HSBC Global Research

Demographics

25 May 2023

Climate Change and Migration

A potential shock to demographic projections

Free to View
Climate Change and Economics

Global

- Climate change could trigger large waves of migration…
- …both within economies and across borders…
- …which could completely alter demographic projections

The impact of climate change on the world is likely to be vast. In addition to shocks to potential economic activity, there are not insignificant risks that certain parts of the world could become less hospitable or even uninhabitable, leading to much higher numbers of economic migrants or refugees in years to come.

There are already reasons to question longer-run demographic forecasts; we believe the way birth rates are modelled is too simplistic. But it also looks like migration assumptions are over-simplified in these sorts of models.

For example, the UN estimates that inward migration from emerging to developed economies (at a rate of three people per 1,000 in 2019) has already peaked this century, and that net migration in the next decade is set to be 30% lower than in the decade that preceded the pandemic. Its estimate is that net migration out of Africa will be 60% lower this decade than during the pre-pandemic period.

Climate change could have a significant impact on such assumptions. Expected rises in global temperatures in the coming decades will likely mean more economies or regions become harder or impossible to live in, including through more frequent and severe droughts and floods; this is supported by the recent Intergovernmental Panel on Climate Change (IPCC) reports, which see significant risks of more frequent climate-related natural disasters as temperatures rise.

As a result, involuntary migration from the most vulnerable parts of the world could pick up sharply, significantly altering the spatial composition of the world's population. Such scenarios could mean that parts of Africa see their populations shrink, whereas Europe doesn't.

The economic consequences are likely to be profound. Firstly, these scenarios imply changes to demographic assumptions that would alter potential growth rates for many economies around the world. Secondly, huge policy questions arise – from border to integration policies – as well as how best to tackle these challenges on an international scale.

James Rydge
Head, ESG Research, EMEA
HSBC Bank plc

James Pomeroy
Economist
HSBC Bank plc

This is an abridged, free to view version of a report by the same title published on 25-May-23. Please contact your HSBC representative or email AskResearch@hsbc.com for more information.

Issuer of report: HSBC Bank plc

View HSBC Global Research at:
https://www.research.hsbc.com

Snapshot: climate and migration

Potential climate change factors

Heat waves
Tolerance exceeded by humans, ecosystems and agricultural land degradation

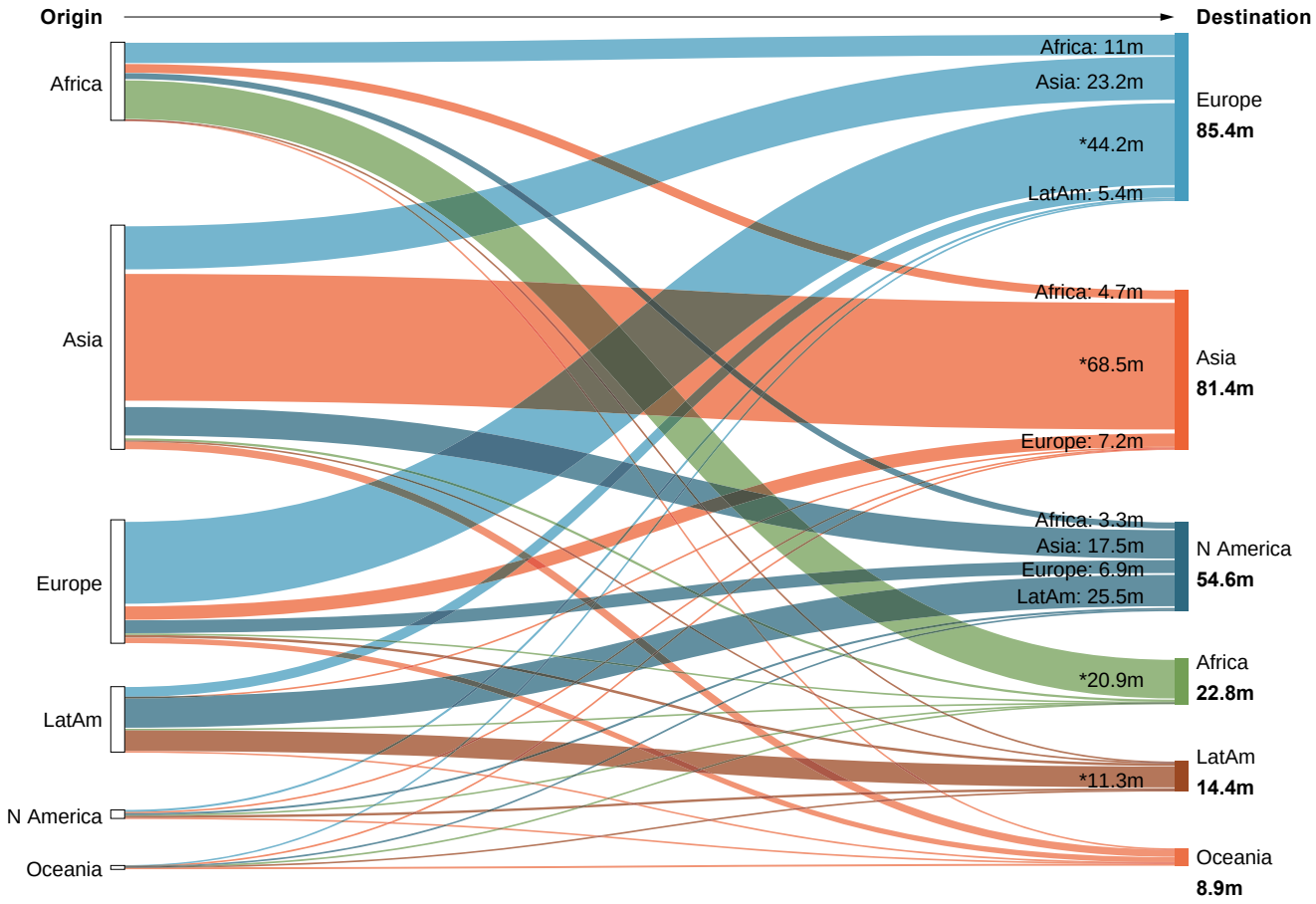
Rising sea levels
Impact on infrastructure, degradation of water supplies and economic loss

Heavy precipitation
Flooding can result in loss of life, impacts on infrastructure, crops and food security

Intense cyclone activity
Loss of human life and livelihoods, impacts to the built environment and crops

Global migration flows by region

Migration isn't just likely to be between emerging and developed markets, or from Africa and the Middle East to Europe – migration flows take place all over the world. Data from 2020 (*internal movement within region)



Environmental refugees

Forcibly displaced through an extreme weather

23.7m
displacements were triggered by disasters in 145 countries and territories in 2021

21.6m
were internal displacements due to weather-related disasters

Environmental migrants

Impacted by slow-onset climate change

2.4m
displacements were caused by droughts between 2008 and 2020

1.1m
displacements were caused by extreme tempereatures during the same period

Source: United Nations Department of Economic and Social Affairs, Population Division (2020). International Migrant Stock 2020, EMDAT (Emergency Disasters Database)

Climate Change and Migration

- Climate change could impact migration flows…
- …and with temperatures rising and more common extreme events…
- …such risks may need to be taken more seriously

Migration – a brief history

Climate change impacts the lives and livelihoods of the most vulnerable populations globally, leading to a range of interconnected effects such as displacement, political instability and conflict. The impacts of climate change are already being felt around the world. The UNHCR estimates that 21.5 million people worldwide were forcibly displaced annually between 2008 and 2016 by sudden-onset hazards linked to climate change impacts[1]. In addition, long-term degradation of socio-economic security, through slow-onset climate change effects (reduced water availability, sea level rise, crop productivity, etc), has also impacted migration patterns, resulting in thousands more being displaced[2].

IPCC estimates 3.5 billion people live in areas vulnerable to climate change

While there is no internationally agreed definition, people that are forcibly displaced through an extreme weather event are sometimes referred to as ***environmental refugees***, while those impacted by slow-onset climate change are often referred to as ***environmental migrants***[3]. The Intergovernmental Panel on Climate Change (IPCC) estimates 3.5 billion people live in areas highly vulnerable to climate change impacts.[4] The most vulnerable regions include East, Central and West Africa, South Asia, areas in the Pacific and Central America. People living in these areas have low ability to cope and adapt to climate impacts, which raises the risk of displacement given the projected increase in acute climate events, such as heatwaves and floods[5].

The vast majority of climate migration to date has been internal migration

Although much attention is focused on cross-border or international migration, the vast majority of climate change induced migration to date is internal; borders are not usually crossed (see chart 1 for key terminology). While climate change is likely to exacerbate both internal and international migration, there is significant uncertainty around future estimates, in particular for international migration.

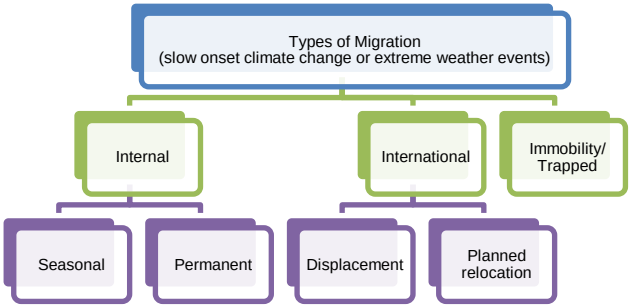
The lack of a globally recognised definition of climate migration hinders estimation

The lack of a globally recognised definition of an international climate migrant/refugee, and the complex interconnectedness of various drivers of migration, complicates future estimation. Improved scientific and economic understanding of climate migration, with a focus on vulnerable areas, is required to inform migration policy at the national, regional and intergovernmental level.

---

[1] UNHCR 2016. "Frequently asked questions on climate change and disaster displacement"
[2] Ibid.
[3] Waldinger and Fankhauser. Climate change and migration in developing countries: evidence and implications for PRISE countries. Oct. 2015
[4] See our write up of the IPCC Working Group 1 (WG I) report, The Physical Science Basis (August 2021). *The twelve key points you need to know* (10 August 2021). And our write up of the WG II report, Impacts, Adaptation and Vulnerability (28 February 2022). *The 10 points you need to know* (1 March 2022).
[5] IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

Chart 1: Key terminology for climate change and migration



Source: HSBC

Why might people move?

To understand the impact of climate on migration we can examine supply and demand (pull and push) factors, which affect whether people migrate internally or internationally.

Supply side factors are predominantly associated with the expected economic potential of the host country/city. For international migration to be compelling, research shows the host country (to which people move) usually has an average annual per capita income more than double that of the source country (from which those people come)[6]. In terms of internal migration, seasonal or permanent migration may occur where labour demand and wage elasticities make migration more compelling, often depicted by rural-to-urban migration. The world's urban population is predicted to double by 2050 from 2015, driven in part by climate change; cities can provide greater economic and social stability.[7]

People still need to be willing and able to leave their home environment.

It is important to remember that people may still need to be willing to leave their home environment. Place attachment, harmful policies that deter people from moving, and international and national laws are some reasons often cited for people choosing to remain rather than migrate internally or internationally.[8] Moreover, the most climate-vulnerable populations are also the ones who tend to have the least available resources to migrate, resulting in immobility or trapped people.[9]

Demand side factors are more often cited as key reasons for climate migration. Whether through slow-onset climate change or extreme weather events, any environmental impact causing long-term/permanent distress will likely increase migration. While some events may lead to temporary migration, the probability of permanent migration depends on a range of complex interrelated factors, including existing vulnerability (poverty, inequality, environmental degradation, state fragility and poor institutional support, etc.) and the context in which migration has occurred, e.g. if homes are destroyed as a result of the event[10]. This is particularly true when climate directly and permanently impacts the income-earning potential of individuals, increasing the economic incentive to migrate.

[6] OECD (2001). Trends in Immigration and Economic Consequences
[7] United States Institute of Peace (2022). Climate Change, Migration and the Risk of Conflict in Growing Urban Centers
[8] See McKenzie, D., and D. Yang. 2014. "Evidence on Policies to Increase the Development Impacts of International Migration & Waldinger, M. 2015. "The Effects of Climate Change on Internal and International Migration: Implications for Developing Countries." & Koubi, V., G. Spilker, L. Schaffer, and T. Bernauer. 2016. "Environmental Stressors and Migration: Evidence from Vietnam." World Development 79: 197–210
[9] The White House. 2021. Report on the Impact of Climate Change on Migration
[10] IDMC. 2021. "Global Report on Internal Displacement 2021."

Table 1: Examples of climate change impacts on lives and livelihoods

Climatic change	Impact on livelihoods	Historical examples
Heat waves	Heat stress tolerance exceeded by humans and ecosystems. Pastoralism declines, farming size reduces, lack capital for farming intensification.	◆ Heat wave deaths in India (2015), Europe (2019); impacts of weather extremes in highly vulnerable economies (e.g. Dominican Republic, Jamaica); agricultural land degradation
Rising sea levels	Impacts on built infrastructure, degradation of water supplies, economic loss, small scale fishing declines, coastal farms under increasingly intensive cultivation	◆ Over wash and groundwater contamination in Pacific and Indian Ocean atolls (e.g., 5 m King tides, Republic of Marshall Islands, 2014)
Increases in heavy precipitation events	Flooding can result in loss of life, impacts homes and infrastructure as well as crops, increasing food insecurity	◆ Flash floods in Nepal (1993, 2020); monsoonal floods and abrupt migration in Bangladesh (1987-1988, 2004, 2007)
Increases in intense tropical cyclone activity	Loss of human life and livelihoods; impacts to the built environment; salinity impacts on crops	◆ Migration from Caribbean islands in the aftermath of Hurricanes Irma and Maria (2017) and after Tropical Cyclone Gorky, south-eastern Bangladesh (1991)

Source: The White House (2021), HSBC

The evidence to date on climate change and migration

The decision to migrate is a combination of many factors

Even when migration can be directly linked to climate events, as is often the case with extreme weather events, the above discussion shows that the decision to migrate is based on many interrelated factors (including economic, political and social).

While data and corresponding evidence on migration and climate change are improving, knowledge gaps remain. For instance, long-term longitudinal data would better outline how slow-onset climate change has resulted in migration[11]. Moreover, with slow-onset climate change, people do not move in mass waves, hence data harmonisation is difficult. In addition, climate change may also impact political stability, resulting in heightened conflict, which in turn is also a driver of migration. While 95% of all conflict displacements in 2020 occurred in countries also vulnerable to climate change[12], the empirical evidence from studies linking climate change to these conflicts is contested.

Reflecting this complexity, the majority of literature that links climate change to migration is focused on the impacts of extreme weather events and on internal migration only. The International Displacement Monitoring Centre (IDMC) on disaster displacement finds that in 2021, 23.7 million new displacements were triggered by disasters in 145 countries and territories with 21.6 million people being internal displacements due to weather-related disasters[13]. In addition, recent studies have become better at attributing the effects of slow-onset climate change, such as variability and anomalies in rainfall, extreme precipitation and temperature changes, to migration[14]. The IDMC also reports that over the period 2008 to 2020, 2.4 million displacements were caused by droughts and 1.1 million by extreme temperatures[15]. Despite the difficulty in attribution, attention should be paid to vulnerable sectors and geographical locations (as stated above).

Those whose lives and livelihoods depend on the agricultural sector face higher climate migration risk

Evidence suggests that countries and people whose economies and livelihoods depend on the agricultural sector (see Box 1 for an example from Africa) will likely see more climate migration. Slow-onset climate change, such as droughts and limited precipitation, and sudden climate events, such as heat waves, will directly impact the sector, resulting in an increase in urban

[11] IOM 2022. World Migration report
[12] UNHCR 2020. Global Trends in Forced Displacement 2020
[13] International Displacement Monitoring Centre (IDMC) 2021 Global Report on Internal Displacement 2021
[14] Šedová, B., L. Čizmaziová and A. Cook 2021 A meta-analysis of climate migration literature
[15] International Displacement Monitoring Centre (IDMC) 2020 Global Report on Internal Displacement 2020

migration. To reduce the negative impacts of migration, specific adaptive techniques can be implemented, such as more resilient and sustainable agricultural techniques, e.g. low-till and drought-tolerant crop variations, and diversification of livelihoods, but also through financial means, such as access to credit and insurance[16].

Box 1: Regional considerations: Africa

Slow-onset climate change impacts migration and this can already be seen in Africa. Future projections indicate sub-Saharan Africa will have the largest number of internal climate migrants. North Africa is particularly vulnerable due to scarce water supplies and the expected rainfall decrease and increase in drought[17]. Coastal populations within the area have also increased, resulting in potential exposure to sea-level rises[18]. At the same time, warming within North Africa will likely cause more extreme heat waves, impacting air quality and human health[19]. Modelling suggests the number of internal climate migrants in North Africa could increase to 6% of the total population in the worst case scenario[20].

The World Bank estimates 216 million people could be displaced internally by 2050

Future Projections. The World Bank estimates (high-end pessimistic scenario) that 216 million people may be forced to move internally by 2050 across six world regions[21]. Its modelling looks specifically at slow-onset climate change and internal migration. According to the World Bank, forced displacement and trapped populations could be reduced through:

1. Cutting greenhouse gases (reducing climate pressures driving migration)
2. Integrating climate migration into development planning
3. Planning for each phase of migration; to support necessary migration
4. Investing in understanding the drivers of climate migration (through evidence-based research, models and consultations).

Migration may be a form of adaptation to climate change

As the above four points indicate, future migration depends not only on climate impacts but also on development policy (including mitigation and adaptation). Where development fails and populations remain extremely vulnerable to climate impacts, migration may be the only viable adaptive technique. In this case it is crucial to ensure that climate migration of displaced peoples does not exacerbate existing inequalities and vulnerabilities. Poorly managed migration can result in high economic, social and psychological costs and be a sign of adaptation failure.

Long-term estimates of climate migration are largely absent and underestimate possible migration levels

What is largely absent from the literature is estimates of longer-term international migration under scenarios of more extreme climate change, eg where the global average temperature increases over two degrees centigrade on pre-industrial levels. While it is challenging to estimate migration impacts at these temperature levels, and it gets harder as temperatures rise, on current emissions paths the probability of these scenarios is rising. While scientific literature is largely absent on migration at these temperature levels, commentators including Jared Diamond and Lord Nicholas Stern have provided informed speculation.[22] They have suggested that at these temperatures it is likely that climate impacts would overcome vulnerable populations and cause billions to move internally and across borders. They envisage the possibility of scenarios where, for example, “wet-bulb” temperatures (a measure of temperature and humidity) in many parts of the world could exceed human tolerance (causing hyperthermia),

[16] Waldinger and Fankhauser. 2015. Climate change and migration in developing countries: evidence and implications for PRISE countries.
[17] World Bank 2021. Groundswell: acting on Internal Climate Migration Part 2
[18] Workd Bank 2014. Turn Down the Heat: Confronting the New Climate Normal.
[19] World Bank. 2019. Sand and Dust Storms in the Middle East and North Africa (MENA) Region: Sources, Costs, and Solutions.
[20] World Bank 2021. Groundswell: acting on Internal Climate Migration Part 2
[21] Ibid.
[22] Diamond. 2011. Collapse: How Societies Choose to Fail or Survive. Stern, 2016. Why are we waiting: The Logic, Urgency, and Promise of Tackling Climate Change.

rainfall and monsoon patterns could radically shift forcing billions to move as crops fail, sea levels could rise dramatically, flooding major population centres, and so on. Conflict, they suggest, would be a likely result, with severe economic consequences; they suggest that history does not leave a positive record on vast movements of populations. It is important we keep these more remote possibilities in mind, even if they are currently low probability scenarios.

Below we look at existing international migration projections, examine their assumptions and compare these to a range of different possible future scenarios; we go beyond the largely benign assumptions embedded in existing demographic and migration modelling and consider how factors such as a pick-up in climate change induced migration could radically change many countries' future populations. What becomes clear is the need for better immigration policy to manage the possible future economic and social impacts from migration of often extremely vulnerable people.

This is an abridged, free to view version of a report by the same title published on 25-May-23.

In the full note, we look at modelling demographic projections. This involves migration estimates which are hard to forecast and are subject to big shocks which could completely change underlying population trends. We do this to predict where we could see the biggest moves in terms of migration - not only that which is related to climate change but overall migration – and its impact on economic assumptions.

We also take a look at the policy angle. We consider how the challenges of climate change and migration may be tackled, from border to integration policies, and how to tackle these on an international scale.

Please contact your HSBC representative or email AskResearch@hsbc.com for more information.

Disclosure appendix

The following analyst(s), who is(are) primarily responsible for this document, certifies(y) that the opinion(s), views or forecasts expressed herein accurately reflect their personal view(s) and that no part of their compensation was, is or will be directly or indirectly related to the specific recommendation(s) or views contained in this research report: James Rydge and James Pomeroy

This document has been issued by the Research Department of HSBC.

HSBC and its affiliates will from time to time sell to and buy from customers the securities/instruments, both equity and debt (including derivatives) of companies covered in HSBC Research on a principal or agency basis or act as a market maker or liquidity provider in the securities/instruments mentioned in this report.

Analysts, economists, and strategists are paid in part by reference to the profitability of HSBC which includes investment banking, sales & trading, and principal trading revenues.

Whether, or in what time frame, an update of this analysis will be published is not determined in advance.

For disclosures in respect of any company mentioned in this report, please see the most recently published report on that company available at *www.hsbcnet.com/research*.

Additional disclosures

1 This report is dated as at 25 May 2023.

2 All market data included in this report are dated as at close 23 May 2023, unless a different date and/or a specific time of day is indicated in the report.

3 HSBC has procedures in place to identify and manage any potential conflicts of interest that arise in connection with its Research business. HSBC's analysts and its other staff who are involved in the preparation and dissemination of Research operate and have a management reporting line independent of HSBC's Investment Banking business. Information Barrier procedures are in place between the Investment Banking, Principal Trading, and Research businesses to ensure that any confidential and/or price sensitive information is handled in an appropriate manner.

4 You are not permitted to use, for reference, any data in this document for the purpose of (i) determining the interest payable, or other sums due, under loan agreements or under other financial contracts or instruments, (ii) determining the price at which a financial instrument may be bought or sold or traded or redeemed, or the value of a financial instrument, and/or (iii) measuring the performance of a financial instrument or of an investment fund.

Disclaimer

Issuer of report
HSBC Bank plc

This document has been issued by HSBC Bank plc, which has based this document on information obtained from sources it believes to be reliable but which it has not independently verified. Neither HSBC Bank plc nor any member of its group companies ("HSBC") make any guarantee, representation or warranty nor accept any responsibility or liability as to the accuracy or completeness of this document and is not responsible for errors of transmission of factual or analytical data, nor is HSBC liable for damages arising out of any person's reliance on this information. The information and opinions contained within the report are based upon publicly available information at the time of publication, represent the present judgment of HSBC and are subject to change without notice.

This document is not and should not be construed as an offer to sell or solicitation of an offer to purchase or subscribe for any investment or other investment products mentioned in it and/or to participate in any trading strategy. It does not constitute a prospectus or other offering document. Information in this document is general and should not be construed as personal advice, given it has been prepared without taking account of the objectives, financial situation or needs of any particular investor. Accordingly, investors should, before acting on it, consider the appropriateness of the information, having regard to their objectives, financial situation and needs. If necessary, seek professional investment and tax advice.

The decision and responsibility on whether or not to purchase, subscribe or sell (as applicable) must be taken by the investor. In no event will any member of the HSBC group be liable to the recipient for any direct or indirect or any other damages of any kind arising from or in connection with reliance on any information and materials herein.

Past performance is not necessarily a guide to future performance. The value of any investment or income may go down as well as up and you may not get back the full amount invested. Where an investment is denominated in a currency other than the local currency of the recipient of the research report, changes in the exchange rates may have an adverse effect on the value, price or income of that investment. In case of investments for which there is no recognised market it may be difficult for investors to sell their investments or to obtain reliable information about its value or the extent of the risk to which it is exposed. Some of the statements contained in this document may be considered forward looking statements which provide current expectations or forecasts of future events. Such forward looking statements are not guarantees of future performance or events and involve risks and uncertainties. Actual results may differ materially from those described in such forward-looking statements as a result of various factors.

This document is for information purposes only and may not be redistributed or passed on, directly or indirectly, to any other person, in whole or in part, for any purpose. The distribution of this document in other jurisdictions may be restricted by law, and persons into whose possession this document comes should inform themselves about, and observe, any such restrictions. By accepting this report, you agree to be bound by the foregoing instructions. If this report is received by a customer of an affiliate of HSBC, its provision to the recipient is subject to the terms of business in place between the recipient and such affiliate. The document is intended to be distributed in its entirety. Unless governing law permits otherwise, you must contact a HSBC Group member in your home jurisdiction if you wish to use HSBC Group services in effecting a transaction in any investment mentioned in this document.

Certain investment products mentioned in this document may not be eligible for sale in some states or countries, and they may not be suitable for all types of investors. Investors should consult with their HSBC representative regarding the suitability of the investment products mentioned in this document.

HSBC and/or its officers, directors and employees may have positions in any securities in companies mentioned in this document. HSBC may act as market maker or may have assumed an underwriting commitment in the securities of companies discussed in this document (or in related investments), may sell or buy securities and may also perform or seek to perform investment banking or underwriting services for or relating to those companies and may also be represented on the supervisory board or any other committee of those companies.

From time to time research analysts conduct site visits of covered issuers. HSBC policies prohibit research analysts from accepting payment or reimbursement for travel expenses from the issuer for such visits.

HSBC Bank plc is registered in England No 14259, is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority and is a member of the London Stock Exchange. (070905)

[1214423]