

AFRICAN FUTURES BRIEF

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THE BENEFITS OF INCREASED INVESTMENT IN EDUCATION

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If the primary and secondary education enrolment rates of all African nations advanced as rapidly as those from the best-practice countries in Africa, then the continent would:

- Effectively meet the goal of universal primary education by 2030 and universal basic education by 2035
- Achieve 85 per cent upper-secondary enrolment by 2050
- Reduce by 2050 the number of malnourished children by 3,5 million, the number of people living on less than US\$ 1,25 per day by 60 million and the chance of state failure by nearly 8 per cent
- Add US\$ 2,5 trillion to Africa's gross domestic product (GDP) through 2050, which is more than five times the cumulative increase in overall spending on education through that year

This would require an increase in educational spending from 4 per cent of Africa's GDP to 4,8 per cent.

INTRODUCTION

Basic education includes primary and lower-secondary education (the first nine years), and is a powerful driver of human well-being.¹ This level of learning enhances human capabilities by providing fundamentals (e.g. literacy and mathematics), cognitive skills and general knowledge (e.g. health

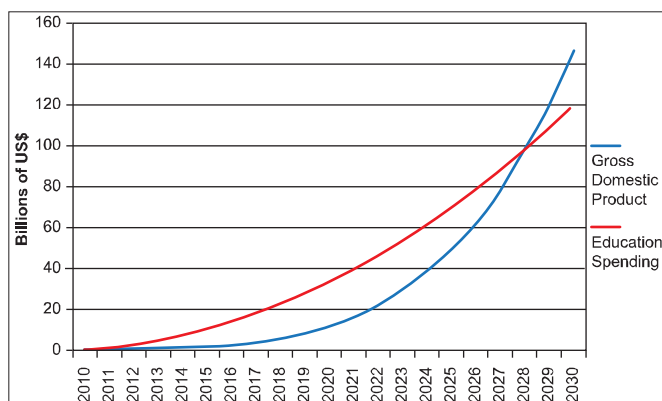
and hygiene). These enhancements increase productivity and economic growth. Equally relevant, improved basic education leads to changes in demography and social values that enable wider improvements in health, welfare and governance.

While the benefits of universal basic education are clear, it is still a distant reality in several African countries. The United Nations (UN) established the target of universal primary education by 2015 as part of the Millennium Development Goals (MDGs). Despite notable improvements, the very low starting point in enrolment levels for many African countries has made the goal of universal primary education by 2015 unreachable.²

While many African countries will not meet the MDGs for education, performance across the continent is mixed. Some have dramatically increased enrolment rates across all levels of education. This policy brief asks the questions: 'What if enrolment rates across Africa increased as rapidly as best-practice countries for primary and secondary education?' and 'What are the costs and benefits?'

By increasing primary and secondary enrolment rate improvements to best-practice levels,³ Africa would effectively achieve universal primary education in the next 20 years and universal basic education by 2035. Specifically, through this intervention and the government funding to support it, near-universal primary education completion would be obtained by 2030. At the lower-secondary level, an ambitious

Figure 1: Difference between aggressive education scenario and base case: cost versus benefit, 2010–2030



gross enrolment level (98 per cent) would be attained by 2035. Upper-secondary levels would reach 85 per cent enrolment by 2050.

To do so, total education spending would need to increase from 4 per cent of Africa’s GDP per annum to 4,8 per cent from 2010 to 2030, and countries would have to increase enrolment and completion rates to best-practice levels. This would lead, with a considerable time lag, to large positive direct effects on human development. Relative to our base case in 2050, there would be 3,5 million fewer malnourished children, 60 million fewer people living on less than US\$ 1,25 per day and nearly an 8 per cent reduction in the probability of state failure.

The cumulative increase in education spending over our base case would be nearly US\$ 120 billion through 2030 and over US\$ 480 billion through 2050.⁴ However, by 2050 the investment in education would provide a considerable payback. The increased spending would be fully recovered, as Africa’s GDP would be US\$ 2,5 trillion larger than in the base case scenario. Figure 1 compares the financial cost against the benefits of investing in education in Africa to 2030. The red line is the cumulative investment needed in education above base case spending, and the blue line is the cumulative increase in the size of the economy as a result of this investment.⁵ The graph shows the long time horizon necessary to realise the return on this investment. Only by 2028 would incremental GDP surpass the increased investment in education.⁶

Despite the macro results of such a policy intervention for the continent, there are significant

differences across individual countries. Full data tables showing policy implications for 52 African countries can be found at www.ifs.du.edu/afp.

UNDERSTANDING EDUCATION AND HUMAN DEVELOPMENT

Many studies have examined the impact of basic education on national development. Beginning with the economy, Shultz concludes that there is an unambiguous connection between additional investment in primary and secondary education, and private wage returns.⁷ In a subsequent study, wage gains of 5–20 per cent for each additional year of education were observed in Ghana, Côte d’Ivoire, Kenya, Nigeria and Burkina Faso.⁸ Psacharopoulos concurs and concludes that, in the case of Africa, a full 17,2 per cent of the economic growth rate is explained by education.⁹

While the economic case alone for increasing investment in basic education is compelling, the wider impacts are also significant. As early as 1980, the impact on health was established, with research showing that for each additional year of education for a mother in a developing country, there is a 5–10 per cent reduction in infant mortality.¹⁰ Likewise, Appiah and McMahon find that education in Africa leads to direct and indirect improvements in infant mortality, longevity, democratisation and political stability.¹¹ The authors extended their analysis across time to develop a comprehensive set of forecasts that are largely corroborated by our findings.¹²

These studies all conclude that funding education is a near-certain positive investment in economic and human development, albeit with important issues to consider. Most prominently, investment in education has a relatively long payback period, taking 25 to 45 years to realise important benefits.¹³ This slow payback is primarily due to the time it takes for educated children to mature into productive adults. The extended horizons are partially explained by generational differences, particularly as educated parents are more likely to send their children to school than uneducated parents.

A second caveat especially salient to Africa is the relative social costs and paybacks derived from increasing investment in different education levels. All of the studies above stressed the importance of basic education because the costs are considerably

Table 1: Enrolment and completion by region: UNESCO Institute for Statistics Data and International Futures base-year estimation, 2010 (per cent)

	Primary completion	Lower-secondary gross enrolment	Upper-secondary gross enrolment
Africa	62,4	53,3	32,0
World Bank groupings, excluding high-income countries			
East Asia and Pacific	98,2	89,3	63,0
Europe and Central Asia	91,4	92,0	85,0
Latin America and Caribbean	100,6	101,8	75,0
Middle East and North Africa	88,8	88,9	59,1
South Asia	68,5	70,8	42,5
African regions			
East Africa	51,7	43,0	19,2
West Africa	62,6	39,0	23,8
North Africa	89,5	92,3	60,5
Central Africa	36,8	45,6	28,6
Southern Africa	72,2	64,5	45,8

lower and its social benefits higher than tertiary education. Africa, however, has historically allocated a disproportionate amount of its educational resources to higher education, spending roughly 44 times more per student at the tertiary level than at the primary level, a benefit that frequently accrues to the highest-income families.¹⁴ Not only does this raise questions of fairness, but this is a suboptimal use of scarce funds.¹⁵

HISTORICAL TRENDS IN BASIC EDUCATION

A persistent deficit exists when comparing historical education levels in Africa with the rest of the world. In 2010, using estimates based on data from the United Nations Educational, Scientific and Cultural Organisation (UNESCO),¹⁶ Africa lagged behind other global regions in primary completion, lower-secondary gross enrolment and upper-secondary gross enrolment, which are the three variables impacted in this policy brief. Internally to the continent, the highest primary and secondary education enrolment levels were found in North Africa, followed in order by Southern Africa, West Africa, East Africa and Central Africa.

For a number of reasons, measures of education are problematic and may misrepresent actual educational attainments. First, enrolment and

completion rates are quantitative measures and omit aspects of quality. Second, these measures only cover formal education and do not reflect learning in non-formal settings (e.g. adult education courses or informal knowledge transfer at home). In order to represent informal education, end-result measures such as literacy may be more appropriate. Our focus, however, is on government policy and this requires an analysis of formal

programmes dedicated to the funding and provision of education.

Such comparisons highlight Africa's continued educational deficit, but mask significant variation within the continent. More than 20 per cent of African countries have already attained primary completion rates of 95 per cent, with Zambia, for example, realising the MDG target before 2005. While these results are commendable, two-thirds of African countries still have primary completion rates below 80 per cent. Of these, over 40 per cent have primary completion rates below 50 per cent.

In spite of the severe deficits in specific countries, rapid growth is still possible. For example, from 2002 to 2010, Togo increased its primary completion rates by nearly 13 percentage points. For this analysis, we reviewed top performers like Togo to ascertain the most favourable, yet plausible, increases in growth rates.¹⁷ These aggressive growth rates in enrolment and completion were then used to construct an **improved education scenario** for all of Africa. Excluding the exceptional growth observed in Zambia, Mali and Eritrea, which appear to be outliers, the highest average growth in the rate of primary education is 1,74 percentage points per year. Togo, Ghana, Ethiopia and Cape Verde all exhibit comparable changes in enrolment rates, ranging from 1,57 percentage points to 1,91 percentage points. At the lower-secondary level, an average

increase in the rate of enrolment of 1,87 percentage points was observed for Morocco, São Tomé and Príncipe, and Kenya.¹⁸ At the upper-secondary level, Guinea, Benin and Nigeria have experienced an average growth in the rate of enrolment of 1,15 percentage points per year.¹⁹

Throughout this analysis, we will compare our improved education scenario to the **base case** of the International Futures Model (IFs), a dynamic forecasting tool described below.²⁰

EXPERIENCES ON THE GROUND

While starting from a very low base, Africa has made tremendous strides toward universal primary education in recent years, attaining 76 per cent net enrolment in primary education in 2008, up from 58 per cent in 1999.²¹ The rise in enrolment rates has been attributed to various factors, but common among all well-performing countries has been the innovative use of state funding. Burundi, Mali and Swaziland have increased their shares of GDP devoted to primary education²² and have allocated a larger percentage of their total educational budgets to the primary level. An MDG report, *Assessing progress in Africa toward the Millennium Development Goals*, illustrates that those countries that allocate at least 50 per cent of their education budgets to primary schooling experience the most rapid improvements in education.²³ Another critical factor has been early-childhood education. For example, Seychelles devoted a portion of its educational budget to pre-primary learners, extending the benefits of government-sponsored schooling to almost 85 per cent of children between 3,5 and 5 years of age. In sub-Saharan Africa, fewer than 5 per cent of eligible children have access to formal early-childhood education,²⁴ even though such programmes have been shown to substantially increase performance in primary school.²⁵

Additionally, the abolition of school fees has had a significant impact on student enrolment. Countries that have eliminated school fees over the past decade with positive effects include Ethiopia, Kenya, Malawi and Mozambique. In Tanzania, the abolition of school fees played a role in raising the primary net enrolment rate from a reported 50 per cent in 1999 to 98 per cent in 2007.²⁶ Of course, the provision of a free education is not sufficient on its own, as additional costs are involved in school attendance,

including textbooks, supplies, uniforms and transportation.²⁷ Ghana was one of the first countries in Africa to eliminate tuition costs and the informal costs of school attendance through the provision of 'capitation grants'. Under this system, every public kindergarten, primary school and lower-secondary school receives about US\$ 3,30 per pupil to allay all associated costs for the year.²⁸ The implementation of this policy has resulted in more student enrolments. Over two academic years, enrolment in public schools in Ghana surged from 4,2 million to 5,4 million students.²⁹

However, while these interventions increase the number of children enrolled in school, they do not directly address educational quality or guarantee completion. At a recent South African parliamentary workshop focusing on the MDGs, Trevor Manuel, the Minister of National Planning, noted that while there has been an increase in the number of children attending primary school, the quality of education provided continues to be inadequate, despite the fact that 6 per cent of South Africa's GDP is spent on education. Of the 1,4 million pupils that started school in 1999, only 600 000 sat for their school-leaving exams in 2010, and while 68 per cent of those students passed, only 15 per cent of those who passed obtained marks higher than 40 per cent.³⁰ South Africa's poor quality of education has been attributed to various causes, including a lack of teacher education, an inadequate teacher/pupil ratio, poor access to learning materials and poor school infrastructure. Clearly, there is a need for further investigation into the quality of education in Africa.

THE TOOL: INTERNATIONAL FUTURES (IFs)

We used the International Futures modelling system to analyse trends across a wide range of key global systems. IFs provides forecasts for 183 countries to 2100. It is housed at the Frederick S. Pardee Center for International Futures at the Josef Korbel School of International Studies, University of Denver. The IFs model is available to download or use online without cost at www.ifs.du.edu/ifs. Further details on the model structure and assumptions are available from the website and other IFs publications. Version 6.47 of the model was used for the development of this report.

KNOWLEDGE

Empowers Africa

How can a relatively small increase (0,8%) in the percentage of GDP devoted to education change the future of our continent?...

63% primary completion <i>Historical Data</i>		97% primary completion <i>Improved Scenario</i>		97% primary completion <i>Base Case Scenario</i>
2010	2020	2030	2040	2050
50% lower secondary enrolment <i>Historical Data</i>		97% lower secondary enrolment <i>Improved Scenario</i>		83% lower secondary enrolment <i>Base Case Scenario</i>

BY 2050 DIFFERENCE IN NUMBER OF MALNOURISHED CHILDREN

...between the base case scenario and the improved scenario



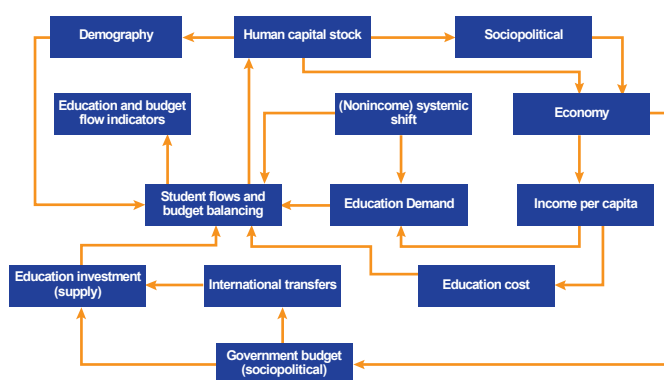
BY 2050 DIFFERENCE IN NUMBER OF PEOPLE LIVING IN POVERTY

...between the base case scenario and the improved scenario



Within the IFs system, a series of interconnected relationships determine the demand, supply and flow of education, and subsequent impacts on human well-being. Key dynamics involved in the educational model include demographic change, economic development, public education spending (constrained by revenue receipts, government consumption and other public sector demands), and the equilibration between the supply of and demand for education funds. A visual rendering of the direct drivers impacting education supply and demand is given in Figure 2.³¹

Figure 2: Direct drivers of education demand and supply in IFs



Source: Adapted from Dickson, Hughes and Irfan, *Advancing global education*, p 60

The scenarios presented in this policy brief change growth in intake and completion rates for primary, lower-secondary and upper-secondary education. These were set to the best-practice improvements in primary completion and upper- and lower-secondary enrolment levels identified in the historic data. Survival rates – the level at which students progress from one grade to the next – were also improved and increased in line with best-practice advances as identified by Dickson, Hughes and Irfan.³² Additionally, spending per student was brought to a global average and the education budget was prioritised relative to other government sectors.³³

FINDINGS

By 2050 the accelerated improvements in education enrolment and persistence rates described earlier would lead to an increase in Africa’s GDP of US\$ 2,5 trillion over the base case at an investment of US\$ 480 billion above base case education spending. While the return on this investment would be large,

the majority would be realised between 2030 and 2050. For example, in 2020 the cumulative increase in education investment over incremental change in GDP would surpass US\$ 21 billion. Thus, unlike some policy choices with immediate impacts, investment in education must be viewed as a long-term initiative with broad payoffs for human development.³⁴

While some studies focus on the amount of foreign aid required to increase education attainment levels,³⁵ our analysis is based solely on increasing enrolment rate improvements as the deeper drivers of amplified domestic government expenditures. Consequently, to increase funding for education requires that funding for other government sectors be reduced. All other government spending was cut in proportion to the increase in education spending. Thus, this budget reallocation would have a negative impact on research and development, infrastructure, military, administration and health.³⁶

The MDG target date of 2015 for universal primary education is largely unattainable for most African countries. However, through the proposed increase in education spending from 4 per cent of GDP to 4,8 per cent by 2030, universal primary education (97 per cent) would be obtained in all of Africa by 2030, more than 15 years faster than the base case. Through the same funding reprioritisation, by 2030 lower-secondary enrolment rates would increase by 24 percentage points and upper-secondary rates by 22 percentage points relative to the base case. By 2035 the improved scenario shows that 97 per cent of African children would obtain basic education.

Other components of human development follow a similar trajectory to improvements in economic growth: increased spending on education would improve the human condition slightly over the next two decades, but considerably more by 2050. The increased education-spending scenario would lead to 3,5 million fewer undernourished children in 2050. The largest improvements would be realised in the Democratic Republic of the Congo (DRC) (530 000 fewer), Nigeria (400 000 fewer) and Niger (370 000 fewer). The largest relative declines in childhood malnutrition in 2050 between the improved case and the base case would occur in Somalia (40 per cent), Niger (35 per cent) and Gambia (30 per cent).

Increased investment would lead to 60 million fewer people living on less than US\$ 1,25 a day. In 2050 the greatest absolute decreases are forecast for the DRC

(11,4 million fewer people), Niger (6,7 million fewer people) and Madagascar (3,2 million fewer people). In relative terms, the greatest percentage declines in 2050 are forecast for Ethiopia (80 per cent), Tanzania (70 per cent) and Angola (50 per cent).

The improved scenario would also lead to 28 million fewer years of life lost to poor health³⁷ in 2050 relative to base case spending. The greatest improvements on this dimension are forecast for Nigeria (4,7 million fewer years lost), the DRC (4,7 million fewer) and Somalia (2 million fewer).

In addition, the probability of state failure would decrease, with a 1,3 per cent reduction in 2030 and a 6 per cent reduction by 2050 relative to the base case. The greatest reductions in instability are forecast for Niger (down 45 per cent), Gambia (down 31 per cent) and Comoros (down 30 per cent). Thirteen African states decline in state fragility by more than 5 per cent with an aggressive, but reasonable increase in education spending.

CONCLUSION

Shortcomings in an analysis like this are inevitable and include the focus on quantitative rather than qualitative changes in education. Unquestionably, increases in enrolment and completion rate growth are only effective when final outcomes, such as literacy and productivity, are actually realised. Our analysis did not address issues of quality over the next 40 years. Accordingly, analyses that clarify education quality levels could extend and/or challenge our findings. Secondly, the assumption that all other government sectors, including health and infrastructure would be proportionately reduced in order to boost education spending is also unrealistic. Finally, we did not examine gender parity in education, another key objective of the MDGs.³⁸

Having disclosed some of the immediate limitations of the study, it is important to reassert its strengths. Through a relatively modest reallocation of expected future government expenditure, Africa would realise significant improvements in economic and human development at a level well beyond the initial investment. Our calculations of the time needed to achieve universal basic education in Africa, the magnitude of expenditure required and the broader development impacts of education are useful extensions of extant educational research. We have

sketched a possible trajectory that African governments can pursue and highlighted the tangible benefits that can be realised.

NOTES

1 This analysis also includes improvements in upper-secondary education, which is not considered to be a part of basic education. This is intentional, as future international goals will increasingly target different levels of secondary education enrolment and completion as primary education goals are met. In addition, completion rates are used for primary education (these correspond to the UN targets on education) and gross enrolment rates are used for lower- and upper-secondary education, as completion rate data does not exist globally.

2 Unlike the first target of the MDGs, where *relative* rates of poverty are to improve, the education target is an *absolute* value, which is largely out of reach for the most deficient countries even with aggressive relative improvement. For further analysis, see Michael A Clemens, Charles J Kenny and Todd J Moss, The trouble with the MDGs: confronting expectations of aid and development success, *World Development* 35(5) (May 2007), 735–751, doi:10.1016/j.worlddev.2006.08.003; William Easterly, How the Millennium Development Goals are unfair to Africa, *World Development* 37(1) (January 2009), 26–35, doi:10.1016/j.worlddev.2008.02.009; Janet R Dickson, Barry B Hughes and Mohammad T Irfan, Advancing global education, Patterns of Potential Human Progress Series, vol 2, Boulder and New Delhi: Oxford University Press and Paradigm, 2010, <http://www.ifs.du.edu/documents>.

3 The International Futures base case is a global scenario that continues the development patterns and strategies for Africa that have been deployed for the past 20 years. It is generally a positive scenario for the continent, although it also has major constraints stemming from poor infrastructure, climate change, fossil fuel depletion and low levels of investment. For a detailed discussion of this 'central drift' scenario in relation to Africa, see Jakkie Cilliers, Barry B Hughes and Jonathan D Moyer, *African futures 2050: the next 40 years*, Monograph no. 175, Pretoria, South Africa and Denver: Institute for Security Studies and Frederick S. Pardee Center for International Futures, 2011.

4 These values are cumulative additions (using a 3 per cent annual discount rate for future expenditures) to base case spending on education. Annual base case government spending on education in Africa increases from US\$ 38 billion in 2010 to nearly US\$ 100 billion by 2030 and surpasses US\$ 250 billion by 2050, a cumulative discounted total between 2010 and 2050 of over US\$ 2.3 billion (in 2005 US dollars). For further analysis of future spending simulations for Africa, see Alain Mingat, Blandine Ledoux and Ramahatra Rakotomalala, *Developing post-primary education in sub-Saharan Africa: assessing the financial sustainability of alternative pathways*, African Human Development Series, Washington, DC: World Bank, 2010.

5 The cumulative increase in the economy as a result of investment in education also considers constraints from reallocating funding away from other government spending, such as health, research and development, military, infrastructure, and administrative costs.

6 The scenario analysis in this policy brief is intentionally simple and involved increasing intake and survival (persistence) rates at primary, lower-secondary and upper-secondary levels to best-practice levels, along with prioritising education budget needs within domestic economies. For a more complex scenario analysis highlighting the benefits of investment in African education, see Dickson, Hughes and Irfan, *Advancing global education*. The results reported in the current policy brief are similar to the results generated by the normative global education scenario in the more complex analysis.

7 T Paul Schultz, Health and schooling investments in Africa, *Journal of Economic Perspectives* 13(3) (July 1999), 67–88.

8 Ibid. Evidence of returns to schooling in Africa from household surveys: monitoring and restructuring the market for education.

9 George Psacharopoulos, Education and development: a review, *World Bank Research Observer* 3(1) (January 1988), 99–116.

- 10 Susan H Cochrane, Joanne Leslie and Donald J O'Hara, The effects of education on health, World Bank Staff Working Paper no. 405, Washington, DC: World Bank, 1980.
- 11 Elizabeth N Appiah and Walter W McMahon, The social outcomes of education and feedbacks on growth in Africa, *Journal of Development Studies* 38(4) (April 2002), 27.
- 12 Ibid.
- 13 Ibid.
- 14 World Bank, *World development report 1997: the state in a changing world*, New York: Oxford University Press, 1997, cited in Wendy Hunter and David S Brown, World Bank directives, domestic interests, and the politics of human capital investment in Latin America, *Comparative Political Studies* 33(1) (February 2000), 117.
- 15 For further analysis on the connection between inequality and educational attainment, see Keith M Lewin and Ricardo Sabates, Who gets what? Is improved access to basic education pro-poor in SSA?, pre-publication draft under review, http://www.create-rpc.org/pdf_documents/UKFIETlewinsabatespaper.pdf (accessed October 2011).
- 16 UIS (UNESCO Institute for Statistics), *Global education digest 2011: comparing education statistics across the world*, Quebec: UIS, http://www.uis.unesco.org/Library/Documents/global_education_digest_2011_en.pdf (accessed October 2011).
- 17 For primary levels, growth rates in completion were used. For lower- and upper-secondary levels, growth rates in gross enrolment were used.
- 18 Exceptional countries, including Algeria, Botswana, Cape Verde, Libya and Tunisia, were considered outliers and excluded from the calculations.
- 19 The calculation excluded these identified outliers: Comoros, the Democratic Republic of Congo, Gambia and Tunisia.
- 20 The full range of assumptions in the base case scenario can also be found online at <http://www.ifs.du.edu>.
- 21 NGO Pulse, Towards universal primary education: Africa's progress in meeting the 2nd Millennium Development Goal, n.d., <http://www.ngopulse.org/article/towards-universal-primary-education-africa-s-progress-meeting-2nd-millennium-development-go> (accessed October 2011).
- 22 UN Development Group, Thematic paper on MDG 2: achieve universal primary education, 2010, http://www.worldfamilyorganization.org/wfs6/bg/1-Thematic-paper-on-MDG2_28-June.pdf (accessed October 2011).
- 23 Economic Commission for Africa, African Union, African Development Bank Group and UN Development Programme, *Assessing progress in Africa toward the Millennium Development Goals*, MDG Report, 2010, <http://www.uneca.org/mdgreports/2010/2010MDGR.pdf> (accessed October 2011).
- 25 Ibid.
- 26 UN Development Group, Thematic paper on MDG 2. In our analysis of historical data, Tanzania had low primary completion rates. However, data for primary completion rates for Tanzania stop in 1998, before the massive improvement in primary enrolment rates.
- 27 Robert Darko Osei, Gertrude Adobea Owusu, Freda E Asem and Robert Lawrence Afutu-Kotey, Effects of capitation grant on education outcomes in Ghana, Institute for Statistical Social and Economic Research, 2009, http://depot.gdnet.org/cms/files/GDN_UNDP_ISSER_Paper1.pdf (accessed October 2011).
- 28 Ibid.
- 29 UN University, *Revitalizing higher education in sub-Saharan Africa*.
- 30 allAfrica.com, Monitor country's development goals more effectively – Manuel, 5 September 2011, <http://allafrica.com/stories/201109052138.html> (accessed October 2011).
- 31 Extended documentation can be found in Dickson, Hughes and Irfan, *Advancing global education*.
- 32 See Ibid.
- 33 The primary, lower-secondary and upper-secondary annual percentage point growth rates used in our aggressive but reasonable scenario differ from those used in the normative education scenario in Dickson, Hughes and Irfan, *Advancing global education*. This is because their analysis of best performance was global and this analysis was Africa-specific.
- 34 For a more detailed analysis of the forward impacts from increased education investment, see Dickson, Hughes and Irfan, *Advancing global education*, chap 8.
- 35 Annababette Wils and George Ingram, *Universal basic education: a progress-based path to 2025*, Washington, DC: FHI, 2011.
- 36 By 2030, before the large increase in GDP, the total decline in spending by sector is the following: US\$ 20 billion less on the military, US\$27 billion less on health, US\$0,7 billion less on research and development, US\$ 17 billion less on infrastructure, and US\$ 27 billion less on government administration. These figures are discounted at 3 per cent and are in 2000 US dollars.
- 37 'Years of life lost' is one measurement of the burden of disease in a country or region. The measure cited above is the total years of life lost by Africa from all causes: communicable diseases, non-communicable diseases, and accidents and injuries. For more information, see Barry B Hughes, Randall Kuhn, Cecilia M Peterson et al, *Improving global health, Patterns of Potential Human Progress Series*, vol 3, Boulder and New Delhi: Oxford University Press and Paradigm, 2011, <http://www.ifs.du.edu/documents>.
- 38 This is explored in detail in Dickson, Hughes and Irfan, *Advancing global education*.

AFRICAN FUTURES PROJECT

The African Futures Project is a collaboration between the Institute for Security Studies (www.issafrica.org) and the Frederick S Pardee Center for International Futures (www.ifs.du.edu) based at the Josef Korbel School of International Studies at the University of Denver. The Institute for Security Studies is a widely recognized pan-African think tank specialising in issues of human security. The Pardee Center is the home of the International Futures model, an integrated approach to understanding human development and the broad implications of policy choices. These organisations leverage each other's expertise to provide forward-looking, policy-relevant material that frames uncertainty around human development in Africa.

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