

Longer Term Investments

Mass Transit Rail

CIO WM Research | 3 May 2017

Carl Berrisford, analyst

- Asia will drive mass global migration from countryside to city over the next two decades. The number of Asians living in megacities of over 10 million is forecast to double by 2025, according to the United Nations. Meanwhile, vehicle ownership is doubling every five years amid rising income, and sharply rising CO₂ emissions are adding to air quality problems in Asia's largest cities.
- Mass transit rail (MTR) systems have proven highly cost-effective transport solutions for Asia's megacities due to their high population densities. Asian countries, including India, Indonesia, Thailand, and Malaysia, are expected to spend over USD 200bn in greenfield MTR systems in the next decade to combat rising urban congestion.
- Companies with high exposure to MTR systems – namely contractors, property developers, capital equipment suppliers, and MTR operators – will enjoy high earnings visibility across the public spending cycle, as well as above-GDP earnings growth rates, suggesting an attractive long-term opportunity.

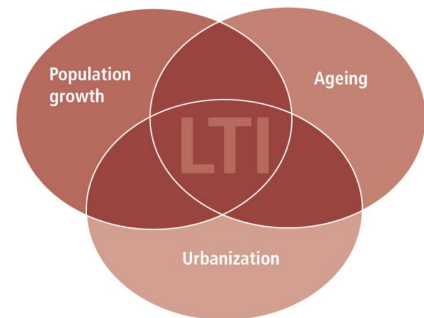
Mass transit rail (MTR) – also known in Asia as mass rapid transit, urban transit, metro, underground, and subway – networks have been long-established icons across many of Asia's developed capitals, including Tokyo, Singapore, Hong Kong, and Seoul. However, in recent years, rapid urbanization and immigration from the countryside have seen population explosions in several key cities in emerging Asia, especially in China and India. This, coupled with the sharp growth in car ownership and the emergence of the city commuter, has led to gridlocked traffic often exacerbated by poor urban planning. A side effect of large-scale traffic congestion has been rising car emissions and air pollution. Resulting social problems include health concerns, long commutes, escalating parking costs, and housing problems as city workers are priced out of homes close to their work places. Because we believe these are longer-term structural trends that will become more acute over the next decade, mass transit systems are becoming a necessity that large Asian cities cannot afford to be without. They are becoming increasingly prioritized in the public spending projects of several Asian governments, a trend we expect to continue.



Source: Martin Ruetschi

Introduction to the Longer Term Investments (LTI) series

- › **The Longer Term Investments (LTI)** series contains thematic investment ideas based on long term structural developments.
- › Secular trends such as population growth, ageing, and increased urbanization create a variety of longer term investment opportunities.
- › Investors willing to invest over multiple business cycles can benefit from potential mispricings created by the typically shorter term focus of stock markets.



Mass migration to cities will strain urban infrastructure in Asia

The United Nations forecasts that the world's population will rise from 7bn currently to around 9.3bn by 2050, with the proportion living in cities climbing from one-half to three-quarters. Most of this shift will occur in Asia and Africa, where 90% of an estimated total 2.7bn incremental urban dwellers will move to cities by 2050. Currently, of the world's 28 megacities with over 10 million inhabitants, 16 are located in Asia. With half of the world's population living in settlements of under 500,000, much of the fastest urban growth in Asia will be from these relatively small settlements. According to the United Nations Population Division (UNPD), the number of Asians living in cities with over 10 million inhabitants will almost double by 2025. This rapid pace of urbanization will be a huge strain on public transportation systems in Asia's large cities. MTR systems will, in our view, become a favored solution for high-growth Asian cities primarily because high population densities make them cost-effective. MTRs allow high capacity with less land use; they also have a smaller environmental impact at lower costs per rider.

Sharp rise in car ownership exacerbates urban congestion

A combination of rapid urbanization and income growth is triggering a sharp rise in car ownership from a low base in Asia's developing economies. According to World Bank and PFC Energy forecasts, most of the vast growth in global car ownership over the next decade will take place in Asia, with an increase of 220 million cars in China alone between 2010 and 2025 (see Fig. 3).

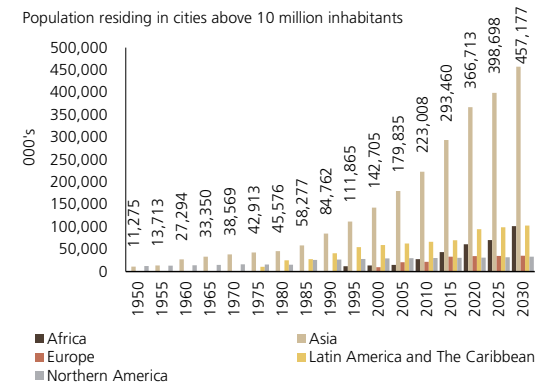
Rising car ownership has been spurred on by urban income growth coupled with the availability of cheap credit since 2008, and special concessions to encourage first-time buyers in several Asian countries. These are often designed to support the homegrown auto-manufacturing industry. Between 2005 and 2012, China, India, Indonesia, Malaysia, and Thailand witnessed significantly higher growth in car ownership than more developed Asian economies. Because public spending has failed to keep up, inadequate road infrastructure has resulted in severe traffic congestion, inefficient commuting times, rising carbon emissions, and deteriorating air quality. The last has become an especially acute problem in many cities in China, which as a nation has experienced the highest car growth in Asia. Malaysia has a very high car ownership rate, yet lacks a mature mass transit system. Rising congestion problems have led the Malaysian government to announce plans for three MTR systems by the end of the decade, with one currently being built in Kuala Lumpur.

Rising CO₂ emissions

Rising car ownership across Asia has meant that emissions from transport have become the fastest growing source of CO₂ emission. By 2030, Asia will account for 31% of total worldwide transport-sector-related CO₂ emissions, almost double the 17% in 1990, according to the Emissions Database for Global Atmospheric Research (EDGAR). Private vehicle ownership is doubling every five years in many Asian countries, with the growth in urban areas often doubling every 2–3 years.

Fig. 1: Population residing in megacities, by region

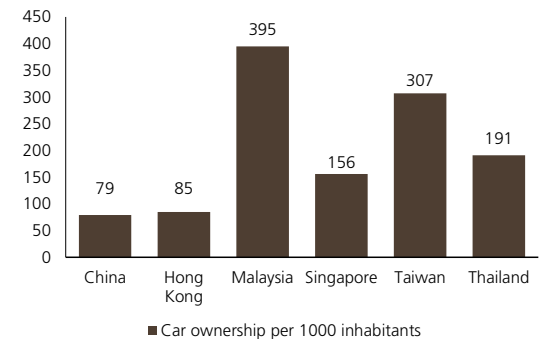
Asians living in cities of over 10 million will almost double by 2025



Source: UNPD, UBS, as of 11 April 2017

Fig. 2: Auto ownership rate in Asia

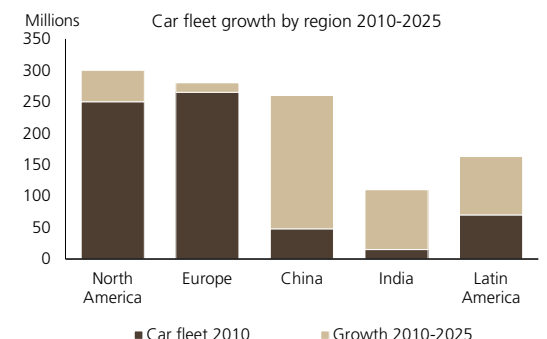
Malaysia has highest car ownership but no mass transit rail system



Source OICA, UBS, as of 11 April 2017

Fig. 3: Car fleet growth, by region 2010–2025

Chinese car ownership alone will grow by 220 million by 2025



Source: IEA, OPEC, World Bank, PFC Energy, UBS, as of 11 April 2017

Indeed, the use of fossil fuels has driven a threefold rise in per capita emissions in China between 1990 and 2012, and a twofold increase in countries like Thailand, India, and Indonesia. While CO₂ emissions are also linked to rising electricity production, we believe the sharp rise in car ownership has been a key swing factor behind the sharp rise in CO₂ production in Asian emerging markets.

Why mass transit systems are particularly cost-effective in Asia

There is evidence that mass transit systems in Asian cities enjoy higher fare-box recovery ratios (the share of operating expenses met by passenger fares) than other parts of the world, making them highly cost-effective. This is because many have been built in megacities or cities with high population densities. The economies of scale these transit systems achieve are reflected in the high annual ridership of Asian MTRs. Of the ten leading mass transit systems globally, ranked by annual ridership, six are in Asian cities (see Fig. 8). A second reason for their profitability is the rapid capital appreciation of land in Asian capital cities. Indeed, Asia is home to seven of the world's 20 most expensive cities. Asian mass transit companies have capitalized on rapid land price appreciation to recover project capital costs through "value capture" – the sale of land whose value appreciates as a result of MTR connectivity. This business model has been especially successful for Hong Kong's MTR Corporation and Singapore's SMRT, and we anticipate this will be emulated by new mass transit systems in cities in Southeast Asia.

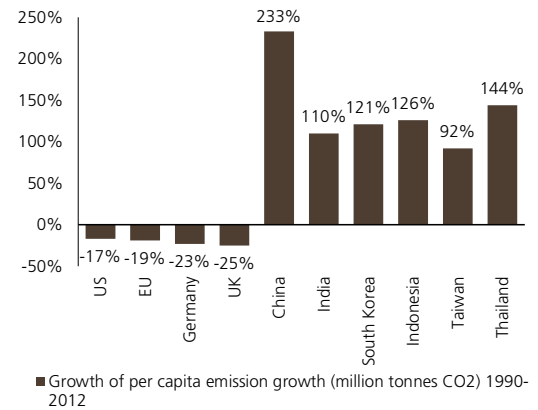
Asian investment in MTR systems will run into hundreds of billions over the next two decades

Due to the trends mentioned earlier, world development banks are forecast to spend USD 175bn on sustainable transport systems in emerging markets alone over the next 10 years, according to consultants Roland Berger. Aside from China, India, Thailand, Malaysia, Indonesia, and the Philippines that are actively building new municipal MTR systems, several frontier markets such as Vietnam and Pakistan are also building MTRs for their capital cities. Because of the high capital costs of MTR systems, Asian governments have tended to bear investment costs, often with subsidized funding. Private companies have benefited from government investment in MTR systems at the level of project delivery, engineering, and construction. MTR operating companies have frequently been spun off and privatized; several key ones in Asia are publicly listed.

Link to sustainable investing

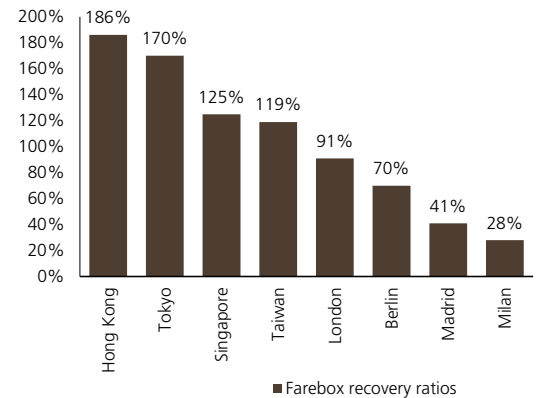
To identify whether a Longer Term Investment (LTI) theme qualifies as a sustainable investment (SI) theme, we follow a two-step process. The first works top-down. LTIs are assessed according to whether they match one or more of the sustainability topics within the environmental, social, and governance (ESG) categories (see Fig. 6). In general, these themes must contribute to environmental sustainability (e.g., a low-carbon economy), resource efficiency (energy, water), a sustainable society (health, education, poverty reduction, equality, social inclusion, etc.) or sustainable corporate governance.

Fig. 4: Growth of per capita CO₂ emission (1990–2012)



Source: EDGAR, European Commission, UBS, as of 11 April 2017

Fig. 5: Fare-box recovery ratios



Source: Company reports, UBS, as of 11 April 2017

The second, bottom-up step consists of considering a thematically aligned representative universe of companies, a large majority of which (80% or more) must align with one or more of the ESG categories. For each individual company, a minimum business involvement threshold is applied, e.g., 20% of revenues must derive from the thematic activity under consideration.

We think the MTR theme dovetails nicely with the SI thematic framework, addressing pressing issues such as congestion, local air pollution, climate change, and limited availability of land in megacities. Mass transit rail can help address several of the 17 UN Sustainable Development Goals (SDGs), such as the goal of sustainable cities and communities (Goal 11), industry, innovation, and infrastructure (Goal 9) or climate action (Goal 13).

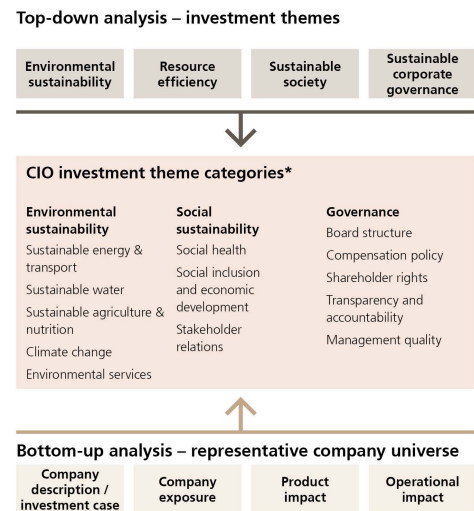
How to invest in Asia's MTR boom

We have identified eight Asian countries that plan to spend over USD 200bn on mass transit systems over the next decade. We believe spending in the decade after that could be double this amount based on megacity growth trends in Asia. First-line beneficiaries of rising Asian government investment in MTR systems are normally local contractors and potentially banks benefiting from related loan growth opportunities. However, it is rare for contractors to be overexposed to MTR projects as they seek to mitigate project risk through diversified exposure across different construction and engineering projects. Once MRT projects have been awarded, second-line beneficiaries tend to be suppliers of capital equipment, including tunneling and other heavy machinery as well as track and rolling stock manufacturers. Many of the leading global suppliers for mass transit system track and rolling stock are European and Japanese. However, more recently, Chinese industrial companies have developed a growing niche in this area. Capital equipment suppliers, as a rule, are globally or regionally diversified, to reduce overexposure to a single market. Operators of Asian MTR systems themselves can be attractive investment targets if they can generate strong profitability or robust recurring cash flow or if they are likely to be awarded new lines or systems to operate.

Significantly, other industries offering high exposure to Asian MTR build-out can be indirect beneficiaries like property developers or landlords whose land banks or development projects enjoy rising value due to proximity or direct connectivity with MTR lines and stations. However, to benefit from new MTR expansion over a longer period of time, property developers need to own large parcels of land in strategic locations which can be developed in phases over many years, or else be major landowners in cities or regions rolling out MRT projects.

Note: In the individual country sections below, we often refer to companies that are or have been major players in the roll-out of MTR systems in their respective countries. This is for clarification and illustrative purposes only, and should not be taken as a recommendation to invest.

Fig. 6: Overview of LTI topic clusters

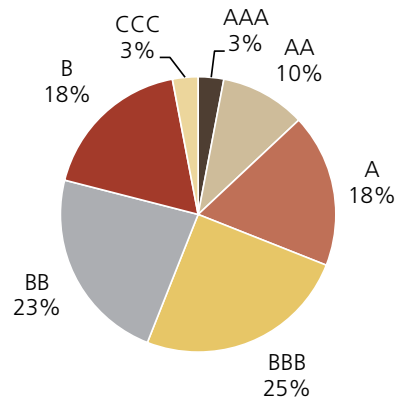


* For simplicity, all topic clusters include several sub-categories not included in the graph. For example: sustainable water includes water utilities, treatment, desalination, infrastructure and technology, water efficiency, and ballast-water treatment. Within each subcategory are further specifications, e.g. water treatment includes filtration, purification, and waste treatment. In total, we have more than 100 categories (potential SI investment themes) in our thematic database.

Source: UBS

Fig. 7: Entire MSCI ESG Research corporate coverage

Rating distribution in %, 6,277 companies



Note: AAA = best possible ESG rating; CCC = worst
Source: MSCI ESG Research, UBS, as of 18 October 2016

Key markets

China

China will invest a forecast USD 119bn (CNY 820bn) in 2016–2020 on mass transit rail (or urban rail transit) systems, a 234% rise over the 2011–2015 period. UBS estimates USD 77bn (CNY 533bn) will be for construction, USD 24bn (CNY 164bn) for construction equipment, USD 12bn (CNY 82bn) for rolling stock, and USD 6bn (CNY 41bn) for signal systems. MTR investments have been small compared with railway investments in the past, but we forecast investments will be similar to railway fixed-asset investment during 2016–2020. Total operating length for Chinese MTR systems will reach 9,489km (including 8,251km subway lines) by 2020. This is 10% higher than the NDRC's guided approved URT length of 8,600km as of 2016. The higher figure can be attributed to the inclusion of 49 cities with MTR systems vs. the original 43 as well as planned upgrades of existing systems. We forecast an additional 7,000km will be added beyond 2020. Chinese construction and capital equipment makers will be key beneficiaries of mass transit investment over the next decade, as well as the build-out of MTR systems elsewhere in Asia.

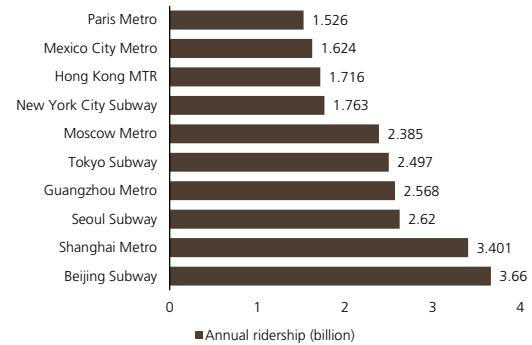
Hong Kong

Hong Kong will spend a projected USD 14.1bn (HKD 110bn, 2013 prices) on seven new rail links for the territory during 2018–2031. Six of these will be extensions to the existing MTR network and include a new North Island line, a new South Island line, a Tung Chung West extension, a Tuen Mun South extension, a Northern Link, and Kwun Tong Station. The seventh link will be an extension of the existing East Kowloon Link, the territory's main domestic rail service, and will take up at least 25% of the total investment budget. Even for a mature MTR network in a developed economy, Hong Kong is a good example of the need for continuous and significant network expansion due to severe capacity constraints on several lines and to facilitate housing developments in more rural parts of Hong Kong. This has partly arisen because of the large influx of mainland Chinese tourists to the territory over the last decade. In 2016, Hong Kong, which has a resident population of 7.3 million, saw 43 million inbound visits from mainland Chinese tourists.

India

India currently has metro networks in seven cities with a total operational length of 325km. It is slated to spend USD 40bn over the next five years on extensions as well as new projects in Ahmedabad, Nagpur, Kochi, New Delhi, Mumbai, Pune, Lucknow, Surat, Varanasi, Guwahati, Kozhikode, Trivandrum, Vijayawada, Vishakhapatnam, and Hyderabad. India boasts 45 cities with populations exceeding 1 million and has vast potential for a further build-out of mass transit systems. Local authorities in second-tier cities like Chandigarh, Patna, Agra, Kanpur, Meerut, Indore, and Bhopal have proposed MTR systems to the central government. Under the Modi administration, we expect India's capex cycle to be rejuvenated due to initiatives to fast-track clearances for stalled infrastructure projects and extend long-term financing. We expect future metro rail orders from the

Fig. 8: World MTRs, ranked by annual ridership



Source: Company reports, UBS, as of 28 April 2017

growing number of second-tier cities that have populations above 1 million.

Indonesia

A greenfield MTR system for Jakarta is planned in two phases at an aggregate estimated cost of USD 2.5bn. The construction of the first phase – an MTR line from Lebak Bulus in South Jakarta to Hotel Indonesia traffic circle in central Jakarta (15.7km, 13 stations) – kicked off in October 2013 and is expected to finish on 1 March 2019 (65% completed as of February this year). It will be able to accommodate 173,000 passengers a day. Leading Indonesian contractors will likely be key beneficiaries of the new infrastructure-friendly government under President Joko Widodo given expectations that his administration will be more efficient in expediting the land acquisition law responsible for large government project backlogs.

Malaysia

The first Mass Rapid Transit (MRT) line in the Greater Kuala Lumpur area known as the SG Buloh-Kajang line is currently under construction and expected to be fully operational in July. Phase 1 (between Sungai Buloh and Semantan) has been operational since December, with Phase 2 (between Semantan and Kajang) expected to start operations in July. The total project cost for the 51km line is estimated at MYR 23bn (USD 5.2bn) of which MYR 8.28bn (USD 1.88bn) is earmarked for the 9.5km underground section. Construction of a second 52km MRT line – the SG Buloh-Sedang-Putrajaya Line (SSP Line), with an estimated total cost of MYR 32bn (USD 7.4bn), of which MYR 15.47bn (USD 3.5bn) is for a 13.5km underground section – began in end-2016. Government approval is expected in 2H 2018 for a 32km MTR system for Penang state worth USD 7.2bn (MYR 32bn) as part of a Penang transport master plan.

Philippines

The Manila Light Rail Transit (LRT) Line 1 Extension will consist of a 11.7km double track with an estimated cost of USD 1.4bn (PHP 64.9bn). Total investment for the full LRT network is estimated at least USD 3.8bn, which will add two additional lines and about 45.8km of tracks. The MRT-7, meanwhile, is a proposed 23km elevated rail line connecting to the existing MRT-3, with an estimated cost of USD 1.5bn (PHP 69.3bn).

In addition, the Mass Transit System Loop is a proposed 12km underground rail network, connecting Metro Manila's key cities, with an estimated cost of USD 3bn (PHP 135bn). The North-South Commuter Rail (South Line), worth USD 3.8bn (PHP 170.7bn), will connect Metro Manila to other provinces in Southern Luzon through a 653km rail line (including existing and proposed branch lines). Among the said projects, the LRT Line 1 Extension and MRT-7 have been awarded to the private sector, while the North-South Commuter Rail, LRT Line 2, and Line 6 are in the advanced stages (prospective bidders conducting due diligence). Mass transit projects connecting Metro Manila now make up the lion's share of the government's Public-Private Partnership Projects (PPP) initiative.

Thailand

Thailand's interim government led by Prayuth Chan-Ocha approved a USD 75bn (THB 2.4trn) infrastructure budget in mid-September 2014. Of this, USD 15bn (THB 532bn, 0.6% of GDP) is earmarked over eight years for seven new mass transit lines in Bangkok totaling 364km in length. UBS estimates USD 1bn (THB 36bn) of civil works, and electrical and mechanical (E&M) works for four lines (dark green, purple, blue, red) was disbursed in 2015. An average USD 1.2bn (THB 43bn) will be disbursed annually from 2016–2019 to complete the project. An additional five lines (two of which will connect with red and blue lines) with total value of USD 7.8bn (THB 282bn) will be built out over 2018–2022.

Vietnam

Vietnam has two mass transit systems under construction in Ho Chi Minh City (HCM) and Hanoi. The HCM city system will comprise six lines of which Line 1 (19.7km) and Line 2 (11.3km) have an aggregate investment cost of USD 2.3bn and are expected to be operational by 2020. Plans for Lines 3 to 6 are still at a feasibility stage. In addition, a nine-line Hanoi metro system was approved in 2008 under Hanoi Metropolitan Rail Transport Project Board. Line 1, Line 2, Line 2A, and Line 3 will have an aggregate length of 52.4km. Total cost for Lines 1 and 2 is estimated at JPY 136.5bn (USD 1.4bn) and will receive Japanese financial assistance. The cost of Line 2A is estimated at USD 553m and will receive financial support from China while Line 3, estimated at USD 1.08bn, will receive financial support from France.

Risks

The key risks to this theme under a bear scenario would be interruptions to Asian government infrastructure spending plans – which have occurred in the past in some Asian countries. These arose due to political pressures related to land acquisitions, rising government deficits, and rising funding costs. There is also a broader trend toward greater fiscal discipline in many emerging Asian economies. In some cases, budgetary restraints might force governments to focus spending on improved road networks or lower-cost public transport alternatives because of the high costs of mass transit systems. In certain cases, companies overly exposed to a specific MTR investment or specific country will present higher investment risk than more diversified companies. Broadly speaking, capital equipment suppliers will tend to be more geographically diversified while contractors, operators, and property developers more focused to a region or country. Discontinuity of certain infrastructure projects by new governments citing some of the above reasons is also a key risk. However, we would highlight that over the last year, Malaysia, Thailand, India, and Indonesia all have new governments in place that are pro-infrastructure spending, implying continuity of MTR spending projects in the coming years.

Appendix

Terms and Abbreviations

Term / Abbreviation	Description / Definition	Term / Abbreviation	Description / Definition
1H, 2H, etc. or 1H11, 2H11, etc.	First half, second half, etc. or first half 2011, second half 2011, etc.	A	actual i.e. 2010A
Capex	Capital expenditures	COM	Common shares
E	expected i.e. 2011E	GDP	Gross domestic product
Shares o/s	Shares outstanding	UP	Underperform: The stock is expected to underperform the sector benchmark
CIO	UBS WM Chief Investment Office		

Chief Investment Office (CIO) Wealth Management (WM) Research is published by UBS Wealth Management and UBS Wealth Management Americas, Business Divisions of UBS AG (UBS) or an affiliate thereof. CIO WM Research reports published outside the US are branded as Chief Investment Office WM. In certain countries UBS AG is referred to as UBS SA. This publication is for your information only and is not intended as an offer, or a solicitation of an offer, to buy or sell any investment or other specific product. The analysis contained herein does not constitute a personal recommendation or take into account the particular investment objectives, investment strategies, financial situation and needs of any specific recipient. It is based on numerous assumptions. Different assumptions could result in materially different results. We recommend that you obtain financial and/or tax advice as to the implications (including tax) of investing in the manner described or in any of the products mentioned herein. Certain services and products are subject to legal restrictions and cannot be offered worldwide on an unrestricted basis and/or may not be eligible for sale to all investors. All information and opinions expressed in this document were obtained from sources believed to be reliable and in good faith, but no representation or warranty, express or implied, is made as to its accuracy or completeness (other than disclosures relating to UBS and its affiliates). All information and opinions as well as any prices indicated are current only as of the date of this report, and are subject to change without notice. Opinions expressed herein may differ or be contrary to those expressed by other business areas or divisions of UBS as a result of using different assumptions and/or criteria. At any time, investment decisions (including whether to buy, sell or hold securities) made by UBS AG, its affiliates, subsidiaries and employees may differ from or be contrary to the opinions expressed in UBS research publications. Some investments may not be readily realizable since the market in the securities is illiquid and therefore valuing the investment and identifying the risk to which you are exposed may be difficult to quantify. UBS relies on information barriers to control the flow of information contained in one or more areas within UBS, into other areas, units, divisions or affiliates of UBS. Futures and options trading is considered risky. Past performance of an investment is no guarantee for its future performance. Some investments may be subject to sudden and large falls in value and on realization you may receive back less than you invested or may be required to pay more. Changes in FX rates may have an adverse effect on the price, value or income of an investment. This report is for distribution only under such circumstances as may be permitted by applicable law.

Distributed to US persons by UBS Financial Services Inc. or UBS Securities LLC, subsidiaries of UBS AG. UBS Switzerland AG, UBS Deutschland AG, UBS Bank, S.A., UBS Brasil Administradora de Valores Mobiliarios Ltda, UBS Asesores Mexico, S.A. de C.V., UBS Securities Japan Co., Ltd, UBS Wealth Management Israel Ltd and UBS Menkul Degerler AS are affiliates of UBS AG. UBS Financial Services Incorporated of Puerto Rico is a subsidiary of UBS Financial Services Inc. UBS Financial Services Inc. accepts responsibility for the content of a report prepared by a non-US affiliate when it distributes reports to US persons. All transactions by a US person in the securities mentioned in this report should be effected through a US-registered broker dealer affiliated with UBS, and not through a non-US affiliate. The contents of this report have not been and will not be approved by any securities or investment authority in the United States or elsewhere. UBS Financial Services Inc. is not acting as a municipal advisor to any municipal entity or obligated person within the meaning of Section 15B of the Securities Exchange Act (the "Municipal Advisor Rule") and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of the Municipal Advisor Rule.

UBS specifically prohibits the redistribution or reproduction of this material in whole or in part without the prior written permission of UBS and UBS accepts no liability whatsoever for the actions of third parties in this respect.

Version as per September 2015.

© UBS 2017. The key symbol and UBS are among the registered and unregistered trademarks of UBS. All rights reserved.