

| Global Research | 10 July 2017

Girls' education – A rewarding investment

- Educating girls yields some of the highest returns of all development investments
- The benefits of investing in girls' education are significant for Sub-Saharan Africa and South Asia
- Each additional year of girls' schooling boosts long-run growth by c0.6ppt per year

Click for The Scoop 

The highest-return investment available

Girls' education is an important contributor to economic growth. Lawrence Summers, in his former capacity as World Bank Chief Economist, argued that *"investment in girls' education may well be the highest-return investment available in the developing world."* Girls comprise approximately half the youth population (aged 15-24) in developing countries but their economic contribution is well below potential. Nearly two-thirds of the world's illiterate adults (496mn) are women, a proportion that has remained stubbornly unchanged for the past 20 years, according to the UN's *World's Women 2015 report*. Globally, one additional year of girls' schooling resulted in a 10% increase in income (UNICEF, 2015). Despite this, 62mn adolescent girls around the world are not in school.

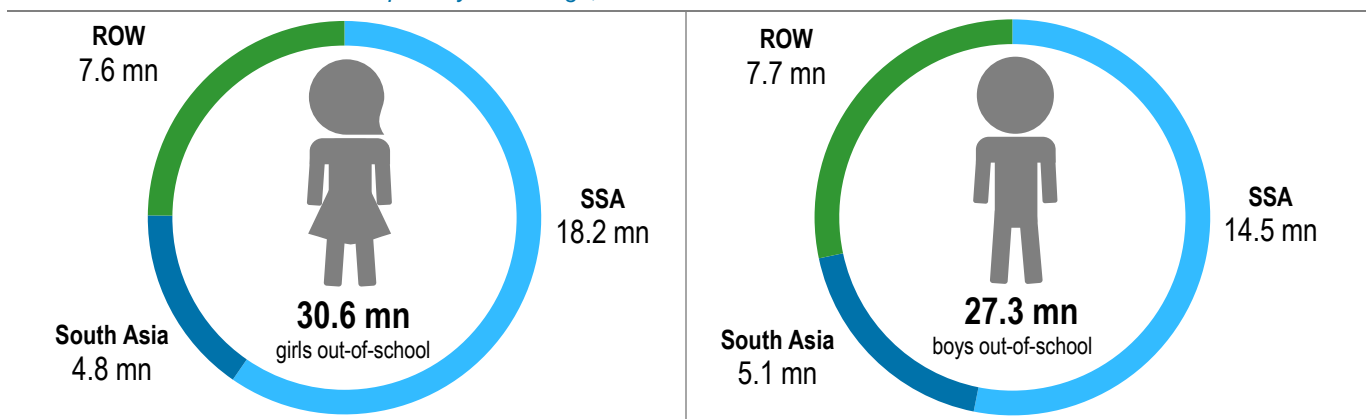
Samantha Amerasinghe +44 20 7885 6625
 Samantha.Amerasinghe@sc.com
 Economist, Thematic Research
 Standard Chartered Bank

Women are equal to men in their potential contribution to economic outcomes and hence there is a huge untapped pool of talent in developing countries. More women in the labour force could provide a significant boost to GDP growth and per capita income. The economic benefits of education for girls include higher wages, better jobs and higher employment rates. Each additional year of girls' schooling is estimated to boost long-run growth by c0.6ppt per year. In our view, the opportunity cost of girls' inactivity is also important when assessing the potential increase in national income.

It is alarming that 30.6mn girls of primary school age are out-of-school, with 18.2mn from Sub-Saharan Africa (SSA) alone (Figure 1). Gender disparities related to access to secondary education have been reduced, but remain wider than at the primary level in many regions. South Asia and SSA are the laggards as girls still face many socio-economic and socio-cultural barriers in these regions. In this report we emphasise that improving access to education is simply not enough, it is the quality of education that matters.

Figure 1: More girls than boys are out-of-school in emerging markets

Number of out-of-school children of primary school age, 2012



Source: UNESCO Institute for Statistics, 2014. Correspondence in June 2014



Why is girls' education important?

Girls' education yields the highest returns

The global average rate of return to schooling is 10%

Educating girls yields some of the highest returns of all development investments. According to the World Bank, the global average rate of return for schooling – estimated over time for 100 countries – is 10% (Patrinos, 2004). Since 1985 the World Bank has consistently stated that educating girls will improve the economy of the village because they will marry later, have fewer children and those children will be healthier.

However, it was not until 2012, when Millennium Goals economist Jeffrey Sachs said that the status of women and the economy are directly related – “*where one’s flourishing, so is the other; where one’s in the ditch so is the other*” – that people started to think more seriously about this issue.

There are three key reasons for investing in girls' education. (1) Returns from girls' education are the highest but gender disparities are the widest at secondary level (Figure 2). (2) The quality of education is more important than completion rates when it comes to improving economic outcomes, and education systems in developing countries need substantial improvement. (3) The benefit of investing in girls' education is especially important for developing countries where gender equity in education often lags the developed world.

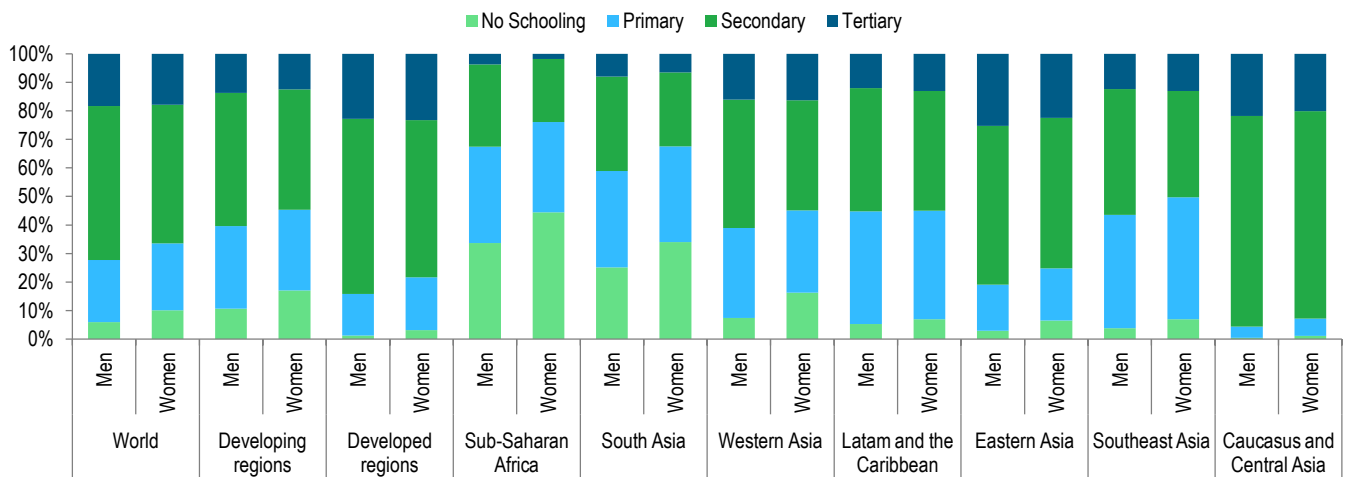
She works hard for the money

The economic benefits of education for girls include higher wages, better jobs and higher employment rates. A key finding from a study of 146 countries from 1950 to 2010 by Barro and Lee (NBER, 2013) is that education has a significant positive effect on output. They found that each additional year of schooling results in a 5-12% increase in economic growth.

Primary education increases girls' earnings by 5-15% over their lifetimes

A World Bank study on the effect of education on average wages (a proxy for productivity) estimates that primary education increases girls' earnings by 5-15% over their lifetimes, versus boys with a rate of return between 4% and 8% (Patrinos, 2002).

Figure 2: Distribution of population aged 25 and over and the highest level of education attained 2005-12 (latest available)



Source: UN Statistics Division



The economic costs are substantial, considering the magnitude by which basic primary education can increase girls’ earnings over their lifetimes. In addition, as wages rise for women, the opportunity cost of staying home should increase, thereby increasing female labour-market participation (Figure 3). More women in the labour force could provide a significant boost to GDP growth and per capita income.

Girls’ education has strong intergenerational benefits

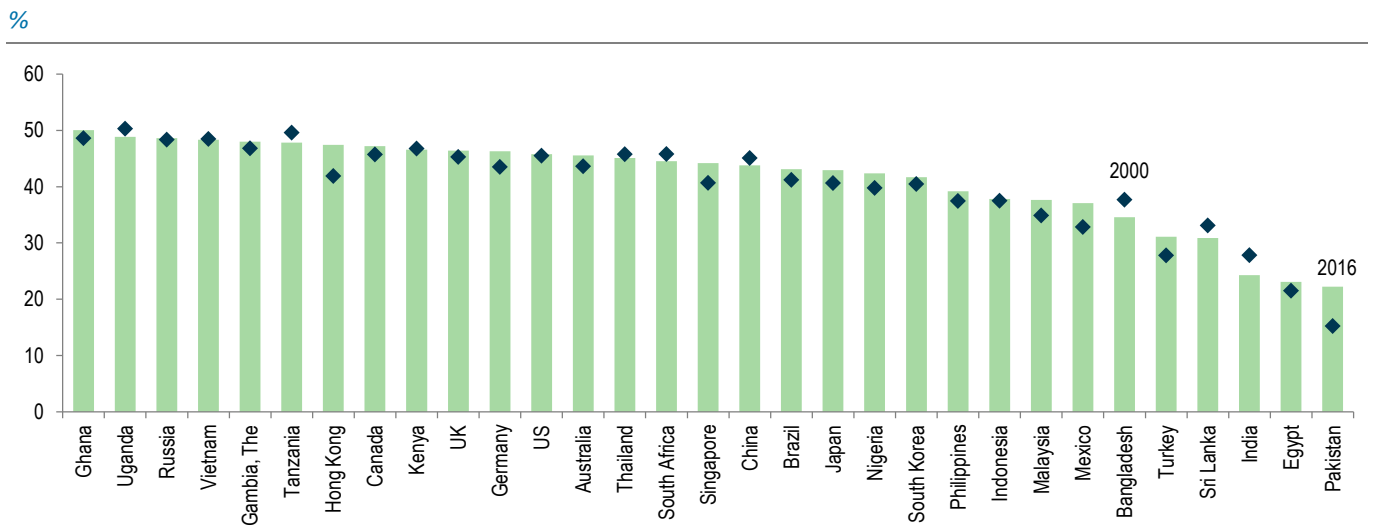
Good for the economy – The multiplier effect

Over the longer term girls’ education also has strong intergenerational benefits. When educated girls become mothers they are much more likely to send their children to school, thereby multiplying the benefits for themselves and society at large.

In addition, economic growth that results from higher education feeds a virtuous cycle. A better-educated female workforce leads to higher economic growth that supports continuous improvements in education. The benefits are wide-ranging – not simply economic, but also social, such as lower fertility, reduced child and maternal mortality and better nutrition and health. This clearly shows that intergenerational benefits can have a powerful impact on future generations and on longer-term economic growth.

Girls’ education in particular also leads to higher productivity and increased output in the agricultural sector. According to a 2005 study by the International Food Policy Research Institute, increasing educational attainment for women in Kenya could increase their agricultural output by 25%. Additionally, education affects agricultural productivity as educated farmers are less risk averse and more likely to adopt new farming technologies. In Nigeria, women farmers who head farm households had on average 1.6 years of education compared with 3 years for men. They represent an important target group due to their low education levels, as there are potential productivity gains from providing them with basic access to education.

Figure 3: Pakistan, HK, Mexico and Turkey have made good progress in improving female labour-force participation, while it has worsened in India and China



Source: UN, Standard Chartered Research

Girls' education – Then and now

Lack of education and poor labour-market policies prevent women from realising their economic potential

There are two key reasons why many countries have failed to capitalise on the economic potential of women. According to the International Labour Organisation (ILO), women are either unprepared due to lack of education or not able to join the workforce due to poor labour-market policies. The ILO measures preparedness or the lack of it through a combination of factors, including enrolment rates in primary, secondary and tertiary education, literacy rates, and average years of schooling. Here we provide an analysis of school enrolment and educational attainment across countries and regions.

South Asia and SSA are lagging behind

China, India and Thailand have made the most progress since 2000 in secondary education enrolment

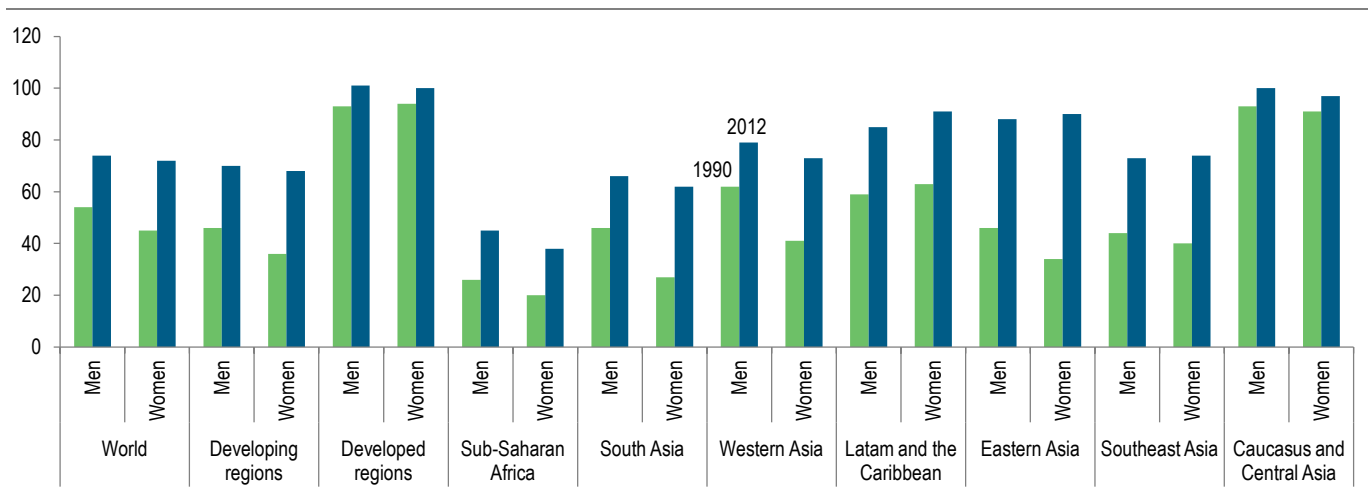
Different levels of social and economic development in individual countries explain the significant variations in educational attainment across regions. In developed regions, educational attainment levels are much higher, with a substantial proportion of men and women at or above secondary level. In contrast, in South Asia and SSA where universal primary education has not yet been achieved, the number of women and men with no education or only primary level attainment is significant. Participation in secondary education has expanded steadily in all regions, albeit lower than at primary level (Figure 4). China, India and Thailand have made the most progress in secondary education enrolment since 2000 (Figure 7).

The lowest transition rates from primary to secondary education prevail in SSA

Country data for secondary educational attainment is patchy so it is difficult to draw firm conclusions. However, a regional comparison shows that the transition from primary to secondary education has improved for developing regions over the past decade, although it is still not at the level of developed economies. In the developed world, transition rates are as high as 95% for both girls and boys. Transition rates are slightly lower in South Asia and Southeast Asia, between 85% and 95%, while some of the lowest transition rates prevail in SSA: only 77% of girls and 79% of boys move on to secondary education.

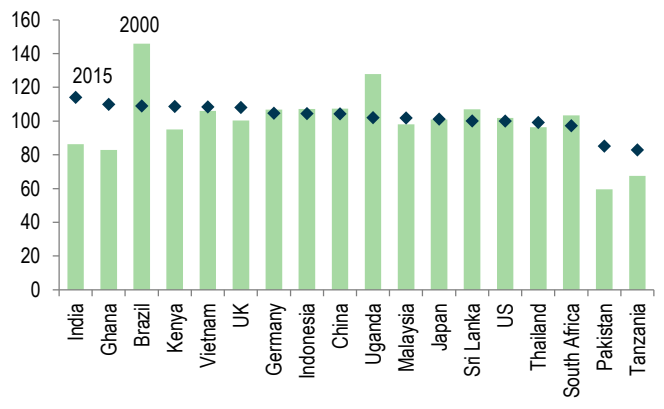
Figure 4: Participation in secondary education has expanded steadily across all regions

Secondary gross enrolment ratios, 1990 vs 2012



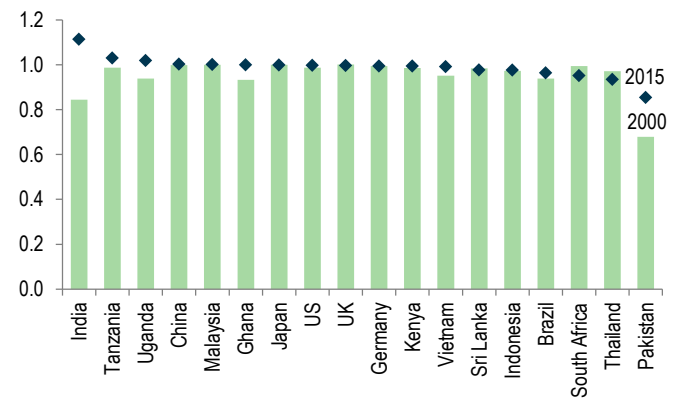
Source: UNESCO Institute for Statistics, 2014, Standard Chartered Research

Figure 5: Female school enrolment, primary
% gross



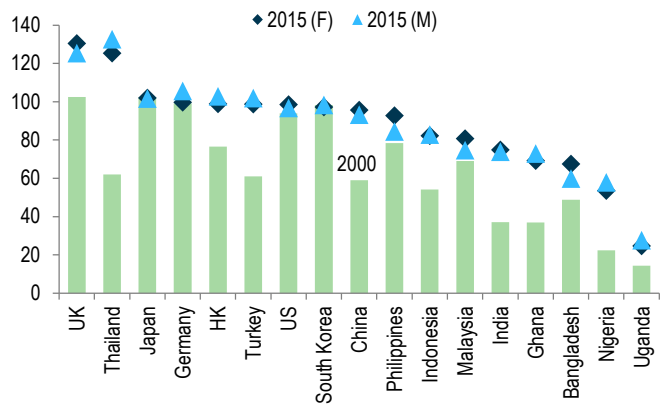
Note: school enrolment (% gross) refers to the number of children enrolled in a level (primary or secondary), regardless of age, divided by the population of the age group that officially corresponds to the same level; Source: WDI, Standard Chartered Research

Figure 6: Primary school enrolment, Gender Parity Index
GPI



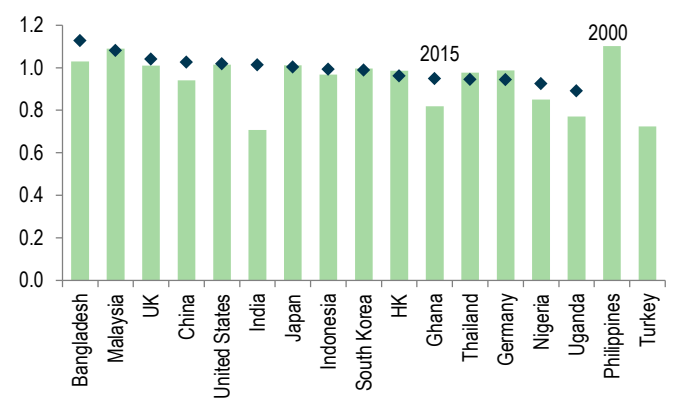
Source: WDI, Standard Chartered Research

Figure 7: Female and male school enrolment, secondary
% gross



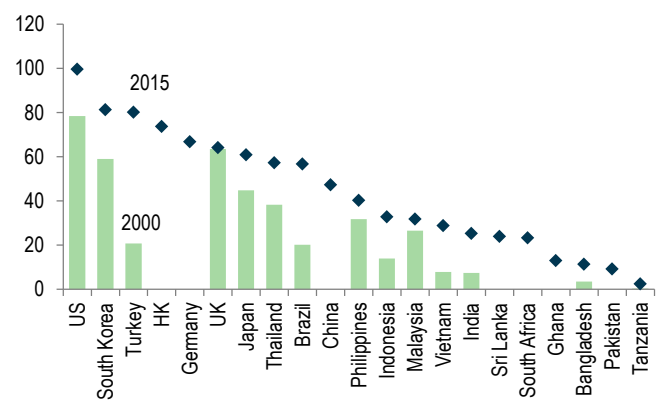
Source: WDI, Standard Chartered Research

Figure 8: Secondary school enrolment, Gender Parity Index
GPI



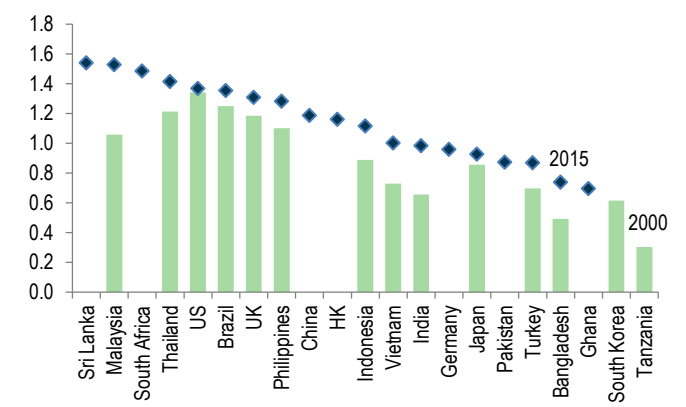
Source: WDI, Standard Chartered Research

Figure 9: Female school enrolment, tertiary
% gross



Source: WDI, Standard Chartered Research

Figure 10: Tertiary school enrolment, Gender Parity Index
GPI



Source: WDI, Standard Chartered Research



Boys lead, girls are starting to catch up...

Tanzania, Bangladesh, Pakistan and Ghana have the lowest number of girls in tertiary education

Closing the gender gap in educational attainment has positive benefits for economic growth. Gender disparities in access to secondary education have been reduced but remain wider than at the primary level in many countries, such as China and India, and across many regions as girls still face significant barriers (Figures 6 and 8).

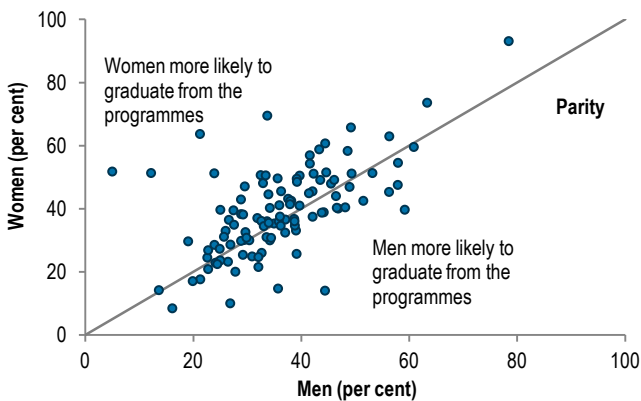
Tertiary education has the highest impact on boosting productivity. It has become even more important as globalisation has raised the demand for educated workers. In developing economies less focus has been on tertiary education due to capacity constraints and cost. Women tend to outnumber men in tertiary education in the developed world; however, there are considerable disparities in developing regions, particularly in South Asia and SSA. Tanzania, Bangladesh, Pakistan and Ghana currently have the lowest number of girls enrolled in tertiary education (Figure 9) and gender parity at the tertiary level is significantly lower than for primary and secondary, particularly in many countries in South Asia and SSA (Figure 10).

...but still face challenges in male-dominated fields

Girls outperform boys in reading, while boys perform slightly better in mathematics

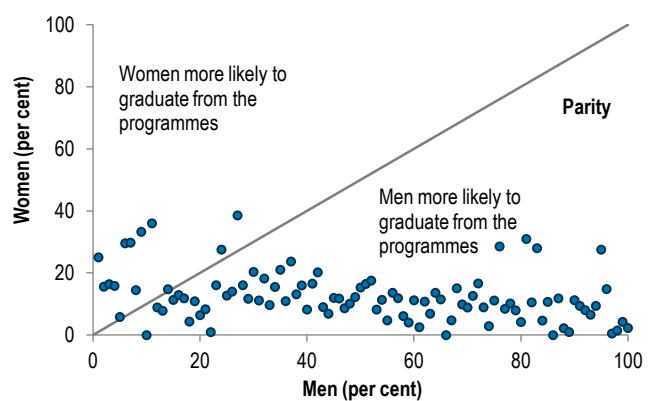
Women increasingly have better access to tertiary education but continue to face challenges in areas traditionally dominated by men, such as science, engineering, manufacturing and construction. Women are more likely to graduate in fields related to education, health and welfare and the humanities and arts (Figures 11-14). A possible reason for this could be that girls' attitudes towards reading and mathematics are very different to boys' and manifest much earlier than at the tertiary

Figure 11: Tertiary graduates in social science, business and law programmes, %



Source: UN, The World's Women 2015: Trends and Statistics

Figure 12: Tertiary graduates in humanities and arts programmes, %



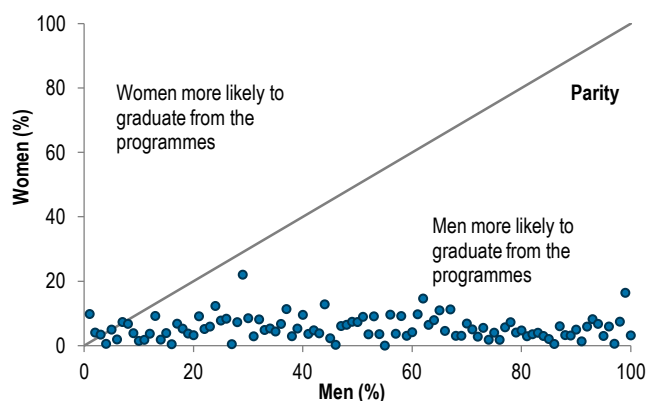
Source: UN, The World's Women 2015: Trends and Statistics

Figure 13: Tertiary graduates in science programmes %



Source: UN, The World's Women 2015: Trends and Statistics

Figure 14: Tertiary graduates in engineering, manufacturing and construction programmes, %



Source: UN, The World's Women 2015: Trends and Statistics



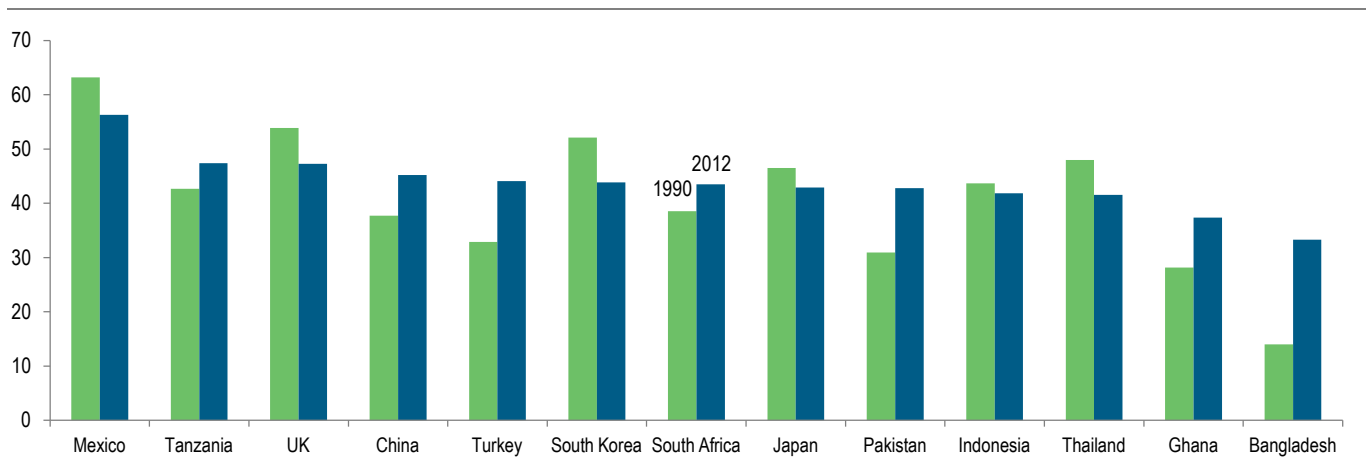
level. Results from the Programme for International Student Assessment (PISA) 2012 reading assessment highlighted that girls outperformed boys in every participating country by a gender gap of 38 points (roughly equivalent to one year of schooling), largely due to different attitudes towards reading. Boys performed slightly better than girls in mathematics, a 10-point gender gap in OECD countries and just a 5-point gap in non-OECD countries.

In addition, girls' participation in technical and vocational education and training (TVET) programmes is lower than for boys in all regions except Latin America, but good progress in increasing girls' participation has been made over the past decade in countries such as Bangladesh and Pakistan (Figure 15). TVET programmes develop skills and competencies valued by employers so girls' under-representation in these fields of study is worrisome.

India and Indonesia have among the largest gender gaps in labour-force participation

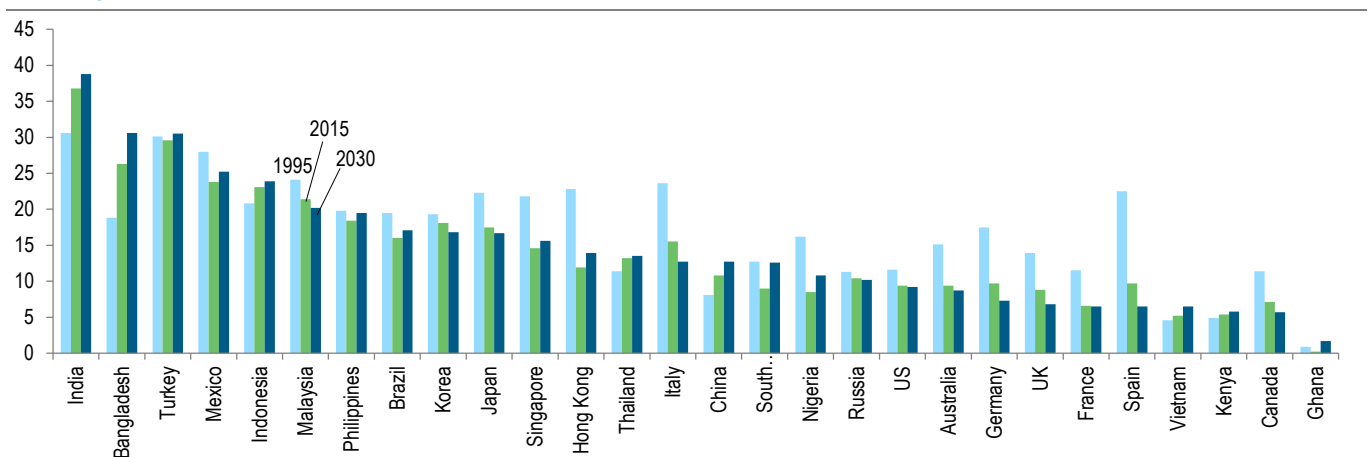
India, Bangladesh, Turkey, Mexico and Indonesia currently have the largest gender gap in labour-force participation (the difference between women's and men's labour-force participation rates) among our coverage countries. By 2030, according to ILO projections, these five countries will have made the least progress towards closing their gender gap in labour-force participation (see [On the Ground, 23 November 2016, Mind the gender gap, please!](#)). Significant gender gaps in employment exist in many countries (Figure 16).

Figure 15: Bangladesh and Pakistan have increased girls' participation in TVET programmes the most between 1990 and 2012, %



Source: WDI, Standard Chartered Research

Figure 16: Gender gaps in labour-force participation rates
Gender gap (ppt difference)



Source: ILOSTAT, Standard Chartered Research; Note: The gender gap is measured as the difference between women's and men's labour-force participation rates

Quality over quantity is what matters most

Improving access to education is simply not enough, it is the quality of education that matters. Cognitive skills have a powerful correlation with individual earnings, income distribution and economic growth. Hanushek (2002) provides evidence that quality of education matters more than educational attainment. In many developing countries, despite an increased allocation of material inputs, literacy rates remain low. For example, in Ghana, although 37% of students stay in school through ninth grade, only 5% are fully literate.

A number of studies assessing the quality of education on economic growth seek to measure the cognitive skills gained by taking a simple average of the maths and science scores of the entire international PISA tests between 1964 and 2003.

These tests are considered a good gauge of the disparities between and within countries in terms of educational attainment; they are typically carried out after about eight years of schooling, towards the end of compulsory education in many countries. A key finding of Hanushek and Woessmann (2007) is that test scores that are one standard deviation above the mean are associated with an average annual growth rate in GDP per capita that is 2ppt higher over the 40-year period.

Adult literacy rates have improved in all regions but gender disparities remain, especially in SSA

Adult literacy rates have improved in all regions for both women and men, but gender disparities remain in four developing regions – namely SSA, northern Africa, South Asia and western Asia – and remain a serious concern. The gender gap in these regions is between 10-22ppts (Figure 17).

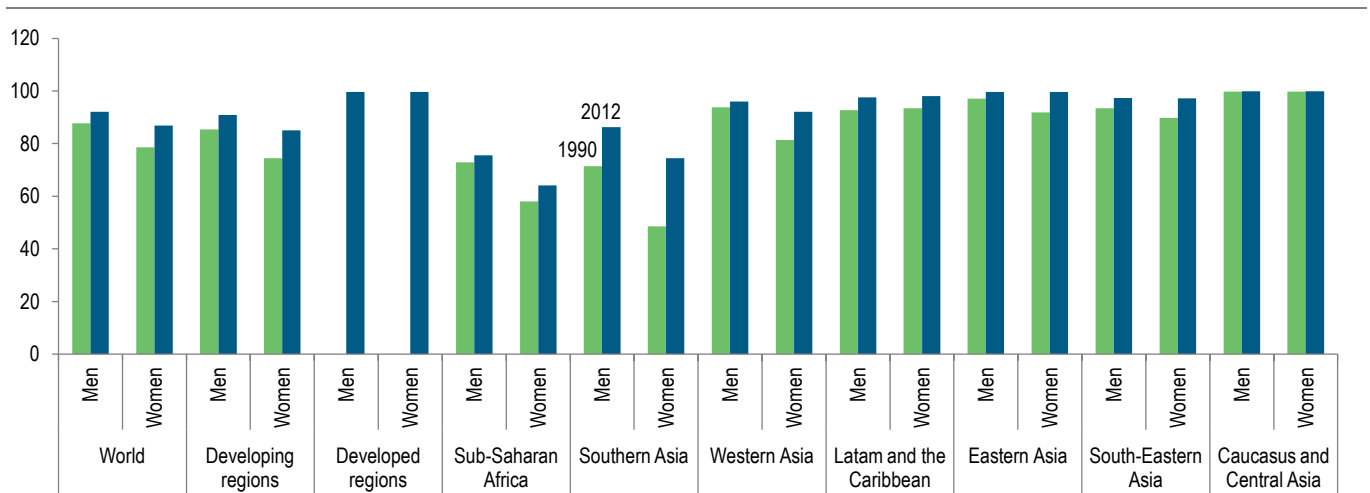
Only 64% of young women are literate in SSA

Young people (aged 15-24) are mostly literate, reflecting increased participation in formal schooling. Gender gaps in global youth literacy rates are almost at parity and decreased in all regions from 1990 to 2012. However, in regions such as SSA where many girls and boys either do not attend school or drop out, youth literacy rates are much lower than global averages. Youth literacy rates in SSA are among the lowest in the world – only 64% of young women are literate.

Once quality of education is included in the analysis, school attainment appears to have a limited impact on growth. Another factor to consider is the role of economic institutions in education. Education may be less effective in less developed countries that lack well-functioning markets and legal systems.

Figure 17: Most illiterate young women come from SSA and South and western Asia

Youth literacy rates, ages 15-24



Source: WDI, Standard Chartered Research



In addition, if the rate at which the labour market transforms towards new STEM-based roles outpaces the rate at which women take up these types of roles, women will lose out. Expanding access to secondary and higher education will be critical if we are to see improvements in the quality of work for women. Better access to education should enable women to enter higher-growth areas that require STEM skills.

Quantifying the impact on economic growth

Each additional year of schooling boosts long-run growth by c.0.6ppt per year

To quantify the impact of education on economic growth it is important to consider two factors – the quantity and quality of education. Many studies that assess girls’ education and its impact on economic development focus on investment in girls’ education and the returns from it. Returns on girls’ education in developing countries are substantial and in most cases are much higher than for boys or those seen in developed countries. A 2007 study by Hanushek and Woessmann which sought to quantify the potential that investment in girls’ education has on GDP growth rates found that each additional year of schooling boosts long-run growth by c.0.6ppt per year.

The opportunity cost of girls’ inactivity

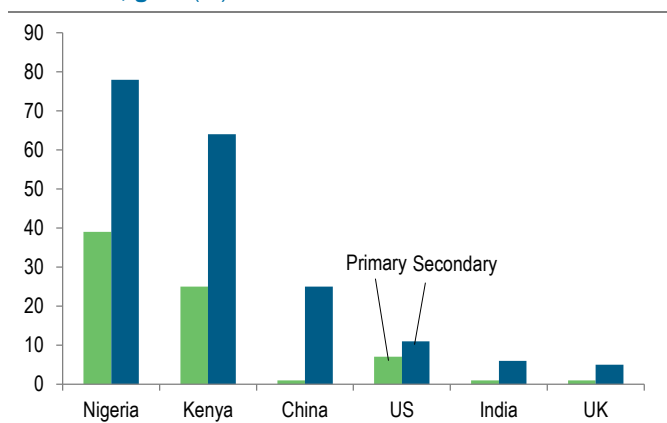
In our view, it is not just the direct impact of schooling that should be considered when assessing potential increases in national income. The analysis should be extended to quantify the opportunity cost of girls’ inactivity and joblessness in regard to lost wages and productivity.

This method essentially assesses the economic costs of girls’ exclusion in terms of early school dropout, teenage pregnancy and joblessness, which are considered high-risk events for adolescent girls. Such adversities make girls more vulnerable than boys and have a bearing on the ratio of girls (aged 15-24) who are not in school or in the labour force as a proportion of the female working-age population aged 15-24. Among developing countries, India and China have the lowest dropout rates (Figure 18). Primary completion rates in both countries are relatively high: only 1% do not complete primary school. At secondary level, 25% of girls in China fail to complete school. Low secondary completion rates are also observed in Nigeria and Kenya.

India and China have the lowest school dropout rates among developing countries

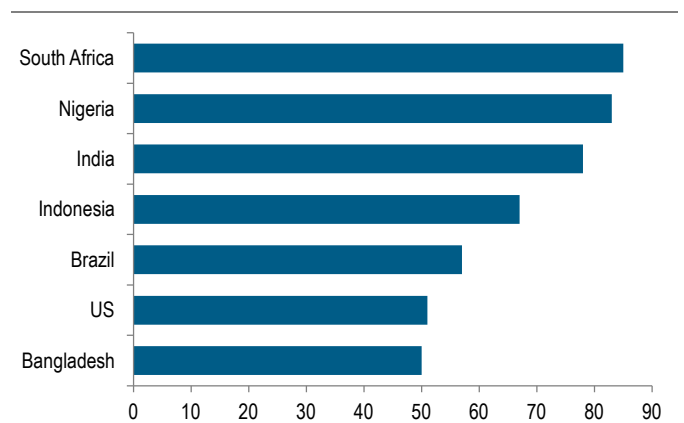
Dropout rates at secondary level are much higher than at primary school level in all countries. In most developing countries school dropout rates are higher for girls than for boys, partly due to circumstances beyond the control of girls, such as early marriage or cultural norms that incentivise investment in boys (Levine, 2009).

Figure 18: Dropout rates for primary and secondary education, girls (%)



Source: WB EdStats, Standard Chartered Research

Figure 19: Youth female inactivity rates %



Source: Chaabani (2011) authors’ computation based on data from ILO and KILM

The opportunity cost of dropping out of secondary school is substantial in China (USD 32bn)

High cost of school dropouts in India and China

The economic cost of early school dropouts is negligible (less than 1%) in India and China, largely due to the low share of girls' wages relative to the size of these economies. It is particularly noteworthy in China, where secondary school completion rates are low. However, the monetary value of the opportunity cost of dropping out of secondary school is substantial in both countries, at USD 32bn (PPP adjusted) in China and USD 10bn in India (Chaaban, 2011).

South Africa and Nigeria have among the highest youth female inactivity rates

Cost of joblessness is lower than that of dropping out of school

Inactivity or being out of work also has an economic cost. In developing countries girls generally have higher inactivity rates than boys. South Africa and Nigeria have among the highest youth female inactivity rates, above 80%, followed by India (Figure 19). The cost of 'joblessness' is far lower than the cost of school dropouts. This is largely because dropout decisions are more definitive, with many girls not opting to return to school later in their lives thereby resulting in foregone earnings (productivity) for a lifetime.

SSA countries such as Kenya and Nigeria show the highest lifetime opportunity 'cost' of girls' school dropouts, attributed to lost productive capacity due to under-investment in girls' education. Lifetime 'costs' range from 41% of annual GDP in Kenya to an almost negligible 0.01% of GDP in India (Figure 20). In contrast, girls' or women's entry into and exit from the labour market can be frequent, short-term and does not imply lifetime consequences for future productivity.

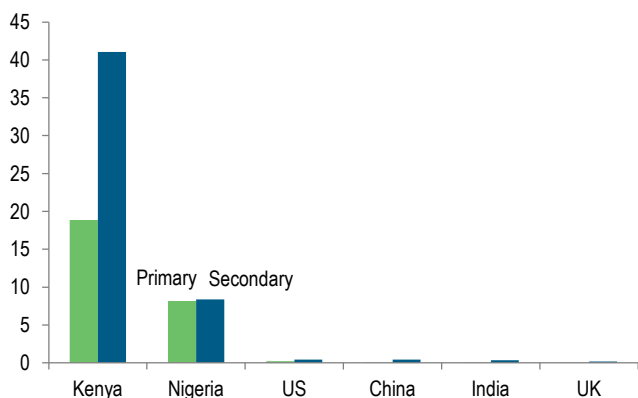
A World Bank paper further highlights that if young women had inactivity rates similar to those of young men (Figure 21, Target 2), the cost of inactivity (as a percentage of GDP) would be higher in countries such as India (4.4%), Brazil (1.7%) and Bangladesh (1.3%) compared with inactivity rates of adult females in those countries (Chaaban, 2011). If, on the other hand, young females had inactivity rates similar to adult females (Target 1), the cost of their inactivity would be higher in countries such as Nigeria and South Africa, compared with inactivity rates of youth males (Figure 21).

On average, women's returns from schooling are slightly higher than men's

Highest returns are at the secondary level

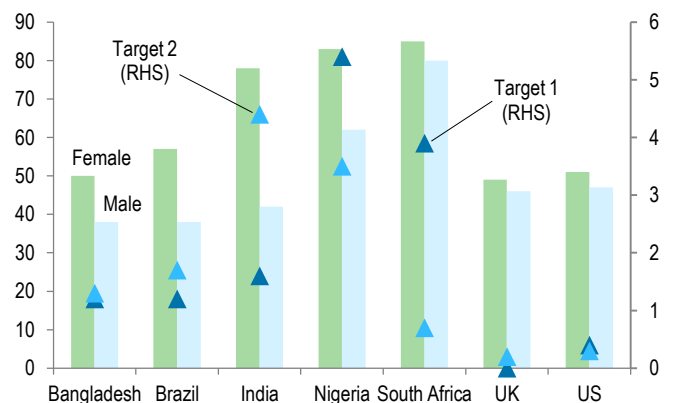
Returns on girls' education are the highest and gender disparities the widest at secondary level. Primary education was believed to produce the highest return due to the relative scarcity of human capital in low-income countries. However, more recent

Figure 20: Lifetime cost estimates of girls dropping out of school, % of GDP (developing countries adjusted for labour elasticity)



Source: Chaaban (2011) authors' computation based on data from ILO, KILM, WDI and WB

Figure 21: Cost of girls' inactivity and excl girls from the job market (Target 1: youth female = adult female; Target 2: youth female = youth male; cost as % of GDP – RHS)



Source: ILO KILM, WDI, Standard Chartered Research



analyses show that secondary and tertiary education has higher returns in terms of individuals' earning capacity. On average, the rate of return on primary education for women is lower than that for men in developing economies, but returns for women are higher at secondary level. Men overtake women at tertiary level, with a rate of return about 2ppt higher.

A possible explanation for low returns on girls' primary education in developing countries is discrimination, which causes women to accept lower wages that undervalue their work contribution. Variation might also be due to different job opportunities available to men and women at each education level.

For instance, in Thailand higher-paid manufacturing jobs that require secondary education have grown more rapidly for women than for men (Patrinos, 2004), while a higher proportion of men work in construction that requires only primary schooling, so men have higher returns at the primary school level.

In a World Bank paper, Patrinos (2004) highlights that, on average, returns on schooling in developing countries are much higher (around 11%) than in developed countries (7%). Also, women's returns – at 11.7% – are slightly higher than men's, at 9.6% (Patrinos and Montenegro, 2014).

At the starting gate, but still a long way to go

More than 80% of working women in South Asia and SSA work in the informal sector

In addition to higher earnings, educated women, particularly in developing countries, are able to access better and more secure jobs in the formal economy. This is crucial for women in low-income countries largely stuck in vulnerable employment with low wages or unpaid work. According to the ILO, more than 80% of working women in South Asia and SSA work in the informal sector, are self-employed or do unpaid work for their families. This is in stark contrast with the developed world where around 8% of women work in this manner.

Closing the gender gap in educational attainment will ensure women are able to move away from the domestic or informal sector, thereby raising the quality of human capital. But, there are many barriers holding girls back from achieving their full potential.

Barriers to girls' education

Poverty and socio-cultural factors are persistent barriers to girls' education

UNICEF (2007) outlines the following generic barriers to girls' education: family poverty, weak legal frameworks around education, an uneven playing field from the start, issues of safety and security around school affecting girls and the lack of relevance of school to the lives of children. Barriers to girls' education include both supply- and demand-side issues, such as socio-economic and traditional/socio-cultural factors (Figure 22).

Only 34% of girls in the poorest-quintile households complete primary school

Accessibility is a significant hindrance to girls' enrolment and retention in school. In rural areas girls' may have to walk considerable distances to reach the nearest school, while others simply cannot afford the school fees. Gender gaps in access to education are also a critical issue. However, many other factors such as income, age and cultural norms also matter. Poverty and socio-cultural factors are persistent barriers to girls' education. Poverty remains the most important factor in determining whether a girl will access education. Recent analysis of data from 24 low-income countries shows that, on average, only 34% of girls in the poorest-quintile households in these countries complete primary school, compared with 72% of girls in the richest-quintile households (UNICEF, 2015, *The Investment Case for Education and Equity*).



Poverty and employment expectations of parents often result in pulling children into various forms of work. For example, mothers may place girls in roles as domestic helpers, nannies to younger children or petty traders to bring additional income into the family home. Women often benefit less from education due to discrimination in the labour market, which means that they are likely to earn less than their male counterparts with the same level of education for the same type of work. This is a further reason why parents might feel justified in not sending their daughters to school.

High-cost, poor-quality schooling can push girls out of school, while gender norms that define girls primarily by their traditional role as wives and mothers, combined with fears of early pregnancy, may lead girls into an early marriage. For boys, completion of basic schooling or higher is often deemed essential to a good marriage and future prosperity. In addition, some parents prefer their boys to go to school because only sons inherit and carry on the family name.

Achieving gender parity in secondary education and improving the quality of education should be a policy priority for governments, with a particular focus on improving access to education.

Figure 22: Barriers to girls' education in developing countries

Supply- and demand-side barriers

Poverty is the most significant factor holding girls back

Categories	
Educational	Accessibility
	Infrastructure
	Safety and security
	Teaching and learning
Socio-economic	School fees and costs
	Poverty
	Child work
Traditional/socio-cultural	Employment
	Gender norms and stereotypes
	Early marriage
	Early pregnancy
	Religion

Source: Standard Chartered Research



Disclosures appendix

Analyst Certification Disclosure: The research analyst or analysts responsible for the content of this research report certify that: (1) the views expressed and attributed to the research analyst or analysts in the research report accurately reflect their personal opinion(s) about the subject securities and issuers and/or other subject matter as appropriate; and, (2) no part of his or her compensation was, is or will be directly or indirectly related to the specific recommendations or views contained in this research report. On a general basis, the efficacy of recommendations is a factor in the performance appraisals of analysts.

Global Disclaimer: Standard Chartered Bank and/or its affiliates ("SCB") makes no representation or warranty of any kind, express, implied or statutory regarding this document or any information contained or referred to in the document (including market data or statistical information). The information in this document, current at the date of publication, is provided for information and discussion purposes only. It does not constitute any offer, recommendation or solicitation to any person to enter into any transaction or adopt any hedging, trading or investment strategy, nor does it constitute any prediction of likely future movements in rates or prices, or represent that any such future movements will not exceed those shown in any illustration. The stated price of the securities mentioned herein, if any, is as of the date indicated and is not any representation that any transaction can be effected at this price. SCB does not represent or warrant that this information is accurate or complete. While reasonable care has been taken in preparing this document and data obtained from sources believed to be reliable, no responsibility or liability is accepted for errors of fact or for any opinion expressed herein. This document does not purport to contain all the information an investor may require and the contents of this document may not be suitable for all investors as it has not been prepared with regard to the specific investment objectives or financial situation of any particular person. Any investments discussed may not be suitable for all investors. Users of this document should seek professional advice regarding the appropriateness of investing in any securities, financial instruments or investment strategies referred to in this document and should understand that statements regarding future prospects may not be realised. Opinions, forecasts, assumptions, estimates, derived valuations, projections and price target(s), if any, contained in this document are as of the date indicated and are subject to change at any time without prior notice. Our recommendations are under constant review. The value and income of any of the securities or financial instruments mentioned in this document can fall as well as rise and an investor may get back less than invested. Future returns are not guaranteed, and a loss of original capital may be incurred. Foreign-currency denominated securities and financial instruments are subject to fluctuation in exchange rates that could have a positive or adverse effect on the value, price or income of such securities and financial instruments. Past performance is not indicative of comparable future results and no representation or warranty is made regarding future performance. While we endeavour to update on a reasonable basis the information and opinions contained herein, we are under no obligation to do so and there may be regulatory, compliance or other reasons that prevent us from doing so. Accordingly, information may be available to us which is not reflected in this document, and we may have acted upon or used the information prior to or immediately following its publication. SCB is acting on a principal-to-principal basis and not acting as your advisor, agent or in any fiduciary capacity to you. SCB is not a legal, regulatory, business, investment, financial and accounting and/or tax adviser, and is not purporting to provide any such advice. Independent legal, regulatory, business, investment, financial and accounting and/or tax advice should be sought for any such queries in respect of any investment. SCB and/or its affiliates may have a position in any of the securities, instruments or currencies mentioned in this document. SCB and/or its affiliates or its respective officers, directors, employee benefit programmes or employees, including persons involved in the preparation or issuance of this document may at any time, to the extent permitted by applicable law and/or regulation, be long or short any securities or financial instruments referred to in this document and on the SCB Research website or have a material interest in any such securities or related investments, or may be the only market maker in relation to such investments, or provide, or have provided advice, investment banking or other services, to issuers of such investments and may have received compensation for these services. SCB has in place policies and procedures and physical information walls between its Research Department and differing public and private business functions to help ensure confidential information, including 'inside' information is not disclosed unless in line with its policies and procedures and the rules of its regulators. Data, opinions and other information appearing herein may have been obtained from public sources. SCB expressly disclaims responsibility and makes no representation or warranty as to the accuracy or completeness of such information obtained from public sources. SCB also makes no representation or warranty as to the accuracy nor accepts any responsibility for any information or data contained in any third party's website. You are advised to make your own independent judgment (with the advice of your professional advisers as necessary) with respect to any matter contained herein and not rely on this document as the basis for making any trading, hedging or investment decision. SCB accepts no liability and will not be liable for any loss or damage arising directly or indirectly (including special, incidental, consequential, punitive or exemplary damages) from the use of this document, howsoever arising, and including any loss, damage or expense arising from, but not limited to, any defect, error, imperfection, fault, mistake or inaccuracy with this document, its contents or associated services, or due to any unavailability of the document or any part thereof or any contents or associated services. This document is for the use of intended recipients only. In any jurisdiction in which distribution to private/retail customers would require registration or licensing of the distributor which the distributor does not currently have, this document is intended solely for distribution to professional and institutional investors. This communication is subject to the terms and conditions of the SCB Research Disclosure Website available at <https://research.sc.com/Portal/Public/TermsConditions>. The disclaimers set out at the above web link applies to this communication and you are advised to read such terms and conditions / disclaimers before continuing. Additional information, including analyst certification and full research disclosures with respect to any securities referred to herein, will be available upon request by directing such enquiries to scgr@sc.com or clicking on the relevant SCB research report web link(s) referenced herein.

Country-Specific Disclosures – This document is not for distribution to any person or to any jurisdiction in which its distribution would be prohibited. If you are receiving this document in any of the countries listed below, please note the following:

United Kingdom and European Economic Area: SCB is authorised in the United Kingdom by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority. This communication is not directed at Retail Clients in the European Economic Area as defined by Directive 2004/39/EC. Nothing in this document constitutes a personal recommendation or investment advice as defined by Directive 2004/39/EC. **Australia:** The Australian Financial Services Licence for Standard Chartered Bank is Licence No: 246833 with the following Australian Registered Business Number (ARBN: 097571778). Australian investors should note that this communication was prepared for "wholesale clients" only and is not directed at persons who are "retail clients" as those terms are defined in sections 761G and 761GA of the Corporations Act 2001 (Cth). **Bangladesh:** This research has not been produced in Bangladesh. The report has been prepared by the research analyst(s) in an autonomous and independent way, including in relation to SCB. THE SECURITIES MENTIONED IN THIS REPORT HAVE NOT BEEN AND WILL NOT BE REGISTERED IN BANGLADESH AND MAY NOT BE OFFERED OR SOLD IN BANGLADESH WITHOUT PRIOR APPROVAL OF THE REGULATORY AUTHORITIES IN BANGLADESH. Any subsequent action(s) of the Recipient of these research reports in this area should be subject to compliance with all relevant law & regulations of Bangladesh; specially the prevailing foreign exchange control regulations. **Botswana:** This document is being distributed in Botswana by, and is attributable to, Standard Chartered Bank Botswana Limited which is a financial institution licensed under the Section 6 of the Banking Act CAP 46:04 and is listed in the Botswana Stock Exchange. **Brazil:** SCB disclosures pursuant to the Securities Exchange Commission of Brazil ("CVM") Instruction 483/10: This research has not been produced in Brazil. The report has been prepared by the research analyst(s) in an autonomous and independent way, including in relation to SCB. THE SECURITIES MENTIONED IN THIS REPORT HAVE NOT BEEN AND WILL NOT BE REGISTERED PURSUANT TO THE REQUIREMENTS OF THE SECURITIES AND EXCHANGE COMMISSION OF BRAZIL AND MAY NOT BE OFFERED OR SOLD IN BRAZIL EXCEPT PURSUANT TO AN APPLICABLE EXEMPTION FROM THE REGISTRATION REQUIREMENTS AND IN COMPLIANCE WITH THE SECURITIES LAWS OF BRAZIL. **China:** This document is being distributed in China by, and is attributable to, Standard Chartered Bank (China) Limited which is mainly regulated by China Banking Regulatory Commission (CBRC), State Administration of Foreign Exchange (SAFE), and People's Bank of China (PBoC). **Germany:** In Germany, this document is being distributed by Standard Chartered Bank Germany Branch which is also regulated by the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin). **Hong Kong:** This document (except any part advising on or facilitating any decision on futures contracts trading) is being distributed in Hong Kong by, and any part hereof authored by an analyst licensed in Hong Kong is attributable to, Standard Chartered Bank (Hong Kong) Limited 渣打銀行(香港)有限公司 which is regulated by the Hong Kong Monetary Authority. Insofar as this



document advises on or facilitates any decision on futures contracts trading, it is being distributed in Hong Kong by, and any part hereof authored by an analyst licensed in Hong Kong is attributable to, Standard Chartered Securities (Hong Kong) Limited 渣打證券(香港)有限公司 which is regulated by the Securities and Futures Commission. **India:** This document is being distributed in India by Standard Chartered Bank, India Branch ("SCB India"). SCB India is a branch of SCB, UK and is licensed by the Reserve Bank of India to carry on banking business in India. SCB India is also registered with Securities and Exchange Board of India in its capacity as Merchant Banker, Investment Advisor, Depository Participant, Bankers to an Issue, Custodian etc. For details on group companies operating in India, please visit https://www.sc.com/in/india_result.html. **Indonesia:** The information in this document is provided for information purposes only. It does not constitute any offer, recommendation or solicitation to any person to enter into any transaction or adopt any hedging, trading or investment strategy, nor does it constitute any prediction of likely future movements in rates or prices or represent that any such future movements will not exceed those shown in any illustration. **Japan:** This document is being distributed to Specified Investors, as defined by the Financial Instruments and Exchange Law of Japan (FIEL), for information only and not for the purpose of soliciting any Financial Instruments Transactions as defined by the FIEL or any Specified Deposits, etc. as defined by the Banking Law of Japan. **Kenya:** Standard Chartered Bank Kenya Limited is regulated by the Central Bank of Kenya. The information in this document is provided for information purposes only. The document is intended for use only by Professional Clients and should not be relied upon by or be distributed to Retail Clients. **Korea:** This document is being distributed in Korea by, and is attributable to, Standard Chartered Bank Korea Limited which is regulated by the Financial Supervisory Service and Financial Services Commission. **Macau:** This document is being distributed in Macau Special Administrative Region of the Peoples' Republic of China, and is attributable to, Standard Chartered Bank (Macau Branch) which is regulated by Macau Monetary Authority. **Malaysia:** This document is being distributed in Malaysia by Standard Chartered Bank Malaysia Berhad only to institutional investors or corporate customers. Recipients in Malaysia should contact Standard Chartered Bank Malaysia Berhad in relation to any matters arising from, or in connection with, this document. **Mauritius:** Standard Chartered Bank (Mauritius) Limited is regulated by both the Bank of Mauritius and the Financial Services Commission in Mauritius. This document should not be construed as investment advice or solicitation to enter into securities transactions in Mauritius as per Securities Act 2005. **New Zealand:** New Zealand Investors should note that this document was prepared for "wholesale clients" only within the meaning of section 5C of the Financial Advisers Act 2008. This document is not directed at persons who are "retail clients" as defined in the Financial Advisers Act 2008. NOTE THAT STANDARD CHARTERED BANK (incorporated in England) IS NOT A "REGISTERED BANK" IN NEW ZEALAND UNDER THE RESERVE BANK OF NEW ZEALAND ACT 1989, and it is not therefore regulated or supervised by the Reserve Bank of New Zealand. **Pakistan:** The securities mentioned in this report have not been, and will not be, registered in Pakistan, and may not be offered or sold in Pakistan, without prior approval of the regulatory authorities in Pakistan. **Philippines:** This document may be distributed in the Philippines by, Standard Chartered Bank (Philippines) which is regulated by the Bangko Sentral ng Pilipinas (Telephone No. (+63) 708-7701, Website: www.bsp.gov.ph). This document is for information purposes only and does not constitute, and should not be construed as an offer to sell or distribute in the Philippines securities that are not registered with the Securities and Exchange Commission unless such securities are exempt under Section 9 of the Securities Regulation Code or such offer or sale qualifies as an exempt transaction under Section 10 thereof. **Singapore:** This document is being distributed in Singapore by SCB Singapore branch and/or Standard Chartered Bank (Singapore) Limited, provided that research reports relating to certain products may be distributed only to accredited investors, expert investors or institutional investors, as defined in the Securities and Futures Act, Chapter 289 of Singapore. Recipients in Singapore should contact SCB Singapore branch or Standard Chartered Bank (Singapore) Limited (as the case may be) in relation to any matters arising from, or in connection with, this document. **South Africa:** Standard Chartered Bank, Johannesburg Branch ("SCB Johannesburg Branch") is licensed as a Financial Services Provider in terms of Section 8 of the Financial Advisory and Intermediary Services Act 37 of 2002. SCB Johannesburg Branch is a Registered Credit Provider in terms of the National Credit Act 34 of 2005 under registration number NCRCP4. **Thailand:** This document is intended to circulate only general information and prepare exclusively for the benefit of Institutional Investors with the conditions and as defined in the Notifications of the Office of the Securities and Exchange Commission relating to the exemption of investment advisory service, as amended and supplemented from time to time. It is not intended to provide for the public. **UAE:** For residents of the UAE – Standard Chartered Bank UAE does not provide financial analysis or consultation services in or into the UAE within the meaning of UAE Securities and Commodities Authority Decision No. 48/r of 2008 concerning financial consultation and financial analysis. **UAE (DIFC):** Standard Chartered Bank, Dubai International Financial Centre (SCB DIFC) having its offices at Dubai International Financial Centre, Building 1, Gate Precinct, P.O. Box 999, Dubai, UAE is a branch of Standard Chartered Bank and is regulated by the Dubai Financial Services Authority ("DFSA"). This document is intended for use only by Professional Clients and is not directed at Retail Clients as defined by the DFSA Rulebook. In the DIFC we are authorized to provide financial services only to clients who qualify as Professional Clients and Market Counterparties and not to Retail Clients. As a Professional Client you will not be given the higher retail client protection and compensation rights and if you use your right to be classified as a Retail Client we will be unable to provide financial services and products to you as we do not hold the required license to undertake such activities. **United States:** Except for any documents relating to foreign exchange, FX or global FX, Rates or Commodities, distribution of this document in the United States or to US persons is intended to be solely to major institutional investors as defined in Rule 15a-6(a)(2) under the US Securities Exchange Act of 1934. All US persons that receive this document by their acceptance thereof represent and agree that they are a major institutional investor and understand the risks involved in executing transactions in securities. Any US recipient of this document wanting additional information or to effect any transaction in any security or financial instrument mentioned herein, must do so by contacting a registered representative of Standard Chartered Securities (North America) Inc., 1095 Avenue of the Americas, New York, N.Y. 10036, US, tel + 1 212 667 0700. WE DO NOT OFFER OR SELL SECURITIES TO U.S. PERSONS UNLESS EITHER (A) THOSE SECURITIES ARE REGISTERED FOR SALE WITH THE U.S. SECURITIES AND EXCHANGE COMMISSION AND WITH ALL APPROPRIATE U.S. STATE AUTHORITIES; OR (B) THE SECURITIES OR THE SPECIFIC TRANSACTION QUALIFY FOR AN EXEMPTION UNDER THE U.S. FEDERAL AND STATE SECURITIES LAWS NOR DO WE OFFER OR SELL SECURITIES TO U.S. PERSONS UNLESS (i) WE, OUR AFFILIATED COMPANY AND THE APPROPRIATE PERSONNEL ARE PROPERLY REGISTERED OR LICENSED TO CONDUCT BUSINESS; OR (ii) WE, OUR AFFILIATED COMPANY AND THE APPROPRIATE PERSONNEL QUALIFY FOR EXEMPTIONS UNDER APPLICABLE U.S. FEDERAL AND STATE LAWS. Any documents relating to foreign exchange, FX or global FX, Rates or Commodities to US Persons, Guaranteed Affiliates, or Conduit Affiliates (as those terms are defined by any Commodity Futures Trading Commission rule, interpretation, guidance, or other such publication) are intended to be distributed only to Eligible Contract Participants as defined in Section 1a(18) of the Commodity Exchange Act. **Zambia:** Standard Chartered Bank Zambia Plc (SCB Zambia) is licensed and registered as a commercial bank under the Banking and Financial Services Act Cap 387 of the laws of Zambia and as a dealer under the Securities Act, No. 41 of 2016. SCB Zambia is regulated by the Bank of Zambia, the Lusaka Stock Exchange and the Securities and Exchange Commission.

© Copyright 2017 Standard Chartered Bank and its affiliates. All rights reserved. All copyrights subsisting and arising out of all materials, text, articles and information contained herein is the property of Standard Chartered Bank and/or its affiliates, and may not be reproduced, redistributed, amended, modified, adapted, transmitted in any form, or translated in any way without the prior written permission of Standard Chartered Bank.

Document approved by
Madhur Jha
Head, Thematic Research

Document is released at
10:48 GMT 10 July 2017