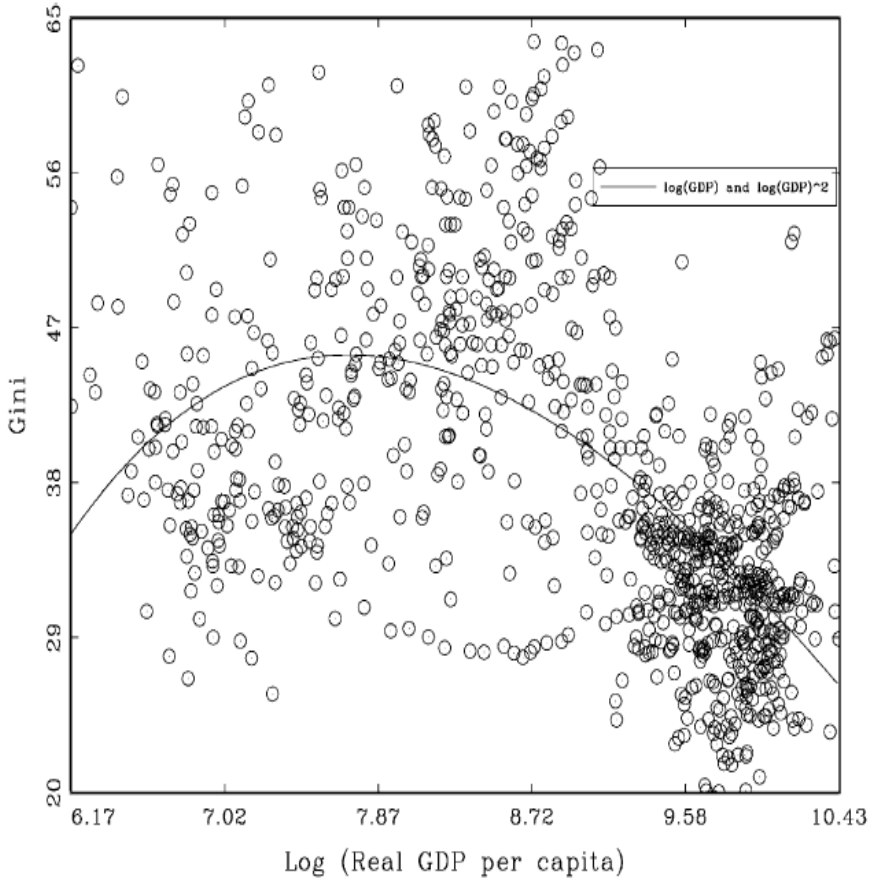


Figure 2. *Pooled regression—Gini versus log(real GDP/captia).*

Table 2. *Data related to countries of Figure 9*

| Country | Range of data | | Number of observations | Per capita income range | | Inequality trend[a] | Maximum predicted Gini | Associated income level | Minimum predicted Gini | Associated income level |
|---|---|---|---|---|---|---|---|---|---|---|
| | First year | Last year | | Minimum | Maximum | | | | | |
| Canada | 1965 | 2000 | 31 | 12,458 | 26,922 | Flat | 0.318 | 13,846 | 0.298 | 22,483 |
| China | 1953 | 1995 | 18 | 615 | 2,818 | Uncertain, then increasing | 0.496 | 615 | 0.302 | 1,088 |
| Taiwan | 1964 | 1997 | 31 | 1,849 | 16,434 | Flat/mild U-shape | 0.322 | 1,849 | 0.290 | 5,710 |
| France | 1956 | 2002 | 18 | 6,906 | 24,284 | Decreasing | 0.495 | 6,906 | 0.279 | 23,864 |
| India | 1951 | 1997 | 34 | 690 | 2,162 | Decreasing, then uncertain | 0.417 | 690 | 0.359 | 1,585 |
| Italy | 1967 | 2002 | 31 | 9,497 | 23,840 | Decreasing, then flat | 0.403 | 9,497 | 0.326 | 18,386 |
| Japan | 1962 | 1990 | 23 | 5,586 | 22,194 | Flat | 0.371 | 5,586 | 0.342 | 14,153 |
| Korea | 1965 | 1998 | 17 | 1,869 | 14,786 | Flat/mild inverted-U shape | 0.363 | 4,249 | 0.324 | 1,869 |
| Mexico | 1950 | 2002 | 16 | 2,993 | 8,550 | Uncertain | 0.545 | 4,816 | 0.521 | 8,139 |
| Thailand | 1962 | 2001 | 16 | 1,198 | 6,742 | Flat or increasing | 0.478 | 5,010 | 0.414 | 1,198 |
| United Kingdom | 1961 | 2003 | 43 | 9,790 | 24,008 | Increasing | 0.339 | 23,883 | 0.265 | 9,790 |
| United States | 1950 | 2003 | 54 | 10,601 | 33,082 | Flat, then increasing | 0.451 | 32,908 | 0.346 | 14,774 |

[a] The description of the curves in the "Inequality trend" column is somewhat arbitrary and based on the opinion of the author. How a particular country's curve is labeled is not central to the main conclusion of the paper. However, noticing that there are a variety of shapes is central to the paper's thesis.

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**Debraj Ray, "Development economics", 1998. Princeton University Press.**

TABLE 1—THE WORLD DISTRIBUTION OF INCOME AND LIFE EXPECTANCY: INEQUALITY AND POVERTY INDICES FOR SELECTED YEARS

| | 1820 | | | | | 1910 | |
|---|---|---|---|---|---|---|---|
| Index | Estimate | SE[a] | 1850 | 1870 | 1890 | Estimate | SE[a] |
| Income shares (percents) | | | | | | | |
| Bottom 20 percent | 4.7 | 0.16 | 4.3 | 3.8 | 3.4 | 3.0 | 0.11 |
| Bottom 40 percent | 13.5 | 0.39 | 12.1 | 11.0 | 9.9 | 8.8 | 0.24 |
| Bottom 60 percent | 25.7 | 0.61 | 23.3 | 21.4 | 19.5 | 17.6 | 0.37 |
| Bottom 80 percent | 43.7 | 0.74 | 40.7 | 38.0 | 35.0 | 33.0 | 0.48 |
| Top 10 percent | 42.8 | 0.64 | 45.2 | 47.6 | 49.8 | 50.9 | 0.52 |
| Top 5 percent | 31.8 | 0.51 | 32.2 | 33.4 | 34.9 | 36.7 | 0.54 |
| Summary inequality measures | | | | | | | |
| Coefficient of Gini | 0.500 | 0.009 | 0.532 | 0.560 | 0.588 | 0.610 | 0.005 |
| Theil index | 0.522 | 0.018 | 0.598 | 0.672 | 0.745 | 0.797 | 0.017 |
| Mean logarithmic deviation | 0.422 | 0.016 | 0.485 | 0.544 | 0.610 | 0.668 | 0.015 |
| Standard deviation of logarithm | 0.826 | 0.016 | 0.873 | 0.919 | 0.971 | 1.027 | 0.015 |
| Mean world income (PPP $ 1990) | 658.7 | 23.2 | 735.7 | 890.0 | 1,113.8 | 1,459.9 | 24.1 |
| World population (millions) | 1,057.0 | | 1,201.1 | 1,266.0 | 1,450.5 | 1,719.0 | |
| Poverty | | | | | | | |
| Headcount (percents) | | | | | | | |
| Poverty | 94.4 | 0.32 | 92.5 | 89.6 | 85.7 | 82.4 | 0.38 |
| Extreme poverty | 83.9 | 0.94 | 81.5 | 75.4 | 71.7 | 65.6 | 1.21 |
| Headcount (millions) | | | | | | | |
| Poverty | 997.8 | 3.4 | 1,110.5 | 1,134.3 | 1,243.6 | 1,416.5 | 8.2 |
| Extreme poverty | 886.8 | 9.9 | 978.8 | 954.0 | 1,040.5 | 1,127.7 | 24.1 |
| Life expectancy | | | | | | | |
| Mean | 26.5 | | | | 29.9 | 32.8 | |
| Theil index (between countries) | 0.012 | | | | 0.032 | 0.045 | |

[a] The computation of these standard errors is explained in the text.

| Index | 1929 | 1950 | | 1960 | 1970 | 1980 | 1992 | |
|---|---|---|---|---|---|---|---|---|
| | | Estimate | SE[a] | | | | Estimate | SE[a] |
| Income shares (percents) | | | | | | | | |
| Bottom 20 percent | 2.9 | 2.4 | 0.04 | 2.4 | 2.2 | 2.0 | 2.2 | 0.03 |
| Bottom 40 percent | 8.2 | 6.8 | 0.10 | 6.8 | 6.1 | 5.7 | 6.4 | 0.07 |
| Bottom 60 percent | 16.7 | 14.2 | 0.17 | 14.1 | 12.8 | 12.5 | 13.5 | 0.10 |
| Bottom 80 percent | 32.3 | 31.1 | 0.23 | 31.9 | 30.4 | 29.5 | 28.2 | 0.13 |
| Top 10 percent | 49.8 | 51.3 | 0.31 | 50.0 | 50.8 | 51.6 | 53.4 | 0.14 |
| Top 5 percent | 35.0 | 35.5 | 0.31 | 34.1 | 34.2 | 35.0 | 36.0 | 0.19 |
| Summary inequality measures | | | | | | | | |
| Coefficient of Gini | 0.616 | 0.640 | 0.002 | 0.635 | 0.650 | 0.657 | 0.657 | 0.001 |
| Theil index | 0.777 | 0.805 | 0.009 | 0.776 | 0.808 | 0.829 | 0.855 | 0.005 |
| Mean logarithmic deviation | 0.690 | 0.775 | 0.008 | 0.766 | 0.823 | 0.850 | 0.827 | 0.005 |
| Standard deviation of logarithm | 1.064 | 1.154 | 0.007 | 1.161 | 1.210 | 1.234 | 1.184 | 0.005 |
| Mean world income (PPP $ 1990) | 1,817.1 | 2,145.5 | 16.1 | 2,798.6 | 3,773.8 | 4,544.0 | 4,962.0 | — |
| World population (millions) | 2,042.1 | 2,511.3 | | 3,024.7 | 3,664.5 | 4,414.0 | 5,459.1 | |
| Poverty | | | | | | | | |
| Headcount (percents) | | | | | | | | |
| Poverty | 75.9 | 71.9 | 1.07 | 64.3 | 60.1 | 55.0 | 51.3 | 1.06 |
| Extreme poverty | 56.3 | 54.8 | 0.42 | 44.0 | 35.6 | 31.5 | 23.7 | 0.52 |
| Headcount (millions) | | | | | | | | |
| Poverty | 1,550.5 | 1,805.6 | 26.8 | 1,946.5 | 2,200.7 | 2,426.6 | 2,800.5 | 57.8 |
| Extreme poverty | 1,149.7 | 1,376.2 | 9.0 | 1,330.1 | 1,304.7 | 1,390.3 | 1,293.8 | 24.1 |
| Life expectancy | | | | | | | | |
| Mean | 38.5 | 50.1 | | | 59.4 | | 61.1 | |
| Theil index (between countries) | 0.046 | 0.025 | | | 0.012 | | 0.013 | |

TABLE 5—RELATIVE INCOME MOBILITY MATRIX AND MOBILITY RATIOS: SELECTED PAIRS OF YEARS

| Income in final year relative to world mean income (wmi) | Income in initial year relative to world mean income (wmi): Less than 1/2 wmi | From 1/2 to 1 wmi | From 1 to 2 wmi | More than 2 wmi | Total (share in world population) | Mobility ratios |
|---|---|---|---|---|---|---|
| ***1820–1870*** | | | | | | |
| Less than 1/2 wmi | 98.8 | 35.0 | 0.0 | 0.0 | 52.3 | |
| From 1/2 to 1 wmi | 1.2 | 63.2 | 10.9 | 0.0 | 26.8 | |
| From 1 to 2 wmi | 0.0 | 1.8 | 80.2 | 3.7 | 12.2 | |
| More than 2 wmi | 0.0 | 0.0 | 8.9 | 96.3 | 8.6 | |
| Total | 39.1 | 39.2 | 14.0 | 7.7 | 100.0 | |
| (Immobility ratio) | | | | | | 84.6 |
| (Upward mobility) | | | | | | 3.0 |
| (Downward mobility) | | | | | | 12.4 |
| ***1870–1910*** | | | | | | |
| Less than 1/2 wmi | 99.5 | 38.3 | 0.0 | 0.0 | 58.9 | |
| From 1/2 to 1 wmi | 0.5 | 60.1 | 32.6 | 0.0 | 20.9 | |
| From 1 to 2 wmi | 0.0 | 1.6 | 63.1 | 7.5 | 10.0 | |
| More than 2 wmi | 0.0 | 0.0 | 4.3 | 92.5 | 10.3 | |
| Total | 48.9 | 26.8 | 13.8 | 10.5 | 100.0 | |
| (Immobility ratio) | | | | | | 78.8 |
| (Upward mobility) | | | | | | 1.6 |
| (Downward mobility) | | | | | | 19.6 |
| ***1910–1950*** | | | | | | |
| Less than 1/2 wmi | 91.7 | 31.3 | 0.0 | 0.0 | 57.9 | |
| From 1/2 to 1 wmi | 8.3 | 47.5 | 6.1 | 0.0 | 15.5 | |
| From 1 to 2 wmi | 0.1 | 21.2 | 65.8 | 19.6 | 14.2 | |
| More than 2 wmi | 0.0 | 0.0 | 28.1 | 80.4 | 12.5 | |
| Total | 55.8 | 21.4 | 11.1 | 11.7 | 100.0 | |
| (Immobility ratio) | | | | | | 71.4 |
| (Upward mobility) | | | | | | 14.4 |
| (Downward mobility) | | | | | | 14.2 |
| ***1950–1992*** | | | | | | |
| Less than 1/2 wmi | 89.7 | 20.5 | 0.0 | 0.0 | 56.2 | |
| From 1/2 to 1 wmi | 7.8 | 49.5 | 20.2 | 0.0 | 14.9 | |
| From 1 to 2 wmi | 1.7 | 18.4 | 45.2 | 4.8 | 10.4 | |
| More than 2 wmi | 0.8 | 11.6 | 34.6 | 95.2 | 18.5 | |
| Total | 59.1 | 15.5 | 13.0 | 12.4 | 100.0 | |
| (Immobility ratio) | | | | | | 78.3 |
| (Upward mobility) | | | | | | 15.2 |
| (Downward mobility) | | | | | | 11.4 |

*Notes:* The table entries are initial year's population in each income band by income in the final year (percentage). The immobility ratio is the share of world population not changing relative income band. Upward (downward) mobility is the share of world population moving up (down) one income band or more.

**Klaus Deiningern and Lyn Squire "New ways of looking at old issues: inequality and growth"**
**Journal of Development Economics vol. 47 1998**

Table 1
Decadal medians of Gini coefficients for the income distribution, by Region 1960–1990

| | 1960s | 1970s | 1980s | 1990s |
|---|---|---|---|---|
| Eastern Europe | 22.76 | 21.77 | 24.93 | 28.60 |
| South Asia | 31.67 | 32.32 | 32.22 | 31.59 |
| OECD and high income | 32.86 | 33.04 | 32.20 | 33.20 |
| East Asia and Pacific | 34.57 | 34.40 | 34.42 | 34.80 |
| Middle East and North Africa | 41.88 | 43.63 | 40.80 | 39.72 |
| Sub-Saharan Africa | 49.90 | 48.50 | 39.63 | 42.30 |
| Latin America | 53.00 | 49.86 | 51.00 | 50.00 |

Regions are ordered by increasing inequality in the 1990s.
Source: Deininger and Squire (1996).

Table 7
Results from estimation of the Kuznets curve with country specific dummies

| | Hypothesis III | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient on income | *t*-value | Coefficient on 1/income | *t*-value | Predicted turning point | No. obs. | GDP difference | Years difference |
| *Countries with a significant 'Kuznets curve' (inverted U-shaped relationship)* | | | | | | | | |
| Brazil | −5.76E−03 | (1.96) | −5.59E+04 | (2.29) | 3117 | 15 | 2533 | 29 |
| Hungary | −1.97E−02 | (2.01) | −4.23E+05 | (2.06) | 4628 | 8 | 1925 | 29 |
| Mexico | −5.19E−03 | (2.13) | −6.39E+04 | (2.01) | 3511 | 8 | 3368 | 39 |
| Philippines | −6.60E−02 | (2.30) | −1.10E+05 | (2.18) | 1292 | 6 | 629 | 31 |
| Trinidad | −4.14E−03 | (2.83) | −1.97E+05 | (2.37) | 6905 | 4 | 6798 | 23 |
| *Countries with a significant U-shaped relationship contrary to Kuznets' prediction* | | | | | | | | |
| Costa Rica | 2.59E−02 | (2.45) | 2.07E+05 | (2.60) | 2822 | 7 | 1534 | 28 |
| India | 1.75E−02 | (1.94) | 1.83E+04 | (2.49) | 1022 | 31 | 674 | 41 |
| United States | 1.79E−03 | (3.10) | 2.39E+05 | (2.63) | 11558 | 45 | 9323 | 44 |
| United Kingdom | 5.01E−03 | (5.03) | 3.79E+05 | (4.08) | 8696 | 31 | 6270 | 30 |
| *Countries with no statistically significant association between inequality and income* | | | | | | | | |
| Australia | −4.93E−03 | (1.39) | −9.86E+05 | (1.83) | 14143 | 9 | 4767 | 22 |
| Belgium | −4.34E−03 | (0.31) | −7.20E+05 | (0.35) | 12882 | 4 | 2805 | 13 |
| Bangladesh | 1.99E−02 | (0.58) | 1.54E+04 | (0.49) | 879 | 8 | 460 | 22 |
| Bulgaria | −1.12E−03 | (0.27) | 8.97E+02 | (0.01) | | 27 | 2942 | 31 |
| Canada | −5.69E−04 | (1.23) | −5.06E+04 | (0.89) | 9432 | 23 | 11013 | 40 |
| Chile | 1.00E−03 | (0.11) | 3.69E+04 | (0.26) | 6070 | 5 | 1690 | 24 |
| China | 7.14E−02 | (2.43) | 7.40E+04 | (1.83) | 1018 | 12 | 530 | 12 |
| Cote d'Ivoire | −7.14E−01 | (0.72) | −1.62E+06 | (0.74) | 1506 | 4 | 139 | 3 |
| Colombia | 8.15E−03 | (0.52) | 6.00E+04 | (0.53) | 2713 | 7 | 1157 | 21 |
| Czechoslovakia | −6.56E−04 | (0.17) | 2.35E+03 | (0.08) | | 10 | 2310 | 30 |
| Germany | −3.17E−03 | (0.38) | −4.21E+05 | (0.45) | 11532 | 6 | 3328 | 15 |
| Denmark | −5.28E−03 | (0.26) | −1.01E+06 | (0.33) | 13813 | 4 | 3170 | 16 |
| Egypt | −1.40E−02 | (1.19) | −2.45E+03 | (0.19) | 418 | 4 | 1133 | 32 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Spain | −3.29E−03 | (1.35) | −1.42E+05 | (1.42) | 6582 | 8 | 4658 | 24 |
| Finland | −1.62E−03 | (0.28) | −2.19E+05 | (0.32) | 11640 | 10 | 3343 | 14 |
| France | −3.25E−03 | (2.53) | −9.82E+04 | (1.20) | 5499 | 7 | 6951 | 28 |
| Hong Kong | 8.35E−04 | (1.31) | 3.19E+04 | (0.68) | 6176 | 7 | 10757 | 20 |
| Indonesia | −5.66E−03 | (0.50) | −2.13E+03 | (0.10) | 614 | 7 | 996 | 14 |
| Iran | −1.96E−02 | (0.65) | −4.21E+05 | (0.68) | 4635 | 5 | 1153 | 15 |
| Italy | 3.98E−03 | (1.24) | 5.71E+05 | (1.71) | 11975 | 15 | 4320 | 17 |
| Jamaica | 2.12E−02 | (1.59) | 1.17E+05 | (1.88) | 2347 | 8 | 1230 | 35 |
| Japan | 5.62E−04 | (1.53) | 3.38E+04 | (1.85) | 7756 | 23 | 10777 | 28 |
| Korea | −1.45E−03 | (1.43) | −1.22E+04 | (2.15) | 2898 | 11 | 4549 | 23 |
| Sri Lanka | 9.29E−03 | (0.85) | 2.34E+04 | (0.91) | 1588 | 9 | 991 | 37 |
| Malaysia | −6.99E−03 | (1.68) | −6.00E+04 | (1.38) | 2930 | 6 | 2520 | 19 |
| Netherlands | 1.57E−02 | (1.74) | 1.88E+06 | (1.53) | 10949 | 12 | 2941 | 16 |
| Norway | −7.53E−04 | (0.87) | −6.84E+03 | (0.08) | 3014 | 9 | 8969 | 29 |
| New Zealand | 3.50E−02 | (1.45) | 3.82E+06 | (1.32) | 10437 | 12 | 1717 | 17 |
| Taiwan | 8.15E−04 | (1.67) | 1.41E+04 | (2.21) | 4165 | 26 | 6521 | 29 |
| Pakistan | −2.73E−02 | (0.56) | −3.88E+04 | (0.60) | 1192 | 9 | 448 | 22 |
| Panama | 3.31E−03 | (0.08) | 1.47E+05 | (0.41) | 6667 | 4 | 808 | 19 |
| Poland | 2.57E−02 | (1.02) | 5.09E+05 | (1.11) | 4453 | 9 | 1076 | 16 |
| Puerto Rico | 1.01E−02 | (1.07) | 3.84E+05 | (1.18) | 6177 | 4 | 3019 | 17 |
| Singapore | 1.53E−04 | (0.11) | 5.94E+03 | (0.08) | 6233 | 6 | 6302 | 16 |
| Soviet Union | 9.07E−03 | (0.34) | 3.52E+05 | (0.28) | 6225 | 5 | 1622 | 13 |
| Sweden | 2.47E−03 | (0.21) | 4.38E+05 | (0.21) | 13324 | 13 | 2741 | 16 |
| Thailand | 4.40E−03 | (2.38) | 4.17E+03 | (0.55) | 974 | 8 | 2947 | 30 |
| Tunisia | −6.92E−03 | (1.00) | −2.34E+04 | (0.97) | 1841 | 5 | 1674 | 25 |
| Venezuela | −1.68E−02 | (1.74) | −7.60E+05 | (1.61) | 6732 | 9 | 2350 | 19 |
| Yugoslavia | −3.49E−02 | (1.90) | −4.11E+05 | (1.97) | 3429 | 4 | 3069 | 26 |

*DW = 1.875*

*Adj. R2 = 0.9481*

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No information on income for the Bahamas was available.
Differences refer to the difference between the first and last observation.

**Alesina, A. et D. Rodrik, 1994.**
**Distributive Politics and Economic Growth. Quarterly Journal of Economics, 465-485.**

TABLE I
GROWTH REGRESSIONS FOR 1960–1985

| | High-quality sample ($N = 46$) | | Largest possible sample ($N = 70$) | | Largest possible sample ($N = 49$) | | Largest possible sample ($N = 41$) | |
|---|---|---|---|---|---|---|---|---|
| | OLS (1) | TSLS (2) | OLS (3) | TSLS (4) | OLS (5) | OLS (6) | OLS (7) | OLS (8) |
| Const. | 3.60 | 8.66 | 1.76 | 6.48 | 3.71 | 6.22 | 6.24 | 6.21 |
| | (2.66) | (3.33) | (1.50) | (2.93) | (3.86) | (4.69) | (4.63) | (4.61) |
| GDP60 | −0.44 | −0.52 | −0.48 | −0.58 | −0.38 | −0.38 | −0.39 | −0.38 |
| | (−3.28) | (−3.17) | (−3.37) | (−3.47) | (−3.61) | (−3.25) | (−3.06) | (−2.95) |
| PRIM60 | 3.26 | 2.85 | 3.98 | 3.70 | 3.85 | 2.66 | 2.62 | 2.65 |
| | (3.38) | (2.43) | (4.66) | (3.72) | (4.88) | (2.66) | (2.53) | (2.56) |
| GINI60 | −5.70 | −15.98 | 3.58 | −12.93 | | −3.47 | −3.45 | −3.47 |
| | (−2.46) | (−3.21) | (−1.81) | (−3.12) | | (−1.82) | (−1.79) | (−1.80) |
| GINILND | | | | | −5.50 | −5.23 | −5.24 | −5.21 |
| | | | | | (−5.24) | (−4.38) | (−4.32) | (−4.19) |
| DEMOC* GINILND | | | | | | | 0.12 | |
| | | | | | | | (0.12) | |
| DEMOC | | | | | | | | 0.02 |
| | | | | | | | | (0.05) |
| $\bar{R}^2$ | 0.28 | 0.27 | 0.25 | 0.26 | 0.53 | 0.53 | 0.51 | 0.51 |

The dependent variable is average per capita growth rate over 1960–1985. *t*-statistics are in parentheses. Independent variables are defined as follows:

GDP60: Per capita GDP level in 1960
PRIM60: Primary school enrollment ratio in 1960
GINI60: Gini coefficient of income inequality, measured close to 1960 (see Appendix for dates)
GINILND: Gini coefficient of land distribution inequality, measured close to 1960 (see Appendix for dates)
DEMOC: Democracy dummy.

Two-stage least squares regressions use GDP60, PRIM60, literacy rate in 1960, infant mortality in 1965, secondary enrollment in 1960, fertility in 1965, and an Africa dummy as instruments.

**Klaus**

**Deiningern and Lyn Squire "New ways of looking at old issues: inequality and growth"**
**Journal of Development Economics vol. 47 1998**



Table 3
Growth regression (1960–1992) with income and land inequality

| | All countries | | | | | | Developing countries[a] | |
|---|---|---|---|---|---|---|---|---|
| Intercept | 2.614 | 1.346 | 2.949 | 2.379 | 4.738 | 3.389 | 4.246 | 3.906 |
| | (2.94) | (1.40) | (4.12) | (2.39) | (4.47) | (2.17) | (2.93) | (1.51) |
| Investment | 0.132 | 0.122 | 0.134 | 0.123 | 0.107 | 0.115 | 0.130 | 0.148 |
| | (6.15) | (5.09) | (6.38) | (4.77) | (4.68) | (4.00) | (3.94) | (3.59) |
| Initial GDP | −0.302 | −0.205 | −0.288 | −0.264 | −0.308 | −0.248 | −0.301 | −0.338 |
| | (3.70) | (2.23) | (4.39) | (3.49) | (4.50) | (3.06) | (1.39) | (1.54) |
| Income Gini | −0.047 | −0.019 | | | −0.025 | −0.019 | −0.018 | −0.045 |
| | (2.80) | (0.95) | | | (1.34) | (0.86) | (0.60) | (1.27) |
| Land Gini | | | −0.034 | −0.022 | −0.037 | −0.027 | −0.039 | −0.053 |
| | | | (4.07) | (1.95) | (3.85) | (2.09) | (2.43) | (2.10) |
| Latin Dummy | | −0.530 | | −0.432 | | 0.018 | | 2.765 |
| | | (0.85) | | (0.87) | | (0.03) | | (1.83) |
| Africa Dummy | | −0.214 | | −0.254 | | 0.324 | | 2.191 |
| | | (0.32) | | (0.46) | | (0.46) | | (1.52) |
| Asia Dummy | | 1.320 | | 0.668 | | 0.798 | | 1.882 |
| | | (2.32) | | (1.36) | | (1.46) | | (1.51) |
| R2 adj | 0.3781 | 0.468 | 0.549 | 0.564 | 0.550 | 0.547 | 0.576 | 0.585 |
| No. Obs. | 87 | 87 | 64 | 64 | 55 | 55 | 27 | 27 |

[a]Only developing countries with a population of more than two million have been included.
Here and in all subsequent tables, figures in brackets denote *t*-values.

**Banerjee, A. et E. Duflo, "Inequality and Growth: What the Data Say?"**
**Journal of Economic Growth vol. 6, 2003.**

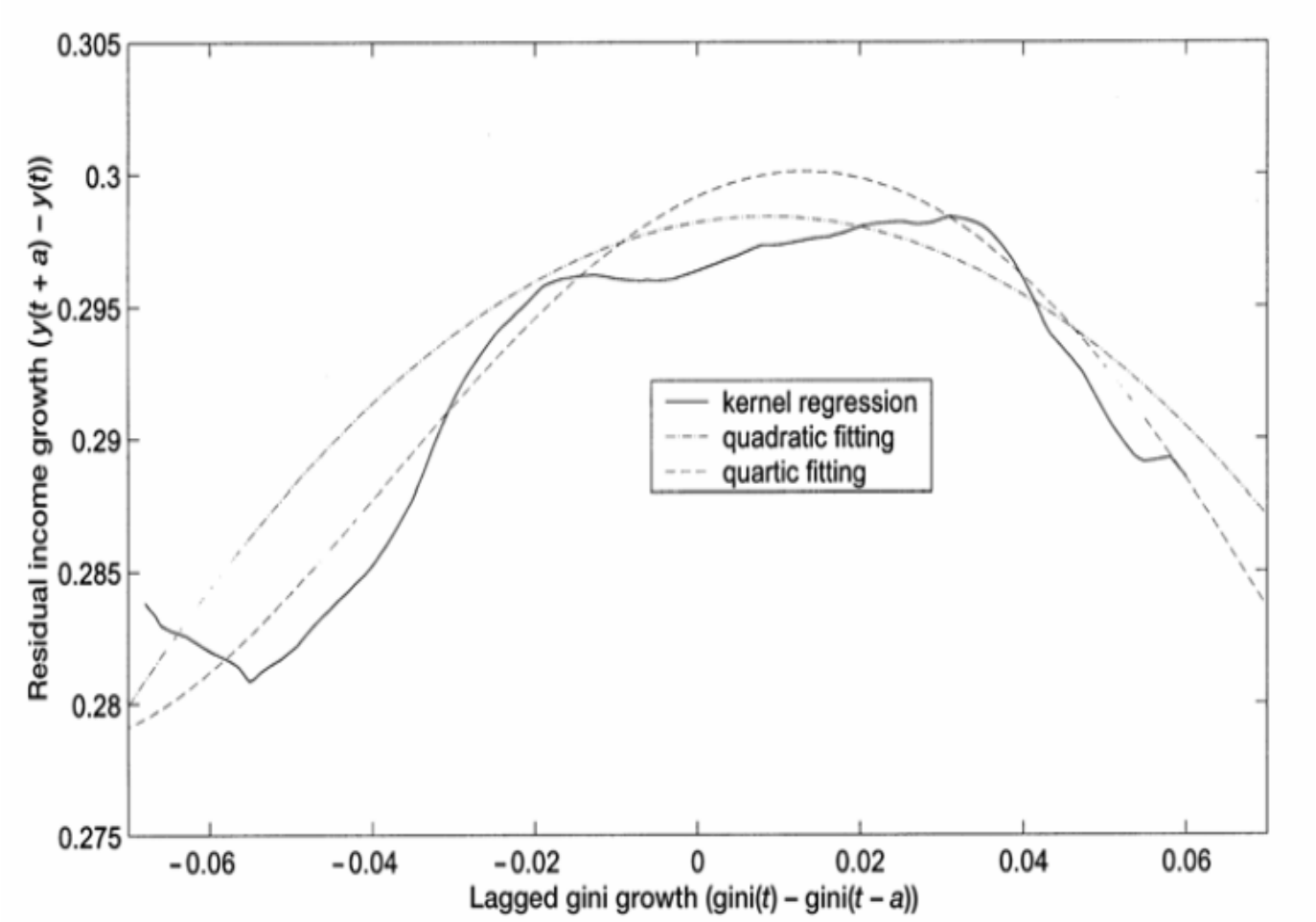


*Figure 2.* Relationship between income growth and lagged gini growth: partially linear model (Barro variables).

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# Economie du développement

*Chapitre 5. La pauvreté*

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**Fabien Tripier**
**Professeur Université de Nantes**

# Contents

# 1 Introduction

- La pauvreté : définition usuelle, sous-développement, nord–sud, individuel
- La pauvreté et le développement :
  - Ne pas disposer les ressources suffisantes pour exercer sa liberté de choix (y compris économique)
  - Seuil de pauvreté "poverty line"
  - Rappel de la définiton du développement*
- Amartya Sen (Nobel 1998)

*Human development is about much more than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests.

- Objectifs du chapitre
  1. Les indicateurs de mesure de la pauvreté
     - et leurs conséquences sur les choix de politique économique
  2. Les conséquences de la pauvreté sur l'activité économique
     - le marché (du travail) fonctionne-t-il de la même manière dans une économie avec ou sans pauvreté ? *Exemple: le salaire d'efficience*
  3. Comment réduire la pauvreté?
     - le rôle de la croissance globale
     - les enseignements des études microéconométriques

- Relations avec les précédents chapitres
  1. Pauvreté et inégalités : phénomène individuel ($\neq$ croissance) mais à distinguer ($\rightarrow$ dimension absolue et non seulement relative de la pauvreté)
  2. Pauvreté et croissance : la croissance (globale) permet-elle de diminuer la pauvreté (au niveau individuel) ?
  3. Pauvreté et trappes : le phénomène de trappe opère-t-il aussi au niveau individuel ?

# 2 Mesurer la pauvreté

## 2.1 Comment mesurer la pauvreté ?

1. Un critère basé sur le revenu ou le contenu des dépenses?
2. Un critère absolue ou relatif ?
3. Un critère de pauvreté temporaire ou chronique ?
4. Un critère de pauvreté des ménages ou des individus?

## 2.2 Les principaux indicateurs

- Malgré ces réserves : utilisation d'une ligne de pauvreté $\longrightarrow$ Quels indicateurs ?
  - $\{y_i\}_{i=1}^{i=n} = \Big(y_1, y_2, ..., y_j, ..., y_n\Big)$ avec $y_j \leq y_{j+1}$ et $\mu = n^{-1} \sum_{i=1}^{i=n} y_i$
  - $p$ le seuil de pauvreté

1. HC (Head Count = compte) le nombre d'individu vivant en-dessous de $p$

$$HC = k, \quad y_k \leq p \text{ et } y_{k+s} > p, \quad s \geq 1$$

2. HCR (Head Cout Ratio) le taux de pauvreté

$$HCR = HC/n$$

   - Critique du HC er HCR: ne tient pas compte de distribution au sein des pauvres $\longrightarrow$ politique biaisée en défaveur des plus pauvres

3. PGR (Poverty gap ratio = profondeur, écart) tient compte de la distance

des pauvres par rapport au reste de la population

$$PGR = \frac{1}{n} \sum_{i=1}^{i=k} \left( \frac{p - y_i}{\mu} \right)$$

moyenne des écarts au seuil de pauvreté rapportés à la moyenne des revenus

4. IGR (Income gap ratio)

$$IGR = \frac{1}{n} \sum_{i=1}^{i=k} \left( \frac{p - y_i}{HC} \right)$$

5. Généralisation de Foster, Greer, Thorbecke (1984 ECTA)

$$P_\alpha = \frac{1}{n} \sum_{i=1}^{i=k} \left( \frac{p - y_i}{p} \right)^\alpha$$

avec :

$$\begin{aligned} \alpha &= 0 : P_0 = HCR \\ \alpha &= 1 : P_1 = PGR' = \frac{1}{n} \sum_{i=1}^{i=k} \left( \frac{p - y_i}{p} \right) \\ \alpha &= 2 : P_2 = HCR \left[ IGR^2 + (1 - IGR)^2 \, \sigma \right] \end{aligned}$$

où $\sigma$ est l'écart-type de la distribution des revenus parmi les pauvres.

## 2.3 La pauvreté : données agrégées

- Documents joints issus des rapports du PNUD

## 2.4 La pauvreté : données d'enquête

- Abhijit V. Banerjee and Esther Duflo "The Economic Lives of the Poor" 2006, MIT Working Paper

# 3 Analyses économiques de la pauvreté

## 3.1 La croissance est–elle bonne pour les pauvres ?

- Introduction de Barro et Sala-i-Martin (2003): la réduction de la pauvreté comme conséquence de la croissance
  - effet non mécanique avec une hausse des inégalités
  - disparités régionales
- Implications de politique économique

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# Documents joints au chapitre 5

TABLEAU 2

**Faire disparaître l'extrême pauvreté : un fléau qui touche encore les masses (en millions)**

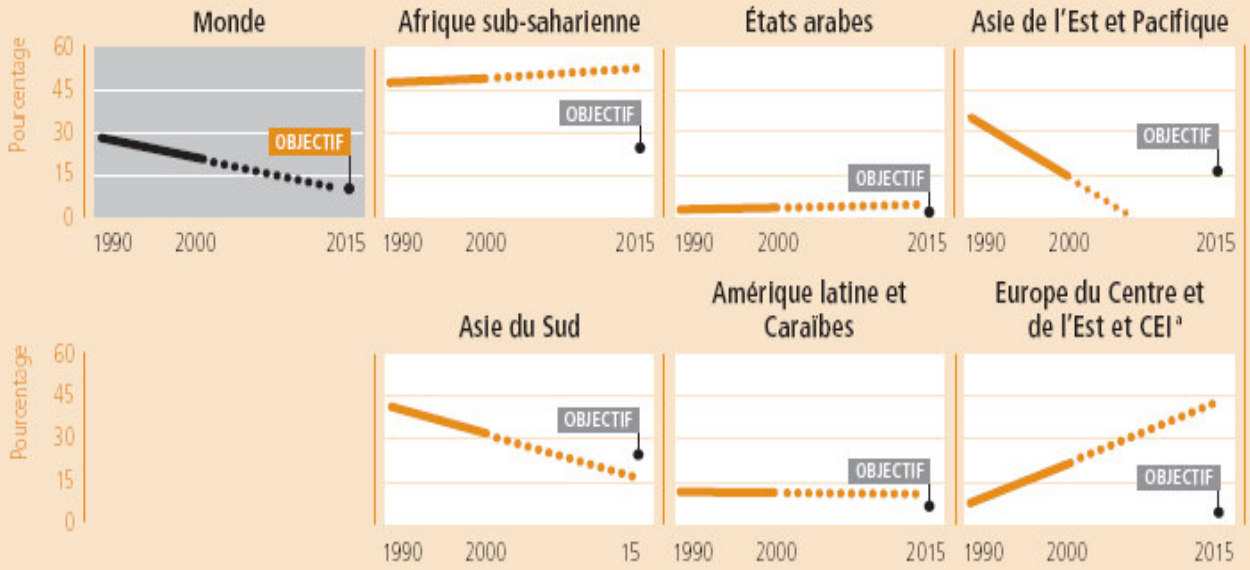
| Région | Vivre avec moins de 1$ (PPA) par jour | Population souffrant de malnutrition [a] | Enfants en bas âge non scolarisés | Filles en bas âge non scolarisés | Enfants de moins de cinq ans mourant chaque année | Population privée d'un accès à une source d'eau aménagée | Population privée d'un accès à des installations sanitaires convenables |
|---|---|---|---|---|---|---|---|
| Afrique sub-saharienne | 323 | 185 | 44 | 23 | 5 | 273 | 299 |
| États arabes | 8 | 34 | 7 | 4 | 1 | 42 | 51 |
| Asie de l'Est et Pacifique | 261 | 212 | 14 | 7 | 1 | 453 | 1 004 |
| Asie du Sud | 432 | 312 | 32 | 21 | 4 | 225 | 944 |
| Amérique latine et Caraïbes | 56 | 53 | 2 | 1 | 0 | 72 | 121 |
| Europe du Centre et de l'Est et CEI | 21 | 33 | 3 | 1 | 0 | 29 | .. |
| Monde | 1 100 | 831 | 104 | 59 | 11 | 1 197 | 2 742 |

a. 1998–2000.

Source : Banque mondiale 2003a, 2004f ; UNESCO 2003 ; ONU 2003.

Figure 3 **Progression insuffisante vers les objectifs du développement du millénaire**

**Pauvreté :** Proportion de la population vivant avec moins de 1$ par jour (%)



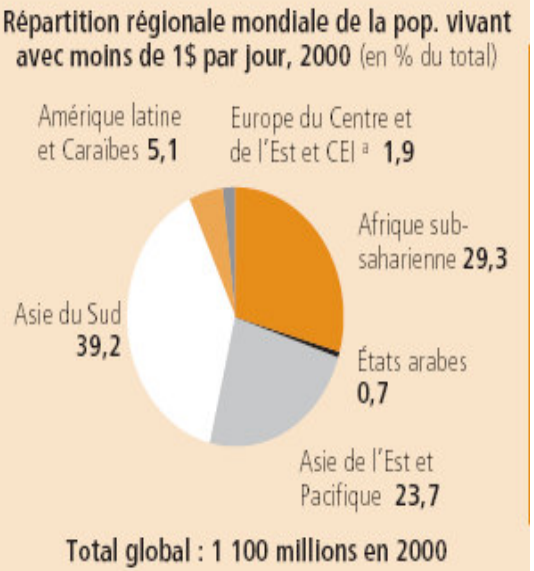
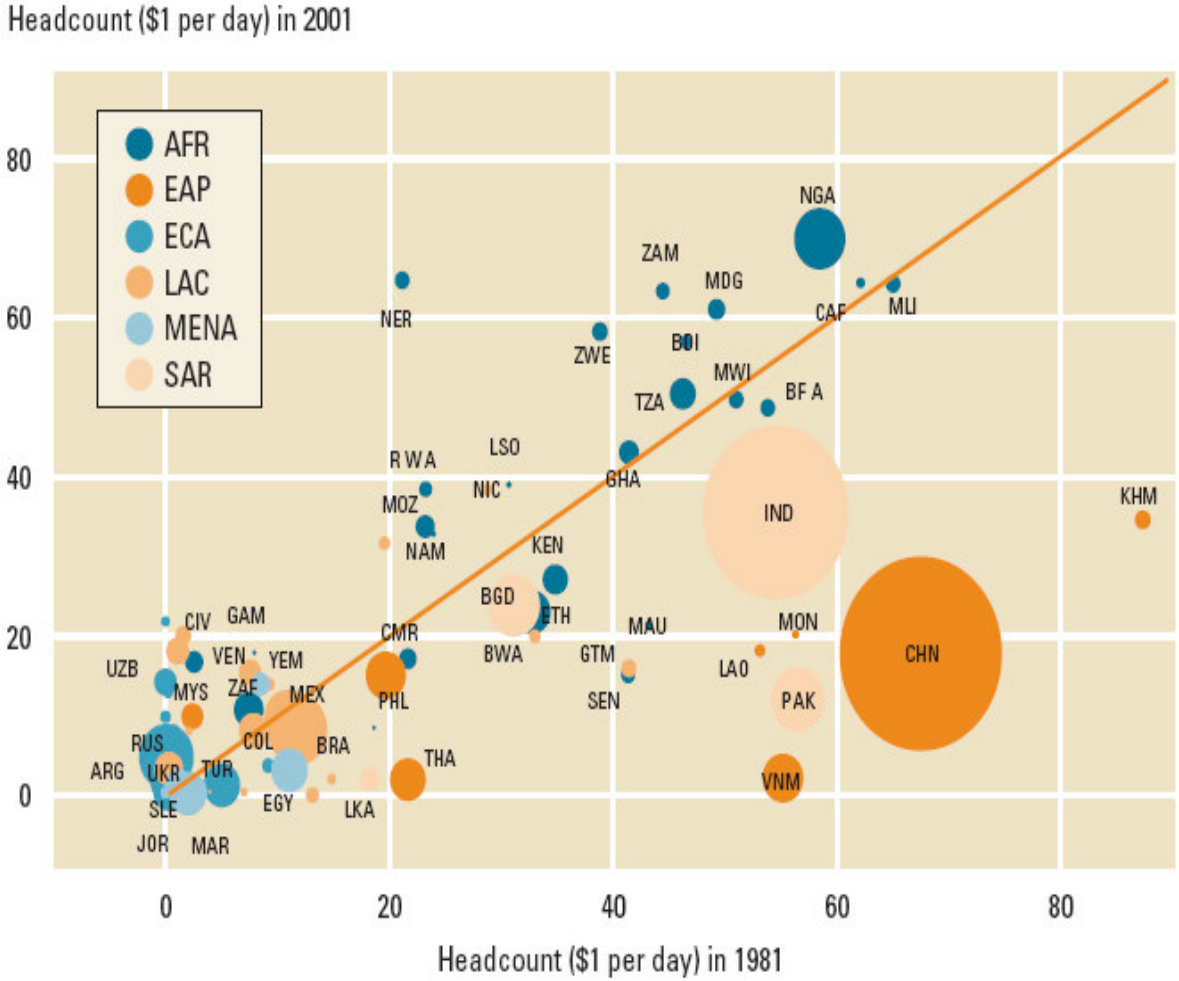
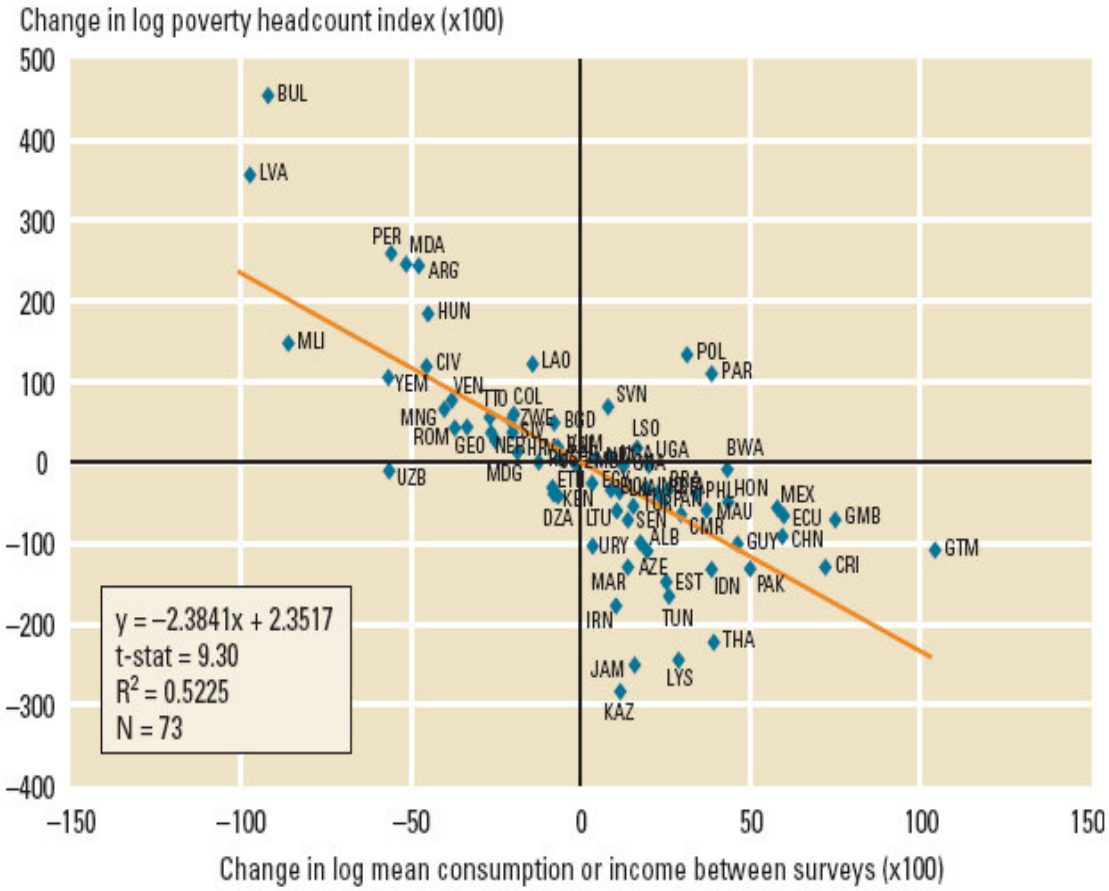



**Figure 3.11 Absolute poverty declined globally, but not in every region**




*Source:* PovcalNet (http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp).

**Figure 4.3 Growth is the key to poverty reduction . . .**




*Source:* Authors' calculations.

Figure 3.4

## Performance mitigée de la discrimination positive aux États-Unis

### Résultats relatifs à l'égalité

| | Environ 1980 | | Environ 2000 | |
|---|---|---|---|---|
| | Blancs | Noirs | Blancs | Noirs |
| **Espérance de vie** (années) | 74.4 | 68.1 | 77.7 | 72.2 |
| **Décès maternels** (pour mille naissances) | 6.7 | 21.5 | 5.1 | 17.1 |
| **Taux de mortalité infantile** (pour mille naissances) | 10.9 | 22.2 | 5.2 | 14 |
| **Individus vivant sous le seuil de pauvreté** (pourcentage) | 10.2 | 32.5 | 9.5 | 22.5 |
| **Taux de chômage** (16 ans et plus) | 6.3 | 14.3 | 3.5 | 7.6 |
| **Taux de chômage** (des 16 à 19 ans) | 15.5 | 38.5 | 11.4 | 24.5 |

**Abhijit V. Banerjee and Esther Duflo "The Economic Lives of the Poor" 2006, MIT Working Paper.**

**Table 1: Data sets description**

| | | | | *Households (HHs) Living On Less Than* | | | |
|---|---|---|---|---|---|---|---|
| | | | | *$1.08 per person per day* | | *$2.16 per person per day* | |
| *Country* | *Source* | *Year* | *Avg Monthly Consumption per capita (In PPP$)* | *Number Surveyed* | *Percent of Total Surveyed HHs* | *Number Surveyed* | *Percent of Total Surveyed HHs* |
| Cote d'Ivoire | LSMS | 1988 | 664.13 | 375 | 14% | 1,411 | 49% |
| Guatemala | GFHS | 1995 | 301.92 | 469 | 18% | 910 | 34% |
| India - Hyderabad | Banerjee-Duflo-Glennerster | 2005 | 71.61 | 106 | 7% | 1,030 | 56% |
| India - Udaipur | Banerjee-Deaton-Duflo | 2004 | 43.12 | 482 | 47% | 883 | 86% |
| Indonesia | IFLS | 2000 | 142.84 | 320 | 4% | 2,106 | 26% |
| Mexico | MxFLS | 2002 | 167.97 | 959 | 15% | 2,698 | 39% |
| Nicaragua | LSMS | 2001 | 117.34 | 333 | 6% | 1,322 | 28% |
| Pakistan | LSMS | 1991 | 48.01 | 1,573 | 40% | 3,632 | 83% |
| Panama | LSMS | 1997 | 359.73 | 123 | 2% | 439 | 6% |
| Papua New Guinea | LSMS | 1996 | 133.38 | 185 | 15% | 485 | 38% |
| Peru | LSMS | 1994 | 151.88 | 297 | 7% | 821 | 20% |
| South Africa | LSMS | 1993 | 291.33 | 413 | 5% | 1,641 | 19% |
| Tanzania | LSMS | 1993 | 50.85 | 1,184 | 35% | 2,941 | 73% |
| Timor Leste | LSMS | 2001 | 64.42 | 662 | 15% | 2,426 | 51% |

Notes 1) To compute the $1.08 and $2.16 poverty line for the countries in our sample, we use the 1993 consumption exchange rate provided by the World Bank (available at <http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp>) multiplied by the ratio of the country's Consumer Price Index to the U.S. Consumer Price Index between 1993 and the year the survey was carried out.

2) To compute average consumption per capita and the proportion of households in poverty, observations are weighted using survey weight*household size

3) The Mexican Family Life Survey is documented in Rubalcava and Teruel (2004) and available at http://www.radix.uia.mx/ennvih/

4) The LSMS are available from the World Bank LSMS project page.

5) The IFLS and GFLS are available from the RAND FLS page (http://www.rand.org/labor/FLS/)

6) The Udaipur data is available from www.povertyactionlab.org/data. The Hyderabad data is forthcoming on the same page

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# Economie du développement

*Chapitre 6. Démographie*

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**Professeur Université de Nantes**

# Contents

# 1 Introduction

- La démographie : une caractéristique des pays pauvres et un enjeu global
- Principales notions utilisées : les taux de natalité et de mortalité, le taux de croissance de la population, la distribution par âge, le taux de fécondité, l'espérance de vie
- Démographie et niveaux de développement

# 2 La modélisation des comportements démographiques

- Gary S. Becker (1981 A Treatise on the Family; Nobel 1992), Freakonomics Steven D. Levitt. Chicago*

## 2.1 Les variables de choix

1. Mortalité ?
2. Fécondité *et* éducation ("Quantité *et* qualité")
3. Migration (autre chapitre)

*Becker Center on Chicago Price Theory. This Chicago-style approach, often known as "Price Theory" because of the fundamental role that prices often play, has shed light not only on the most fundamental topics of traditional economics (e.g. consumption, saving, taxation, regulation), but also pioneered the use of economic tools in studying a wide range of other human behavior (e.g. crime and corruption, discrimination, marriage).

## 2.2 La valorisation des enfants

- Critère utilitariste = dans la fonction d'utilité
- Deux motifs
  1. L'actualisation de transferts futurs
  2. L'altruisme
- Deux motifs compatibles avec une modélisation combinant le nombre d'enfants et leur capital humain

## 2.3 Le programme du ménage

- La fonction d'utilité

$$\max_{x,n,c,t} U(x, n, z; \boldsymbol{\alpha})$$

$x$ consommation des parents, $n$ nombre d'enfants, $z$ capital humain par enfant, $\boldsymbol{\alpha}$ paramètres structurels

- La technologie de production du capital humain

$$z = \frac{Z(c, t; \boldsymbol{\beta})}{n}$$

$Z$ capital humain total, $c$ revenu investi dans le capital humain, $t$ temps investi dans le capital humain, $\boldsymbol{\beta}$ paramètres structurels

- La contrainte budgétaire

$$w(1 - t) = p_x x + p_c c$$

$w$ taux de salaire

- Le programme réduit et les conditions d'équilibre

$$\max_{n,c,t} U\left(\frac{w}{p_x}(1-t)-\frac{p_c}{p_x}c, n, \frac{Z(c,t;\boldsymbol{\beta})}{n}; \boldsymbol{\alpha}\right)$$

avec $U_y = \partial U(x,n,z;\boldsymbol{\alpha})/\partial y > 0$ pour $y = x, n, z$

$$\begin{aligned} n &: U_n - U_z\frac{Z(c,t;\boldsymbol{\beta})}{n^2} = 0 \\ c &: -\frac{p_c}{p_x}U_x + U_z\frac{Z_c(c,t;\boldsymbol{\beta})}{n} = 0 \\ t &: -\frac{w}{p_x}U_x + U_z\frac{Z_t(c,t;\boldsymbol{\beta})}{n} = 0 \end{aligned}$$

1. Arbitrage entre consommation et enfants (et entre nombres d'enfants et éducation de chaque enfant)
2. Ressources arbitrées : temps des parents et leur revenu
3. Environnement économique ($\boldsymbol{\alpha}, \boldsymbol{\beta}, n, p_x, p_c, w$) détermine les choix d'équilibre selon la forme de $U(\cdot)$ et $Z(\cdot)$
4. Exemple d'application : hausse de $w \rightarrow$ hausse du coût d'opportunité de l'éducation

## 2.4 Le rôle des normes sociales

- L'environnement social et culturel compte
- L'utilité marginale d'un enfant est plus élevée dans une société où le nombre d'enfants est élevé

$$\frac{\partial U_n}{\partial \mathbf{n}} > 0$$

où $\mathbf{n}$ est le nombre moyen d'enfants

- Externalité $\longrightarrow$ complémentarité stratégique

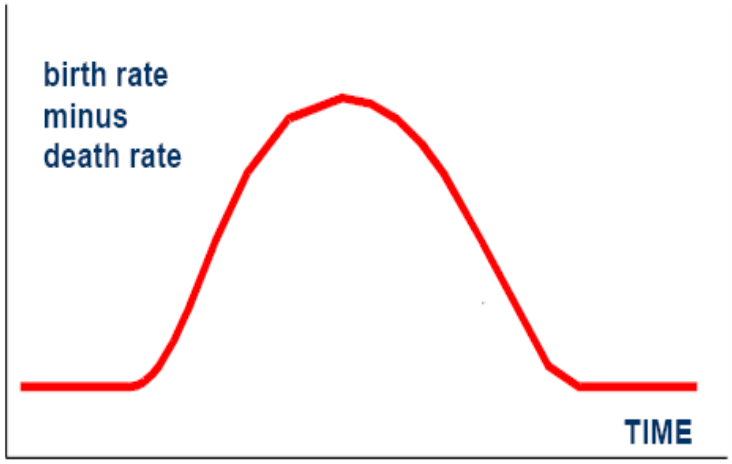
$$n^* = f(\mathbf{n})$$

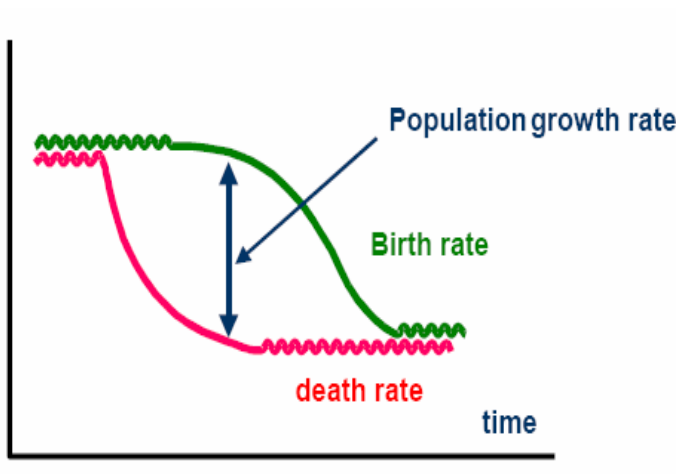
avec $n^*$ le nombre d'enfants choisis et selon la forme de $f()$ la possibilité d'équilibres multiples

- Remarque : fertilité et immigration.

# 3 La transition démographique

## 3.1 Définition de la transition démographique



## 3.2 Retrospective (0–1998)

- Histoire économique : la transition démographique dans les pays occidentaux.
  - Interactions population – technologie – capital humain (O. Galor)

1. Regime malthusien
   - revenu par tête quasi–constant et relation positive pop. – développement. "the most decisive mark of the prosperity of any country is the increase in the number of its inhabitants" (Smith 1776).
2. Regime post–malthusien
   - croissance du revenu par tête et relation positive pop. – développement
3. Régime de croissance moderne
   - croissance du revenu par tête et relation négative pop. – développement

- Les différentes hypothèses
  1. La baisse de la mortalité ?
  2. La hausse du revenu ?
  3. La hausse de la demande du capital humain ?

## 3.3 Prospective (1950—2050)

- Une transition démographique en cours

# 4 Conclusion

- Pertinence du concept de transition démographique
  - histoire économique de l'occident occident
  - évolution courante d'une partie des pays en développement avec le problème des pays les moins avancés
- Mécanismes économiques
  - rationnalité des choix avec effet revenu,effet substitution
  - limite : prise en compte du genre et de la négociation intra–famille (développements actuels en économie de la famille avec théorie de la négociation, expérimentations)
- Questions importantes non–abordées
  1. "Les missing women" Amartya sen (1990)
  2. Les conséquences des épidémies (Sida)

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# Documents joints au chapitre 6

**United Nations • Department of Economic and Social Affairs • Population Division**

| Country or area | Mid-year population (thousands) 2005 | 2015 | 2050 | Density (pop/km²) Mid-2005 | Percentage urban | Average annual rate of population change (per cent) 2000-2005 | Crude birth rate (per 1,000) | Crude death rate (per 1,000) | Total fertility (children per woman) | Percentage of all births to women under age 20 | Life expectancy at birth (years) | Under-five mortality (deaths per 1,000 live births) | Percentage of population Under age 15 Mid-2005 | 60 or older |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| **World** | **6 464 750** | **7 219 431** | **9 075 903** | **48** | **49** | **1.2** | **21** | **9** | **2.6** | **13** | **65** | **86** | **28** | **10** |
| More developed regions[a] | 1 211 265 | 1 236 561 | 1 236 200 | 23 | 75 | 0.3 | 11 | 10 | 1.6 | 8 | 76 | 10 | 17 | 20 |
| Less developed regions[b] | 5 253 484 | 5 982 871 | 7 839 702 | 63 | 43 | 1.4 | 24 | 9 | 2.9 | 13 | 63 | 94 | 31 | 8 |
| Least developed countries[c] | 759 389 | 951 610 | 1 735 368 | 37 | 28 | 2.4 | 38 | 14 | 5.0 | 18 | 51 | 160 | 42 | 5 |

**More developed regions comprise all regions of Europe plus Northern America, Australia/New Zealand and Japan. Less developed regions comprise all regions of Africa, Asia (excluding Japan) and Latin America and the Caribbean, as well as Melanesia, Micronesia and Polynesia. The group of least developed countries, as defined by the United Nations General Assembly in 2003, comprises 50 countries: Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao Peoples Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Timor-Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen and Zambia**

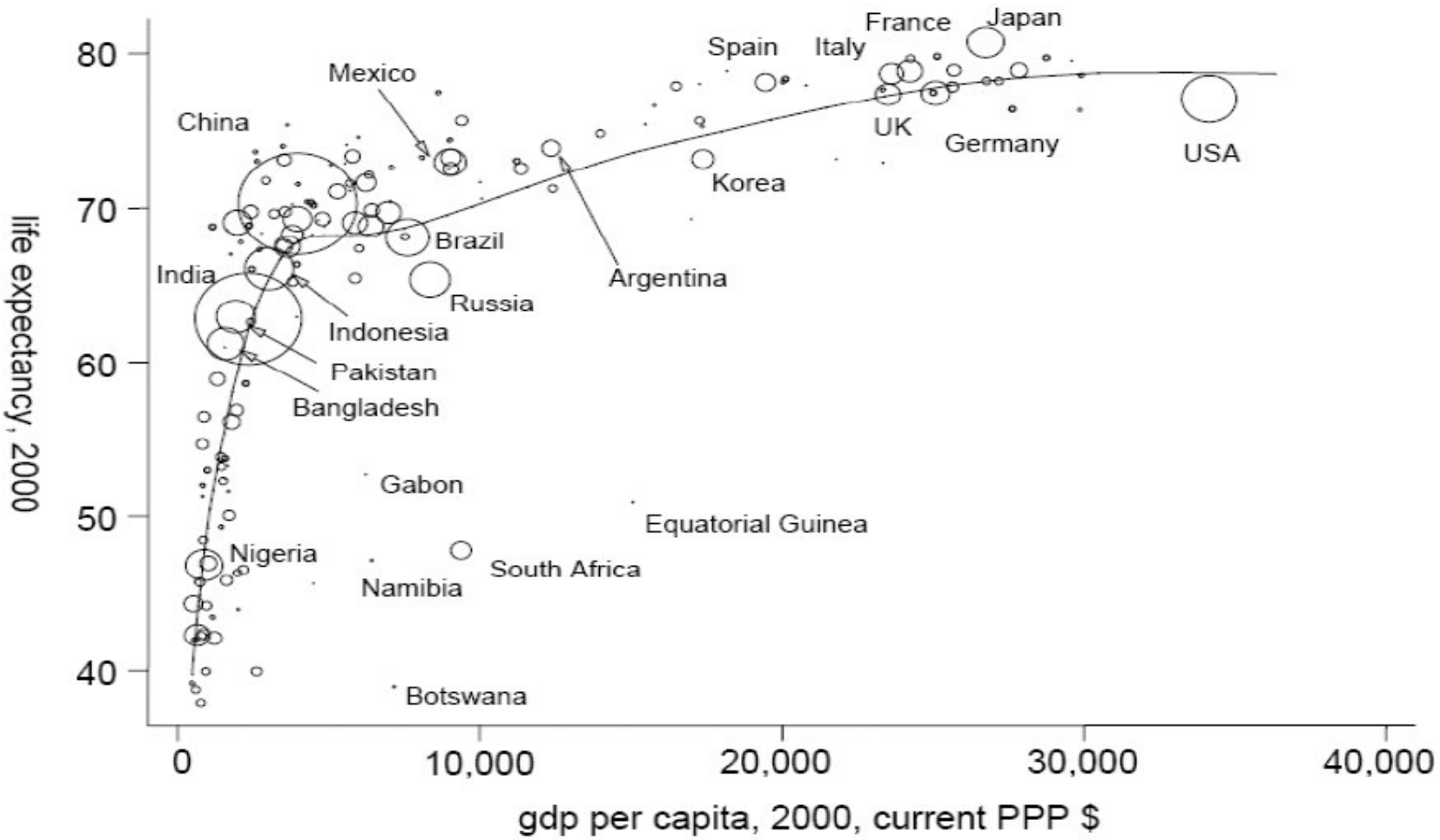



**Figure 1: The Millennium Preston curve**

Source: Author's calculations based on World Development Indicators 2003 (life expectancy and Penn World Table (GDP.)

Note: Circles have diameter proportional to population size

**Sources : Oded Galor (2004) "From stagnation to growth: unified growth theory" in the Handbook of Economic Growth edited by Ph. Aghion et S. Durlauf, North-Holland, 2. Angus Maddison (2001) The World Economy. OECD.**

Table 1–1. **Level and Rate of Growth of Population: World and Major Regions, 0–1998 A.D.**

| | *0* | *1000* | *1820* | *1998* | *0–1000* | *1000–1820* | *1820–1998* |
|---|---|---|---|---|---|---|---|
| | | | *(million)* | | *(annual average compound growth rate)* | | |
| Western Europe | 24.7 | 25.4 | 132.9 | 388 | 0.00 | 0.20 | 0.60 |
| Western Offshoots | 1.2 | 2.0 | 11.2 | 323 | 0.05 | 0.21 | 1.91 |
| Japan | 3.0 | 7.5 | 31.0 | 126 | 0.09 | 0.17 | 0.79 |
| Total Group A | 28.9 | 34.9 | 175.1 | 838 | 0.02 | 0.20 | 0.88 |
| Latin America | 5.6 | 11.4 | 21.2 | 508 | 0.07 | 0.08 | 1.80 |
| Eastern Europe & former USSR | 8.7 | 13.6 | 91.2 | 412 | 0.05 | 0.23 | 0.85 |
| Asia (excluding Japan) | 171.2 | 175.4 | 679.4 | 3 390 | 0.00 | 0.17 | 0.91 |
| Africa | 16.5 | 33.0 | 74.2 | 760 | 0.07 | 0.10 | 1.32 |
| Total Group B | 202.0 | 233.4 | 866.0 | 5 069 | 0.01 | 0.16 | 1.00 |
| World | 230.8 | 268.3 | 1 041.1 | 5 908 | 0.02 | 0.17 | 0.98 |

*ource:* Appendix B.

Table 1–2. **Level and Rate of Growth of GDP Per Capita: World and Major Regions, 0–1998 A.D.**

| | *0* | *1000* | *1820* | *1998* | *0–1000* | *1000–1820* | *1820–1998* |
|---|---|---|---|---|---|---|---|
| | | *(1990 international dollars)* | | | *(annual average compound growth rate)* | | |
| Western Europe | 450 | 400 | 1 232 | 17 921 | –0.01 | 0.14 | 1.51 |
| Western Offshoots | 400 | 400 | 1 201 | 26 146 | 0.00 | 0.13 | 1.75 |
| Japan | 400 | 425 | 669 | 20 413 | 0.01 | 0.06 | 1.93 |
| Average Group A | 443 | 405 | 1 130 | 21 470 | –0.01 | 0.13 | 1.67 |
| Latin America | 400 | 400 | 665 | 5 795 | 0.00 | 0.06 | 1.22 |
| Eastern Europe & former USSR | 400 | 400 | 667 | 4 354 | 0.00 | 0.06 | 1.06 |
| Asia (excluding Japan) | 450 | 450 | 575 | 2 936 | 0.00 | 0.03 | 0.92 |
| Africa | 425 | 416 | 418 | 1 368 | –0.00 | 0.00 | 0.67 |
| Average Group B | 444 | 440 | 573 | 3 102 | –0.00 | 0.03 | 0.95 |
| World | 444 | 435 | 667 | 5 709 | –0.00 | 0.05 | 1.21 |

**Transitions démographiques achevées et en cours**

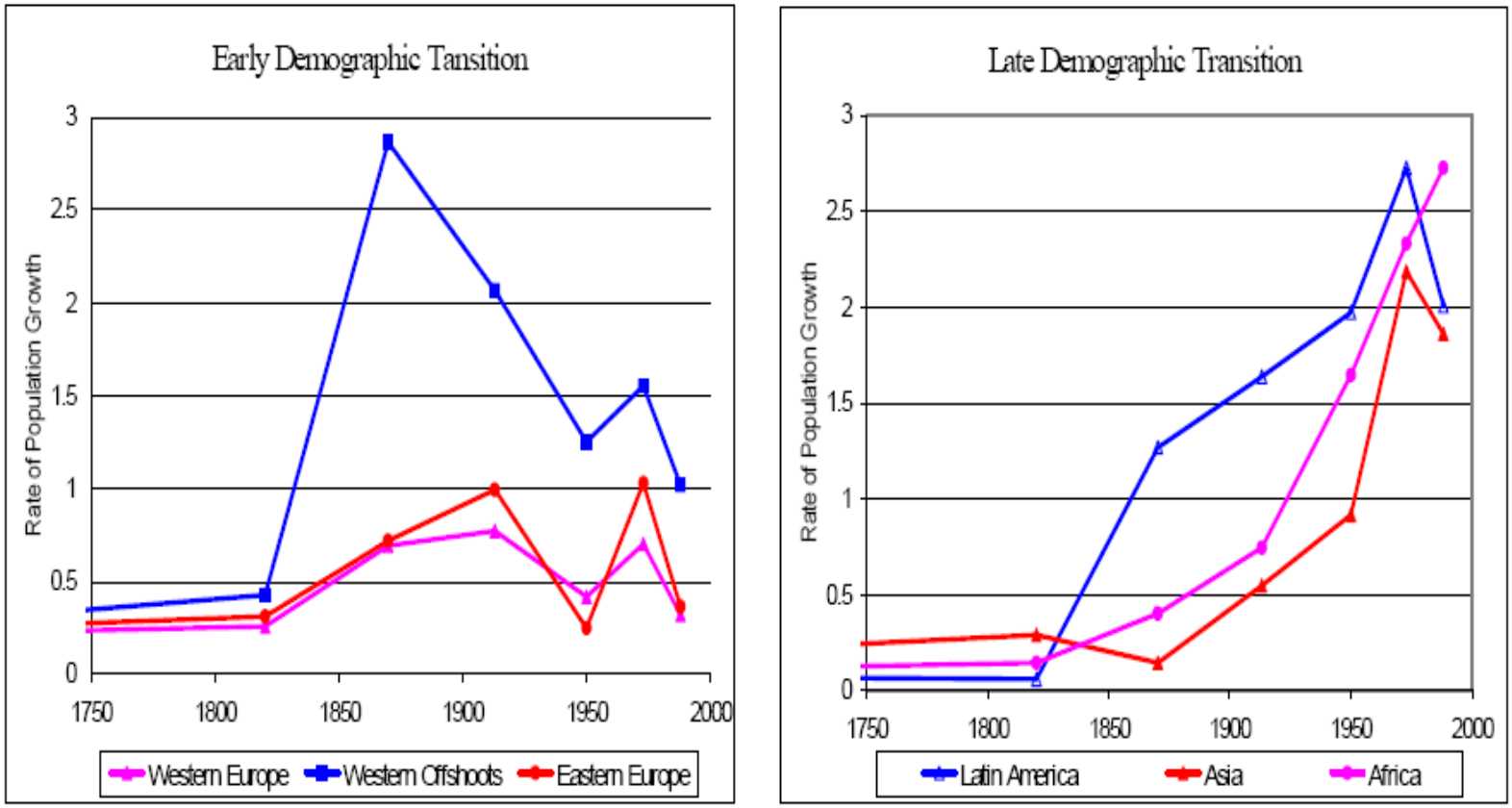



Figure 2.20. The Differential Timing of the Demographic Transition Across Regions

Source: Maddison (2001)

**Pourquoi la baisse de la mortalité n'est pas à l'origine de la transition démographique.**

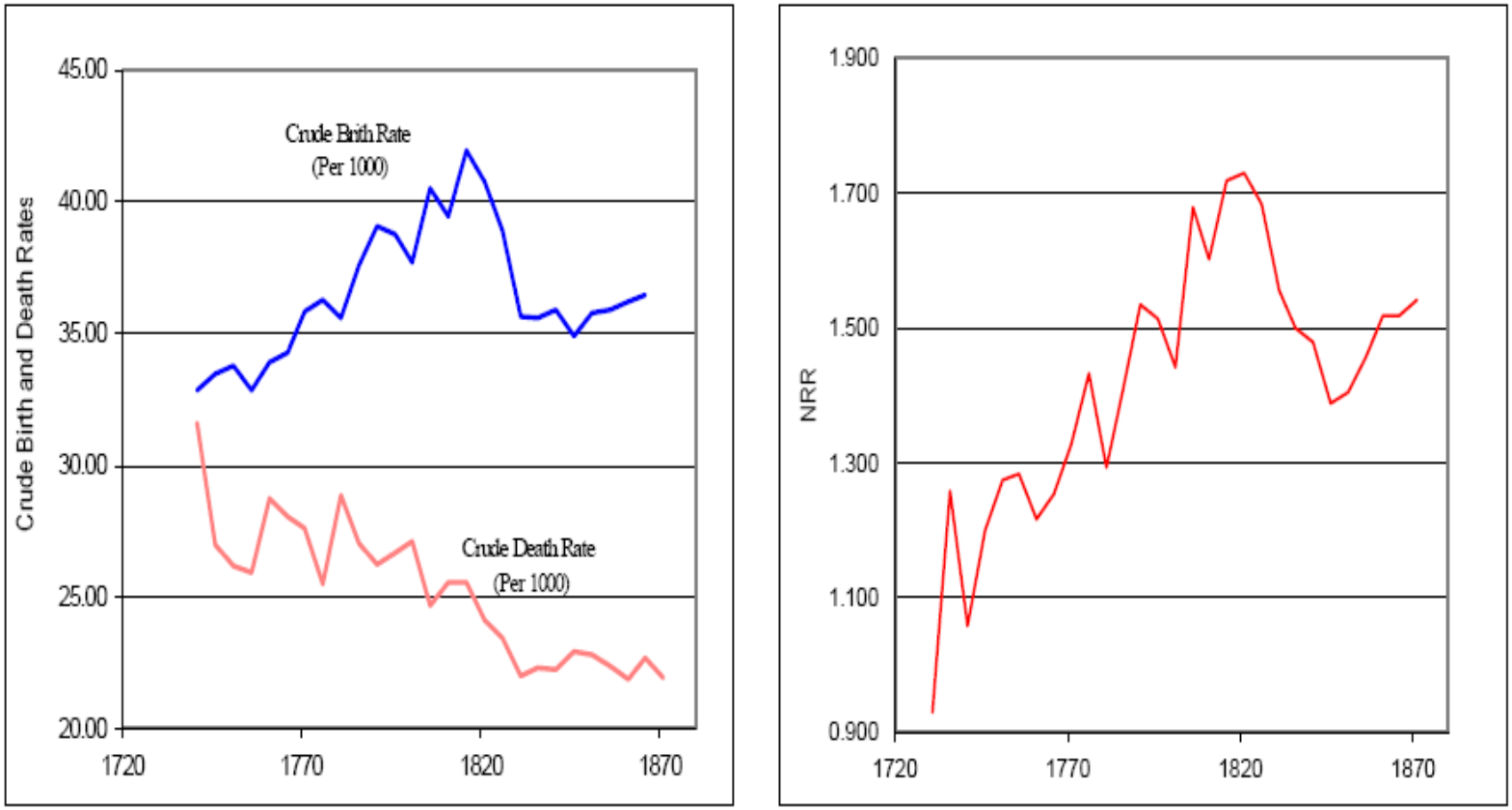



Figure 2.12. Fertility, Mortality and Net Reproduction Rate: England, 1730-1871
Source: Wrigley and Schofield (1981)

**La transition démographique en Europe**

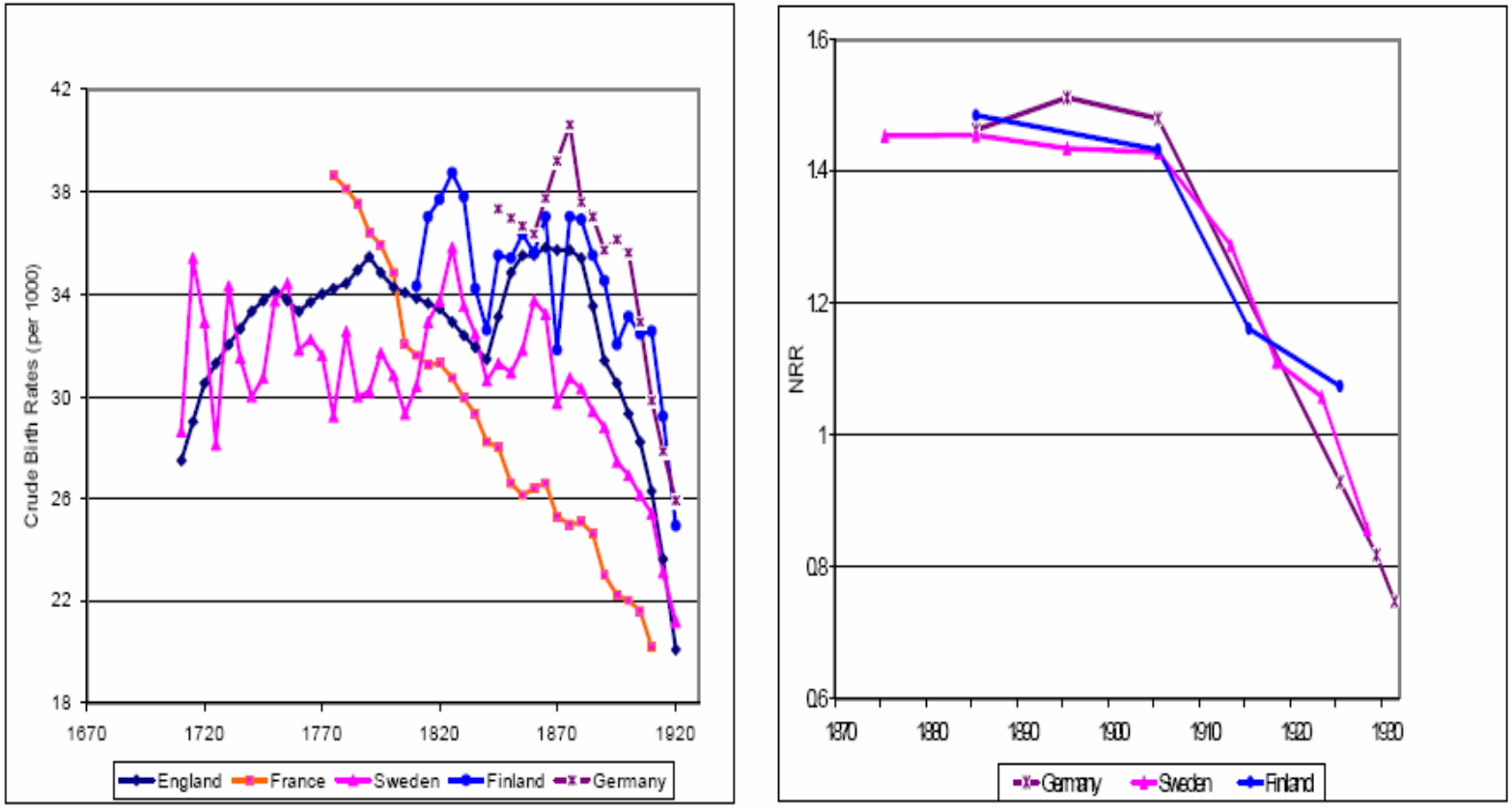
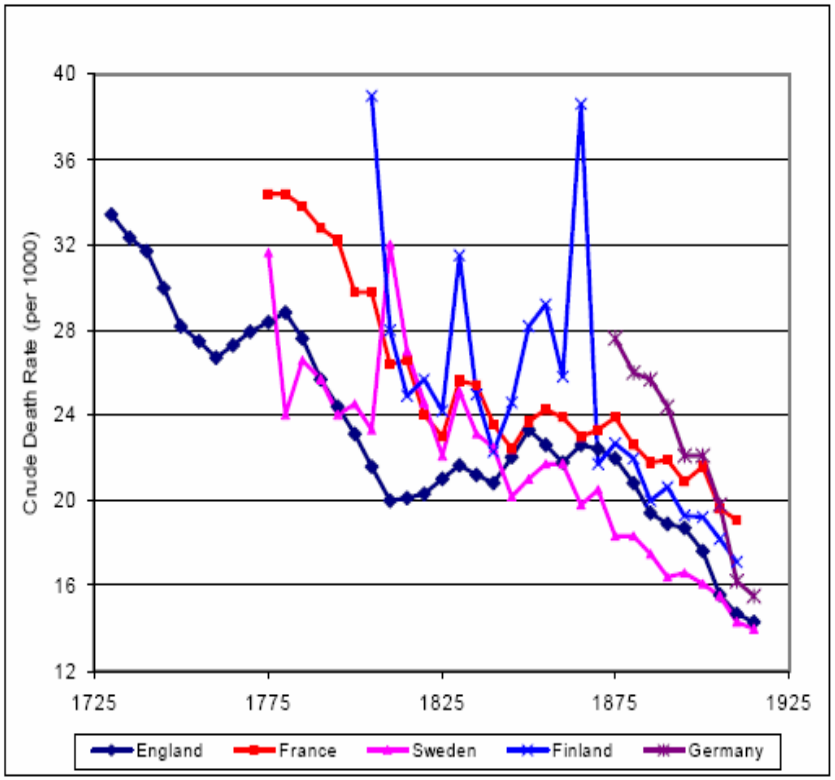
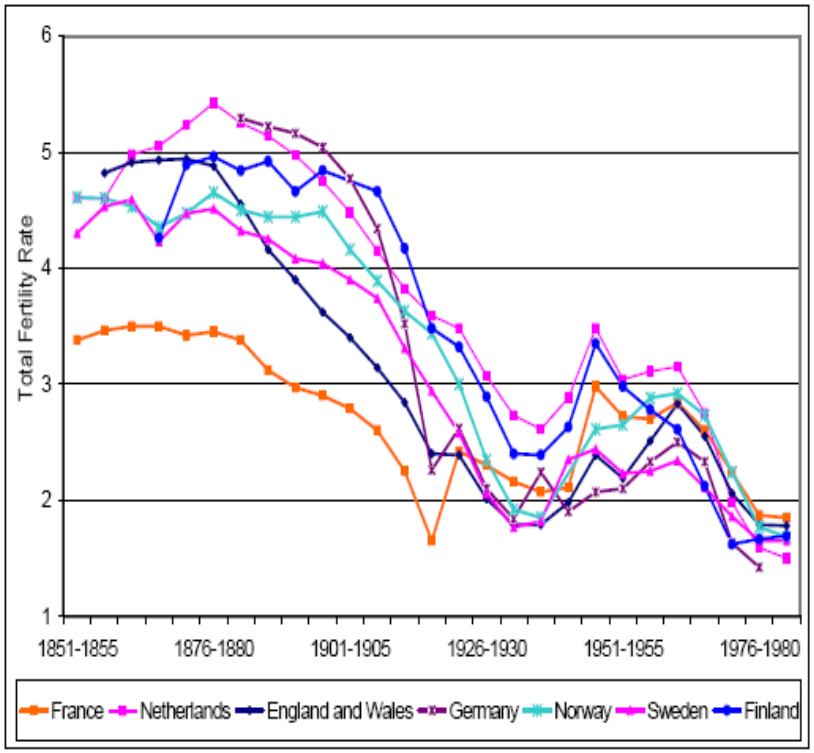



Figure 2.22. The Demographic Transition in Western Europe:
*Crude Birth Rates* and *Net Reproduction Rates*
Source: Andorka (1978) and Kuzynski (1969)

# La transition démographique en Europe (suite)



**La transition démographique en Europe (suite)**

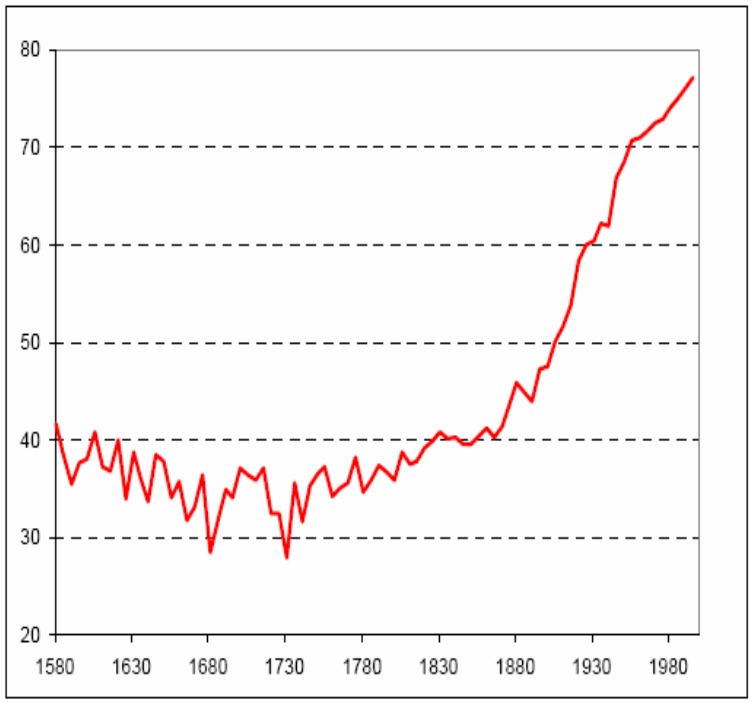



Figure 2.26. The Evolution of Life Expectancy: England 1726-1996

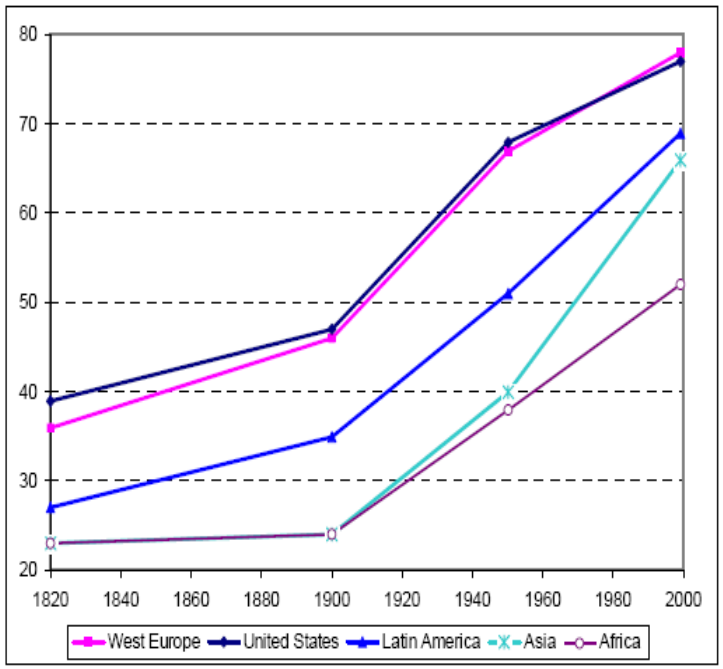
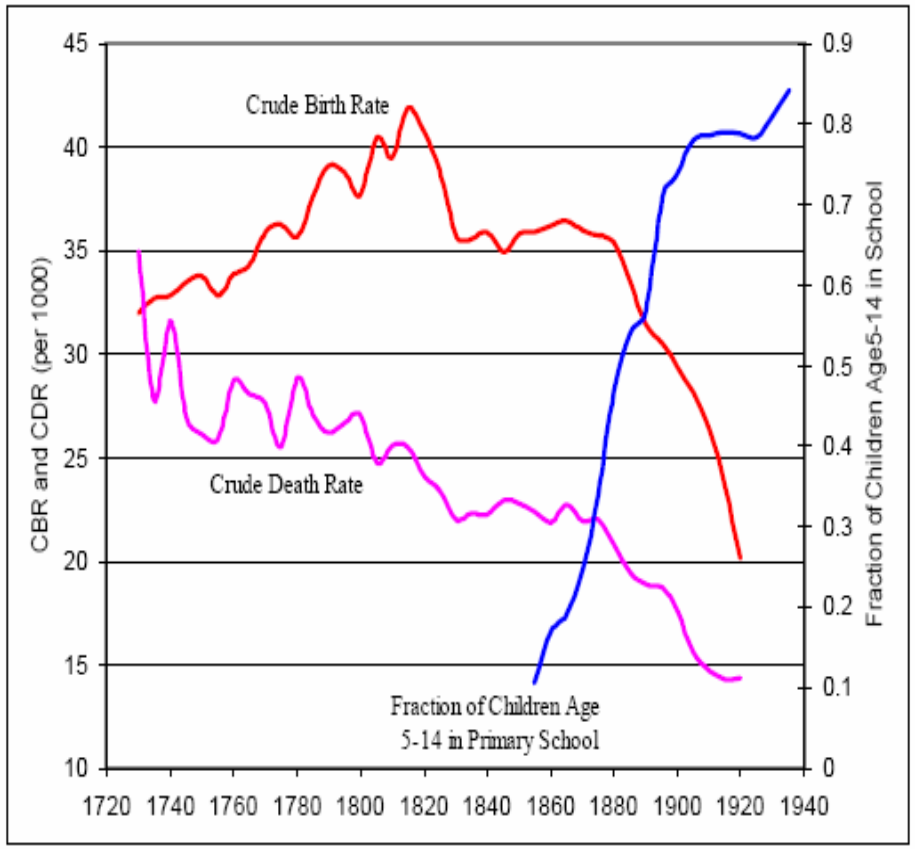
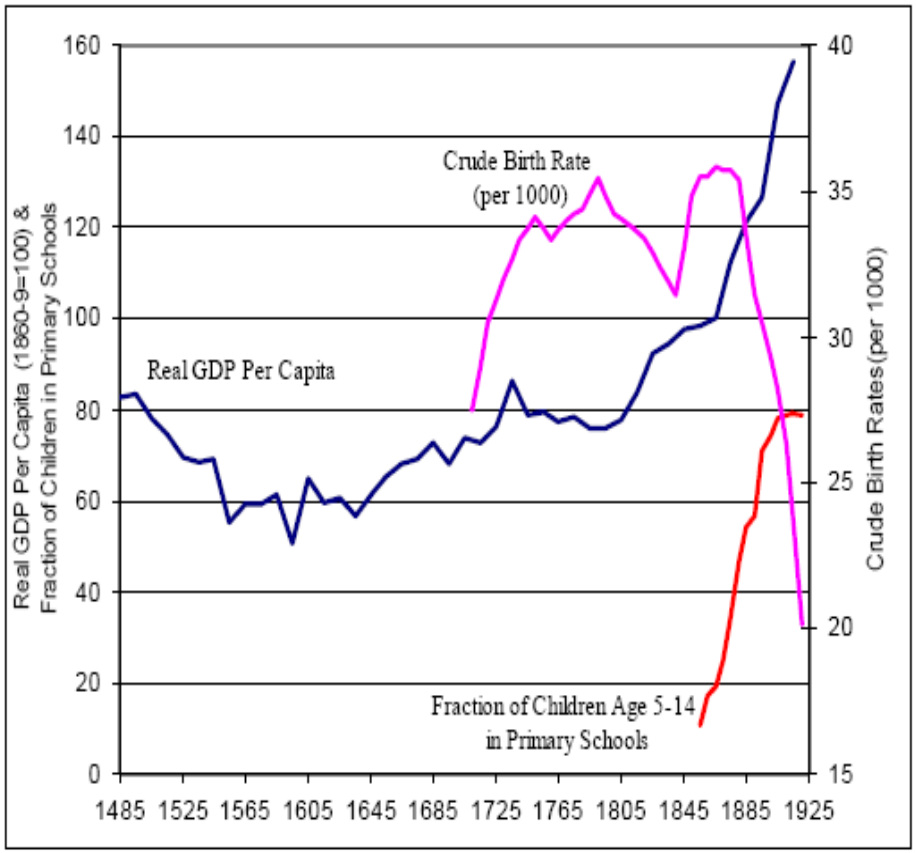



Figure 2.27. The Evolution of Life Expectancy Across Regions, 1820-1999

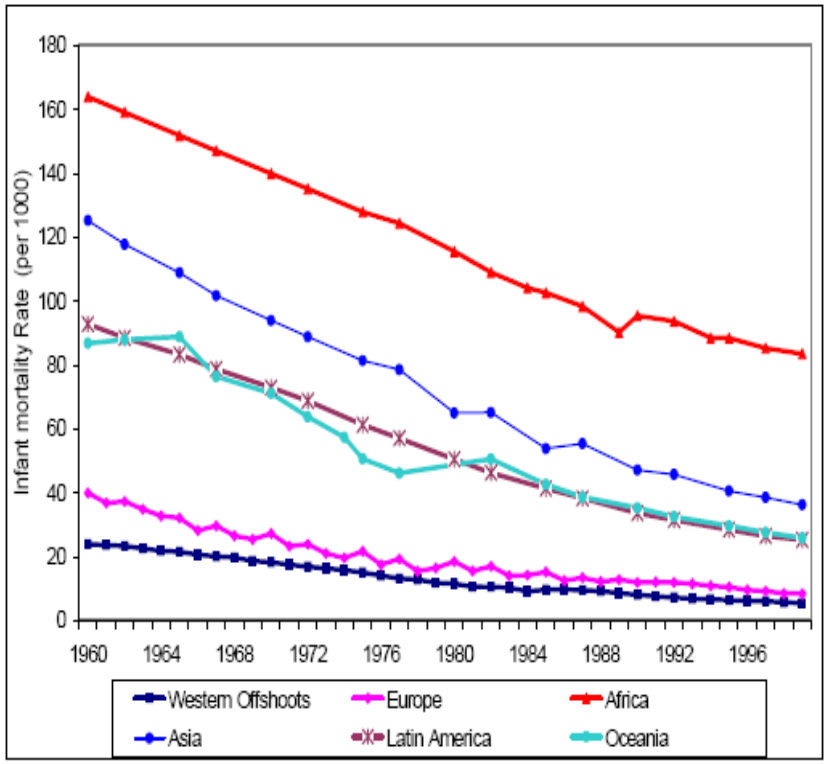
## Le rôle du capital humain

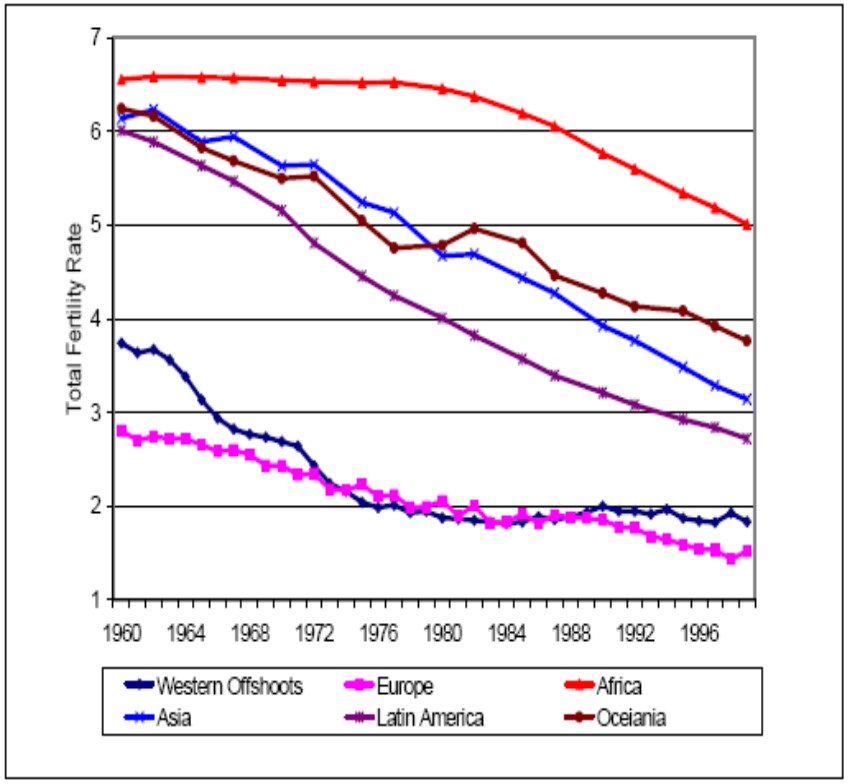


## Le rôle du capital humain (suite)



## Les évolutions récentes



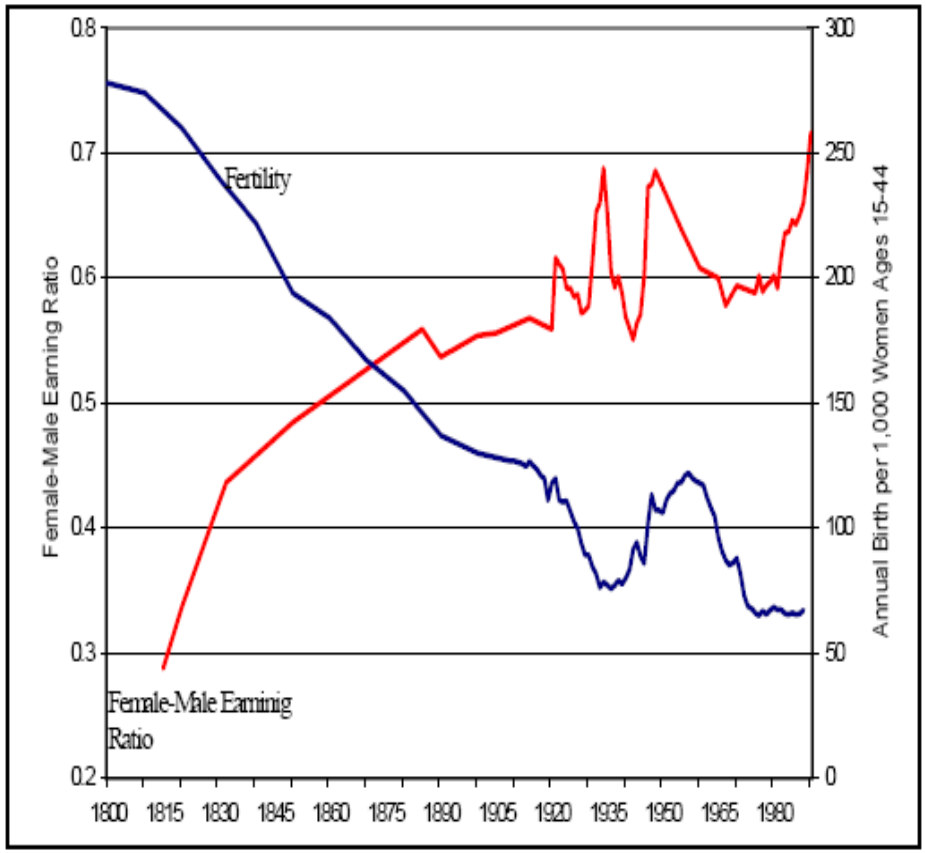


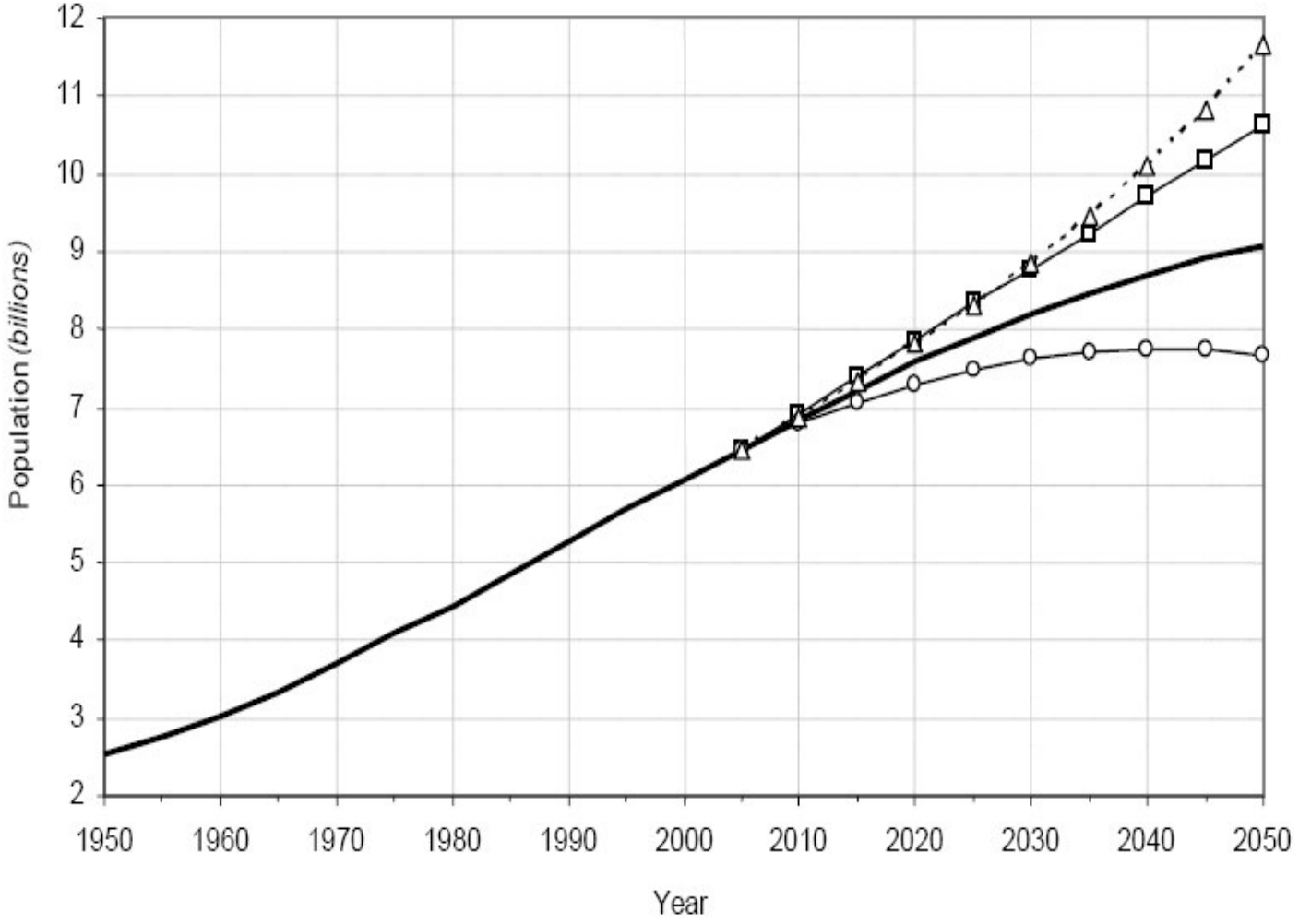

Figure 3.3. Female Relative Wages and Fertility Rates
United States 1800-1990

**World Population Prospects 2004, UN.**

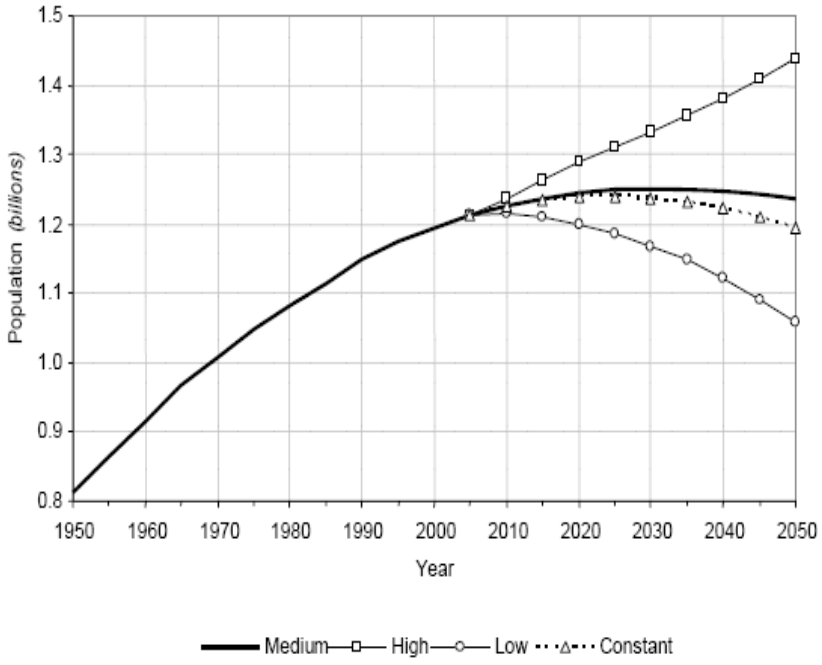
TABLE I.1. POPULATION, BY DEVELOPMENT GROUP AND MAJOR AREA, ESTIMATES AND MEDIUM VARIANT, 1950, 2005 AND 2050

| | *Population (millions)* | | | *Percentage distribution* | | |
|---|---|---|---|---|---|---|
| *Development group or major area* | *1950* | *2005* | *2050* | *1950* | *2005* | *2050* |
| World | 2 519 | 6 465 | 9 076 | 100.0 | 100.0 | 100.0 |
| More developed regions | 813 | 1 211 | 1 236 | 32.3 | 18.7 | 13.6 |
| Less developed regions | 1 707 | 5 253 | 7 840 | 67.7 | 81.3 | 86.4 |
| Least developed countries | 201 | 759 | 1 735 | 8.0 | 11.7 | 19.1 |
| Other less developed countries | 1 506 | 4 494 | 6 104 | 59.8 | 69.5 | 67.3 |
| Africa | 224 | 906 | 1 937 | 8.9 | 14.0 | 21.3 |
| Asia | 1 396 | 3 905 | 5 217 | 55.4 | 60.4 | 57.5 |
| Europe | 547 | 728 | 653 | 21.7 | 11.3 | 7.2 |
| Latin America and the Caribbean | 167 | 561 | 783 | 6.6 | 8.7 | 8.6 |
| Northern America | 172 | 331 | 438 | 6.8 | 5.1 | 4.8 |
| Oceania | 13 | 33 | 48 | 0.5 | 0.5 | 0.5 |

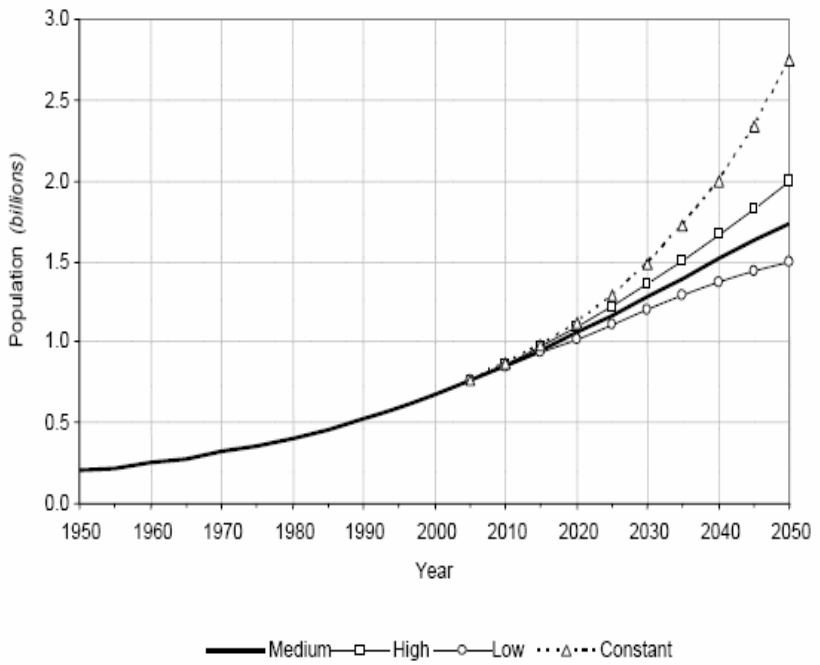
**Figure I.2. World population, estimates and projection variants, 1950–2050**



*A. More developed regions*




*B. Least developed countries*



*C. Other less developed countries*

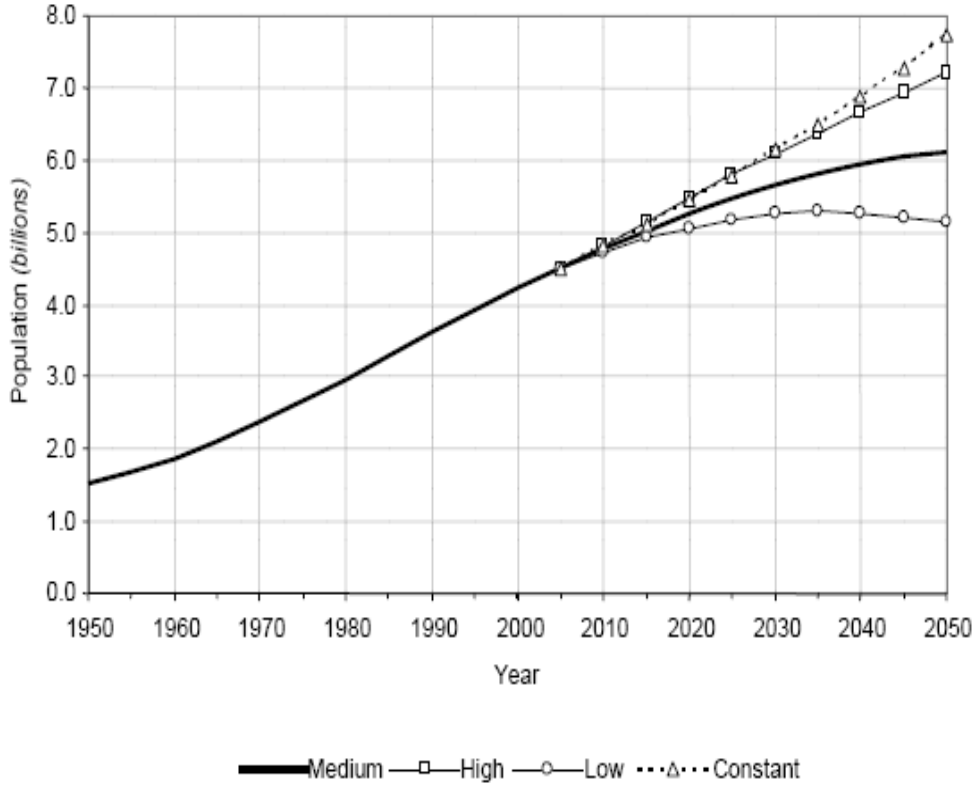
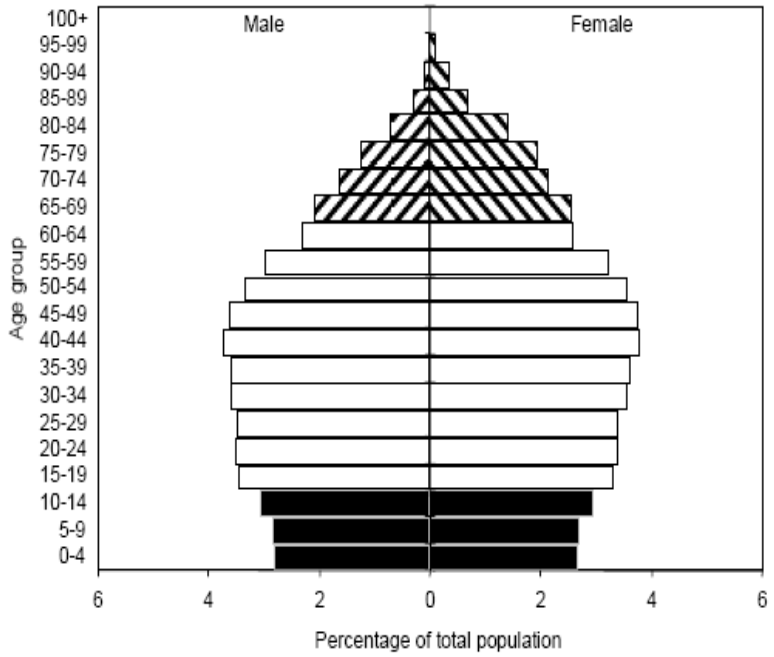
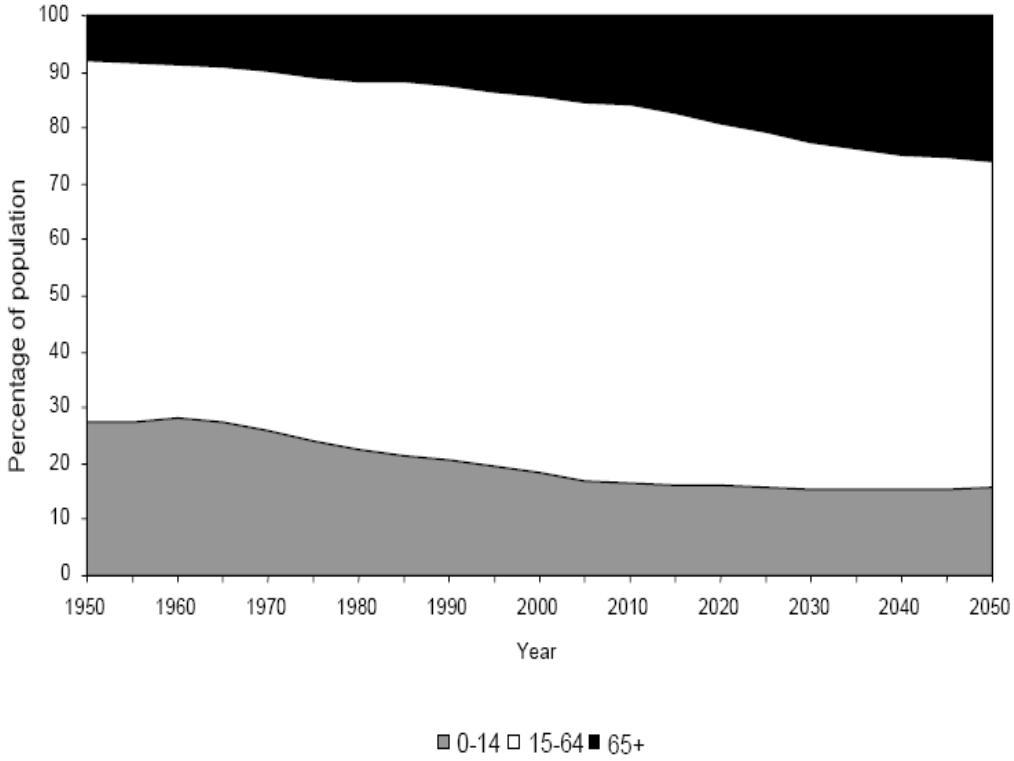


**Figure II.1. Population pyramids, by development group, 2005**

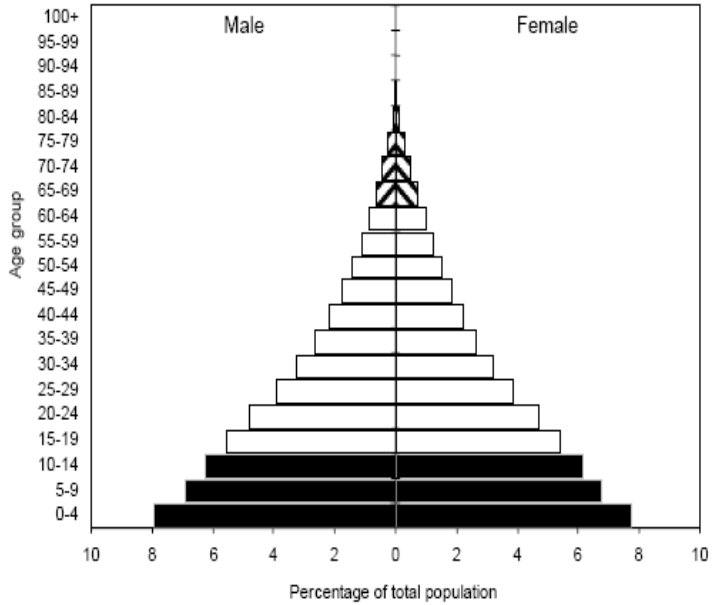
*A. More developed regions*



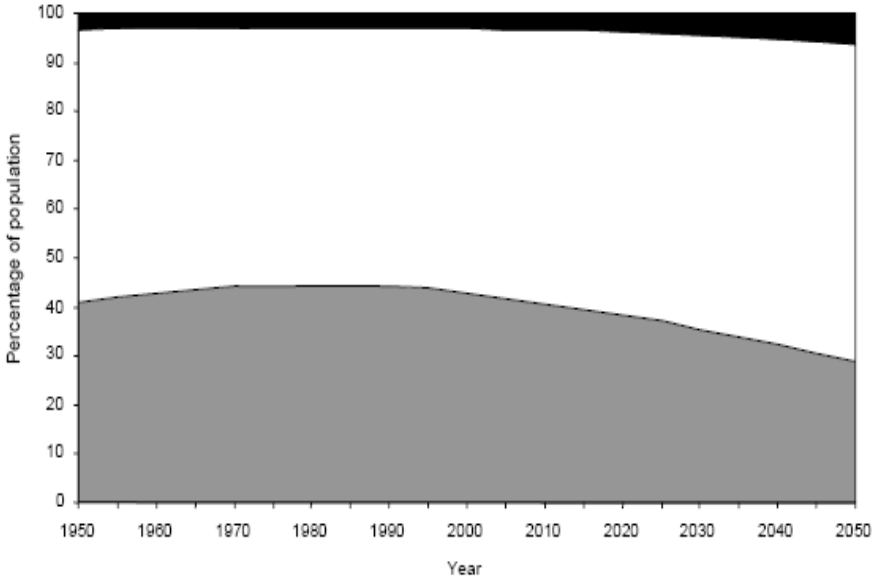

*A. More developed regions*

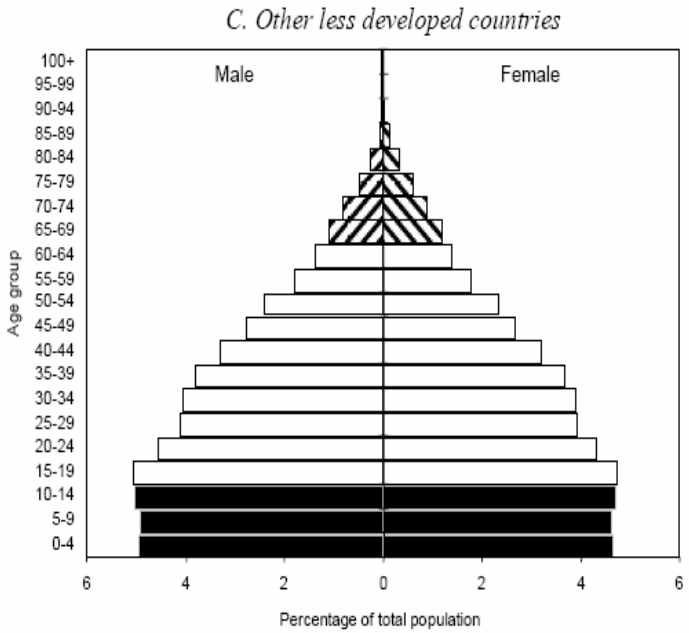


*B. Least developed countries*




*B. Least developed countries*




C. Other less developed countries
Male
Female
100+
95-99
90-94
85-89
80-84
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
Age group
6
4
2
0
2
4
6
Percentage of total population

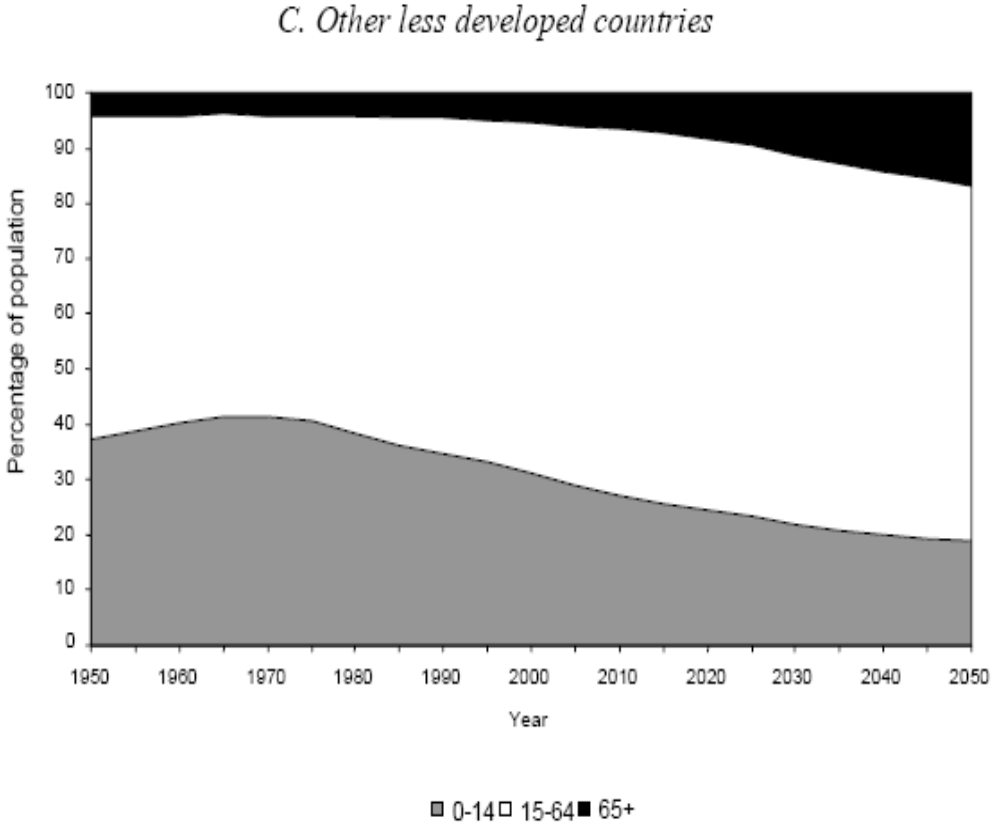

C. Other less developed countries
100
90
80
70
60
50
40
30
20
10
0
Percentage of population
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Year
0-14
15-64
65+

**Figure III.3. Total fertility, by major area, estimates and medium variant, 1950-1955 to 2045-2050**

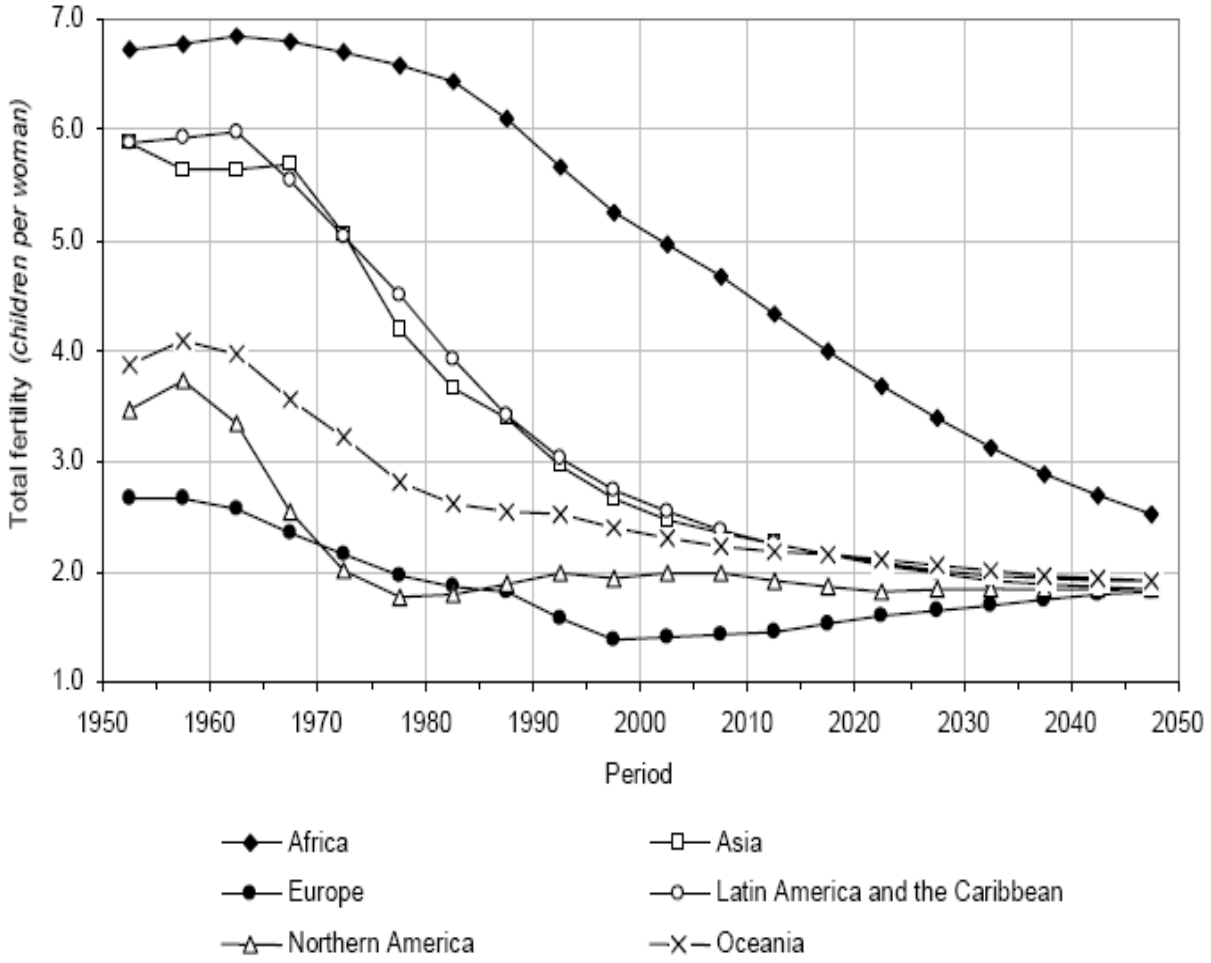
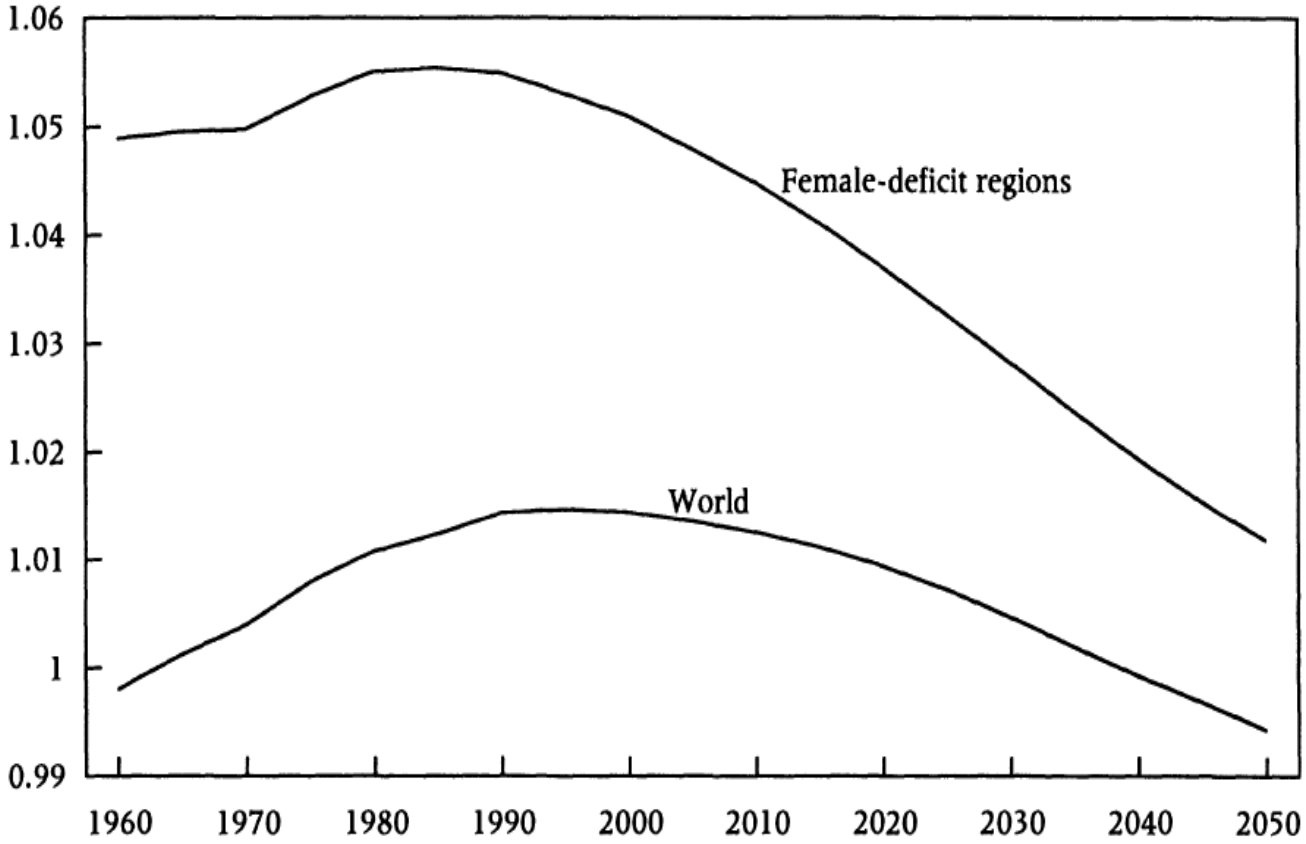


TABLE IV.1. LIFE EXPECTANCY AT BIRTH, BY DEVELOPMENT GROUP AND MAJOR AREA, ESTIMATES AND MEDIUM VARIANT, 1950-1955, 2000-2005, AND 2045-2050

| | *Life expectancy at birth (years)* | | | *Absolute change* | | *Percentage change* | |
|---|---|---|---|---|---|---|---|
| *Development group or major area* | *1950-1955* | *2000-2005* | *2045-2050* | *1950-1955 to 2000-2005* | *2000-2005 to 2045-2050* | *1950-1955 to 2000-2005* | *2000-2005 to 2045-2050* |
| World | 46.6 | 65.4 | 75.1 | 18.8 | 9.7 | 40.3 | 14.8 |
| More developed regions | 66.1 | 75.6 | 82.1 | 9.5 | 6.5 | 14.4 | 8.6 |
| Less developed regions | 41.1 | 63.4 | 74.0 | 22.2 | 10.6 | 54.1 | 16.7 |
| Least developed countries | 36.1 | 51.0 | 66.5 | 14.9 | 15.5 | 41.3 | 30.3 |
| Other less developed countries | 41.9 | 66.1 | 76.3 | 24.2 | 10.2 | 57.7 | 15.5 |
| Africa | 38.4 | 49.1 | 65.4 | 10.7 | 16.3 | 28.0 | 33.2 |
| Asia | 41.4 | 67.3 | 77.2 | 25.8 | 10.0 | 62.3 | 14.8 |
| Europe | 65.6 | 73.7 | 80.6 | 8.2 | 6.8 | 12.5 | 9.3 |
| Latin America and the Caribbean | 51.4 | 71.5 | 79.5 | 20.2 | 7.9 | 39.3 | 11.1 |
| Northern America | 68.8 | 77.6 | 82.7 | 8.7 | 5.2 | 12.7 | 6.7 |
| Oceania | 60.4 | 74.0 | 81.2 | 13.6 | 7.2 | 22.5 | 9.7 |

**FIGURE 1 Sex ratio, global and in female-deficit regions**




NOTE: Female-deficit regions are East Asia, West Asia, South Asia, and North Africa. Up to 1995 the figures are based on actual demographic data; thereafter they are projections.
SOURCE: United Nations (1999).

**Université de Nantes**
**Faculté des sciences économiques et de gestion**

**Année 2006/2007**
**Master 1 EGDD**

# Economie du développement

*Chapitre 7. Villes et campagnes*

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**Fabien Tripier**
**Professeur Université de Nantes**

# Contents

# 1 Introduction

- Rappel (chapitre 1) : une très forte relation entre développement et % de la population active dans le secteur agricole
- Importance du monde du rural dans les pays en développement
  1. pour ses habitants et leurs conditions de vie
  2. pour les villes et l'industrie (surplus agricole, migrations)

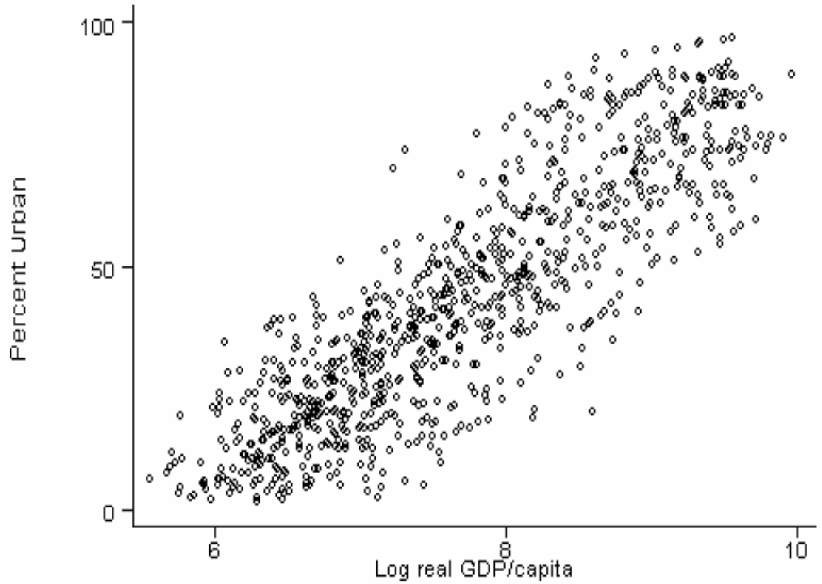



Fig. 1. Urbanization and income (UN World Urbanization Prospects and Penn World Tables).

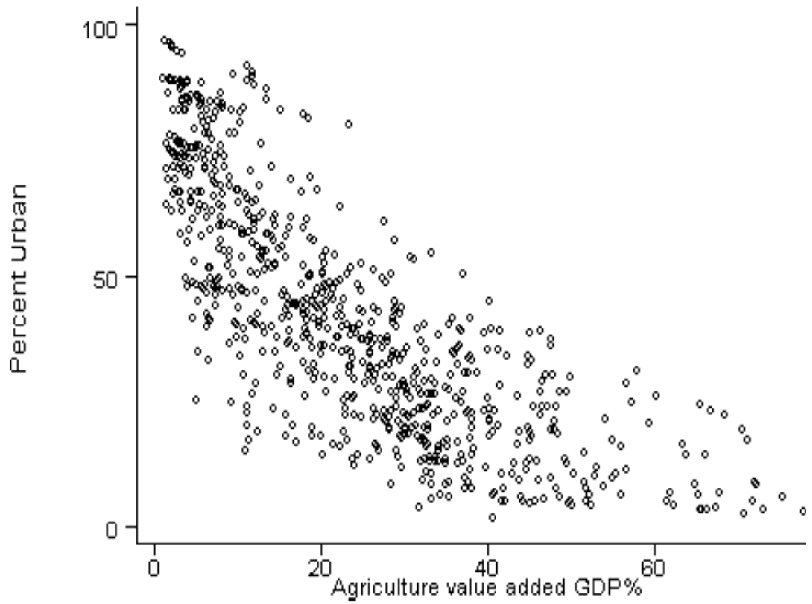



Fig. 2. Urbanization and agriculture (UN World Urbanization Prospects and World Bank Worl Indicators).

- Les différents secteurs
  1. Les secteurs urbains formels et informels (législation du travail, fiscalité, ...)
  2. Le secteur agricole
     - un grand secteur informel ! importance de l'auto–consommation de la production (quasi-absente dans les pays riches)
     - plusieurs formes d'organisation de la production : exploitation familiale, grandes exploitations "capitalistes", tenanciers, fermiers ou métayers (location de la terre aux propriétaires terriens, rente), salariés agricoles.

- le programme ICRISAT* (International Crops Research Institute for the Semi-Arid Tropics) sur des villages
  - Caractérisitiques des zones : un climat imprévisible, des pluies limitées et erratiques, des sols pauvres en éléments nutritifs, l'habitat du sixième de la population mondiale, l'habitat des plus pauvres au monde
  - Suivi longitudinal : hétérogénéité des fertilités des sols, importance du climat dans le choix des cultures et des techniques, diffusion des techniques d'irrigation, d'engrais, répartition et exploitation des terres ...

*L'Institut international de recherche sur les cultures des zones tropicales semi-arides (ICRISAT) est une organisation à but non lucratif, apolitique qui fait de la recherche agricole innovatrice et du renforcement de capacités pour le développement durable avec divers partenaires à travers le monde.

## l'ICRISAT dans le monde

# 2 L'urbanisation

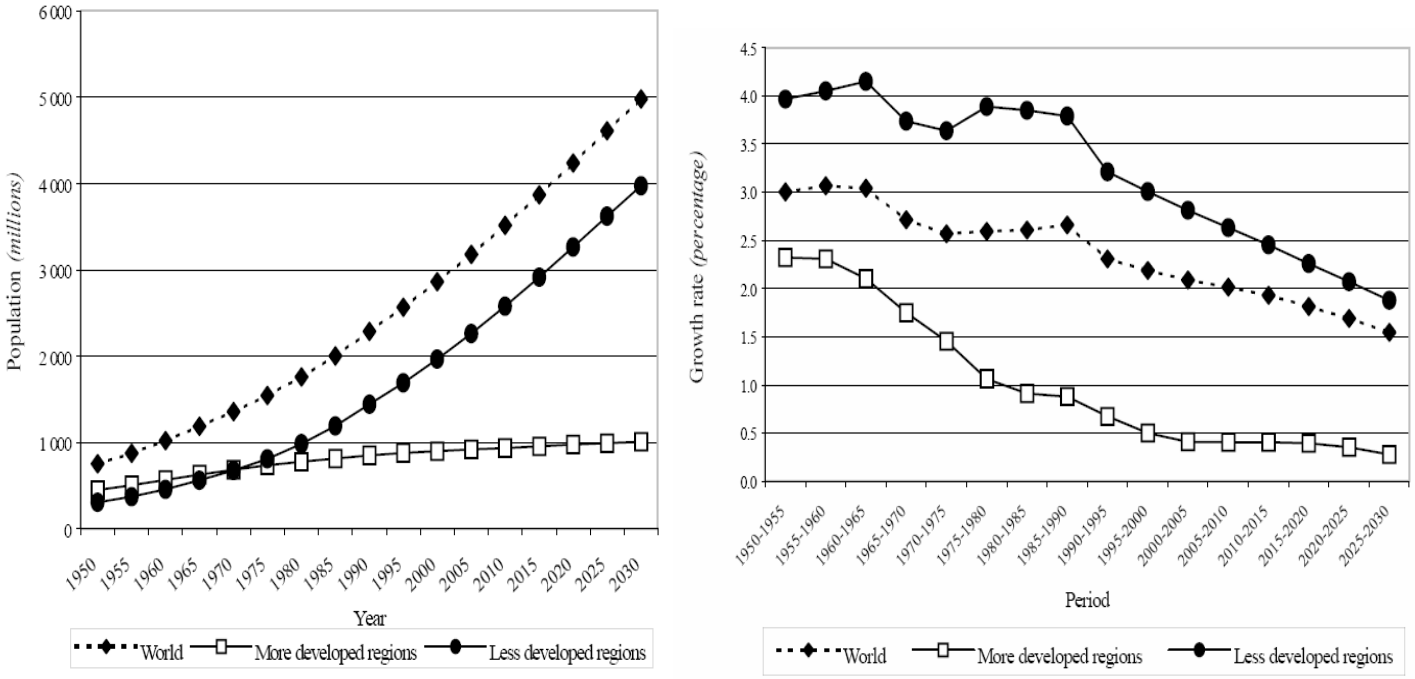
## 2.1 Faits stylisés

- Quelques données pour décrire les mondes ruraux et urbains
- L'urbanisation
  - Un processus achevé dans les pays développés
  - Un processus en cours dans les pays en développement
- Données United Nations Population Division World Urbanization Prospects: The 2001 Revision

TABLE 14. PROPORTION OF THE POPULATION LIVING IN URBAN AREAS AND URBANIZATION RATE BY MAJOR AREA, 1950, 2000 AND 2030

| *Major area* | *Percentage urban* | | | *Urbanization rate (percentage)* | |
|---|---|---|---|---|---|
| | *1950* | *2000* | *2030* | *1950-2000* | *2000-2030* |
| World | 29.8 | 47.2 | 60.2 | 0.92 | 0.81 |
| Africa | 14.7 | 37.2 | 52.9 | 1.86 | 1.17 |
| Asia | 17.4 | 37.5 | 54.1 | 1.53 | 1.23 |
| Europe | 52.4 | 73.4 | 80.5 | 0.68 | 0.31 |
| Latin America and the Caribbean | 41.9 | 75.4 | 84.0 | 1.18 | 0.36 |
| Northern America | 63.9 | 77.4 | 84.5 | 0.38 | 0.30 |
| Oceania | 61.6 | 74.1 | 77.3 | 0.37 | 0.14 |

**Figure 1. Estimated and projected urban population in the world, the more developed and the less developed regions, 1950-2030**



- La dynamique des villes

TABLE 55. URBAN AGGLOMERATIONS WITH MORE THAN HALF A MILLION INHABITANTS EXHIBITING THE HIGHEST RATES OF GROWTH DURING 1950-1975, 1975-2000 AND 2000-2015

| *Rank* | *Country* | *Urban agglomeration* | *Population (thousands)* | *Population (thousands)* | *Growth rate (percentage)* |
|---|---|---|---|---|---|
| | | | *1950* | *1975* | *1950-1975* |
| 1 | Republic of Korea | Seoul | 1 021 | 6 808 | 7.6 |
| 2 | Iraq | Baghdad | 579 | 2 815 | 6.3 |
| 3 | Colombia | Bogotá | 676 | 3 071 | 6.1 |
| 4 | Iran (Islamic Republic of) | Teheran | 1 042 | 4 274 | 5.6 |
| 5 | Brazil | São Paulo | 2 528 | 10 333 | 5.6 |
| 6 | Pakistan | Karachi | 1 028 | 3 990 | 5.4 |
| 7 | Peru | Lima | 973 | 3 651 | 5.3 |
| 8 | Mexico | Mexico City | 2 883 | 10 691 | 5.2 |
| 9 | Venezuela | Caracas | 676 | 2 342 | 5.0 |

| | | | *1975* | *2000* | *1975-2000* |
|---|---|---|---|---|---|
| 1 | Saudi Arabia | Riyadh | 710 | 4 549 | 7.4 |
| 2 | Bangladesh | Dhaka | 2 173 | 12 519 | 7.0 |
| 3 | Saudi Arabia | Jidda | 594 | 3 192 | 6.7 |
| 4 | Nigeria | Lagos | 1 890 | 8 665 | 6.1 |
| 5 | Guatemala | Guatemala City | 715 | 3 242 | 6.0 |
| 6 | India | Surat | 642 | 2 699 | 5.7 |
| 7 | Angola | Luanda | 669 | 2 697 | 5.6 |
| 8 | Côte d'Ivoire | Abidjan | 960 | 3 790 | 5.5 |
| 9 | Portugal | Porto | 500 | 1 940 | 5.4 |
| 10 | Afghanistan | Kabul | 674 | 2 602 | 5.4 |
| 11 | Bangladesh | Chittagong | 969 | 3 651 | 5.3 |
| 12 | Republic of Korea | Inch'on | 791 | 2 884 | 5.2 |
| 13 | Venezuela | Valencia | 519 | 1 893 | 5.2 |

| | | | *2000* | *2015* | *2000-2015* |
|---|---|---|---|---|---|
| 1 | China | Beihai | 729 | 2 949 | 9.3 |
| 2 | Brazil | Aparecida de Goiania | 528 | 2 111 | 9.2 |
| 3 | Republic of Korea | Kimhae | 583 | 1 723 | 7.2 |
| 4 | China | Weihai | 626 | 1 830 | 7.2 |
| 5 | Republic of Korea | Kunp'o | 522 | 1 486 | 7.0 |
| 6 | Mexico | Reynosa | 548 | 1 290 | 5.7 |
| 7 | Niger | Niamey | 775 | 1 789 | 5.6 |
| 8 | China | Dezhou | 621 | 1 431 | 5.6 |
| 9 | Yemen | Sana'a | 1 327 | 3 028 | 5.5 |
| 10 | Republic of Korea | Ansan | 984 | 2 230 | 5.5 |
| 11 | Uganda | Kampala | 1 213 | 2 706 | 5.3 |
| 12 | Iran (Islamic Republic of) | Rezaiyeh | 743 | 1 651 | 5.3 |
| 13 | China | Shaoguan | 590 | 1 310 | 5.3 |
| 14 | Nepal | Kathmandu | 713 | 1 565 | 5.2 |
| 15 | India | Ghaziabad | 928 | 2 027 | 5.2 |
| 16 | Republic of Korea | Kyongju | 503 | 1 067 | 5.0 |
| 17 | India | Surat | 2 699 | 5 715 | 5.0 |
| 18 | Somalia | Mogadishu | 1 157 | 2 444 | 5.0 |
| 19 | China | Puyang | 540 | 1 139 | 5.0 |

TABLE 56. URBAN AGGLOMERATIONS WITH 5 MILLION INHABITANTS OR MORE, 1950-2015

| 1950 | | | 1975 | | | 2000 | | | 2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* | *Population (thousands)* |
| 1 | New York | 12 339 | 1 | Tokyo | 19 771 | 1 | Tokyo | 26 444 | 1 | Tokyo | 27 190 |
| 2 | London | 8 733 | 2 | New York | 15 880 | 2 | Mexico City | 18 066 | 2 | Dhaka | 22 766 |
| 3 | Tokyo | 6 920 | 3 | Shanghai | 11 443 | 3 | São Paulo | 17 962 | 3 | Mumbai (Bombay) | 22 577 |
| 4 | Paris | 5 441 | 4 | Mexico City | 10 691 | 4 | New York | 16 732 | 4 | São Paulo | 21 229 |
| 5 | Moscow | 5 356 | 5 | São Paulo | 10 333 | 5 | Mumbai (Bombay) | 16 086 | 5 | Delhi | 20 884 |
| 6 | Shanghai | 5 333 | 6 | Osaka | 9 844 | 6 | Los Angeles | 13 213 | 6 | Mexico City | 20 434 |
| 7 | Rhein-Ruhr North[a] | 5 296 | 7 | Buenos Aires | 9 144 | 7 | Calcutta | 13 058 | 7 | New York | 17 944 |
| 8 | Buenos Aires | 5 042 | 8 | Los Angeles | 8 926 | 8 | Shanghai | 12 887 | 8 | Jakarta | 17 268 |
| | TOTAL | 54 459 | 9 | Paris | 8 885 | 9 | Dhaka | 12 519 | 9 | Calcutta | 16 747 |
| | | | 10 | Beijing | 8 545 | 10 | Delhi | 12 441 | 10 | Karachi | 16 197 |
| | | | 11 | London | 8 169 | 11 | Buenos Aires | 12 024 | 11 | Lagos | 15 966 |
| | | | 12 | Rio de Janeiro | 7 963 | 12 | Jakarta | 11 018 | 12 | Los Angeles | 14 494 |
| | | | 13 | Calcutta | 7 888 | 13 | Osaka | 11 013 | 13 | Shanghai | 13 598 |
| | | | 14 | Moscow | 7 623 | 14 | Beijing | 10 839 | 14 | Buenos Aires | 13 185 |
| | | | 15 | Bombay (Mumbai) | 7 347 | 15 | Rio de Janeiro | 10 652 | 15 | Metro Manila | 12 579 |
| | | | 16 | Seoul | 6 808 | 16 | Karachi | 10 032 | 16 | Beijing | 11 671 |
| | | | 17 | Chicago | 6 749 | 17 | Metro Manila | 9 950 | 17 | Rio de Janeiro | 11 543 |
| | | | 18 | Rhein-Ruhr North[a] | 6 448 | 18 | Seoul | 9 888 | 18 | Cairo | 11 531 |
| | | | 19 | Tianjin | 6 160 | 19 | Paris | 9 630 | 19 | Istanbul | 11 362 |
| | | | 20 | Cairo | 6 079 | 20 | Cairo | 9 462 | 20 | Osaka | 11 013 |
| | | | 21 | Milan | 5 529 | 21 | Tianjin | 9 156 | 21 | Tianjin | 10 319 |
| | | | 22 | Metro Manila | 5 000 | 22 | Istanbul | 8 953 | 22 | Seoul | 9 918 |
| | | | | TOTAL | 195 224 | 23 | Lagos | 8 665 | 23 | Kinshasa | 9 883 |
| | | | | | | 24 | Moscow | 8 367 | 24 | Paris | 9 858 |
| | | | | | | 25 | London | 7 640 | 25 | Bangkok | 9 816 |
| | | | | | | 26 | Lima | 7 443 | 26 | Lima | 9 388 |
| | | | | | | 27 | Bangkok | 7 372 | 27 | Bogotá | 8 970 |
| | | | | | | 28 | Chicago | 6 989 | 28 | Lahore | 8 721 |
| | | | | | | 29 | Teheran | 6 979 | 29 | Bangalore | 8 391 |
| | | | | | | 30 | Hong Kong | 6 860 | 30 | Teheran | 8 178 |

TABLE 30 (*continued*)

| 1950 | | | 1975 | | | 2000 | | | 2015 | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* | *Population (thousands)* | *Rank* | *Urban agglomeration* |
| | | | | | | 31 | Bogotá | 6 771 | 31 | Moscow |
| | | | | | | 32 | Rhein-Ruhr North[a] | 6 531 | 32 | Madras |
| | | | | | | 33 | Madras | 6 353 | 33 | Hong Kong |
| | | | | | | 34 | Bangalore | 5 567 | 34 | Wuhan |
| | | | | | | 35 | Santiago | 5 467 | 35 | London |
| | | | | | | 36 | Lahore | 5 452 | 36 | Chicago |
| | | | | | | 37 | Hyderabad | 5 445 | 37 | Riyadh |
| | | | | | | 38 | Wuhan | 5 169 | 38 | Hyderabad |
| | | | | | | 39 | Kinshasa | 5 054 | 39 | Chongqing |
| | | | | | | | | TOTAL 394 152 | 40 | Ahmedabad |
| | | | | | | | | | 41 | Rhein-Ruhr North[a] |
| | | | | | | | | | 42 | Baghdad |
| | | | | | | | | | 43 | Santiago |
| | | | | | | | | | 44 | Chittagong |
| | | | | | | | | | 45 | Yangon |
| | | | | | | | | | 46 | Ho Chi Minh City |
| | | | | | | | | | 47 | Pune (Poona) |
| | | | | | | | | | 48 | Abidjan |
| | | | | | | | | | 49 | Surat |
| | | | | | | | | | 50 | Toronto |
| | | | | | | | | | 51 | Shenyang |
| | | | | | | | | | 52 | Kabul |
| | | | | | | | | | 53 | Belo Horizonte |
| | | | | | | | | | 54 | Guatemala City |
| | | | | | | | | | 55 | Bandung |
| | | | | | | | | | 56 | Hanoi |
| | | | | | | | | | 57 | Jidda |
| | | | | | | | | | 58 | Luanda |
| | | | | | | | | | | TOTA |

[a] Rhein-Ruhr North is the urban agglomeration around Essen.

## 2.2 Les choix de migration

- L'urbanisation est le résultat de la migration
- L'industrie à la différence de l'agriculture a besoin de concentration et bénéfice d'externalités : Alfred Marshall (1920) - repris par la Nouvelle Economie Géographie, Paul Krugman
- Le secteur agricole est un réservoire de main d'oeuvre : le modèle d'économie duale d'Arthur Lewis 1954
- La migration : le processus de mobilité de la main d'oeuvre vers les villes
  - Michael P. Todaro (A model of labor, migration, and urban unemployment in less developped countries, 1969 AER)
  - John R. Harris Michael P. Todaro (Migration, Unemployment & Development: A Two-Sector Analysis, 1970 AER)

- Hypothèses
  1. Le secteur rural est parfaitement concurrentiel (ou auto-production)
  2. Les entreprises embauchent des travailleurs dans les villes à une salaire au-dessus du niveau de concurrence parfaite (législation, syndicats ... ou imperfections de l'information)
  3. Seuls les urbains peuvent postuler aux emplois de l'industrie
  4. Il existe un secteur informel pour les urbains non-employés dans les entreprises du secteur formel
  5. Migration est le résultat d'un calcul économique

- La résolution du modèle suppose
  1. La détermination de l'emploi dans le secteur urbain
  2. La quantité de migrants d'équilibre
  3. Le revenu des travailleurs du secteur rural
- Notations
  1. $f(\ell_i)$ fonction de production du secteur industriel
  2. $g(\ell_a)$ fonction de production du secteur agricole
  3. population : $\ell_i + \ell_u + \ell_a = 1$ ($i =$industrie, $a =$agricole, $u =$unemployment)
  4. rémunération : $w_i$, $w_u, w_a$

- Résolution
  - Quelle est la demande de travail du secteur industriel ?
  - Quel est le salaire moyen attendu d'un migrant et d'un non-migrant?
  - Quel est l'équilibre de la répartition entre migrants et non-migrants?

- Réponse
  - Quelle est la demande de travail du secteur industriel ?

$$f'(\ell_i) = w_i$$

  - Quel est le salaire moyen attendu d'un migrant et d'un non-migrant?

$$w_m = \frac{\ell_i}{\ell_i + \ell_u} w_i + \frac{\ell_u}{\ell_i + \ell_u} w_u$$

$$w_a = g'(\ell_a)$$

  - Quel est l'équilibre de la répartition entre migrants et non-migrants? La réparition de la population est telle que $w_a = w_m$ (normalisation $w_u = 0$)

$$g'(1 - \ell_i - \ell_u) = \frac{\ell_i}{\ell_i + \ell_u} w_i$$

- Dans le plan $(\ell, w)$ représentation de la fonction de demande de travail du secteur urbain formel, du secteur rural et l'équation d'absence d'arbitrage

$$f'(\ell_i) = w_i \rightarrow \ell_i^*$$

$$g'(1 - \ell_i - \ell_u) = w_i \ell_i^* / (\ell_i + \ell_u) \rightarrow (\ell_i^* + \ell_u^*)$$

- Applications
  - Amélioration des conditions économiques dans le secteur urbain ou dégradation dans le secteur rural $\longrightarrow$ migration, avec un chômage plus important
  - Une migration sans chômage est possible si $w_i$ s'ajuste de manière parfaitement concurrentiel

$$\begin{aligned} w_i &= f'(\ell_i + \ell_u) \\ w_m &= w_i \\ g'(1 - \ell_i - \ell_u) &= f'(\ell_i + \ell_u) \end{aligned}$$

- Remarques
  - Le paradoxe de Todaro : création d'emplois dans le secteur urbain accroît le chômage
  - Pourquoi le salaire ne s'ajuste-t-il pas ? Insatisfaction avec la réponse institutionnelle, une réponse en termes de salaire d'efficience basé sur la sélection adverse
  - Les autres aspects des choix de migration : l'aversion au risque, le capital social et les réseaux, choix familiaux

# 3 Le marché de la terre

## 3.1 Faits stylisés

- Une très grande inégalité dans la distribution de la terre (surtout en Amérique Latine) et une variété des formes de contrats d'exploitation
- Une écriture synthétique du revenu du proprétaire : $R = \alpha Y + F$
  - $\alpha = 0, F > 0$ : contrat de fermage (le fermier perçoit la totalité de la récolte contre un loyer) *fixed-tenure*
  - $0 < \alpha < 1$, $F = 0$ : contrat de métayage (le métayer perçoit une fraction $\alpha$ de la récolte) *sharecropping*
  - $\alpha = 1$, $F < 0$ : contrat de travail (le salarié agricole perçoit un salaire $F$ indépendant de la récolte)
- L'exploitation des terres dans les villages du ICRISAT : l'importance du métayage (surtout en Afrique)

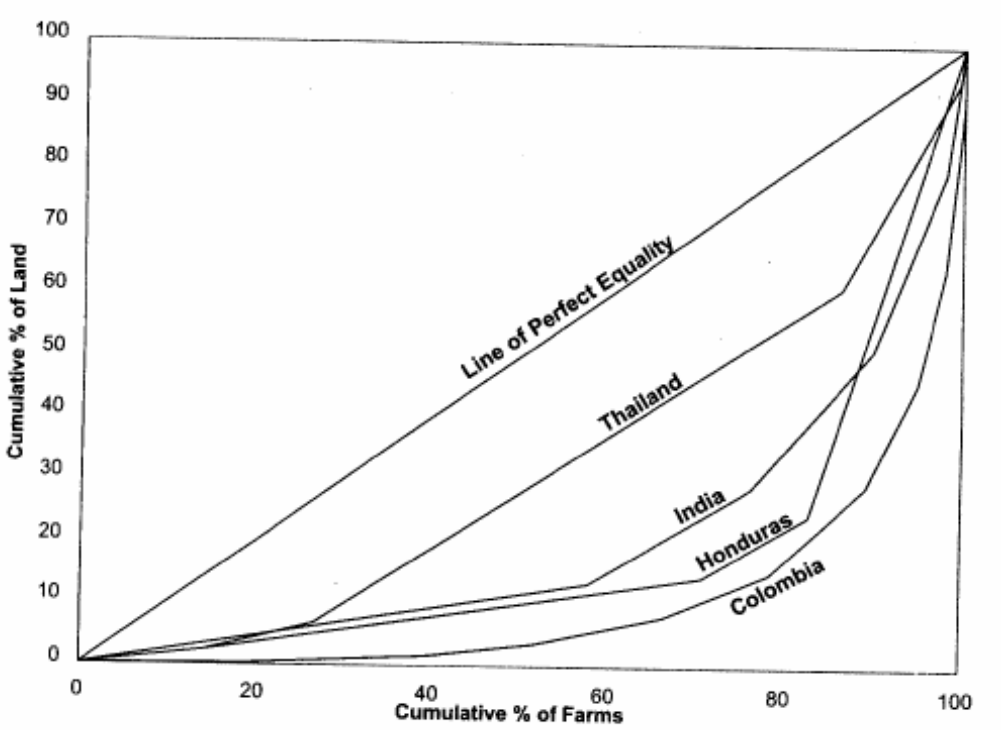



*Figure 12.1. Lorenz curves for land holdings in two Asian and two Latin American countries. Source: Agricultural Censuses of Colombia [1988], Honduras [1993], India [1986], and Thailand [1988].*

## 3.2 L'inefficacité du métayage

- Alfred Marshall 1920: inefficience marshallienne du métayage
  - métayage est un mauvais contrat en termes d'incitations
- Le processus de production
  - fonction de production dépend de l'effort du métayer $f(e)$
  - fonction de coût de l'effort $c(e) = c \times e$
- La maximisation du surplus donne

$$\max_{e} \quad f(e) - c \times e$$

soit la solution $e^{\circ}$

$$f'(e^{\circ}) = c$$

- Le calcul du métayer est

$$\max_{e} \quad (1-\alpha) f(e) - c \times e - F$$

soit la solution $e^*$

$$(1-\alpha) f'(e^*) = c$$

- La comparaison des deux donne

$$(1-\alpha) f'(e^*) = f'(e^\circ)$$

sachant $(1-\alpha) < 1$

$$f'(e^*) > f'(e^\circ)$$

sachant $f''(e) < 0$

$$e^* < e^\circ$$

- Illustration graphique

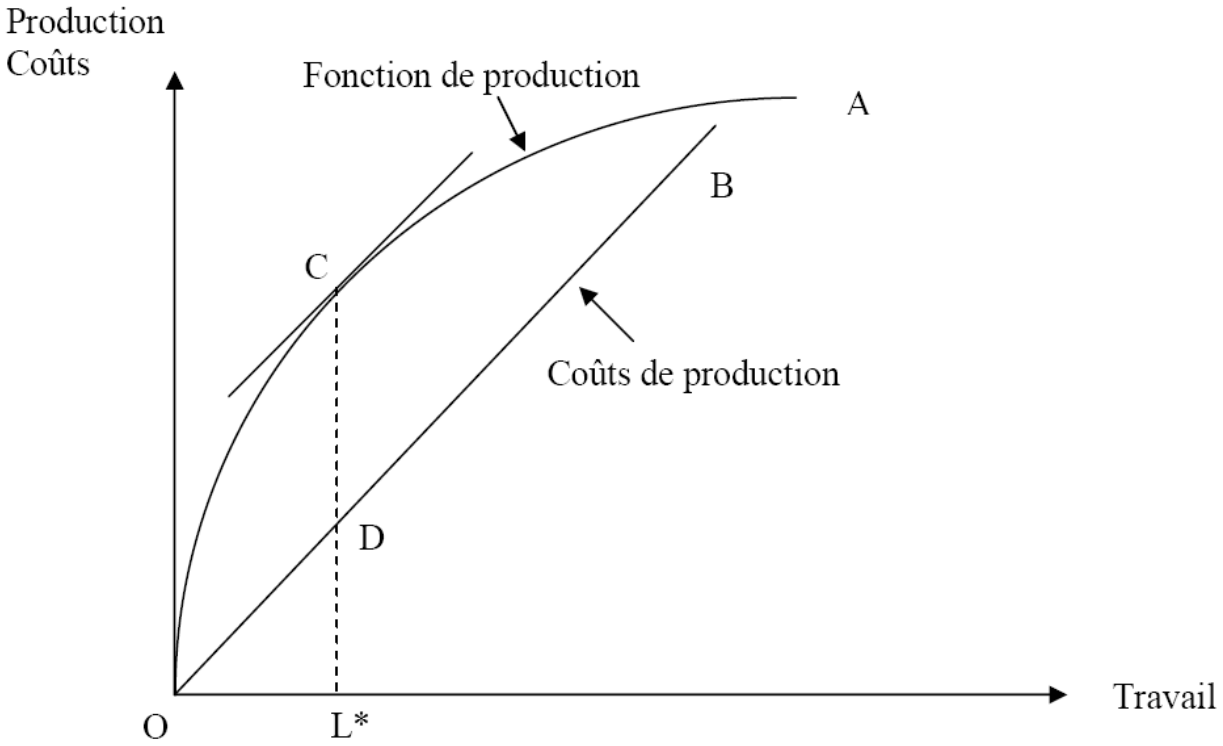



Figure 1. Production, coût et surplus économique

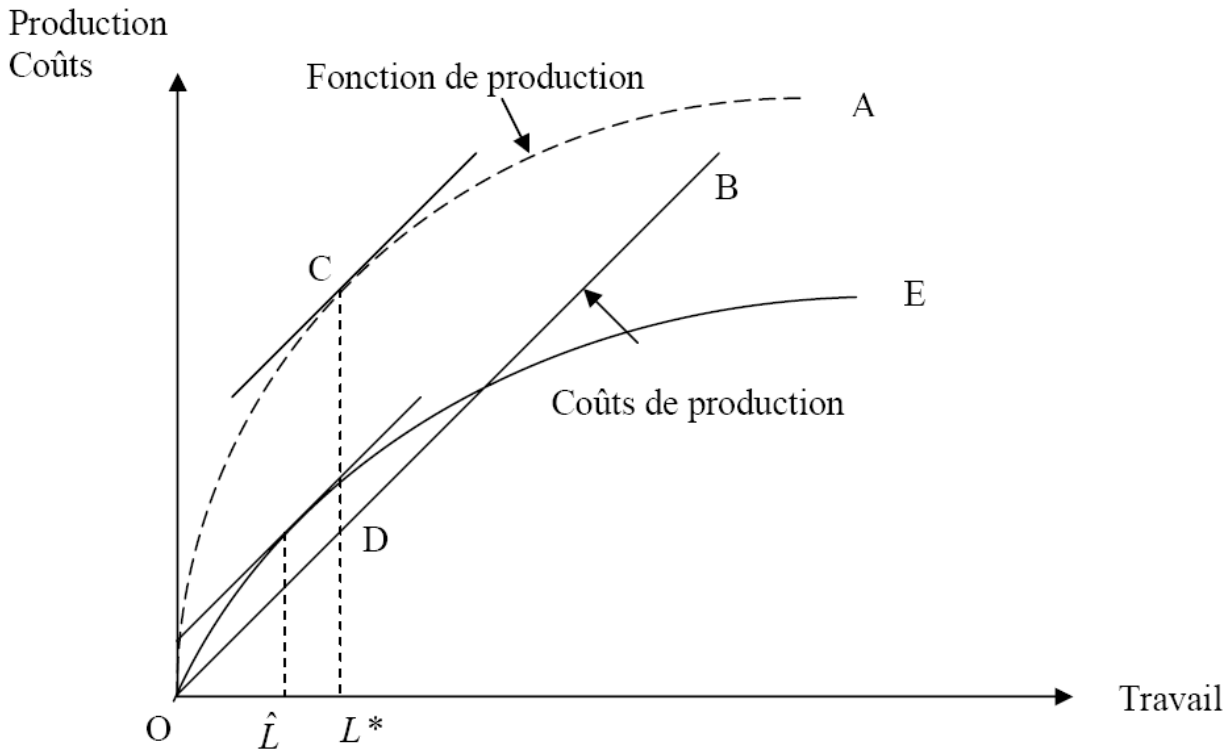



Figure 2. Inefficience du contrat de métayage

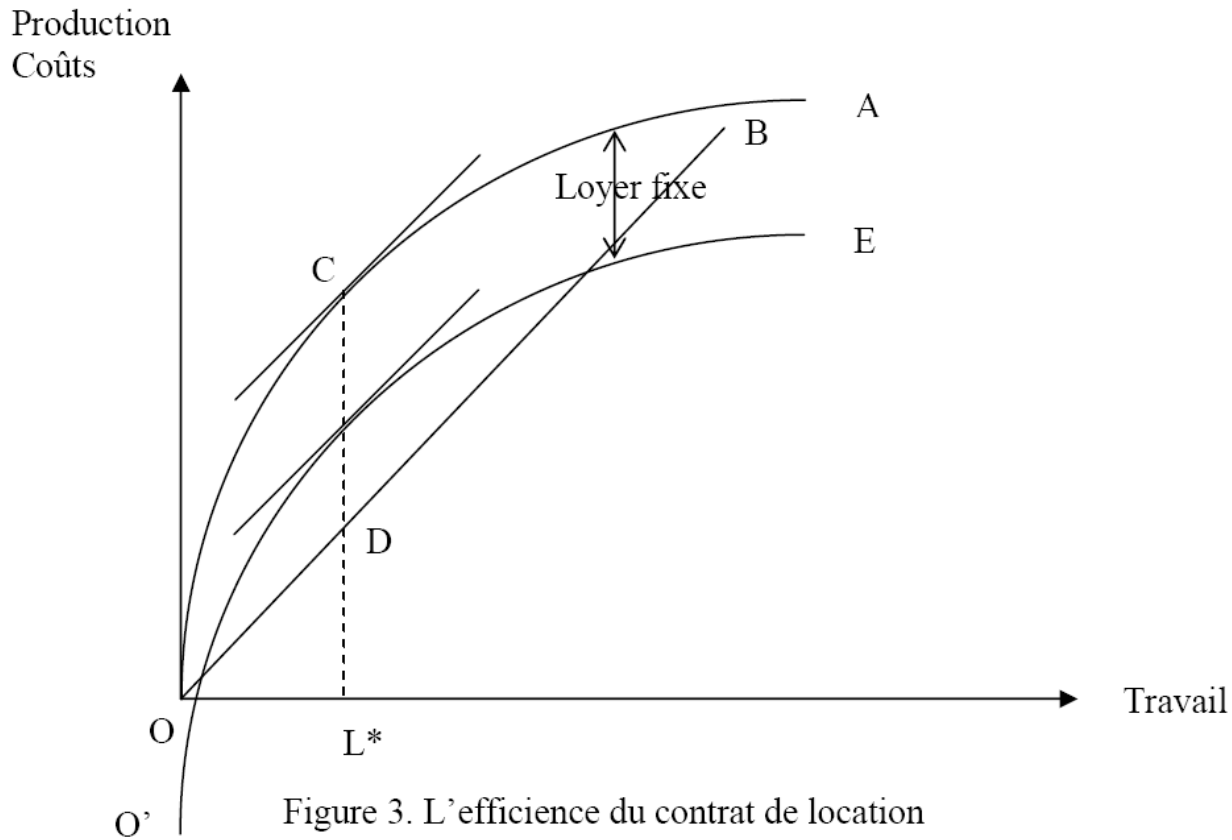



Figure 3. L'efficience du contrat de location

- Conclusion
  1. L'effort est sous optimal en métayage, il est trop faible : inefficacité du métayage
  2. Le partage de la récolte crée une distorsion dans la décision de l'exploitant (à la différence du transfert forfaitaire)
  3. Etude sur les villages ICRISAT confirme le faible rendement de ce mode d'exploitation et l'identité des rendements des terres exploitées directement ou par un contrat de fermage (document joint issu de Ray 1998)
  4. Pourquoi le métayage est-il alors si important dans les pays en développement ?

## 3.3 La justification du métayage

- Stiglitz (1974) : le métayage résoud un double problème d'information imparfaite et de risque négligé par Marshall
  1. Métayage vs. fermage : un mécanisme d'assurance de l'exploitant (en présence d'un risque sur la production)
  2. Métayage vs. salariat : un mécanisme d'incitation de l'exploitant (en présence d'un effort inobservable de sa part)

### 3.3.1 Aversion au risque

- Introduction de l'aversion au risque
  1. Le risque porte sur le niveau de la production (par exemple : climat)
  2. L'exploitant est averse au risque et le propriétaire est neutre au risque
  3. Justification: richesse, diversification.

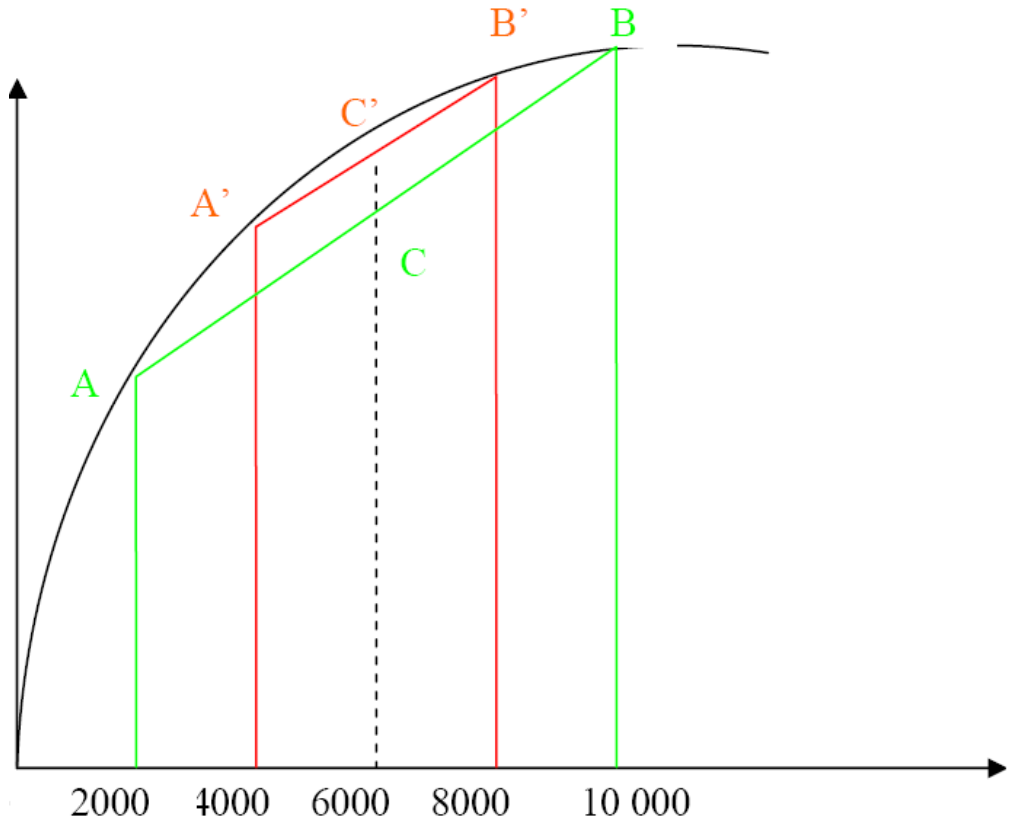
- Définition de l'aversion au risque
  1. La notion d'espérance d'utilité qui combine les probabilités de réalisation d'états de la nature et l'utilité des gains selon ces états
  2. La valorisation du risque dépend de la forme de la fonction d'utilité : concave (averse), linéaire (neutre), convexe (goût)
  3. Soit les gains $x_1, x_2$ (avec $x_1 < x_2$) et $\pi$ la probabilité de réalisation de $x_1$ et $(1-\pi)$ celle de $x_2$, on a les propriétés suivantes

$$\begin{aligned} EU &= \pi u(x_1) + (1-\pi)\, u(x_1) < u(\pi x_1 + (1-\pi)\, x_2) : u(\cdot) \text{ concave} \\ EU &= \pi u(x_1) + (1-\pi)\, u(x_1) = u(\pi x_1 + (1-\pi)\, x_2) : u(\cdot) \text{ linéaire} \end{aligned}$$

- Illustration avec $\pi = 0.5$ et $u(x) = \log(x)$

| | | | | |
|---|---|---|---|---|
| $x_1$ | 1000 | 2000 | 4000 | 6000 |
| $x_2$ | 11000 | 10000 | 8000 | 6000 |
| $EU$ | 8,11 | 8,41 | 8,64 | 8,70 |
| $U\,(moy.)$ | 8,70 | 8,70 | 8,70 | 8,70 |
| $EQ.certain$ | 3 316,6 | 4 472,1 | 5 656,9 | 6 000,0 |

Représentation graphique



### 3.3.2 Les hypothèses du modèle

- La relation principal (propriétaire) – agent (exploitant)
- Deux contraintes pour le principal
  1. Contrainte de participation de l'agent - compte tenu de son utilité de réservation $\bar{U} = u(\bar{w})$
  2. Contrainte d'incitation de l'agent - à fournir l'effort désiré
- La production $Y$ est incertaine (deux niveaux $H, L$ avec $H > L$) et dépend de l'effort de l'agent $e$ (égal à 0 ou 1) coûteux $e \times E$
  1. $e = 0 : Y = H$ avec une probabilité $q$
  2. $e = 1 : Y = H$ avec une probabilité $p > q$
- Hypothèses techniques
  1. Le surplus total est max pour $e = 1$

$$\begin{aligned} pH + (1-p)L - E &> qH + (1-q)L \\ (p-q)(H-L) + L &> E \end{aligned}$$

2. Le surplus total est suffisant pour faire participer l'agent

$$qH + (1 - q) L \geq \bar{w}$$

### 3.3.3 Le contrat avec effort observable

- Le principal choisit le contrat qu'il propose à l'agent.
- Objectif du principal
  1. Maximiser le surplus
  2. Maximiser la part du surplus qu'il reçoit (= minimiser celle de l'exploitant)
- Solution
  1. Maximiser le surplus : $e = 1$
  2. Contrainte de participation saturée $w$

$$u(w) - E = u(\bar{w}) \rightarrow u(w) = u(\bar{w}) + E$$

  3. La participation assure l'incitation à fournir $e = 1$ sinon rupture du contrat par le principal
- Assurance : il y a assurance parfaite de l'agent, le principal subit tout le

risque (pour qu'il cela n'est pas coûteux)

$$qH + (1 - q)\, L - w$$

- Conclusion : avec aversion au risque et effort observale, le salariat est le contrat optimal

### 3.3.4 Le contrat avec effort inobservable

- La maximisation du surplus total reste l'objectif : $e = 1$ comme solution
- Introduction d'un contrat avec paiements différenciés selon la production (*sharecropping*) : $(w_H, w_L)$ tel que
  1. L'agent accepte le contrat (participation)

$$pu(w_H) + (1-p)u(w_L) - E \geq u(\bar{w})$$

  2. L'agent réaliser l'effort $e = 1$ (inciation)

$$pu(w_H) + (1-p)u(w_L) - E \geq qu(w_H) + (1-q)u(w_L)$$

$$(p-q)[u(w_H) - u(w_L)] \geq E$$

- Soit la solution : $w_H \geq w_L$
  1. Il n'y a plus assurance parfaite
  2. La sous-assurance de l'agent est nécessaire pour l'inciter à fournir l'effort (inobservable)

- Résolution graphique dans le plan $(u(w_L), u(w_H))$ avec saturation des contraintes

$$\begin{aligned} pu(w_H) + (1-p)u(w_L) &= E + u(\bar{w}) \\ (p-q)[u(w_H) - u(w_L)] &= E \end{aligned}$$

soit

$$\begin{aligned} u(w_H) &= -\frac{1-p}{p}u(w_L) + E + u(\bar{w}) \\ u(w_H) &= u(w_L) + \frac{E}{(p-q)} \end{aligned}$$

# 4 Conclusion

- Faits stylisés
  1. L'urbanisation forte dans les pays en développpement (importance des migrations internes)
  2. L'importance du métayage comme contrat d'exploitation des terres agricoles
- Modèles
  1. Harris – Todaro : déterminants des choix de migration et rôle du chômage
  2. Marshall vs. Stiglitz : efficience relative des différents contrats d'exploitation des terres agricoles