Measuring Progress toward Universal Primary Education:
An Examination of Indicators*

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February 2013

Word Count: ?????

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Acknowledgments: Tahra Hassan provided fast and accurate data analysis for this paper. Mary Beth Weinberger gave invaluable statistical advice and many helpful suggestions throughout this work. Maxine Olson and Rania Salem provided useful feedback on earlier versions. I have benefitted from the feedback received at seminars presented at the Centre for International Education, University of Sussex, UK; the Social Statistics Department, University of Southampton, UK; the Millennium Villages Project, Columbia University, USA; the Harvard Center for Population and Development Studies, USA; and the Population Studies Center, University of Michigan, USA. Of course, any misstatements or errors remain my own.

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Abstract

In this paper I compare two internationally accepted indicators for assessing progress toward Universal Primary Education (UPE): 1) the Net Enrollment Rate (NER); and 2) the Primary School Completion Rate (PSCR). I also consider the role played in UPE assessment by the Gross Enrollment Ratio—mainly used when measuring gender parity. These measures can produce dramatically different indications of the amount and nature of progress achieved over time. These differences are largely caused by differing impacts of the proximate determinants of educational attainment—ever-enrollment, retention, and timely progress through education. I show that the NER and related measures, the most commonly used indicators of progress, will, under conditions widely prevalent in sub-Saharan Africa, produce misleading results. The PSCR, in the context of the proximate determinants of educational attainment framework, provides an integrated, mathematically coherent, perspective on progress toward UPE and useful feedback for policy makers.

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Introduction / Literature Review

The Education Millennium Development Goal (MDG-goal 2) of Universal Primary Education (UPE), a reformulation of the second Dakar Education for All (EFA) goal (UNESCO 2000), states that "by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling@ (UN Statistics Division 2008). The World Education Forum gave UNESCO the responsibility to Aco-ordinate the global efforts to achieve@ and Amonitor progress toward@ EFA (UNESCO n.d.:6), while the United Nations and the World Bank issue annual reports on the MDGs in general, including basic information about the education MDG[1]. Early in the new millennium the international community chose two indicators for measuring progress toward UPEBthe Net Enrollment Ratio (NER) and the Grade Four Completion Rate (UNESCO 2002b). Given the focus of UPE on primary school *completion*, an early report urged that APrimary school completion rates ... should be the criterion for evaluating progress toward the goal of EFA.@ (UNESCO 2001b:42; see also Bruns, Mingat and Rakotomalala 2003; Carr-Hill 2009; Kane 2004; UNESCO 2003; UNESCO 2007; UNESCO 2010). The World Bank uses a proxy "primary completion rate" (also known, and more correctly described, as the "gross intake rate to the last grade of primary") to assess progress toward UPE in its annual MDG monitoring reports (World Bank 2012)[2]. Over time, however, the NER, together with the proportion of pupils starting grade 1 who reach the

1 The most recent UN MDG monitoring report can be found here:
http://unstats.un.org/unsd/mdg/Resources/Static/Products/Progress2012/English2012.pdf
The most recent World Bank MDG monitoring report is here:
http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/04/25/000386194_20110425025358/Rendered/PDF/613110PUB0impr18700010978082138700 9.pdf

2 World Bank Primary Completion Rates are found here:
http://data.worldbank.org/indicator/SE.PRM.CMPT.ZS

last grade of primary (the primary school Asurvival rate@), have come to be the main indicators of progress toward the education MDG (UN Statistics Division 2008). In practice, the NER has received more attention than the primary school survival rate in the UN's annual MDG monitoring reports. The NER is also the principal indicator used to assess if countries are "on-track" to achieve EFA (UNESCO 2007) and the NER is the single indicator representing progress towards achieving UPE in the "Education for All Development Index", though the survival rate to grade 5 is used as an indicator of the quality of education in this index (UNESCO 2011). Thus, even though reports routinely note that the NER is a measure of enrollment in, rather than completion of, primary school; the NER is often implicitly treated as a close proxy of completion that indicates each country's distance from achieving the goal of UPE.

In the midterm review of progress toward EFA, UNESCO identified just one sub-Saharan African (SSA) country (Tanzania) as having achieved UPE, i.e. having a Atotal NER@ (tNER)[3] greater than or equal to 97%. Four other SSA countries (Benin, Madagascar, Malawi, Zambia) are said to be Aon-track@ to achieve UPE by the target date of 2015, i.e. having a tNER greater than or equal to 80% and Amoving towards the goal, with steady progress@ (UNESCO 2007:180 Table 5.1; see also Schwab 2009; UNDP 2010).

An important reason why the NER is generally used in preference to primary completion is that the NER is easily computed from the administrative data that are the basis of most of the widely used education indicators; completion rates are not. Various indicators besides the NER are employed in discussions of progress, and they are valuable for examining specific elements required for achieving UPE, including universal and timely enrollment and retention through the grades. Of these, the Gross Enrollment Ratio (GER) deserves special

3 The tNER has now been replaced by the "adjusted net enrollment ratio" [ANER] (UNESCO 2010). This appears to be a change of name only. The definition remains the same.

attention, as it is used in computation of the Gender Parity Index (GPI), used to assess MDG3, gender equality (UN Statistics Division 2008; UNESCO 2007; UNESCO 2010). Attempts to develop from administrative data a valid – and generally available – direct indicator of primary completion have met with less success, as is discussed below.

At the same time, primary school completion is easily computed from questions asked in many household sample surveys. Below I present a survey-based measure, the "primary school completion rate" (PSCR), and show how the PSCR can be divided into components or "proximate determinants"[4] of completion. Together the PSCR and proximate determinants form an integrated, mathematically coherent system for assessing the role enrollment, retention, and timely-progress play in achieving UPE.

Survey data can also be used to calculate the NER[5] and some of the other main indicators produced from administrative data. From the beginning of the UPE program, the possibility of inconsistencies between indicators was recognized and comparison between results based on administrative records and those from survey data was recommended (UNESCO 2001a). Previous studies have analyzed the substantial discrepancies that sometimes arise when comparing survey-based with administrative-data-based NERs (Education Policy and Data Center [EPDC] 2007; Stukel and Feroz-Zada 2010; UNESCO 2010). Such studies have focused largely on issues related to the quality of the underlying data. They have not considered whether conclusions about progress towards UPE based largely on trends in the NER are consistent with those based on a direct measure of primary completion such as the PSCR. In fact, even when the same survey is used to compute both the NER and PSCR, the level of educational attainment and the pace of progress toward achieving

[4] The proximate determinants framework of educational attainment was inspired by, and uses terminology borrowed from, Bongaarts's proximate determinants of fertility framework (Bongaarts 1978).

[5] The survey based equivalent is technically called the "net attendance ratio" (NAR). For the sake of convenience, however, I will use NER throughout this paper, whether I am using UNESCO-reported, administrative-statistic-based figures, or survey-based results.

UPE can differ dramatically depending on which of the two measures is used. The underlying cause of these differences is not data quality, but the fundamentally different ways in which the NER and the PSCR are affected by the proximate determinants.

In this paper I will first describe the PSCR, the proximate determinants, the NER, the GER, and several of the other measures used in assessing progress toward UPE and show how seemingly similar measures differ from each other. I will explain why these measures differ. I will then compare results using different measures of educational attainment in the five SSA countries said by the 2008 midterm Global Monitoring Report (GMR) to have either achieved UPE, or to be on-track to reach UPE by 2015[6].

I will also discuss briefly how use of different indicators results in different understanding of other educational changes in these SSA countries. For example, since the mid-1990s all five of these countries, along with many other countries, have eliminated fees (UNESCO 2007:113 Map 3.2; see also Horn, Prouty and Wright 2009; Tomasevski 2003). Studies examining the impact of fee abolition in SSA countries report not just increased enrollment, but also greater socioeconomic and gender equity following elimination of fees (al-Samarrai and Zaman 2007; Deininger 2003; Essama-Nssah 2010; Nishimura, Yamano and Sasaoka 2008; Shabaya and Konadu-Agyemang 2004; World Bank 2009). However, research on gender parity, particularly, yields contradictory results depending on the indicator used to measure the GPI (al-Samarrai and Zaman 2007; Bennell, Bulwani and Musikanga 2008). Analysis using the PSCR and proximate determinants explains these inconsistencies.

The Indicators

[6] For convenience I will refer to all five of these countries as "on-track".

In this paper the survey-based PSCR[7] is defined very simply as the percentage of children in a cohort who have completed primary education. The PSCR is based on a cohort of children slightly older than the normal age of completing primary school and is presented in the context of the proximate determinants of education framework (see Appendix A—available from the author on request—for a detailed description of the framework). Ideally there would be four proximate determinants[8] of educational attainment: 1) ever-enrollment; 2) retention; 3) timely enrollment; and 4) timely progress through education[9]. Due to data limitations the last two proximate determinants are collapsed into a single measure of "timely progress"[10]. Each of the proximate determinants has a complement: 1) failure to enroll; 2) dropout; and 3) delay (whether due to late enrollment, grade repetition, or temporary absence from school[11]). There is a mathematical coherence to this framework. The PSCR is equal to: 1) ever-enrollment—the percentage of a cohort of children who ever enrolled in grade one of primary school; 2) multiplied by retention—the percentage of those in the cohort who ever enrolled, who either: a) completed primary school; or b) remained in school until reaching the age of the study cohort; 3) multiplied by timely progress—that is, those in the cohort who

[7] Though the definition of the PSCR I use is new, it is closely related to the grade-4 and grade-5 completion rates used in earlier work (Filmer 2005; Lloyd and Blanc 1996; Lloyd, Kaufman and Hewett 2000).

[8] The term "*proximate determinants* of educational attainment" is used with specific intent. The proximate determinants completely determine whether or not a person is enrolled in, or has completed, a given level of education.

[9] Timely progress through education itself has two components: 1) regular transitions from one grade to the next, without repetition; and 2) staying consistently in school through the primary school years, without withdrawal and re-entry.

[10] Although the variables currently found in most DHS and MICS household listings prevent independent measures of delayed enrollment and grade repetition, the EdData module used in some DHS studies and included in the woman questionnaire does include questions that would permit estimates of these determinants. They ask: 1) the age when the child first started going to school (timeliness of enrollment), and 2) whether the child has ever repeated a grade (repetition). It is also possible to add a question about whether the child has ever left school for at least one complete school year and then returned to her/his education (delay resulting from interrupted studies). Though currently the "timely progress / delay" questions are part of the woman questionnaire, and thus potentially subject to selectivity bias (mothers of some eligible children will be older than the eligible woman age range), the questions could, without difficulty, be added to the household listing.

[11] Though there are technically these three components to delay, temporary absence from school—i.e. withdrawal and subsequent return—is rarely spoken of and is believed to be rare in most countries. Therefore, when considering delay, I will focus on delayed enrollment and grade repetition.

completed primary education, divided by those: a) who are still enrolled, plus b) who completed primary school before dropping out (see Appendix A).

Use of the PSCR together with the proximate determinants of educational attainment is the major innovation of this paper. The PSCR and proximate determinants provide a simple survey-based approach to achieving the goal of an "integrated way of measuring the … things that count in progress toward universal primary education:" entering school, progressing through the system in a timely way, remaining in school, and completing primary education (UNESCO 2010:6).

A wide range of other, mainly administrative-data-based, education indicators have been developed and defined. Many are included in UNESCO's technical guidelines (UNESCO 2009); others appear only in the annual GMRs or in World Bank reports. A few of these indicators have played a particularly important role in assessing progress toward UPE. Historically the GER was used as the main indicator of progress. As more countries had GERs exceeding 100%, mainly as a result of delay in completing primary, the NER gained prominence. There was concern, however, that due to late enrollment the NER would underestimate actual school participation and the proportion of children who would eventually complete primary education (UNESCO 2003:51). In the 2002 EFA GMR both the NER and GER were used, and an NER "close to 100" was deemed one of the "key criteria" for achieving UPE (UNESCO 2002b: 16). In later EFA GMRs the NER emerged as the principal indicator of progress toward UPE, while the GER was used to measure gender parity. Both the numerator and denominator of the primary NER are restricted to children of primary school age. The denominator of the GER is the same as the denominator of the NER—all children of primary school age. The numerator of the GER, however, includes *all* children studying in

primary, *regardless of age* (UNESCO 2007). The NER and GER are usually computed from administrative data, though there are survey-based equivalents.

The NER is a measure of enrollment and "does not capture actual completion" (Bruns, Mingat and Rakotomalala 2003:32). Measuring completion was viewed as important because completing primary is seen as necessary to maintain basic literacy and numeracy skills (Kane 2004: 39; see also Carr-Hill 2009). Others feel that completion rates are a "more accurate indicator of human capital formation and the quality and efficiency of the school system.…" (Cameron 2005: 2). Some early reports used the primary completion rate (PCR), the number of children who complete primary school in a given year, regardless of age, divided by the number of children at the official primary school completion age in that year[12]; however, not all countries reported the data required to compute this indicator (Bruns, Mingat and Rakotomalala 2003; see also, Kane 2004). The World Bank in its annual reports on progress toward the MDGs also uses a measure called the primary completion rate (World Bank 2012). However, this is a very different measure from that used by Bruns, Mingat and Rakotomalala (2003) and Kane (2004). The current World Bank PCR is the "total number of new entrants in the last grade of primary education, regardless of age, expressed as percentage of the total population of the theoretical entrance age to the last grade of primary"[13]. More recently, the annual EFA GMRs have included the primary cohort completion rate (PCCR), the percentage among those who entered school who actually complete primary, or, more formally, "the product of the survival rate to the last grade and the percentage of those in the last grade who successfully graduate" (UNESCO 2010: 448). (Though called a "completion" rate, the PCCR is more similar to my retention proximate determinant—see the following paragraphs.) The 2010 EFA GMR observed that available

[12] This is equivalent to UNESCO's Gross Primary Graduation Ratio (UNESCO 2009). This indicator has not been reported in the GMRs.

[13] http://data.worldbank.org/indicator/SE.PRM.CMPT.ZS

indicators failed to provide an integrated approach to assessing progress toward UPE (UNESCO 2010:6). To fill this gap, the GMR's authors introduced the net cohort completion rate (NCCR)—the product of the PCCR and the net primary intake rate—in order to estimate the percentage of a cohort expected to complete primary school (UNESCO 2010). All of these indicators are based on administrative data.

There are also administrative-data-based cognates for each of the proximate determinants. For example, ever-enrollment is approximated by the net and gross intake rates (NIR/GIR)—"new entrants to primary grade 1 (who are of the official primary school entry age / [regardless of age]) as a percentage of the population of official entry age" (UNESCO 2001a:16). Retention is similar to the survival rate—"the percentage of a cohort of pupils who enrolled in the first grade of primary education in a given year and who eventually[14] reach [the final year of primary school]" (UNESCO 2001a:21), and to the PCCR, defined above. Though there is no cognate for timely progress, its complement, delay, is related to the repetition rate—"the number of repeaters in a given grade in a given school year expressed as a percentage of enrolment in that grade the previous school year" (UNESCO 2001a:21).

The administrative-data-based cognates only roughly approximate the survey-based proximate determinants. For example, the NIR is affected not only by failure to enroll, but by delayed enrollment. The GIR should include all children who ever enroll, but may include children of a wide range of ages, not just from a narrow cohort, and may exceed 100%. And of course, the NIR and GIR relate to a different base population, approximately 8-10 years younger than the denominator used for the survey-based measure of ever-enrollment. The survey-based indicator of retention shares some key characteristics

[14] More recently, "eventually" has been replaced by "expected to" (UNESCO 2009:14). Both these terms have important implications for this measure, as will be discussed below.

with the survival rate and the PCCR. They are all defined as cohort measures based on children who ever enrolled in school, measuring whether that child stays in school or not. That said, though all three are defined as cohort measures, the survival rate and PCCR use period data and are based on synthetic cohorts, while retention is computed using data from an actual cohort. In addition, the survival rate requires only that a child reach the last year of primary; the PCCR represents the probability that a child actually completes primary school. Retention, on the other hand, doesn't require completion of any particular grade but only that a child stays in school until a certain age. The repetition rate refers only to the previous school year; timely progress/delay considers the child's entire educational career. As a result, the values of delay and the repetition rate will often be very different.

Most of the cognates have been routinely reported in the annual GMRs since the 2003/04 report (UNESCO 2003). However, the data required for them are not always available. Moreover, they lack internal coherence, as will be shown below.

Names, abbreviations, and definitions of all the indicators discussed in the preceding paragraphs can be found in Box 1.

As noted earlier, even though the EFA monitoring reports refer to a range of indicators when discussing progress towards UPE, assessments of whether countries are "on track" have relied principally on whether the net enrolment rate is approaching 100 (is on track to reach 97% by 2015). There are certainly some circumstances in which an NER near 100 would indicate success at reaching near-universal completion of primary education. For instance, if nearly all students enroll on time, complete each primary grade on time, and dropout is low then the NER and the PSCR will both be near 100%. However, there are also circumstances in which an NER close to 100 would not mean that a country was close to achieving universal completion of primary education. In order to

explore this idea, I have created a number of simple scenarios (see Appendix B—available from the author on request) to illustrate how the NER, PSCR and other indicators relate to each other in situations representing different levels and age patterns of ever-enrollment, retention, and timely progress. For the sake of simplicity in exposition, the scenarios assume that there has been no time trend in the number of students entering primary school age each year, nor in the indicators and their components, i.e. these scenarios are based on stationary population assumptions. (All assumptions underlying the scenarios are detailed in Appendix B.) Because of the importance of the NER in assessing progress toward UPE, I constrain the NER to be 90% in all scenarios. I focus the extent to which the PSCR *differs* from the NER as ever-enrollment, timeliness of enrollment, timely progress through the grades of primary education, and retention change. I also comment on the GER because of its use in the GPI. Appendix B provides specific examples and details about the behavior of the proximate determinants and their cognates under the different scenarios.

First, the scenarios show that the more that exclusion of children from primary school is concentrated near the beginning of children's educational careers, the less will be the difference between the NER and PSCR. If all exclusion occurs at the very beginning of primary education, i.e. as failure to enroll, and there are no extensive delays in progress through the grades, then the NER and PSCR will be equal. However, exclusion due to dropout can result in large differences between the NER and the PSCR. The timing of dropout is important for the NER: early dropouts reduce it more than do late dropouts. If dropout is common and is concentrated near the end of the primary school career, especially in the transition from the last year of primary to graduation (as might occur where graduation depends on passing a final examination), the

difference between the NER and the PSCR can be large. By contrast, all dropouts before primary completion have an equal impact on the PSCR, irrespective of the number of years a child studies before dropping out.

Delays in enrollment and in grade progression introduce greater complications. By itself, a delay in enrollment decreases the NER from the level that would otherwise be observed, but such delays need not affect the PSCR at all. Delayed enrollment is the only determinant that can result in a PSCR that is greater than the NER, though this will only happen when subsequent retention and timely progress are high. Grade repetition also affects the indicators differently. Repetition has no effect on the NER. Importantly for the GPI, delay tends to increase the GER, assuming that some children remain in primary school beyond the normal graduation age in a effort to complete their primary educations. The PSCR is not sensitive to a small amount of grade repetition or to modest delays in enrolling, since cohorts are examined 2-3 years beyond the "normal" age for primary completion. However, extensive delays in progress through the grades can substantially lower the PSCR, especially if children who repeat grades also enrolled late.

Thus, in some situations the NER can be close to 100 while the PSCR is much lower--in particular when many students drop out in the later years of the primary cycle and/or when students experience substantial delays in timely progress through school and drop out after the normal age of completion. In the latter case, many students may still be in primary school at the ages when the PSCR is assessed, and it is worth re-examining the cohort when it is older to see how many students eventually graduate. If large proportions of children remain in primary school 2-3 or more years after the normal completion age, the timely progress determinant will be low and this will be reflected in the PSCR. There is no mechanism for including delay in the NER and GER.

All of the scenarios in Appendix B show period data. Because of the stationary population assumptions that underlie these scenarios, however, all of the outcome indicators, proximate determinants, and cognates shown would be the same had they been computed from cohort data using the same transition rates.

While these scenarios show the effects of the proximate determinants in hypothetical situations, it is important to show how the outcome indicators are affected by the proximate determinants in actual countries. I use Demographic and Health Survey (DHS) data to assess differences in outcome indicators (NER/GER vs. PSCR) and the effects of the proximate determinants for Tanzania and the four other SSA countries that the 2008 GMR finds to have a high chance of achieving UPE by 2015 (UNESCO 2007). I also use data for Egypt to illustrate results for a country with a very different outcome and proximate determinant profile. (Egypt is also said to have attained UPE by 2005 [UNESCO 2007].) All of these countries have multiple surveys with the earliest data being collected some time in the 1990s, or earlier, and the most recent survey being 10 or more years after the first survey.

DHS provide all the data necessary to compute the outcome indicators (both NER/GER and PSCR) and the proximate determinants. They also provide key indirect determinants such as gender, urban/rural residence, and wealth. In this present work, I will examine gender differentials only. They are particularly illustrative of the differential impact of the proximate determinants on the outcome measures.

As noted above, the scenarios in Appendix B are based on "stationary" population assumptions. The number of children eligible to enter school each year and all the transition rates are constant over time. The African countries examined here are not stationary. However, the number of children eligible to enter school is growing at a reasonably steady rate in most sub-Saharan countries, while enrollment and transition rates have in most (not all) cases

been increasing slowly over the period studied. The same general demographic and educational circumstances characterize Egypt, as well. In these demographic and educational circumstances the levels of ever-enrollment, retention, and timely progress determine the level and trends of the NER, GER and PSCR – as illustrated by the scenarios in Appendix B. The size of the difference between the NER and the PSCR in the results presented below is caused by the way these indicators are affected by the proximate determinants that characterize these countries.

At the same time, it is necessary to take into account the nature of these outcome indicators when making comparisons over time. Specifically, the NER and GER are "period" rates pertaining to a particular year while the PSCR pertains to a cohort of children, assessed when they are a little older than the normal age for completing primary school. This means that a change that has a large effect on rates of enrollment, retention and timely progress will manifest itself immediately on the NER and GER. The PSCR, and all true completion rates, will also be affected, but only after a lag (Cameron 2005). For example, if a policy change such as elimination of school fees results in a large influx of students into the primary school system and retention of students who might otherwise have dropped out, this will be reflected immediately in the numerator of the NER and GER, but the increase in enrollment and improved retention resulting from fee abolition will not be fully evident in the PSCR for several years while the change in the number of students works its way up through school and into the age-range specified by the PSCR analysis (Cameron 2005). Thus the NER may be seen as a more "timely" indicator than the PSCR.

While the timeliness of results is an important consideration, it is also valuable to have an integrated, mathematically coherent structure including all the determinants of progress that measures *completion* of primary education, the stated goal of UPE (UNESCO 2010). The

PSCR in the context of the proximate determinants meets this standard; the NER, even when combined with the cognates of the proximate determinants, does not. I will show below that, especially under conditions commonly found in SSA countries, these different outcome indicators give radically divergent indications of the current level of educational attainment and of progress over time toward achieving UPE.

Results

Measuring Progress Toward UPE

Despite the range of indicators UNESCO has defined, when the UN assesses progress toward the education MDG, the main indicator used is the NER (UN 2012). More precisely the countries said to have achieved UPE have a "*total* NER" of 97 percent or more. The tNER is very similar to the NER, but includes in the numerator all children of primary school age who are studying in primary school *or above*. This means, in effect, that it also includes children who either enroll early or advance quickly through the grades, and who therefore have advanced beyond primary school while still being of primary school age. In practical terms, because in developing countries early enrollment is rare, as is skipping grades to advance quickly through school, the tNER is generally no more than 1-2 percentage points greater than the NER.

Achieving a tNER of 97 percent is difficult. For example, we can create scenarios, following the same general assumptions as the scenarios in Appendix B, to illustrate that even excellent school systems would have difficulty achieving a tNER of 97 percent. Thus, if 98 percent of all children enroll in school, but 10 percent enroll after a delay of just one year, the tNER will be 96 percent, even if no child drops out during primary. Similarly, if 98 percent of children enroll at the statutory age, but 1 percent of children drop out each year, once again the

tNER will be just 96 percent[15]. Moreover, when using survey data to compute the NER there is a practical problem that not all children reported to be at the statutory age of beginning school in the survey were of an age eligible to enter school at the start of the most recent school year. The size of this effect depends on the timing of the survey relative to the start of the school year, and the exact rules governing age at first enrollment. The difficulty of reaching a tNER of 97 percent was recognized early in the current century: across the OECD countries, where primary completion is close to 100 percent, the average NER is just 94 percent (Brossard and Gacougnolle 2001: cited in Bruns, Mingat and Rakatomala 2003:35) Thus, a country that has achieved UPE, i.e. a tNER of 97 percent or more, has a truly exemplary educational system.

With this caution in mind, I first consider Tanzania, the only SSA country determined in the 2008 GMR to have achieved UPE. In Tanzania there are 7 years of primary education, beginning at the statutory age of enrollment of 7 years (UNESCO 2010-Tanzania; World Bank 2010). Therefore the NER and GER are computed for children aged 7-13 years. Since children who progress through primary education in a routine fashion should complete grade 7 by the age of 13-14 years, the PSCR and proximate determinants are based on the cohort of children 16-17[16] years old, allowing 2-3 years past the normal age of completion to finish primary education without being considered delayed in the proximate determinants framework. In Tanzania, fees for primary education were eliminated when the Primary Education Development Program (PEDP) began in 2001 (World Bank 2005).

[15] Tables illustrating these scenarios are in Appendix C—available from the author on request.

[16] The age range used is arbitrary. Different age ranges could be used. My goal in choosing 16-17 years is to allow for some expected delay while still capturing extreme delay. In general, as the age range used is moved further from the normal age of completing primary school, the PSCR will increase, ever-enrollment will remain unchanged, retention will decrease, "timely-progress" (no longer very "timely") will increase.

According to the administrative-data-based figures presented in the EFA midterm assessment (UNESCO 2007), the NER[17] in Tanzania was less than 50% in 1991 and 1999, but following fee abolition, jumped to 98% in 2005, thus attaining UPE (Table 1, Column 2). The survey-based NER computed from DHS data was a bit higher through the 1990s, ranging from 51-54%. It also jumped in the new millennium, but only to 71% in 2004 and 80% in 2010 (Table 1, Column 3). Despite this substantial progress over time, the survey based NER remains far from UPE even in 2010[18].

For the PSCR there is a substantial drop between 1992 and 1996[19], followed by little change between 1996 and 2004. The lack of a response to fee elimination in the 2004 data may reflect the lagged nature of the PSCR, while the jump of 23 percentage points in the PSCR between 2004 and 2010 may be the result of fee elimination. Nevertheless, even in 2010, when 69% of children 16-17 years of age are found to have completed primary education, the PSCR suggests a country even farther from achieving UPE than the picture presented by the survey-based NER.

What accounts for these large differences in the levels of the NER and the PSCR even when based on data from a single survey? It is difficult to make direct comparisons because, as has been mentioned, the NER is a current indicator of primary enrollment using period data, while the PSCR is lagged and reflects primary completion of a cohort, with the two indicators based on children in different age groups in the same year. Nevertheless, keeping in mind the lessons learned from the scenarios in Appendix B, examination of the proximate determinants (Table 1, Columns 12-14) can help in understanding why the NER and PSCR differ as they do.

[17] Although UPE is based on the tNER, the statistical tables in the UNESCO GMR for 2008 provide only the NER. As, noted, the NER and tNER are generally very similar in these countries.

[18] The difference between the administrative-statistic- and survey-based NERs may be due to data problems such as those investigated by the Education Policy and Data Center (EPDC 2007) and by Stukel and Feroz-Zada (2010). This question is beyond the scope of this paper.

[19] This drop may be the result of increasing private costs of primary education beginning in the 1980s and culminating in the reinstitution of primary school fees in 1995 after a period of no fees (Alonso i Terme n.d.). Assessing this change is beyond the scope of this paper.

Consider the increases in the outcome indicators that occurred after fees were eliminated in 2001. It is plausible that the NER increased in 2004 and continued to increase in 2010 because the elimination of fees resulted in higher ever-enrollment and better retention (Cameron 2005). Because of the lagged nature of the PSCR, the increases in ever-enrollment and retention are not fully evident until 2010. But the improvement in timely progress also played a substantial role in the change in the PSCR between 2004 and 2010. Had ever-enrollment and retention increased as shown between 2004 and 2010 (ever-enrollment 83% to 91%; retention 87% to 91%) but timely progress stayed the same at 65% across those two years, the PSCR would have increased only to 54% in 2010. On the other hand, if ever-enrollment and retention had remained the same while timely progress increased as it did (from 65% to 83%), the PSCR would have increased from 46% in 2004 to 60% in 2010. That is, the change in timely progress had a greater impact on the PSCR than did the combined effect of improved ever-enrollment and retention. Yet this timely progress effect will be largely, perhaps completely, invisible to the NER.

Another point to note from Table 1 is the seeming inconsistency between the administrative-statistics-based indicators of intake, survival/retention and grade repetition for 2004 and 2005 (Columns 6-10); and the survey-based indicators (Columns 12-14). The UNESCO 2003 and 2005 NIRs[20] are close to (2003, very close to; 2005, slightly higher than) ever enrollment in the 2004 DHS. The UNESCO GIR, on the other hand, is substantially higher. Survival to the last grade and the PCCR are both lower than retention. UNESCO's estimate of repeaters is low, suggesting high levels of timely progress, while the DHS data indicate that the level of timely progress is low. In part these inconsistencies exist because the

[20] The 1999 NIR is extremely low (14%) suggesting a very high level of late enrollment. The substantial increase in the NIR by 2005 indicates that in that year, timely enrollment had improved considerably.

administrative-statistic-based cognates are, at best, only rough proxies for the survey-based proximate determinants (see above, pp. 6-7).

Note too, however, that an estimate of the NER based on the NIR of 90 and survival rate of 79 reported in 2004 and 2005 is not wholly consistent with the NER of 98 reported for 2005. The highest value of NER that would be consistent with the NIR and survival rate figures is 95.6 percent, which would be observed if all children entered school, with 10% of them delayed just one year in their entry, and all entrants remained in school until 21% dropped out in the last year of primary. An NER of 95.6 percent is an excellent achievement, but short of UPE, and of the 98 percent NER reported in the 2008 GMR. If dropout were instead assumed to be distributed evenly over the years of schooling, the value of the NER that would be consistent with reported NIR and survival rates would drop to 90 percent or less: still very good, but even farther from UPE[21]. Any failure to enroll, delay beyond one year in school entry, or higher levels of dropout early in the educational career would reduce the NER still further.

Results for the four SSA countries determined by UNESCO to be "on-track" with a "high chance" of achieving UPE by 2015—Benin, Madagascar, Malawi, and Zambia—(UNESCO 2007:180) are shown in Tables 2 through 5. Rather than discuss each country individually, I will summarize the common points seen in these countries[22]. The administrative-data-based NERs tend to be low in the 1990s, with substantial increases in 2005. Three of the countries have NERs ranging from 89% to 95% in 2005, while the NER for Benin in that year is just 78%[23]. The DHS-based NERs follow the same general pattern—low in the 1990s and increasing into the 2000s. But the DHS NERs for the most recent year available are

[21] Details of these scenarios are in Appendix D—available from the author on request.
[22] Basic information on statutory age of first enrollment, duration of primary, and timing of elimination of fees for each country can be found in Appendix E—available from the author on request.
[23] Technically an NER of 78% in 2005 would not qualify Benin to be on-track. However, a background paper (EPDC 2007) for the midterm GMR reports a tNER for Benin of slightly over 80% pushing it just into the qualifying range. Moreover, the background paper found Benin to have experienced very high growth in the NER between 1999 and 2005.

consistently 9-19 percentage points lower than the 2005 administrative-data NERs[24]. And, as in the case of Tanzania, the PSCRs in these countries are very much lower—16 to 51 percentage points lower—than the survey-based NERs. Overall, the PSCRs based on the most recent surveys available for each country (2006 – 2010) are low. They range from just 35% in Malawi, to 43% in both Benin and Madagascar, to 59% in Zambia.

Three of these four countries (Madagascar, Malawi and Zambia) share a similar pattern for their proximate determinants—high and generally increasing ever-enrollment, moderate and generally increasing retention, low though increasing (with the exception of Zambia) timely progress. In Benin, ever-enrollment is low, retention moderate and timely progress also low; all these indicators have increased over time. Empirically, the data show that when countries have moderate to high ever-enrollment and retention but low timely progress, then there will be a substantial gap between the value of the survey-based NER and the PSCR. The country with the largest difference between the survey-based NER and the PSCR (Malawi) has very high ever enrollment and the lowest level of timely-progress. On the other hand, of these four on-track countries, the one with the smallest difference between the survey-based NER and PSCR (Benin) has the lowest ever-enrollment and moderate timely-progress. These results are consistent with expectations based on Models 8 and 9, in Table B1, Appendix B. Much of the difference between the survey-based NER and the PSCR is attributed to the effect of the low levels of timely progress.

To further illustrate this point: assume that in all four of these on-track countries *all* children enroll at the statutory age and remain in primary school throughout the normal primary school age range. Timely progress, however, remains as found in the most recent DHS survey

[24] By contrast, an earlier study found that in about 1/3 of the countries studied the survey-based NER was *greater* than the administrative-statistic-based figure (EPDC 2007). I find similar results in some of these on-track countries, but only in the 1990s when NERs from all sources are low. Every comparison of the 2005 NER with DHS results since 2000 shows that the administrative-statistic-based figure is substantially greater than the survey-based result.

for each country. That is, there is substantial grade repetition that keeps students from completing primary education in a timely fashion. In this case, the NER would be 100% in all four countries. The PSCR, on the other hand, would range from 48% to 69%; that is, it would be equal to the level of timely progress.

Despite the difficulty in making direct comparisons between the NER and the PSCR, gaps between these two measures are seen consistently in all five on-track SSA countries, in virtually all the years[25] for which data are available. These gaps are consistent with the gaps expected based on the scenarios in Appendix B illustrating the role of the proximate determinants in producing differences between the NER and the PSCR.

Egypt (Table 6) provides a counter-example to these SSA countries. Egypt is also said to have achieved UPE (UNESCO 2007:180), though the administrative-data-based NER in 2005 was just 94%[26]. As with the SSA countries studied, in the years since 2000 the survey-based NER—87% in 2008—has consistently been less than the administrative-data-based NER in 2005[27]. In Egypt, ever-enrollment and retention are both high—not very different from the levels seen in Tanzania. But, in Egypt, the level of timely progress is very high—consistently 98% to 99% in all years shown. And, in general, in Egypt, the level of the survey-based NER tracks well with the PSCR. In four of the five years shown,

[25] The *only* exception is Tanzania 1992. In that year, timely progress was unusually high.

[26] According to the background paper on attendance estimates (EPDC 2007) the tNER for Egypt in 2005 is 97.3%. The gap of 3.6 percentage points between the NER and the tNER in that year is unusually large. There may be something about 2005 that is distorting these figures. In Egypt, the cohorts that entered school between 1988 and 1998 were given only 5 years of primary education. Given a statutory age of enrollment of 6 years, the age range for the NER during this period was 6-10 years of age. The cohort that began its studies in 1999 was the first cohort to complete the newly restored 6th year of primary education (MoE-Egypt 2003). This 1999 cohort would have completed the newly added 6th year of primary in 2005. As a result, analysts may have used the age range 6-11 years when computing the NER and tNER in 2005. The relatively large difference between the NER and tNER in that year, however, suggests that many of the 11 year olds in 2005 had completed primary education and were studying in the preparatory level. Analysis of the 2005 DHS illustrates this situation. When the age group 6-10 years is used, the difference between the tNER and the NER is less than one percentage point, consistent with the NER/tNER gap in all previous Egypt DHS. If, however, the age range is increased to 6-11 years, the difference between the tNER and NER increases to more than 6 percentage points.

[27] Stukel and Feroz-Zada (2010) note that official enrollment figures for Egypt may be inflated, possibly accounting for this difference.

these two figures are within 4 percentage points of each other. In 2005 and 2008, the PSCR is actually 2-4 percentage points *higher* than the survey-based NER[28]. The only exception is 1995, when the PSCR is 9 percentage points lower than the survey-based NER. Even this difference is less than all but a few of the NER-PSCR comparisons for the five on-track SSA countries.

As shown in the scenarios in Appendix B, even when timely-progress is very high as it is in Egypt, there is no requirement that the NER and PSCR be similar. If exclusion is concentrated near the end of the primary school career, these two measures could still differ substantially. In Egypt, however, failure to enroll has consistently been the main cause of failure to complete primary education—generally accounting for around 60 percent of this latter failure, though this figure dropped to 46 percent in 2008 (results available from the author). That is, exclusion in Egypt tends to be concentrated early in the school career. In combination with very low levels of delay this results in close similarity between the NER and PSCR. The large NER-PSCR gaps in the five on-track SSA countries result from: a) the low level of timely-progress seen in all these countries; along with b) the possibility of late dropout[29]. Combined these effects lead to concentrating exclusion toward the end of the primary school career and large differences between the NER and PSCR.

The age group chosen above for the calculation of PSCR – 2 to 3 years beyond the "normal" age of primary school completion – helped to highlight low levels of timely progress through school as an important issue in the five sub-Saharan countries examined. In such cases it is interesting to see what happens to the PSCR at an older age, after all or nearly all children have *eventually* either completed primary school or dropped out. This can be done by

[28] This result suggests an effect of delayed enrollment, as illustrated by scenario Model 6 in Table B1, Appendix B.

[29] The timing of dropout can be determined in the proximate determinants structure by estimating retention to specific grades. Illustration of this approach is beyond the scope of this paper.

comparing the PSCR and proximate determinants of the penultimate DHS survey with results for the same cohort, now aged some years, in the most recent survey. For example, for Tanzania, Table 7 compares the results for children 16-17 years of age in 2004 with those 22-23 years of age, six years later, in 2010. In the sub-Saharan countries the PSCR increases substantially once the cohorts reach older ages, ever-enrollment stays about the same[30], retention declines, and timely progress (no longer so timely) approaches 100 percent indicating that very few cohort members remain in primary school at these higher ages. Egypt, of course, is different because few students experience extensive delays in finishing school so that there is no scope for change as the cohort ages. Despite the increases in the PSCR in the five SSA countries as the cohorts age, in all five countries the PSCR remains far from UPE.

While the NER has been the main indicator of progress toward UPE, the 2010 GMR introduced the NCCR to provide an integrated measure of primary school completion (UNESCO 2010). Therefore, a brief discussion of the NCCR and how it compares to the PSCR seems in order. As noted above, the NCCR is defined as the product of the NIR and the PCCR—that is, the product of the measures of timely enrollment and retention. Thus, superficially, the NCCR and the PSCR appear similar. However, there are important differences in the details. In particular, use of the NIR puts a premium on timely entry, while ever-enrollment as measured in the proximate determinants framework is not sensitive to small delays in first enrollment. Another difference is that the PCCR is insensitive to delay caused by grade repetition, while the existence of substantial delays in completing primary school (low values of "timely progress") can have a large effect on the PSCR. For that reason, we might expect the NCCR to be more similar to the PSCR of the older age group in the most recent DHS shown in Table 7.

[30] Except in Benin where there is an inconsistency between the 2001 or 2006 Benin DHS education data.

The calculation and use of the NCCR was illustrated in the 2010 GMR (UNESCO 2010: Figure 2.22, p.73). Though values of the indicator have not been included in published tables in the GMR reports, the NCCR can be calculated from published values of the PCCR and NIR. The PCCR has been included in the annual GMRs since 2007, though it is not available for all countries. To date, there is at least one published PCCR for four of the countries included in this analysis (Tanzania, Benin, Madagascar, and Malawi). The values of the NCCRs tend to be very low. Only the NCCR for Tanzania (55 percent in 2003) is in the same range as the PSCRs shown in Tables 1 and 7. All the other computed NCCRs (Benin – 17% in 2004; Madagascar – 19% in 2005; Malawi – 17% in 2006) are substantially lower than either: 1) the PSCRs for the DHS closest in time to the date of the NCCR in Tables 1-5; or 2) the "terminal" PSCRs computed for the older age group in the most recent survey (Table 7). The probable main reason for these low values is the implicit assumption, in calculating the NCCR as the product of the NIR and PCCR, that the NIR provides a good proxy for the proportion of a cohort of students who ever enroll. Where late enrollment is common, as it is in all these countries except Tanzania, the NIR provides a serious underestimate of ever-enrollment, and therefore the NCCR gives a serious underestimate of the proportion of the whole cohort who ever graduate. Since late enrollment is common in many countries besides those examined here, the NCCR will tend to provide an underestimate of primary completion in many other countries as well.

Measuring Gender Parity

I will now illustrate how use of the NER / GER can produce misleading results beyond the simple question of progress toward UPE by examining the gender equality MDG (goal 3). This MDG mandates elimination of "gender disparity in primary and secondary education,

preferably by 2005" (UN Statistics Division 2008). In this paper, I focus on gender parity in primary education only. The GMRs measure the gender parity index (GPI) by the ratio of the gender specific GERs (UNESCO 2007:200). A GPI between 0.97 and 1.03 is considered parity. Previous research in on-track countries finds that gender parity has been achieved—but only when this is measured by the ratio of NERs. For example, a report on Malawi states that "gender parity in NER has been achieved" (World Bank 2009:178; see also al-Samarrai and Zaman 2007). If however, the GPI had been based on the GER, this study would not have found gender parity (World Bank 2009:177, Table 5.4). Similarly a study in Zambia observes that secondary NERs are higher for girls than for boys while the pattern of the corresponding GERs is reversed (Bennell, Bulwani and Muskanga 2008). In general it has been observed that "GPIs are consistently better for NERs than GERs" (UNESCO 2003:49).

Data for four[31] of the on-track SSA countries (Tables 8 – 11) show that this inconsistency between the NER- and GER-based gender ratios persists in the survey-based GPIs. There are 17 surveys available for the four on-track countries considered here. Of these, 13 have a GPI that favors males (mGER / fGER > 1.03). Of these 13, four have NER ratios that favor females (mNER / fNER < 0.97), while the remaining nine have NER ratios that suggest gender parity (0.97 <= mNER / fNER <= 1.03). Thus, inconsistencies between GPIs based on the GER relative to the GPIs based on the NER are the norm rather than the exception.

Why do these inconsistencies occur? Bennell, Bulwani and Musikanga (2008:15) suggest it is "probably because dropout rates are higher for girls". In Malawi and Zambia it is certainly true that dropout is higher for girls than for boys (Tables 10 & 11). In all eight surveys for these two countries, males have substantial retention advantages. In Tanzania and Madagascar (Tables 8 & 9), however, where the inconsistency between the NER and GER

[31] Benin has been excluded because in Benin all the key outcome indicators (NER, GER, PSCR) show an unambiguous male advantage. The Benin data are discussed in Appendix G—available from the author on request, and presented in Table G-1.

holds for five of nine surveys, there is a male retention advantage for just one of the surveys (Madagascar 1997). In the other four surveys males and females have retention parity. In one survey (Madagascar 2004) females have a slight ever-enrollment advantage and are at parity in retention, yet still there is a male GER advantage and a female NER advantage. Thus differential retention / dropout is unlikely to be the explanation for this inconsistency.

So, once again, why do these inconsistencies occur? Consistent with earlier speculation (UNESCO 2003) the reason lies in differential timely progress. To understand why these timely progress differentials cause the inconsistencies between the GER and NER ratios, recall how timely progress affects these measures. Late enrollment reduces the NER, but generally has no impact on the GER. Grade repetition, on the other hand, has no effect on the NER, but can actually cause the GER to increase. Thus, other things being equal, delay will always result in a GER that is greater than the NER. The greater the amount of delay, the larger will be the difference between the GER and NER. I have already noted that, overall, in these countries timely progress is low; i.e. delay is high. Moreover, in 16 of the 17 surveys available, females are substantially more likely to make timely progress through primary education than are males. These over-age males, who are disproportionately staying in primary education long past[32] the normal age of completion, are not included in the NER, but add to the numerator of the GER. Otherwise stated: "pupils outside the official age range tend more often to be boys than girls", largely because "repetition rates [are] higher for boys" (UNESCO 2003:49). Hence the inconsistency between these two measures.

The large differentials in timely progress also affect the apparent gender advantage in primary school completion as measured by the PSCR. In 11 of the 13 surveys with a GPI favoring males, the ratio of the PSCR suggests a female advantage in primary school

[32] Recall that the measure of timely progress used allows students to be 2-3 years over the age of normal completion of primary education without being considered delayed. Despite this tolerance, in 8 of 17 surveys 50% or more of males are delayed; this level of delay is reached by females in just two of 17 surveys.

completion (mPSCR / fPSCR < 0.97). Indeed, in eight of these 11 surveys the m/f ratio of the PSCR is < .90, indicating a very substantial female advantage. In seven of these eight surveys, either ever-enrollment, retention, or both favor males, while the other of these two proximate determinants is at parity—generally with a slight male bias. Recall that the PSCR is the product of ever-enrollment times retention times timely progress. Thus, when ever-enrollment and/or retention favor males and the other of the two is at parity, their product must favor males. Therefore it is necessarily the large female advantage in timely progress that results in the substantial female PSCR advantage.

One final point to make about the effect of differential timely progress by gender: in most cases timely progress favors those population groups who are advantaged—wealthy, urban, etc. In the case of gender, however, this is not the case. As can be seen from ever-enrollment and retention, males are generally advantaged in these countries. Still they are more likely to be delayed, and the dimension of delay is great enough that females in the cohort near the normal age of primary school completion have higher levels of completion.

What happens as the cohort ages? Given that many males remain in school, even though over-age, do these males complete primary education, or not? I have assessed this by comparing the same *cohort* for the penultimate and most recent survey in each of the four countries[33], just as I did with the cohort analysis above. Consider the case of Tanzania (see Table 8 – compare Row E with Row G.) As seen previously, over time, the level of ever-enrollment should stay about the same—it does—while retention goes down and "timely progress" (no longer very timely) goes up. The net result is that the PSCR of both males and females increased. But the increase for males (32 percentage points—from 43% in 2004 to 75% in 2010) is much greater than the increase for females (11 percentage points—from 50%

[33] For Malawi I've compared the same cohort in the ante-penultimate and penultimate surveys, as well as the same cohort in the penultimate and most recent surveys.

in 2004 to 61% in 2010). Therefore, while females in this cohort had a PSCR advantage when aged 16-17 years in 2004 (Table 8, Column 10, Row E), by 2010, when the members of this cohort were 22-23 years old and all had either completed primary or left school, males were substantially advantaged (Table 8, Column 10, Row G).

I have carried out an equivalent analysis for each of the four countries. In all four the same pattern holds. In the penultimate survey there is a substantial female PSCR advantage; in the last survey the same cohort exhibits a substantial male PSCR advantage. The net shift in the mPSCR/fPSCR ratio is between 0.30 and 0.39.

Once again, Egypt (Table 12) provides a counter example. In all years, timely progress is high—98% or higher—for both males and females. As a result, all the outcome indicators—NER, GER, PSCR—show similar gender parity results. In the early surveys there is a female disadvantage in all these indicators, with all indicators trending toward gender parity over time. The male/female ratios of the NER and GER are very similar in all years. Because very few children are delayed in their educations, the cohort analysis comparing children 14-15 years of age in 2005 (Table 12, Row E) with those 17-18 years of age in 2008 (Table 12, Row G) yields virtually no change in the PSCR or any of the proximate determinants. Gender parity in the PSCR remains the same for this cohort over time (compare Column 10, Row E with Row G).

In sum, the ways in which gender parity changes across different outcome measures and over time illustrate the important role played by the low levels of, and large gender differentials in, timely progress in the four on-track SSA countries studied. Similar timely-progress effects cause misleading results when using the NER / GER to assess the impact of fee abolition on wealth differentials of educational attainment (al-Samarrai and Zaman 2007; Deininger 2003) and the impact of UPE on secondary enrollments (Lewin 2008; Sutherland-Addy 2008).

Discussion

The purpose of program monitoring is twofold: 1) measure progress; 2) guide policy makers (UNESCO 2002a). Therefore the outcome indicators used must accurately reflect levels and trends in educational attainment. Moreover, the analysis of the outcome indicators must help policy makers understand the reasons for the levels and trends observed.

In the early years of this century official sources recommended that progress toward UPE be measured using both administrative-statistic and survey-based data. Moreover, both the NER and completion rates should be used as outcome indicators. In practice this has rarely been done. Recent official assessments have focused on the administrative-statistic based NER as the primary outcome indicator. Even when survey data are used to assess change, the NER has often been the indicator of choice (al-Samarria and Zaman 2007; Deininger 2003). Moreover, little thought has been given to the ways in which the proximate determinants affect the outcome indicators used. In recent years efforts have been made to develop an integrated approach to measure completion and, in effect, the proximate determinants of educational attainment in order to better measure progress and provide better guidance to policy makers on which of the proximate determinants is primarily responsible for any UPE shortfall (UNESCO 2010).

In this paper I have introduced a survey-based primary school completion rate, and have shown that, relative to the NER, the PSCR can give very different indications of the level of achievement and the pace of progress over time. When the level of timely progress is low, the results based on the NER have been shown to be much more positive than are those based on the PSCR, even when both measures are computed from the same survey. My analysis suggests that, under these circumstances which are common in SSA countries, the NER based

results are misleading when they are used as the primary criterion for assessing whether countries are close to achieving UPE, while the PSCR results give a better reflection of progress toward UPE. Why?

First, as I have shown, the NER is largely insensitive to delay. Although late enrollment does reduce the NER, one of the few studies that can separate the effects of late enrollment from those of grade repetition argues that eliminating fees—as all of these countries have done, though the effect may not yet be apparent in all of them—reduces the level of late enrollment without affecting grade repetition (Nishimura, Yamano and Sasaoka 2008; see also Grogan 2008). In such a situation, grade repetition, which has no effect on the NER, becomes a greater part of delay. The PSCR is also insensitive to low levels of delay. But when timely progress is low, as it is in all the on-track SSA countries, and a number of other SSA countries as well (data available from the author), it can, and does, substantially reduce the PSCR. It is primarily this effect that accounts for the difference between the relatively high levels of the NER found and the much lower levels of the PSCR. Even when cohorts are allowed to age until all members of the cohort have either completed primary education or dropped out, the PSCR remains much lower than the NER and far from UPE.

In addition, differential timely progress accounts for the inconsistencies in measures of gender parity, and in the direction of change in gender parity over time. In 16 of 17 surveys for the four on-track SSA countries used in the gender parity analysis, males were more likely to be delayed than females[34]. In 15 of these 16 surveys the m/f ratio of timely progress was <0.90, indicating very substantial male disadvantages. Because of disproportionate male delay, the mGER is inflated by the large number of males who remain in school long after the normal age of primary completion. Thus following the official recommendation to use the

[34] In Benin also, though not included in this analysis, males have higher levels of delay than females in two of three surveys available for that country – see Appendix G, Table G-1.

GER to compute the GPI ensures a tendency to find a female disadvantage in school enrollment in countries with low levels of timely progress. As several past studies have shown, however, the NER, which is largely unaffected by delay, tends to show a female enrollment advantage (al-Samarrai and Zaman 2007; Bennell, Bulwani and Musikanga 2008; World Bank 2009). The DHS data presented here confirm this inconsistency between the GER and NER parity ratios. The PSCR also generally shows a female advantage at ages 2 to 3 years beyond the "normal" age of primary completion—in almost all cases because a higher level of timely progress among females overcomes the ever-enrollment and retention advantages of males. An analysis that follows a cohort from the penultimate survey to the most recent survey for each country, however, shows that more delayed males than females tend to stay in school and complete primary, so that by the time all members of the cohort have either completed primary or dropped out, the primary completion rate of males exceeds that of females.

Conclusions

In conclusion, the analysis in this paper has shown that the very low levels of timely progress that characterize these and many other SSA countries distort the most commonly used measures for assessing the education and gender equality MDGs. Official measures suggest these countries have achieved UPE, or are on-track to do so by 2015. The PSCR and proximate determinants, on the other hand, show that all of these countries remain far from UPE. If current trends continue, none will have achieved UPE by 2015.

Why is this important?

I noted above that the purpose of program monitoring is to: 1) measure progress; 2) guide policy makers. At a minimum, the measure of progress must reflect reality as closely as possible. But, the more important point is that misleading assessments of progress may

cause policy makers to make poor policy choices. If a country has achieved UPE, policy makers will rightly divert resources to other goals that demand attention. But, if the country is reported to have achieved UPE, but remains far from the goal, resources may be diverted and the critical goal of providing basic education for all children will be delayed—at best. This risk is especially great in an environment where some in the development community have come to assert that "By 2015, the universal primary education Millennium Development Goal (MDG) will be met in nearly all countries" (Beatty and Pritchett 2012:i; see also World Bank 2012:12).

What is to be done?

Since the turn of the century, irrespective of which indicator is used, all five of these on-track SSA countries have made great progress, increasing their enrollments and improving levels of primary school completion. This progress should be commended. But, according to the survey-based NER all these countries remain far from achieving UPE. Only Tanzania and Malawi are "on-track" in 2010 according to this measure. And, according to the PSCR, *none* of the five countries is on-track. Indeed, the PSCR shows Malawi with just 35% of children 16-17 years of age having completed primary in 2010. While this is a commendable improvement over the 13 percent completion rate found in 1992, there is little chance that Malawi will achieve UPE, as measured by the PSCR, by 2015. The inconsistencies seen between the various outcome measures used suggest that, at a minimum, progress toward UPE should be measured using a variety of sources of information—official government statistics and surveys; the NER and the PSCR. If all sources tell effectively the same story, as they do in Egypt, there is no problem. But, if there are inconsistencies, the proximate determinants help to reveal the cause of these inconsistencies.

At least for the foreseeable future, these countries must maintain their focus on primary education[35]. Ever-enrollment in all these countries, except Benin, is now above 90%. Recent increases in ever-enrollment in countries such as Tanzania, Madagascar, Malawi, and Zambia may reflect the positive impact of fee abolition. Retention remains low, especially in Madagascar and Malawi, and in general has increased less than has ever-enrollment. In all these countries, timely progress, an indicator of the efficiency of the educational system (EPDC 2007; UNESCO 2007), though increasing in four of the five countries (all except Zambia), remains very low. UPE, at least if considered to be a PSCR of 97%, cannot be achieved until all three proximate determinants are at 99% or better. A tNER of 97% also requires very high ever-enrollment and retention, but, as has been shown, is largely unaffected by delay. However, a tNER of 97% that co-exists with low timely progress has been shown to be a misleading indication of UPE.

Therefore, these countries must continue to improve all three of the proximate determinants of educational attainment. And they must also concentrate on improving the quality of primary education. There is growing recognition of the importance of focusing not just on "schooling" goals—having all children enter and complete primary education, but also on "learning" goals (Beatty and Pritchett 2012)—completing a primary education of *good quality*, as the original Dakar EFA goals specify (UNESCO 2000). Greater emphasis on learning should bring not just greater efficiency and higher levels of timely progress, but should foster higher levels of ever-enrollment and retention as well, thus supporting the schooling goal and UPE. This will only happen, however, if policy makers continue to focus on both

[35] Recently concern has been raised that the focus on UPE may come at the expense of adequate financing for secondary education (Lewin 2008; see also Sutherland-Addy 2008). For example, Lewin analyzing UNESCO data finds that "transition rates to secondary school have been static over the past decade in much of SSA and appear to have fallen where primary growth has been fastest." (Lewin 2008:61). Lewin (2008:62) adds that: "Girls will not remain in primary schools if few girls access secondary school, especially if transition rates fall." Evidence from the five countries studied does not support these concerns. See Appendix H —available from the author on request for details.

schooling and learning goals, in the many countries where UPE, properly measured, remains unmet.

Box 1. Names, Abbreviations and Descriptions of the Indicators.

Name and Abbreviation	Description
Outcome Indicators	
Primary School Completion Rate (PSCR)	The percentage of children in a cohort (generally selected to be within a couple of years of the normal age of completing primary education) who have completed primary education.
Net Enrollment Rate (NER)	Enrolment of the official age group for a given level of education expressed as a percentage of the corresponding population. (UNESCO 2009:10)
Gross Enrollment Ratio (GER)	Total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school year. (UNESCO 2009:9)
Primary Completion Rate (PCR)	a) The total number of students successfully completing (or graduating from) the last year of primary school in a given year, divided by the total number of children of official graduation age in the population. (Bruns, Mingat and Rakatomalala 2003:37-38) b) The total number of new entrants in the last grade of primary education, regardless of age, expressed as percentage of the total population of the theoretical entrance age to the last grade of primary. (Also know as the Gross Intake Rate to the Last Grade of Primary.) (UNESCO 2009:38)
Net Cohort Completion Rate (NCCR)	The net cohort completion rate is obtained by multiplying the net intake rate by the primary cohort completion rate. (UNESCO 2010:73)
Proximate Determinants and Cognates	
Enrollment	
Ever-Enrollment	The percentage of children in the selected cohort who ever-enrolled in grade one of primary school.
Net Intake Rate (NIR)	New entrants in the first grade of primary education who are of the official primary school-entrance age, expressed as a percentage of the population of the same age. (UNESCO 2009:6)
Gross Intake Ratio (GIR)	Total number of new entrants in the first grade of primary education, regardless of age, expressed as a percentage of the population at the official primary school-entrance age. (UNESCO 2009:5)
Retention	
Retention	Of the children in the selected cohort who ever-enrolled, the percentage who either: a) completed primary school; or b) remain in school at the age of the selected cohort.
Survival Rate (SR)	Percentage of a cohort of pupils (or students) enrolled in the first grade of a given level or cycle of education in a given school year who are expected to reach successive grades. (UNESCO 2009:14)
Primary Cohort Completion Rate (PCCR)	The primary cohort completion rate is the product of the survival rate to the last grade and the percentage of those in the last grade who successfully graduate. (UNESCO 2010:448)
Timely Progress	
Timely Progress	Of those children in the selected cohort who: a) are still enrolled, or b) completed primary school before dropping out, the percentage who have actually completed primary education.
Repetition Rate (RR)	Proportion of pupils from a cohort enrolled in a given grade at a given school year who study in the same grade in the following school year. (UNESCO 2009:13)

Table 1. Indicators of Educational Attainment - Tanzania.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1991	49%		68%										
1992		51%		70%						58%	87%	89%	75%
…													
1996		52%		76%						42%	86%	90%	54%
…													
1999	48%	54%	64%	76%	14%	75%			3%	45%	87%	81%	63%
…													
2003					81%	120%	73%	69%					
2004		71%		93%			79%			46%	83%	87%	65%
2005	98%		110%		90%	109%			5%				
…													
2010		80%		99%						69%	91%	91%	83%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO GMRs – various years.
[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 2. Indicators of Educational Attainment – Benin.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1991	41%		54%										
…													
1996		43%		63%						17%	55%	75%	41%
…													
1999	50%		74%										
…													
2001		53%		77%						26%	66%	83%	48%
…													
2004					48%	103%	46%	36%					
2005	78%		96%		48%				17%				
2006		59%		81%	48%	115%	65%	36%		43%	74%	85%	68%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO GMRs – various years.
[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 3. Indicators of Educational Attainment - Madagascar.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1991	64%		93%										
1992		55%		94%						21%	83%	50%	50%
…													
1997		59%		89%						21%	78%	52%	52%
…													
1999	63%		94%			118%	51%		28%				
…													
2003		75%		120%				48%		31%	81%	71%	54%
…													
2005	92%		138%		71%	179%	36%	27%	18%				
…													
2008		78%		122%		186%				43%	89%	74%	66%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO GMRs – various years.
[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 4. Indicators of Educational Attainment - Malawi.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1990/91													
1991	48%		66%										
1992		58%		81%						13%	78%	64%	27%
…													
1997/98													
1999	98%		139%		NA		37%		14%				
2000		77%		103%						22%	94%	69%	34%
…													
2004		81%		104%			34%			30%	94%	71%	44%
2005	95%		122%		NA				20%				
2006					62%	150%	36%	27%					
…													
2010		86%		108%						35%	96%	76%	48%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO GMRs – various years.
[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 5. Indicators of Educational Attainment – Zambia.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1991			93%										
1992		72%		87%						65%	92%	80%	89%
…													
1996		67%		90%						45%	93%	73%	67%
…													
1999	63%		75%		35%				6%				
…													
2002		64%		84%						47%	92%	75%	68%
…													
2004							79%						
2005	89%		111%		47%				6%				
…													
2007		77%		101%						59%	98%	87%	69%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO 2007.

[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 6. Indicators of Educational Attainment – Egypt.

	NER		GER		UNESCO					DHS			
	UNESCO[a]	DHS[b]	UNESCO	DHS	Net Intake Rate	Gross Intake Rate	Survival Rate to Last Grade	PCCR	Repeaters All Grades	PSCR	Ever Enrollment	Retention	Timely Progress
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1988		81%		92%						77%	83%	93%	99%
…													
1991	84%		92%										
…													
1995		83%		95%						74%	89%	84%	99%
…													
1999	93%		101%				99%		6%				
2000		85%		100%						82%	89%	93%	99%
…													
2004							99%						
2005	94%	85%	101%	100%	92%				2%	89%	94%	96%	99%
…													
2008		87%		120%						89%	95%	96%	98%

[a] All UNESCO indicators in all Tables are from the Appendix Tables of UNESCO GMRs – various years.
[b] All DHS indicators in all Tables are computed from DHS recode files.

Table 7. Cohort Analysis of the PSCR and Proximate Determinants – Five On-Track SSA Countries and Egypt.

Country, Year, & / Indicator Age	PSCR	Ever Enrollment	Retention	Timely Progress
Tanzania - 2004 16-17	46%	83%	87%	65%
2010 22-23	67%	83%	81%	100%
Benin - 2001 14-15	26%	66%	83%	48%
2006 19-20	39%	56%	71%	98%
Madagascar - 2003 14-15	31%	81%	71%	54%
2008 19-20	42%	81%	52%	99%
Malawi - 2004 16-17	30%	94%	71%	44%
2010 22-23	41%	92%	46%	97%
Zambia - 2002 16-17	47%	92%	75%	68%
2007 21-22	63%	92%	70%	98%
Egypt - 2005 14-15	89%	94%	96%	99%
2008 17-18	89%	93%	96%	100%

Table 8. Indicators of Educational Attainment by Gender – Tanzania.

		NER			GER			PSCR			Ever-Enrolled			Retention			Timely Progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(A)	DHS Age 16-17	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(B)	1992	50%	52%	.96	74%	66%	1.12	55%	61%	.89	88%	85%	1.04	90%	88%	1.03	68%	83%	.83
(C)	1996	50%	53%	.93	78%	75%	1.04	36%	47%	.76	89%	83%	1.07	90%	89%	1.02	45%	64%	.70
(D)	1999	52%	56%	.92	73%	79%	.93	49%	42%	1.18	92%	83%	1.11	83%	80%	1.04	64%	63%	1.03
(E)	2004	68%	72%	.95	94%	91%	1.04	43%	50%	.86	89%	77%	1.16	88%	85%	1.03	55%	77%	.72
(F)	2010	79%	82%	.96	100%	99%	1.01	67%	71%	.95	94%	89%	1.06	91%	90%	1.02	78%	89%	.88
	DHS Age 22-23	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(G)	2010							75%	61%	1.22	89%	79%	1.12	85%	78%	1.10	100%	100%	1.00

Table 9. Indicators of Educational Attainment by Gender – Madagascar.

		NER			GER			PSCR			Ever-Enrolled			Retention			Timely Progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(A)	DHS Age 14-15	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(B)	1992	54%	56%	.96	95%	94%	1.01	19%	22%	.86	83%	83%	1.00	51%	49%	1.04	46%	56%	.83
(C)	1997	58%	60%	.97	91%	88%	1.04	17%	25%	.68	77%	79%	.97	54%	50%	1.09	42%	64%	.65
(D)	2004	73%	76%	.96	122%	117%	1.05	27%	37%	.73	79%	83%	.96	71%	72%	.98	48%	62%	.77
(E)	2008	77%	79%	.98	122%	122%	1.00	39%	48%	.83	88%	91%	.97	75%	73%	1.03	60%	72%	.83
	DHS Age 19-20	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(F)	2008							44%	40%	1.08	82%	81%	1.01	54%	50%	1.08	99%	100%	.99

Table 10. Indicators of Educational Attainment by Gender – Malawi.

		NER			GER			PSCR			Ever-Enrolled			Retention			Timely Progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(A)	DHS Age 16-17	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(B)	1992	58%	58%	1.00	86%	75%	1.15	15%	12%	1.29	83%	71%	1.16	74%	51%	1.45	24%	32%	.77
(C)	2000	76%	78%	.97	107%	100%	1.06	21%	24%	.89	95%	93%	1.01	76%	62%	1.22	30%	41%	.72
(D)	2004	80%	83%	.97	107%	102%	1.05	28%	31%	.91	94%	94%	1.00	77%	65%	1.19	39%	51%	.77
(E)	2010	85%	86%	.98	111%	105%	1.06	33%	38%	.86	96%	97%	.99	78%	72%	1.11	43%	54%	.78
	DHS Age 20-21	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(F)	2004							49%	35%	1.40	93%	89%	1.05	58%	41%	1.41	91%	98%	.93
	DHS Age 22-23																		
(G)	2010							47%	36%	1.30	94%	91%	1.04	51%	41%	1.25	97%	97%	.99

Table 11. Indicators of Educational Attainment by Gender – Zambia.

		NER			GER			PSCR			Ever-Enrolled			Retention			Timely Progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(A)	DHS Age 16-17	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(B)	1992	72%	71%	1.01	91%	83%	1.10	67%	63%	1.06	93%	90%	1.04	85%	75%	1.14	85%	94%	.90
(C)	1996	67%	68%	.99	94%	86%	1.10	43%	47%	.92	93%	92%	1.01	79%	67%	1.18	59%	76%	.77
(D)	2002	65%	64%	1.01	89%	78%	1.14	44%	51%	.85	93%	92%	1.01	81%	69%	1.18	58%	82%	.71
(E)	2007	77%	77%	1.00	104%	98%	1.06	56%	62%	.90	99%	97%	1.02	92%	83%	1.11	62%	77%	.80
	DHS Age 21-22	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(F)	2007							68%	59%	1.15	97%	89%	1.09	73%	67%	1.10	96%	99%	.96

Table 12 Indicators of Educational Attainment by Gender – Egypt.

		NER			GER			PSCR			Ever-Enrolled			Retention			Timely Progress		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(A)	DHS Age 14-15	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(B)	1988	86%	76%	1.13	98%	86%	1.15	85%	69%	1.24	93%	74.4%	1.24	94%	93%	1.01	99%	99%	1.00
(C)	1995	88%	78%	1.13	101%	89%	1.14	80%	69%	1.16	95%	82%	1.15	85%	84%	1.01	99%	100%	.99
(D)	2000	87%	83%	1.05	103%	97%	1.07	86%	78%	1.11	94%	84%	1.13	92%	93%	.99	99%	99%	1.00
(E)	2005	86%	84%	1.02	102%	97%	1.05	91%	87%	1.05	97%	90%	1.07	95%	97%	.98	99%	99%	1.00
(F)	2008	89%	86%	1.04	122%	118%	1.03	90%	89%	1.01	97%	94%	1.03	95%	97%	.98	98%	98%	1.00
	DHS Age 17-18	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F	Male	Female	Ratio M/F
(G)	2008							92%	87%	1.05	96%	90%	1.07	95%	97%	.98	100%	100%	1.00

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