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ADB Economics Working Paper Series



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Craig Sugden

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ABSTRACT

The newly independent Timor-Leste has established itself as one of the fastest growing economies in Asia and the Pacific. A concentration of economic activity in the capital has, however, raised the concern that the better off members of society are capturing most of the benefits. This study examines the first decade of the restoration of independence to assess if Timor-Leste's economic growth has been inclusive. Opportunity is found to have been provided to a larger share of the population, with those on lower as well as higher living standards enjoying more opportunity. Inequality in opportunity is generally in decline. It concludes that inclusive growth has been achieved. To maintain progress, it will be important to (i) prioritize support for the poorest Timorese, and (ii) achieve improvements in some lagging sectors, notably roads, water, and sanitation. Minimum standards of service delivery are proposed as a safeguard for the poorest Timorese.

Keywords: inclusive growth, opportunity, inequity, concentration index, Timor-Leste

JEL Codes: D63, I32, O12, O40, O53

I. INTRODUCTION

The importance to development of the pattern as well as the rate of economic growth has long been recognized. Concepts such as rural to urban drift, of economic enclaves, of outward versus inward looking growth, of ecologically sustainable growth, and pro-poor growth, have broadened the understanding of how best to guide developing economies. The concept of pro-poor growth has been especially important in focusing attention on the needs of the poorest members of society. Pro-poor growth established a test of achieving growth that alleviates poverty or, in a stronger form, ensures that the incomes of the poor grow faster than the incomes of the non-poor. Concerns of a potential over-emphasis on redistribution at the expense of the creation of sustainable economic growth have encouraged the more recent concept of inclusive growth.

Inclusive growth emphasizes the creation of more opportunities through a high rate of economic growth, and providing the poor and non-poor equal access to those opportunities. It establishes a test of achieving growth coupled with equality of opportunity. The emphasis on equality of opportunity marks an important change from earlier thinking. The inclusive growth concept acknowledges the responsibility of governments to correct for differences in circumstances faced by individuals, but not for differences in the effort of individuals. Inclusive growth focuses on opportunity and not outcomes such as consumption or income.¹

The concept of pro-poor growth benefits from a clear measurement framework. The monetary value of consumption (or income) can be estimated and compared to a poverty line to determine how many people are poor and the depth of poverty. Comparisons can readily be made over time and across countries of the progress in alleviating poverty. A well developed theory on the measurement of poverty and inequality, and an expanding collection of household income and expenditure surveys, underpin a large literature on the performance in achieving pro-poor growth and the implications for public policy.²

How can the performance in achieving inclusive growth be measured? Timor-Leste, Asia and the Pacific's newest nation, has joined the growing number of economies pursuing inclusiveness. How could Timor-Leste track its progress in achieving inclusive growth? How could any shortcomings in performance be identified so they can be fixed? The rate of economic growth is as measurable as before, but factoring opportunity into a performance assessment raises new challenges. For example, what opportunities should be measured, how should distributional concerns be factored into an assessment, and how could different opportunities be aggregated into an overall view?

One approach to monitoring the inclusiveness of growth is to continue to examine the growth and distribution of consumption (or income), on the basis that this provides an indirect measure of the inclusiveness of growth. An alternative approach of a framework of inclusive growth indicators is presented by the Asian Development Bank (2011a). This framework provides comparisons over time and across countries of economy-wide indicators of opportunity (e.g., the availability of infrastructure) and indicators of a pro-inclusive growth policy framework (e.g., government expenditure on social security, good governance indicators). A third

¹ The paper adopts the definition of inclusive growth discussed in Ali and Zhuang (2007), Ali and Son (2007a,b), Asian Development Bank (2008), and Zhuang and Ali (2010). See Kohli, Sharma, and Sood (eds.) (2011); World Bank (2009); and the International Centre for Inclusive Growth (www.ipc-undp.org) for additional discussion of inclusive growth; and World Bank (2006) for a discussion of equity and growth.

² See for example the discussion in Ravallion (2004).

alternative, which is adopted in the study, is to examine the distribution of opportunity across living standards.

The next section provides a background on the Timor-Leste economy. The study methodology is then presented, which is based on the application of the concentration index and a distribution-weighted measurement of achievement. This is followed by a discussion of the specification of opportunity in the study, and the use of asset indices as the study's measure of living standards. The subsequent section presents the main findings. It is found that Timor-Leste achieved inclusive economic growth over the last decade, with the positive on an overall increase in opportunity outweighing the negative of rising inequality in opportunity. A final section offers some observations and suggestions on the implications of the study.

II. COUNTRY BACKGROUND

Timor-Leste's economic growth can be separated into two periods marked by the security, humanitarian, and political crisis of 2006. The pre-2006 period was one of economic stabilization as the new country recovered from the extensive violence and destruction of 1999. The country was administered by the United Nations from late 1999 until formal independence in May 2002. With almost no domestic revenue, the economy was extremely dependent on foreign aid during the initial period. Constrained by a very small budget, the first democratically elected government focused on the rebuilding of security, education, and health services, and putting in place the machinery of a modern government. Foreign aid constituted the largest economic driver. Gross domestic product (GDP) excluding the petroleum sector (the preferred measure of GDP) fell dramatically in 1999 before bouncing back in 2000 and averaging a low rate of growth of 2.0% per annum (p.a.) over 2001–2005. The crisis of 2006 saw nonpetroleum GDP contract by 3.2% during the year.³

The post-2006 period has been one of rapid economic growth. Revenue from offshore petroleum developments began to surge in 2005, reaching \$1.3 billion in 2007, \$2.5 billion in 2008, and \$3.5 billion in 2011. The government in effect used petroleum revenue to buy peace and security. Cash payments were made to resettle the 15% of the population displaced by the 2006 crisis, a wide public safety net was put in place, and small-scale grants were used to inject funds at the village level. The public sector wage and salary bill and expenditure on goods and services have also grown rapidly, and the commencement of a national electrification program saw infrastructure spending begin to build. Public expenditure more than tripled from 2007 to 2011, underpinning average growth in nonpetroleum GDP over the period of 11.7% p.a.

The agriculture sector has generally struggled to adjust to the removal of extensive assistance and the opening of the trade environment in 1999, and to overcome the hurdles of deteriorating rural infrastructure and low education levels. With little manufacturing activity and a shallow private services sector, the economy is highly dependent on public expenditure. In

³ There are almost no direct links from the petroleum sector to the rest of the economy, with all production from an offshore area jointly managed with and largely serviced from Australia. The petroleum sector contributes around 80% of GDP, and changes in GDP are dominated by the changes in the world oil price. Most petroleum revenue is saved offshore in a petroleum fund, which provides the main source of funding of government expenditure. The result is that changes in total GDP are typically of little immediate relevance to most Timorese. Official projections show the volume of petroleum production as having already passed its peak, and barring the development of new fields, to end in 2025. Economic dialogue is focused on building the nonpetroleum economy in order to provide sustainable economic growth. Reflecting this focus, and given the enclave nature of the petroleum sector, monitoring and analysis of economic growth concentrates on the nonpetroleum economy.

2011, public expenditure was one and half times nonpetroleum GDP. The economy is highly import dependent, with the latest data showing a ratio of merchandise imports to nonpetroleum GDP of 140%. Nonpetroleum exports are very low at around 5% of merchandise imports, and consist almost entirely of coffee.

While improvements in living standards associated with the rebuilding of public services and the recent economic growth are readily apparent, concerns are frequently aired in public debate as to the distribution of the benefits. A key concern is that benefits have been concentrated in the capital, Dili, where much of the public sector is located. While this concentration has lessened since 2006, there is a concern that many of those living in rural areas are being left behind.

Most economy-wide indicators of basic opportunity show an overall improvement over the last decade, albeit with generally slower progress in the later years (Annex A). The net enrollment rate in primary schools rose slightly, while there was a large increase in the secondary school net enrollment rate. The coverage of health care during birth and the antenatal period improved, and there was a large expansion in immunization coverage. Access to electricity, and clean water and sanitation improved. Turning to other indicators, the infant mortality rate has declined by a quarter since 2001, to 45 infants per 1,000 live births, and the adult literacy rate has risen from 37% to slightly more than 50%.

The improvements tended to be faster during the period of slow economic growth than during the subsequent period of faster growth. This probably partly reflects the quick wins available in the early stages of recovery from the damage of 1999. Subsequent improvements has been more demanding of human capacity and public funding, as well as facing the additional hurdles arising from the 2006 crisis.

There are notable exceptions to the general improvement in development indicators. Despite some easing in child malnutrition late in the decade, malnutrition rates remain above their levels of 2002 and 2003. And the incidence of poverty rose from 36% in 2001 to 50% in 2007, and remained at a high 41% in 2009.

The period since formal independence can thus be broadly characterized as one of economic growth with an expansion in opportunity on average. Some key development indicators have, however, deteriorated.

While such an economy-wide perspective provides useful background, it is silent on distribution as it is based on averages only. Hence, it does not address the distributional issues at the heart of inclusive growth.⁴ The relevance of such distributional issues is made clear in Timor-Leste's Strategic Development Plan 2011–2030. The plan:

⁴ See, for example, Roemer (2011), who discusses the limitations of the averages over the whole population used in the human development index.

.... is about setting out a pathway to **long-term, sustainable, inclusive development in Timor-Leste**....The plan aims to develop core infrastructure, human resources and the strength of our society, and to encourage the growth of private sector jobs in strategic industry sectors—a broad based agriculture sector, a thriving tourism industry and downstream industries in the oil and gas sector.....The Strategic Development Plan sets out what needs to be done to achieve the collective vision of the Timorese people for a peaceful and prosperous nation in 2030.⁵ (emphasis added)

Broad indicators of distribution present a mixed picture. The Gini coefficient declined from 2001 to 2007, showing a decline in income inequality over the period. The basic education indicators were already pointing to a gender balance at the time of formal independence, and this has been sustained. Improvements in maternal health care have also provided important gains for women. There is a large urban–rural imbalance, with the development indicators strongly in favor of urban areas. But where there has been a discernible change in the urban–rural imbalance, it is generally in favor of rural areas. While these indicators offer some insights, a deeper analysis of distributional issues is needed if the inclusiveness of Timor-Leste’s economic growth is to be understood.

III. METHODOLOGY

A. Framework

Consider the social welfare function:

$$W = W(u_1, u_2, \dots, u_n) \quad (1)$$

where, u is the utility function for the 1 to n individuals, and W is nondecreasing in each of its arguments (i.e., social welfare does not decrease if an individual’s utility increases without decreasing the utility of another individual).

The individual’s utility is typically represented by consumption or income. Many studies also implicitly use proxies such as nutrition, health, and education status.⁶ These measures of utility can be characterized as objectives or development outcomes. Building on the work of John Rawls, Amartya Sen, and other political philosophers, Roemer (1998, 2006, 2011) attributes such outcomes to three factors: (i) an individual’s circumstances, such as geographical location, family background, parental education, gender, culture, gender, race, and religious belief, which are beyond an individual’s control; (ii) the policy that an agency or country develops, and (iii) effort, being the set of actions that an individual controls. Roemer argues that effort should be distinguished from circumstances and policy because effort is the responsibility of the individual, whereas circumstances and policy are not, and because it is morally acceptable to hold individuals responsible for their effort.

Under this characterization, the availability of an opportunity such as schooling or basic infrastructure can be considered the result of circumstances and public policy, but not effort. In

⁵ Government of Timor-Leste (2011) p.12

⁶ As examples, see the analysis of inequality and poverty in Asia by Cain, Hasan, and Magsombol (2010), Tandon and Sparkes (2010), and Niimi (2010).

contrast, a development outcome such as income, consumption, wage-earning capacity, life expectancy, or nutrition, would be a combined result of circumstances, policy, and effort.

On this basis, the social welfare function could be represented as:

$$W = W(u_1(O_1, E_1, A_1), u_2(O_2, E_2, A_2), \dots, u_n(O_n, E_n, A_n)) \quad (2)$$

where, O_i represents the opportunities available to an individual I and is a function of circumstances and policy, E_i is the effort of the individual, and A_i captures other factors relevant to determining an individuals' utility.

A feature of the inclusive growth concept—growth coupled with equality of opportunity—is that it shifts the emphasis from development outcomes to opportunity. In presenting the case for an emphasis on equality in opportunity, Roemer (2006) argued against the adoption of utilitarianism as a theory of justice and the assumption that per capita income represents welfare. He argued that economic development should be measured by the rate at which opportunities for income acquisition become equalized in a society. Ali and Zhuang (2007) broaden the basis for emphasizing opportunity:

The importance of equal opportunities for all lies in its intrinsic value as well as instrumental role. The intrinsic value is based on the belief that equal opportunity is a basic right of a human being and that it is unethical and immoral to treat individuals differently in access to opportunities. The instrumental role comes from the recognition that equal access to opportunities increases growth potential, while inequality in opportunities diminishes it and makes growth unsustainable, because it leads to inefficient utilization of human and physical resources, lowers the quality of institutions and policies, erodes social cohesion, and increases social conflict.

Hence to understand if growth is inclusive, the interest is in the O_i variable within the above social welfare function. A number of opportunities can potentially be identified, i.e., O_j , and aggregated into an opportunity function for society such as:

$$O_j = O(O_{j1}, O_{j2}, \dots, O_{jn}) \quad (3)$$

where, O_{ji} is non decreasing in each of its arguments.

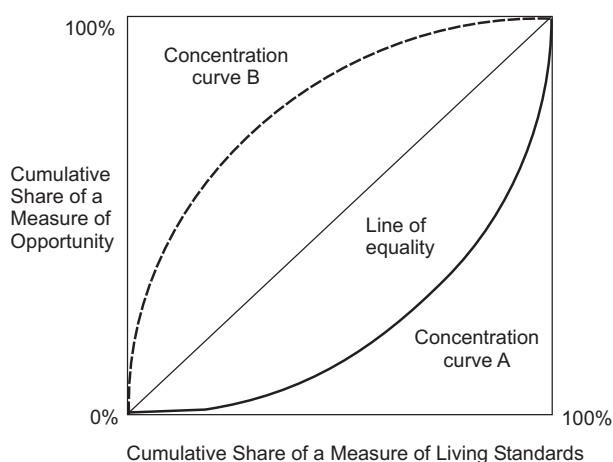
B. The Concentration Curve

Ali and Son (2007a, b) pointed out that a concentration curve can be constructed from equation (3) when O_j is ranked by a measure of living standards. A concentration curve is similar to the Lorenz curve used to study income inequality. A Lorenz curve relates the cumulative proportion of total income to the cumulative proportion of the population, when the population is ranked by income. That is, a Lorenz curve shows the share of total income held by a share of the population. A concentration curve relates the cumulative proportion of an economic variable other than income to the cumulative proportion of the population, when the population is ranked by living standards.⁷ That is, the concentration curve shows the share of the total value of an economic variable held by a share of the population.

⁷ Discussion of the basis and use of concentration curves is provided in Kakwani (1980); Yitzhaki and Olkin (1991); Bishop, Chow, and Formby (1994); O'Donnell et al. (2008); and Son (2011).

Like the Lorenz curve, a concentration curve has a simple graphical presentation. A concentration curve can be shown as the cumulative proportion of the economic variable of interest on the y axis and the cumulative proportion of a measure of living standards on the x axis. Comparisons can then be made with a line of equality. But unlike a Lorenz curve, a concentration curve can lie either above or below the line of equality. An illustrative concentration curve is shown in Figure 1 for a hypothetical opportunity. For a variable that increases with living standards, a concentration curve below the line of equality (curve A in Figure 1) represents a distribution in favor of those with higher living standards (i.e., a pro-rich distribution), while a concentration curve above the line of equality (curve B in Figure 1) represents a distribution in favor of those with lower living standards (i.e., a pro-poor distribution). Thus a concentration curve constructed for an opportunity variable can illustrate whether the equality in opportunity targeted by inclusive growth has been met.

Figure 1: A Concentration Curve for an Illustrative Opportunity



Source: Author's calculations.

C. The Concentration Index

The Gini coefficient provides a summary of income inequality represented by the Lorenz curve. The concentration index is the equivalent for the concentration curve of the Gini coefficient. It provides a summary of inequality in the distribution of the economic variable represented by the concentration curve.⁸ While the concentration index has been used most extensively in the analysis of health issues, it is applicable more widely to the study of the inequality in the distribution of economic variables. It can be used to summarize the extent of the departure from equality of the distribution of an opportunity variable.

Wagstaff (2002) provides the following formulation of the concentration index, $C(v)$, for individual level data and large samples:

$$C(v) = 1 - \frac{v}{n\mu} \sum_{i=1}^n y_i (1 - R_i)^{v-1} = 1 - \sum_{i=1}^n \frac{y_i}{n\mu} w_i(R_i, v), \quad (4)$$

⁸ Discussion of the concentration index is provided by Kakwani, Wagstaff, and van Doorslaer (1997), Wagstaff (2002), Wagstaff, van Doorslaer and Watanabe (2003), Koolman and van Doorslaer (2004), Wagstaff (2005), and O'Donnell et.al. (2008). O'Donnell et.al. (2008) provides worked examples, relevant Stata code, and the formula for standard errors. Son (2011) discusses the specification of the concentration index in the context of opportunity.

where, ν represents the aversion to inequality, y_i is the economic variable being studied, and μ is the mean of the variable, n is the sample size, and R_i is the fractional rank of individual i in the distribution of living standards with $i = 1$ for the poorest and $i = N$ for the richest. The individuals' share of the variable of interest is $y_i/n\mu$, while the weight attached to the individual is $\nu(1-R_i)^{(\nu-1)}$.

The fractional rank equals $1/N$ when the distribution is not weighted, and when the distribution is weighted is found as:

$$r_i = \sum_{j=0}^{i-1} w_j + \frac{w_i}{2}, \quad (5)$$

where, w_i is the sample weight scaled to sum to 1, observations are sorted in ascending order of living standards, and $w_0 = 0$.⁹

O'Donnell et al. (2008) provide the formula for the concentration index for grouped data:

$$\begin{aligned} C(\nu) &= \nu \sum_{t=1}^T f_t (1-R_t)^{(\nu-1)} - \frac{\nu}{\mu} \sum_{t=1}^T f_t h_t (1-R_t)^{(\nu-1)} \\ &\approx 1 - \frac{\nu}{\mu} \sum_{t=1}^T f_t h_t (1-R_t)^{(\nu-1)} \end{aligned} \quad (6)$$

where f_t is the sample proportion of the t 'th group.

When the parameter ν showing the aversion to inequality equals 1, there is no aversion to inequality and the concentration index is 0. The aversion to inequality and weight attached to those on lower living standards rises with ν . The poorest member receives a weight close to the degree of risk aversion, while the richest member receives a weight of zero or close to zero.¹⁰ The standard formulation of the concentration index, and also of the Gini coefficient, is based on $\nu = 2$.

When $\nu > 1$ and there is an aversion to inequality, the concentration index is 0 when there is equality in the distribution of the economic variable. For an economic variable that increases with living standards, the convention is that the concentration curve is negative when the concentration curve is above the line of equality and the distribution is pro-poor, and positive when the concentration curve is below the line of equality and the distribution is pro-rich. The index ranges between -1 and 1 .¹¹

⁹ O'Donnell et al. (2008) p.101.

¹⁰ Wagstaff (2002) presents a graphical summary of the weights for different degrees of risk aversion.

¹¹ Wagstaff (2005) demonstrates that when the economic variable is binary, the index for a dataset has a lower bound of $\mu-1$ and an upper bound of $1-\mu$, (where μ ranges from 0 to 1) and suggests that concentration indexes for binary variables be expressed as a fraction of the relevant bound. The same suggestion is made in O'Donnell et al. (2008). This suggestion is not adopted, as it is considered that the identification of an upper and lower bound within a dataset is a helpful observation rather than a cause for concern. Consider a situation where 90% of all living standard groups have access to an opportunity. As there is equity in distribution, the concentration index should be zero and the achievement measure should equal the simple average. If the proposed normalization procedure is used, the concentration index is positive and the achievement measure is below the simple average, which is a misstatement. In the extreme, when there is universal coverage and the concentration index is zero, the proposed normalized concentration index cannot be derived.

D. Alternatives to the Concentration Index

The literature has used a number of alternatives to the concentration index as a measure of the distribution of opportunity. For example, Son (2012) and ADB (2012) apply the dissimilarity index presented by de Barros et al. (2009) and Molinas et al. (2010), who in turn draw on the sociology literature. The dissimilarity index is based on the relative mean deviation. This can be interpreted as the fraction of better-off people whose access to an opportunity would have to be reassigned to worse-off people in order to achieve equality of opportunity, where better-off or worse-off is defined by circumstances. If there is equality in opportunity, no reassignment is needed and the index is zero. The dissimilarity index is higher, the further the distribution is from equality. Son (2011) utilizes the Bonferroni index, which is based on the Bonferroni curve.¹² Like the Lorenz and concentration curves, the Bonferroni curve is based on a ranking of individuals by living standards. The curve shows the average value of an economic variable for those on lower living standards compared to the average value of the variable across all living standards.

The concentration index, the Bonferroni index, and the dissimilarity index all allow preparation of a distribution weighted average as an overall measure of opportunity (i.e. the simple average of a variable, such as the coverage ratio of service, multiplied by a measure of how equitably opportunity is distributed). In this study the measure is called achievement, while Son (2012), ADB (2012), de Barros et. Al. (2009) and Molinas et. al. (2010) term the measure the human opportunity index.

An important difference between these three indices is the weighting of individuals. Both the concentration and the Bonferroni indices give more weight to those on lower incomes, and so are 'pro-poor'. Son (2011) explains that the weights for the concentration index decrease monotonically at a constant rate, while the weights for the Bonferroni index decrease monotonically at an increasing rate, meaning it is more 'pro-poor' than the concentration index. In contrast, the dissimilarity index is shown by Son (2011) to attach equal weights to all individuals with a below average living standard, and equal weights to all individuals with an above average living standard, and hence is not 'pro-poor' in the same sense.

The concentration index is favored over the dissimilarity index for this study because it has the ethically desirable feature of giving a higher weight to individuals as living standards declines. Both the concentration index and Bonferroni index share this advantage. The concentration index is preferred for practical reasons: the wider familiarity with the underlying concept (because it can be easily explained by reference to the well known Lorenz curve and Gini coefficient); the ease of exploring the sensitivity to the assumption regarding the aversion to inequality; and the availability of a larger literature on the use of the concentration index. The concern of Son (2011) that the concentration index may not be pro-poor enough can be accommodated, as necessary, by increasing the aversion to inequality parameter.¹³

¹² Son (2011) explains the equity index of opportunity of Ali and Son (2007a, b) is the same as the Bonferroni concentration index.

¹³ Note that as weights sum to one, increasing the weight attached to the poor decreases the weight attached to the non-poor. In the extreme, distributions highly skewed in favor of the richest can potentially become 'more equal' as the aversion to inequality rises, because the values attached the richest become less important.

E. The Achievement Measure

Inclusive growth targets an expansion in opportunity as well as a more equitable distribution. Whether this target is met could be evaluated by comparing both the change in the average opportunity and the concentration index. Such comparisons would face the challenge of weighting the relative importance of the two results. Wagstaff (2002) presents an alternative of a composite measure of achievement measure which is based on an explicit preference regarding the distribution of opportunity. The achievement measure, $I(v)$, is:

$$I(v) = \frac{1}{n} \sum_{i=1}^n y_i v (1 - R_i)^{v-1}, \quad (7)$$

$$I(v) = \mu(1 - C(v)). \quad (8)$$

The achievement measure is thus a weighted average of the economic variable, where the weights are determined by the assessed extent of inequality.¹⁴ When there is no aversion to inequality (i.e., $v=1$), the achievement measure equals the simple average.

The change in the achievement measure can, with the acceptance of linearization error, be decomposed into the effect of a change in the simple average and in inequality as follows:

$$dI(v) = (1 - C(v))d\mu - \mu dC(v) \quad (9)$$

F. The Inclusive Growth Test

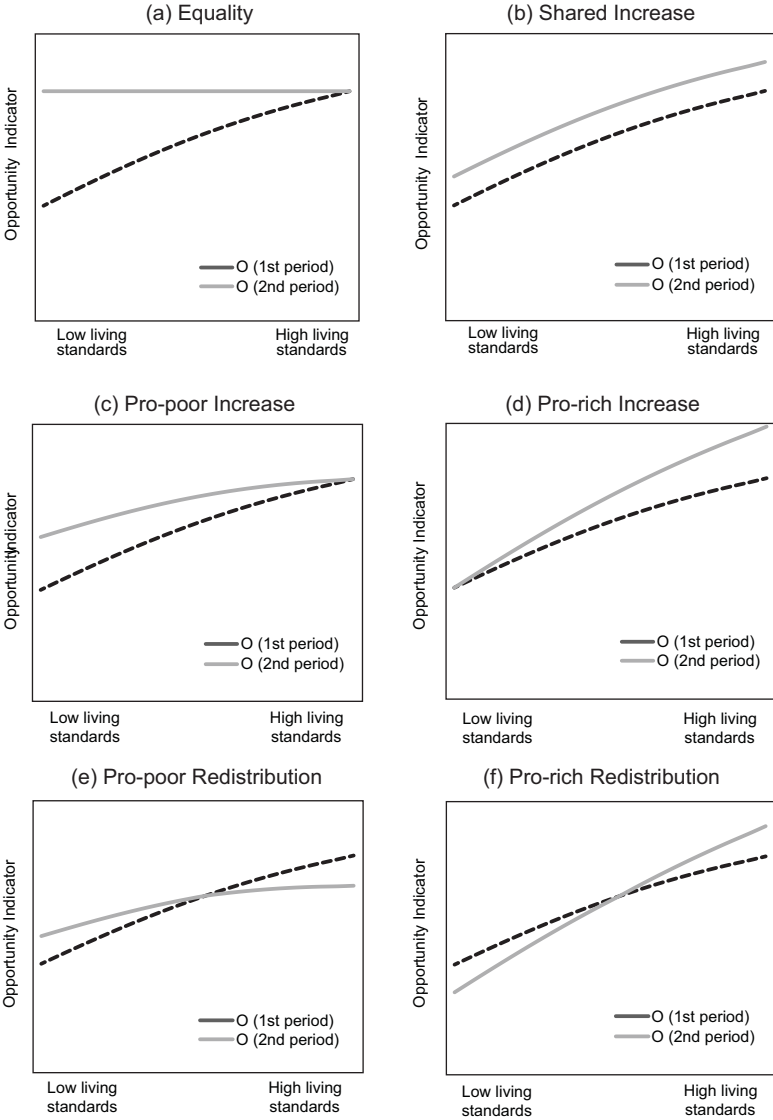
This study adopts a working definition of inclusive growth as a situation where the achievement measure increases over time, when a high and sustainable rate of economic growth is also in place. This definition incorporates an assumption regarding the aversion to inequality. The requirement that the achievement must rise over time is demonstrated in Figure 2. The figure shows illustrative opportunity curves, O , for period 1 and the latter period 2, for a fast growing economy. The curves show the opportunity available to groups of individuals (e.g., the share of a group with access to basic services) arranged in ascending order of living standards.

In case (a), the opportunity curve for the first period shows that those groups with high living standards have more economic opportunity. In the next period, all groups have the same economic opportunity, and the opportunity curve is flat. All groups benefit from the same absolute increase in opportunity in case (b), while those with lower living standards enjoy a proportionally larger increase in case (c), and those with higher living standards enjoy a proportionally larger increase in case (d). In case (e) and case (f), the (simple) average level of opportunity is unchanged over the two periods, but opportunity is redistributed in favor of those on lower living standards in case (e), or in favor of those on higher living standards in case (f).

¹⁴ Wagstaff (2002) presents this as an achievement index. As the units of measure are those of the indicator being assessed, without conversion to an index, the term achievement measure is used in this paper.

The achievement measure increases from the first to the second period in all cases but case (f). Thus, cases (a) to (e) are interpreted in this study as situations of inclusive growth. The concentration index shows the distribution of opportunity becoming more equitable in cases (a), (c), and (e). In case (b), the concentration index is almost unchanged and the increase in the achievement measure is due to the rise in the simple average opportunity. In case (d), the increase the achievement measure is due to the rise in the simple average, which outweighs the negative of an increase in inequality.

Figure 2: Illustrative Opportunity Curves



Source: Author's calculations.

Case (a) represents what can be thought of as a pure form of inclusive growth—of ‘growth coupled with equality of opportunity’. This pure form appears unlikely to be realized for most opportunities relevant to Timor-Leste. Zhuang and Ali (2010) propose an alternative formulation of inclusive growth of ‘growth coupled with declining inequality of opportunity.’ This formulation can be considered a strong test, which is only met in cases (a), (c), and (e). This study’s test for inclusive growth of an increase in the achievement measure, which is met for cases (a) to (e), can be thought of as a weak test of inclusive growth.¹⁵

IV. SPECIFICATION

A. The Specification of Opportunity

Opportunity is a function of circumstances and policy. An opportunity is exogenous to the individual (or potentially a group of individuals), and is free of the influence of that individual’s effort. In practice it can be difficult to define a ‘pure’ opportunity for an adult, as adults normally have some ability to exert effort to influence what is available to them. For example, the availability of publicly supplied electricity can be thought of as exogenous if an adult is unable to move location; either the area they live in does or does not have electricity. But if an adult could with effort move to areas with electricity, then the availability of electricity is not truly an exogenous opportunity.

One approach to identifying opportunity is to identify circumstance and policy variables relevant to a variable of interest, such as access to education, and to use statistical techniques to isolate the portion of the variable of interest that is explained by the circumstance and policy variables.¹⁶ This portion then becomes a measure of opportunity. Examples of this approach include Bourguignon, Ferreira, and Menéndez (2003); de Barros et al. (2009); and Molinas et al. (2010) for South America; and ADB (2012) and Son (2012) for Asia. An attraction of this approach is that it deepens the understanding of opportunity by identifying the circumstances and policies that drive opportunity. But the approach can be analytically challenging and demanding on data because of the complexity of opportunity. If total opportunity is of interest, all circumstance and policy variables need to be identified and measureable. It may, however, be possible to reduce the demands on data by making inferences from a subset of circumstance and policy variables.

Findings that opportunity explain a small portion of ‘effort heavy’ variables highlight the importance of avoiding inferences from a variable that is a function of both opportunity and effort, without isolating that portion accounted for by opportunity. For example: Bourguignon, Ferreira, and Menéndez (2003) estimate that the inequality of observed opportunities accounts for approximately 8 to 10 percentage points of the Gini coefficient for individual earnings in Brazil; Ferreira and Gignoux (2008) found that between one-half and one-quarter of inequality in consumption reflected inequality of opportunity in a sample of Latin American countries (also

¹⁵ Son (2011) discusses the ranking of social welfare functions based on the generalized Lorenz curve. A social welfare function (that is symmetric and quasi-concave in individual incomes) is unambiguously superior to a second social welfare function if the generalized Lorenz curve associated with the first function is, at all points, above the generalized Lorenz curve associated with the second function. A generalized concentration curve could be constructed for an opportunity, and this test for unambiguous superiority applied to assess the opportunity. The test of inclusiveness adopted in this study is more general, and potentially allows for a finding on inclusiveness when the implicit generalized concentration curves intersect. When the implicit concentration curves intersect, varying the assumption on the aversion to inequality could vary conclusions on inclusiveness.

¹⁶ Apart from Roemer (2006, 2011), the literature does not distinguish policy, appearing to it with circumstances.

reported in de Barros et al. [2009]); and Romer (2011) reports that one key circumstance, parental education, accounts for between 5%–25% of income inequality in 20 of 22 European countries, while a broader set of seven circumstance variables explains 33% of inequality of income in Sweden.

A second approach to identifying opportunity is to identify a variable that is likely to be dominated by circumstances and policy, and to use the variable as a proxy for opportunity. This approach relies on distinguishing what can be thought of as ‘effort light’ variables from ‘effort heavy’ variables. The studies of Ali and Son (2007a, b) and Son (2011) provide examples of this approach. This approach can be made manageable by drawing on the view that up to a certain age, children cannot be held responsible for what is available to them. Defining opportunity from the perspective of a child simplifies the task, as a variable relating to a child can more reliably be considered a function of circumstances and policy only and independent of effort. Roemer (2011) presents such an argument. The argument also underlies the examination of human opportunity in South America by de Barros et al. (2009) and Molinas et al. (2010), which are undertaken from the perspective of the child.¹⁷

The use of variables from the perspective of the child, does however, need to be undertaken judiciously. Most household level variables can be re-expressed from the perspective of a child. For example, if there was concern that the availability of electricity to a household was income and hence effort dependent, the influence of income could potentially be ‘removed’ by re-expressing the variable as the availability of electricity to children (family income being exogenous to a child and hence a circumstance variable to a child). But does that truly transform the underlying economic relationship? Consider the quality of housing, which can be expected to be heavily influenced by household income and hence effort. Would the re-expression of a measure of housing quality available to the household as a measure of the housing quality available to a child remove the effect of effort, and convert an effort heavy variable into an effort free variable?

This study follows the second approach to identifying opportunity. It focuses on variables that are largely exogenous to a household or child and are determined by circumstance and policy. Opportunity is represented by access to basic infrastructure, education, and health services. Specifically, the opportunity variables are: for infrastructure, access to electricity, improved water, improved sanitation, and transport; for education, participation of younger and older children in school, for child health, access to vaccinations and Vitamin A; and for maternal health, access to skilled attendants at birth and skilled antenatal carers.

These services are selected on the basis that: (i) data are available on a consistent basis in the 2009–2010 demographic and health survey (DHS), the 2001 and 2007 living standards measurement surveys (LSMSs), and the 2002 Multiple Indicator Cluster Survey,¹⁸ (ii) they can be thought of as ‘normal’ services, such that demand will rise with living standards

¹⁷ For example, Molinas et al. (2010) focus on seven personal circumstances: parents’ education, family income, number of siblings, the presence of both parents in the house, gender, gender of household income, and location of residence. In all cases, the unit of the focus is the child, defined as an individual between the ages of zero and 16. This isolates away the problem of effort and choice-at that age, children can hardly be responsible for their fate. (p.14).

¹⁸ Government of Timor-Leste and the United Nations Children’s Fund (2003), and World Bank (2003). Ministry of Finance and World Bank (2008a, b), National Statistics Directorate (2010), Measure DHS (2011), World Bank (2011a, b).

and an increase in opportunity increases utility,¹⁹ and (iii) the variable is either defined from the perspective of the child, or the provision of services is in the nature of an endowment from the government rather than a result of individual effort, and hence are effort light.²⁰

The findings of ADB (2012) and Son (2012) may be seen as contesting the treatment of the selected variables as 'effort light'. From a study of seven large Asian economies, they conclude that per capita household expenditure, being an effort variable, is typically the most important variable in explaining access to secondary education and basic infrastructure. This would make these variables effort heavy and thus not opportunities. A similar finding is presented for South America by de Barros et al. (2009) and Molinas et al. (2010). These studies do not, however, examine causality. It is of no surprise that low incomes are associated with poor opportunity, but this does not necessarily mean that income causes opportunity. This study assumes that 'effort light' opportunity causes incomes. For the opposite to apply and for income to cause opportunity, either: households on low incomes would need to gravitate towards areas without basic public services; or the government would need to be avoiding servicing low income areas because they are low income. This interpretation of causality appears out of place for Timor-Leste. Household mobility is too low to account for the gaps in service delivery, and the location of services largely follows the population distribution (i.e., larger populations have more services) or the distribution of facilities as of 1999.

B. The Specification of Living Standards

Living standards are represented by an asset index rather than consumption, the widely preferred measure for developing countries.

Utility can be expressed as a function of goods and services consumed, and for the optimal bundle of goods and services can be approximated by the monetary value of consumption. Income has also been used as a measure of living standards, but it is generally accepted that consumption is a better measure. The smoothing of consumption means it fluctuates less than income, making consumption a more reliable indicator of longer term living standards. More importantly, in a developing economy, consumption can be measured at lower cost and is likely to be measured with higher accuracy.²¹

Asset indices have been used as an alternative to consumption, with their use gaining momentum after the work of Filmer and Pritchett (1999, 2001). For example, the reports on the DHSs, which lack data on consumption, report many variables against quintiles of wealth formed from an asset index. Asset indices are not as versatile as consumption. Notably, asset

¹⁹ Ali and Son (2007a, b) assess the equity of access to rural health unit health centers and barangay (or village) health centers. Access to both is found to be pro-poor, in contrast to the pro-rich nature of access to hospitals and private clinics. These most basic of health care centers are potential examples of 'inferior' opportunities (as opposed to 'normal' opportunities), being an opportunity that by its nature is more likely to be available to the poor than the rich. The interpretation of an increase in availability of an 'inferior' opportunity is unclear. It could represent either a desirable improvement for poor people, or have a negative interpretation of a failure to make a superior, optimal opportunity available. This study avoids such issues by focusing on opportunities that poorer members of the community would be expected to prefer more of.

²⁰ Ali and Son (2007a, b) treat access to employment as an opportunity variable. In Timor-Leste, average incomes are highest in the general government sector, followed by the formal private sector, then the informal sector, then the subsistence sector. Effort, particularly in terms of achievement in higher education and language training and moving to larger centers, is very important role in determining employment. It is concluded that employment is a poor indicator of opportunity in Timor-Leste because it is effort heavy.

²¹ For a discussion of the arguments in favor of the use of consumption, see Deaton (1997), Deaton and Zaidi (2002), Grosh and Munoz (1996), and Ravallion (1998).

indices lack the equivalent of a poverty line that allows the poor to be distinguished from the non-poor, and are normally only used to rank a population by living standards.

Like the arguments for the use of consumption instead of income, the arguments in favor of asset indices emphasize measurement issues. Assets can be physically observed by an interviewer, and provided superior assets can be distinguished from inferior assets (e.g., tin roofs versus palm frond roofs, cars versus motorbikes), can provide an objective marker of living standards. In contrast, expenditure data are more costly to collect, and are more exposed to measurement error and reporting bias. For example, respondents to a household income and expenditure may seek to hide their total expenditure; it may be difficult for respondents to recall all expenditure; some sources of expenditure are difficult to value in the absence of a well developed market (such as required when valuing imputed rent and own-production); and the reporting of expenditure is exposed to seasonality effects. The arguments in favor of asset indices, and how asset indices can be prepared and used, are discussed in Filmer and Pritchett (1999, 2001); Bollen, Glanville, and Stecklov (2002); Sahn and Stifel (2003); Ferguson et al. (2003); Rutstein and Johnson (2004); McKenzie (2005); Filmer and Scott (2008); O'Donnell et al. (2008); and Kolenikov and Angeles (2009); among others.

One motivation for applying asset indices in this study is that it allows the use of the most recent household survey for Timor-Leste, the 2009–2010 DHS.²² The study also uses data from the 2001 and 2007 LSMSs. The 2001 and 2007 data is analyzed using both assets indices and consumption as a measure of living standards. This allows comparisons of the results derived from the different measures.

A further consideration in favor of the use of asset indices is the potential advantages in communicating and thus achieving acceptance of the results. Hentschel and Lanjouw (1996) provided a useful, but at time neglected, reminder of this perspective:

The value of poverty analysis rests crucially on the degree to which the conclusions are widely accepted. As the poverty profile and the subsequent strategies for poverty alleviation all rest on the credibility of the underlying consumption aggregate, it is important not to sacrifice credibility in the process of adding some particularly tricky consumption component to the consumption aggregate. (p.3).

There has been extensive reporting in Timor-Leste of the headcount measure of poverty provided by the 2001 and 2007 LSMSs, and an update of the headcount measure of poverty was derived from the 2009–2010 DHS. But the analysis has been undertaken by outsiders, and there is very little evidence of the extension of poverty analysis beyond the initial reports or of locally-led poverty analysis. And little, if any progress has been made in transferring the skills needed to undertake empirical analysis based on consumption.²³

In contrast to the poor take-up of consumption-based poverty analysis, the government seized the task of disseminating the results of the 2010 population and housing census. This included a countrywide dissemination through the Sensus Fo Fila Fali. Presentations were

²² The National Directorate of Statistics conducted a household income and expenditure survey in early 2012, modeled on the latest living standards measurement survey. The results were not available for this analysis.

²³ There has in contrast been very good progress in building the capacity to undertake fieldwork required for household surveys and census. Notably, the first fully Timor-Leste led household income and expenditure survey was undertaken in early 2012. But even for this survey, it has been necessary to continue to rely on outside help to analyze the data and prepare estimates of consumption and poverty.

made in each suco (i.e., a village) of a 24-page, village-specific report on population and key development characteristics, asset data, and a simple performance benchmarking. As described in the Minister's foreword to the village reports, the:

*main objective ..is to inspire and help community leaders to get involved in and lead the development process in their villages.... Community leaders will be taught how to interpret the social indicators and how they can be used to set local development targets and to monitor progress in their villages.*²⁴

The use of asset indices in this study opens a link to this innovative program.

Appendix B explains the derivation of the asset index used in the study. The appendix also extends Filmer and Scott's (2008) international comparisons of asset indices and consumption to include Timor-Leste. Key conclusions of Filmer and Scott (2008) are found to apply to Timor-Leste. A close relationship is found between the ranking of individuals by living standards using asset indices and consumption. It is concluded that asset indices can provide a meaningful ranking of individuals by living standards in Timor-Leste. Although this ranking is different to that provided by consumption, the ranking from asset indices is not necessarily inferior.

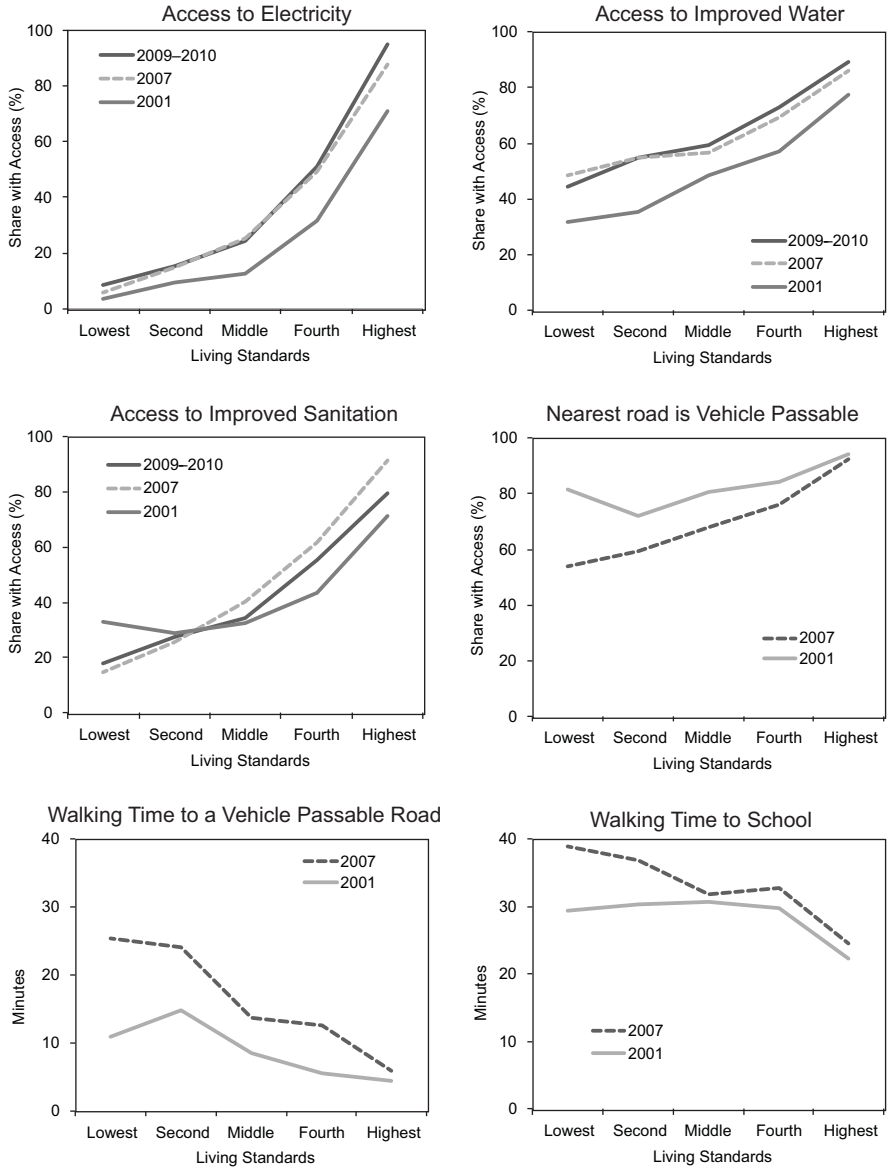
V. FINDINGS

Opportunity curves for infrastructure (access to electricity, improved water, improved sanitation, and transport), education (participation of younger and older children in school), child health (access to vaccinations and Vitamin A), and maternal health (access to skilled attendants at birth and skilled antenatal carers), are shown in Figures 3–6. The figures show how opportunity varies across five groups ranked by living standards, using the asset index as the measure of living standards. Most indicators are derived from the microdata of the 2001 and 2007 LSMs and the 2009–2010 DHS. The earliest data for maternal health are drawn from the 2002 Multiple Indicator Cluster Survey.²⁵

²⁴ The Sensus Fo Fila Fali, which means returning the census to the village, is described at www.dne.mof.gov.tl

²⁵ Sample comparisons found that the results derived from microdata and grouped data were similar. This suggests that the grouped data presented in the DHS reports, which are available for a large number of countries and over a number of time periods, could provide a reasonable first approximation of concentration indexes and the achievement measure. The use of grouped data combined with the wealth index prepared with DHSs would be a simple way to extend the methodology of this study to other countries.

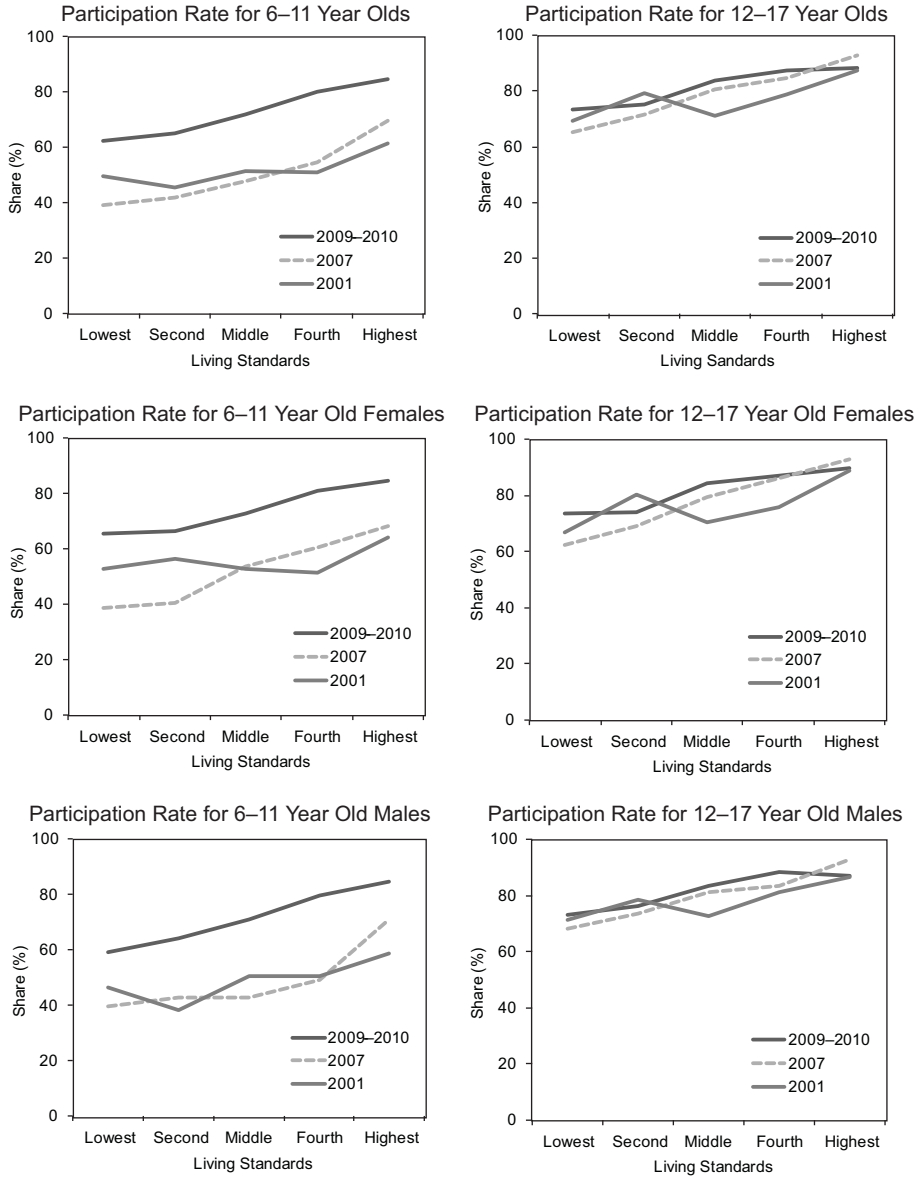
Figure 3: Opportunity Curves for Infrastructure



Note:* Data on transport are not available for 2009-2010.

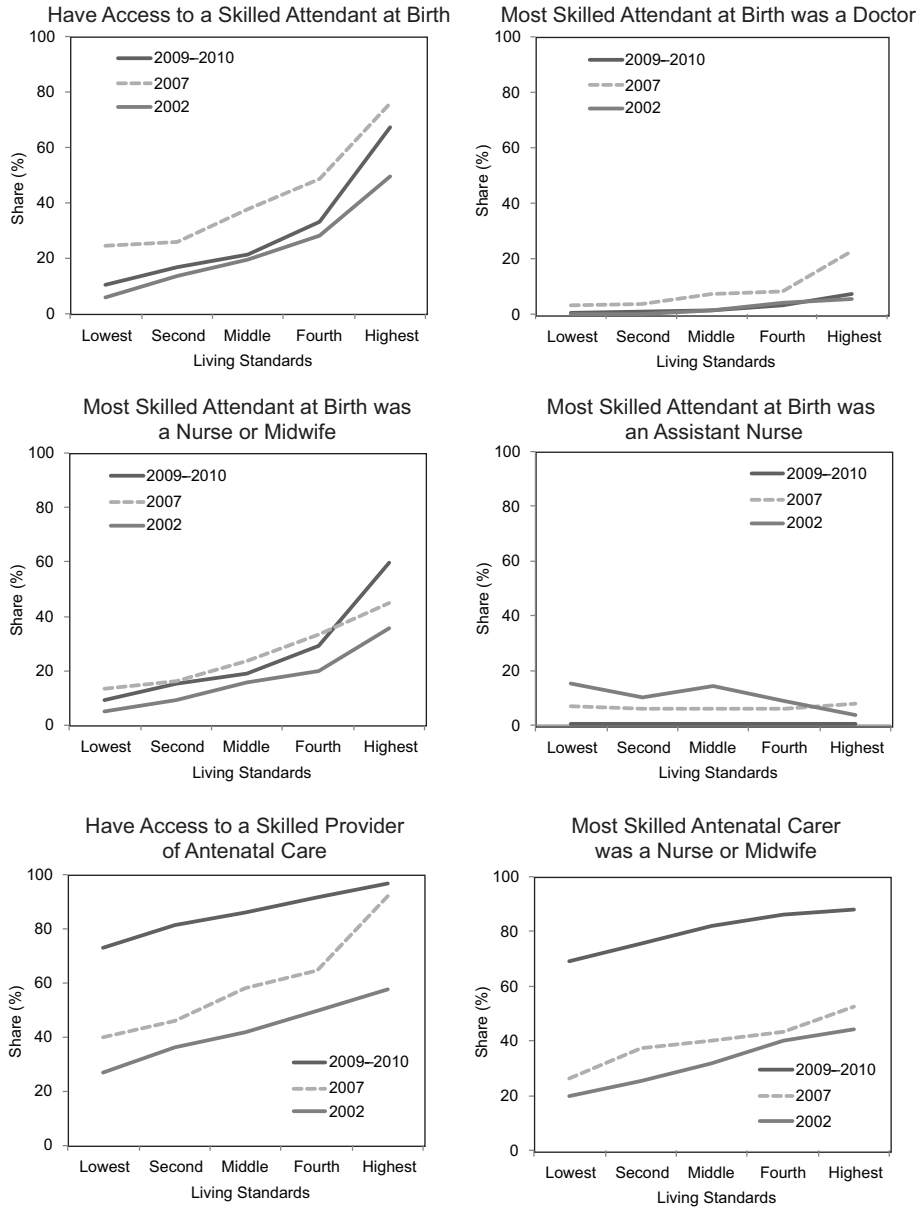
Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009-2010 DHS.

Figure 4: Opportunity Curves for Education



Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMs and the 2009-2010 DHS.

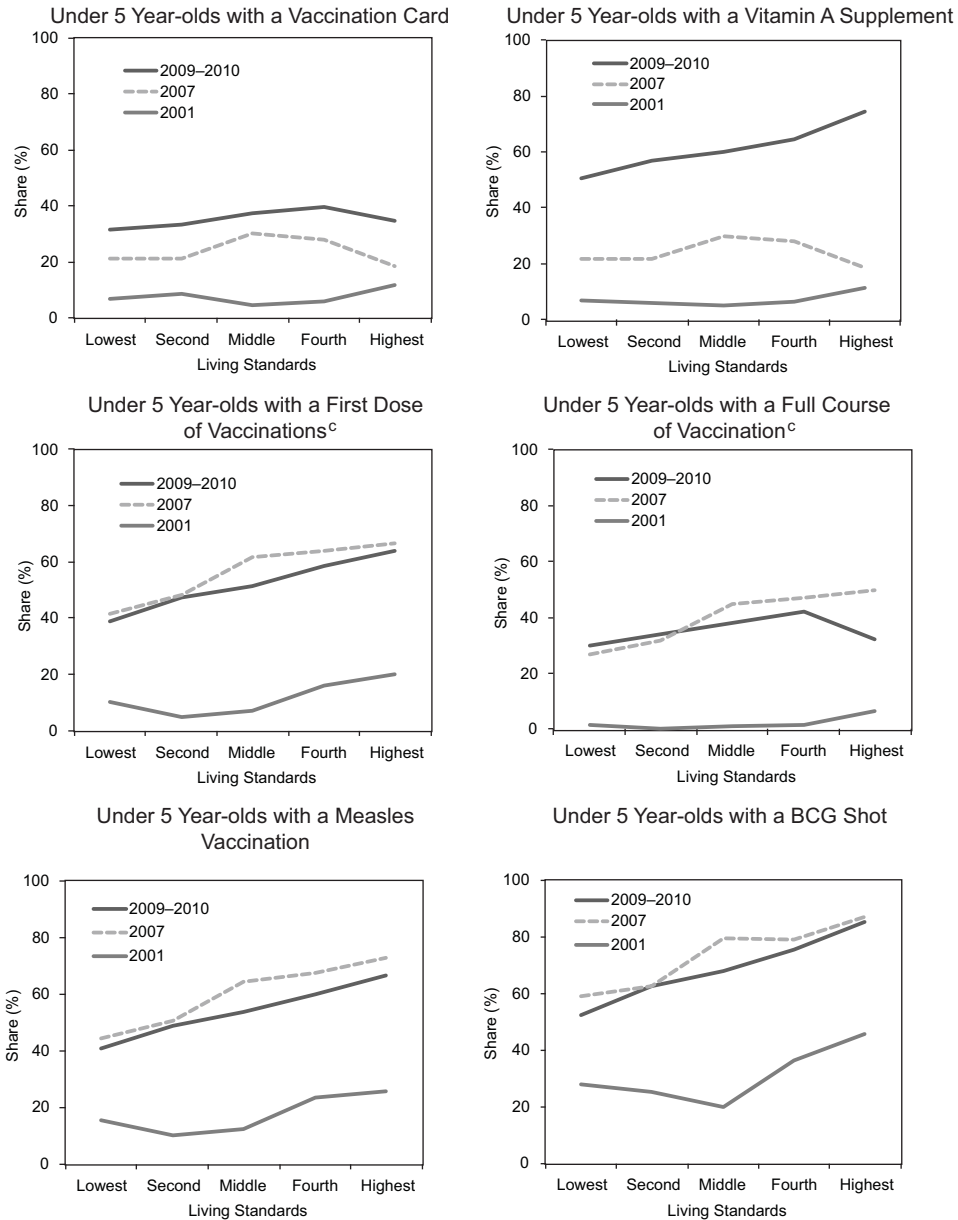
Figure 5: Opportunity Curves for Child Health



a A full course of vaccinations includes BCG, measles and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth).

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009-2010 DHS.

Figure 6: Opportunity Curves for Maternal Health



Notes:

a Data for 2009–2010 cover the most recent birth during the 5 years prior to the survey, data for 2007 covers the most recent birth in the 2 years prior to the survey, while data for 2002 covers births during the prior 12 months.

b Skilled attendant includes doctor, nurse, midwife, and assistant nurse. If the respondent mentioned more than one person during delivery, only the most qualified person is included.

Sources: Author's estimates based on the microdata of the 2007 LSMS, the 2009–2010 DHS and the grouped data of the 2002 Multiple Indicators Cluster Survey.

Two points are evident from the opportunity curves. The first is an expected one; those on higher living standards generally enjoy more opportunity.²⁶ The second is that there has been an expansion in most opportunities at all living standards over the last decade.

The opportunity curves have moved upwards at all living standards for access to electricity and improved water, for participation in school by younger children, and for child health. There has also been improvement, although not as pronounced, in maternal health (after recognizing that the improved access to a nurse or midwife at birth offset a decline in access to the lower skilled assistant nurse).²⁷ The opportunity curves for the participation in school by older children show only a small improvement, but this indicator was already high at the start of the decade. The opportunity curves for access to sanitation suggest little, if any improvement, with the opportunity curve actually higher at lower living standards in the earliest periods. The only opportunity curves to show deterioration at all living standards relate to transport.²⁸

The estimates of the concentration index and achievement measure are summarized at Tables 1 and 2. Almost all concentration indices are positive because opportunity is distributed in favor of those on higher living standards in most cases. The only opportunity of note distributed in favor of those on lower living standards is the availability of assistant nurses at birth in 2009–2010. This, however, more than offset by a distribution of doctors, nurses, or midwives in favor of those on higher living standards.

The concentration indices show that inequality generally declined over the last decade. Data are available for 24 indicators for the 2001/2002 to 2009–2010 period. The concentration index declined—i.e., the distribution changed in favor of those on lower incomes—for 19 of these indicators. Over the last decade, only access to sanitation and road transport show a notable change in favor of those on higher incomes.

²⁶ Note that for the transport indicators showing walking times, lower values are preferred. Hence, an opportunity curve that slopes downward to the right shows a situation where those on lower living standards have less opportunity and are relatively disadvantaged. For ease of exposition, the concentration index for these variables is reversed so that a positive index shows a situation where those on higher living standards are advantaged and vice versa.

²⁷ The 2009–2010 DHS reports a distribution of the share of births in a health facility that is very similar to the distribution of the share of births assisted by a nurse or midwife. There are no earlier data on the place of delivery.

²⁸ Although the latest data for transport are for 2007, the trend deterioration is expected to have continued. Roads are a deteriorating asset. This is pronounced in the high rainfall and young geology of Timor-Leste. Recent analysis of national and the main district roads has shown the downward trend in road quality arising from a shortage of funds for rehabilitation and maintenance (ADB 2011b). This trend is also evident in rural roads.

Table 1: Inequality and Achievement

Opportunity Indicator	Period	Average		Quintile Ratio ^a	Concentration Index ^b	Achievement ^b
		Units	Value			
A. Infrastructure						
1	Access to electricity					
	2009–2010	%	38.9	11.1	0.45	21.6
	2007	%	36.6	15.5	0.45	20.0
	2001	%	25.7	19.4	0.52	12.4
2	Access to improved water					
	2009–2010	%	64.1	2.0	0.14	55.3
	2007	%	63.1	1.8	0.12	55.7
	2001	%	50.1	2.4	0.19	40.7
3	Access to improved sanitation					
	2009–2010	%	42.9	4.4	0.29	30.4
	2007	%	46.8	6.2	0.34	31.0
	2001	%	41.8	2.2	0.19	34.0
4	Nearest road is vehicle passable					
	2009–2010					
	2007	%	70.1	1.7	0.11	62.4
	2001	%	82.7	1.2	0.04	79.5
5	Walking time to a vehicle passable road					
	2009–2010					
	2007	minutes	16.3	0.2	0.26	20.5
	2001	minutes	8.8	0.4	0.21	10.6
6	Walking time to school					
	2009–2010					
	2007	minutes	32.1	0.6	0.09	35.0
	2001	minutes	28.0	0.8	0.05	29.5
B. Education						
1	Participation rate for 6 to 11 year olds					
	2009–2010	%	72.6	1.4	0.07	67.6
	2007	%	51.6	1.8	0.12	43.9
	2001	%	51.4	1.2	0.07	47.8
2	Participation rate for 6 to 11 year old males					
	2009–2010	%	71.7	1.4	0.08	66.2
	2007	%	48.1	1.8	0.11	42.6
	2001	%	48.1	1.3	0.08	44.2
3	Participation rate for 6 to 11 year old females					
	2009–2010	%	73.6	1.3	0.06	69.1
	2007	%	51.6	1.8	0.12	45.2
	2001	%	55.2	1.2	0.05	52.1
4	Participation rate for 12 to 17 year olds					
	2009–2010	%	81.5	1.2	0.04	78.0
	2007	%	79.2	1.4	0.07	73.7
	2001	%	77.0	1.3	0.06	72.6
5	Participation rate for 12 to 17 year old males					
	2009–2010	%	81.4	1.2	0.04	78.1
	2007	%	80.0	1.4	0.06	75.3
	2001	%	77.8	1.4	0.06	73.2
6	Participation rate for 12 to 17 year old females					
	2009–2010	%	81.7	1.2	0.05	77.9
	2007	%	80.0	1.5	0.08	72.0
	2001	%	76.1	1.3	0.06	71.8

C. Maternal health care^c						
1	Have access to a skilled attendant at birth					
	2009–2010	%	29.0	6.4	0.36	18.7
	2007	%	42.0	3.1	0.25	31.5
	2002	%	23.6	8.3	0.41	13.8
2	Most skilled attendant at birth was a doctor					
	2009–2010	%	2.7	10.2	0.47	1.5
	2007	%	8.9	6.8	0.43	5.1
	2002	%	2.3	–	0.50	1.2
3	Most skilled attendant at birth was a nurse or midwife					
	2009–2010	%	25.7	6.4	0.36	16.6
	2007	%	25.9	3.4	0.25	19.4
	2002	%	17.2	7.3	0.37	10.8
4	Most skilled attendant at birth was an assistant nurse					
	2009–2010	%	0.6	0.7	–0.06	0.6
	2007	%	6.8	1.2	0.03	6.6
	2002	%	4.2	0.2	0.27	3.0
5	Have access to a skilled provider of antenatal care					
	2009–2010	%	85.7	1.3	0.05	81.1
	2007	%	59.6	2.3	0.17	49.3
	2002	%	42.5	2.1	0.25	31.9
6	Most skilled antenatal carer was a nurse or midwife					
	2009–2010	%	80.2	1.2	0.05	76.4
	2007	%	39.8	1.5	0.13	34.7
	2002	%	32.4	1.6	0.23	24.9
D. Child health care^c						
1	Under 5 year olds with a vaccination card					
	2009–2010	%	35.3	1.1	0.03	34.4
	2007	%	23.8	0.9	0.00	23.9
	2001	%	7.5	1.7	0.12	6.6
2	Under 5 year olds with a vitamin A supplement					
	2009–2010	%	61.1	1.5	0.07	56.9
	2007	%	24.0	0.9	–0.01	24.2
	2001	%	7.1	1.7	0.16	5.9
3	Under 5 year olds with a first dose of vaccinations ^d					
	2009–2010	%	51.8	1.6	0.09	47.0
	2007	%	56.2	1.6	0.10	50.5
	2001	%	11.5	2.0	0.15	9.7
4	Under 5 year olds with a full course of vaccinations ^d					
	2009–2010	%	32.0	1.1	0.03	34.4
	2007	%	39.9	1.9	0.13	34.6
	2001	%	2.2	4.0	0.37	1.4
5	Under 5 year olds with a BCG shot					
	2009–2010	%	68.5	1.6	0.09	62.3
	2007	%	73.4	1.5	0.08	67.2
	2001	%	30.5	1.5	0.11	27.3
6	Under 5 year olds with a measles vaccination					
	2009–2010	%	53.7	1.6	0.09	48.8
	2007	%	59.8	1.6	0.11	53.5
	2001	%	17.1	1.7	0.09	15.5

a The quintile ratio shows the ratio of the indicator of the richest to the poorest group.

b Derived using private asset index or, where not available, the DHS wealth index.

d Data for 2009–10 cover the most recent birth during the five years prior to the survey, data for 2007 covers the most recent birth in the two years prior to the survey, while data for 2002 covers births during the prior 12 months. Skilled attendant includes doctor, nurse, midwife, and assistant nurse. If the respondent mentioned more than one person during delivery, only the most qualified person is included.

d A full course of vaccinations includes BCG, measles and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth).

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–10 DHS and the grouped data of the 2002 Multiple Indicators Cluster Survey.

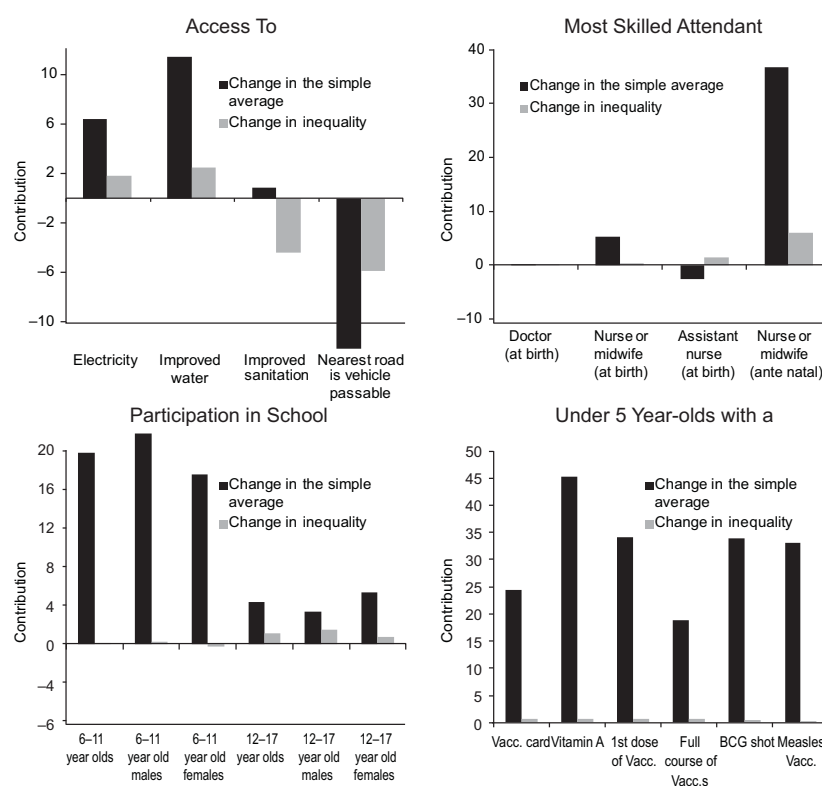
Table 2: The Direction of Change

Direction of Change	Count of Indicators		Share of Indicators (percent)	
	Concentration Index ^a	Achievement ^a	Concentration Index ^a	Achievement ^a
Over the decade				
Improvement	19	19	79	79
Deterioration	5	5	21	21
No change	0	0	0	0
Total	24	24	100	100
From 2001/2002 to 2007				
Improvement	14	17	58	71
Deterioration	10	7	42	29
No change	0	0	0	0
Total	24	24	100	100
From 2007 to 2009–2010				
Improvement	14	11	67	52
Deterioration	7	10	33	48
No change	0	0	0	0
Total	21	21	100	100

a Derived using private asset index or, where not available, the DHS wealth index.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS and the grouped data of the 2002 Multiple Indicators Cluster Survey.

Figure 7: Contribution to the Change in Achievement



Vacc. = vaccination, Vitamin A = Vitamin A supplement.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs, the 2009–2010 DHS and the grouped data of the 2002 Multiple Indicators Cluster Survey (Government of Timor-Leste and United Nation's Children's Fund [2003]).

Achievement has generally increased over the last decade. There was an increase in the achievement measures for 19 of the 24 indicators. The only achievement measures to have deteriorated over the last decade were for access to improved sanitation and road transport.²⁹

The improvement in achievement is primarily a result of the general expansion in coverage (as shown by an increase in the simple average) rather than the decline in inequality. This is illustrated in Figure 7, which shows the contribution to the change in the achievement measure based on equation 9. It would take a large re-weighting in favor of those on lower living standards (i.e., a large increase in the parameter ν) for the decline in inequity to dominate the improvement in the simple average.

The widespread decline in inequality in opportunity as the economy has developed is expected *a priori*. When service coverage is low, delivery is normally concentrated in the larger population centers, where living standards are relatively high because of the presence of government employment and the formal private sector. This leads to the distribution of opportunity typically favoring those on higher living standards at the early stages of development. As the coverage of services rises, opportunity is shared with those on lower living standards and this reduces inequality.³⁰ Hence, the expansion in overall opportunity achieved as an economy develops is very likely to go hand-in-hand with declining inequality. A trend decline in inequality is, however, not assured, with the Timor-Leste experience displaying a number of cases of rising inequality even as service coverage has expanded.

Turning to the changes within the last decade, the estimates show mixed progress across the sectors. For example, there were no gains in the education of younger children before 2007 but strong gains after 2007, and the gains in education of older children were concentrated in the post-2007 period. In relation to maternal health care, there were good gains prior to 2007 in access to skilled attendants at birth and then slippage, but good progress throughout the decade in providing access to antenatal care. Turning to child health care, most of the gains were recorded prior to 2007, and some slippage after 2007. The only notable improvements in infrastructure were recorded prior to 2007, and only for electricity and access to improved water. Other infrastructure deteriorated. Thus it has been a case of sector specific success, rather than one of broad-based improvement on a wide front. This suggests that sector policies and programs have more important than general, uplifting drivers of inclusiveness (e.g., the post-2006 peace dividend, the aggregate increase in government expenditure).

A limitation of the achievement measure is it lacks a natural aggregation. This precludes calculation of a single number that can show if growth has been inclusive or not. Any attempt to weigh up of the improvements in some areas against the decline in others is open to debate. But, the general improvement with a deterioration limited to some areas of infrastructure is seen as good ground for concluding that growth was inclusive over the last decade. The finding of inclusive growth is the main finding of the study. There are nonetheless important shortcomings

²⁹ Note that for the transport indicators showing walking times, an increase in the achievement measure is a deterioration.

³⁰ This observation that inequality in opportunity is likely to trend down as an economy develops applies to effort-light opportunities and not necessarily effort-heavy variables such as income. Once an effort-light opportunity such as a basic service has been provided to a better off person, they cannot be provided more. In which case, an expansion in coverage will benefit a less well-off person and reduce inequality. This gives rise to the likelihood of a trend decline. But consider an effort-heavy variable such as income. As the income of a better-off person can rise indefinitely, the overall increase in income that occurs as an economy develops can readily increase income inequality.

in the pattern of growth, with achievement deteriorating and inequality rising in some periods for some indicators.

Infrastructure is a priority area of need. Across the sectors, performance has been weakest in infrastructure, and poor quality infrastructure threatens to become a binding constraint to development that will undermine progress in other sectors. For example, recent projections for national roads suggest that by the end of the decade most would only be usable by four-wheel drives, on a business-as-usual case (ADB 2011b). Such deterioration in road quality would have a debilitating effect on development across all sectors. A national electrification program is now beginning to address the gaps in electricity supply, and momentum is building in road transport, for both major and rural roads. Such success would need to be sustained, and extended to the poorly performing water and sanitation sector, to make up for the weak progress over the last decade.

VI. OBSERVATIONS AND SUGGESTIONS

The study has demonstrated an approach to measuring the inclusiveness of economic growth. This is made possible by the achievement measure, which combines changes in the average opportunity and the distribution of opportunity. The weighting given to distributional issues is explicit and transparent. The approach can be implemented with different measures of living standards, including estimates of consumption or asset indices. The key challenges faced in using the approach arise from the definition of opportunity and in aggregating opportunity to form an overall view on inclusiveness.

The application to Timor-Leste has found that inclusive economic growth was achieved over the last decade. Broad trends of declining inequality in opportunity and increased availability of opportunity are identified. That is, opportunity generally increased across all living standard groups, including the poorest.

The finding of inclusive growth overall is driven by improvements in education and health care. Performance was weakest in infrastructure; inequality is high for some services, and only small gains were achieved in access to electricity, while access to transport and improved sanitation deteriorated.

If Timor-Leste's growth is to remain inclusive, it will be important to maintain the upward movement in average opportunity and the decline in inequality. This could be achieved by prioritizing (i) support for the poorest Timorese, and (ii) improvements in the weakly performing sectors (i.e., sectors where inequality is high and gains in access are slow).³¹

One reason for focusing on equality in opportunity is the likely alignment with society's underlying preferences.³² Achieving such an alignment is political economy smart as it will make the acceptance of policies that address inequality more likely. Anecdotal evidence suggests that within Timor-Leste, development is equated with access to basic services. On this basis, Timorese society and the political system are more likely to support policies that pursue equality of opportunity than alternatives, such as pursuing equality in incomes.

³¹ Suggestions on how Timor-Leste can maintain a high rate of economic growth are provided in ADB (2011c).

³² A similar point is made in Ferreira and Gignoux (2008), with reference to associated literature.

The inclusive growth agenda can be summarized as follows. The government cannot ensure equality in living standards. But there are good reasons for equalizing the provision of the most basic opportunities across society. Most fundamentally, access to basic health, education, and infrastructure services is a human right. This aspiration is yet to be achieved, but can be put into practice by adopting minimum standards of service delivery. Such standards would provide a safeguard for the poorest Timorese, and put into practice the aspiration of the Timor-Leste Strategic Development Plan 2011–2030 of sustainable, inclusive development. Improving the opportunity of those with the least would reduce inequality and ultimately equalize the distribution of opportunity.

ANNEX A: DEVELOPMENT INDICATORS

Table A1: Economy-wide Indicators

Description	Indicator by Year and Source of Estimate								
	2001 SS	2001 LSMS	2002 MICS	2003 DHS	2004 Census	2007 LSMS	2009– 2010 DHS	2010 LFS	2010 Census
Basic Opportunities									
Primary school gross enrollment rate (%)		113.0				96.2	100.2		104.6
Secondary school gross enrollment rate (%)		38.0				53.3	69.1		61.1
Primary school net enrollment rate (%)		65.1	75.3			65.6	71.1		70.6
Secondary school net enrollment rate (%) ^a		13.6				23.3	45.2		20.0
Births attended by skilled health personnel (%)			23.6			41.3	29.9		33.5
Antenatal coverage of at least one visit (%)			42.5			80.4	86.0		
Children 12–23 months fully immunized (%)			4.8	18.0		27.0	53.0		
Population with access to electricity (%)	30.2	25.6				36.6	38.9		36.7
Population with access to improved water (%)	43.7	50.1	56.2			63.1	64.0		65.9
Population with access to basic sanitation (%)		41.2	22.9			46.8	43.0		49.6
Other Indicators									
Adult literacy (% of population 18/15 years and older, est.) ^b		37.6				50.6			53.4
Employees in vulnerable employment (%)		85.7			80.6	86.3		69.9	68.4
Agriculture, forestry and fishing share of employment (%)		81.6				84.3		51.3	65.3
Unemployment rate (%, population 15–64 years)									
– including discouraged workers						8.5		3.6	9.8
– excluding discouraged workers		5.3				1.7	6.7		
Infant mortality rate (per 1,000 live births)			88.0	60.0			45.0		
Under-5 mortality rate (/per 1,000 live births)			125.0	83.0			64.0		
Child stunting (% with low height-for-age) ^c			47.0	49.4			53.0		
Children wasted (% with low weight-for-height) ^c			12.0	12.4			17.0		
Children underweight (% with low weight-for-age) ^c			53.0	45.8			52.0		
Child stunting (% with low height-for-age) ^d						53.9	58.1		
Children wasted (% with low weight-for-height) ^d						24.5	18.6		
Children underweight (% with low weight-for-age) ^d						48.6	44.7		
Contraceptive prevalence rate (%)		7.3	6.7	10.0		19.8	22.3		
Maternal mortality (per 100,000 live births)							557.0		
Life expectancy at birth (years)					59.0	57.0			62.0
Population below the national poverty line (%)		36.0				49.9	41.0		
Gini coefficient		0.36				0.28			

Census = census of population and housing, DHS = demographic and health survey, LFS = labor force survey, LSMS = living standards measurement survey, MICS = multiple indicator cluster survey, SS = suco survey.

- a Data from the 2010 Census are the weighted average for lower secondary and 'secondary, where the later has a broader meaning than in other sources as it includes enrolment in technical education.
- b Data for 2001 and 1007 are for the population 18 years and older. Data for 2010 are for the population 15 years and older.
- c Based on NCHS/CDC/World Health Organization Standards. Children below 2 standard deviations reported, for children below 5 years.
- d Based on World Health Organization Child Growth Standards. Children below 2 standard deviations reported, for children below 5 years.

Sources: National Statistics Directorate and United Nations Population Fund (2011), Secretariat of State for Vocational Training and Employment and National Statistics Directorate (2011), Government of Timor-Leste (2010), National Statistics Directorate (2006, 2010), World Bank (2010), Ministry of Finance and World Bank (2008a,b), Government of Timor-Leste and United Nations Children's Fund (2002), and East Timor Transitional Administration et al. (2001).

Table A.2: Indicators of the Gender and Urban–rural Balance

Description	Indicator by year and source of estimate						
	2001 LSMS	2002 MICS	2004 Census	2007 LSMS	2009– 2010 DHS	2010 LFS	2010 Census
Urban to Rural Ratio							
Basic Opportunities							
Births attended by skilled health personnel (%)	–	2.8	–	2.0	2.9	–	–
Antenatal coverage of at least one visit (%)	–	1.4	–	1.1	1.1	–	–
Children 12–23 months fully immunized (%)	–	88.0	–	–	88.2	–	–
Population with access to electricity (%)	6.5	–	–	4.1	3.4	–	4.6
Population with access to improved water (%)	1.6	1.5	–	1.5	1.6	–	1.6
Population with access to basic sanitation (%)	2.1	4.4	–	2.3	1.8	–	2.5
Other Indicators							
Employees in vulnerable employment (%)	–	–	–	0.6	–	–	–
Agriculture, forestry and fishing share of employment (%)	–	–	–	0.5	–	–	–
Unemployment rate (%)	–	–	–	–	–	–	–
– including discouraged workers	–	–	–	–	–	3.1	2.4
– excluding discouraged workers	3.9	–	–	2.5	–	–	–
Infant mortality rate (per 1,000 live births)	–	0.7	–	–	0.7	–	–
Under-5 mortality rate (per 1,000 live births)	–	0.7	–	–	0.7	–	–
Contraceptive prevalence rate (%)	–	1.3	–	1.8	–	–	–
Population below poverty line (%)	0.6	–	–	0.9	–	–	–
Gini coefficient	1.2	–	–	1.1	–	–	–
Female-to-male ratio							
Basic Opportunities							
Primary school gross enrollment rate (%)	–	–	–	–	0.99	–	0.98
Secondary school gross enrollment rate (%)	–	–	–	–	1.02	–	0.91
Primary school net enrollment rate (%)	1.11	0.98	–	–	1.03	–	1.02
Secondary school net enrollment rate (%) ^a	1.25	–	–	–	1.10	–	1.21
Other Indicators							
Employees in vulnerable employment (%)	0.99	–	–	1.13	–	–	–
Agriculture, forestry and fishing share of employment (%)	0.98	–	–	0.94	–	–	–
Unemployment rate (%)	–	–	–	–	–	–	–
– including discouraged workers	–	–	0.69	–	–	1.48	1.20
– excluding discouraged workers	1.48	–	0.57	1.80	–	–	–

Census = census of population and housing, DHS = demographic and health survey, LFS = labor force survey, LSMS = living standards measurement survey, MICS = multiple indicator cluster survey.

^a Data from the 2010 Census are the weighted average for lower secondary and secondary. In the source, secondary is has a broader meaning that in other sources as it includes enrolment in technical education.

Sources: National Statistics Directorate and United Nations Population Fund (2011), Secretariat of State for Vocational Training and Employment and National Statistics Directorate (2011), Government of Timor-Leste (2010), National Statistics Directorate (2006, 2010), World Bank (2010), Ministry of Finance and World Bank (2008a, b), Government of Timor-Leste and United Nations Childrens' Fund (2002).

ANNEX B: ASSET INDICES

The preparation of the asset indices used in the study draws heavily on Filmer and Pritchett (2001), Rutstein and Johnson (2004), and Filmer and Scott (2008).

The assets recorded by the 2001 and 2007 living standard measurement surveys (LSMSs) and the 2009–2010 demographic and health survey (DHS) used in preparing the indices are listed at Table B.1.³³ A total of 41 assets are drawn from the 2001 LSMS, 36 from the 2007 LSMS and 28 from the 2009–2010 DHS. Following normal practice, the housing asset is separated into its components of a roof, floor, and wall. The long list reduces the potential for bunching, which occurs when asset holdings are similar across the population and cannot distinguish between those on different living standards.

Indices are prepared using principal components and two alternatives, a share weighted average and a count index. The principal components method is applied to the full list of indicators, the list exclusive of housing indicators, and the list exclusive of electricity, water, and sanitation.³⁴ This third index is termed the private asset index, which avoids mixing indicators of opportunity with effort-based indicators. The share-weighted index is a sum of the number of assets weighted by the share of the population that does not own the asset. The count index is a simple sum of the number of assets owned. The share-weighted index and count index use the full list of indicators.

Principal components is applied by first standardizing the indicator values by calculating z-scores (i.e., the difference from the mean value is divided by the standard deviation). The factor coefficient scores (factor loadings) are then calculated, and the indicator values are multiplied by the loadings for the first of the factors. This is summed to produce the index value. This index value is a standardized score with a mean of zero and a standard deviation of one.

³³ The DHSs use the term wealth indices, on the basis the indicators used in preparing the indices explain the underlying unobserved variable, wealth (Rutstein and Johnson [2004] p4). This study follows Filmer and Scott (2008) and uses the term asset indices.

³⁴ The index exclusive of housing characteristics is prepared to allow comparisons with the assets index presented in Filmer and Scott (2008).

Table B.1: List of Assets

2001	2007	2009–2010
Main source of lighting	Availability of electricity	Availability of electricity
Hours of electricity available	Availability of improved water	Availability of improved water
Main source of water for drinking	Availability of improved sanitation	Availability of improved sanitation
Main source of water for bathing and washing	Material of house walls	Material of house walls
Type of toilet	Material of house roof	Material of house roof
Location of bathing	Material of house floor	Material of house floor
Material of house walls	Rooms per person	Rooms used for sleeping per person
Material of house roof	Car or truck	Car or truck
Material of house floor	Motorcycles or scooter	Motorcycle
Rooms occupied per person	Bicycle	Bicycle
Area of the dwelling	Stove	Animal drawn cart
Time living in dwelling	Refrigerator	Refrigerator
Damaged house	Television	Television
Cars or truck	Radio	Radio
Motorcycle	Mobile phone	Mobile phone
Bicycle	Personal computer	Watch
Refrigerator	Electric rice cooker	Boat with motor
Television	Water dispenser	Hectares of agricultural land
Radio	Mosquito net	Own agricultural land
Personal computer	Washing machine	Buffalos per person
Electric rice cooker	Sewing or knitting machine	Cows per person
Sewing or knitting machine	Cupboard for clothes	Horses per person
Motor boat	Buffet	Donkeys per person
Boat without a motor	Fan	Pigs per person
Tractor	Video player	Goats per person
Motorized thresher	Tape or compact disc player	Sheep per person
Rice or corn mill	Camera or video camera	Chickens per person
Own agricultural land	Generator	Ducks per person
Buffalos per person	Motor boat	
Cows per person	Boat without a motor	
Horses per person	Own agricultural land	
Donkeys per person	Buffalos per person	
Pigs per person	Cows per person	
Goats per person	Horses per person	
Sheep per person	Donkeys per person	
Chickens per person	Pigs per person	
Ducks per person	Goats per person	
	Sheep per person	
	Chickens per person	
	Ducks per person	

DHS = demographic and health survey, LSMS = living standard measurement survey.

Sources: 2001 and 2007 LSMSs, and the 2009–2010 DHS.

Kolenikov and Angeles (2009) found that ordinal variables perform better than the binary variables used by Filmer and Pritchett (2001) and many subsequent studies. They also found that a ‘naive’ ordinal coding that records a value of 1 to the lowest standard of asset with higher values given to higher standards in steps of 1, performed adequately in comparison to more computationally intensive alternatives. Consideration was given to applying such a naive ordinal coding. Under this approach, in recording a value for roofing material, a roof of unspecified material could be recorded as 1, a roof of leaves recorded as 2, a roof of sugar palm fiber is recorded as 3, and so on with the maximum value recorded for houses with a concrete roof. The alternative binary approach would be to record a value of 0 for low quality roofing material, and

to record a value of 1 for higher standard roofing material. The results were, however, not obviously superior, and the binary variable approach was used in most instances.

Income groups are derived from each index based on rank. Five groups are defined in ascending order of living standards: the lowest, second, the middle, fourth, and the highest.

The results are assessed by including Timor-Leste in the international comparisons of Filmer and Scott (2008). Key results are presented at Tables B.2 to B.4. These tables draw on asset indices, and indices of living standards prepared using per capita household consumption and predicated household per capita consumption (prepared using an ordinary least squares regression).

Table B.2 reports the rank correlation coefficient of these indices with the index prepared using per capita household consumption, and the rank correlation coefficient with the asset index prepared using principal components with the full list of indicators. Table B.3 shows the share of the lowest living standards group as defined by each index that overlaps with the lowest group as defined by the indices prepared using per capita household consumption and principal components with the full list of indicators. Tables B.4 broadens this comparison to show the overlap with the lowest and the second living standard groups combined.

The strength of the relationship between the asset indices and per capita household consumption is below average for Timor-Leste in comparison to the 12 other countries. The key results are those showing the relationship between the indices prepared using per capita household consumption and principal components with the full list of indicators. In most cases, the rank correlation coefficients and extent of overlap are the lowest among the 13 surveys for the Timor-Leste data for 2001. The rank correlation coefficients and extent of overlap are relatively higher for the Timor-Leste data for 2007, in most cases being higher than the results for Ghana, Nepal, Papua New Guinea, and Zambia.

Table B.2: Rank Correlation Coefficients between Welfare Indices Across Households

	Per Capita HH Expenditure (1)	Predicted per Capita HH Expenditure (2)	PC Index, All Indicators (3)	PC Index, Assets Only (4)	IRT Index (5)	Share Weighted Average (6)	Count Index (7)	Per Capita Value of Durable Goods (8)	PC Index, Private Assets Only (9)
Correlation with ranking by per capita household expenditures									
Albania	1.00	0.64	0.47	0.45	0.45	0.45	0.44	0.63	–
Brazil	1.00	0.84	0.72	0.71	0.72	0.68	0.68	–	–
Ghana	1.00	0.47	0.43	0.37	0.44	0.30	0.34	0.33	–
Nepal	1.00	0.60	0.48	0.41	0.43	0.42	0.44	0.53	–
Nicaragua	1.00	0.77	0.71	0.67	0.69	0.64	0.66	0.71	–
Panama	1.00	0.79	0.70	0.67	0.68	0.65	0.66	0.65	–
Papua New Guinea	1.00	0.57	0.47	0.46	0.47	0.48	0.49	0.53	–
South Africa	1.00	0.79	0.67	0.60	0.66	0.59	0.58	–	–
Uganda	1.00	0.68	0.55	0.39	0.53	0.45	0.41	–	–
Viet Nam	1.00	0.71	0.61	0.62	0.59	0.61	0.59	0.62	–
Zambia	1.00	0.42	0.39	0.37	0.38	0.40	0.40	0.53	–
Timor-Leste (2001)	1.00	0.53	0.36	0.18	–	0.32	0.29	–	0.37
Timor-Leste (2007)	1.00	0.68	0.50	0.39	–	0.43	0.40	–	0.48
Average	1.00	0.65	0.54	0.48	–	0.49	0.49	–	–
– excluding Timor-Leste	1.00	0.66	0.56	0.52	0.55	0.52	0.52	0.57	–
Correlation with ranking by principal components index which uses all indicators									
Albania	0.47	0.81	1.00	0.95	0.99	0.94	0.96	0.73	–
Brazil	0.72	0.85	1.00	0.99	0.99	0.97	0.99	–	–
Ghana	0.43	0.89	1.00	0.89	0.98	0.79	0.86	0.44	–
Nepal	0.48	0.86	1.00	0.81	0.95	0.96	0.94	0.58	–
Nicaragua	0.71	0.94	1.00	0.96	0.99	0.88	0.93	0.82	–
Panama	0.70	0.90	1.00	0.98	1.00	0.95	0.97	0.70	–
Papua New Guinea	0.47	0.77	1.00	0.92	0.96	0.92	0.88	0.73	–
South Africa	0.67	0.84	1.00	0.93	0.98	0.93	0.93	–	–
Uganda	0.55	0.86	1.00	0.76	0.96	0.87	0.80	–	–
Viet Nam	0.61	0.84	1.00	0.89	1.00	0.97	0.98	0.73	–
Zambia	0.39	0.92	1.00	0.89	0.95	0.96	0.95	0.74	–
Timor-Leste (2001)	0.36	0.43	1.00	0.70	–	0.84	0.77	–	0.97
Timor-Leste (2007)	0.50	0.69	1.00	0.76	–	0.92	0.89	–	0.97
Average	0.54	0.81	1.00	0.88	–	0.91	0.91	–	0.97
– excluding Timor-Leste	0.56	0.86	1.00	0.91	0.98	0.92	0.93	0.68	–

– = no available data, HH = household, IRT = item response theory, PC = principal components.

a Blank entry indicates that data are not available.

b Cross-country averages are unweighted.

Sources: Filmer and Scott (2008) and author's estimates based on the microdata of the 2001 and 2007 LSMSs.

Table B.3: Rank Overlap in the Classification in the Poorest Quintiles

	Per Capita HH Expenditure (1)	Predicted per Capita HH Expenditure (2)	PC Index, All Indicators (3)	PC Index, Assets Only (4)	IRT Index (5)	Share Weighted Average (6)	Count Index (7)	Per Capita Value of Durable Goods (8)	PC Index, Private Assets Only (9)
Proportion of the population classified in the poorest 20% by per capita household expenditures who are in the poorest 20									
Albania	1.00	0.47	0.42	0.41	0.41	0.37	0.38	0.47	–
Brazil	1.00	0.68	0.64	0.62	0.63	0.57	0.63	–	–
Ghana	1.00	0.37	0.42	0.39	0.40	0.33	0.38	0.32	–
Nepal	1.00	0.36	0.34	0.32	0.30	0.32	0.30	0.35	–
Nicaragua	1.00	0.56	0.51	0.46	0.50	0.48	0.49	0.52	–
Panama	1.00	0.72	0.71	0.69	0.70	0.65	0.70	0.65	–
Papua New Guinea	1.00	0.36	0.34	0.27	0.32	0.32	0.33	0.34	–
South Africa	1.00	0.48	0.43	0.38	0.43	0.43	0.42	–	–
Uganda	1.00	0.52	0.48	0.43	0.51	0.47	0.48	–	–
Viet Nam	1.00	0.54	0.49	0.50	0.47	0.49	0.48	0.49	–
Zambia	1.00	0.42	0.40	0.40	0.40	0.41	0.42	0.40	–
Timor-Leste (2001)	1.00	0.38	0.30	0.11	–	0.31	0.28	–	0.30
Timor-Leste (2007)	1.00	0.43	0.40	0.40	–	0.33	0.33	–	0.38
Average	1.00	0.48	0.45	0.41	–	0.42	0.43	–	0.34
– excluding Timor-Leste	1.00	0.50	0.47	0.44	0.46	0.44	0.46	0.44	–
Proportion of the population classified in the poorest 20% by the principal components index using all indicators who are in the poorest 20% according to other welfare indices									
Albania	0.42	0.74	1.00	0.83	0.91	0.70	0.83	0.68	–
Brazil	0.64	0.82	1.00	0.93	0.96	0.81	0.93	–	–
Ghana	0.42	0.71	1.00	0.68	0.78	0.38	0.50	0.26	–
Nepal	0.34	0.71	1.00	0.58	0.81	0.86	0.81	0.46	–
Nicaragua	0.51	0.81	1.00	0.80	0.85	0.50	0.63	0.53	–
Panama	0.71	0.91	1.00	0.87	0.96	0.81	0.88	0.72	–
Papua New Guinea	0.33	0.46	1.00	0.77	0.61	0.39	0.38	0.24	–
South Africa	0.44	0.54	1.00	0.57	0.85	0.73	0.66	–	–
Uganda	0.48	0.74	1.00	0.66	0.85	0.78	0.72	–	–
Viet Nam	0.49	0.67	1.00	0.71	0.95	0.84	0.88	0.63	–
Zambia	0.40	0.77	1.00	0.76	0.80	0.79	0.80	0.62	–
Timor-Leste (2001)	0.30	0.16	1.00	0.38	–	0.50	0.33	–	0.79
Timor-Leste (2007)	0.41	0.46	1.00	0.50	–	0.68	0.65	–	0.82
Average	0.45	0.65	1.00	0.70	–	0.67	0.69	–	0.80
– excluding Timor-Leste	0.47	0.72	1.00	0.74	0.85	0.69	0.73	0.52	–

– = no available data, HH = household, IRT = item response theory, LSMS = living standard measurement survey, PC = principal components.

a Blank entry indicates that data are not available.

b Cross-country averages are unweighted.

Sources: Filmer and Scott (2008) and author's estimates based on the microdata of the 2001 and 2007 LSMSs.

Table B.4: Overlap in the Classification in the Poorest Quintile by One Measure and the Poorest Two Quintiles by Another

	Per Capita HH Expenditure (1)	Predicted per Capita HH Expenditure (2)	PC Index, All Indicators (3)	PC Index, Assets Only (4)	IRT Index (5)	Share Weighted Average (6)	Count Index (7)	Per Capita Value of Durable Goods (8)	PC Index, Private Assets Only (9)
Proportion of the population classified in the poorest 20% by per capita household expenditures who are in the poorest 40% according to other welfare indices									
Albania	1.00	0.73	0.68	0.68	0.68	0.65	0.66	0.78	–
Brazil	1.00	0.93	0.90	0.90	0.90	0.87	0.88	–	–
Ghana	1.00	0.65	0.69	0.65	0.69	0.63	0.64	0.61	–
Nepal	1.00	0.63	0.59	0.60	0.50	0.55	0.54	0.65	–
Nicaragua	1.00	0.88	0.87	0.84	0.86	0.80	0.82	0.86	–
Panama	1.00	0.93	0.91	0.91	0.92	0.90	0.90	0.89	–
Papua New Guinea	1.00	0.63	0.65	0.64	0.65	0.65	0.68	0.63	–
South Africa	1.00	0.79	0.76	0.74	0.77	0.75	0.75	–	–
Uganda	1.00	0.78	0.73	0.69	0.75	0.73	0.72	–	–
Viet Nam	1.00	0.81	0.77	0.79	0.75	0.76	0.75	0.78	–
Zambia	1.00	0.73	0.71	0.68	0.70	0.72	0.72	0.70	–
Timor-Leste (2001)	1.00	0.66	0.56	0.36	–	0.54	0.58	–	0.54
Timor-Leste (2007)	1.00	0.76	0.67	0.65	–	0.61	0.72	–	0.66
Average	1.00	0.76	0.73	0.70	–	0.70	0.72	–	0.60
– excluding Timor-Leste	1.00	0.77	0.75	0.74	0.74	0.73	0.73	0.54	–
Proportion of the population classified in the poorest 20% by the principal components index using all indicators who are in the poorest 40% according to other welfare indices									
Albania	0.68	0.95	1.00	1.00	1.00	0.95	1.00	0.91	–
Brazil	0.88	0.97	1.00	1.00	1.00	0.99	1.00	–	–
Ghana	0.66	0.97	1.00	0.94	1.00	0.72	0.83	0.50	–
Nepal	0.60	0.92	1.00	0.90	1.00	1.00	0.97	0.70	–
Nicaragua	0.79	0.99	1.00	1.00	1.00	0.91	0.96	0.87	–
Panama	0.91	0.99	1.00	1.00	1.00	0.99	1.00	0.93	–
Papua New Guinea	0.60	0.88	1.00	0.96	1.00	0.97	0.96	0.87	–
South Africa	0.71	0.87	1.00	0.99	1.00	0.95	1.00	–	–
Uganda	0.71	0.94	1.00	0.97	1.00	0.96	0.99	–	–
Viet Nam	0.73	0.91	1.00	1.00	1.00	0.99	1.00	0.89	–
Zambia	0.65	1.00	1.00	0.99	1.00	1.00	1.00	0.87	–
Timor-Leste (2001)	0.58	0.42	1.00	0.64	–	0.81	0.72	–	1.00
Timor-Leste (2007)	0.86	0.77	1.00	0.86	–	0.93	1.00	–	1.00
Average	0.72	0.89	1.00	0.94	–	0.94	0.96	–	1.00
– excluding Timor-Leste	0.72	0.94	1.00	0.98	1.00	0.95	0.97	0.59	–

HH = household, IRT = item response theory, LSMS = living standard measurement survey, PC = principal components.

- a Blank entry indicates that data are not available.
b Cross-country averages are unweighted.

Sources: Filmer and Scott (2008) and author's estimates based on the microdata of the 2001 and 2007 LSMSs.

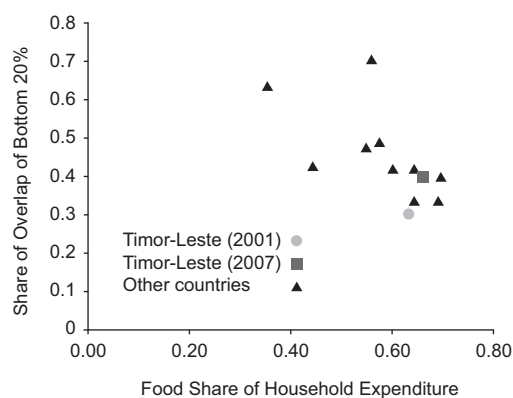
The weaker relationship for the Timor-Leste data for 2001 is expected given a low asset ownership recorded in the data. In contrast, the 2007 data show a much higher share of the population as owning assets and ownership of a broader range of assets. This provides a finer distinction between households at different living standards. This finer distinction probably produces the stronger relationship between the asset indices and per capita household consumption in the 2007 data.

The low asset ownership in 2001 can be partly attributed to the violence of late 1999, and the events leading up to and following the violence. There was extensive dislocation of the population and property damage during 1999. Asset ownership suffered a further setback during the harsh living conditions in 2000 and 2001, and as people re-established themselves in traditional area they had been forced to leave after 1975. The finding that the asset index has a weaker relationship with the per capital expenditure index accords with the observation of Filmer and Scott (2008) that the rankings yielded by expenditure and asset indices are likely to differ substantially in settings with large transitory shocks.

The weaker relationship between the asset indices and per capita household consumption for Timor-Leste also appears to be partly explained by a higher share of food in household expenditure. At higher food shares, less expenditure is available for asset accumulation, and the relevance of assets as a predictor of total consumption is likely to be lower. This point is evident in the results of Filmer and Scott (2008), who found that asset indices are more closely related to non-food expenditures than to food expenditures. Figure B.1 illustrates the point by showing the negative relationship in the countries studied between the share of expenditure allocated to food and the overlap between the asset and per capita consumption indices.

For Timor-Leste, considerable overlap is evident between the group on the lowest living standard by the indices prepared using principal components with all indicators and per capita expenditure. Most of the lowest group identified by an index can be found in the bottom two living standards groups of the other index. But this still leaves a significant share of the lowest group identified by one index distributed among the higher living standard groups. Thus, the asset index prepared using principal components with all indicators and the per capita expenditure index identify a different group of people as having the lowest living standards. A similar finding is reported by Filmer and Scott (2008) for the 11 countries of their study.

One way to explore the relevance of the indices of living standards is to compare them with alternative measures of development outcomes. Table B.5 shows the rank correlation coefficient of the indices with measures of malnutrition: weight-for-age; height-for-age (or stunting), which is indicative of long-term inadequacies in health or nutrition; and weight-for-height, which is closely linked with poverty. Table B.6 shows the rank correlation coefficient of the indices with household self-evaluations of different dimensions of their living standards. The relationship between the per capita consumption index and the alternative measures of development outcomes is not obviously superior to the relationship to the asset indices prepared with principal components. The 2007 data are suggestive of a clearer relationship between the household's self evaluation of living standards in 2007 and asset indices than with per capita consumption.

Figure B.1: Food Expenditure and Asset and Consumption Overlap

a The share of overlap of the bottom 20% shows the proportion of the population classified in the poorest 20% by per capita household expenditures who are in the poorest 20% based on the principal components asset index using all indicators

Sources: Filmer and Scott (2008), Ministry of Finance and World Bank (2008b), World Bank (2003), and author's estimates based on the microdata of the 2001 and 2007 LSMSs.

Table B.5: Correlation with Malnutrition in 2007

Variables	Per Capita Expenditure	Predicted per Capita Expenditure	PC Index, All Indicators	PC Index, Assets Only	Share Weighted Average	Count Index	PC Index, Private Assets Only
Rank correlation coefficient							
z score weight-for-age	0.062	0.064	0.062	0.061	0.065	0.062	0.063
z score height-for-age	0.042	0.023	0.028	0.044	0.050	0.044	0.037
z score weight-for-height	0.024	0.057	0.053	0.036	0.033	0.039	0.042
p-values							
z score weight-for-age	0.0043	0.0033	0.0043	0.0047	0.0027	0.0040	0.0035
z score height-for-age	0.0519	0.2949	0.2034	0.0420	0.0221	0.0440	0.0870
z score weight-for-height	0.2687	0.0083	0.0155	0.0936	0.1280	0.0731	0.0528

HH = household, LSMS = living standard measurement survey, PC = principal components.

Sources: Author's estimates based on the microdata of the 2007 LSMSs.

Variables (autoevaluation of)	2007						
	Per Capita Expenditure	Predicted per Capita Expenditure	PC Index, All Indicators	PC Index, Assets Only	Share Weighted Average	Count Index	PC Index, Private Assets Only
Rank correlation coefficient							
Food consumption	0.156	0.272	0.366	0.309	0.362	0.347	0.345
Housing conditions	0.191	0.294	0.366	0.304	0.360	0.347	0.364
Clothing	0.160	0.229	0.340	0.338	0.316	0.317	0.339
Household total income	0.203	0.273	0.344	0.262	0.337	0.319	0.332
Value of food/goods the household did have	0.088	0.261	0.384	0.371	0.404	0.393	0.360
Have enough to be 'not poor'	-0.042	0.085	0.123	0.170	0.144	0.134	0.112
Have enough to be 'not poor' at the low poverty line	0.061	0.231	0.316	0.293	0.329	0.316	0.296
Food availability score	0.056	0.194	0.260	0.190	0.265	0.255	0.232
Months of no rice or maize	-0.156	-0.294	-0.358	-0.305	-0.354	-0.324	-0.335
p-values							
Food consumption	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Housing conditions	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Clothing	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Household total income	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Value of food/goods the household did have	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Have enough to be 'not poor'	0.005	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Have enough to be 'not poor' at the low poverty line	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Food availability score	0.000	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Months of no rice or maize	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

HH = household, LSMS = living standard measurement survey, PC = principal component.

1 A household has enough to be 'not poor' if its self declaration of the value of food and goods is higher than its self evaluation of what is required to be 'not poor'.

2 A household has enough to be 'not poor' at the lower poverty line if its self declaration of the value of food and goods is higher than the estimated low poverty line.

3 Food availability is aggregate score when a month of low food consumption is scored a 1, a month of average food consumption is scored a 2, and a month of high food consumptions is scored a 3.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs.

Turning to the distribution of opportunity across living standard groups for Timor-Leste, the pattern derived from the asset indices is more regular than that derived from consumption, when assessed against the a priori expectation of a trend improvement with living standards. The asset indices typically show a wider distribution than the per capita expenditure indices. That is, in most cases quintile ratios and (absolute) concentration indices are higher for the asset indices (see the results presented in Appendix C). This finding differs from Filmer and Scott (2008). Although they find some differences in the rich–poor gap across development indicators, they conclude the gap is fairly insensitive to the measure of living standards.

The main conclusions reached by Filmer and Scott (2008) are found to extend to Timor-Leste. Specifically, (i) asset indices and per capita consumption yield different rankings by living standards, but (ii) the asset indices do not necessarily identify the wrong people as being at lower living standards.

The loss and depletion of assets associated with the violence of 1999 needs to be kept in mind. The LSMSs found that 36% of the population were living in poverty in 2001, and that a decline in real per capita consumption saw the headcount measure of poverty rise to 50% by 2007. The surveys also showed considerable asset accumulation over the 2001–2007 period (see Table B.7). It is possible that that consumption was suppressed over 2001–2007 in order to make up for assets lost because of the violence, and as people moved back to their traditional land and needed to re-establish themselves (e.g., build new houses). If the estimate of consumption was unable to accurately capture the consumption value of the additional assets (noting that the estimation of imputed values and the consumption of durables are among the practical limitations of estimated consumption), consumption would have been underestimated. In such an environment, asset indices have some practical advantages over consumption in identifying living standards.

The asset index used in the study is that prepared with principal components using private assets. This index avoids access to electricity, water, and sanitation being included as both a measure of opportunity and of living standards. The index produces very similar results to the more typical index prepared using all assets.

Table B.7: Asset Holdings by Year

Asset	2001	2007	2009–2010
Share of individuals with the asset (%)			
Good walls (concrete, baked brick)	24.9	34.2	33.7
Good roof (metal, concrete or tile)	60.4	72.7	76.3
Good floors (concrete, tile or wood)	28.4	28.8	38.6
Car or truck	1.8	2.9	4.0
Motorcycle	3.0	6.9	14.4
Bicycle	5.2	5.9	12.0
Motor boat	0.0	0.3	0.7
Boat without a motor	0.5	0.8	
Refrigerator	2.9	5.6	8.9
Television	6.9	15.6	23.9
Radio	32.4	25.9	36.3
Mobile phone		12.1	43.3
Electric rice cooker	2.2	1.7	
Computer	0.1	0.4	
Sewing or knitting machine	2.9	3.0	
Own agricultural plot	85.9	83.2	81.0
Number of animals per capita			
Large animals	30.9	39.1	44.7
Pigs	68.6	82.3	47.6
Goats	11.0	29.3	32.0
Sheep	1.4	1.5	2.9
Chickens	73.8	71.8	76.6
Ducks	1.3	2.6	73.7

DHS = demographic health survey, LSMS = living standard measurement survey.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS.

ANNEX C: RESULTS

Table C.1: Availability of Infrastructure by Measure of Living Standards

Indicator	Living Standards Group	Unit	2009–2010		2007		2001	
			Private Assets	Wealth (DHS)	Private Assets	Consumption	Private Assets	Consumption
1	Access to electricity							
	Lowest	%	8.6	1.2	5.7	16.8	3.7	10.4
	Second	%	15.1	8.8	14.8	20.3	9.4	21.1
	Middle	%	24.4	25.8	25.5	26.5	12.7	18.8
	Fourth	%	51.2	60.4	49.2	44.3	31.6	30.4
	Highest	%	95.2	96.9	87.8	75.0	71.0	47.6
	Average	%	38.9	38.9	36.6	36.6	25.7	25.7
2	Access to improved water							
	Lowest	%	44.5	44.6	48.5	52.6	31.8	42.4
	Second	%	54.7	47.1	55.0	53.0	35.3	51.8
	Middle	%	59.2	62.1	56.7	58.1	48.4	48.2
	Fourth	%	72.8	75.4	69.3	67.6	57.3	47.3
	Highest	%	89.3	90.7	86.0	84.2	77.7	60.8
	Average	%	64.1	64.1	63.1	63.1	50.1	50.1
3	Access to improved sanitation							
	Lowest	%	18.0	6.2	14.8	24.3	32.9	39.4
	Second	%	27.3	22.0	25.8	31.5	28.8	42.4
	Middle	%	34.6	41.4	40.2	36.4	32.4	31.9
	Fourth	%	55.2	62.5	61.6	58.3	43.6	43.0
	Highest	%	79.3	81.2	91.4	83.4	71.1	52.2
	Average	%	42.9	42.9	46.8	46.8	41.8	41.8
4	Nearest road is vehicle passable							
	Lowest	%			54.1	63.9	81.6	85.7
	Second	%			59.3	63.7	72.2	79.8
	Middle	%			68.1	67.2	80.9	77.7
	Fourth	%			76.1	68.9	84.5	80.6
	Highest	%			92.6	86.6	94.2	89.5
	Average	%			70.1	70.1	82.7	82.7
5	Walking time to a vehicle passable road							
	Lowest	minutes			25.4	19.0	10.9	8.6
	Second	minutes			24.0	18.0	14.7	7.2
	Middle	minutes			13.6	17.9	8.5	11.3
	Fourth	minutes			12.6	16.2	5.5	10.2
	Highest	minutes			5.8	10.2	4.4	6.6
	Average	minutes			16.3	16.3	8.8	8.8
6	Walking time to school							
	Lowest	minutes			38.9	32.6	29.4	22.7
	Second	minutes			36.9	34.4	30.3	22.9
	Middle	minutes			31.9	35.4	30.7	36.0
	Fourth	minutes			32.7	32.9	29.7	30.2
	Highest	minutes			24.5	25.9	22.3	29.1
	Average	minutes			32.1	32.1	28.0	28.0
Memo items: quintile ratios								
	Access to electricity	ratio	11.1	83.0	15.5	4.5	19.4	4.6
	Access to improved water	ratio	2.0	2.0	1.8	1.6	2.4	1.4
	Access to improved sanitation	ratio	4.4	13.1	6.2	3.4	2.2	1.3
	Nearest road is vehicle passable	ratio			1.7	1.4	1.2	1.0
	Walking time to a vehicle passable road	ratio			0.2	0.5	0.4	0.8
	Walking time to school	ratio			0.6	0.8	0.8	1.3

DHS = demographic and health survey, LSMS = living standard measurement survey.

a The quintile ratio shows the ratio of the indicator of the richest to the poorest group.

b Private assets refers to the index of living standards prepared with principal components using data on privately owned assets. Wealth (DHS) refers to the wealth index reported with the results of the demographic and health survey. Consumption refers to the index of living standards prepared using real per capita expenditure.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS.

Table C.2: School Participation Rates by Measure of Living Standards

Indicator	Living Standards Group	Unit	2009–2010		2007		2001	
			Private Assets	Wealth (DHS)	Private Assets	Consumption	Private Assets	Consumption
1	Participation rate for 6–11 year olds							
	Lowest	%	62.1	60.0	39.2	41.2	49.3	48.5
	Second	%	65.1	68.9	41.6	44.9	45.6	51.5
	Middle	%	72.0	72.0	47.8	49.7	51.5	49.7
	Fourth	%	80.2	79.1	54.7	51.4	51.1	50.3
	Highest	%	84.6	84.8	69.6	71.9	61.3	61.5
	Average	%	72.6	72.6	49.8	49.8	51.4	51.4
2	Participation rate for 6–11 year old males							
	Poorest	%	59.1	57.5	39.5	37.3	46.7	51.0
	Poorer	%	64.1	69.3	42.9	42.5	38.3	44.7
	Middle	%	71.2	70.5	42.7	51.5	50.4	44.2
	Richer	%	79.6	78.3	49.3	46.9	50.8	45.3
	Richest	%	84.6	84.6	71.1	72.8	58.6	59.2
	Average	%	71.7	71.7	48.1	48.1	48.1	48.1
3	Participation rate for 6–11 year old females							
	Poorest	%	65.2	62.7	38.8	45.2	52.5	45.5
	Poorer	%	66.3	68.4	40.2	47.6	56.3	59.1
	Middle	%	72.8	73.6	53.5	47.6	52.6	56.4
	Richer	%	80.8	80.0	60.5	55.5	51.3	56.0
	Richest	%	84.7	85.1	68.2	70.9	64.3	64.0
	Average	%	73.6	73.6	51.6	51.6	55.2	55.2
4	Participation rate for 12–17 year olds							
	Poorest	%	73.2	72.7	65.0	76.7	69.5	74.0
	Poorer	%	75.0	78.4	71.5	77.5	79.1	76.7
	Middle	%	83.7	82.1	80.4	75.8	71.2	76.9
	Richer	%	87.5	86.3	84.8	81.5	78.6	78.1
	Richest	%	88.3	88.0	92.8	85.1	87.5	80.3
	Average	%	81.5	81.5	79.2	79.2	77.0	77.0
5	Participation rate for 12–17 year old males							
	Poorest	%	72.9	74.4	68.0	81.3	71.5	73.2
	Poorer	%	76.1	78.8	73.5	78.7	78.2	77.7
	Middle	%	83.2	81.5	81.3	74.5	72.4	80.7
	Richer	%	88.3	85.7	83.6	81.5	81.3	73.0
	Richest	%	87.0	86.4	93.0	84.0	86.5	85.4
	Average	%	81.4	81.4	80.0	80.0	77.8	77.8
6	Participation rate for 12–17 year old females							
	Poorest	%	73.5	70.9	62.2	71.5	66.9	74.8
	Poorer	%	73.9	78.0	69.1	76.3	80.1	75.7
	Middle	%	84.2	82.6	79.5	77.3	70.3	72.6
	Richer	%	86.8	86.8	86.0	81.6	75.7	83.4
	Richest	%	89.7	89.8	92.7	86.1	88.7	73.9
	Average	%	81.7	81.7	78.4	78.4	76.1	76.1
<i>Memo items: quintile ratios</i>								
	Participation rate for 6–11 year olds	Ratio	1.4	1.4	1.8	1.7	1.2	1.3
	Participation rate for 6–11 year old males	Ratio	1.4	1.5	1.8	2.0	1.3	1.2
	Participation rate for 6–11 year old females	Ratio	1.3	1.4	1.8	1.6	1.2	1.4
	Participation rate for 12–17 year olds	Ratio	1.2	1.2	1.4	1.1	1.3	1.1
	Participation rate for 12–17 year old males	Ratio	1.2	1.2	1.4	1.0	1.2	1.2
	Participation rate for 12–17 year old females	Ratio	1.2	1.3	1.5	1.2	1.3	1.0

DHS = demographic and health survey.

Notes:

1 The quintile ratio shows the ratio of the indicator of the richest to the poorest group.

2 Private assets refers to the index of living standards prepared with principal components using data on privately owned assets. Wealth (DHS) refers to the wealth index reported with the results of the demographic and health survey. Consumption refers to the index of living standards prepared using real per capita expenditure.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMs and the 2009–2010 DHS.

Table C.3: Maternal Health Indicators by Measure of Living Standards

Indicator	Living Standards Group	Unit	2009–2010		2007		2002
			Private Assets	Wealth (DHS)	Private Assets	Consumption	Wealth (DHS)
1	Have access to a skilled attendant at birth						
	Lowest	%	10.6	10.6	24.3	25.7	6.0
	Second	%	16.9	14.1	26.1	34.9	13.5
	Middle	%	21.5	21.5	37.7	30.8	19.7
	Fourth	%	33.3	37.2	48.5	49.9	28.1
	Highest	%	67.5	68.3	75.8	73.6	49.4
	Average	%	29.0	29.0	42.0	42.0	23.6
2	Most skilled attendant at birth was a doctor						
	Poorest	%	0.7	0.6	3.4	1.1	0.0
	Poorer	%	1.2	1.1	3.8	5.6	0.0
	Middle	%	1.6	1.7	7.3	4.4	1.5
	Richer	%	3.5	3.5	8.1	11.7	4.0
	Richest	%	7.2	7.4	22.8	24.2	5.8
	Average	%	2.7	2.7	8.9	8.9	2.3
3	Most skilled attendant at birth was a nurse or midwife						
	Poorest	%	9.3	9.3	13.2	17.3	4.9
	Poorer	%	15.1	12.4	16.0	20.7	9.2
	Middle	%	19.0	19.0	23.8	19.5	15.6
	Richer	%	29.3	33.0	33.5	31.3	19.7
	Richest	%	59.8	60.4	44.7	43.3	35.4
	Average	%	25.7	25.7	25.9	25.9	17.2
4	Most skilled attendant at birth was an assistant nurse						
	Poorest	%	0.6	0.6	7.1	6.9	15.3
	Poorer	%	0.7	0.6	6.3	8.2	10.4
	Middle	%	0.8	0.8	6.2	6.9	14.2
	Richer	%	0.4	0.4	6.1	5.8	8.9
	Richest	%	0.4	0.5	8.1	6.0	3.7
	Average	%	0.6	0.6	6.8	6.8	10.5
5	Have access to a skilled provider of antenatal care						
	Poorest	%	72.8	74.1	40.1	47.3	27.0
	Poorer	%	81.1	78.9	45.9	50.9	36.4
	Middle	%	86.1	87.5	57.9	55.5	41.5
	Richer	%	91.6	92.4	64.5	60.7	49.8
	Richest	%	96.6	96.6	92.0	87.7	57.4
	Average	%	85.7	85.7	59.6	59.6	42.5
6	Most skilled antenatal carer was a nurse or midwife						
	Poorest	%	69.0	69.2	26.3	30.9	19.9
	Poorer	%	75.4	75.6	37.5	36.3	25.5
	Middle	%	81.9	83.1	40.1	39.5	31.9
	Richer	%	86.1	85.2	43.3	43.8	40.3
	Richest	%	88.1	88.5	52.7	50.0	44.4
	Average	%	80.2	80.2	39.8	39.8	32.4
Memo items: quintile ratios							
	Have access to a skilled attendant at birth	ratio	6.4	6.5	3.1	2.9	8.3
	Most skilled attendant at birth was a doctor	ratio	10.2	12.1	6.8	22.9	
	Most skilled attendant at birth was a nurse or midwife	ratio	6.4	6.5	3.4	2.5	7.3
	Most skilled attendant at birth was an assistant nurse	ratio	0.7	0.7	1.2	0.9	0.2
	Have access to a skilled provider of antenatal care	ratio	1.3	1.3	2.3	1.9	2.1
	Most skilled antenatal carer was a nurse or midwife	ratio	1.2	1.2	1.5	1.3	1.6

DHS = demographic and health survey, LSMS = living standard measurement survey.

1 The quintile ratio shows the ratio of the indicator of the richest to the poorest group.

2 Private assets refers to the index of living standards prepared with principal components using data on privately owned assets. Wealth (DHS) refers to the wealth index reported with the results of the demographic and health survey. Consumption refers to the index of living standards prepared using real per capita expenditure.

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS.

Table C.4: Child Health Indicators by Measure of Living Standards

Indicator	Living Standards Group	Unit	2009–2010		2007		2001	
			Private Assets	Wealth (DHS)	Private Assets	Consumption	Private Assets	Consumption
1	Under 5 year olds with a Vaccination Card							
	Lowest	%	31.5	31.3	21.1	23.6	6.8	4.5
	Second	%	33.2	32.8	21.2	28.5	8.7	6.2
	Middle	%	37.3	37.9	30.2	27.9	4.7	7.5
	Fourth	%	39.5	41.2	28.1	21.6	5.9	10.3
	Highest	%	34.6	33.8	18.5	15.6	11.8	10.2
	Average	%	35.3	35.3	23.8	23.8	7.5	7.5
2	Under 5 year olds with a Vitamin A Supplement							
	Poorest	%	50.5	53.5	21.7	23.9	6.7	3.4
	Poorer	%	57.1	53.2	21.6	28.9	6.1	6.5
	Middle	%	60.2	59.1	30.0	28.1	5.0	7.0
	Richer	%	64.3	67.7	27.8	21.6	6.5	9.2
	Richest	%	74.5	74.3	18.8	15.5	11.3	10.1
	Average	%	61.1	61.1	24.0	24.0	7.1	7.1
3	Under 5 year olds with a first dose of vaccinations ^c							
	Poorest	%	39.0	40.0	41.4	49.6	10.2	13.6
	Poorer	%	47.2	44.4	48.3	57.6	4.9	9.6
	Middle	%	51.4	53.8	61.5	52.5	7.2	9.1
	Richer	%	58.4	60.1	63.7	59.0	16.2	11.5
	Richest	%	63.9	63.3	66.5	64.7	20.2	14.1
	Average	%	51.8	51.8	56.2	56.2	11.5	11.5
4	Under 5 year olds with a full course of vaccinations ^c							
	Poorest	%	30.1	30.3	26.6	34.7	1.6	0.4
	Poorer	%	33.7	32.2	31.9	39.5	0.0	1.3
	Middle	%	37.9	39.7	44.8	37.6	1.2	1.9
	Richer	%	41.9	43.3	46.9	40.3	1.7	2.5
	Richest	%	32.0	31.5	49.6	49.7	6.5	5.3
	Average	%	35.3	35.3	39.9	39.9	2.2	2.2
5	Under 5 year olds with a BCG shot							
	Poorest	%	52.3	55.7	59.1	67.7	27.8	30.5
	Poorer	%	62.5	58.9	62.6	73.5	25.0	25.6
	Middle	%	68.1	69.1	79.6	69.4	19.7	29.6
	Richer	%	75.5	77.4	79.0	75.5	36.2	30.3
	Richest	%	85.2	84.4	87.1	83.3	45.5	38.0
	Average	%	68.5	68.5	73.4	73.4	30.5	30.5
6	Under 5 year olds with a measles vaccination							
	Poorest	%	40.6	41.9	44.3	53.0	15.2	24.5
	Poorer	%	48.6	46.1	50.6	60.3	10.2	13.9
	Middle	%	53.8	55.2	64.5	55.1	12.5	13.3
	Richer	%	59.9	62.3	67.3	62.6	23.5	15.8
	Richest	%	66.5	65.8	72.9	70.9	25.4	17.9
	Average	%	53.7	53.7	59.8	59.8	17.1	17.1
Memo items: quintile ratios								
	Under 5 year olds with a vaccination card	ratio	1.1	1.1	0.9	0.7	1.7	2.3
	Under 5 year olds with a vitamin A supplement	ratio	1.5	1.4	0.9	0.6	1.7	2.9
	Under 5 year olds with a first dose of vaccinations ^c	ratio	1.6	1.6	1.6	1.3	2.0	1.0
	Under 5 year olds with a full course of vaccinations ^c	ratio	1.1	1.0	1.9	1.4	4.0	12.1
	Under 5 year olds with a BCG shot	ratio	1.6	1.5	1.5	1.2	1.6	1.2
	Under 5 year olds with a measles vaccination	ratio	1.6	1.6	1.6	1.3	1.7	0.7

Notes:

1 The quintile ratio shows the ratio of the indicator of the richest to the poorest group.

2 Data for 2009–2010 cover the most recent birth during the five years prior to the survey, data for 2007 covers the most recent birth in the two years prior to the survey, while data for 2002 covers births during the prior 12 months.

3 Skilled attendant includes doctor, nurse/midwife, and assistant nurse. If the respondent mentioned more than one person during delivery, only the most qualified person is included.

4 A full course of vaccinations includes BCG, measles, and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth).

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS.

Table C.5: Summary of Results

Opportunity Indicator	Period	Simple Average		Concentration Index by Measure of Living Standards			Achievement by Measure of Living Standards		
		Units	Value	Private Assets	Consumption	Wealth (DHS)	Private Assets	Consumption	Wealth (DHS)
A. Infrastructure									
1	Access to electricity								
	2009–2010	%	38.9	0.45	–	0.52	21.6	–	18.7
	2007	%	36.6	0.45	0.32	–	20.0	24.8	–
	2001	%	25.7	0.52	0.28	–	12.4	18.4	–
2	Access to improved water								
	2009–2010	%	64.1	0.14	–	0.16	55.3	–	53.9
	2007	%	63.1	0.12	0.10	–	55.7	56.5	–
	2001	%	50.1	0.19	0.06	–	40.7	47.3	–
3	Access to improved sanitation								
	2009–2010	%	42.9	0.29	–	0.37	30.4	–	27.0
	2007	%	46.8	0.34	0.26	–	31.0	34.8	–
	2001	%	41.8	0.19	0.06	–	34.0	39.4	–
4	Nearest road is vehicle passable								
	2009–2010		–	–	–	–	–	–	–
	2007	%	70.1	0.11	0.06	–	62.4	65.9	–
	2001	%	82.7	0.04	0.01	–	79.5	81.8	–
5	Walking time to a vehicle passable road								
	2009–2010		–	–	–	–	–	–	–
	2007	minutes	16.3	0.26	0.10	–	20.5	18.0	–
	2001	minutes	8.8	0.21	0.01	–	10.6	8.9	–
6	Walking time to school								
	2009–2010		–	–	–	–	–	–	–
	2007	minutes	32.1	0.09	0.04	–	35.0	33.4	–
	2001	minutes	28.0	0.05	-0.05	–	29.5	26.6	–
B. Education									
1	Participation rate for 6–11 year olds								
	2009–2010	%	72.6	0.07	–	0.07	67.6	–	67.6
	2007	%	51.6	0.12	0.10	–	43.9	45.0	–
	2001	%	51.4	0.07	0.03	–	47.8	49.8	–
2	Participation rate for 6–11 year old males								
	2009–2010	%	71.7	0.08	–	0.07	66.2	–	66.4
	2007	%	48.1	0.11	0.11	–	42.6	42.6	–
	2001	%	48.1	0.08	0.01	–	44.2	47.4	–
3	Participation rate for 6–11 year old females								
	2009–2010	%	73.6	0.06	–	0.06	69.1	–	68.9
	2007	%	51.6	0.12	0.08	–	45.2	47.5	–
	2001	%	55.2	0.05	0.05	–	52.1	52.6	–
4	Participation rate for 12–17 year olds								
	2009–2010	%	81.5	0.04	–	0.04	78.0	–	78.3
	2007	%	79.2	0.07	0.02	–	73.7	77.5	–
	2001	%	77.0	0.06	0.02	–	72.6	75.6	–
5	Participation rate for 12–17 year old males								
	2009–2010	%	81.4	0.04	–	0.03	78.1	–	78.6
	2007	%	80.0	0.06	0.01	–	75.3	79.6	–
	2001	%	77.8	0.06	0.02	–	73.2	76.1	–
6	Participation rate for 12–17 year old females								
	2009–2010	%	81.7	0.05	–	0.05	77.9	–	77.9
	2007	%	80.0	0.08	0.04	–	72.0	75.4	–
	2001	%	76.1	0.06	0.01	–	71.8	75.0	–

Opportunity Indicator	Period	Simple Average		Concentration Index by Measure of Living Standards			Achievement by Measure of Living Standards		
		Units	Value	Private Assets	Consumption	Wealth (DHS)	Private Assets	Consumption	Wealth (DHS)
C. Maternal health care									
1	Have access to a skilled attendant at birth								
	2009–2010	%	29.0	0.36	–	0.39	18.7	–	17.8
	2007	%	42.0	0.25	0.21	–	31.5	33.0	–
	2002	%	23.6	–	–	0.41	–	–	13.8
2	Most skilled attendant at birth was a doctor								
	2009–2010	%	2.7	0.47	–	0.48	1.5	–	1.4
	2007	%	8.9	0.43	0.49	–	5.1	4.5	–
	2002	%	2.3	–	–	0.50	–	–	1.2
3	Most skilled attendant at birth was a nurse or midwife								
	2009–2010	%	25.7	0.36	–	0.39	16.6	–	15.7
	2007	%	25.9	0.25	0.19	–	19.4	21.0	–
	2002	%	17.2	–	–	0.37	–	–	10.8
4	Most skilled attendant at birth was an assistant nurse								
	2009–2010	%	0.6	–0.06	–	–0.06	0.6	–	0.6
	2007	%	6.8	0.03	–0.04	–	6.6	7.1	–
	2002	%	4.2	–	–	0.27	–	–	3.0
5	Have access to a skilled provider of antenatal care								
	2009–2010	%	85.7	0.05	–	0.06	81.1	–	80.9
	2007	%	59.6	0.17	0.12	–	49.3	52.2	–
	2002	%	42.5	–	–	0.25	–	–	31.9
6	Most skilled antenatal carer was a nurse or midwife								
	2009–2010	%	80.2	0.05	–	0.05	76.4	–	76.2
	2007	%	39.8	0.13	0.10	–	34.7	35.9	–
	2002	%	32.4	–	–	0.23	–	–	24.9
D. Child health care									
1	Under 5 year old with a vaccination card								
	2009–2010	%	35.3	0.03	–	0.03	34.4	–	34.2
	2007	%	23.8	0.00	–0.07	–	23.9	25.6	–
	2001	%	7.5	0.12	0.19	–	6.6	6.1	–
2	Under 5 year old with a vitamin A supplement								
	2009–2010	%	61.1	0.07	–	0.07	56.9	–	56.7
	2007	%	24.0	–0.01	–0.08	–	24.2	25.9	–
	2001	%	7.1	0.16	0.21	–	5.9	5.6	–
3	Under 5 year old with a first dose of vaccinations ^c								
	2009–2010	%	51.8	0.09	–	0.10	47.0	–	46.7
	2007	%	56.2	0.10	0.05	–	50.5	53.7	–
	2001	%	11.5	0.15	0.03	–	9.7	11.2	–
4	Under 5 year old with a full course of vaccinations ^c								
	2009–2010	%	32.0	0.03	–	0.03	34.4	–	34.2
	2007	%	39.9	0.13	0.06	–	34.6	37.6	–
	2001	%	2.2	0.37	0.40	–	1.4	1.3	–
5	Under 5 year old with a BCG shot								
	2009–2010	%	68.5	0.09	–	0.09	62.3	–	62.3
	2007	%	73.4	0.08	0.03	–	67.2	70.8	–
	2001	%	30.5	0.11	0.05	–	27.3	28.8	–
6	Under 5 year old with a measles vaccination								
	2009–2010	%	53.7	0.09	–	0.10	48.8	–	48.4
	2007	%	59.8	0.11	0.05	–	53.5	56.8	–
	2001	%	17.1	0.09	–0.05	–	15.5	17.9	–

– = no available data, DHS = demographic and health survey.

1 Data for 2009–2010 cover the most recent birth during the 5 years prior to the survey, data for 2007 covers the most recent birth in the two years prior to the survey, while data for 2002 covers births during the prior 12 months.

2 Skilled attendant includes doctor, nurse/midwife, and assistant nurse. If the respondent mentioned more than one person during delivery, only the most qualified person is included.

3 A full course of vaccinations includes BCG, measles, and three doses each of DPT and polio vaccine (excluding polio vaccine given at birth).

Sources: Author's estimates based on the microdata of the 2001 and 2007 LSMSs and the 2009–2010 DHS and the grouped data of the 2002 Multiple Indicators Cluster Survey (Government of Timor-Leste and United Nations Children's Fund [2003]).

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Is Timor-Leste's Growth Inclusive?

This study examines the first decade of the restoration of independence of Timor-Leste to assess if the country's economic growth has been inclusive. Opportunity is found to have been provided to a larger share of the population, with those on lower and higher living standards enjoying more opportunity, and that inequality in opportunity is generally in decline. Suggestions are offered on how economic growth can remain inclusive.

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ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to two-thirds of the world's poor: 1.7 billion people who live on less than \$2 a day, with 828 million struggling on less than \$1.25 a day. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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