

# ***ACHIEVING THE MDGs: A CRITIQUE AND A STRATEGY***

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## **ABSTRACT**

Effective strategic choices for achieving the MDGs must be based on sound data and analysis. However, existing (technocratic) approaches to identifying these strategic choices are unreliable. In particular, estimates of the costs of alternative strategies derive from implausible and restrictive assumptions, depend on poor quality data, and do not adequately reflect uncertainties about the future. These weaknesses of existing approaches can be mitigated but not overcome. In contrast, a democratic approach to strategic planning establishes an institutional framework for continuous informed policy choice by representative decision-makers. A democratic approach diminishes the likelihood of acting on inappropriate recommendations by technocrats. A democratic approach to achieving the MDGs can be implemented through a process of periodic peer-and-partner review, or Institutionalized Financing and Learning Mechanism (IFLM). The IFLM enables each country to learn from its own experience and that of other countries and thereby increases the likelihood of success.

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## 1.0 Introduction: The Millennium Development Goals and MDG Cost Estimates<sup>3</sup>

This study argues for the follow four propositions:

1. Effective strategic choice requires the comparison of alternative cost estimates.
2. Existing (technocratic) approaches to identifying the best strategies for achieving the MDGs are unreliable.
3. There is an alternative (democratic) approach to identifying the best strategies for achieving the MDGs, which diminishes the likelihood of costly errors and increases the likelihood of sustained success. The democratic approach establishes an institutional framework for representative decision-makers to periodically form policy recommendations on the basis of relevant information from diverse sources.
4. A plausible mechanism for implementing the democratic approach is an Institutionalized Financing and Learning Mechanism (IFLM) centered on periodic peer and partner-review. The IFLM enables each country to learn from its own experience and that of other countries and thereby increases the likelihood of success.

As a prelude to arguing these four propositions, we present in this section a brief introduction to the MDGs.

### *Introduction to the MDGs:*

The Millennium Development Goals (MDGs) are a set of eight specific (in many instances, quantitative) objectives for the betterment of the human condition, including goals of poverty reduction and improvement in education, gender equality, health, and environmental quality<sup>4</sup>.

The MDGs replace various previous UN initiatives to provide time-bound and quantitative global goals to guide and influence national and international strategies for development. Since its creation the United Nations system has defined a wide variety of global goals with specific outcome targets, including among others ending colonialism (a focus especially in the period from the 1940s to the 1960s), accelerating economic growth through increased international assistance (a focus during the UN Development

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<sup>4</sup> Each goal is associated with specific targets - eighteen in total-; and each target is related to quantifiable indicators – forty-eight in total. The different goals, targets and indicators are presented in Appendix 1.

Decade in the 1960s and the three subsequent decades) and eradicating smallpox, malaria and other communicable diseases (a focus from the 1950s onward)<sup>5</sup>.

In 1995, the OECD Development Assistance Committee (DAC) engaged in a year long process of reviewing past experiences and of planning long-term policies. This initiative resulted in the report *Shaping the 21<sup>st</sup> Century: The Contribution of Development Co-operation*, published in May 1996, which formulated seven goals extracted from the resolutions of UN conferences and meetings<sup>6</sup>. Subsequent expert meetings led to the definition of quantified International Development Targets (IDTs) (measured by 21 indicators) to be achieved by 2015<sup>7</sup>. The MDGs are a synthesis of the International Development Goals agreed upon at the UN social development conferences and global summit meetings of the 1990s, and the Millennium Declaration adopted by heads of state at the Millennium Summit in New York in September 2000<sup>8</sup>. In 2001, the MDGs were approved by the UN General Assembly as part of the UN Secretary General's report *A Road Map Towards the Implementation of the United Nations Millennium Declaration*<sup>9</sup>.

The Millennium Summit integrated most of the IDTs into its Millennium Declaration, while adding new objectives for halving the proportion of people suffering from hunger, reversing the spread of HIV/AIDS, malaria, tuberculosis and other major diseases, halving the proportion of people without sustainable access to safe drinking water, and improving the lives of 100 million of slum dwellers. The addition of an eighth goal (to "Develop a Global Partnership for Development") was meant to complement the seven social and environmental targets and to underline the need for developed countries to bring about policy reforms and provide resources so as to support developing countries' ability to participate effectively in the global economy<sup>10</sup>.

The final declaration of the Monterrey Conference on Financing for Development<sup>11</sup> held in 2002 emphasized the dramatic shortfall in the resources required to achieve the internationally agreed development goals, including those contained in the Millennium Declaration.

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<sup>5</sup> For more detailed information on the history of UN global goals, see Jolly, R., 2003.

<sup>6</sup> Five global conferences offered inspiration for the formulation of the seven international development targets: the World Summit for Social Development, Copenhagen; World Conference on Education for All, Jomtien; World Conference on women, Beijing; International Conference on Population and Development, Cairo; UN Conference on Environment, Rio de Janeiro.

<sup>7</sup> The paper "The Millennium Development Goals and the IDC: driving and framing the Committee's work" (2003) developed by the Overseas Development Institute (ODI) provides a full description of the IDTs (in its appendix) and provides a comprehensive genealogy of the MDGs.

<sup>8</sup> United Nations, 2000.

<sup>9</sup> United Nations, 2001a

<sup>10</sup> United Nations, 2001a.

<sup>11</sup> United Nations, 2002b.

### *Global cost estimates*<sup>12</sup>:

In the Technical section of the Report of the High Level Panel on Financing for Development (also called the “Zedillo Report”, after the former President of Mexico who chaired the Panel), it was suggested that “the cost of achieving the 2015 goals would probably be on the order of an extra \$50 billion a year”<sup>13</sup>. The Zedillo Report’s estimate of this total derives from adding the costs of achieving individual goals as identified in other sources (typically produced for previous international conferences on sectoral goals) and as produced by its own *ad hoc* calculations. Where cost estimates for specific goals were altogether unavailable or infeasible to produce, the cost of achieving these goals was not included in the analysis. Accordingly, the figures provided in the Zedillo Report are represented as merely indicating “the order of magnitude” of the additional funds required to achieve the Millennium Development Goals.

Subsequently, other actors, including the World Bank and the UNDP have attempted to assess the cost of achieving the MDGs in greater detail.

The World Bank’s estimates<sup>14</sup> the cost (to donors) of achieving Goal 1 (the reduction of income poverty and undernutrition) as ranging between US \$ 54 billion and \$ 62 billion a year. It estimates the cost of achieving the other goals (by adding existing sectoral estimates as did the Zedillo commission) as ranging between US \$ 35 and \$ 76 billion per year. According to the Bank, which stresses the theory that the attainment of Goal 1 will help to achieve the other goals, these two sets of figures should not be aggregated, in order to avoid ‘double-counting’.

A background paper<sup>15</sup> for the UNDP’s Human Development Report 2003 (by Pettifor and Greenhill) takes a broadly similar approach to that of the World Bank. It estimates the cost of achieving Goal 1 by attempting (as does the Bank) to identify the investments required to generate poverty-reducing increases in output in developing countries.<sup>16</sup> The total cost estimate is US\$ 76 billion, significantly higher than the Zedillo report and in the upper range of the World Bank’s estimates. Its sectoral cost estimates derive from previously published sources, as in the case of the Zedillo Commission and the World Bank.

As mentioned, all of these reports draw to a significant extent on existing global cost estimates developed for individual sectors. These sectoral cost estimates are often of poor quality for a variety of reasons (which will be surveyed below). Moreover, as the estimates are based on different cost concepts, they cannot be meaningfully added.

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<sup>12</sup> Appendix 2 presents a summary of the diverse existing global cost estimates.

<sup>13</sup> United Nations, 2001b. Technical Report, p.16.

<sup>14</sup> Devarajan S., Miller M.J. and Swanson, E.V., 2002

<sup>15</sup> Pettifor A. and Greenhill R., 2003.

<sup>16</sup> The assumptions made by the report regarding growth requirements for poverty-reduction and capital-output ratios are not made wholly clear. It is to be hoped that they will be specified more explicitly in a subsequent version of the paper.

All of the reports recognize (though insufficiently) these inadequacies of global estimates and accordingly call for country-level cost estimates of achieving the MDGs, in the belief that these will be more reliable. Such country-level cost estimation exercises are being undertaken presently by the UNDP, the Millennium Project (described below) and the World Bank.

### *Country-level cost estimates:*

At the national level, UNDP country offices have participated in a pilot project which has attempted to estimate the cost of attaining the MDGs in six countries<sup>17</sup>. The reports focus on six MDG targets, related to income poverty, primary education, child mortality, maternal health, HIV/AIDS and access to water.

The Millennium Project (an advisory body to the UN Secretary-General directed by Professor Jeffrey Sachs), is also preparing a number of country case studies to map out the major interventions and investments required to achieve the MDGs (taken together) in the countries concerned. To develop its “MDG needs assessment”, the Millennium Project follows a multi-step approach based on experts’ task forces and country institutions’ input. The Millennium Project approach develops a list of interventions that can potentially promote the MDGs, and develops investment plans which aim to attain the MDGs through these interventions<sup>18</sup>.

The World Bank project focuses on 18 countries<sup>19</sup>. The World Bank approach gives priority to the ‘Poverty Reduction Strategy’ previously defined by each country, and asks how, given that priority, the MDGs can be best achieved. Since the World Bank gives priority to a goal other than that of achieving the MDGs, the sense in which it is estimating the cost of achieving the MDGs is unclear. One way to make sense of the Bank’s approach is to interpret it as estimating the cost of achieving the MDGs subject to the constraint that a country will adhere to the plans identified in its PRSP. Although this is (arguably) a coherent exercise, it is certainly not the same as estimating the cost of achieving the MDGs as such.

### *Remainder of the paper:*

The next section (2.0) of the paper establishes the rationale for estimating the cost of achieving the MDGs – whether taken together or separately, and whether considered globally or in individual countries. The main conceptual and practical requirements of a cost estimate are studied in section 3.0. The primary problems that are present in existing approaches to estimating the cost of achieving the MDGs are presented in section 4.0. In the final section (5.0), we propose a means of responding to the inadequacies in existing efforts to identify the costs of achieving the MDGs and to use these as a basis for

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<sup>17</sup> UNDP, 2002a.

<sup>18</sup> Millennium Project, 2004, page 9-14

<sup>19</sup> The countries studied are Tanzania, Uganda, Ethiopia, Mozambique, Benin, Burkina Faso, Madagascar, Mali, Mauritania; Indonesia, Vietnam; Bangladesh, Pakistan, India; Bolivia, Honduras; Albania and Kyrgyz Republic. See World Bank (2003).

planning and decision-making. Specifically, we propose the development of a democratic approach to MDG cost estimation based on the creation of a flexible system for incorporating new information, assessing needs and allocating resources entitled the Institutionalized Financing and Learning Mechanism (IFLM).

## 2.0 The importance of cost estimates in the choice of strategies

Typically, there is more than one strategy that can plausibly help to achieve a goal. The comparison of strategies requires attention to relevant information, including the effectiveness with which it is likely to promote the goal, the risks attendant in pursuing the strategy and its costs.

Cost estimates play a role in arriving at an answer to two types of questions. At the risk of some oversimplification, we may view the first question as normative in nature and the second as operational in nature. The central normative question is: should a specific end be pursued at all (given alternative ends)? The primary operational question is: how should a specific end best be pursued (given alternative means to achieve the end)? Cost estimates play an essential role in determining the relative desirability of alternative means of achieving an end. The end that we consider in this paper is the achievement of the MDGs.

### *2.1 The role of aggregate cost estimates in informing the choice between objectives:*

If a decision-maker makes a firm commitment to achieving a particular (feasible) objective, then the total cost of achieving that objective is (by definition of having made a commitment) irrelevant to determining whether or not the objective ought to be pursued. A different situation arises when the commitment to achieving a particular objective is not unconditional (for instance because distinct objectives are ‘traded off’ against one another). In that case, the cost of achieving a particular objective will be salient to determining whether (or to what extent) the objective should be pursued.

Much of the discussion on MDG cost estimates seems to take this latter view. The feasibility of achieving the MDGs, given a sufficient application of resources and adequate policy and institutional reform, is not generally in doubt<sup>20</sup>. However, much of the discussion on MDGs implicitly supposes that a firm commitment to achieving the MDGs does not yet exist. One implicit rationale for cost estimates is that they are needed to convince developing countries and donors that the MDGs can be achieved without undue sacrifice of other objectives. Thus there has been a desire to argue that the MDGs can be achieved with a ‘reasonable’ quantity of resources (for instance, for less than the 0.7% of GNP development assistance norm that donors have previously agreed upon).

### *2.2 The role of aggregate cost estimates in planning to achieve an objective:*

Once it has been determined that the MDGs are to be achieved, there remains a question of how best to achieve them. Aggregate cost estimates may be important from the standpoint of budgeting. In particular, it may be necessary to identify *in advance* the resources to be allocated to a specific purpose. If so, it is important to identify

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<sup>20</sup> There are certain exceptions. See e.g. Devarajan, Miller and Swanson, 2002.

realistically the resources that will be required. Failure to do so may lead to the inability to make appropriate expenditures when they are required and a concomitant undermining of the objective.

Why is budgeting necessary? One fundamental reason is that there may exist irreversibilities in investment or consumption. Certain expenditures cannot, once undertaken, be revised. Another fundamental reason is that resources may become available only periodically. Thus, a family may wish to choose its daily food expenditure so as to ensure that it does not run out of food before the next pay period. Correspondingly, a government seeking to provide support for the food requirements of such a family will need to realistically project these requirements over the time period during which it will not again provide these resources.

Generally, the optimal level and pattern of current consumption and investment will depend on forecasts of future income and needs. The rationale for current choices regarding the level and pattern of consumption and investment derives from the part they play in an integrated expenditure plan over a relevant budgetary period.

This role of aggregate cost estimates in budgeting to achieve the MDGs may be relevant at both the global and the national level. However, budgeting must be undertaken over a realistic period. The length of the appropriate period over which budgeting should take place will reflect the reliability of forecasts regarding future costs and resource generation opportunities, the likelihood that new information will be revealed at different points in the future, the possibility that over time there will arise changes in priorities, and the costs of undertaking budgeting itself. The appropriate period for budgeting will vary according to context and purpose<sup>21</sup>.

### *2.3 The role of disaggregated cost estimates in planning to achieve an objective:*

It may be desired to achieve the MDGs with the fewest possible resources, so as to leave more resources to achieve other objectives (other than those identified in the MDGs or beyond the thresholds defined in the MDGs), or to achieve the MDGs as rapidly as possible. It is necessary to identify the costs of achieving the MDGs through distinct (and potentially substitutable) means in order to identify the most efficient approach to achieving the goals. It is important to note that a global cost estimate for achieving the MDGs (considered jointly or individually) is of no interest from this perspective. We may consider two distinct types of substitution across distinct means of achieving the MDGs:

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<sup>21</sup> It is interesting to note that in the context of national development plans, it has generally been thought unrealistic to produce budgetary plans over periods of greater than five years.

*Substitution across countries:*

A number of the MDGs are phrased as global goals. It is therefore imaginable that they may be best achieved by focusing efforts in a few large countries. If the MDGs are to be pursued on an aggregate global basis, without regard for the fact that individual countries may fall severely behind in their individual attainment of the goals, then the relative cost of achieving the goals in different countries will be of great importance to determining the best strategy to pursue. The interpretation that the MDGs are to be attained globally, and without regard to the extent of their achievement in individual countries, is implicit in certain analyses (such as Bhalla (2002)).

In contrast, the MDGs have been interpreted by others (in particular Devarajan, Miller and Swanson 2002, the UNDP and the Millennium Project) as to be achieved on a country-by-country basis. Under this latter interpretation, there is no scope for substitution across countries to achieve the MDGs, and as a result information concerning the relative costs of achieving the MDGs in different countries will be of little relevance.

*Substitution across interventions:*

Within any country, the MDGs may be promoted through alternative interventions. The choice of interventions may be greatly important to enabling the MDGs to be achieved at all, let alone at the least cost and as rapidly as possible. Therefore, information on the costs of promoting the MDGs through distinct interventions is indispensable to developing a country-specific plan for achieving the MDGs. For instance, it may be necessary to choose between promoting school enrolment through mid-day meals schemes or through reducing the distance to schools. However, the total cost of achieving the MDGs (or indeed any specific MDG) is of no inherent interest from this standpoint.

We can conclude that:

*Effective strategic choice requires the comparison of alternative cost estimates.  
(Proposition 1)*

### **3.0 Requirements of an Estimate**

A credible estimate of the cost of achieving the MDGs, within a country or globally, must undertake the following tasks:

*Identify the cost concept:*

It is necessary to conceptualize cost in some way. For instance, costs to the domestic public sector, costs to the domestic and foreign public sector, aggregate costs (to the

domestic private and public sector) and aggregate costs (to the domestic and foreign private and public sector) are each distinct cost concepts that will give rise to distinct estimates of costs. Moreover, explicit financial costs and total (explicit and implicit) resource and opportunity costs are distinct cost concepts. These distinct cost concepts have rarely been clearly differentiated in the literature, although each is appropriate for a different purpose and will give rise to widely divergent estimates of costs.

*Accurately identify the baseline scenario:*

Estimating the cost of achieving a goal requires an assessment of the starting point in relation to which it is defined. What is the initial level of each indicator (for instance the percentage of persons suffering from hunger, or possessing an income of less than \$1 per day) in relation to which the goals' final targets and ongoing progress ought to be assessed?

*Accurately identify the cost function:*

An estimate of the cost of achieving a goal requires the identification of the cost function which describes the cost of achieving the goal to a particular extent, given relevant circumstances. Since this cost function cannot directly be observed, it is necessary to have some other basis for imputing it. Typically, this imputation is disaggregated into the following elements:

Identification of unit costs:

What are the *observed* costs of generating a unit of the desired outcome, either on average or on the margin? Where these costs are not directly observed, they may be inferred based upon experiences in other contexts.

Projection of unit costs over the coverage range:

What are *expected* to be the costs of generating subsequent units of output, until the point that the goal is achieved? Judgments concerning the costs of producing subsequent units of output will generally be influenced by current observations of unit costs and by relevant facts about the world, including the causal process giving rise to a particular outcome. For example, there may be increasing costs of achieving certain outcomes as it becomes necessary to extend services to populations that are geographically or socially difficult to reach. On the other hand, positive 'network externalities' (associated for instance with the spread of information) may reduce the marginal cost of achieving certain goals as they are closer to being attained. Judgments concerning the nature of the cost function will be controversial insofar as the empirical information and causal theories that they depend on are controversial. By definition, unit costs that will hold in the future cannot be observed. They must be estimated based upon present unit costs and (possibly also controversial) assumptions concerning expected technological and institutional changes.

## 4.0 Main Methodological problems

Recent estimates of the cost of achieving the MDGs are subject to various criticisms. As we shall see, some recent estimates suffer from more severe problems than do others. *All* existing efforts to identify the cost of achieving the MDGs suffer from problems under *each* of the general headings that we identify below. Of course, different approaches differ in the extent to which they suffer from the *specific* problems that we identify under these headings. In lieu of a goal by goal discussion of the issues, many of which are well known to expert readers, we confine ourselves here to a discussion of issues that are of critical and cross-cutting concern in relation to all MDG cost estimates. We offer examples of difficulties with existing estimates that are merely indicative. Many more can be found through careful scrutiny.

### 4.1 Unjustified assumptions:

Existing national and global cost estimates are not robust to the choice of assumptions. A number of simplifying assumptions have been made in each existing study in order to make the analysis tractable. Unfortunately, these assumptions are rarely justified.

Studies vary widely in their assumptions concerning future growth rates of national income, future rates of tax revenue generation, and the balance of public and private financing of expenditure that may reasonably be expected. It might be added that they have often made very optimistic assumptions in this regard as compared with the historical record for the countries concerned. These parameters are of great importance to ‘closing a model’ and generating a cost estimate since it is usually desired to estimate the total costs of achieving the MDGs to national governments and foreign donors rather than to estimate the total costs as such. There is often no evident basis on which to choose between these qualitatively and quantitatively widely divergent assumptions, and thus the resulting cost estimates lack in credibility. Appendix three shows for example that the estimates of future national growth that are made by the Millennium Project are highly optimistic as compared with the historical record of many developing countries.

Similarly, although Devarajan, Miller and Swanson (2002) quite appropriately note that “any attempt to determine the aggregate costs of achieving the development goals is a highly speculative exercise”, the methodology employed ironically illustrates how restrictive assumptions can result in erroneous estimates. The authors’ basic method is to “calculate the additional aid required to meet the poverty goal by estimating the additional growth required to raise average incomes by enough to raise the goal, and then estimating the additional aid required to attain that growth”. The authors emphasize that their approach is to assume that the MDGs must be met on a country-by-country basis. They state that “Working backward from the existing poverty level and distribution of income, the average rate of growth required to reach the poverty goal in 2015 determines the amount of additional investment needed”. The authors have assumed (see Appendix 2 of their paper) that the income distribution will be unchanged (i.e. that growth in incomes will raise all incomes by an equal share). As recent experience in many countries demonstrates, this may be an unreasonable assumption (see e.g. Cornia and Kiiski, 2001).

The authors estimate the additional resources required to attain the growth target by making assumptions based on historical experience concerning countries' savings rates and incremental capital output ratios, and considering alternative scenarios.

The authors also note that there may exist “absorption constraints” that limit countries' capacity to use resources effectively. As a result, beyond a “saturation point”, additional resources have zero impact. Moreover, this “saturation point” is said to vary with the nature (or “quality”) of a country's policies and institutions. The authors report research that finds that “for countries which have policies and institutions that are among the best (sic) of developing countries... the point beyond which the growth impact is zero is reached when aid is around 30 percent of GDP. By contrast, the saturation point for countries with extremely weak (sic) policies and institutions is calculated to be around 6 percent of GDP”. This inference is based on a model that is replete with conceptual problems. The notion of an “absorption constraint” (beyond which the marginal impact of applying additional resources is presumably zero) is ill-conceived. Presumably it is believed that the so-called absorption constraint cannot itself be relieved through the appropriate application of additional resources. It is unclear what would in practice constitute an absorption constraint of this kind. The concept of an “absorption constraint” is employed extensively in the report of the Development Committee<sup>22</sup> entitled “Supporting Sound Policies with Adequate and Appropriate Financing” which goes even further, and suggests that a rather large share of countries would be altogether unable to achieve the first MDG (and others), irrespective of the degree to which policies are revised and finances augmented!<sup>23</sup>

The view that policy revisions (and in particular the abandonment by countries of “bad” policies for “good ones”) can by itself substantially accomplish the first MDG appears to be quite popular among some authors (see in particular, Development Committee, 2003 or Collier and Dollar 1999 and 2000). In addition to the admirable terminological clarity which these analysts bring to bear, they should perhaps also be congratulated for the unequivocal character of their analysis. Regrettably, there is neither universal agreement on how to classify policies as “good” and “bad” nor on the impact that “good” policies have on growth. A country is identified as having “good” policies in this literature if it receives a high score on the World Bank “Country Policy and Institutional Assessment”<sup>24</sup> (CPIA). This measure relies on the subjective judgments of World Bank “country specialists” and gives importance to criteria such as the presence of a “Competitive Environment for the Private Sector” and “Property Rights and Rule-based Governance”<sup>25</sup>. Furthermore, the CPIA gives equal weights to each indicator, notwithstanding the preponderance of indicators linked to macroeconomic management and microeconomic efficiency and the relatively few indicators linked to social inclusion.

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<sup>22</sup> A Joint Ministerial Committee of the Boards of Governors of the World Bank and the IMF

<sup>23</sup> Development Committee, 2003. See page 10, e.g. health in Albania and Mauritania.

<sup>24</sup> See e.g. Dollar and Burnside (1999). The CPIA assigns a value between 1 and 6 to capture perceived performance in twenty different respects, ranging from macro-economic management and factor market policies to policies for social inclusion and public sector management.

<sup>25</sup> Vandemoortele (2003) stresses the subjectivity of evaluations concerning, for instance, whether a country has a distortionary minimum wage, excessive labor market regulations or too many public sector workers (page 14).

It is unlikely that there would be universal agreement either that such criteria are appropriate to include in a measure of “good policy” or on how to measure them. It is interesting to note that the analyses on which these conclusions rely suffer from omitted variable biases and other econometric failings that may seriously distort their conclusions<sup>26</sup>. It seems imprudent for analysts to base a global cost estimate for achieving the MDGs on such controversial causal theories, and unwise for others straightforwardly to accept them.

A subtle but profound problem is that the cost of achieving individual MDGs is not well-defined. The reason is that, as has been widely recognized, the distinct MDGs are likely to be “jointly produced”. The interventions that help to promote a given MDG may also promote other MDGs. For instance, better nutrition may promote both the ability of children to learn and to survive. In such circumstances, it is not feasible to unambiguously identify the cost of achieving the goals associated with education and with good health. The reason is that it is not possible to unambiguously identify the share of the cost of an intervention (serving as a joint input to more than one MDG) that should be attributed to each of the goals. Only the cost of achieving the MDGs jointly can, properly speaking, be identified. The cost of achieving individual MDGs can be specified by arbitrarily attributing the cost (or a share of the cost) of a particular input to a specific MDG. However, under this approach (which, for example, is that taken by the Millennium Project) the presumed cost of achieving the MDGs jointly (i.e. the sum total of the costs attributed to each MDG) will not equal the true cost of achieving the MDGs jointly. All of the existing efforts to estimate the total global cost of achieving the MDGs, which have simply added estimates of the presumed costs of achieving individual MDGs defined as above, are invalid<sup>27</sup>. Moreover, efforts to identify the cost of achieving the MDGs jointly require an adequate understanding of the *joint* production function for MDGs. The requirements on understanding the causal pathways by which the MDGs are interrelated are immense and strain the limits of existing knowledge. Problems in the estimation of costs which arise due to the presence of joint production, which are conveniently ignored in many empirical economic analyses, cannot be ignored in the context of the MDGs, in view of the highly interdependent causal processes that are likely to underlie aggregate social and economic achievements in developing countries.

The Millennium Project needs assessment establishes a list of interventions required to meet each of the goals<sup>28</sup>. These (possibly overlapping) lists identify appropriate “interventions” (“defined broadly as the provision of goods and services as well as infrastructure”) needed to meet each of the goals, and their costs. The Project’s methodology distinguishes between “policies” and “institutions” (defined as means for delivering specific interventions)<sup>29</sup>. Although the Millennium Project recognizes the role of policies, it focuses its analytical work on interventions. However, a list of

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<sup>26</sup> For instance, Reddy and Minoiu (unpublished) point out the omission of explanatory variables related to human “capital” (such as life expectancy and school enrolment) and the structure of economies (such as dependence on primary commodity exports) in these analyses. The consequence is to attribute to “good policies” a much larger effect than they may in fact have. See also Dayton-Johnson and Hoddinott (2003).

<sup>27</sup> We are very grateful to Sudhir Anand for bringing our attention to this point.

<sup>28</sup> A detailed list of these interventions is available in Millennium Project, 2004, page 200-220.

<sup>29</sup> Millennium Project, 2004, p.9.

interventions, as comprehensive as it may be, cannot provide an adequately sound framework for the comparison of alternative strategies to achieve the MDGs (which necessarily consist of both interventions and policies). For example, it is clear that institutions and policies in rich countries (for example, the regime governing trade and capital flows) will have a significant impact on the ability of poor countries to achieve the MDGs, just as will the nature of institutions and policies in poor countries themselves. Although policies are discussed, this is often done formulaically. Claims concerning the policies and institutions that are most desirable are often asserted without justification.

Existing methodologies for estimating the cost of achieving the major MDGs (for instance those related to education and to health) rely on the generalization of unit cost estimates derived from limited evidence. A major issue concerns the accuracy of these unit cost estimates. Often, it is not made clear whether they refer to average or marginal costs, and whether they are based on national average data or on local data. Estimates of marginal costs are based on assumptions regarding counterfactuals (for instance, concerning what factors are fixed and what factors are flexible in the short-run), and can be produced in many different ways. The methodologies used are rarely made clear, and are likely to be mutually incompatible.

Generalization of unit cost estimates across countries is invariably done (for instance, by the Kumaranayake, Kurowski and Conteh (2001) for the Commission on Macroeconomics and Health and by recent MDG country studies by diverse agencies) by using general purchasing power parity conversion factors, which may be badly mis-measured in poor countries, and can be quite inappropriate for calculating the relative costs of the goods and services that are likely to be needed to expand MDG achievements. To illustrate this point, Appendix four shows that the relative costs of the components of health care (such as drugs or the services of physicians) across countries can be widely divergent from the relative costs of general consumption.

This point is further illustrated by Table 1, which draws on the data in Appendix four to demonstrate that the relative price structure across different components of health expenditure is widely divergent even among poorer countries. It may easily be checked that these divergences exist even between pairs of countries in the same region. This suggests that the use of general consumption PPPs (or even existing disaggregated PPPs) to predict overall costs of achieving health improvements in poor countries may lead to non-negligible errors.

**Table 1: Correlation between PPP for all consumption and PPP for components of health care (for Poor Countries\*)**

Drugs	Medical Supplies	Therapeutic Appliances	Hospital Care	Physicians' Services	Dentists' Services	Nurses' Services
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0.943861	0.94096333	0.44176484	0.64295312	0.64568034	0.60078694	0.94344501
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\* All countries for which data is reported in Appendix four.

It has been widely noted that existing PPPs are based on data drawn from price points in major cities (and often from capital cities alone). As a result, they are unlikely accurately to reflect the costs of purchasing goods and services in small towns and in rural areas, in which both the level and the structure of prices are likely to be different, in ways that vary from country to country. This is an additional reason that estimates of unit and total costs based on PPPs are unlikely to be accurate.

Quite apart from the difficulties involved in generalizing cost estimates across countries, recent country studies from different sources have made unit cost estimates for the extension of particular services in the *same* country that vary widely. Table 2, comparing estimates of the cost of achieving universal primary education in Uganda from different sources, is illustrative.

**Table 2: Unit costs of Universal Primary Education in Uganda<sup>34</sup>**

Study	Estimated annual cost per pupil
UNICEF 2001 <sup>35</sup>	\$13 (1998 prices)
EPRC 2001 <sup>36</sup>	\$46 (2001 prices)
World Bank 2003 <sup>37</sup>	\$27.5 (2000 prices)
Millennium Project 2003 <sup>38</sup>	\$53 (2000 prices)

Although these cost estimates are phrased in dollars of different years, it is clear that they are widely discrepant. Of course, these variations in part appropriately reflect differences in the understanding of the goal, and in detailed assumptions. From this standpoint, the existence of discrepancies is not necessarily embarrassing (although, in the absence of adequate explanation, it is still worrying).

Should unit costs be taken as fixed over the interval required to achieve the goal, as is done in all of the recent estimates of the cost of achieving the individual goals? There are strong *a priori* reasons to think that decreasing or increasing marginal costs (identified here with economies and diseconomies of scale) may play an important role in relation to the MDGs. For instance, in poor countries, those who are not already the beneficiaries of relevant services may be those who are most difficult to reach, for geographical or social reasons. The limited supply of skilled personnel and the impact of ODA on the exchange rate may make it increasingly costly to extend services. Contrarily, positive externalities may lower barriers to service provision as more units of a service are provided.

<sup>34</sup> We would like to thank Lynn McDonald for this comparison.

<sup>35</sup> Delamonica E., Mehrotra S. and Vandemoortele J., 2001

<sup>36</sup> Economic Policy Research Centre, 2002

<sup>37</sup> Bruns B., Mingat A. and Rakotomalala R., 2003

<sup>38</sup> Millennium Project, 2004

Transformations in social norms and transmission of relevant knowledge within social networks are likely to be among the reasons for such phenomena<sup>39</sup>. Although it is difficult to know in advance what the scale of such effects is and what form they take, it seems entirely plausible that they exist. Similarly, there are strong a priori reasons to think that there are significant complementarities between distinct MDGs. For instance, it seems likely that greater access to safe drinking water and literacy will both improve health outcomes. On the other hand, achieving certain goals may increase the cost of achieving others. For instance, reductions in child mortality will increase the school-age population and thereby increase the cost of achieving universal primary education. Similarly, pecuniary externalities associated with the achievement of a given MDG (such as the effects on wages and exchange rates mentioned above) may also raise the cost of achieving other MDGs. It is not difficult to think of these and other connections, or indeed to imagine that the magnitude of their impact may be sizable. Such quantitative work as exists on the complementarities between distinct development achievements suggests that this is indeed the case. We may refer to such complementarities as “economies of scope” (and their opposite as “diseconomies”).

How accurate is a cost estimate likely to be if it assumes that unit costs are fixed when (in fact) there exist economies (or diseconomies) of scope or scale? In order to answer this question, we have undertaken a simple numerical exercise (reported in Appendix six), drawing on actual data, from a background paper of the Commission on Macroeconomics and Health, which appears to have played a critical role in the cost estimates of the Commission. For a variety of health interventions, we have inferred the unit costs of coverage extensions (i.e. the costs of expanding the percentage of the population covered by one unit) that are implicitly assumed in this background paper. We have also used the actual baseline coverage levels and the targets (for 2007 and 2015) used in the paper. The accuracy of the unit costs is arguably not in itself of great importance, as the purpose of the exercise is merely to show that the impact of divergence from the assumption that there are no economies of scale or scope can be large over realistic coverage ranges. In particular, the numerical exercise shows that the impact of the presence of (dis)economies of scale or scope by themselves on total cost estimates is significant. Moreover, the impact of the interaction of even moderate levels of (dis)economies of scale and scope is to generate truly massive discrepancies in total cost estimates. As shown in Tables A8 and A9 in the Appendix, the inclusion of reasonable economies of scale and scope can lead to variation in total cost estimates of more than an order of magnitude! The conclusion we would draw is that in the absence of far greater knowledge concerning the causal processes at work, we should be greatly wary of current cost estimates, which almost universally depend upon simple linearity assumptions (which preclude economies and diseconomies of scale) and separability assumptions (which preclude joint production -- economies or diseconomies of scope). Indeed, even if the assumptions were to be relaxed, the sensitivity of total cost estimates to the assumptions made should be cause for great concern. Some of the results of these exercises are summarized below.

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<sup>39</sup> See e.g. Rosenzweig and Foster (2003).

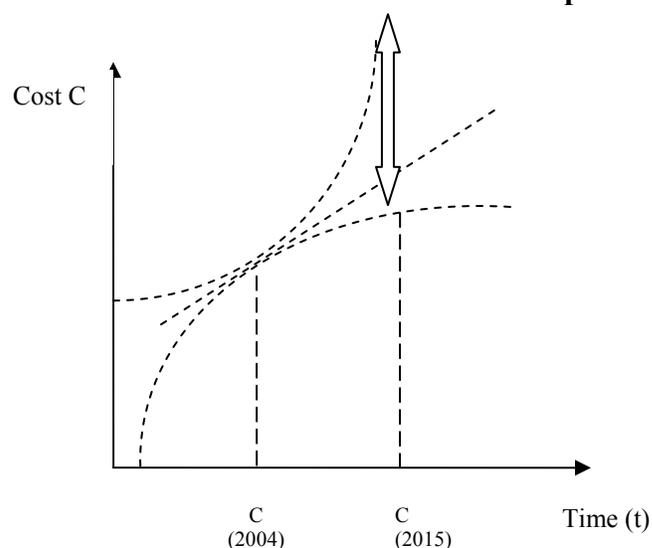
**Table 3: Total (tuberculosis treatment and malaria diagnosis) health costs in billions of (2002) dollars under different assumptions concerning economies of scale and scope\*.**

Neither Economies of Scale nor Scope	Economies Of Scale Alone	Diseconomies of Scale Alone	Economies of Scope Alone	Diseconomies of Scope Alone	Economies of Scale and Scope	Diseconomies of Scale and Scope
4.3	1.442	17.215	2.213	6.387	0.737	25.516

\*The figures presented in the table are taken from Tables A8 and A9 of Appendix six. The results represent the values obtained for the highest magnitude of parameters used in the exercises.

Figure 1 below demonstrates how failing to take account of economies of scale and scope can lead to potential errors in the estimation of total costs. A similar drawing can be made to describe the errors (in the opposite direction) that may arise from neglecting diseconomies of scale and scope. *Ex ante*, there is little basis on which to conclude that the cost function for achieving the MDGs has a particular form. The resulting uncertainty undermines the credibility of long-range cost estimates and makes it necessary to identify bases for decision-making that do not rely inordinately upon such estimates.

**Figure 1: Potential error from disregarding economies of scale or scope**



The existence of economies and diseconomies of scale and scope is reason to doubt the credibility and accuracy of current MDG cost estimates. The World Bank acknowledges the “inter-dependence of MDGs”<sup>40</sup> without assessing – explicitly and transparently - the impact of this interdependence the cost of achieving the MDGs. The Millennium Project makes a partial and unsatisfactory attempt to estimate complementarities between the

<sup>40</sup> World Bank, 2003. Box 1, Page 3.

different goals. Synergies between and within the MDGs are only assessed in the health sector –where most complementarities are assumed to occur<sup>41</sup>, and “estimated” (by what means is unclear) to “have the potential to save 20-35 percent of the total health costs”<sup>42</sup>. Despite these flaws and exposure to the results of the exercise presented in appendix six, which shows that cost estimates can vary by more than an order of magnitude according to the alternative (plausible) assumptions made, the Millennium Project rather forcefully concludes that “while our treatment of cost savings related to synergies within and across sectors is neither complete nor final, we believe that the results contained in this paper capture some of the most important savings. They show that these effects are substantial, but do not change the order of magnitude of resources required to meet the MDGs”<sup>43</sup>.

#### *4.2 Weaknesses in Data*

The data required to assess the baseline scenario of the MDGs and to monitor their progress over time are at present severely deficient. As a result, it is often not possible meaningfully to judge either the extent of progress required or the costs of achieving progress. Apparent spatial and temporal variation in data is often not meaningful, as a result of which efforts to identify the sources of this variation and estimate relevant parameters (such as “poverty reduction elasticities of growth”) are also not meaningful. Efforts to estimate the cost of achieving the first MDG are perhaps the most severely compromised by data weaknesses of this kind. Data on unit costs (whether of providing interventions or of achieving outcomes) are rare, and where available are produced using methodologies that are most often both inadequately specified and not comparable across countries. There is widespread confusion as to whether the unit costs being used refer to average or marginal costs, and there are rarely careful attempts to distinguish between these.

The estimation of the joint production function for MDGs (i.e. the impact that interventions have on outcomes) amounts to the estimation of an interdependent (‘simultaneous equation’) system. The number and complexity of the causal inter-linkages that are present between distinct MDGs as well as the uncertainties concerning these relationships and the underlying data make this task of ‘identification’ a difficult one, to say the least, and subject to uncertainties sufficient to raise serious doubts about the credibility of the exercise.

Weaknesses in the database for defining and monitoring the goals are most evident in regard to the first goal. Although the goal contains two components, in practice there has been a tendency to focus on the first component (halving from 1990 levels the proportion of people whose income is less than one dollar per day). Regrettably, this indicator lacks in credibility. There is no convincing way in which to monitor this indicator either over time and space, because of basic weaknesses in its definition and in its methodology of estimation. Reddy and Pogge (2002) and Pogge and Reddy (2003) have extensively discussed the difficulties involved with the “1 dollar per day” indicator of extreme

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<sup>41</sup> Millennium Project, 2004, Page 30-31

<sup>42</sup> Ibid, page 59

<sup>43</sup> Ibid, page 30-31

poverty. There are two distinct issues here. The first is that the indicator is not meaningfully defined. The second is that it is poorly conceived and estimated.

The first concern is that the ‘\$1/day’ indicator fails meaningfully to capture extreme poverty. In a majority of poor countries, national poverty lines are substantially above the “\$1 per day” line. In fact the “\$1 per day” line was not designed to reliably capture the cost of achieving any particular set of elementary human requirements. As a result, the assumption that data on ‘\$1/day’ poverty captures the reality of extreme poverty is simply false. This is an error to which the Zedillo commission falls prey, when it writes (rather casually) in its technical appendix that “It seems reasonable to suppose that extreme poverty and hunger go together; halving one would more or less halve the other”. In fact, there is no evidence of a relationship between “1 dollar per day poverty” and other measures of human well-being, such as undernutrition (see e.g. Karshenas, 2000).

More fundamentally and damagingly, estimates of \$1/day poverty for a specific country and year can fluctuate wildly due to irrelevant factors (in particular, the base year in relation to which the international poverty line is defined), undermining confidence in the meaningfulness of these estimates<sup>44</sup>. Confidence in the estimates is further undermined by the fact that the PPP conversion factors used to translate the international poverty line (of \$1/day) into local currency units are both inappropriate (as they capture the price level of general commodities rather than essential commodities) and are often based on an inadequate (or even altogether absent) evidence base. This is true even for large countries such as India and China. Different estimates of PPPs for these countries would lead to radically different estimates of the global poverty headcount and trend. Estimates of “\$1 per day” poverty do not provide a basis for meaningful comparisons of absolute poverty across time or space. As a result, the target of “halving the proportion of people whose income is less than one dollar a day” is not well-defined, contrary to appearances.

The “poverty reduction elasticities of growth” drawn on by Collier and Dollar (2000), Hanmer and Naschold (1999), and by the Millennium Project (2004), are based on these figures and therefore lack in credibility. Beyond causal empiricism, there is little basis for conclusions regarding the magnitude or determinants of the elasticities of poverty indicators with respect to income. Nevertheless, such conclusions are widely drawn and existing estimates of the cost of achieving the first MDG are critically dependent on them. In the case of the World Bank’s estimates, this is because the resources necessary to achieve the income growth required to achieve the first MDG depends on the assumed parameters. In the case of the Millennium project’s estimates, this is because the resources estimated to be available domestically to achieve the MDGs depend on the assumption that sufficient growth will take place to achieve the first MDG<sup>45</sup>. In fact, estimates of poverty-reduction elasticities of growth vary widely according to the

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<sup>44</sup> See Reddy and Pogge (2002) and Pogge and Reddy (2003)

<sup>45</sup> It is not especially evident why it should be assumed that countries will actually attain this rate of growth. Indeed, the assumed per capita income growth rates (for example, 3.3 percent per annum for Tanzania) are extremely optimistic in relation to historical levels in many countries. A more detailed discussion of that issue is presented in Appendix 3.

country, sector, and type of income. Recent literature (see for instance Bourguignon (2001), Farr (2001), Heltberg (2002), Kakwani and Pernia (2000), and Ravallion and Datt (1999)) demonstrates that poverty-reduction elasticities widely vary between countries, regions and persons. Moreover, such elasticities are not inflexible, but are rather greatly influenced by policy variables and by other human development achievements (such as literacy). This is hardly surprising, as it is well-known that individual earnings capacities are deeply dependent on the possession of relevant human capabilities (or as they are more frequently referred to in the literature, 'human capital'). Moreover, unless income distributions and growth dynamics are for a very special kind, it is necessarily true that as poverty reduction takes place, the so-called poverty reduction elasticity of growth will also change. For these reasons, inflexible assumptions (such as the heroic assumption of Collier and Dollar (2000) that the elasticity of the headcount ratio measure of poverty with respect to growth is everywhere -2 or the equally implausible assumption of the Millennium Project (2004) that this elasticity is everywhere -1.4 are entirely without merit. The Millennium Project explicitly declines to use country-specific estimates of so-called poverty reduction elasticities of growth because of the large variation between different available estimates<sup>46</sup>. However, the absence of reliable and accurate estimate of poverty reduction elasticities of growth at the country level is also a reason to adopt a very skeptical understanding of the assumed global parameters.

The second (undernourishment) target corresponding to the first goal is currently measured by the FAO using a 'food balance approach' that combines information on the net material balances of food available in each country with distributional assumptions concerning nutritional intake. Unfortunately, the FAO has not adopted a clear and uniform standard of undernourishment to be applied in all countries. As well, as pointed out in particular by Svedberg (2001) the FAO's estimates are extremely sensitive to variations in parameter assumptions. Significant strengthening of the evidential basis for judgments concerning undernutrition is necessary. As pointed out, by Reddy and Pogge (2002), however, the strengthening of the database for the measurement of global income poverty and the database for the measurement of undernutrition are likely to be closely related.

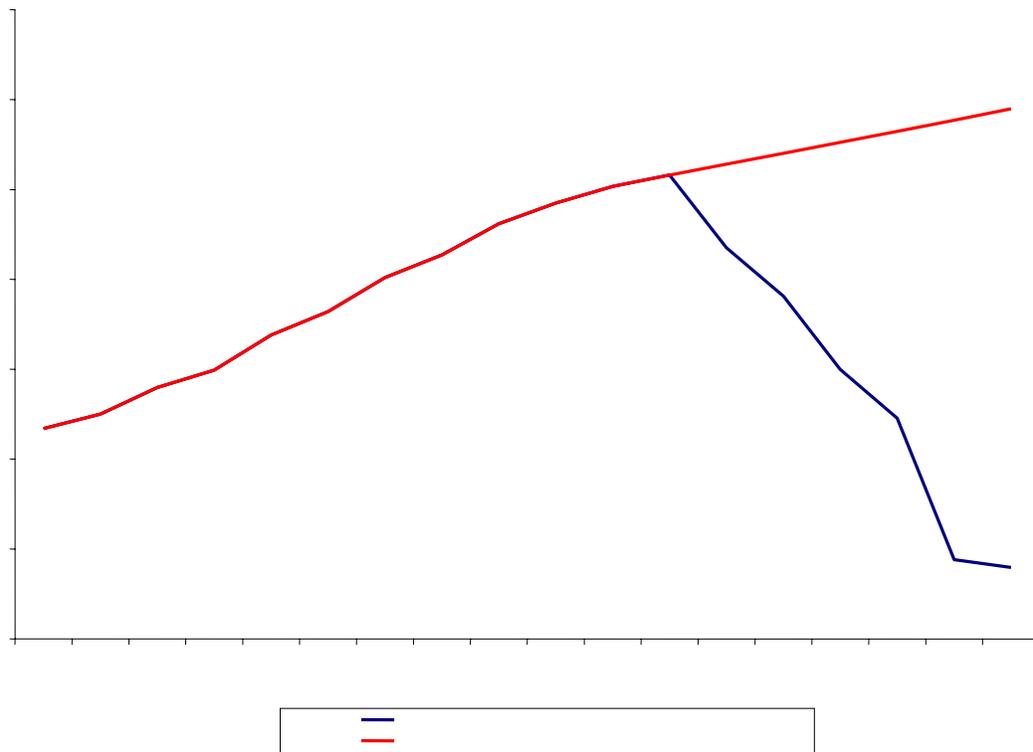
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<sup>46</sup> Millennium Project, 2004. Page 79

### *4.3 Unpredictable Future Shocks*

Even the most carefully constructed cost estimates are unlikely ultimately to prove accurate, especially over longer time horizons. The reason is that unpredicted future shocks are sure eventually to undermine the accuracy of these estimates. The number and breadth of the assumptions required to generate global cost estimates for the MDGs all but ensures that the resulting cost estimates will eventually be made inaccurate by unpredicted shocks, operating at national or global levels, which are sure to influence both the level of achievement of the goals and the cost of extending them. Examples of significant shocks of this nature that have arisen in the past or may occur in the future include new diseases (such as HIV/AIDS), climatic events (such as El Niño and global warming), and civil and regional wars. In addition to shocks of this kind that influence the aggregate cost of achieving the MDGs, unpredictable events such as shocks to terms of trade and global demand may in turn influence both the level and distribution of domestic income, and thereby influence both the total resource requirements for achieving the MDGs and the shares of these overall costs that will have to be borne by developed countries if they are to be achieved.

The impact of AIDS in Botswana provides an example of the negative consequences of an unpredicted shock. In Botswana, while life expectancy grew from 47 to 61 between 1960 and 1987, it plummeted to 39 in 2000 as a result of HIV/AIDS. The extrapolation of historical trends of life expectancy before the spread of HIV/AIDS would have led to projections of life expectancy quite at variance with what in fact took place (for example, linear extrapolation would suggest that a life expectancy of 68 would have been attained). The effects of HIV/AIDS on other human development indicators have also been significant. Unpredicted extreme events of this kind are likely to continue to arise, and will influence our judgments concerning resource needs and priorities, between and within countries. Accordingly, mechanisms for periodically updating needs assessments and strategic choices can substantially improve the quality of decision making.



Source: *World Development Indicators 2003*.

#### 4.4 Conclusions and an Alternative

We may conclude that:

***Existing (technocratic) approaches to identifying the best strategies for achieving the MDGs are unreliable. (Proposition 2)***

It is not hard to see that damage can arise from the use of unreliable cost estimates. One reason is that inaccurate cost estimates can cause significant misallocation of resources and errors in policy choice. Such misallocation and error can reduce the effectiveness of resource use and policy choice, and diminish the pace with which the MDGs are attained, or make it infeasible for them to be attained at all. Another reason is that unreliable cost estimates can cause estimated resource requirements to be either higher or lower than the actual requirement. If higher, resources may be directed away from other potentially valuable development goals. If lower, the MDGs will not be attained, at great social cost.

Further, political credibility will have been lost and it may become increasingly difficult to mobilize around similar future goals.

The existing approaches to estimating the cost of achieving the MDGs, globally, in specific countries, and through alternative means, are flawed as a result of their reliance on unjustified assumptions and weak data. Moreover, it is possible that they will ultimately be incorrect because unpredicted shocks will arise. Although *any* cost estimates are likely to suffer from such problems, the potential damage from the use of incorrect cost estimates as a guide to decision-making is likely to be greater in contexts in which they serve as a guide to decision-making over long periods of time. On the other hand, if the cost estimates used in decision-making (and in resource allocation and policy choice) are adjusted periodically, as new information regarding needs, options, and costs becomes available, and if critical decisions are also periodically adjusted on the basis of revised cost estimates, then the damage from the use of incorrect cost estimates can be limited. In particular:

*There is an alternative (democratic) approach to identifying the best strategies for achieving the MDGs, which diminishes the likelihood of costly errors and increases the likelihood of sustained success. The democratic approach establishes an institutional framework for representative decision-makers to periodically form policy recommendations on the basis of relevant information from diverse sources. (Proposition 3)*

*The heart of an alternative*

The unreliability of the informational base and methods of analysis of the orthodox approach to strategic choice is the source of its problems. These problems are compounded when its prescriptions are applied inflexibly.

The rationale of the alternative approach (the IFLM) is Bayesian: Its premise is that knowledge of how best to achieve the MDGs is necessarily imperfect. Beliefs about how best to achieve the MDGs ought to be updated in light of new information. Moreover, strategic choices can be made more effective by seeking out and incorporating relevant information to the maximal extent. The IFLM incorporates this Bayesian insight in two ways. First, it seeks periodically to reassess the appropriate choice of strategies in light of new information concerning conditions in each country. Second, it seeks to identify appropriate strategies in light of information from other countries. In this way the IFLM ensures that the pace of learning concerning the strategies most appropriate to each country is accelerated, thereby diminishing the likelihood of error and increasing the likelihood of success.

The Bayesian principles of statistical decision theory underlying the IFLM are well-known. Recent literature has discussed the issues involved in great detail<sup>47</sup>. In appendix five we present a simple model that illustrates the core insight underlying the IFLM.

The alternative approach is a general one. It can be pursued in many different ways. However, we propose one particular way of pursuing the general approach, which we consider to be plausible, below. The proposal that we make is merely one possible instantiation of the general approach, and may be taken to be helpful in ‘fixing ideas’. It is not the only way of dealing with the problems inherent in the ‘top-down’ approach’ that underlies existing estimates, but it appears to us a promising one.

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<sup>47</sup> See e.g. Bala and Goyal (1998), French and Rios Insua (2000), Gale and Kariv (2002). Under appropriate conditions, it can be shown that as the number of observations increases a posterior distribution generated by Bayesian decision rules “converges to a point mass at the ‘true’ value of the parameter” [French and Rios Insua (2000), section 6.32].

## 5.0 An Institutionalized Financing and Learning Mechanism (IFLM) for the MDGS

### 5.1 Rationale for a MDG Institutionalized Financing and Learning Mechanism (IFLM)

It has been argued above that the credibility of existing estimates of the cost of achieving the MDGs is undermined by a number of factors, including weaknesses in the underlying data, lack of robustness to small variations in assumptions, and the likelihood of actual costs being influenced by unpredicted shocks. Errors in cost estimates can lead to the inadequate allocation of the resources needed to achieve the MDGs, or the misallocation of those resources, both of which will make it more difficult to achieve the MDGs.

Is there any alternative capable of overcoming the shortcomings of the methodologies currently used to estimate the cost of achieving the MDGs? Errors in long-run cost estimates are especially likely to arise, for each of the reasons mentioned above. Cost estimates are an essential aid to decision-making over a realistic budgetary horizon, as noted in section 2.0 above. The impact of incorrect cost estimates can be minimized by giving them the role that is appropriate to them in decision-making. In particular, this implies eschewing long-range cost estimates where possible and focusing on cost-estimates over a relevant time horizon, reflecting the limitations of current information and the requirements of planning. Cost estimates are an essential requirement in strategic choice (of policies and resource allocation) but their role must be qualified by the degree of uncertainty attached to them. Accordingly, in what follows we propose an approach to achieving the MDGs which requires cost estimates over relevant (and typically short) planning horizons, and allows policy-makers to compare and synthesize or choose from the variety of cost estimates that may be available, with explicit regard to the uncertainties that are present. The proposed approach replaces what may be regarded as a 'long-range' and 'top-down' methodology, which possesses attendant problems, with one that is short-term, flexible, and participatory, and recognizes the limits of knowledge from any one source. It is hoped that this shift of basis will enable the proposed approach to overcome some of the limitations inherent in existing approaches.

Cost estimates are only one component of a comprehensive process of planning and decision-making that will help to achieve the MDGs. Accordingly, we recommend the adoption of a *comprehensive* approach to goal-oriented learning and decision-making entitled the **MDG Institutionalized Financing and Learning Mechanism (IFLM)**.

The purpose of the IFLM is to provide a realistic, effective, and flexible approach to planning and financing at the country level, which takes note of the pervasive limitations of information and understanding that have been identified above.

The IFLM is motivated by two core empirical ideas:

- **The importance of learning:** It cannot be known in advance how the MDGs can be best achieved. As a result, it is necessary to foster individual and collective learning on this subject.
- **The importance of flexibility:** It cannot be known in advance what it will cost to achieve the MDGs. As a result, it is necessary periodically both to reassess these costs and to identify ways of financing them.

The IFLM approach is further underpinned by two core normative principles which reflect the “Monterrey Consensus”<sup>48</sup>:

- **A need principle:** Countries ought to have access to the resources they need to meet the MDGs.
- **A capacity principle:** Countries ought to provide the resources and take actions required to meet the MDGs to the extent of their capacities.

The concepts of need and capacity applied here encompasses counterfactual judgments concerning whether countries (both developed and developing) are currently doing all that they reasonably can to raise domestic resources and to use these resources effectively to achieve the MDGs.

A developing country is deemed to need external resources to achieve the MDGs if improvements in domestic resource generation and utilization cannot reasonably suffice for this purpose. The efforts of developed countries can similarly be assessed in light of the capacity principle. We propose that the standard to be used in assessing developed countries’ capacities reflect at a minimum the internationally agreed objective that 0.7 per cent of the gross national product (GNP) be provided as ODA to developing countries.

The IFLM is designed to foster individual and collective learning concerning how the MDGs may be best furthered, and to enable periodic reassessment of countries’ need for resources and (where applicable) their capacities to provide resources for the MDGs. A distinguishing feature of the IFLM is that it proposes that countries’ needs and capacities be identified on a continuous (and evolving) basis.

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<sup>48</sup> United Nations, 2002. Resolution 1 , page 1 of the report for instance:

“We the heads of State and Government (...) have resolved to address the challenges of financing for development around the world [and] we note with concern current estimates of dramatic shortfalls in resources required to achieve the internationally agreed development goals, including those contained in the United Nations Millennium Declaration. (...) Mobilizing and increasing the effective use of financial resources and achieving the national and international economic conditions needed to fulfill internationally agreed development goals (...) will be our first step in ensuring that the twenty-first century becomes the century of development for all.”

## 5.2 Operation of the IFLM:

It is proposed that the IFLM operate by means of a **Peer and Partner Review Mechanism (PPM)**, through which each country's efforts toward the MDGs are assessed by a peer and partner review committee, drawing upon diverse evidence, and operating in a publicly transparent and broadly consultative way. A peer review committee might contain representatives from North and South, from within a region and beyond it, and from among civil society representatives as well as states. The peer and partner review mechanism is meant to provide a flexible instrument to identify each country's requirement of resources in order to achieve the MDGs, and to identify opportunities for resource generation and policy reorientation. The peer and partner review mechanism will bring about **periodic assessments** of each country's efforts toward the MDGs, and their capabilities. Although assessment is periodic, the ultimate goal of attaining the MDGs is to be kept in mind by peer and partner review committees in each assessment or planning period. Strategies proposed and highlighted in each assessment or planning period should be ones that are deemed to promote the ultimate goals. It is proposed that cost estimates and social scientific knowledge from multiple sources, and reflecting alternative assumptions, play a role in the peer and partner review process. 'Peer and partner review committees ought to possess resources with which to commission and call upon studies. Participation in the peer and partner review mechanism ought to be entirely **voluntary**, so as to reflect the importance attached by nations and societies to their sovereignty.

We propose (although this is not essential to the proposal) that countries that choose to participate may expect that **bona fide resource gaps** identified by the peer and partner review of mechanism will be filled through a fast disbursing "**high priority MDG-resource channel**" to be made available by international organizations and donor countries. The modalities of the "high priority MDG resource channel" are left open. It may operate as a part of existing mechanisms for the transfer of resources to developing countries, or apart from them. The MDG resource channel, if activated, will function as a supplemental incentive mechanism for developing countries to undertake peer and partner review and to seek to achieve the MDGs, as well as a means of assuring donors that resources provided meet bona fide resource gaps. This incentive mechanism is to be distinguished from conditionalities, which demand adherence to particular conditions in return for assistance, and often emerge against a background of duress. It is proposed that all countries, North and South, be encouraged to undergo peer and partner review through the IFLM.

The recently proposed International Financing Facility (IFF) represents a potential source of funding of the proposed "high priority MDG resource channel". The objective of the IFF is to rise to the challenge of meeting the MDGs through the immediate mobilization of funds on the bond markets through borrowings guaranteed by developed countries. The most critical challenge of the IFF is to establish an innovative, credible and sustainable modality for allocating its funding. The IFF *raison d'être* lies in its capacity to provide an alternative financing to the grants and loans schemes of Bretton-Woods Institutions. The IFLM offers an original institutional mechanism which would

complement the IFF by providing a credible means for assessing resource gaps for reaching the MDGs at the country level.

The term “peer and partner review” has not been rigorously defined in the international context, although it has been widely applied. According to OECD, it can be described as “the systematic examination and assessment of the performance of a State by other States, with the ultimate goal of helping the reviewed State improve its policy making, adopt best practices, and comply with established standards and principles”<sup>49</sup>. A peer and partner review system for the MDG would, analogously, help to assess rich and poor governments’ current efforts towards the goals and systematically to identify bona fide resource gaps, as well as opportunities for new resource generation, reallocation of effort, and policy reorientation.

The peer and partner review system proposed as a central feature of IFLM draws its inspiration from existing experiences within the international system. The primary motive of a peer and partner review mechanism is to identify relevant facts and options in a transparent manner, and to foster exchange of information and rapid collective learning concerning effective policies and actions. The peer and partner review mechanism has historically been closely associated with the OECD<sup>50</sup>, which has very successfully applied this method since its creation in most of its policy arenas. However, UN bodies and specialized agencies also use peer and partner review to evaluate national policies in various sectors<sup>51</sup>. The European Union also applies peer and partner review mechanisms in several areas<sup>52</sup>. The IMF and the WTO apply mechanism involving periodic review of members’ actions and policies, although peers are not explicitly represented in the review process in the case of these institutions<sup>53</sup>. The peer and partner review systems recently developed by the Development Assistance Committee of the OECD for tracking the volume and characteristics of aid and private flows to developing countries and the African Peer Review Mechanism within the New Partnership for Africa’s Development (NEPAD) are important sources of inspiration for the propose peer and partner review mechanism. These important existing initiatives may potentially be integrated with the proposed IFLM<sup>54</sup>.

Improvements in the MDG data base are essential for the success of the IFLM, as they are essential for the success of any effort to promote the MDGs. As a result, a significant

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<sup>49</sup> OECD, 2002, page 1

<sup>50</sup>Pagani F., 2002, Annex A

<sup>51</sup> For instance, the Environmental Performance Reviews Program led by the UN Economic Commission for Europe or the review of investment policies of developing countries through peer review within UNCTAD - see UNCTAD.

<sup>52</sup> Within the European Union, the Employment and Social Affairs Direction has developed a peer review for national labor market policies to identify good policies and assess their transferability. For a detailed discussion of the European Union’s peer-review based “Open Method of Coordination”, see Sabel and Cohen, page 4-5.

<sup>53</sup> For a description of the IMF Country Surveillance mechanism, see IMF, 1999. The WTO uses a peer review mechanism to monitor trade policy and practices in member states -see WTO, 1994.

<sup>54</sup>NEPAD, 2002.

investment in improving the comprehensiveness, consistency and quality of MDG related statistics should be considered an essential complement to the creation of the IFLM.

The practical modalities of an MDG peer and partner review mechanism remain to be clarified. However, as an initial step we propose the following options, which may be considered as a baseline for subsequent discussion.

*Possible actors, functions and procedures of the MDG peer and partner review mechanism*

The frequency of the reviews would depend on the programme of work of the body. Tentatively, a three year cycle seems suitable for an MDG peer and partner review process. Peer and partner review is a combination of the activity of the member country undergoing peer review, a Secretariat, and the peer and partner review committee (the group of examiners).

**A Secretariat** is to be put in place by the international organization under whose authority the peer and partner review takes place. The Secretariat is expected to have a central role in supporting the review process by producing documentation and analysis as requested by the peer and partner review committee, commissioning studies as required and requested, organizing missions and meetings, maintaining the quality and the continuity of the process, and disseminating the results of the reviews to the public. UNDP's leading role in MDG monitoring and the advantages related to its presence worldwide, and OECD's experience with review processes – particularly in relation to goal eight (concerning aid commitments) – would suggest the active involvement of these two organizations in the Secretariat. External initiatives to estimate the cost of achieving the MDGs and appropriate strategies for doing so are likely to provide an important analytical resource for use in periodic country reviews. Accordingly, the IFLM secretariat should have a strong cooperative relationship with such initiatives. The definitive composition of the Secretariat may be decided at a later stage of discussion.

**The members:** Any country wishing to undergo an MDG-related peer and partner review process may do so.

**The Peer and partner Review Committee** (or group of examiners) should include national delegates from different countries. Officials from diverse Ministries involved with the MDGs should also be represented (for instance, ministries of Finance, Economic Planning, Health, and Education).

All peer group committees should include members from the South and the North in order to foster objectivity, internal and external confidence, policy dialogue and cooperation. Moreover the examiner countries should be chosen according to a rotating system in order to foster the productivity, objectivity and credibility of the process. However, the choice of committee members should centrally reflect (and give priority to) the necessity to develop a fair process based on mutual trust between the different parties involved.

A critical issue concerns the **participation of civil society** in the review process. It seems desirable to offer a substantive role to civil society in the peer and partner review process (preferably through the direct participation of civil society representatives in the peer and partner review committee) so as to enhance the public credibility and impact of the system and to encourage productive dialogue between governments and civil society representatives concerning a country's MDG related strategy. Where possible, civil society organizations from the North and the South ought to be involved in all committees and sub-committees and their activities should be supported by the Secretariat.

Finally the MDG peer and partner review process should follow certain **procedures** to ensure the transparency, credibility and salience of its work:

- A preparatory phase consisting of background analysis and some form of self-evaluation by the country under review. The support of the Secretariat is important in this phase.
- A consultation phase during which the peer and partner review committee and the Secretariat conduct their evaluation. The MDG Report and available country analyses (developed, for instance, by the UN Millennium Project) represent important input that may be drawn upon in this phase.
- An assessment phase during which the final report of the peer and partner review committee will be prepared. The committee will seek consensus but if necessary will file a report based on majority agreement. There will be an opportunity for dissenting members of the committee to file public comments on the majority report.
- Communication: The final report should be followed by a press release supervised by the Secretariat with a summary the main issues and findings for the national and international media. Press events and dissemination seminars should also be organize to publicize the results of the review. All documents associated with the review should be made publicly accessible via the world-wide web.
- Incorporation in to resource generation mechanisms. The final report should be considered by multilateral and bilateral donors. If the link between the peer and partner review process and financing is accepted, then in the case of developing countries under review, *bona fide* resource gaps identified by the peer and partner review committee will initiate fast disbursement of resources through a high-priority MDG resource channel, the modalities of which are to be established.
- Although the periodicity of this cycle is expected to be short (perhaps three or four years), the peer and partner review committee ought to be encouraged to centrally consider in each of its reviews the compatibility of a country's current actions with the long-term objectives represented by the MDGs. It should be explicitly recognized by a peer and partner review committee that the terminal conditions of a country's short and medium-term plan to achieve the MDGs will form the initial conditions of the next plan, and so-forth, culminating in the 2015 target date.

### *Size, scope and coverage*

In order to involve rich and poor countries symmetrically, and to help to achieve the promises of the Millennium Declaration and the Monterrey Conference, all countries should be encouraged to adopt the peer and partner review process, on a voluntary basis.

Developing countries will have an incentive to participate in the peer and partner review process so as to prove their commitment to the MDGs, to identify policy options and lessons, and potentially to attract additional resources. The peer and partner review process will allow developed countries to comparatively assess the level of their commitments to goal 8 (and thereby to reduce the ‘assurance problem’ among developed countries). It will also allow them to learn from their mutual experiences in regard to aid effectiveness. The Nordic countries have already conducted a review of their aid commitment under the supervision of OECD DAC. The peer and partner review process led by OECD could be integrated within the framework of the MDG peer and partner review process. The development of a “peer pressure” effect is likely to produce effective results and higher commitment on the part of the rich countries.

The principles, criteria and standards by which peer and partner reviews will ordinarily be conducted should be defined on a global basis, by the secretariat in conjunction with participating countries. A set of explicit criteria and indicators that may be used as part of a fair and credible review process ought to be identified. Developing a voluntary, flexible and positive approach based on mutual trust between countries and taking into account the specificities of the national context is central to the rationale of the IFLM.

The peer and partner review should assess each country’s efforts to achieve the MDGs in the light of local conditions and resource requirements. It ought to pay special heed to the need for additional resources with which to build institutional capacities and relax the constraints of countries’ “absorptive capacity”. It ought to take note of the baseline outcome information gathered in national MDG reports from diverse sources, and pay attention to relevant indicators of national effort (such as the pattern and level of public expenditures and the transparency of the administration) taking due account of a country’s economic, political and social conditions. The MDG peer and partner review committee should take note of the responsiveness of a country to previous peer suggestions as part of its determination of the options available to a country when it makes its judgments concerning the existence of *bona fide* resource gaps.

### *Relation between the IFLM and the PRSPs*

This is a major issue that remains to be addressed. The MDGs are development objectives that are distinct from those highlighted in the PRSPs. Accordingly, a distinct focus may be required in national development plans aimed at achieving the MDGs. The IFLM is potentially compatible with the PRSP process, if the latter explicitly recognizes the MDGs as legitimate long-term objectives. The IFLM may exist alongside the PRSPs, and (in the long term) supplant them.

*Global assessment of aggregate needs and resources:*

A global report identifying governments' MDG-related aggregate commitments and aggregate needs should be prepared periodically by the central secretariat of the IFLM, on the basis of the reports prepared by peer and partner review committees, and other sources. This global report will highlight the aggregate resource need and availability in countries undergoing peer and partner review, and (to the extent feasible) in others.

The global report should identify weaknesses in the statistical database for monitoring the MDGs and prioritize specific efforts to improve the quality of data. The secretariat should make improvements in the quality of the statistical database a major concern, to which it draws donors' attention and efforts.

The global report should also provide explicit guidelines for mobilizing additional resources, pooling funds to cope with fundamental uncertainties caused by shocks and likely to affect countries' capacities to achieve the MDGs (see box below), and allocating resources more effectively both across and within sectors and countries.

The global report should identify areas in which global attention is required if progress toward the MDGs is to be made. In particular, a number of measures contributing to the provision of 'global public goods' can facilitate the achievement of the MDGs. There exist a wide variety of strategic interventions -- such as efforts to develop new medical, agricultural and environmental technologies -- which can have a potentially significant impact on the MDGs but which are unlikely to form a significant part of any individual country's MDG strategy. The global secretariat of the IFLM should draw attention to such measures and advocate them, in conjunction with other concerned parties.

### 5.3 *A Global Contingency Fund (GCF)*

It is likely that a number of developing countries will face severe negative shocks whose consequences will severely affect their capacities to achieve the MDGs, such as natural disasters (e.g. earthquakes and droughts) political crises (e.g. external and internal conflicts.), health emergencies (e.g. contagious diseases epidemics) and aggregate income shocks (e.g. shocks to prices of key imports and exports). Although such shocks are anticipable (i.e. it can be recognized that they will occur) they may not be predictable (i.e. where and when they will occur cannot be known in advance).

Robert Schiller's seminal work on "Macro Markets" (1993) lays out the theoretical rationale for the creation of institutions for reducing the impact of unpredictable future shocks. Both from an efficiency and equity standpoint, provision for such unpredictable extreme events is required at the global level. Because of the magnitude and the unpredictability of such shocks, countries that are already poor ought not to bear the costs alone. Moreover provision to withstand such shocks (i.e. self-insurance) cannot easily be integrated into national budgetary planning. Due to the impact of unpredicted future shocks, the MDGs are likely to be made more difficult to achieve in a range of countries. However existing initiatives to estimate the cost of achieving the MDGs have been

developed at the country level and thus do not adequately address this probability, which is low from the standpoint of individual countries. It is essential to establish an effective insurance mechanism to cope with this uncertainty and give all countries a realistic chance to achieve the MDGs. The cost of such an insurance mechanism is an integral part of the cost of achieving the MDGs globally. Although it is difficult to calculate risks of unlikely but costly events associated with “thick tailed” distributions actuarial techniques to do so have been developed.

While Schiller argues for the creation of “macro markets” to cope with aggregate uncertainty and shocks, the absence of adequate market mechanisms, and the existence of a global public interest in achieving the MDGs strengthens the case for a public institutional mechanism to help poor countries hedge against risks. The creation of a global contingency fund (GCF) that would provide additional resources to countries facing severe negative shocks is an appropriate instrument to with which address this issue. The formation of a GCF would secure the timely provision of adequate resources to avoid human development reversals and enhance the feasibility of the MDGs. The pooling of resources resolves coordination failures, facilitates budgeting, and ensures that aid is effectively spent. The motivation of the GCF is to put aside resources with which to support the strategies of countries committed to achieving the MDGs, when these countries suffer from unpredicted severe negative shocks.

The scope of the fund can be limited to helping countries facing adverse shocks to achieve the MDGs. The GCF can provide additional resources in the form of grants to governments of the developing countries concerned, after an appropriate assessment has been made. For instance, peer review committees may assess the situation faced by countries that have undergone such adverse shocks and recommend the granting of additional funds as required. The recommendation of a peer-review committee can play a special role in determining whether resources are disbursed by the GCF, and to what extent.

The principle of the GCF can be satisfied in many ways, and need not require the creation of an altogether new institution.

#### 5.4 Advantages of the IFLM

The potential advantages of a peer and partner review mechanism to further the MDGs can be summarized as follows.

The IFLM fosters:

**Capacity building & learning:** Peer and partner review is a mutual learning process in which best practices and innovative policy solutions are shared and exchanged. The process can therefore serve as an important capacity building instrument not only for the country under review, but also for countries participating in the process as committee members, and for others beyond. By encouraging context-specific problem solving and the comparison of problem-solving approaches that have worked in different contexts, the peer and partner review mechanism will help to foster collective learning and dynamic efficiency.

**Policy Dialogue:** The peer and partner review provides an opportunity for countries to systematically share their perceptions of the constraints to achieving the MDGs and of required policy reforms in all countries. Policy dialogue can generate a better understanding of national specificities and facilitate appropriate and mutually compatible choices of policies and allocations of resources.

The IFLM embodies values of:

**Equity:** The need and capacity principles incorporated into the design of the IFLM promote the flow of resources from countries with the ability to provide them to those facing *bona fide* resource requirements. A peer and partner review committee will typically be composed of members from both North and South.

**Flexibility:** The short-term (perhaps three or four year) cycle of the IFLM will ensure that the need for resources and the ability to provide resources will be periodically reassessed, in light of new information. This does not preclude the integration of a country's immediate plans in to a longer-term framework to achieve the MDGs.

**Incentive Compatibility:** Countries have an incentive to participate in the IFLM, since doing so offers a means of learning about bringing about potential improvements in policies and practices, demonstrating commitment to avowed goals, and gaining access to a "high-priority" and fast-disbursing channel of resources.

**Symmetry:** All countries, North and South, are encouraged to participate in the IFLM. Although the policies and responsibilities that will be brought under scrutiny are asymmetric, the scrutiny itself is symmetric.

**Transparency:** The peer and partner review mechanism provides a relatively transparent system through which the efforts of countries, North and South, to achieve the MDGs can be judged.

**Voluntarism:** Participation in the IFLM is an entirely voluntary process that respects countries' sovereignty and avoids conditionalities.

#### *5.4 Making the IFLM work for the poor*

We conclude that:

***A plausible mechanism for implementing the democratic approach is an Institutionalized Financing and Learning Mechanism (IFLM) centered on periodic peer and partner-review. The IFLM enables each country to learn from its own experience and that of other countries and thereby increases the likelihood of success. (Proposition 4)***

Existing 'top-down' approaches to identifying strategies for achieving the MDGs may lead to damaging errors, for the reasons identified earlier in this paper. An alternative that avoids such errors is necessary. The IFLM is one such alternative.

For the rich countries, the IFLM's peer and partner review mechanism will provide a basis for assessing their commitment to the MDGs both in terms of the level and quality of aid (ODA) and policy practices (fairness of trade, contribution to peacekeeping, commitment to sustainable environment). In poor countries, the peer and partner review process will identify the *bona fide* resource requirements of the countries in order to achieve the MDGs, will offer a basis for making judgments about the commitment and capacities of countries to reach the goals, and will help to identify promising policy changes.

The expected outcome of the IFLM is to create a flexible framework for poor and rich countries to demonstrate their progress towards the MDGs and to identify and mobilize adequate resources to achieve them. The IFLM will lead to a periodic reallocation of resources across sectors and countries in accordance with new information. The peer and partner review process will strengthen policy coordination and dialogue as well as create an incentive mechanism for poor and rich countries to deliver on the promises of the Millennium Declaration.

Peer and partner review institutionalizes a system for learning and sharing experiences that will help to integrate the MDGs into national development strategies. The combination of peer and partner review in rich and poor countries paves the way for more effective aid and policy coordination. It is hoped that the review process will provide an open and evolving framework for assessing the actual "demand" and "supply" of resources for achieving the MDGs and for ensuring that the resources available are made equal to the resources required to meet the goals.

The IFLM is expected to encourage relevant policy reforms in the developing countries and increase commitment to the MDGs in the rich countries. The IFLM is not a system that imposes conditionalities on poor countries as a *quid pro quo* for increased aid. On the

contrary, the central principle of the IFLM is to develop a system based on partnership and mutual trust.

It is hoped that the IFLM will make countries mutually accountable. The IFLM can encourage countries – rich and poor - to reform their institutions, improve their policies and apply the resources needed to achieve the MDGs.

## REFERENCES

African Development Bank, 2002. "Achieving the Millennium Development Goals in Africa: Progress, Prospects, and Policy Implications" Global Poverty Report 2002

Bala V. and Goyal S., 1998. "Learning from Neighbors", Review of Economic Studies, Vol. 65, pp. 595-621.

Bhalla S., 2002. "Imagine There's No Country: Poverty, Inequality, and Growth in the Era of Globalization" Institute for International Economics

Bloom D. and Canning D., 2000. "Out of Poverty: on the feasibility of halving poverty by 2015" CAER Discussion Paper No. 52

Bourguignon F., 2001. "The Pace of Economic Growth and Poverty Reduction" LACEA 2001, Montevideo, Uruguay  
[\[http://www.nipnetwork.org/programs\\_lacea/Bourguignon.pdf\]](http://www.nipnetwork.org/programs_lacea/Bourguignon.pdf)

Brossard M. and Gacougnolle L., 2000. "Financing Primary Education for All: Yesterday, Today and Tomorrow" Paris, UNESCO

Bruns B., Mingat A. and Rakotomalala R., 2003. "Achieving UPE by 2015: A Chance for Every Child", August 2003. The World Bank: Washington D.C.

Collier P. and Dollar D., 1999. "Aid allocation and poverty reduction". Policy Research Working Paper No. 2041, Washington D.C.: The World Bank.

Collier P. and Dollar D., 2000. "Can the World Cut Poverty in Half? How Policy Reform and Effective Aid Can Meet International Development Goals." World Bank Policy Research Working Paper 2403, Washington D.C.: The World Bank.

Clemens M. and Radelet S., 2003. "The Millennium Challenge Account: How much is too much, how long is long enough?" Center for Global Development, working paper 23.

Clemens M., Kenny C.J. and Moss T.J., 2004. "The Trouble with the MDGs: Confronting Expectations of Aid Development Success". Center for Global Development, working paper 40, May 2004.

Cornia G.A. and S. Kiiski, 2001. "Trends in Income Distribution Changes in the Post-World War II Period: Evidence and Interpretation", WIDER Discussion Paper 2001/89.

Delamonica E., Mehrotra S. and Vandemoortele J., 2001. "Is EFA affordable? Estimating the global Minimum cost of 'Education for all' ", Innocenti Working Papers No 87, UNICEF.

Demery L. and Walton M., 1999. "Are the poverty and social goals for the 21st century attainable?" IDS Bulletin 30 (2) 75.

Devarajan S., Miller M.J. and Swanson E.V, 2002. "Goals for Development: History, Prospects and Costs", World Bank Policy Research Working Paper 2819.

Development Committee, Joint Ministerial Committee of the Boards of the Bank and the Fund on the Transfer of Real Resources to Developing Countries, 2003. "Support Sound Policies with Adequate and Appropriate Financing", September 2003.

Dreze J.H., 1999. "On the Macroeconomics of Uncertainty and Incomplete Markets", Presidential Address to the Twelfth World Congress of the International Economic Association, Buenos Aires, August 1999.

Economic Policy Research Centre, 2002. "Costing the Millennium Development Goals Uganda Country Study".

Farr P., 2001. "Poverty Reduction and Economic Growth: The Asian Experience", processed, Asia and Pacific Forum on Poverty, Manila 5-9 February 2001.

French, S. and Insua D.R., 2002. "Statistical Decision Theory", New York: Oxford Univ. Press.

Gale D. and Kariv S., 2002. "Bayesian Learning in Social Networks", Mimeo, Dept. of Economics, New York University.

Global Water Partnership, 2001. Framework for Action.

Gottschalk R., 2000. 'Growth and Poverty Reduction in Developing Countries: How much external financing will be needed in the new century?' Institute of Development Studies.

Hanmer L. and Naschold F., 1999. "Are the International Development Targets Attainable?"

Heltberg R., 2002. "The Growth Elasticity of Poverty" WIDER discussion paper 2002/21.

International Monetary Fund (IMF), 1999. "External Evaluation of IMF Surveillance", Report by a Group of Independent Experts.

Jolly R., 2003. "Global Goals- the UN experience. Background paper for HDR 2003". Occasional Paper, January 3, 2003

Kakwani N. and Pernia E.M, 2000. “Pro-Poor Growth and Income Inequality”, draft, Asian Development Bank.

Karshenas 2002. “Measurement and Nature of Absolute Poverty in Least Developed Countries.” Mimeograph, School of Oriental and African Studies, University of London.

Kumaranayake L., Kurowski C., and Conteh L., 2001. “Costs of Scaling-up Priority Health Interventions in Low and Selected Middle Income Countries”, Background Paper for Working Group 5 – Improving the Health Outcomes of the Poor, Commission on Macroeconomics and Health.

Manasan R., 2002. “Philippine Country Study on Meeting the Millennium Development Goals”, UNDP

Mbelle A., 2003. “The Cost of Achieving Millennium Development Goals and Evaluation of Their Financing: Tanzania’s Experience” UNDP

Millennium Project, 2004. “Millennium Development Goals Needs Assessments: Country Case Studies Bangladesh, Cambodia, Ghana, Tanzania and Uganda” Working Paper, 16 January 2004.

Naschold F., 2002. “Aid and the Millennium Development Goals”, ODI opinion No 4.

New Partnership for Africa (NEPAD), 2002. “The African Peer Review Mechanism”, 10 June 2002.

OECD, 2002. “The Concept of Peer Review”. Directorate for Legal Affairs. Available at [www.oecd.org/dataoecd/48/1/1959679.pdf](http://www.oecd.org/dataoecd/48/1/1959679.pdf).

OECD, 2003. “Practical Modalities of Peer Review in a Multilateral Framework on Competition”, Joint Group on Trade and Competition.

Oxfam, 2001. Briefing Paper “Education Charges: A Tax on Human Development”

Oxfam, Briefing Paper, 2003. “Education for All: Fast track or slow trickle?”

Pagani F., 2002. “Peer Review: A Tool for Co-operation and Change. An analysis of an OECD working method”, OECD Directorate for Legal Affairs

Pettifor A. and Greenhill R., 2003. “Debt Relief and the Millennium Development Goals” Occasional Paper, Background Paper for the Human Development Report 2003, UNDP .

Pogge T. and Reddy S., 2003. "Unknown: the Extent, Distribution and Trend of Global Income Poverty". Columbia University: New York. Available on: <http://www.socialanalysis.org>.

Poston M., Conway T. and Christiansen K., 2003. "The Millennium Development Goals and the IDC: driving and framing the Committee's work", ODI, London.

Ravallion M. and Datt G., 1999. "When is Growth Pro-Poor? Evidence from the diverse experiences of India's States", mimeographed, World Bank.

Reddy S. and Pogge T., 2003. "How Not to Count the Poor". Columbia University: New York. Available on: <http://www.socialanalysis.org>.

Reddy S. and Minoiu, C., 2003. "Assessing development strategies: conceptual issues", background paper prepared for the UNDP Development Effectiveness Report 2003.

Rosegrant M.W., Paisner M.S., Meijer S. and Witcover J., 2001. "Global Food Projections to 2020" International Food Policy Research Institute.

Rosegrant M.W., Paisner M.S., Meijer S. and Witcover. J., 2001. "2020 Global Food Outlook" International Food Policy Research Institute

Rosenzweig and Foster, 2003. "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture". Available on: <http://adfdell.pstc.brown.edu/papers/hyv4.pdf>

Sabel C.F. and Reddy S.G., 2001. "Learning to Learn: Undoing the Gordian Knot of Development Today", Draft available online: <http://www2.law.columbia.edu/sabel/papers.htm>

Sabel C.F. and Cohen J. 2001. "Sovereignty and Solidarity: EU and US", Draft available online: <http://www2.law.columbia.edu/sabel/papers.htm>

Schiller R., 1993 "Macro Markets: Creating Institutions for Managing Society's Largest Economic Risks", Oxford University Press.

Schmidt R., 2002. "Ownership and Partnership in Africa's Development Strategy". The North South Institute

Seth A. and Bipul S., 2002. "Methodologies Used to Estimate Financing Requirements of the MDGs", mimeograph, UNDP.

Svedberg P., 2001. "Undernutrition overestimated", Seminar Paper No. 693. Institute for International Economics Studies, Stockholm University.

United Nations, 2000. A/RES/55/2 United Nations Millennium Declaration.

United Nations, 2001a. "Road Map: Towards the Implementation of the United Nations Millennium Declaration". A/56/326.

United Nations, 2001b. "Report of the High Level Panel on Financing for Development". A/CONF. 198/1

United Nations, 2002. "Report of the International Conference on Financing for Development. Monterrey, Mexico, 18-22 March 2002". A/CONF. 198/11.

UNCTAD, 2000. "Capital Flows and Growth in Africa".

UNCTAD, Investment Policy Reviews. Available at:  
<http://www.unctad.org/Templates/Page.asp?intItemID=1975&lang=1>

United Nations Economic and Social Council, 2003. "Policy Dialogue: Financial and other key Resource Mobilization issues in implementing the Millennium Development Goal of eradicating extreme poverty and hunger" Economic and Social Commission for Asia and the Pacific, Committee on Poverty Reduction, First session 8-10 October 2003, Bangkok.

UNESCO, 2002. "Education for All Is the World on Track? " EFA Global Monitoring Report 2002.

United Nations Development Programme, 2002a. 'Financing the Development Goals: An Analysis of Tanzania, Cameroon, Malawi, Uganda, and the Philippines', March 2002.

United Nations Development Programme, 2002b. "Costing the Millennium Development Goals in Egypt".

United Nations Development Programme, 2002c. "Financement des Objectifs de Développement International Rapport Cameroun" UNDP.

United Nations Development Programme, 2002d. "Millennium Development Goals Malawi 2002 Report".

United Nations Development Programme, 2003. "Human Development Report 2003. Millennium Development Goals: A compact among nations to end human poverty". Published for UNDP by Oxford University Press.

Vandemoortele J., 2003. "The MDGs and pro-poor policies. Can external partners make a difference?" Mimeographed, United Nations Development Group, New York

Vandemoortele J, 2004. "Are the MDGs Feasible?" in Black R. and White H. "Targeting development: critical perspectives on the Millennium development Goals". Pages 124-144, Routledge.

Water Supply and Sanitation Collaborative Council: "Vision 21: A Shared Vision for Hygiene, Sanitation and Water Supply".

WEHAB working group, 2002. "A Framework for Action on Water and Sanitation".

White H., 2002. "A Drop in the Ocean? The International Development Targets as a Basis for Performance Measurement".

World Bank, 2002. "Costing the 7th Millennium Development Goal: Ensure Environmental Sustainability", Draft.

World Bank, 2003. "Progress Report and Critical Next Steps in Scaling Up Education for All, Health, HIV/AIDS, Water and Sanitation".

World Bank Human Development Network, 2002. "Achieving Education for All by 2015: Simulation Results for 47 Low-Income Countries".

World Health Organization, 2001. "Macroeconomics and health: Investing in health for economic development", Report of the Commission on Macroeconomics and Health.

World Trade Organization, 1994. "Agreement Establishing the WTO. Annex 3: Trade Policy Review Mechanism".

World Water Council, 2003. "Financing Water for All", Report of the World Panel on Financing Water Infrastructure.

## APPENDIX 1: THE MILLENNIUM DEVELOPMENT GOALS

GOALS AND TARGETS	INDICATORS
<b>GOAL 1: ERADICATE EXTREME POVERTY AND HUNGER</b>	
<b>Target 1:</b> Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1. Proportion of population below \$1 per day 2. Poverty gap ratio [incidence x depth of poverty] 3. Share of poorest quintile in national consumption
<b>Target 2:</b> Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children (under-five years of age) 5. Proportion of population below minimum level of dietary energy consumption
<b>GOAL 2: ACHIEVE UNIVERSAL PRIMARY EDUCATION</b>	
<b>Target 3:</b> Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	6. Net enrolment ratio in primary education 7. Proportion of pupils starting grade 1 who reach grade 5 8. Literacy rate of 15-24 year olds
<b>GOAL 3: PROMOTE GENDER EQUALITY AND EMPOWER WOMEN</b>	
<b>Target 4:</b> Eliminate gender disparity in primary and secondary education preferably by 2005 and to all levels of education no later than 2015	9. Ratio of girls to boys in primary, secondary and tertiary education 10. Ratio of literate females to males of 15-24 year olds 11. Share of women in wage employment in the nonagricultural sector 12. Proportion of seats held by women in national parliament
<b>GOAL 4: REDUCE CHILD MORTALITY</b>	
<b>Target 5:</b> Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate	13. Under-five mortality rate 14. Infant mortality rate 15. Proportion of 1 year old children immunized against measles
<b>GOAL 5: IMPROVE MATERNAL HEALTH</b>	
<b>Target 6:</b> Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio 17. Proportion of births attended by skilled health personnel
<b>GOAL 6: COMBAT HIV/ AIDS, MALARIA AND OTHER DISEASES</b>	
<b>Target 7:</b> Have halted by 2015, and begun to reverse, the spread of HIV/AIDS	18. HIV prevalence among 15-24 year old pregnant women 19. Contraceptive prevalence rate 20. Number of children orphaned by HIV/AIDS
<b>Target 8:</b> Have halted by 2015, and begun to reverse, the incidence of malaria and other major diseases	21. Prevalence and death rates associated with malaria 22. Proportion of population in malaria risk areas using effective malaria prevention and treatment measures 23. Prevalence and death rates associated with tuberculosis 24. Proportion of TB cases detected and cured under DOTS (Directly Observed Treatment Short Course)
<b>GOAL 7: ENSURE ENVIRONMENTAL SUSTAINABILITY*</b>	
<b>Target 9:</b> Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	25. Proportion of land area covered by forest 26. Land area protected to maintain biological diversity 27. GDP per unit of energy use (as proxy for energy efficiency) 28. Carbon dioxide emissions (per capita) [Plus two figures of global atmospheric pollution: ozone depletion and the accumulation of global warming gases]
<b>Target 10:</b> Halve, by 2015, the proportion of people without sustainable access to safe drinking water	29. Proportion of population with sustainable access to an improved water source

<p><b>Target 11:</b> By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers</p>	<p>30. Proportion of people with access to improved sanitation 31. Proportion of people with access to secure tenure [Urban/rural disaggregation of several of the above indicators may be relevant for monitoring improvement in the lives of slum dwellers]</p>
<p><b>GOAL 8: DEVELOP A GLOBAL PARTNERSHIP FOR DEVELOPMENT*</b></p>	
<p><b>Target 12:</b> Develop further an open, rule-based, predictable, non-discriminatory trading and financial system</p> <p>Includes a commitment to good governance, development, and poverty reduction – both nationally and internationally</p> <p><b>Target 13:</b> Address the Special Needs of the Least Developed Countries</p> <p>Includes: tariff and quota free access for LDC exports; enhanced programme of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction</p> <p><b>Target 14:</b> Address the Special Needs of landlocked countries and small island developing states (through Barbados Programme and 22nd General Assembly provisions)</p> <p><b>Target 15:</b> Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term</p>	<p><b>Some of the indicators listed below will be monitored separately for the Least Developed Countries (LDCs), Africa, landlocked countries and small island developing states</b></p> <p><b>Official Development Assistance</b> 32. Net ODA as percentage of DAC donors' GNP [targets of 0.7% in total and 0.15% for LDCs] 33. Proportion of ODA to basic social services (basic education, primary health care, nutrition, safe water and sanitation) 34. Proportion of ODA that is untied 35. Proportion of ODA for environment in small island developing states 36. Proportion of ODA for transport sector in landlocked countries</p> <p><b>Market Access</b> 37. Proportion of exports (by value and excluding arms) admitted free of duties and quotas 38. Average tariffs and quotas on agricultural products and textiles and clothing 39. Domestic and export agricultural subsidies in OECD countries 40. Proportion of ODA provided to help build trade capacity</p> <p><b>Debt Sustainability</b> 41. Proportion of official bilateral HIPC debt cancelled 42. Debt service as a percentage of exports of goods and services 43. Proportion of ODA provided as debt relief 44. Number of countries reaching HIPC decision and completion points</p>
<p><b>Target 16:</b> In cooperation with developing countries, develop and implement strategies for decent and productive work for youth</p>	<p>45. Unemployment rate of 15-24 year olds</p>
<p><b>Target 17:</b> In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries</p>	<p>46. Proportion of population with access to affordable essential drugs on a sustainable basis</p>
<p><b>Target 18:</b> In cooperation with the private sector, make available the benefits of new technologies, especially information and communications</p>	<p>47. Telephone lines per 1000 people 48. Personal computers per 1000 people</p>

*\*The selection of indicators for Goals 7 and 8 is subject to further refinement*

## APPENDIX 2: MILLENNIUM DEVELOPMENT GOALS GLOBAL ESTIMATES

	Zedillo Report		Debt Relief and the Millennium Development Goals, Background Paper for HDR 2003		World Bank	
	Estimate in billion USD	Source	Estimate in billion USD	Source	Estimate in billion USD	Source
<b>Halving Poverty and hunger</b>	20	UNCTAD & WB	45.7	See Paper by Gottschalk, R (2000) & own calculations	54 to 62	WB model
<b>Halving Population without access to safe drinking water</b>	0	Global Water Partnership	2.4	Vision 21: A Shared Vision for Hygiene, Sanitation and Water Supply	5 to 21	WB model
<b>Achieving UPE</b>	9	UNICEF	9.1	UNICEF (low)	10 to 30	WB model
<b>Achieving gender equality in primary education</b>	3	Own estimates	-	-	-	WB model
<b>Achieving 3/4 decline in maternal mortality</b>	-	-	20.03	Report of the Commission on Macroeconomics and Health, page 4	20 to 25	WB model
<b>Achieving 2/3 decline in USMR</b>	-	-				
<b>Halting and reversing HIV/AIDS</b>	7 to 10	UN Secretary General				
<b>Providing special assistance to orphans</b>	-	-	-	-	-	-
<b>Improving lives of 100 million slum dwellers</b>	4	WB Cities without slums action plan	1.7	WB Cities without slums action plan	3.5	WB Cities without slums action plan
<b>Total (Goal1)</b>	<b>20</b>		<b>45.7</b>		<b>54 to 62</b>	
<b>Total (Excluding Goal1)</b>	<b>30</b>		<b>30.6</b>		<b>35 to 76</b>	
<b>TOTAL</b>	<b>50</b>		<b>76.3</b>		<b>-</b>	

### APPENDIX 3: MILLENNIUM PROJECT GROWTH ASSUMPTIONS

The Millennium Project states that its estimate of “the 2015 level of GDP per capita that is consistent with halving the incidence of extreme poverty in the country [is] based on an average elasticity of poverty reduction to income growth, estimated from existing literature at  $-1.4$ ,” and that “An elasticity of  $-1.4$  implies that countries would need to grow by an average 2.0 percent per capita between 1990 and 2015 in order to halve income poverty”<sup>55</sup>. The difficulties associated with assumptions concerning fixed poverty elasticities have been addressed in the body of the paper and will not be detailed here.

However, given the Millennium Project’s assumption concerning the magnitude of the poverty reduction elasticity of growth, it can be verified that per capita growth must at least be 1.95 percent per annum in order for the first MDG to be met. To see this solve,

$$H(1-0.014*g)^n=H/2$$

Where:

- H represents the poverty headcount as a percentage of the total population
- g is the annual per capita growth (in percent)
- n is the number of years

Since  $n = 2015-1990 = 25$  and since the H drops out, we can solve this equation for g:

$$g = (1-(0.5)^{(1/25)})/0.014 = 1.95 \text{ or } 1.95\%$$

The growth requirement is independent of the initial headcount. The analysis of population weighed per capita GDP growth in constant 1995 US \$ over the 1990-2000 decade both at the country and regional level (presented in the table below) demonstrates that the Millennium Project’s hypothesis may be optimistic<sup>56</sup>. Among the countries selected by the Millennium Project for case studies of country strategies to achieve the MDGs, only Bangladesh (3%), Cambodia (2.4%) and Uganda (3.3%) display an average per capita growth rate above 2 percent per year. The Millennium Project emphasizes that the growth rates for Tanzania and Ghana must be accelerated and assumes that these two countries will respectively have an annual per capita growth rate of 3.3 and 2.2 percent. However the way these growth rates will be achieved is not explained or detailed in the Tanzania and Ghana case studies. Although it is suggested that public investment to promote the MDGs and to develop infrastructure will guarantee higher per capita income growth rates, no explicit argument is provided as to why. The impact of MDG and other

<sup>55</sup> Millennium Project, 2004. “Millennium Development Goals Needs Assessments: Country Case Studies Bangladesh, Cambodia, Ghana, Tanzania and Uganda” Working Paper, 16 January 2004. Page 79.

<sup>56</sup> We computed population weighed GDP per capita income (defined in terms of constant 1995 US\$ and drawn from the World Bank’s World Development Indicators 2003) growth rates. Based on population and per capita GDP in 1990 and 2000 for each country, we calculate total GDP for regional aggregates. For individual countries, the growth rate in per capita GDP can be obtained directly. We use the following formula:

$$\text{Growth rate in per capita GDP} = [(GDPTOTAL2000/POPTOTAL2000)/(GDPTOTAL1990/POPTOTAL1990)]^{0.1} - 1$$

The results are presented in Table 2 for individual countries involved in Millennium Project MDG needs assessment and for the East Asia and the Pacific and South Asia regions (with and without India and China). For Latin America and Sub-Saharan Africa, the average has been calculated by taking a decadal geometric average of the annual regional per capita income growth rates from 1990 to 2000 as reported in the World Development Indicators. The results are reported in Table 1.

public investment on per capita growth rates is not at present modeled explicitly. As a result, it is difficult to assess the validity of the growth assumptions that are being made without making historical comparisons.<sup>57</sup>

Although even without China and India, both South Asia (2.27% annual per capita income growth rate over the decade) and East Asia and the Pacific (2.53% annual per capita income growth rate over the decade) are likely to experience sustained growth rates that would be sufficient (given the Millennium Project's elasticity assumptions) to halve income poverty by 2015, the following table demonstrates that for individual countries as well as for entire regions such as sub-Saharan Africa (-0.57% average annual GDP per capita growth in the 1990s), the growth target of 1.95% is likely to be out of reach. The Latin American regional average (1.28% annual GDP per capita growth in the 1990s) suggests that the region has also not had sufficient recent growth to generate confidence in its ability to achieve the required threshold.

**Table 1: 1990-2000 Average per Capita GDP Growth: Latin America & Caribbean and Sub-Saharan Africa**

	<b>Latin America &amp; Caribbean</b>	<b>Sub-Saharan Africa</b>
<b>1990</b>	-2.44	-2.13
<b>1991</b>	2.35	-2.40
<b>1992</b>	1.69	-3.97
<b>1993</b>	2.47	-1.40
<b>1994</b>	3.45	-0.29
<b>1995</b>	-0.15	0.99
<b>1996</b>	1.94	2.11
<b>1997</b>	3.54	0.64
<b>1998</b>	0.59	-0.28
<b>1999</b>	-1.30	0.03
<b>2000</b>	2.12	0.58
<b>Average GDP per capita growth rate 1990-2000</b>	1.28%	-0.57%

*Source: World Development Indicators 2003*

<sup>57</sup> Interestingly, while the Millennium Project sector costing seems to implicitly assume that the attainment of goal 1 does not contribute the achievement of the other goals in a significant way (which leads the Millennium Project to calculate the total cost of meeting the MDGs at the country level by adding various sectoral estimates); Devarajan, Miller and Swanson make the opposite assumption in "Goals for Development: History, Prospects and Costs", World Bank Policy Research Working Paper 2819. Indeed they develop two independent set of estimates. First Devarajan, Miller and Swanson calculate the cost of raising growth rates to reduce poverty by half and argue that meeting goal 1 would automatically lead to the achievement of the other goals. The second methodology relies on the addition of sectoral estimates for each goal. The stark contrast between the World Bank and the Millennium Project assumptions in this connection brings to the surface the limited understanding that exists at present of the complex causal pathways connecting the MDGs.

**Table 2: 1990-2000 Population Weighed Average Per Capita GDP Growth**

Country Name	POPULATION		GDP PER CAPITA (Constant US\$ 1995)		GDP TOTAL		Weighed per capita GDP growth rate 1990- 2000
	1990	2000	1990	2000	1990	2000	
East Asia*	1,517,287,840	1,711,391,130	510	946	738,009,131,322	1,554,601,567,893	6.45%
<i>E.A. without China</i>	382,102,840	448,931,130	-	-	340,373,709,731	513,383,356,657	2.53%
South Asia**	1,102,524,170	1,327,368,000	333	457	367,847,016,690	610,049,802,755	3.25%
<i>S.A. without India</i>	253,009,170	311,445,000	-	-	92,659,729,407	142,784,839,902	2.27%
Sub-Saharan Africa	508,621,400	659,010,030	587	563	298,373,575,911	370,956,660,884	-0.41%
Latin America & Caribbean	438,408,340	515,786,800	3,275	3,862	1,435,980,713,751	1,991,884,262,594	1.66%
Bangladesh	110,025,000	131,050,000	278	373	30,604,566,880	48,906,099,670	2.98%
Cambodia	9,145,000	12,021,230	240	304	2,190,776,554	3,656,275,739	2.42%
Ethiopia	51,180,000	64,298,000	100	115	5,134,462,732	7,364,328,804	1.33%
Ghana	15,138,000	19,306,000	346	413	5,236,080,070	7,978,279,246	1.80%
Kenya	23,354,000	30,092,000	358	328	8,360,454,982	9,884,284,651	-0.86%
Senegal	7,327,000	9,530,000	566	609	4,150,162,684	5,806,050,468	0.73%
Tanzania	25,470,000	33,696,000	189	190	4,807,938,209	6,418,594,662	0.09%
Uganda	16,330,000	22,210,000	251	348	4,101,957,646	7,728,045,148	3.31%
Yemen, Rep.	11,876,000	17,507,160	272	316	3,231,057,211	5,539,356,628	1.52%

Source: World Development Indicators 2003

\* East Asia: Cambodia, Indonesia, Lao PDR, Mongolia, Papua New Guinea, Solomon Islands, Vietnam, China, Fiji, Kiribati, Marshall Islands, Micronesia Fed. Sts., Philippines, Samoa, Thailand and Vanuatu. Data is missing for Korean Dem. Rep., Myanmar and Timor-Leste.

\*\* South Asia: Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. Data is missing for Afghanistan and the Maldives

**APPENDIX 4: 1985 PPPs OF DISAGGREGATED COMPONENTS OF HEALTH CARE  
RELATIVE TO PPPs FOR GENERAL CONSUMPTION**

Country*	PPP for All Consumption	PPP for Drugs (PPPD)	PPP for Medical Supplies (PPPMS)	PPP for Therapeutic Appliances (PPPTA)	PPP for Hospital Care (PPPHC)	PPP for Physicians' Services (PPPPS)	PPP for Dentists' Services (PPPDS)	PPP for Nurses' Services (PPPNS)	Ratio PPPD / PPP All Consumption	Ratio PPPMS / PPP All Consumption	Ratio PPPTA / PPP All Consumption	Ratio PPPHC / PPP All Consumption	Ratio PPPPS / PPP All Consumption	Ratio PPPDS / PPP All Consumption	Ratio PPPNS / PPP All Consumption
<b>Bangladesh</b>	8.67	5.17	.	9.29	.	1.92	2.50	5.00	0.60	.	1.07	.	0.22	0.29	0.58
<b>Benin</b>	150.87	404.51	257.21	52.69	43.16	27.20	28.97	88.24	2.68	1.70	0.35	0.29	0.18	0.19	0.58
Botswana	0.77	2.04	1.60	0.43	0.29	0.17	0.18	0.50	2.65	2.08	0.56	0.38	0.22	0.23	0.65
Cameroon	207.23	474.23	332.30	138.48	66.28	35.14	37.43	156.89	2.29	1.60	0.67	0.32	0.17	0.18	0.76
Congo	272.25	610.02	558.45	.	57.39	59.06	62.90	247.52	2.24	2.05	.	0.21	0.22	0.23	0.91
Egypt	0.37	0.65	0.72	0.13	0.09	0.08	0.08	0.08	1.78	1.96	0.37	0.25	0.21	0.22	0.21
<b>Ethiopia</b>	1.16	4.66	2.03	0.47	0.28	0.22	0.23	0.96	4.02	1.75	0.41	0.25	0.19	0.20	0.83
Grenada	2.22	3.67	2.05	2.00	2.88	3.78	2.74	2.76	1.65	0.93	0.80	1.30	1.70	1.23	1.24
<b>India</b>	6.28	4.13	6.11	.	6.70	2.45	.	4.28	0.66	0.97	.	1.07	0.39	.	0.68
Ivory Coast	236.11	622.30	524.62	29.11	79.73	55.48	59.09	247.69	2.64	2.22	0.12	0.34	0.23	0.25	1.05
Jamaica	3.07	7.15	4.00	3.90	4.70	7.37	5.34	5.63	2.33	1.30	1.27	1.53	2.40	1.74	1.83
<b>Kenya</b>	7.22	18.09	13.16	.	2.01	1.39	.	11.77	2.51	1.82	.	0.28	0.19	.	1.63
<b>Madagascar</b>	341.42	1036.42	461.49	111.21	72.11	48.80	51.98	217.88	3.04	1.35	0.33	0.21	0.14	0.15	0.64
<b>Malawi</b>	0.63	1.64	0.99	0.08	0.22	0.11	0.11	0.47	2.63	1.59	0.13	0.34	0.17	0.18	0.75
<b>Mali</b>	207.54	430.07	215.28	88.13	47.02	22.77	24.25	101.64	2.07	1.04	0.42	0.23	0.11	0.12	0.49
Mauritius	4.56	12.90	9.29	3.99	1.74	0.98	1.05	8.31	2.83	2.04	0.87	0.38	0.22	0.23	1.82
Morocco	3.25	8.83	.	0.73	1.07	0.74	0.79	3.30	2.72	.	0.22	0.33	0.23	0.24	1.02
<b>Nepal</b>	6.88	4.03	13.51	.	.	1.49	.	1.54	0.59	1.97	.	.	0.22	.	0.22
<b>Nigeria</b>	1.16	3.01	2.11	0.65	0.27	0.22	0.24	0.99	2.59	1.81	0.56	0.23	0.19	0.20	0.86
<b>Pakistan</b>	5.57	4.56	3.06	.	.	0.63	0.57	2.14	0.82	0.55	.	.	0.11	0.10	0.38
Philippines	8.39	12.35	3.70	.	1.34	6.33	.	5.23	1.47	0.44	.	0.16	0.75	.	0.62
Poland	88.16	78.38	29.51	577.19	57.27	77.53	.	.	0.89	0.33	6.55	0.65	0.88	.	.
<b>Rwanda</b>	55.97	146.59	41.69	23.54	13.86	4.41	.	14.30	2.62	0.74	0.42	0.25	0.08	.	0.26
Senegal	197.43	463.98	.	.	68.35	44.44	47.33	198.41	2.35	.	.	0.35	0.23	0.24	1.00
<b>Sierra Leone</b>	3.29	10.67	5.92	6.52	0.49	0.63	0.67	2.79	3.24	1.80	1.98	0.15	0.19	0.20	0.85
<b>Sri Lanka</b>	8.81	6.11	7.77	17.49	0.61	3.47	2.55	3.81	0.69	0.88	1.99	0.07	0.39	0.29	0.43
St. Lucia	1.90	3.09	1.74	1.69	2.37	3.19	2.31	2.33	1.62	0.91	0.89	1.24	1.67	1.21	1.22
Swaziland	0.90	2.83	1.66	0.26	0.33	0.18	0.19	0.78	3.15	1.85	0.29	0.37	0.20	0.21	0.87
<b>Tanzania</b>	18.83	27.71	.	6.61	2.80	1.48	1.57	6.59	1.47	.	0.35	0.15	0.08	0.08	0.35
Thailand	10.15	7.32	.	.	2.52	5.94	6.82	7.23	0.72	.	.	0.25	0.59	0.67	0.71
Tunisia	0.37	0.56	0.62	0.08	0.15	0.07	0.07	0.30	1.52	1.68	0.23	0.39	0.18	0.19	0.80
Turkey	241.16	187.42	229.16	289.96	363.55	243.27	309.74	314.52	0.78	0.95	1.20	1.51	1.01	1.28	1.30
<b>Zambia</b>	1.46	3.27	1.69	0.23	0.39	0.18	0.19	0.80	2.23	1.16	0.16	0.26	0.12	0.13	0.55
Zimbabwe	0.81	2.51	1.72	0.57	0.36	0.18	0.19	0.81	3.11	2.13	0.71	0.45	0.22	0.24	1.00

**SUMMARY  
STATISTICS**

	Low and Lower Middle Income Countries	Low Income Countries
<b>Geometric Mean Ratio of PPP for Drugs to PPP for All Consumption</b>	<b>1.78</b>	<b>1.68</b>
<b>Geometric Mean Ratio of PPP for Medical Supplies to PPP for All Consumption</b>	<b>1.30</b>	<b>1.28</b>
<b>Geometric Mean Ratio of PPP for Therapeutic Appliances to PPP for All Consumption</b>	<b>0.55</b>	<b>0.48</b>
<b>Geometric Mean Ratio of PPP for Hospital Care to PPP for All Consumption</b>	<b>0.34</b>	<b>0.24</b>
<b>Geometric Mean Ratio of PPP for Services of Physicians to PPP for All Consumption</b>	<b>0.27</b>	<b>0.17</b>
<b>Geometric Mean Ratio of PPP for Services of Dentists to PPP for All Consumption</b>	<b>0.26</b>	<b>0.17</b>
<b>Geometric Mean Ratio of PPP for Services of Nurses to PPP for All Consumption</b>	<b>0.72</b>	<b>0.56</b>

\* Note: A country's name appears in boldface if it was denoted as "low income" according to the 1990 WDR. Otherwise, it is classified as "lower-middle income" by the same sources.

Source: International Comparison Programme.

## APPENDIX 5: THE LOGIC OF PERIODIC PLANNING

Consider the following decision-making scenario. There are  $F$  periods,  $(0, 1, \dots, F)$ . In each period, the decision-maker forms a judgment concerning the “technology” that prevails at present and is likely to prevail in subsequent periods. It is assumed that the decision-maker observes prices in the current period and forms assumptions concerning the probability distribution of prices in subsequent periods. The assumptions regarding technology and prices give rise to an expected cost function (which states the minimum expected cost of promoting the desired objectives to a specified extent).

It is assumed that in each period of time the decision-maker may choose an *action*,  $x$ , from a space of possible actions  $X \sim R^{+l}$  ( $l \in N^+$ ) and that each action carries an associated cost,  $p \bullet x$ , which is defined by the price vector  $p$  prevailing at the moment that the action is taken. To fix ideas, we may think of an action as the application of some set of inputs toward a goal. It is assumed that the decision-maker is risk neutral and thus is concerned only with expected costs. We neglect discounting for simplicity. We denote the current period as period  $i$ . We suppose that the cost of processing information, formulating a plan, and revising actions is zero.

We may write

$$E(C_i(g = \underline{g})) = \sum_{j=i}^F p_i^j \cdot x_i^j \quad (\text{A}^*)$$

where  $C_i$  represents the expected least cost of attaining the goal ( $g = \underline{g}$ ) by the end of the planning horizon (i.e. period  $F$ ) given the prices that are currently faced and that are expected to be faced in future periods,  $\{p_i^j\}$ , and where  $x_i^j$  represents the set of actions that it is planned (in period  $i$ ) to undertake in period  $j$  in order to attain the goal (the attainment of which is represented by the expression  $g = \underline{g}$ ) by the end of the planning horizon. Expectations concerning future prices ( $\{p_i^j\}$ ) and technology depend on the information available in period  $i$ . We assume that  $p_j^j$  represents the prices that actually prevail in period  $j$ . The planned sequence of present and future actions constitutes an “action plan”. We assume that all actions planned to be undertaken during the planning horizon are (once planned to be taken) actually undertaken.

If no information is lost, but information is accumulated over time then it follows from the fact that the action plan formulated in a given period is cost-minimizing that:

$$\sum_{j=i2}^F p_{i2}^j \cdot x_{i1}^j \geq \sum_{j=i2}^F p_{i2}^j \cdot x_{i2}^j \quad (\text{B}^*)$$

when  $i1 \leq i2$ , and  $\{x_{i1}^j\}, \{x_{i2}^j\}$  both constitute sequences of actions that constitute feasible plans to bring about the goal. In other words, the expected cost of achieving a goal is

lower when the actions planned to be taken are those that are optimal on the basis of present information than when they are those chosen on the basis of past information.

How often should plans be modified? Suppose that successive sequential action plans are formed and executed. If we identify the sequence of plans with the starting point of each successive plan  $(0, T1, T2, \dots, TN)$ , then we may describe total costs (TC) actually incurred (given the actions that were planned and executed in each planning period and the prices that actually prevailed at the time the actions were executed) by the expression:

$$TC = \sum_{j=0}^{T1} p_j^j \cdot x_0^j + \sum_{j=T1}^{T2} p_j^j \cdot x_{T1}^j + \dots + \sum_{j=TN}^F p_j^j \cdot x_{TN}^j \quad (C^*)$$

Applying inequality (B\*) repeatedly to this expression, it is easy to arrive at the conclusion that the least cost attainable is  $\sum_{j=1}^F p_j^j \cdot x_j^j$  i.e. the least cost occurs when actions are adjusted each period according to the latest available information.

We have so far supposed that the cost of processing information, formulating a plan, and revising actions is zero. Otherwise, it may no longer be optimal to adjust actions each period in accordance with the latest available information. In particular, suppose that there is a fixed cost,  $w$ , that is incurred by processing information, formulating a plan, and revising actions. In that case, this cost must be balanced against the benefits to be realized by taking advantage of new information. In particular, if an action plan leading up to some final time period,  $F$ , was formulated in period  $i1 < i2$ , then in order to justify (once period  $i2$  has arrived) the cost of processing information, formulating a plan and revising actions (i.e. reformulating the plan) we require that:

$$\sum_{j=i2}^F p_{i2}^j \cdot x_{i1}^j - \sum_{j=i2}^F p_{i2}^j \cdot x_{i2}^j > w \quad (D^*)$$

If  $w$  is not excessively high then it will be optimal to undertake a new exercise of strategic choice in period  $i2$  and revise the action plan identified in the earlier period  $i1$ .

The extent to which costs can be reduced through periodic revision of the choice of actions will depend on the extent of new information regarding the optimal action plan that is generated with the passage of time. This information may be revealed through increases in general understanding of the world, or through specific observations of the consequences of past actions undertaken by oneself or by others for the attainment of similar goals. Information-sharing structures (such as the IFLM) that enable agents to observe and learn from the experiences of others can enhance the advantage gained by periodic revision of choices.

In this note, we have assumed that it is possible to attain a goal given sufficient expenditure and have focused on the impact of periodic revisions to strategic choices on the costs of attaining the goal. However, it may not always be certain that a goal can be

achieved. The probability of attaining a goal, as well as the cost of achieving it will depend on the actions taken. In general, periodic informed revisions to strategic choices are, if not overly costly to implement, likely to increase the probability of attaining a goal as well as reduce its cost. Moreover, efforts to accelerate the pace of learning concerning the best actions to take in each future period will have the effect of increasing the value of such periodic informed revisions.

## APPENDIX 6: ERRONEOUS ESTIMATES OF THE COST OF ACHIEVING THE MDGs: AN EXAMPLE

We explore in this appendix the sensitivity of cost estimates to the assumptions of joint production and nonlinearity of the cost function.

We take unit cost and PIN ('Population in Need') data from: Kumaranayake, L., Kurowski, C., and Conteh, L., 2001 "Cost of scaling up priority health interventions in low-income and selected middle-income countries: methodology and estimates", (Commission on Macroeconomics and Health Working Paper WG5 # 18).

Let  $c$  = \$ 'unit cost' for increasing coverage of a health treatment by 1%  
 $x$  = increase in prevalence of the treatment in % (i.e. if it is desired to increase coverage from 10% to 80%, then  $n = 70$ )

We compare the following two cost functions:

Linear cost: =  $cx$

Nonlinear cost : =  $\frac{cx^{\beta+1}}{\beta+1}$ ;  $\beta \in \mathbb{R}, \beta \neq -1$

List of interventions:

- Tuberculosis treatment
- Malaria prevention + treatment
- HIV/AIDS care + treatment (HAART)

Countries:

- poor countries (GPD/capita < 1200 USD in 1999 USD), including ALL sub-Saharan Africa
- excluding countries with less than 150 000 population
- sample of 83 countries

Assumptions made by CME background paper:

- incidence/prevalence of diseases/risks are constant over the time period through 2015, and so are unit costs of providing the health interventions defined

**Table A1.** Current coverage rates and future targets

Disease	Year	2002	2007A	2007B	2015
		baseline	min target	min target	min target
Tuberculosis	Treatment	44%	50%	60%	70%
Malaria	Diagnosis	31%	50%	60%	70%
	Prevention	2%	30%	50%	70%
HIV/AIDS	Care of OI	10%	25%	40%	70%
	Treatment (HAART)	1%	10%	45%	65%

NOTE: these figures are averages of coverage across relevant countries

Implied annual unit costs: (total costs/coverage increase to be achieved) from Kumaranayake, Kurowski and Conteh (2001), expressed in \$2002 USD:

Disease	Year	2007A	2007B	2015
Tuberculosis	Treatment	\$ 66,666,667	\$ 31,250,000	\$ 34,615,385
Malaria	Diagnosis	\$ 63,157,895	\$ 68,965,517	\$ 87,179,487
	Prevention	\$ 10,714,286	\$ 10,416,667	\$ 14,705,882
HIV/AIDS	Care of OI	\$ 106,666,667	\$ 93,333,333	\$ 106,666,667
	HAART	\$ 111,111,111	\$ 113,636,364	\$ 125,000,000

**First exercise ((dis)economies of scale):**

Nonlinear cost =  $\frac{cx^{\beta+1}}{\beta+1}$ ;  $\beta \in \mathbb{R}$ ,  $\beta \neq 1$  where  $x$  is the increase in coverage of the intervention,  $c$  is the initial unit cost, and  $\beta$  is a parameter. For  $\beta=0$ , the cost function becomes linear:  $= cx$  and there are no economies of scale.

It is assumed that the unit cost,  $c$ , identified by the CME background paper is correct for the last (observed) unit (1%) of the coverage. For the next unit (1%) of coverage produced, we have:

$MC = \frac{c}{\beta+1}(\beta+1)x^\beta = cx^\beta$ . At the first additional unit produced,  $x = 1$ , (1% additional coverage of the intervention), the MC is exactly  $c$  (the unit cost).

A positive value of  $\beta$  implies rising marginal costs, and a negative value of  $\beta$  implies falling marginal costs. A value of zero implies that the linearity assumption of the background paper is correct.

A value of 0.5 (the maximum value considered in the estimates) implies that the one-hundredth unit costs 10 times as much to produce as does the first. A value of -0.5 (the

minimum value considered in the estimates) implies that the one-hundredth unit costs one-tenth as much to produce as does the first. A value of 0.2 implies that the one-hundredth unit costs 2.5 times as much to produce as does the first. A value of -0.2 implies that the one-hundredth unit costs less to produce than does the first unit by a factor of 2.5. A value of 0.1 implies that the one-hundredth unit costs 1.6 times as much to produce as does the first. A value of -0.1 implies that the one-hundredth unit costs less to produce than does the first unit by a factor of 1.6.

Economies of scale in service delivery may exist due to phenomena such as, for instance, informational externalities and fixed costs of health infrastructure development. Diseconomies of scale in service delivery may exist due to, for instance, increasing difficulty in reaching underserved (geographically and socially marginalized) populations.

**Second exercise ((dis)economies of scope):**

What is the cost of achieving the MDGs concomitantly? Are there spillovers between interventions? Are there economies or diseconomies of scope?

**An example involving two goals:** take tuberculosis treatment and malaria diagnosis, and denote the interventions by  $x$  and  $y$ .

In general, let the total cost function identifying the minimum cost of providing a given level of outputs (jointly) be represented by  $TC(x, y)$ , where  $x$  and  $y$  denote the improvements in intervention coverage to be attained (by 2007 or 2015).

$$TC(x, y) = \frac{c_1 x^{\beta_1 + 1}}{\beta_1 + 1} \left(1 - \delta_1 \frac{y}{y_{\max}}\right) + \frac{c_2 y^{\beta_2 + 1}}{\beta_2 + 1} \left(1 - \delta_2 \frac{x}{x_{\max}}\right), \text{ where } \beta \in \mathbb{R}, \beta \neq -1, \delta \in [-1, 1].$$

The  $\delta$  parameters will generate economies/diseconomies of scope.  $Y_{\max}$  and  $X_{\max}$  are defined as follows:  $y_{\max} = 100 - y_{\text{baseline}}$ , and similarly  $x_{\max} = 100 - x_{\text{baseline}}$  (the maximum coverage extension).

$\delta = 0$  means that there are no economies of scope.

Note that  $\delta > 0$  yields economies of scope.

$\delta < 0$  yields diseconomies of scope.

In what follows, assume that  $\delta_1 = \delta_2 = \delta$  and  $\beta_1 = \beta_2 = \beta$  for simplicity. In that case:

An interpretation of delta is that it corresponds to the percentage decrease (increase) in the total cost of producing both outputs to the maximum extent feasible -- i.e. covering

the population entirely with both interventions -- arising as a result of the existence of economies (diseconomies) of scope<sup>58</sup>.

For example, a value for delta of 0.5 implies that the total cost of covering the entire population is fifty percent lower (due to the presence of economies of scope, or complementarities) than it would have been if there had not been any complementarities.

Economies of scope may exist in the health sector due to the presence, for instance, of positive spillovers in diagnosis. Diseconomies of scope may exist due to the presence, for instance, of 'congestion effects' or crowding out in the utilization of health service infrastructure.

In the exercises below, we have tried to use plausible values of both beta and delta corresponding to such interpretations.

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<sup>58</sup> It may be checked that the marginal cost of producing a single output (say  $x$ ), holding the other output constant, is influenced by the level of the other output (say  $y$ ) in two ways. First, the level of  $y$  decreases (or increases, depending on the sign of delta) the marginal cost of producing  $x$  by a multiplicative proportion, given by the magnitude of delta. Second, the level of  $y$  decreases (or increases) the marginal cost of producing  $x$  by an additive constant, also given by the magnitude of delta.

**TABLE A2: Comparison between LINEAR AND NONLINEAR costs: DIS/ECONOMIES OF SCALE (DELTA = 0, BETA VARIES)**

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>	<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
		<b>0.000</b>	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
Tuberculosis Treatment	0.40	0.400	0.400	0.402	0.403	0.417	0.435
Malaria Diagnosis	1.20	1.200	1.202	1.212	1.224	1.324	1.464
Malaria Prevention	0.30	0.300	0.301	0.304	0.307	0.338	0.381
HIV/AIDS Care of OI	1.60	1.600	1.603	1.614	1.628	1.745	1.907
HIV/AIDS HAART	1.00	1.000	1.001	1.006	1.012	1.063	1.132

<b>Scenario 2007B</b>	<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
		<b>0.000</b>	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
Tuberculosis Treatment	0.50	0.500	0.501	0.504	0.509	0.547	0.600
Malaria Diagnosis	2.00	2.000	2.005	2.024	2.048	2.254	2.546
Malaria Prevention	0.50	0.500	0.501	0.507	0.515	0.578	0.669
HIV/AIDS Care of OI	2.80	2.800	2.807	2.834	2.868	3.161	3.577
HIV/AIDS HAART	5.00	5.000	5.014	5.070	5.141	5.754	6.636

<b>Scenario 2015</b>	<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
		<b>0.000</b>	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
Tuberculosis Treatment	0.90	0.900	0.902	0.910	0.921	1.009	1.133
Malaria Diagnosis	3.40	3.400	3.409	3.446	3.492	3.889	4.459
Malaria Prevention	1.00	1.000	1.003	1.016	1.033	1.176	1.386
HIV/AIDS Care of OI	6.40	6.400	6.420	6.500	6.601	7.480	8.762
HIV/AIDS HAART	8.00	8.000	8.025	8.127	8.257	9.380	11.023

**TABLE A3: Comparison between LINEAR AND NONLINEAR costs: DIS/ECONOMIES OF SCALE ([DELTA = 0, BETA VARIES](#))**

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>		<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
			<b>0.000</b>	<b>- 0.001</b>	<b>- 0.005</b>	<b>- 0.01</b>	<b>- 0.05</b>	<b>- 0.1</b>
Tuberculosis	Treatment	0.40	0.400	0.400	0.398	0.397	0.385	0.372
Malaria	Diagnosis	1.20	1.200	1.198	1.188	1.177	1.090	0.993
	Prevention	0.30	0.300	0.299	0.297	0.293	0.267	0.239
HIV/AIDS	Care of OI	1.60	1.600	1.597	1.586	1.573	1.471	1.356
	HAART	1.00	1.000	0.999	0.994	0.988	0.943	0.892

<b>Scenario 2007B</b>		<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
			<b>0.000</b>	<b>- 0.001</b>	<b>- 0.005</b>	<b>- 0.01</b>	<b>- 0.05</b>	<b>- 0.1</b>
Tuberculosis	Treatment	0.50	0.500	0.499	0.496	0.491	0.458	0.421
Malaria	Diagnosis	2.00	2.000	1.995	1.976	1.953	1.779	1.587
	Prevention	0.50	0.500	0.499	0.493	0.486	0.434	0.377
HIV/AIDS	Care of OI	2.80	2.800	2.793	2.767	2.734	2.486	2.214
	HAART	5.00	5.000	4.986	4.931	4.863	4.356	3.805

<b>Scenario 2015</b>		<b>LINEAR</b> Beta →	<b>NONLINEAR</b>					
			<b>0.000</b>	<b>- 0.001</b>	<b>- 0.005</b>	<b>- 0.01</b>	<b>- 0.05</b>	<b>- 0.1</b>
Tuberculosis	Treatment	0.90	0.900	0.898	0.890	0.880	0.805	0.722
Malaria	Diagnosis	3.40	3.400	3.391	3.355	3.311	2.980	2.619
	Prevention	1.00	1.000	0.997	0.984	0.968	0.852	0.729
HIV/AIDS	Care of OI	6.40	6.400	6.380	6.302	6.205	5.490	4.722
	HAART	8.00	8.000	7.975	7.875	7.752	6.840	5.864

**TABLE A4: Comparison between LINEAR AND NONLINEAR costs: DIS/ECONOMIES OF SCALE ([DELTA = 0, BETA VARIES](#))**

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>	<b>LINEAR</b>	<b>NONLINEAR</b>				
	Beta →	<b>0.15</b>	<b>0.20</b>	<b>0.30</b>	<b>0.40</b>	<b>0.50</b>
Tuberculosis Treatment	0.40	0.455	0.477	0.527	0.585	0.653
Malaria Diagnosis	1.20	1.623	1.802	2.233	2.783	3.487
Malaria Prevention	0.30	0.430	0.487	0.627	0.813	1.058
HIV/AIDS Care of OI	1.60	2.089	2.292	2.773	3.376	4.131
HIV/AIDS HAART	1.00	1.209	1.293	1.487	1.720	2.000

<b>Scenario 2007B</b>	<b>LINEAR</b>	<b>NONLINEAR</b>				
	Beta →	<b>0.15</b>	<b>0.20</b>	<b>0.30</b>	<b>0.40</b>	<b>0.50</b>
Tuberculosis Treatment	0.50	0.659	0.725	0.884	1.083	1.333
Malaria Diagnosis	2.00	2.882	3.268	4.225	5.494	7.180
Malaria Prevention	0.50	0.777	0.904	1.229	1.680	2.309
HIV/AIDS Care of OI	2.80	4.055	4.607	5.975	7.796	10.224
HIV/AIDS HAART	5.00	7.670	8.881	11.969	16.226	22.111

<b>Scenario 2015</b>	<b>LINEAR</b>	<b>NONLINEAR</b>				
	Beta →	<b>0.15</b>	<b>0.20</b>	<b>0.30</b>	<b>0.40</b>	<b>0.50</b>
Tuberculosis Treatment	0.90	1.276	1.439	1.840	2.366	3.059
Malaria Diagnosis	3.40	5.122	5.895	7.850	10.514	14.155
Malaria Prevention	1.00	1.637	1.938	2.728	3.863	5.497
HIV/AIDS Care of OI	6.40	10.285	12.096	16.814	23.513	33.049
HIV/AIDS HAART	8.00	12.981	15.316	21.429	30.160	42.667

**TABLE A5: Comparison between LINEAR AND NONLINEAR costs, DIS/ECONOMIES OF SCOPE (BETA = 0, DELTA VARIES)**

Two interventions: tuberculosis treatment and malaria diagnosis

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.1</b>	<b>-0.05</b>	<b>-0.01</b>	<b>-0.005</b>	<b>-0.001</b>
<b>Total linear costs: \$ 1.6 B</b>		1.624	1.612	1.602	1.601	1.600
	Delta →	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
		1.600	1.599	1.598	1.588	1.576

<b>Scenario 2007B</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.1</b>	<b>-0.05</b>	<b>-0.01</b>	<b>-0.005</b>	<b>-0.001</b>
<b>Total linear costs: \$ 2.5 B</b>		2.578	2.539	2.508	2.504	2.501
	Delta →	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
		2.499	2.496	2.492	2.461	2.422

<b>Scenario 2015</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.1</b>	<b>-0.05</b>	<b>-0.01</b>	<b>-0.005</b>	<b>-0.001</b>
<b>Total linear costs: \$ 4.3 B</b>		4.509	4.404	4.321	4.310	4.302
	Delta →	<b>0.001</b>	<b>0.005</b>	<b>0.01</b>	<b>0.05</b>	<b>0.1</b>
		4.298	4.290	4.279	4.196	4.091

**TABLE A6: Comparison between LINEAR AND NONLINEAR costs, DIS/ECONOMIES OF SCOPE (BETA = 0, DELTA VARIES)**

Two interventions: tuberculosis treatment and malaria diagnosis

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>		<b>NONLINEAR</b>				
	Delta →	<b>0.15</b>	<b>0.25</b>	<b>0.35</b>	<b>0.40</b>	<b>0.45</b>
<b>Total linear costs: \$ 1.6 B</b>		1.564	1.540	1.516	1.505	1.493
	Delta →	<b>0.50</b>	<b>0.55</b>	<b>0.60</b>	<b>0.65</b>	<b>0.70</b>
		1.481	1.469	1.457	1.445	1.433

<b>Scenario 2007B</b>		<b>NONLINEAR</b>				
	Delta →	<b>0.15</b>	<b>0.25</b>	<b>0.35</b>	<b>0.40</b>	<b>0.45</b>
<b>Total linear costs: \$ 2.5 B</b>		2.383	2.305	2.226	2.187	2.148
	Delta →	<b>0.50</b>	<b>0.55</b>	<b>0.60</b>	<b>0.65</b>	<b>0.70</b>
		2.109	2.070	2.031	1.992	1.953

<b>Scenario 2015</b>		<b>NONLINEAR</b>				
	Delta →	<b>0.15</b>	<b>0.25</b>	<b>0.35</b>	<b>0.40</b>	<b>0.45</b>
<b>Total linear costs: \$ 4.3 B</b>		3.987	3.778	3.569	3.465	3.361
	Delta →	<b>0.50</b>	<b>0.55</b>	<b>0.60</b>	<b>0.65</b>	<b>0.70</b>
		3.256	3.152	3.048	2.943	2.839

**Table A7: Comparison between LINEAR AND NONLINEAR costs, DIS/ECONOMIES OF SCOPE (BETA = 0, DELTA VARIES)**Two interventions: tuberculosis treatment and malaria diagnosis

Figures are in '000 000 000 USD

<b>Scenario 2007A</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.15</b>	<b>-0.25</b>	<b>-0.35</b>	<b>-0.4</b>	<b>-0.45</b>
		1.636	1.660	1.684	1.695	1.707
<b>Total linear costs: \$ 1.6 B</b>	Delta →	<b>-0.5</b>	<b>-0.55</b>	<b>-0.6</b>	<b>-0.65</b>	<b>-0.7</b>
		1.719	1.731	1.743	1.755	1.767

<b>Scenario 2007B</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.15</b>	<b>-0.25</b>	<b>-0.35</b>	<b>-0.4</b>	<b>-0.45</b>
		2.617	2.695	2.774	2.813	2.852
<b>Total linear costs: \$ 2.5 B</b>	Delta →	<b>-0.5</b>	<b>-0.55</b>	<b>-0.6</b>	<b>-0.65</b>	<b>-0.7</b>
		2.891	2.930	2.969	3.008	3.047

<b>Scenario 2015</b>		<b>NONLINEAR</b>				
	Delta →	<b>-0.15</b>	<b>-0.25</b>	<b>-0.35</b>	<b>-0.4</b>	<b>-0.45</b>
		4.613	4.822	5.031	5.135	5.239
<b>Total linear costs: \$ 4.3 B</b>	Delta →	<b>-0.5</b>	<b>-0.55</b>	<b>-0.6</b>	<b>-0.65</b>	<b>-0.7</b>
		5.344	5.448	5.552	5.657	5.761

**Table A8: Comparison between LINEAR AND NONLINEAR costs, DIS/ECONOMIES OF SCALE AND OF SCOPE (BETA, DELTA VARY)**

Two interventions: tuberculosis treatment and malaria diagnosis  
**SCENARIO 2015**

**Delta positive (Economies of scope)**

Figures are in '000 000 000 USD

Scenario 2015	Delta →	NONLINEAR				
	Beta ↓	0.00	0.15	0.40	0.70	1.00
Total linear costs: \$4.3B  Disecon. of scale	0.000	4.300	3.987	3.465	2.839	2.213
	0.001	4.311	3.997	3.474	2.846	2.218
	0.005	4.356	4.039	3.510	2.876	2.242
	0.01	4.413	4.091	3.556	2.913	2.271
	0.05	4.898	4.541	3.948	3.235	2.522
	0.1	5.592	5.185	4.508	3.694	2.881
	0.2	7.334	6.802	5.914	4.849	3.784
	0.5	17.215	15.970	13.894	11.404	8.913
Scenario 2015	Delta →	NONLINEAR				
Beta ↓	0.00	0.15	0.40	0.70	1.00	
Total linear costs: \$4.3B  Economies of scale	0.000	4.300	3.987	3.465	2.839	2.213
	- 0.001	4.245	3.977	3.456	2.832	2.207
	- 0.005	4.245	3.936	3.421	2.802	2.184
	- 0.01	4.191	3.886	3.377	2.767	2.156
	- 0.05	3.785	3.509	3.049	2.498	1.946
	- 0.1	3.341	3.097	2.691	2.204	1.717
	- 0.2	2.629	2.437	2.117	1.733	1.349
	- 0.5	1.442	1.336	1.160	0.948	0.737

**Table A9: Comparison between LINEAR AND NONLINEAR costs, DIS/ECONOMIES OF SCALE AND OF SCOPE (BETA, DELTA VARY)**

Two interventions: tuberculosis treatment and malaria diagnosis  
**SCENARIO 2015**

**Delta negative (Diseconomies of scope)**

Figures are in '000 000 000 USD

<b>Scenario 2015</b>		<b>NONLINEAR</b>				
	Delta →	<b>0.00</b>	<b>- 0.15</b>	<b>- 0.40</b>	<b>- 0.70</b>	<b>- 1.00</b>
	Beta ↓					
<b>Total linear costs:</b> <b>\$4.3B</b>	<b>0.000</b>	4.300	4.613	5.135	5.761	6.387
	<b>0.001</b>	4.311	4.625	5.148	5.776	6.404
	<b>0.005</b>	4.356	4.673	5.202	5.836	6.470
	<b>0.01</b>	4.413	4.734	5.269	5.912	6.554
	<b>0.05</b>	4.898	5.254	5.848	6.561	7.274
	<b>0.1</b>	5.592	5.998	6.676	7.489	8.302
	<b>0.2</b>	7.334	7.867	8.755	9.820	10.885
	<b>0.5</b>	17.215	18.460	20.535	23.026	25.516
<b>Scenario 2015</b>		<b>NONLINEAR</b>				
	Delta →	<b>0.00</b>	<b>- 0.15</b>	<b>- 0.40</b>	<b>- 0.70</b>	<b>- 1.00</b>
	Beta ↓					
<b>Total linear costs:</b> <b>\$4.3B</b>	<b>0.000</b>	4.300	4.613	5.135	5.761	6.387
	<b>- 0.001</b>	4.245	4.601	5.122	5.746	6.371
	<b>- 0.005</b>	4.245	4.554	5.069	5.687	6.306
	<b>- 0.01</b>	4.191	4.496	5.005	5.615	6.225
	<b>- 0.05</b>	3.785	4.061	4.520	5.072	5.623
	<b>- 0.1</b>	3.341	3.585	3.991	4.478	4.965
	<b>- 0.2</b>	2.629	2.821	3.141	3.525	3.909
	<b>- 0.5</b>	1.442	1.548	1.724	1.935	2.147

