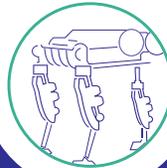




The Future of Asia

FORCES OF CHANGE AND POTENTIAL SURPRISES

SUPPLEMENTARY REPORT



CANADA-AUSTRALIA
PUBLIC POLICY INITIATIVE
COLLABORATIVE STUDY 2013

Forces of Change in Asia Detailed Insights

Index

Economic Systems

Hybrid Models of State and Market-led Innovation	3
Rethinking Models of Growth and Consumption in Asia	5
Rapid Growth of South-South Trade may Reshape Global and Regional Trading Blocs	7
Infrastructure and Technology Advances: Key to Regional Integration	9
Innovative Asian Cities Could Leap Ahead	11
Chimerica – the Beginnings of a New Regional Reserve	13

Social Systems

Implications of Demographic Shifts on Migration, Employment and Health	15
Rising Inequality Threatens to Derail Projected Asian Growth	18
A Rising Middle Class Brings Rising Demands	20
Benefits Associated with Asia’s Increased use of Soft Power	22

Technology

Bio-manufacturing’s Potential to Reshape Production	24
Artificial Intelligence & Data Analytics Might Manage Billions	26
Robotics Emerges in the Lands of Cheap Labour	28
Three-dimensional Printing’s Effects on Value Chains	30
E-commerce Speeding up Asian Consumption	32

Energy and Environment Systems

Energy Starts to Become more of a Technology Race	34
Urbanization and Scrap Metal Potential to Change Resource Consumption	38
Spiraling Complexity of Food Security	39
Cascading Water Supply Challenges	42

Security Systems

Regional Stability Threatened by Border Disputes and Rising Nationalism	44
The Rise of Fundamentalism as a Constraint to Economic Development	47
Cyber-security and the New Cold War	49
After Fukushima, Asia Sticks to Nuclear Power Plans	52

Governance Systems

Acting on Corruption	54
Willingness to Experiment in Governance and Service Delivery	56
The Rise of ‘Para-diplomacy’: The Implications of Increasing Sub-national Relations on Trade and Diplomacy	58

Disclaimer

This report is a collaborative project between Policy Horizons Canada, a scanning and foresight organization within the Federal Public Service of Canada, and the Strategy and Delivery Division of the Department of the Prime Minister and Cabinet, Australia. For more information on how this report was compiled, please consult the “How this Report was Developed” section.

The views contained in this document do not represent the views of the Governments of Australia and Canada or their participating departments and agencies.

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Australian Government

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Background to this report

This supplementary report provides more detailed information on the issues raised in *The Future of Asia: Forces of Change and Potential Surprises*. This report may be read as a stand-alone document.

The report was jointly written by Policy Horizons Canada and the Strategy and Delivery Division, Department of the Prime Minister and Cabinet, Australia.



Economic Systems

Asian countries are experimenting with their own paths to prosperity. There is an early sense that a shift is underway from a GDP-centric model to more inclusive growth model.

HYBRID MODELS OF STATE AND MARKET-LED INNOVATION

WHAT IS IT?

Influenced by the strong economic growth of China over the past two decades, many Asian countries see the benefits of a strong state, especially in the aftermath of the 2008 financial crisis. Nevertheless, China and others are experimenting with a range of strategies that allow governments to leverage the private sector while still maintaining overall control.¹ The newly established Pilot Free Trade Zone in Shanghai is one such example.² Its main objectives are to promote competition and boost economic growth and vitality through easing foreign investment rules, allowing goods to be imported, processed and re-exported without customs intervention, and permitting the cross-border use and convertibility of the Yuan³. The zone is expected to be a litmus test for further liberalization initiatives across China.

1 Kurlantzick, J. "The Rise of Innovative State Capitalism." Bloomberg Business Week. June 2012. <http://www.businessweek.com/articles/2012-06-28/the-rise-of-innovative-state-capitalism>

2 Chen, B. "Pilot free trade zone in Shanghai to build open economy." East Asia Forum. October 2013. <http://www.eastasiaforum.org/2013/10/19/pilot-free-trade-zone-in-shanghai-to-build-open-economy/>

3 Dominguez, G. "Shanghai's new free trade zone opens." Deutsche Welle. October 2013. <http://www.dw.de/shanghais-new-free-trade-zone-opens/a-17124228>

Asian governments are also leveraging private sector investments through Public-Private Partnerships (PPP) to meet the growing need for infrastructure development projects throughout the region.⁴ Asia will need to invest approximately \$750 billion per year in national and regional infrastructure projects between 2010 and 2020.⁵ Early indications also point to the use of PPPs in the social sector, namely the Model Schools initiative in India.⁶ The pilot PPP Centre in Indonesia may promote further development of these public-private models.⁷

4 Basu Das, S. & Rose James, C. "Addressing Infrastructure Financing in Asia." Institute of Southeast Asian Studies. May 2013. <http://www.iseas.edu.sg/ISEAS/upload/files/ISEAS-Perspective-2013-27-Addressing-Infrastructure-Financing-in-Asia.pdf>

5 Kawai, M. & Na, R.M. "Infrastructure for a Seamless Asia." Asian Development Bank and the Asian Development Bank Institute. August 2009. http://www.adbi.org/files/2009_08_31_book_infrastructure_seamless_asia.pdf

6 "Centre-India Inc to roll out 2,500 model schools." Hindustan Times. July 2013. <http://www.hindustantimes.com/india-news/newdelhi/centre-india-inc-to-roll-out-2-500-model-schools/article1-1095759.aspx>

7 Jamzuri, M. "Indonesia Becomes Home to APEC's Public Private Partnership Pilot Project." Indonesia-Investments. September 2013. <http://www.indonesia-investments.com/news/todays-headlines/indonesia-becomes-home-to-apecs-public-private-partnership-pilot-project/item1126>



Asian countries are also using the levers of the state to promote innovation in important sectors of their economies, which have resulted in some first-rate companies as well as potential opportunities for the development of small and medium enterprises.⁸ Singapore provides a good example of state intervention in the economy without hindering entrepreneurship. Another example is India's recent Science, Technology and Innovation (STI) policy released in January 2013, which aims to make India one of the top five global scientific powers by 2020.⁹ This policy includes measures to increase R&D spending, identify critical sectors for STI investment, increase financial mechanisms for small and medium scale enterprises, leverage the private sector to facilitate investments in science and technology, and focus STI efforts to promote inclusive growth.

WHY IS IT IMPORTANT?

A hybrid state-market approach to managing the economy affects how particular industries develop. For example, China's commitment towards renewable energy to reach carbon pollution reduction targets translates into direct government assistance for wind and solar energy manufacturers. The same could be said for India's recent STI policy. Some Asian countries may find this hybrid approach appealing if it makes policy more consistent over time and allows decisions to be made quickly and in a timely manner. However, there is also a risk that this will lead to a strategy of "picking favourites" that creates inefficiencies in large state-backed companies and stifles innovation in smaller enterprises and start-ups.¹⁰

If the Chinese government continues to experiment with various forms of privatization, such as the Shanghai Free Trade Zone, it could result in a wave of further liberalization initiatives. This may solidify the hybrid state-market approach and, depending on the results, could have spillover effects to other parts of the region and beyond.

⁸ Idem. Kurlantzick, J. "The Rise of Innovative State Capitalism." Bloomberg Business Week. June 2012.

⁹ "India plans big to make this the decade of innovation." The Economic Times. July 2013. <http://economictimes.indiatimes.com/news/news-by-industry/india-plans-big-to-make-this-the-decade-of-innovation/articleshow/20943132.cms>

¹⁰ "The rise of state capitalism. The spread of a new sort of business in the emerging world will cause increasing problems." The Economist. January 2012. <http://www.economist.com/node/21543160>

RETHINKING MODELS OF GROWTH AND CONSUMPTION IN ASIA

WHAT IS IT?

The concept of inclusive growth, whereby an economy develops across a number of sectors in accordance with the skills of the labour force, is a common economic development model in Asia.¹¹ Inclusive growth strategies can facilitate the growth of a robust middle class and lead to a more consumption-led and/or service-oriented economy. When it is successful, inclusive growth helps address inequality issues, promotes the need for social protection by the state and legitimizes the efforts of those in power. However, efforts to reduce waste and extravagant spending as part of inclusive growth strategies, whether by individuals using models such as social capitalism¹² or through state intervention such as constrained capitalism,¹³ may result in lower levels of consumption.

Asian consumption patterns will be shaped by the middle class. There is no widely accepted definition of what constitutes a member of the Asian middle class, and this has repercussions for the type and quantity of

goods and services that they will purchase. The Asian Development Bank defines a person as middle class if they earn between \$2 and \$20 a day, adjusted for purchasing power parity. Most Asians are currently members of the lower middle class and earn \$2 to \$4 a day. In the short term this will mean that Asian consumption levels will not approach those of Western countries.¹⁴

Asian countries will need to develop innovative goods and services for consumers as they make the transition from working poor to established members of the middle class. One means of achieving this is through frugal innovation, which involves making products or delivering services from a limited amount of resources. Examples of frugal innovation include the Tata Swach¹⁵, a low-cost water purifier, and the Mitti Cool Refrigerator,^{16,17} neither of which require electricity to operate. An example of how frugal innovation has been applied to services is the cardiac care provided by the Narayana Hrudayalaya Group in India, which involves patients' families in non-specialist

11 "Inclusive Growth," The World Bank. Website. <http://go.worldbank.org/KMA81PV60>

12 Lehé, Olivier. "Frugal Innovation. An Indian approach of capitalism." World of Innovations Blog. April 2013. <http://worldofinnovations.net/2013/04/13/frugal-innovation-an-india-approach-of-social-capitalism/>

13 Bunting, M. "Arguments for constrained capitalism in Asia." The Guardian – Poverty Matters Blog. April 2011. <http://www.theguardian.com/global-development/poverty-matters/2011/apr/21/arguments-constrained-capitalism-asia-chandran-nair>

14 Chun, N. "Middle Class Size in the Past, Present, and Future: A Description of Trends in Asia." ADB Economics Working Paper Series No. 217. September 2010. (p. 17) <http://www.adb.org/publications/middle-class-size-past-present-and-future-description-trends-asia>

15 "Tata Swach." Nesta – Frugal Innovations. Website. <http://www.nesta.org.uk/node/292/tata-swach>

16 See Mitti Cool Refrigerator http://www.mitticool.in/product_detail.php?product_id=4

17 GE ECG Machine." Nesta – Frugal Innovations. Website. http://www.nesta.org.uk/news_and_features/frugal_innovations/ge_ecg_machine

care and uses new approaches to micro-health insurance.¹⁸ Frugal innovation occurs in businesses of every size, and especially in the small and medium-sized enterprises that make up more than 95% of all enterprises, account for 85% of employment and contribute up to 53% of GDP in ASEAN countries.¹⁹

WHY IS IT IMPORTANT?

Asia's consumption patterns will influence two of the continent's biggest challenges over the next fifteen years – reversing environmental damage and sustaining high levels of economic growth. Some governments, notably China, are now officially acknowledging citizen discontent over pollution, and devising policies to address these concerns.²⁰

Asia's response to environmental issues and consumption patterns will also affect the profitability and competitiveness of particular industries. The requirements of running technologically intensive industries may increase as a result of environmental pressures. Those countries with the ability to rapidly adopt advanced technology will have a competitive advantage in certain fields²¹ Furthermore, companies with new business models and concepts that creatively design products and services at a price point consumers can afford will have market opportunities in emerging economies.

18 "Narayana Hrudayalaya." Nesta – Frugal Innovations. Website. <http://www.nesta.org.uk/node/292/narayana-hrudayalaya>

19 Lo, J. "Mapping out road ahead for SMEs." China Daily. July 2013. http://www.chinadailyasia.com/focus/2013-07/26/content_15080220.html

20 Morris, R. "Economic growth chokes China." Deutsche Welle. November 2012. <http://www.dw.de/economic-growth-chokes-china/a-16395393>

21 Rodrik, D. "The Past, Present, and Future of Economic Growth." Global Citizen Foundation, Working Paper 1. June 2013. (p. 58) http://www.gcf.ch/wp-content/uploads/2013/06/GCF_Rodrik-working-paper-1_-6.17.131.pdf

RAPID GROWTH OF SOUTH-SOUTH TRADE MAY RESHAPE GLOBAL AND REGIONAL TRADING BLOCS

WHAT IS IT?

In 2013, China surpassed the U.S. to become the largest trading country in the world.²² Within the BRICS (Brazil, Russia, India, China and South Africa), Brazil and China are now the main trading partners and have agreed to a currency swap, distancing themselves from the U.S. dollar.²³ South-South trade (trade between developing countries) is crystalizing into a robust trend as the middle classes of emerging countries rise and regional integration strengthens. The Asia-Pacific region has witnessed a proliferation of bilateral free trade agreements (FTAs), and with the impending implementation of both the TransPacific Partnership and Regional Comprehensive Economic Partnership, the next decade will likely see new trading blocs emerge, including or excluding developed countries.

²² "China Eclipses U.S. as Biggest Trading Nation." Bloomberg News. February 2013. <http://www.bloomberg.com/news/2013-02-09/china-passes-u-s-to-become-the-world-s-biggest-trading-nation.html>

²³ Rapoza, K. "Dollar Wary Brazil And China Sign Currency Pact." *Forbes.com*. June 2012. <http://www.forbes.com/sites/kenrapoza/2012/06/23/dollar-wary-brazil-and-china-sign-currency-pact/>

However, these "mega FTAs" could create distinctive regional spheres with their own set of rules that ultimately stifle world trade by competing with one another.²⁴

WHY IS IT IMPORTANT?

These changes will also impact the "North". The huge and attractive markets of Asian countries – even more so if trade is liberalized – may cause the disruption of current blocs like the European Union and the North America Free Trade Agreement. The U.S. trade balance sheet shows that China has surpassed Mexico's volume of trade and is zeroing in on Canada's privileged spot.²⁵ South Korea trades more with the U.S. than the United Kingdom does. For Europe, the opening of the Arctic sea route and the Silk Railroad currently stretching

²⁴ Kawai, M. & Wignaraja, G. "Asian FTAs: Trends, Prospects, and Challenges." Asian Development Bank. October 2010. <http://www.adb.org/publications/asian-ftas-trends-prospects-and-challenges>

²⁵ United States Census Bureau. "Top Trading Partners - September 2013." United States Government. September 2013. <http://www.census.gov/foreign-trade/statistics/highlights/top/top1309yr.html>

from southwest China to Germany will facilitate trade with Asia.^{26,27} According to projections, Germany's fastest growing exports and imports will be with India, China, South Korea and Vietnam. China may also overtake France and the Netherlands as Germany's main trading partner.^{28,29}

Up to now, global trade has mostly revolved around Western economies and has been administered by international institutions that embrace Western ideologies. As Asian countries increase their share of

global trade and new blocs are formed, such as the Trans-Pacific Partnership and Regional Comprehensive Economic Partnership, there will likely be changes to the governance of international trade and financial systems. This shift has already started: in recent years, we have entered the G20 era, in which the larger forum has taken precedence over the G8.³⁰ Other alterations are to be expected in the next decade, and international institutions that govern the rules of trade like the World Trade Organization³¹ may be undermined by new initiatives in which Asia has a stronger voice.

26 Roberts, D. et al. "The Silk Railroad of China-Europe Trade." Bloomberg Business Week. December 2012. <http://www.businessweek.com/articles/2012-12-20/the-silk-railroad-of-china-europe-trade>

27 Byers, M. "How the Arctic Ocean Could Transform World Trade." Aljazeera. August 2013. <http://www.aljazeera.com/indepth/opinion/2013/08/201382273357893832.html>

28 Parello-Plesner, J. & Kundnani, H. "China and Germany: a new special relationship?" European Council on Foreign Relations. May 2012. http://ecfr.eu/content/entry/China_and_Germany_a_new_special_relationship

29 Yao, K. & Rinke, A. "China sees trade with Germany near doubling by 2015." Reuters. April 2012. <http://www.reuters.com/article/2012/04/23/us-germany-china-idUSBRE83L08D20120423>

30 Cooper, A. "The G8 in the Era of the G20." G8 Centre, University of Toronto. June 2013. <http://www.g8.utoronto.ca/conferences/2013/cooper.html>

31 Draper, P. "Can the WTO still change the rules of trade?" World Economic Forum. August 2012. <http://forumblog.org/2012/08/can-the-wto-still-change-the-rules-of-trade/>

INFRASTRUCTURE AND TECHNOLOGY ADVANCES: KEY TO REGIONAL INTEGRATION

WHAT IS IT?

The World Bank reports that in 2012 there were 128 projects underway in South Asia and 64 in East Asia and the Pacific, with the largest investment share in the energy sector.³² McKinsey calculates that across the Asian region, around US\$8 trillion will be committed to infrastructure projects over the next decade.³³ In the last three months of 2013, China invested US\$50 billion into central Asian infrastructure projects.³⁴

An important factor in regional integration is the physical and virtual connections between places.³⁵ Other important factors include the elimination of trade barriers, more integrated financial markets and cooperation on matters of public benefit (e.g., coordinated disaster response, and anti-corruption measures). Infrastructure such as the rail networks planned for mainland Southeast Asia³⁶ and the high

speed rail planned in India are important for physically linking places. New trade routes can open up through infrastructure investments, such as the creation of a bridge between South Asia and East Asia through the development of Myanmar's infrastructure.³⁷ Shared energy and water infrastructure has the ability to both join countries in a common purpose and to cause significant tension over resources.

WHY IS IT IMPORTANT?

The type and level of investment, as well as the ability to work together across borders will distinguish which areas of Asia rapidly grow and which ones will lag. As some countries start investing massively in the development of their neighbours' infrastructure, integration may become synonymous with foreign economic influence (e.g., China in Laos, Thailand in Myanmar).³⁸ More recently, China has proposed an Asian Infrastructure Development Bank to help coordinate foreign investment into the region. A key purpose of the proposal is to capture technical expertise from developed countries to speed up

32 "Private Participation in Infrastructure Database: Regional Snapshots." The World Bank. Website. http://ppi.worldbank.org/explore/ppi_exploreRegion.aspx?regionID=2h

33 Tahilyani, N. et al. "Asia's \$1 trillion infrastructure opportunity." McKinsey & Company. March 2011. http://www.mckinsey.com/insights/financial_services/asia_1_trillion_infrastructure_opportunity

34 Chu, B. "China's \$50bn spending spree on new Silk Road." The Independent. October 2013. <http://www.independent.co.uk/news/business/news/chinas-50bn-spending-spre-on-new-silk-road-8854793.html>

35 "Regional Public Goods." Asia Regional Integration Center, Asian Development Bank. Website. <http://aric.adb.org/regional-public-goods>

36 "One night to Bangkok." The Economist. September 2013. <http://www.economist.com/blogs/banyan/2013/09/infrastructure-laos>

37 "Connecting South Asia and Southeast Asia. Interim Report." Asian Development Bank and the Asian Development Bank Institute. May 2013. <http://www.adbi.org/files/2013.05.05.book.connecting.south.asia.southeast.asia.interim.report.pdf>

38 "Better run through the jungle." The Economist. July 2013. <http://www.economist.com/node/21581660>

progress in industrialization and urbanization in Asia, especially in underdeveloped Southeast Asian countries (e.g., Laos and Myanmar).³⁹

At the same time, the advancement and uptake of technology (e.g., distributed energy, additive manufacturing, etc.) may lead to less use of roads and pipelines and provide new opportunities and challenges for integration. In a country like India, where millions of people do not have electricity, leapfrogging to a distributed system may undercut the need for investments in centralized infrastructure systems.⁴⁰ The growing trend of e-commerce combined with drone

delivery⁴¹ and the advent of 3D printing, may have a similar impact on transportation by reducing the volume of air, ground and sea shipping.^{42, 43} As a result, disruptive technologies could potentially decrease the expected returns on infrastructure investments.

39 Zongze, R. "Being Good Neighbours". The Nation. October 2013. <http://www.nationmultimedia.com/opinion/Being-good-neighbours-30216868.html>

40 La Monica, M. "Can India's Tata make cheap, distributed energy?" CNET. March 2011. http://news.cnet.com/8301-11128_3-20047974-54.html

41 Guilford, G. "Australia and China are way ahead of Amazon in the commercial drone race." Quartz. December 2013. <http://qz.com/152788/australia-and-china-are-way-ahead-of-amazon-in-the-commercial-drone-race/>

42 Burg, N. "Why 3D Printing will Change how Businesses Deliver." Forbes. September 2013.

43 Dunphy, B. "What potential does 3D printing have for developing economies?" TED Conversations. May 2013. http://www.ted.com/conversations/18251/what_potential_does_3d_printin.html

INNOVATIVE ASIAN CITIES COULD LEAP AHEAD

WHAT IS IT?

Asian cities such as Singapore, Hong Kong, Tokyo, Seoul and Taipei, with high population densities and a track record of high-tech advances, have set a high standard for urban innovation in Asia. A new crop of innovative cities – high-tech eco-cities and entrepreneurial slums – are now showing that innovation comes in many guises.

Asian urbanization will continue at an unprecedented pace, with another 1.1 billion people projected to move to cities in the region in the next 20 years.⁴⁴ This trend will bring its share of challenges, but may also trigger innovative changes. For example, the large scale eco-city of Songdo in South Korea is being built from

scratch. Once completed, it will become the largest of 15 planned South Korean “ubiquitous cities.”⁴⁵ In such cities, “ubiquitous computing” is integrated within the urban environment, where virtually every computing device is linked to an information network, facilitating services such as parking, traffic, crime prevention and much more.

WHY IS IT IMPORTANT?

Asian cities will need to find innovative ways to address congestion, housing affordability, transport, pollution and access to utilities and services, while serving ever-increasing urban populations. Behind the screen of polluted air and the many troubles that come with urbanization, we may find that Asia leaps

44 “Managing Asian Cities.” Asian Development Bank. June 2008. <http://www.adb.org/publications/managing-asian-cities>

45 Lee, Y. “Ubiquitous [Smart] City.” EU Parliament Seminar. Brussels: European Union. May 2013. <http://www.europarl.europa.eu/document/activities/cont/201305/20130514ATT66084/20130514ATT66084EN.pdf>

ahead. Urban innovation is a potential change to the way cities are built. China is developing expertise in modular building^{46,47,48} and taking it to new levels of sophistication, with enhancements in quality, cost and energy efficiency, size, speed of construction, as well as new heights, including what promises to be the tallest building in the world: Sky City.⁴⁹ In the future, such buildings could be built by robots in manufacturing plants and taken to sites by automated transport where they are assembled by few or potentially no workers.

Innovation will happen in high-tech cities like Songdo, but big surprises may also come from a more unlikely place – slums. Contrary to what one might think, in Chongqing’s arrival city⁵⁰ and Mumbai’s and Delhi’s slums,⁵¹ the thousands of people living in poverty are not resigned to their standard of living. Many have turned into small business entrepreneurs – much of it illegal. The most successful are operating legitimate small- to medium-size businesses and joining the growing middle class. In countries labelled as followers when it comes to innovation and technology, this kind of social dynamism may prompt unexpected results.

46 Jones, Terril Yue. “China ‘instant buildings’ seeking to be pioneer in shoddy construction sector.” Financial Post. May 14, 2012. http://business.financialpost.com/2012/05/14/china-instant-buildings-seeking-to-be-pioneer-in-shoddy-construction-sector/?_lsa=59d5-95e4

47 TSTInstallations. “Modular Building System installed by TST installations.” You Tube. March 2013. <http://www.youtube.com/watch?v=Tz9YvQgbzw8>

48 Hickory UBA. “7 storey apartment building in 11 days.” You Tube. April 2013. <http://www.youtube.com/watch?v=Fz2t8JUI5V4>

49 Burton, R. “800 Meters in 6 Months.” You Tube. May 2013. <http://www.youtube.com/watch?v=3fx5AVyHuds>

50 Saunders, D. “Liu Gong Li: Inside a Chinese Arrival City.” Website: <http://arrivalcity.net/video/>

51 Kaye, L. “Social Enterprise in Indian Slums.” The Guardian. August 2013. <http://www.theguardian.com/sustainable-business/social-enterprise-india-slums>

CHIMERICA – THE BEGINNINGS OF A NEW REGIONAL RESERVE

WHAT IS IT?

Chinese concerns over the ability of the U.S. to manage its debt have led to recent calls by China to “de-Americanize” the world economy and seek an alternative to the U.S. dollar as the international reserve currency.⁵² As far back as 2008, China proposed the need for a new international currency reserve which would limit the importance of any one national currency.⁵³

In recent times, the U.S. economy has avoided a debt crisis by raising the debt ceiling level. Any adjustment has the potential to impact the Chinese economy, given the level of exposure to U.S. securities. The People’s Bank of China (PBOC) has amassed US\$3.5 trillion in foreign reserves – largely U.S. Treasury securities. The fact that a single institution wields so much influence over global macroeconomic stability has caused considerable anxiety, with doomsayers predicting that doubts about U.S. debt sustainability will force China to sell off its holdings of U.S. debt. This would drive up interest rates in the U.S. and ultimately could trigger the dollar’s downfall.

However, selling off U.S. Treasury securities may not be in China’s interest, as it would drive up the renminbi’s (RMB) exchange rate against the U.S. dollar, diminishing the domestic value of China’s reserves and undermining the export sector’s competitiveness. Indeed, a U.S. Defense Department report last year on the national security implications of China’s holdings of U.S. debt concluded that “attempting to use U.S. Treasury securities as a coercive tool would have limited effect and likely would do more harm to China than to the [U.S.]”⁵⁴

U.S. debt is only one side of the coin. Economist Robert Shiller believes that the real estate bubble is a serious problem in China.⁵⁵ According to Shiller, people are buying apartments in the expectation that house prices will continue to rise. This gambling mentality is leading them to make completely irrational buying decisions. Slowing economic growth and exports has the potential to expose a serious financial bubble in the Chinese housing sector. The banking sector in China would need to be recapitalized should the Chinese housing bubble burst.

52 Puzanghera, J. “Upset over U.S. Fiscal Crisis, China Urges a ‘de-Americanized World.’” Los Angeles Times. October 2013. <http://www.latimes.com/business/money/la-fi-mo-china-debt-limit-shutdown-de-americanized-economy-20131014,0,1990632.story#ixzz2mwhEb6ll>

53 Landler, M. “Seeing its Own Money at Risk, China Rails at U.S.” The New York Times. October 2013. http://www.nytimes.com/2013/10/16/us/politics/china-rails-over-us-fiscal-crisis-seeing-its-own-money-at-risk.html?_r=0

54 Morrison, W. and M. Labonte. “China’s Holdings of U.S. Securities: Implications for the U.S. Economy.” (CRS Report for Congress.) Congressional Research Service. August 2013. <http://www.fas.org/sgp/crs/row/RL34314.pdf>

55 “2013 Nobel Prize winner: China’s real estate bubble is serious.” People’s Daily Online. October 2013. <http://english.people.com.cn/business/8427784.html>

WHY IS IT IMPORTANT?

The symbiotic relationship between Chinese export-led growth and U.S. consumption is such that should one economy falter the other will follow. Both of these disruptors exist against a backdrop of rising bilateral trade using national currencies and a call by the International Monetary Fund for a new global currency to replace the U.S. dollar.⁵⁶

Research by AMRO-Asia, the chief economists of ASEAN+3, finds that while the U.S. remains the anchor currency in the Asian region, the U.S. dollar has “seemingly lost its dominating status.”⁵⁷ At the same time, the weight of the RMB in regional currency

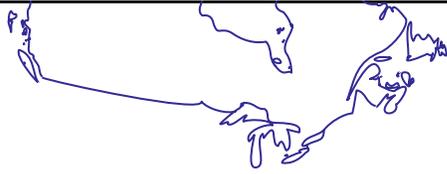
baskets has been increasing since 2005.^{58,59} The rise of the RMB as the Asian regional reserve has implications for regional trade and global growth. In the long run, the success of the U.S. economic pivot to Asia is likely to be slowed by the rise of the RMB and the corresponding decline in U.S. economic power. Over the last decade, U.S. growth has been facilitated by Chinese holdings of U.S. securities. Questions remain as to whether a decoupling in the long run will have a positive outcome for China and the U.S. as well as global growth.

56 Snyder, M. “Shift From U.S. Dollar as World Reserve Currency Underway – What Will This Mean For America?” munknee. <http://www.munknee.com/shift-from-u-s-dollar-as-world-reserve-currency-underway-what-will-this-mean-for-america/>

57 Chen, C., R. Siregar and M Yiu. “RMB as an Anchor Currency in ASEAN, China, Japan and Korea Region.” ASEAN+3 Macroeconomic Research Office. April 2013. <https://www.cb.cityu.edu.hk/ef/doc/Conference%20on%20>

58 Chong, F. “Is RMB Approaching Safe Haven Status?” Asia Today International. June 2013. <http://asiatoday.com.au/content/rmb-approaching-safe-haven-status>

59 Irwin, N. “This one number explains how China is taking over the world.” Washington Post. December 2013.



Social Systems

Asia's economic growth has lifted millions out of extreme poverty. However, the litmus test for Asian governments will be how they manage the growing expectations of a rising middle class, social inequality and shifts in demographic structures. As Asia's economies grow, it should be accompanied by a flourishing of Asian culture

IMPLICATIONS OF DEMOGRAPHIC SHIFTS ON MIGRATION, EMPLOYMENT AND HEALTH

WHAT IS IT?

The demographic shifts of ageing, youth bulge and sex ratio imbalance will play out differently across Asia, against the backdrop of rapid economic development and urbanization. Many countries in East Asia are currently enjoying strong economic growth as a result of a large working-age population, but will soon experience a notable decline in these populations. Those ageing fastest include Japan, South Korea and Singapore, with China not far behind. By 2025, Japan's over-65 population will represent 34% of the total population, making it the "oldest" country in the world.⁶⁰ In the same timeframe, the proportion of China's over-65 population will increase from 10% to

15%.⁶¹ The situation will only worsen as the over-60 population in China hits 360 million by 2030 and 430 million by 2040.⁶²

While East Asia is ageing, South Asia is experiencing a youth bulge. Over the next thirty years, the bulk of population growth in the region will take place in South Asia. In 2030, about 68% of India's population will be of working age.⁶³

A skewed sex ratio imbalance has emerged in a number of Asian countries, including China, India, Nepal and Vietnam. The skewed sex ratio at birth (SRB) imbalance

60 "Meet the 2020 Chinese Consumer." McKinsey Consumer & Shopper Insights, McKinsey Insights China, McKinsey & Company 2012. March 2012. <http://www.mckinseychina.com/wp-content/uploads/2012/03/mckinsey-meet-the-2020-consumer.pdf>

61 Ibid.

62 Schure, T. "China's Gender Imbalance." Wordpress.org. January 2011. <http://www.worldpress.org/Asia/3676.cfm> Cary, E. "China's People Problem." The Diplomat. February 2013. <http://thediplomat.com/2013/02/chinas-people-problem/>

63 Drysdale, P. "Asia's demographic transition over the next 30 years." East Asia Forum. March 2013. <http://www.eastasiaforum.org/2013/03/18/asias-demographic-transition-over-the-next-30-years/>



is most pronounced in China, where an estimated 119 boys are born for every 100 girls.⁶⁴ By 2020, it is estimated that 24 million Chinese men will be unable to find a wife in their own country.⁶⁵

Rapid urbanization is also contributing to demographic change in Asia. Some 1.1 billion people (100,000 people per day) will be moving to urban environments in Asia in the next fifteen years, meaning that 50% of Asia's population will be living in cities by 2020. In many East and Southeast Asian countries the movement of labour from farms to factories has driven industrial development.

WHY IS IT IMPORTANT?

In coming years, these demographic changes will combine to produce a complex story of positive and negative consequences that Asian countries have yet to prepare for or appreciate.

Mass migration: Migration will be driven by three factors. First, many Asians will continue to migrate to urban centres in search of opportunity, including higher incomes, access to health services, education and social networks. While this will bring upward mobility for some, it also puts others at risk of social dislocation and its associated consequences, such as higher rates

64 Golley, J. and R. Tyers. "China's Gender Imbalance and its Economic Performance." Australian Centre on China in the World. August 2012. <http://www.thechinastory.org/chinas-gender-imbalance-and-its-economic-performance>

65 "China faces growing gender imbalance." BBC News. January 2010. <http://news.bbc.co.uk/2/hi/asia-pacific/8451289.stm>

of suicide, crime and violence.

Second, the shortage of working-age people in East Asia is likely to result in an influx of young workers from South Asia. Demand for elder-care workers (which will also be in short supply as it is traditionally a female occupation) will be a key factor. It is estimated that by 2030, China alone will require approximately ten million caregivers to meet the needs of its ageing population⁶⁶. Currently, there are only 300,000 people working in the field.⁶⁷

Third, the skewed SRB will also create a relative scarcity of women that will draw people across borders. Marriage is a social expectation. With more competition, there will be increasing material requirements to secure marriage, and in many cases men will have to look to other countries for a spouse, delay marriage, or will not be able to marry at all. The skewed SRB will likely also spur an increase in sex work and human trafficking. A survey of 3,000 Indian sex workers revealed 73% had worked in overseas labour markets.⁶⁸ Human trafficking is also linked to the migration of sex workers. In 2001, 42,000 kidnapped women and children who had been sold into marriage or prostitution were freed by police in China.⁶⁹

66 Kleinman, A. and H. Chen. "Looking after the Elderly — Asia's Next Big Challenge." Fung Global Institute. April 2012. <http://www.funglobalinstitute.org/en/looking-after-elderly-asia%E2%80%99s-next-big-challenge>

67 Ibid.

68 Kaufman, J. "HIV, Sex Work, and Civil Society in China." The Journal of Infectious Diseases (Volume 204, Issue Supplement 5). December 2011. http://jid.oxfordjournals.org/content/204/suppl_5/S1218.full

69 Liu, L. and W. Leonard. "Influence of China's One Child Policy on Sexual Economy: Wife Trafficking in Urban vs. Rural China." North Western University, Global Health. <http://www.ipd.northwestern.edu/images/students-research/>

Disease risk: The increased movement of people increases the risk of disease. The deadly outbreak of a new strain of bird flu in China (H7N9) in 2013 caused 45 deaths.⁷⁰ An estimated 10 million female sex workers in Asia, with an estimated 75 million male clients, have the potential to result in widespread sexually transmitted diseases and HIV/AIDS.⁷¹ The spread of disease due to migration may add to the social service burden that will not be evenly distributed between countries.

Economic openness: As countries become more reliant on external sources to fulfil domestic labour shortages, issues such as diplomatic ties, border control, trade, citizenship, wages and working conditions will need to be addressed. Efforts to attract the limited pool of younger workers may result in improvements in these areas. At the same time, those countries that choose immigration will need strategies to foster positive intercultural relations and social cohesion.

Breakdown of traditional cultural and social barriers: Increased openness also has the potential to break down some longstanding cultural and social barriers, especially in countries that are largely homogenous (e.g., Japan). Immigration and the diversification of workforces and populations will represent a significant

shift for some Asian countries. This has the potential to soften norms that have previously prevented inter-marriages between castes and ethnicities, or women in Asia from accessing employment, particularly higher paid skilled jobs. On the flip-side, migrant workers can also exacerbate the breakdown of traditional family structures both at home and abroad. Those left behind bear the social costs of the migrant worker phenomena. For example, there are approximately 9 million children in the Philippines being raised by extended family members.⁷² Children left behind have been linked to increasing instances of mental and physical abuse as well as alcoholism and drug abuse later in life.

[Influence%20of%20Chinas%20One%20Child%20Policy%20on%20Sexual%20Economy.pdf](#)

70 Kelland, K. "New bird flu poses 'serious threat' scientists say." Reuters. May 2013. <http://www.reuters.com/article/2013/05/01/us-birdflu-threat-idUSBRE94011D20130501>

71 Idem. "HIV, Sex Work, and Civil Society in China." The Journal of Infectious Diseases. December 2011.

72 Reyes, M. M. "Migration and Filipino Children Left=Behind.: A Literature Review", UNICEF, July 2008. http://www.unicef.org/philippines/Synthesis_StudyJuly12008.pdf.

RISING INEQUALITY THREATENS TO DERAIL PROJECTED ASIAN GROWTH

WHAT IS IT?

The main drivers of Asia's rapid growth have been technological progress, globalization, and market-oriented reform. These very same factors increase the inequality gap between the rich and poor, as highly skilled, capital rich, and urban centres are favoured over those without access to resources.⁷³ Although economic growth in Asia has benefited most of the region's populations, some have benefited more than others.

Over the past two decades, 11 of 28 Asian economies (over 80% of the region's population) experienced rising income inequality, as measured by the Gini coefficient.⁷⁴ This trend is particularly notable in China, India and Indonesia – the most populous Asian countries – as well as Pakistan, Bangladesh, Sri Lanka and Vietnam, despite high average economic growth rates. China has experienced the highest economic growth rate of 10%, but also the highest rise in inequality over the same period.

Inequalities in the three most populous countries have regional, rural-urban and educational dimensions. More employment opportunities are generally available in urban and coastal areas that act as global trade hubs, than in rural and inland areas. In India, much inequality

is driven by higher earnings in skill-intensive jobs and industries in urban settings.⁷⁵ In both Indonesia and India, bottlenecks in infrastructure (i.e., limited electricity supply and poor roads) in impoverished, remote and rural areas also contribute to inequality.

WHY IS IT IMPORTANT?

While a modest degree of income inequality is generally considered conducive to economic growth, as it can foster initiative and innovation, this relationship reverses beyond a certain threshold. Extreme inequality can limit access to productive employment, as many people cannot obtain the resources they need to invest in entrepreneurship and education for themselves or their children. Income inequality contributes to an influential elite class that can shape resource allocation in ways that are sub-optimal for society as a whole. It can also marginalize populations and may lead to crime and vandalism, which can undermine stability and act as a deterrent to future business investments.⁷⁶ The increasing divide between the rich and poor can reduce social cohesion, create barriers to social and economic mobility, foster corruption, weaken

73 Francisco, R. "ADB: Rising income inequality a threat to Asia's growth." ABS-CBN News. April 2012. <http://www.abs-cbnnews.com/business/04/11/12/adb-rising-income-inequality-threat-asias-growth>

74 "Deepening Divide: Can Asia Beat the Menace of Rising Inequality?" Asian Development Bank. April 2013. <http://www.adb.org/publications/deepening-divide-can-asia-beat-menace-rising-inequality>

75 Kundu, K. "India has a problem with inequality, and it won't be solved easily." Business Standard. May 2013. http://www.business-standard.com/article/opinion/india-has-a-problem-with-inequality-and-it-won-t-be-solved-easily-113052500705_1.html

76 Berg, A. and J. Ostry. "Equality and Efficiency." International Monetary Fund. September 2011. <http://www.imf.org/external/pubs/ft/fandd/2011/09/Berg.htm>

governance structures, and create social unrest,^{77,78} all of which could impact economic growth.⁷⁹ For example, cronyism and ‘favours’ in a range of Asian countries, such as the Philippines and Thailand, are a constant source of social unrest and political dysfunction.

Asian governments are initiating measures to combat inequality in order to ensure stability and foster economic growth. China, India and Indonesia’s most recent national development plans focus on inclusive economic growth. China’s goal is to create 50 million urban jobs (largely in the services sector), initiate tax reform to improve income distribution, undertake governance reforms, invest in infrastructure projects in underdeveloped western provinces, and expand compulsory education, health coverage, pension programs and housing opportunities.⁸⁰ India’s aim is to enhance economic opportunities for the poor by upgrading infrastructure, revitalizing manufacturing, improving agricultural productivity, and developing skills.⁸¹ Indonesia plans to expand half of its

infrastructure spending to the eastern region, promote green growth initiatives, and increase investment in social safety programs such as food security, employment creation, community empowerment, health care and education.⁸²

The jury is still out as to whether these policies will be sufficient to stem the rising tide of inequality and the corresponding impact on economic growth. Setbacks by Asian governments in addressing income inequality and redistributing wealth may reduce opportunities for the most marginal to fully participate in the economy. It will also reduce the policy options available to governments to alleviate poverty. In 2012, the Asian Development Bank conducted simulations for the period spanning the 1990s and 2000s to show the degree to which rising inequality holds back poverty reduction. The ADB concluded that had inequality not increased during this period, the poverty headcount for India, China and Indonesia would be substantially different than what it is today. In India, the poverty headcount rate would have declined to 29.5% in 2008, instead of the actual 32.7%. In China, extreme poverty would have declined to 4.9%, instead of the actual 13.1%. In Indonesia, the poverty rate would have fallen to 6.1%, instead of the actual 16.3%.⁸³

77 “China to tackle inequality, as social unrest grows.” Equal Times. February 2013. http://www.equaltimes.org/china-to-tackle-inequality-as-social-unrest-grows?lang=en#.U4Sgw_IdUwA

78 Otto, B. and I. Sentana. “Indonesia Strikers Turn Out in Force.” The Wall Street Journal. October 2012. <http://online.wsj.com/news/articles/SB10000872396390443493304578034272131159086>

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80 “China’s 12th Five-Year Plan: Overview.” KPMG. March 2011. <http://www.kpmg.com/CN/en/IssuesAndInsights/ArticlesPublications/Publicationseries/5-years-plan/Documents/China-12th-Five-Year-Plan-Overview-201104.pdf>

81 “Twelfth Five Year Plan 2012-17.” Government of India – Planning Commission. 2012. <http://planningcommission.gov.in/plans/planrel/12thplan/welcome.html>

82 “National Medium-Term Development Plan (RPJMN 2010-2014).” Indonesia-Investments. <http://www.indonesia-investments.com/projects/government-development-plans/national-medium-term-development-plan-rpimn-2010-2014/item307>

83 “Asian Development Outlook 2012: Confronting Rising Inequality in Asia.” Asian Development Bank. 2012. <http://www.adb.org/sites/default/files/pub/2012/ado2012.pdf>

A RISING MIDDLE CLASS BRINGS RISING DEMANDS

WHAT IS IT?

According to Goldman Sachs, the number of people with an annual income of \$6,000-\$30,000 is expected to grow to 4.9 billion by 2030.⁸⁴ The bulk of the growth will be in the emerging economies, especially in China and India.⁸⁵ By 2030, it is estimated that Asia will be home to 64% of the global middle class, accounting for 40% of global middle class consumption.⁸⁶ Highly educated, urban, assertive, mobile, and tech savvy, this group has and will continue to have a strong influence in Asia.

WHY IS IT IMPORTANT?

The expanding middle class in Asia will put pressure on global resources as they become wealthier and aspire to Western living standards. Their appetite for products, food, energy, housing and transport

stimulates consumption on the one hand while putting constraints on resources on the other.⁸⁷ It is possible that similar cultural experiences and increasingly linked regions might create more affinities between the Asian middle classes. These new ties could reduce nationalist sentiments and contribute to overall regional stability.

Highly aware of their rights and relative power, combined with a willingness to organize, the middle classes can drive changes to improve environmental conditions and civil rights in their respective countries (e.g., public responses to poor air quality, public protests over proposed factories, demands for a new growth model, etc.). Compared to protests by rural and less educated groups, the middle class, by its sheer size and purchasing power, is more likely to get its voice heard and demands acted upon.⁸⁸

These demands will not necessarily be heard through street protests, but increasingly through online platforms. By 2018, Asia will lead the world in Internet subscriptions and despite the presence of

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Middle class knowledge in science and technology can spur innovation and entrepreneurship. As Asian countries seek to promote creative and innovative entrepreneurial skills to foster economic growth, more citizens – especially within the middle class – will desire open Internet platforms.⁹⁵ Governments could become less restrictive (potentially not by choice) about online activity, allowing citizens to discuss social issues and bring about positive change, while still maintaining its control of the Internet.^{96,97} At the same time, e-government platforms such as Hong Kong’s MyGovHK will make it easier for citizens and businesses to interact with government and government services.

BENEFITS ASSOCIATED WITH ASIA'S INCREASED USE OF SOFT POWER

WHAT IS IT?

Soft power is the ability to shape the preferences of others through the attraction of one's values, culture and policies.⁹⁸ Some scholars argue that cultural globalization is a form of soft power. In the West, soft power largely relates to nation branding internationally (e.g., the export of democracy by the U.S.). In Asia, soft power is not only about nation branding, but nation building as well.⁹⁹

This form of soft power is rising in Asia. 'Asianization' of the Asian region and some Western countries is happening through mechanisms such as popular culture, media, sports, language outreach and the strategic establishment of universities.

So far Asia's soft power initiatives have been more receptive in neighbouring countries due to proximity, close cultural ties, trade relations, and diaspora populations.¹⁰⁰ However, this in itself is an important step, as some countries within Asia (e.g., Japan, South

Korea) have traditionally been homogenous. Cultural globalization within Asia may assist in breaking down some cultural and social norms that discourage immigration and inter-ethnic relationships and marriage.

WHY IS IT IMPORTANT?

Global 'Asianization' allows Asia to project itself in a more confident and persuasive manner and forge its own development path, rather than relying on Western-based institutions or models.¹⁰¹ Within the next decade, more bi-directional cultural influences can be expected between the East and the West.

Gains in soft power can lead to benefits countries outside of Asia:

- Increasing appeal of Asian-friendly countries to Asians. Asian students studying abroad may prefer countries that appear to embrace aspects of Asian culture, such as the availability of Asian foods and popular culture.
- Improving tourism or even migration flows, as these soft power strategies present glamorous aspects of a country's life.
- Enhancing understanding of Asian culture in other

98 Nye, J. "Soft Power: The Means to Success in World Politics." Public Affairs. New York. 2004.

99 Arshad, I. "The New Cultural Revolution: Chinese Soft Power at Home and Abroad." Policy Horizons Canada. March 2012 <http://www.horizons.gc.ca/eng/content/new-cultural-revolution-chinese-soft-power-home-and-abroad>

100 Ibid.

101 Ibid.

countries. For example, 'Hallyu' (the Korean wave arising from the increasing popularity of Korean music 'K-Pop') has done much to dispel commonly held perceptions of South Korea as 'feudal,' 'violent,' 'poor,' and 'politically unstable'.¹⁰²

- Fostering an interest in learning and the spread of Asian languages.

Western countries are beginning to embrace more aspects of Asian culture. With Asia's ever-increasing economic clout, those more accepting of Asian soft power may find themselves receiving preferential treatment in some of the areas listed above (such as tourism, migration or international student flow) or may be more open to establishing relations with Asian countries than with traditional Western allies.

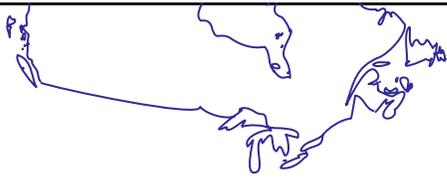
For example, Australia has a long history of Asian migration dating back to its gold rushes in the 1800s. Aspects of Asian culture such as food have long been prevalent throughout Australia. Its geographic

proximity, combined with the long history of Asian migration and increasing receptiveness to Asian soft power such as the K-Pop phenomenon, may give it an advantage compared to other Western countries in attracting international students, or even in gaining preferential treatment in other political, trade and diplomatic areas.

How Asian countries promote aspects of their culture to Western countries may also have negative impacts on relations within the region. For example, Japan's pop culture has been embraced by Western countries, with some Asian countries viewing it negatively in the realm of Japan's relationship with the U.S. In contrast, Hallyu has become a driving cultural power changing traditional relations and perceptions between the two Koreas, the peninsula's neighbours, and the West. For example, writer Nick Desideri argues that with K-Pop's ability to blend Western sensibilities appealingly with Asian values, South Korea could paint itself as a bridge between East and West.¹⁰³

102 Desideri, N. "Bubble Pop: An Analysis of Asian Pop Culture and Soft Power Potential." *Res Publica - Journal of Undergraduate Research* (Vol.18, Iss.1, Article 9). 2013. <http://digitalcommons.iwu.edu/cgi/viewcontent.cgi?article=1207&context=respublica>

103 Ibid.



Technology

Building on the region's existing strength, governments in Asia, as well as foreign private investors, are increasingly supporting the research and development of emerging technologies in Asia. While most Asian countries are primarily adopting existing technologies from the West, in 15 years, they may be the leaders in some fields.

BIO-MANUFACTURING'S POTENTIAL TO RESHAPE PRODUCTION

WHAT IS IT?

Genetically modified living organisms, such as yeast, algae, viruses or bacteria, are increasingly being used to produce new or existing substances including pharmaceuticals, plastics, fuels, food products or genetic therapies. This new form of production, bio-manufacturing, is in essence the application of engineering principles to biology. Relying on a strong culture of open source development, bio-manufacturing draws on a number of existing technologies to design and construct new biological systems that produce useful products or serve useful purposes.^{104, 105, 106, 107}

104 Joyce, S. et al. "Positioning Synthetic Biology to Meet the Challenges of the 21st Century". National Academies Press. 2013. http://www.nap.edu/catalog.php?record_id=13316

105 National Research Council of the U.S. National Academies. "New Biology for the 21st Century". National Academies Press. 2009. http://www.nap.edu/catalog.php?record_id=12764

106 Woodrow Wilson International Center for Scholars. "Inventory of Synthetic Biology Products – Existing and Possible." July 2012. <http://www.cbd.int/doc/emerging-issues/emergingissues-2013-07-WilsonCenter-SynbioApplicationsInventory-en.pdf>

107 Denise Caruso, "Synthetic Biology. An Overview and Recommendations for Anticipating and Addressing Emerging Risks." Science Progress. November 2008. <http://scienceprogress.org/2008/11/synthetic-biology/>

The inputs for bio-manufacturing (such as sunlight, carbon dioxide, nitrogen, etc.) are more widely available and often cheaper than the inputs of competing processes or products (e.g., fossil fuels, rare earths, rare metals). Accessibility and cheap inputs are also encouraging new market entrants. International competitions for new biological systems include high school and tertiary teams. The International Genetically Engineered Machine (iGEM) competition is a worldwide competition aimed at promoting the development of tools for engineering biology. While no Asian universities participated in iGEM in 2006, Asia is now leading with 68 out of 204 registered teams.¹⁰⁸ Within Asia, China and Japan are conducting the most research in synthetic biology, the core science supporting bio-manufacturing.¹⁰⁹ Companies are being pulled to Asia by the relatively cheap cost structures and hubs of bio-innovation but

108 International Genetically Engineered Machine (iGEM) Foundation. "Teams Registered for iGEM 2013." iGEM website. http://igem.org/Team_List?year=2013

109 Woodrow Wilson International Center for Scholars. "Tracking the Growth of Synthetic Biology: Findings for 2013." July 2013. http://www.cbd.int/doc/emerging-issues/emergingissues-2013-07-WilsonCenter-Synbio_Maps_Findings-en.pdf



also by the sheer size of the potential market. The McKinsey Global Institute estimates the pharmaceutical market in India alone will exceed \$45 billion by the year 2020.¹¹⁰ GE HealthCare has installed its first flexible bio-manufacturing platform in Taiwan that is capable of both responding rapidly to local healthcare needs and contributing to the global supply chain.¹¹¹ In addition, Novartis recently opened its first biopharmaceuticals manufacturing plant in Asia, based in Singapore.¹¹² On the “push” side, companies in Europe and North America are encouraged to outsource their operations to achieve greater efficiencies. Outsourcing to Asia has typically occurred in the areas of validation and testing but more recently in bio-manufacturing.¹¹³

WHY IS IT IMPORTANT?

With an emerging middle class and a growing population, Asia could face resource shortages and continued pressures to reduce pollution. Both are drivers for efficiencies in resource use and renewable solutions. Bio-manufacturing offers the possibility of reducing the ecological footprint of manufacturing

through the use of renewable resources in the production of goods. It could also help relieve arable land-use pressures on agriculture as biofuels and some food products (spices, sugars, etc.) are likely to be increasingly made through bio-manufacturing.

A shift from traditional production processes to bio-manufacturing could reshape the world map of production, promoting local production and thus affecting globalization. For Asia, this could impact its status as a world leader in manufacturing. A worldwide bio-based economy where raw materials are replaced by biomaterials would reduce the comparative advantage of some Asian countries endowed with natural resources and agricultural land, and at the same time enhance others. Countries that rely on the export of natural resources to fuel growth could be forced to find alternative markets or develop other strengths. The emergence of a bio-economy could simplify supply chain management for the region and help meet the essential needs of the population at a relatively low cost. This could give some flexibility to decision-makers to redirect the economy down new paths.

110 “McKinsey: India pharma to touch \$45 bn in 2020.” BioSpectrum. June 2013. <http://www.biospectrumasia.com/biospectrum/analysis/190822/mckinsey-india-pharma-touch-usd45-bn-2020#sthash.fBBR5O2r.dpuf>

111 “GE installs biomanufacturing platform in Taiwan.” BioSpectrum. December 2013. <http://www.biospectrumasia.com/biospectrum/news/202623/ge-installs-biomanufacturing-platform-taiwan#sthash.PJExAYlp.dpuf>

112 “Novartis Opens First Biomanufacturing Facility in Asia.” GEN: Genetic Engineering and Biotechnology News. February 2013. <http://www.genengnews.com/gen-news-highlights/novartis-opens-first-biomanufacturing-facility-in-asia/81247956/>

113 Langer, E. “Global Changes in Biomanufacturing: A retrospective analysis of CMO Trends.” Contract Pharma. April 2013. http://www.contractpharma.com/issues/2013-04/view_features/global-changes-in-biomanufacturing/

ARTIFICIAL INTELLIGENCE & DATA ANALYTICS MIGHT MANAGE BILLIONS

WHAT IS IT?

Artificial intelligence (AI) is a technology and a branch of computer science concerned with the development of machines capable of performing intelligent tasks, particularly ones previously thought only possible by humans. Closely linked to robotics, AI enhances the capacity of machines to complete complex functions, including learning, communicating and analyzing. This last role, undertaking complex analytics, is growing in importance as datasets increasingly contain more usable information.¹¹⁴ The expansion of datasets is occurring as virtually all aspects of our lives become digitized and as real-world sensors become ever smaller, cheaper and more capable.

AI is in wide and growing use today in Asia and around the world. Currently, familiar applications include Apple's Siri for voice recognition, Google's text and image search functions, Facebook's facial recognition capability, NASA's rovers, and algorithmic stock trading. In Asia, AI is being used to assist with a number of governance-related tasks, including drought estimation systems,¹¹⁵ text-messaged agricultural advice to

Indian farmers,¹¹⁶ population identification and service delivery in India and AI-assisted social media monitoring in China (see e-governance insight below). There are now also applications relating to government services such as education and health.^{117, 118, 119}

WHY IS IT IMPORTANT?

As populations get ever larger, with cities growing to the size of countries, and countries reaching previously unimaginable scale, AI could be used to address governance capacity. Distributed authority, service delivery, employment-finding services,¹²⁰ human rights atrocity prediction,¹²¹ and collaboration with citizens

114 Rangaroo, D. "What is Big Data Analytics?" IBM. February 2012. <http://www-01.ibm.com/software/data/infosphere/hadoop/what-is-big-data-analytics.html>

115 Smakhtin, V.U. and D. A. Hughes. "Review, Automated Estimation and Analyses of Drought Indices in South Asia." International Water Management Institute. 2004. http://www.unisdr.org/files/1869_VL102136.pdf

116 Basu, M. "Indian Farmers Receive Expert Advice Via Mobile." Asia Pacific futuregov. August 2013. <http://www.futuregov.asia/articles/2013/08/26/indian-farmers-receive-expert-advice-mobile/>

117 "Robots teach South Korean students." Special Broadcasting Service (SBS). August 2013. <http://www.sbs.com.au/news/article/2011/01/17/robots-teach-south-korean-students>

118 Thayer, T. "Singapore Moving Toward Future with Artificial Intelligence in Schools." Education4site. December 2012. <http://www.education4site.org/blog/2012/singapore-moving-toward-future-with-artificial-intelligence-in-schools/>

119 Singapore-based "Healint" supports doctors in taking advantage of smartphone sensors and big data for the management of chronic diseases, through a simple smartphone app that lives in the patient's pocket. Website: <http://www.healint.com/>

120 Ito, A. "Algorithms Play Matchmaker to Fight 7.7% U.S. Joblessness." Bloomberg Technology. April 2013. <http://www.bloomberg.com/news/2013-04-03/>

121 Hazelton, A. "Tech challenge develops algorithms to predict atrocities." SciDevNet. December 2013. <http://www.scidev.net/global/human-rights/news/tech-challenge-develops-algorithms-to-predict-atrocities.html>

are examples of how AI could be used by governments. AI also has potential widespread military and enforcement applications. For example, drones fitted with AI systems could theoretically perform military operations without human interaction.¹²² AI-assisted governance also promises to aid in the fight against corruption.^{123,124} An AI governance structure largely free from corruption would consequently cause significant change to the economic and social systems of any country. However, it also raises new challenges. Where AI has the potential to affect human welfare, it raises questions of liability and ethics.

As it links more and more to large flows of data, including data from sensors, the prospect of AI-aided real-time management of complex systems and services (i.e., financial, social and environmental) is increasing. However, while AI-assisted governance may improve the delivery of services, it could also be used as a means of monitoring citizens' activities. AI may change existing structures of control by putting those responsible for the algorithms closer to decision makers. It may also reduce transparency in government as AI-assisted decision-making becomes taken for granted.¹²⁵

122 Helton, S. "Artificial Intelligence and Death by Drones: the Future of Warfare will be 'Decided by Drones' not Humans." Global Research: Centre for Research on Globalization. October 2013. <http://www.globalresearch.ca/artificial-intelligence-and-death-by-drones-the-future-of-warfare-will-be-decided-by-drones-not-humans>

123 Saadi, S. "Uzbekistan to Transition to E-government." Central Asia Online. March 2013. http://centralasiaonline.com/en_GB/articles/caii/features/main/2013/03/27/feature-01

124 The potential of new technologies to prevent bribery in procurement: e-announcements, e-bidding and e-procurement. "Fighting Bribery in Public Procurement in Asia and the Pacific." Asian Development Bank and Organisation for Economic Co-operation

125 Anthropomorphic bias occurs when things in our lives become so universal we take them for granted to the point where we forget they exist.

ROBOTICS EMERGES IN THE LANDS OF CHEAP LABOUR

WHAT IS IT?

With almost 51% of global stock, Asia was the world's largest market for industrial robots in 2012. By 2016, nearly 55% of the world's industrial robots, or over 908,000, could be in Asia, with Japan, China and South Korea projected to have 2.8 times the number of the U.S., Canada and Mexico combined.¹²⁶ As the range of their abilities increases alongside falling prices, robots are increasingly leaving the factory as well, taking up roles in homes, workplaces and the outdoors. These roles could include teaching, agricultural work, disaster relief, environmental clean-up, security, transportation, and various kinds of therapy. The Japanese Ministry of Economy, Trade and Industry expects these "service sector robots" to be the fastest growing segment of robotics for at least the next twenty years.¹²⁷

126 "World Robotics 2013 - Industrial Robots." International Federation of Robotics. September 2013. <http://www.ifr.org/industrial-robots/statistics/>

127 "Robot market projections announced - Growth to 9.7 trillion yen anticipated by 2035" Japanese Ministry of Economy, Trade and Industry. April 2010. http://www.meti.go.jp/english/press/data/20100423_01.html

WHY IS IT IMPORTANT?

Many are hoping that robotics will raise living standards and economic performance. Robots have the potential to improve the competitiveness of countries with looming labour shortages and ageing populations. Robots undertake jobs that humans cannot do, as well as jobs that humans should not do for health and safety reasons.

The main concern of the continued rise of robots is the potential impacts on jobs, wages and inequality.^{128,129} Advancing automation has historically caused structural changes in industry, and this will accelerate as robotics progresses. Firms are seeing robotics as increasingly advantageous to cost reduction and competitiveness. China's average manufacturing wages are increasing by 10% to 20% per year, but the price of robots is

128 Ford, M. "Could Advancing Robotics and Automation Bring on an Unemployment Crisis in Korea?" The Hankyoreh. March 2013. http://english.hani.co.kr/arti/english_edition/e_editorial/577306.html

129 Kang, C. "Will Robots End Up Creating Jobs or End Them?" The Japan Times. March 2013. http://www.japantimes.co.jp/life/2013/03/10/general/will-robots-end-up-creating-jobs-or-end-them/#.UoUf_PnksZl

dropping by about 4% a year.^{130,131} Human rights and labour standard issues are also driving robotics. As a way to escape negative public perceptions associated with its treatment of employees, Foxconn, the world's largest manufacturer of electronics for major global companies, aspires to have one million robots replace a similar number of employees by 2014.¹³²

For a number of decades, Asian countries have been home to low-wage, low-cost manufacturing – exactly

the jobs that are most readily replaced by automation. The integration of robots into Asian economies has been mostly manageable so far, but the potential pace and the scale of robotically driven automation could have significant social, political and economic impacts across Asia if automation leads to high rates of unemployment. Moreover, the different rates at which national economies adopt robotics and the different stages at which they do so in their economic development may create major challenges for the region.

130 "The end of cheap China. What do soaring Chinese wages mean for global manufacturing?" The Economist. March 2012. <http://www.economist.com/node/21549956>

131 "Robot makers gear up for fast growth." China Daily. November 2013. <http://www.ecns.cn/business/2013/11-06/87357.shtml>

132 Rapoza, K. "As China Changes, Infamous Foxconn Goes Robotic." Forbes Magazine. February 2013. <http://www.forbes.com/sites/kenrapoza/2013/02/22/as-china-changes-infamous-foxconn-goes-robotic/>

THREE-DIMENSIONAL PRINTING'S EFFECTS ON VALUE CHAINS

WHAT IS IT?

Additive manufacturing, commonly known as three-dimensional or 3D printing, is a process whereby a solid object is assembled based on a digital model. The model can be derived from an optical scan of a real-world model or from a design created on a computer. Printing is performed by successively adding layers of material on top of each other. 3D printing is increasingly used in all fields of human endeavour. Though it is currently best known for printing in plastics, it can print in a wide range of materials, including metals, food products (e.g., chocolate), and even biological cells.¹³³

In recent years there has been major growth in the sales of 3D printing machines, and their price has dropped significantly. Machines that once cost \$20,000 now cost \$1,000 or less.¹³⁴ According to the consulting firm Wohlers Associates, the global market for 3D

printers and services has had a compound annual growth rate of 27.4% between 2010 and 2012.¹³⁵ Credit Suisse forecasts the market to continue to grow at about 20% annually until at least 2020.¹³⁶ The Chinese market is a large and growing fraction of the global market, with a China-based industry association asserting that it may become the world's largest market for 3D printers by 2016.¹³⁷

WHY IS IT IMPORTANT?

The ability to print any item will have implications for all players in a distribution chain, potentially changing how we define producers, consumers and distributors. For individuals and firms, it will be possible to mass-produce and even mass-customize commercial products, changing how goods and services are

133 "3D printing 'will change the world'" Agence France Presse. November 2013. <http://www.arabnews.com/news/479031>

134 Bilton, N. "Disruptions: On the Fast Track to Routine 3-D Printing." New York Times. February 2013. http://bits.blogs.nytimes.com/2013/02/17/disruptions-3-d-printing-is-on-the-fast-track/?nl=todaysheadlines&emc=edit_th_20130218&r=0

135 "Wohlers Report 2013 Reveals Continued Growth in 3D Printing and Additive Manufacturing." Wohler Associates Website. May 2013. <http://wohlersassociates.com/press59.html>

136 Maxey, K. "3D Printing will be Much Bigger than Expected." *Engineering.com*. September 2013. <http://www.engineering.com/3DPrinting/3DPrintingArticles/ArticleID/6358/3D-Printing-Will-Be-Much-Bigger-Than-Expected.aspx>

137 Chen, T. "Aurora given 3D printer China distribution rights." The China Post. September 2013. <http://www.chinapost.com.tw/business/company-focus/2013/09/26/389838/Aurora-given.htm>

created, exchanged and disposed of. Three-dimensional printing thus has the potential to transform entire national economic structures.^{138,139} This will present significant challenges and opportunities for governments across Asia and the entire world.

However, Asia faces particular challenges. Southeast Asia has traditionally been the “workshop for the world,” taking advantage of low wages and a favourable climate for mass production. As private institutions in other parts of the world develop the capacity to

produce commercial products, this could reduce their reliance on the region.^{140,141} Apart from producing goods for their own large domestic market, Asian governments could be forced to develop new ways of encouraging manufacturing production and growth.

138 “Manufacturing: The third industrial revolution.” The Economist. April 2012. <http://www.economist.com/node/21553017>

139 Kelly, H. “Study: At-home 3-D printing could save consumers ‘thousands.’” CNN. July 2013. <http://whatsnext.blogs.cnn.com/2013/07/31/study-at-home-3-d-printing-could-save-consumers-thousands/>

140 Chan, M. “What 3-D Printing Could Mean for the World’s Factory – China.” Bloomberg News. September 2013. <http://www.bloomberg.com/news/2013-09-26/what-3-d-printing-could-mean-for-the-world-s-factory-china.html>

141 D’Aveni, R. “3-D Printing Will Change the World.” Harvard Business Review. March 2013. <http://hbr.org/2013/03/3-d-printing-will-change-the-world/ar/pr>

E-COMMERCE SPEEDING UP ASIAN CONSUMPTION

WHAT IS IT?

The emergence of digital marketplaces in Asia is helping it shift from an investment-oriented society to a more consumption-driven one by offering more choice, ease and temptation while shopping.^{142,143,144,145} Indeed, for every US\$1 spent online, as much as 40 cents is new spending (or spending that consumers would not have incurred had they purchased off-line). The Asia-Pacific region is expected to become the largest online retail market in the world this year, with China a particularly large market due to population, the prevalence of the Internet and the rate of cellphone uptake. Online sales in China were an estimated

US\$190–210 billion in 2012. This amounted to 5% to 6% of total retail sales in 2012, compared with 5% in the U.S. By 2020, China's online retailers might sell \$650 billion worth of products.

WHY IS IT IMPORTANT?

This trend will likely continue to stimulate entrepreneurship and innovation in Asia. Online commerce is breathing life into some small and medium-sized businesses (SMEs) searching for niche markets. There are reports of poor and excluded individuals who cannot obtain physical store permits but who can operate online businesses.¹⁴⁶ Online retailers are also expanding the range of services offered to banking and to facilitate export (label translation, licensing, etc.).¹⁴⁷ This should influence the

142 "E-Commerce in Asia: Growth of the Online Marketplace." Asia-Pacific Foundation of Canada. February 2014. <http://horizons.gc.ca/eng/content/e-commerce-asia-growth-online-marketplace>

143 Dobbs, R. et al "China's e-tail revolution" McKinsey Global Institute. March 2013. http://www.mckinsey.com/insights/asia-pacific/china_e-tailing

144 VanderKlippe, N. "E-commerce explosion: China clicks its way to a new economy." The Globe and Mail. November 2013. <http://www.theglobeandmail.com/report-on-business/international-business/in-china-online-retail-is-about-to-get-a-whole-lot-bigger/article15688956/#dashboard/follows/>

145 Tan, G. "Rise of E-commerce in Asia." February 2013. <http://www.slideshare.net/Gwendolyn1/rise-of-ecommerce-in-asia-15675831>

146 VanderKlippe, Nathan "China's online markets give economic refuge to the poor and nonconformists." The Globe and Mail. November 2013. <http://www.theglobeandmail.com/news/world/chinas-online-markets-give-economic-refuge-to-the-poor-and-nonconformists/article15700830/#dashboard/follows/>

147 "What is Alibaba.com's Escrow Service?" Alibaba website: <http://www.alibaba.com/escrow/buyer.html>

makeup and configuration of supply structures both in Asia and globally. It might also advance economies through traditional stages of development more quickly as remote regions can now more readily develop online.

The rapid increase in online retailing should continue to affect infrastructure and real estate by reducing the need for physical stores.¹⁴⁸ Ongoing challenges to successful e-commerce (payment mechanisms, logistics and distribution channels, consumer attitudes about security or product quality, etc.) might be at least partially offset by increased participation and certain innovations.^{149,150,151} However, political challenges could

linger. Chinese banks are lobbying against the rise of competing financial services and governments may not like the idea of commercial interests having so much data on citizens.¹⁵²

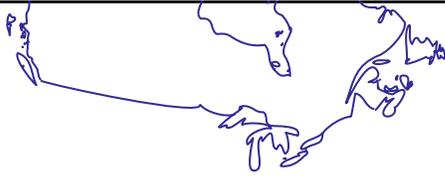
148 Cole, M. "Jack Ma Takes in \$5.75 Bil – and Takes on China's Real Estate Barons." November 2013. <http://www.mingtiandi.com/real-estate/cre-news/china-retail-real-estate-news/why-jack-ma-shrugged-off-rmb-35-billion-to-fight-chinas-real-estate-barons/>

149 Moore Gerety, R. "The secret to e-commerce in countries with few credit cards: cash on delivery." Quartz. July 2013. <http://qz.com/107346/the-secret-to-e-commerce-in-countries-with-few-credit-cards-cash-on-delivery/>

150 Do, A. "CEO of Vietnam's biggest e-commerce site reveals his secrets to success (INTERVIEW)." TechnAsia. November 2013. <http://www.techinasia.com/indepth-interview-ceo-vietnams-biggest-ecommerce-site-vat-gia/>

151 Horwitz, J. "Alibaba doubles down on NFC payments as Alipay partners with major Chinese retailer." TechnAsia. November 2013 <http://www.techinasia.com/alibaba-doubles-nfc-payments-alipay-partners-major-chinese-retailer/>

152 "The Alibaba phenomenon: China's e-commerce giant could generate enormous wealth—provided the country's rulers leave it alone." The Economist. March 2013. <http://www.economist.com/news/leaders/21573981-chinas-e-commerce-giant-could-generate-enormous-wealthprovided-countrys-rulers-leave-it>



Energy and Environment Systems

The rapid pace of economic development is taking its toll on the natural environment, with parched rivers, smog-filled skies and algae-infested beaches. Governments are ready to take dramatic steps and are open to using innovative technologies and policy measures, from economic instruments to drastic bans on particular activities.

ENERGY STARTS TO BECOME MORE OF A TECHNOLOGY RACE

WHAT IS IT?

The emergence, or re-emergence, of fusion, hydrogen and thorium-fueled reactors, and other energy generation alternatives in convergence with renewable technologies, smart grids and energy storage is rebalancing the energy story in Asia. Globally, it is gradually shifting from a story that is mostly about natural resource extraction to one that is increasingly about the pace of technological development and adoption.

This shift is most obvious in the turnover or additions to capital stocks for electricity generation. While the overall contributions of renewable energies to stocks are currently small, their input to turnover/additions are large and still on the rise. In 2012, China and Japan were the world's first and fourth largest

renewable energy investors.¹⁵³ That same year, China's wind power generation increased more than its power generation from coal, and in 2013 the country doubled its total renewable energy output (including hydroelectricity).^{154, 155} This means that around 57% of new capacity in China was renewables in 2013, compared to 34%-37% in the three previous years.¹⁵⁶ The growth of this sector is likely to remain strong.

153 "Renewables 2013 Global Status Report." REN21 Secretariat. 2013. http://www.ren21.net/Portals/0/documents/Resources/GSR/2013/GSR2013_lowres.pdf

154 Ibid.

155 "China Doubles Renewable Energy Capacity Amid Pollution Cut Push." Bloomberg News. December 2013. <http://www.businessweek.com/news/2013-12-04/china-doubles-renewable-energy-capacity-amid-pollution-cut-push>

156 Matthews, J. and H. Tan. "China roars ahead with renewables." The Conversation. December 2013. <http://theconversation.com/china-roars-ahead-with-renewables-21155>



Global forecasts project that around 57% (IEA) to 70% (Bloomberg New Energy Finance) of new power generation capacity added between 2012 and 2030 could be from renewable technologies, including the large-scale use of hydroelectricity.¹⁵⁷ This could be true for China as well. Renewables there might account for more than half of new additions, eroding coal's dominant share and attracting investments of US\$1.4 trillion, such that China's power sector carbon emissions could be in decline by 2027.¹⁵⁸ Indeed, the IEA is now projecting that by 2035 China will add more electricity generating capacity from renewable sources than the U.S., Europe, and Japan combined.¹⁵⁹

The success of renewable energy today is still largely dependent upon government intervention. Striking the right balance between investment and demand is an ongoing challenge. In late September 2013, China's National Development and Reform Commission raised the renewable-energy surcharge from 0.008 Yuan per kilowatt-hour to 0.015 Yuan (US\$0.25) per kilowatt-hour to help make up a shortfall in subsidies

to developers of renewable energy projects.¹⁶⁰ The Chinese government is also not averse to intervening in the energy market. In 2011, the Chinese government stepped in to curb the oversupply of wind farm projects and again in 2013 to boost domestic demand for solar in response to increasing international competition. However, while the issue of subsidies remains important in the short to medium term, a number of these electricity sources may reach prices that allow them to grow without government support.^{161, 162}

The shift in character of energy provision towards a technology race involves more than renewable energy. Technological advances in energy storage (especially batteries and hydrogen fuel cells), "smart" grid management, traffic management, building energy management, end-use efficiency, materials as well as other forms of power generation, are all evolving steadily.

While energy companies such as BP, Exxon, and Shell do not see the emergence of the hydrogen economy occurring until mid to late century, there is evidence that a structural shift may already be underway.

157 "Strong growth for renewables expected through to 2030." Bloomberg New Energy Finance. April 2013. <http://about.bnef.com/press-releases/strong-growth-for-renewables-expected-through-to-2030>

158 "China's power sector heads towards a cleaner future." Bloomberg New Energy Finance. August 2013. <http://about.bnef.com/press-releases/chinas-power-sector-heads-towards-a-cleaner-future/>

159 Coy, P. "Green China? It Leads the World in Adding Renewable Electricity". Bloomberg BusinessWeek. November 2013. <http://www.businessweek.com/articles/2013-11-21/green-china-it-leads-the-world-in-adding-renewable-electricity>

160 Ma, W. "China Boosts Renewable-Energy Surcharge." Wall Street Journal. August 2013. <http://online.wsj.com/news/articles/SB10001424127887324324404579044592532822898>

161 "Revolution Now: The Future Arrives for Four Clean Energy Technologies." U.S. Department of Energy. September 2013. <http://www.doe.gov/articles/cleantechnow-america-s-clean-energy-revolution>

162 Brown, A. and S. Müller. "Deploying Renewables 2011." International Energy Agency. 2011. http://www.iea.org/publications/freepublications/publication/Deploying_Renewables2011.pdf

Though less aggressive than past policies, Chinese policies are seeking to promote the adoption of fuel cell vehicles. BP and China's Ministry of Science and Technology have been working to build the world's largest hydrogen fuelling station in Beijing. BP estimates that the world is 10 to 20 years away from seeing the mass production of vehicles.¹⁶³ China already waives the sales taxes on domestically made fuel cell vehicles, while Toyota and Honda believe that the cost of producing fuel cell vehicles will fall substantially by 2015.¹⁶⁴ A report produced by Pike Research in the U.K. predicts that there will be 1 million fuel cell vehicles on the road by 2020, with over half of these in the Shanghai area.¹⁶⁵

163 "How far is hydrogen economy away from us?" BP. Website: <http://www.bp.com/extendedgenericarticle.do?categoryId=9011373&contentId=7026696>

164 Rehtin, M. "Toyota: Cost to develop fuel cell cars falls" Automotive News. May 2013. <http://www.autonews.com/article/20130506/OEM06/305069944/toyota:-cost-to-develop-fuel-cell-cars-falls#axzz2hBCURy7E>

165 "One million Fuel Cell vehicles expected on the road by 2020." Scottish Hydrogen and Fuel Cell Association. 2013. http://www.shfca.org.uk/news_article/234/

China and India are also at the forefront of thorium research. China's National Academy of Sciences has invested a start-up budget of \$350 million into thorium power. The institute has already recruited 140 PhD scientists, and by 2015 will have 750 PhD scientists on staff working full-time on thorium power.¹⁶⁶ Likewise, India is seeking to scale up thorium power throughout the 2020s. India plans to produce 30% of electricity needs from thorium-based reactors by 2050.¹⁶⁷ Thorium and fourth generation reactors offer an abundant and independent source of energy with the benefit of reduced waste and a lower carbon footprint.

WHY IS IT IMPORTANT?

As the shift towards technology-based energy occurs, there will be a corresponding shift in the character of energy competitiveness. Technology races emphasize

166 Evans-Pritchard, A. "China blazes trail for 'clean' nuclear power from thorium." The Telegraph. January 2013. http://www.telegraph.co.uk/finance/comment/ambroseevans_pritchard/9784044/China-blazes-trail-for-clean-nuclear-power-from-thorium.html

167 "India to build more thorium nuclear reactors." Asian Power. July 2012. <http://asian-power.com/power-utility/in-focus/india-build-more-thorium-nuclear-reactors>

the need for a highly knowledgeable, collaborative and innovative workforce, as well as strong management and governance capacities. National energy and innovation policies raise the prominence of some trade issues, including intellectual property and component tracking, and test the ability of countries to overcome barriers to the rapid uptake of new technologies (policy/institutional, infrastructural, informational, financing, etc.). Early-adopters are rewarded, but constant vigilance is required to maintain a competitive position. The extent to which new technologies make in-roads will be determined by a broad-based policy mix that encourages innovation, commercialization, and/or incentives and levies to promote adoption. The size of the Chinese market is such that wholesale adoption of a particular energy technology can reduce the cost of that product globally.

For large exporters of fossil fuels, these energy technology developments pose a risk in the form of “stranded assets.” That is, existing investments are “stranded” by changing demand, lower prices, and failure to adapt.¹⁶⁸ For example, China’s prodigious investments in alternative energy may emerge as a risk to Australia’s coal assets or conversely act as driver to accelerate gasification projects.¹⁶⁹

168 Caldecott, B., J. Tilbury and Y. Ma. “Stranded Down Under? Environment-related factors changing China’s demand for coal and what this means for Australian coal assets.” Oxford University. December 2013. <http://www.smithschool.ox.ac.uk/research/stranded-assets/Stranded%20Down%20Under%20Report.pdf>

169 Chambers, M. “LNG tipped to lift economy as coal volume slides.” The Australian. October 2013. <http://www.theaustralian.com.au/business/mining-energy/lng-tipped-to-lift-economy-as-coal-volume-slides/story-e6frg9df-1226731852113>

URBANIZATION AND SCRAP METAL POTENTIAL TO CHANGE RESOURCE CONSUMPTION

WHAT IS IT?

In 2012, China produced 5.6 million tonnes of copper, of which 2.75 million tonnes was made from scrap.¹⁷⁰ A similar level of reuse in China is forecast for steel with 20% of steel production to come from scrap by 2015. Steel scrap recycling has wide-ranging economic and environmental impacts. Recycled steel is more cost effective and has a smaller carbon footprint than iron ore extraction. As the price of scrap and iron ore are correlated, the movement of one will affect the other. In 2010, Chinese imports of scrap fell dramatically as demand was met internally. There may be a decrease in iron ore demand as a result of metal reuse and Chinese industries moving up the value chain.

WHY IS IT IMPORTANT?

Chinese consumption of iron ore is beginning to slacken – a trend that is likely to continue for the next decade. China's projected supply of scrap metal in the future is affecting present day iron ore investment decisions.¹⁷¹ Plans by India to re-enter the iron ore

export market to boost foreign exchange reserves will increase downward pressure on prices. In addition, it is estimated that China already has an excess production capacity of 200 million tonnes of steel per year.¹⁷² This would appear to indicate that China's steel demand is peaking much sooner than the previously predicted peak of 2030.¹⁷³

As the world's largest iron ore steel producer and scrap metal importer, Chinese demand can influence the global price of steel and hence the cost of construction. In addition, the emergence of more efficient recycling technologies and sustainable metals management (industrial ecology) will ensure metal quality can be retained in the recycling process, further reducing the overall demand for iron ore.

170 Minter, A. "How China Profits from our Junk." The Atlantic. November 2013. <http://www.theatlantic.com/china/archive/2013/11/how-china-profits-from-our-junk/281044/>

171 "Keep an eye on India and China, says Standard Bank." MiningWeekly.com. December 2013. <http://www.miningweekly.com/article/keep-an-eye-on-india-and-china-banking-firm-2013-12-20>

172 "Heavenly iron-ore prices bound for purgatory as China reforms." The Sydney Morning Herald. July 2013. <http://www.smh.com.au/business/world-business/heavenly-ironore-prices-bound-for-purgatory-as-china-reforms-20130730-2qvoz.html#ixzz2n2pSYFvE>

173 Ibid.

SPIRALING COMPLEXITY OF FOOD SECURITY

WHAT IS IT?

A global structural shift to higher food prices occurred late in the first decade of the 2000s, as longstanding food security issues came to a head. In response to and in anticipation of social unrest, many Asian countries reacted with a variety of protectionist measures.¹⁷⁴

Despite these initial initiatives, the food price hike and a long list of ongoing, worsening and anticipated challenges to food security continue.^{175, 176, 177} The food security challenges facing Asia include, among others, water quality and availability issues, competition for land from cities and biofuels, increased storm damages, pollinator decline, pesticide resistance, ocean acidification, and increased meat consumption. In response, countries are beginning to shift their approaches from reactive to more proactive food policies. The more recent policies largely take the form of top-down approaches such as further agricultural industrialization, foreign land purchasing or leasing, grain stockpiling, major infrastructure projects and more use of genetically-modified organisms (GMOs).¹⁷⁸

174 Jayasuriya, S. et al. "Food Security in Asia: Recent Experiences, Issues and Challenges." *Economic Papers*. September 2013. <http://onlinelibrary.wiley.com/doi/10.1111/1759-3441.12051/abstract>

175 Food and Agriculture Organization. "Food Outlook. Biannual Report on Global Food Markets." United Nations. November 2013. <http://www.fao.org/docrep/019/i3473e/i3473e.pdf>

176 Dobbs, R. et al. "Resource revolution: Tracking global commodity markets." McKinsey Global Institute. September 2013. http://www.mckinsey.com/Insights/Energy_Resources_Materials/Resource_revolution_Tracking_global_commodity_markets?cid=other-eml-alt-mgi-mck-oth-1309

177 Centre for International Security Studies. "Food Security in Asia - A Report for Policymakers." University of Sydney. February 2013. http://sydney.edu.au/arts/ciss/downloads/CISS_Food_Security_Policy_Report.pdf

178 Mann, H. and C. Smaller. "Foreign land purchases for agriculture: what impact on sustainable development?" United Nations – Sustainable

Development Innovation Briefs, Issue 8. January 2010. http://www.un.org/esa/dsd/resources/res_pdfs/publications/ib/no8.pdf

179 Thukral, N. "Asia Grain 'Mountains' Swell as Governments Fret Over Food Security." Reuters. October 2013. <http://in.reuters.com/article/2013/10/02/us-asia-food-stocks-idINBRE99118H20131002>

180 "Global Status of Commercialized Biotech/GM Crops: 2012." International Service for the Acquisition of Agri-Biotech Applications. 2012. <http://www.isaaa.org/resources/publications/briefs/44/executivesummary/default.asp>

181 "South–North Water Transfer Project." Wikipedia. http://en.wikipedia.org/wiki/South%E2%80%93North_Water_Transfer_Project#Project_controversy

WHY IS IT IMPORTANT?

A host of new risks have been introduced or increased.

- Greater industrialized agriculture can pose challenges to or even usurp subsistence and small-hold farmers.
- Industrialized farming can be resource intensive (e.g., fossil fuels, pesticides, fertilizers), increase monoculture (the production of a single crop or plant over a wide area) and degrade soils over time.
- When such large farms are foreign-owned there can be domestic discontent.
- Foreign land agreements may lead to foreign relations challenges and import dependence.
- Grain stockpiles are vulnerable to different threats (e.g., pests, terrorism).
- Major infrastructure projects can pit regions against each other, within or across countries.¹⁸¹

- GMOs are divisive and present a number of known, unknown and debated risks.

Many food security experts argue that holistic, bottom-up solutions involving the education, empowerment and broader social support of individuals and communities have a better chance at resulting in food resilience.¹⁸² This is not happening as much as they suggest is required. Consequently, hunger, under-nourishment and food unpredictability still exist for tens of millions of Asians. As a result of both this and the continued underlying issues listed above, chronic food and water-related crises will still be a significant risk to the health and stability of the region in the coming 10-15 years.

A good illustration of the spiraling complexity and consequences of decreasing food security in Asia is the case study of fish. Fish and seafood are a main staple in the Asian diet. In fact, the Chinese eat roughly twice the amount of fish in kilograms per person per year than the global average.¹⁸³ Around 85% of global fish

¹⁸² Idem. "Food Security in Asia - A Report for Policymakers." University of Sydney. February 2013.

¹⁸³ Food and Aquaculture Organization – Fisheries and Aquaculture Department. "The State of World Fisheries and Aquaculture 2012." United Nations. 2012. <http://www.fao.org/docrep/016/i2727e/i2727e00.htm>

stocks are over-exploited, depleted, fully exploited or in recovery from exploitation.¹⁸⁴ Scientists commonly predict and agree that based on current practices and trends, 2050 will be the "end of the world" for the oceans.¹⁸⁵ Some are now predicting it will be sooner – in the 2020s.^{186, 187, 188} This prediction is more dire than many current commonly held assumptions and the impact of the loss of fish on food security and livelihoods in the Asia-Pacific region has not been adequately considered in relation to:

- **Food security:** The loss of fish as a food supply in Asia will be significant. It is estimated that at least one billion people depend on fish in Asia as their only source of meat/protein.¹⁸⁹

¹⁸⁴ Vince, G. "How the world's oceans could be running out of fish." BBC Future. September 2012. <http://www.bbc.com/future/story/20120920-are-we-running-out-of-fish>

¹⁸⁵ Ibid.

¹⁸⁶ Ibid.

¹⁸⁷ Delgado, C.L. et al. "Outlook for Fish to 2020: Meeting Global Demand." International Food Policy Research Institute, World Bank. October 2003. <http://www.hubrural.org/IMG/pdf/ifpri-fish2020-3.pdf>

¹⁸⁸ Sielen, A.B. "The Devolution of the Seas: The Consequences of Oceanic Destruction." Foreign Affairs. November/December 2013. <http://www.foreignaffairs.com/articles/140164/alan-b-sielen/the-devolution-of-the-seas>

¹⁸⁹ Safina, C. "World's Imperilled Fish (Global Fish Declines)." Scientific American. November 1995. <http://www.seaweb.org/resources/articles/writings/safina6.php>

- **Loss of livelihoods:** Millions of people in Asia depend upon the fishing industry for their livelihoods. Artisanal fishing (small-scale fishing) catches half of the world's fish, yet provides 90% of the sector's jobs.¹⁹⁰ In Southeast Asia alone, nearly 100 million people are directly dependent on fishing industries and their related service sectors.¹⁹¹

In addition to these concerns, little consideration has been given to other potential negative impacts of such an eventuation on energy supply and security threats in the region.

- **Security threats:** Dwindling fish stocks and increasingly aggressive action to ensure access to bountiful fishing grounds serve to highlight growing concerns about fisheries as an aspect of Asia-Pacific security.^{192, 193, 194}

- **Energy supply:** Over-fishing and environmental degradation of the oceans will pose a threat to energy supply in the region. Water-related energy technology is becoming an increasing source of Asia's energy supply, such as hydro-electricity and nuclear energy.¹⁹⁵ Over-fishing and degradation of the ocean and fresh water supplies result in "dead zones" that are commonly infested with algae and jelly fish blooms. Clogging of these water supplies with algal and other infestations hampers their use for water-based energy supplies.¹⁹⁶

Many of these negative effects will still occur even if the wild fish supply is not totally eliminated by 2025.

190 "Small-scale and artisanal fisheries: Key features of small-scale and artisanal fishing." Food and Agriculture Organization of the United Nations. 2013. <http://www.fao.org/fishery/topic/14753/en>

191 Williams, M.J. "Enmeshed: Australia and Southeast Asia's Fisheries." Lowy Institute. November 2007. http://www.lowyinstitute.org/files/pubfiles/LIP20_EnmeshedWEB.pdf

192 Yardley, J. "Two Hungry Nations Collide Over Fishing." International New York Times. September 2012. http://www.nytimes.com/2012/09/05/world/asia/sri-lanka-and-india-battle-over-fishing-grounds.html?_r=0

193 "Fishing trips: attempts fail to get a relationship off the rocks." The Economist. August 2013. <http://www.economist.com/news/asia/21583272-attempts-fail-get-relationship-rocks-fishing-trips>

194 Schiffman, H.S. "Out of the Frying Pan: Pacific Fisheries and a Fresh Take on Security in Asia." Centre for Strategic & International Studies. July 2013. <http://cogitasia.com/out-of-the-frying-pan-pacific-fisheries-and-a-fresh-take-on-security-in-asia>

195 Daly, J. "Russia Builds Floating Nuclear Power Plants." Environment News Service. July 2013. <http://ens-newswire.com/2013/07/17/russia-builds-floating-nuclear-power-plants/>

196 "Jellyfish shuts down nuclear reactor." Sky News. October 2013. <http://www.skynews.com.au/offbeat/article.aspx?id=912064>

CASCADING WATER SUPPLY CHALLENGES

WHAT IS IT?

Former Chinese prime minister Wen Jiabao once remarked that water shortages “threaten the very survival of the Chinese nation.”¹⁹⁷

Increasing water scarcity in Asia is attributed to worsening pollution, unsustainable consumption due to changing lifestyles, droughts and climate change. The construction of dams, nuclear and coal power plants, and other megaprojects is diverting the natural flow of rivers, thereby exacerbating the problem. The problem is especially acute in densely populated areas in Asia, where water scarcity could create “water refugees,” increase black market water sales and pose serious institutional challenges.

The region’s three major river systems — the Indus, the Ganges and the Brahmaputra — sustain India and Pakistan’s breadbasket states and many of their major cities including New Delhi and Islamabad, as well as Bangladesh. Rapid and continuing urbanization will only exacerbate pollution and resource strain,

particularly on surface water such as rivers. A 2012 U.S. intelligence report warns that fresh water supplies are unlikely to keep up with global demand by 2040.

The prevailing assumption is that people will co-operate over water rather than fight, however, past water conflicts and the lack of cooperative arrangements indicate that the risk for conflict around water issues is on the rise in Asia.

WHY IS IT IMPORTANT?

Water supply issues could trigger or escalate geopolitical tensions, especially in the case of trans-boundary rivers, such as the Mekong and the Brahmaputra. Demand for fresh water that outstrips the available surface and groundwater may also lead to increased water trading, and increased use of desalination and filtration technologies. The trade-offs both between agricultural and industrial usage, and between water and energy needs, will present policy dilemmas for the economic growth objectives of many emerging economies in Asia.

¹⁹⁷ “Desperate measures.” The Economist. October 2013. <http://www.economist.com/news/leaders/21587789-desperate-measures>

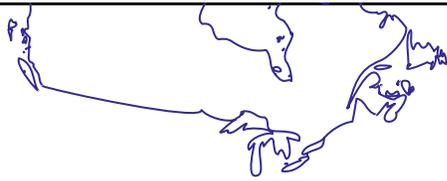
With more reliance on water to generate energy, an excessive number of dams are being constructed in Asia. Out of the 57 transitional river basins only 4 have a co-operative or water sharing treaty. Increasing autonomous action, such as the building of new dams, is leading to heightened tensions between neighboring countries.¹⁹⁸ The future of the world's most famous mountain range – the Himalayas – is endangered by this regional race. China and India together have plans to build over 400 hydroelectric dams that will generate 160,000 megawatts of electricity. In the next 20 years, the Himalayas will be the most dammed region in the world.

Indian farmers will increase their use of ground water for irrigation as rivers become more polluted and river levels decline. The increased use of ground water may

have a negative impact on salinity and soil quality, leading to a decline in agricultural output and further exacerbating food security concerns. According to the Asian Water Development Outlook 2013, saline soils are already estimated to affect almost 50% of irrigated areas in Turkmenistan, 23% in China, and 20% in Pakistan.

Investment in desalination and filtration technologies could offset some of the impact. Water technology and management companies will find Asia a highly receptive market over the next 15 years. For example, Singapore recently opened the region's largest seawater desalination plant and is hoping to reduce its reliance on Malaysia for water supply.

198 Chellaney, B. "From Arms Racing to 'Dam Racing' in Asia: How to contain the geopolitical risks of the dam-building competition." Transatlantic Academy. May 2012. <http://www.transatlanticacademy.org/publications/arms-racing-dam-racing-asia-how-contain-geopolitical-risks-dam-building-competition>



Security Systems

Asia's re-emergence to date has been peaceful. However, to maintain its regional growth, Asia will need to face potential disruptions that could come both from historically rooted disputes and threats as well as emerging new technologies. Asia is also emerging as one of the world's centres for weapons manufacturing

REGIONAL STABILITY THREATENED BY BORDER DISPUTES AND RISING NATIONALISM

WHAT IS IT?

There are several long-standing border disputes in Asia. Recent rhetoric in relation to the Senkaku/Diaoyu Islands has shown how quickly tensions can escalate, and the risk that ensues from governments committing themselves to respond if a particular act occurs.¹⁹⁹

Some of the most volatile border disputes include the Kashmir Border (India/Pakistan), Aksai Chin (China/India), Senkaku/Diaoyu Islands (China/Japan), and the Liancourt Rocks (Japan/South Korea), any of which could destabilize the region. While most public attention is focused on the current dispute between

Japan and China, or India's land border disagreements with Pakistan and China, there is also a heightened chance of conflict over the Spratly Islands, a group of more than 750 reefs, islets, atolls, cays and islands off the coasts of the Philippines, Malaysia, and Vietnam.²⁰⁰ Large parts of the Spratly Islands have not been legally recognized as belonging to a particular country, with different portions claimed by Brunei, China, Malaysia, the Philippines, Taiwan and Vietnam. If a current Taiwanese search for oil and gas in the region is successful, countries may make stronger claims to the islands.²⁰¹

199 Sevastopulo, D. and J. Soble. "China-Japan relations take turn for worse." The Financial Times. October 2013. <http://www.ft.com/intl/cms/s/0/db42ec8e-3fab-11e3-8882-00144feabdc0.html#axzz2kIaARh5g>

200 Himmelman, J. and A. Gilbertson. "A Game of Shark and Minnow." The New York Times. October 2013. <http://www.nytimes.com/newsgraphics/2013/10/27/south-china-sea/>

201 "Spratly Islands." Ethnographic Edge. <http://www.ethnographicedge.com/event/spratly/>



North Korea also continues to be a potential source of instability and unpredictability in the region. The recent public removal and subsequent execution of Jang Song Thaek, uncle-in-law and mentor to ruler Kim Jong Un, might be the sign of a power struggle among the ruling elite that may result in significant shifts in policies and relationships with neighbouring countries, including the unknown status of the North Korean special economic zone in Rason, which borders China and Russia.²⁰² Internal power struggles, food scarcity, nuclear ambitions and diplomatic tensions, combined with some early signs of opening parts of the economy in controlled circumstances,^{203, 204, 205, 206} may result in significant changes in North Korea, with unpredictable consequences for Asia.

202 "Public purge in Pyongyang puts stability in question." Oxford Analytica. December 2013. <https://www.oxan.com/display.aspx?ItemID=DB187722&StoryDate=20131210>

203 Yenko, A. "North Korea: Kim Jong Eun Launches Own Version of Apple's iPhone or Google's Android OS?" International Business Times. August 2013. <http://au.ibtimes.com/articles/498556/20130813/smartphone-apple-iphone-google-android-os-north.htm>

204 Habib, B. "North Korea's surprising status in the international climate change regime." East Asia Forum. November 2013. <http://www.eastasiaforum.org/2013/11/09/north-koreas-surprising-status-in-the-international-climate-change-regime/>

205 Winstanley-Chesters, R. "Hydrological Engineering, Coastal Land Reclamation and the Multifunctional Paradigm in the DPRK." Sino-NK. May 2012. <http://sinonk.com/2012/05/06/taegyedo-tidal-reclamation-multifunction/>

206 Noor, F. "China paves way for new gold rush." New Straits Times. October 2013. <http://www.nst.com.my/opinion/columnist/china-paves-way-for-new-gold-rush-1.381016>

WHY IS IT IMPORTANT?

It is difficult to make a judgment about the effectiveness of current diplomatic efforts to resolve Asian border and sea disputes because leaders are nearly always publicly optimistic about resolving, or at the very least not escalating, disputes between countries. A nascent Code of Conduct in the South China Sea might be a significant positive step,²⁰⁷ as are ongoing talks to improve communications between Chinese and Indian officials in disputed areas.²⁰⁸ A number of factors will affect the likelihood of conflict, including nationalist sentiment, the actions of individuals not under government control, and the influence of the U.S. in the region. Other problems may arise from the absence of international rules for the use of drones in disputed territories,²⁰⁹ and the overlap of Japan's Air Defense Identification Zone (ADIZ) – an area in which unidentified aircraft are liable to be interrogated and intercepted – with the ADIZ recently

207 "Code of Conduct for South China Sea." The Japan Times. November 2013. <http://www.japantimes.co.jp/opinion/2013/11/03/editorials/code-of-conduct-for-south-china-sea/>

208 Krishnan, A. "India, China conclude talks; to strengthen border mechanism." The Hindu. June 2013. <http://www.thehindu.com/news/international/world/india-china-conclude-talks-to-strengthen-border-mechanism/article4862865.ece>

209 Idem. Sevastopulo and Soble. "China-Japan relations take turn for worse." The Financial Times. October 2013.

announced by China.²¹⁰ South Korea has now set up its own ADIZ, and the U.S., Japan and South Korea have not officially complied with China's identification zone.²¹¹

Although Asian governments recognize the potential for conflict over territorial claims, no one can accurately predict the catalyst for military action, the duration of any conflict, how it would be resolved, or the role of other countries. The way that events unfold would

largely determine the impact of military confrontation. A prolonged conflict or even a skirmish between Asian countries could potentially affect all aspects of the continent's institutions and society, with particularly detrimental consequences for trade relationships, economic growth and migration.

210 Welch, D. "What's an ADIZ?" Foreign Affairs. December 2013. <http://www.foreignaffairs.com/articles/140367/david-a-welch/whats-an-adiz>

211 Ibid.; Tiezzi, S. "China is Surprisingly OK with South Korea's New ADIZ." The Diplomat. December 2013. <http://thediplomat.com/2013/12/china-is-surprisingly-ok-with-south-koreas-new-adiz/>

THE RISE OF FUNDAMENTALISM AS A CONSTRAINT TO ECONOMIC DEVELOPMENT

WHAT IS IT?

Religious fundamentalism is increasing across several Asian nations, posing threats to national economic development. Failed states characterized by social, political and economic failures such as Afghanistan and Pakistan are not the only Asian countries affected by fundamentalism. Although other tensions have a more local reach, religious fundamentalism is present in Bangladesh,²¹² the Maldives,²¹³ Indonesia,²¹⁴ Thailand,²¹⁵ Malaysia,²¹⁶ the Philippines,²¹⁷ India,²¹⁸

Nepal, Sri Lanka²¹⁹ and Myanmar.²²⁰ For example, Muslim-Buddhist clashes in Myanmar, and Muslim-Hindu-Buddhist tensions in Sri Lanka, continue to pull the countries down and slow their economic development.²²¹

The cause of religious fundamentalism is not necessarily linked to poverty. Political ideologies, the uprooting of traditional ways of living through rapid urbanization²²² and even the highly educated class (as evidenced in Bangladesh) may also contribute to its development. These factors, especially ones relating to the fast modernization of societies, may indicate that the trend will continue in the future.

At the same time, the form and scope of fundamentalist activity has been evolving. Prior to September 11, 2001, the focus of terrorist groups included investment in large-scale operations and international targets. However, since 9/11, counter-terrorist responses have resulted in organizational

212 Jha, L. "Minority Hindus attacked in Bangladesh." NITI Central. November 2013. <http://www.niticentral.com/2013/11/21/minority-hindus-attacked-in-bangladesh-160191.html>

213 Randolph, E. "Unrest in the Maldives." Current Intelligence. March 2013. <http://www.currentintelligence.net/analysis/2013/3/25/unrest-in-the-maldives.html>

214 Yang Hui, J. "Religious harmony under attack in Indonesia." The Nation. October 2013. <http://www.nationmultimedia.com/opinion/Religious-harmony-under-attack-in-Indonesia-30216068.html>

215 Mandhana, M. "No Peace: Why Conflict Persists in Thailand's Deep South." Time World. April 2012. <http://world.time.com/2012/04/23/thailand-insurgency/>

216 "Four dead as Myanmar religious clashes bleed into KL. The Malaysian Insider. June 2013. <http://www.themalaysianinsider.com/malaysia/article/four-dead-as-myanmar-religious-clashes-bleed-into-kl/>

217 Eulich, W. "Separatist clashes in Philippines could renew insurgency." September 2013. <http://www.csmonitor.com/World/Security-Watch/terrorism-security/2013/0912/Separatist-clashes-in-Philippines-could-renew-insurgency>

218 Subramanya Dehejia, R. "Economics Journal: Mumbai 2011 – What is the Cost of Terrorism?" The Wall Street Journal. July 2013. <http://blogs.wsj.com/indiarealtime/2011/07/14/economics-journal-mumbai-2011-what-is-the-cost-of-terrorism/>

219 Al Maeena, T. "Sri-Lanka Besieged by religious conflict." Gulf News. November 2013. <http://gulfnews.com/opinions/columnists/sri-lanka-besieged-by-religious-conflict-1.1250289>

220 "Latest Myanmar violence blamed on religious and ethnic extremists." The Himalayan. October 2013. <http://www.thehimalayantimes.com/fullNews.php?headline=Latest+Myanmar+violence+blamed+on+religious+and+ethnic+extremists&NewsID=392954>

221 "Impact on Religious Fundamentalism on Asia." Shaping Tomorrow. October 2013.

222 Avakian, B. "Why is Religious Fundamentalism Growing in Today's World – And What is the Real Alternative?" October 2007. Website: <http://www.revcom.us/a/104/avakian-religion-en.html>

fragmentation, hindering the ability of these groups to implement large-scale attacks. As a result, terrorist operations have become more localized, with religious minorities and local authorities frequently targeted.²²³ This form of local fundamentalism and terrorism is a common source of instability across Asia.

WHY IS IT IMPORTANT?

Although estimating the cost of religious fundamentalism is very challenging, it can negatively impact health, culture and economic output. It has the potential to cause international alienation and large population displacements, as well as incubation of criminal activity, destabilization of national budgets, increased debt, and excessive reliance on foreign aid²²⁴. Countries bogged down by religious

fundamentalism and the costs of response (i.e., counter-terrorism, law enforcement) tend to have a lower GDP, Purchasing Power Parity, and rank on the Human Development Index. These countries generally have fewer fundamental freedoms, women's^{225, 226} and children's rights and less personal mobility. As a result, rising fundamentalism has the capacity to undermine economic growth and development in otherwise economically healthy countries in Asia.

223 "Fragmentation and Resurgence of Islamic Terrorist Groups in Asia." Asia-Pacific Foundation of Canada. February 2014. <http://horizons.gc.ca/eng/content/fragmentation-and-resurgence-islamic-terrorist-groups-asia>

224 Idem. "Impact on Religious Fundamentalism on Asia." Shaping Tomorrow. October 2013.

225 Devasahayam, T. "Through a Woman's Lens: A Survey of Employment, Marriage and Fertility Trends in Southeast Asia." Trendnovation Southeast. September 2010. <http://www.trendsoutheast.org/opinion/2010/9/1/through-a-womans-lens-a-survey-of-employment-marriage-and-fertility-trends-in-southeast-asia>

226 Derischs, C. and A. Fleschenberg. "Religious Fundamentalisms and Their Gendered Impacts in Asia." Friedrich-Ebert-Stiftung. January 2010. <http://library.fes.de/pdf-files/iez/07061.pdf>

CYBER-SECURITY AND THE NEW COLD WAR

WHAT IS IT?

The increasing digitization of world financial markets, critical infrastructure systems (such as power, transportation and telecommunications) and military command and control systems has made countries around the world susceptible to significant cyber security threats. These threats also jeopardize the freedoms their citizens exercise online and the economic viability of their businesses. As global economic activity shifts to Asia, cyber competition and conflict is likely to increase, especially in terms of military planning, asymmetric warfare, and economic espionage to gain economic advantages.²²⁷

A recent study on global stock exchanges indicates that half of the exchanges surveyed had experienced some form of cyber-attack (nearly 25% of which were in Asia), including malware, denial of service, data theft, and insider information theft.²²⁸ Most of these threats seemed to be motivated by disruption rather than financial gain and focused on non-trading-related online services and websites.²²⁹

China, India, Japan, Malaysia, Myanmar, North Korea and South Korea are developing military cyber capabilities. Defensive cyber capabilities are being developed by Brunei and Singapore.²³⁰ Capabilities of other Asian countries range from minor to comparatively advanced. However, recent attacks by Anonymous, an international network of hacktivists, have exposed the cyber weaknesses of many governments throughout Asia.^{231, 232} While many Asian countries have created computer emergency response teams (CERTs) to help deal with cyber-attacks, Asian businesses are not proactively investing enough in cyber-security.²³³ For example, in more recent times the vulnerability of electricity systems or the “grid” have proven to be highly susceptible to cyber-attack with the potential for enormous economic disruption. According to Schneider Electric, most cyber-attacks on industrial targets seek to penetrate the control network via the corporate network, Internet and trusted third party suppliers.²³⁴

227 Heinl, C. “Tackling cyber threats will require regional cooperation.” The Nation. June 2013. <http://www.nationmultimedia.com/opinion/Tackling-cyber-threats-will-require-regional-coope-30209055.html>

228 Rashid, F. “Cyber Attacks Against Stock Exchanges Threaten Financial Markets: Report.” Security Week. July 2013. <http://www.securityweek.com/cyber-attacks-against-stock-exchanges-threaten-financial-markets-report>

229 Clearfield, C. “Finance Industry Grapples with Cyber Threats.” Forbes. November 2013. <http://www.forbes.com/sites/chrisclearfield/2013/11/15/finance-industry-grapples-with-cyber-threats/>

230 Lewis, J. “Cyber: Unclear and present danger.” The Interpreter. February 2013. <http://www.lowyinterpreter.org/post/2013/02/19/Cyber-Unclear-and-present-danger.aspx>

231 Idem. “Tackling cyber threats will require regional cooperation.” The Nation. June 2013.

232 Sturmer, J. “Hackers target Australian websites in protest Indonesia spying claims.” Australia Broadcasting Corporation (ABC). November 2013. <http://www.abc.net.au/news/2013-11-04/websites-hacked-in-protest-at-spying-allegations/5068778>

233 Abbugao, M. “Hackers expose weak cyber defenses across Asia.” InterAksyon. November 2013. <http://www.interaksyon.com/article/74448/>

234 “How can I... protect a system from cyber attacks?” Schneider Electric. February 2012. http://www.schneider-electric.nl/documents/news/corporate/netherlands/STN_Ethernet.pdf

At the same time, China's state-control of the Internet has helped, in large part, shield it from cyber-attacks as well as provide a safe haven for businesses.²³⁵ This model may be appealing to many countries in the region. For example, Decree 72 in Vietnam will impose further restrictions on Internet access.²³⁶

WHY IS IT IMPORTANT?

Given the already tense cyber relationship between Asian countries, hacktivism and cyber-crime have the potential to both change how people use the Internet and support attempts by some nation states to exert greater control over the flow of Internet traffic. The threat, real or perceived, will require responses by governments to better manage a free and open Internet and ensure confidence is maintained. As

Nobel laureate Kenneth Arrow once said, "Virtually every commercial transaction has within itself an element of trust." Consequently, attempts to manage or curtail Internet freedom will impact consumer confidence. At the same time, cyber-security threats, real or perceived, may exacerbate existing tensions or cause miscalculations among countries that could pose significant security risks to the region. This will require regional investments to protect critical infrastructure and promote economic security to develop new levels of cyber-security.

Although cyber-security threats to financial markets are now relatively small in scale, future cyber-attacks may have a large impact on the integrity and efficiency of markets. The consequences could range from "halting trading, manipulating data, targeting telecommunications networks, and affecting the functions of a clearing house".²³⁷

²³⁵ Idem. "Hackers expose weak cyber defenses across Asia." InterAksyon. November 2013.

²³⁶ Ponnudurai, P. "Governments want Vietnam to Review New Internet Control Decree. Radio Free Asia. August 2013. <http://www.rfa.org/english/news/vietnam/internet-08262013211044.html>

²³⁷ Idem. "Cyber Attacks Against Stock Exchanges Threaten Financial Markets: Report." Security Week. July 2013.

The threat of cyber warfare is helping to drive increasing public and private sector investment in cyber security.²³⁸ The cyber security ecosystem is a dispersed network of private and public organizations. The impact of austerity measures in many countries is leading to a focus on assuring “greater bang for the buck,” with a movement away from the purchase of tanks and planes towards cyber capabilities. Developed countries can achieve military efficiencies and developing countries can acquire new strike/deterrent capabilities. In a networked world, increasing cyber capabilities require a matching investment by the ‘cyber-industrial complex’ to secure trust and confidence in cyber services for citizens as well as for governments. For

238 “Cyber Threat from China, Russia and Iran on US Military and Civilian Networks Drive Cyber Warfare Spending.” Space War. March 2012. http://www.spacewar.com/reports/Cyber_Threat_from_China_Russia_and_Iran_on_US_Military_and_Civilian_Networks_Drive_Cyber_Warfare_Spending_999.html

example, a recent World Bank report cited investments in South Korean research parks to create inter-industry hubs to promote the cross-fertilisation of technologies between industry sectors. “These capabilities are the technical basis of investment in dual-use technologies, not only for carrying out computer network attacks but also in creating precision weapons and command and control weapons for maneuvering in cyberspace.”²³⁹

239 Elkus, A. “Rise of the Asian Cyber Armies.” USNI News. August 2012. <http://news.usni.org/2012/08/08/rise-asian-cyber-armies>

AFTER FUKUSHIMA, ASIA STICKS TO NUCLEAR POWER PLANS

WHAT IS IT?

Developing countries that are not currently using nuclear power are being enticed to do so by the availability of cheap nuclear technology exports. Firstly, Russia is encouraging the deployment of nuclear technology in the developing world via its “Build, Own, Operate” (BOO) package and estimates that it will have 80 BOO packages in place worldwide by 2030.²⁴⁰ In addition, the likes of the U.S., South Korea and France are all competing in Asia to secure nuclear technology exports. Countries with no previous experience operating nuclear power are exploring nuclear technology to fulfill their current and future energy needs. As most of the Asia Pacific sits on the geological Ring of Fire, an area of intense seismic and volcanic activity, the consequences of a nuclear accident would be significant.

²⁴⁰ “Nuclear Ambition on Display at Home and Abroad.” Moscow Times. July 2013. <http://www.themoscowtimes.com/mobile/article/483507.html>

WHY IS IT IMPORTANT?

The nuclear reactors in use worldwide are categorised as either first, second or third generation. Third generation reactors currently being built in China are modified second generation reactor designs that have not been tested. For example, the construction of two European Pressurised Reactors (EPR) in France and Finland have been plagued with safety concerns and design flaws that have significantly slowed development.²⁴¹ China is currently building an EPR design just 130 kilometres from Hong Kong while four AP1000 designs are currently under construction.²⁴² In addition, the U.S.-based Westinghouse (controlled by Toshiba) won a technology transfer contract for its untested AP1000, a pressured water reactor design

²⁴¹ Patel, T. and S. Bakewell. “U.K. Nuclear Future Relies on Reactor Plagued by Delays: Energy.” Bloomberg News. October 2013. <http://www.bloomberg.com/news/2013-10-21/u-k-nuclear-future-relies-on-reactor-plagued-by-delays-energy.html>

²⁴² Kao, E. “Green groups fear ‘most dangerous’ nuclear power plant on Hong Kong’s doorstep.” South China Morning Post. September 2013. <http://www.scmp.com/news/hong-kong/article/1303433/green-groups-fear-most-dangerous-nuclear-power-plant-hong-kongs>

that is to form the standard for Chinese inland nuclear projects. A key criticism of the AP1000 is that it has “weaker containment, less redundancy in safety systems, and fewer safety features than current reactors.”²⁴³

According to the Max Planck Institute for Chemistry in Germany, we can expect a severe nuclear accident on average every 10-20 years.²⁴⁴ A former Chinese state physicist has stated that a nuclear accident in China between 2020 and 2030 is highly probable.²⁴⁵ This assessment is based on China’s plan to build 30

untested third generation reactors in locations likely to suffer from future water shortages. Extrapolating from the European modelling, 50% of caesium particles would be deposited about 1000 kilometres from the site and 25% about 2500 kilometres from the site should an accident occur. An accident anywhere in Asia has the potential to have significant regional impact.

243 “Sunday Dialogue: Nuclear Energy, Pro and Con (Letter to the Editor),” New York Times. February 2012. http://www.nytimes.com/2012/02/26/opinion/sunday/sunday-dialogue-nuclear-energy-pro-and-con.html?_r=3&pagewanted=all&

244 “Severe Nuclear Reactor Accidents Likely Every 10 to 20 Years, European Study Suggests.” ScienceDaily. May 2012. <http://www.sciencedaily.com/releases/2012/05/120522134942.htm>

245 He, Z. “Chinese nuclear disaster ‘highly probable’ by 2030.” Chinadialogue. March 2013. <https://www.chinadialogue.net/article/show/single/en/5808-Chinese-nuclear-disaster-highly-probable-by-2-3->



Governance Systems

Changes are underway to make Asian governance institutions more efficient, open and transparent. Such changes could be difficult to implement due to vested interests. However, if these measures succeed, they could increase the economic competitiveness of the region. Observers may be surprised by the extent to which established institutions are willing to accommodate rising demands in order to maintain their legitimacy.

ACTING ON CORRUPTION

WHAT IS IT?

A country that scores less than 50 on Transparency International's "Corruption Perceptions Index" is judged to have highly corrupt public institutions. In 2013, Malaysia, Bhutan and Brunei were the only developing Asian countries to score above 50. Indonesia (32), in spite of recent progress, still has a long way to go to reform its public institutions.²⁴⁶ Aside from undermining the rule of law, government corruption increases the cost of services to the general population, makes it less likely that governments will act in the public interest and could inhibit the in-flow of international aid.^{247, 248}

Many government-led anti-corruption initiatives are underway in Asia. Asian governments are especially watching the ongoing success of the Corruption Eradication Commission (KPK) of Indonesia.²⁴⁹ Formed in 2002 as a result of public anger at the corruption associated with former President Suharto, the KPK has been given sweeping powers to prosecute crimes as well as to prevent and investigate them. The KPK can prosecute any public official, including members of parliament and judges, but not the military. A number of factors have contributed to the success of the KPK, including a lack of political interference. Investigators and prosecutors work together, and the KPK assesses the strength of its arguments before deciding whether to prosecute. As a result, the KPK has won all its cases,

246 "Corruption Perceptions Index 2013." Transparency International. Website: <http://cpi.transparency.org/cpi2013/results/>

247 "Anti-corruption." United Nations' Office on Drug and Crime. Website: <http://www.unodc.org/southeastasiaandpacific/en/topics/anti-corruption/overview.html>

248 Rugar, T. "Asia's rise could be held back by corruption, report says." Washington Post. December 2013. <http://www.washingtonpost.com/blogs/worldviews/wp/2013/12/03/asia-rise-could-be-held-back-by-corruption-report-says/>

249 This section is a summary of the description of the KPK provided in Emil P. Bolongaita's "An exception to the rule? Why Indonesia's Anti-Corruption Commission succeeds where others don't - a comparison with the Philippines' Ombudsman." U4. August 2010. <http://www.u4.no/publications/an-exception-to-the-rule-why-indonesia-s-anti-corruption-commission-succeeds-where-others-don-t-a-comparison-with-the-philippines-ombudsman/>



and all appeals have been upheld in the corruption court. This has made the KPK one of the most desirable places to work in Indonesia, and fostered a large amount of public goodwill.

With high ranking officials being accused of corruption in 2013, China has also decided to strengthen its anti-corruption regime and investigation process. The resolution produced at the recent third plenary session of the 18th Communist Party of China includes a section that shows the objectives of the government to prevent and punish corruption in the coming years. Among these objectives are reforms to the Party's discipline inspection system and plans to implement legal and public opinion supervision through the Internet.

WHY IS IT IMPORTANT?

Corruption has an effect on corporations, officials and individuals benefiting from the status quo. In the short term, the detention of major officials might send a clear signal to public managers that corruption will no longer go unpunished.²⁵⁰ Companies under bribery allegations may lose market share and have their reputations tarnished, while governments may bolster their legitimacy with voters by punishing corrupt politicians and officials and designing rules to minimize

250 Kapoor, K. and R. Fabi. "Special Report: Indonesia's graftbusters battle the establishment." Reuters. November 2013. <http://in.reuters.com/article/2013/11/17/indonesia-graftbusters-idINDEF9AG00H20131117>

systemic corruption.^{251, 252} For other corporations, the fight against corruption might affect the luxury goods market as officials are increasingly reluctant to publicly display expensive goods.²⁵³

Reduced levels of corruption contribute to regulatory stability, improve perceptions of government legitimacy and foster business and investment confidence. The World Economic Forum's *Global Competitiveness Report* shows a strong correlation between the quality of institutions, which are characterised by low levels of corruption, and the competitiveness of a country.²⁵⁴ With a clear commitment from Indonesian authorities to fight against corruption, Southeast Asia could become an important trading and investment destination, forcing Western countries to strengthen their bilateral trade relations with the region.

251 Burkitt, L. and J. Whalen. "China Targets Big Pharma. GlaxoSmithKline Hit with Bribery Allegations as Health-Care Sector Soars." Wall Street Journal. July 2013. <http://online.wsj.com/news/articles/SB10001424127887323664204578607502156860618>

252 "The new middle classes rise up." The Economist. September 2011. <http://www.economist.com/node/21528212>

253 "How LVMH Adapts to China's Evolving Luxury Market." Jing Daily. October 2013. <http://www.jingdaily.com/how-lvmh-adapts-to-chinas-evolving-luxury-market/38161/>

254 "The Global Competitiveness Report 2011–2012." World Economic Forum. 2011. http://www3.weforum.org/docs/WEF_GCR_Report_2011-12.pdf

WILLINGNESS TO EXPERIMENT IN GOVERNANCE AND SERVICE DELIVERY

WHAT IS IT?

E-governance is the application of Information and Communication Technology (ICT) to all aspects of government and governance. E-governance can increase the efficiency and effectiveness of public organizations in delivering services while at the same time managing relationships and developing policy with citizens and businesses. It consolidates internal government operations with greater exchange between departments and may reduce corruption, especially in developing countries.²⁵⁵ By 2018, Asia will lead the world in Internet subscriptions, and access to the Internet through mobile devices is estimated to grow 56-fold, from 14 million in 2010 to 788 million in 2015. Asian governments are capitalizing on this and e-governance in Asia is beginning to show its potential as an important driver for the improvement of government and governance, particularly in high-income economies like South Korea, Singapore and Japan, but also emerging countries like India and China.²⁵⁶

India's efforts to manage the biggest democracy in the world have resulted in the launch of a mobile governance system to speed up service delivery in rural areas as well as reduce costs. Indeed, India is home to the world's most ambitious personal identification program called AADHAAR.²⁵⁷ The system uses biometric information such as finger prints and retinal scans as the basis for providing every Indian citizen with a 12-digit unique identification number. The ID will in turn be the basis of information records and service delivery.

Another growing trend is governments using ICT to censor online content. In China, computer-assisted censorship is employed to control information flow on search engines and social media websites. Digital monitoring is becoming increasingly sophisticated. The government is learning to allow more sensitive content in the form of conversation while impeding attempts at citizen mobilization.

255 Mistry, J. and A. Jalal. "An Empirical Analysis of the Relationship between e-government and Corruption." *The International Journal of Digital Accounting Research*. October 2012. http://www.uhu.es/ijdar/10.4192/1577-8517-v12_6.pdf

256 United Nations. "E-Government Survey 2012: E-Government for the People." March 2012. <http://www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html>

257 Unique identification Authority of India. <http://uidai.gov.in/>

WHY IS IT IMPORTANT?

E-governance allows governments to leapfrog their existing modes of operation and increase the potential for delivering cost-effective policies with high levels of reach and transparency. As access to the Internet expands in urban and rural areas, governments will be able to improve the availability of services to the population, gaining the ability to rapidly transmit and receive information between governments and stakeholders.

These technologies, however, can also be used by governments for purposes at odds with the public interest. ICT can be used to block the flow of information, to exclude stakeholders and to violate privacy and human rights, and can also be used in ways that discourage online business innovation.

In short, ICT use can have profound effects on the availability and flow of information and the speed, nature and inclusivity of decision-making. As such, the way in which it is applied by governments and citizens in Asia should have a significant effect on governance and therefore all other aspects of the region in the future.

THE RISE OF ‘PARA-DIPLOMACY’: THE IMPLICATIONS OF INCREASING SUB-NATIONAL RELATIONS ON TRADE AND DIPLOMACY

WHAT IS IT?

As globalization intensifies, so has competition between regions. Region-specific economic advantages have required political and institutional changes. Para-diplomacy, or sub-national foreign relations, is on the rise. In early October 2013, the British Minister of State and the Foreign and Commonwealth Office came to Brazil to sign an agreement establishing “formal bilateral relations” with São Paulo, Latin America’s wealthiest state.²⁵⁸ In late March 2013, the U.S. signed a similar agreement — the first time that the U.S. State Department forged direct relations with a subnational government in the southern hemisphere.²⁵⁹ Canada, France, Germany and a handful of other countries in Europe and Asia will soon sign their own agreements with São Paulo.²⁶⁰

With rising urbanization, some cities, states/provinces and regions have economies the size of countries. For example, the German state of Baden-Württemberg has become an international technological hub for sustainable development and one of the most prosperous regions in Europe.²⁶¹ Likewise, Guangdong is a significant economy in its own right. According to the OECD, Guangdong is a significant contributor to China’s overall output and export success, and is a key destination for foreign direct investment.²⁶² Within Guangdong, much of the provincial domestic product of US\$665 billions concentrated within the Pearl River Delta. The growth of Guangdong has resulted, in part, from the freedom to pursue initiatives on the international stage set in place during the reforms of the 1980s.

258 Tavares, R. “Foreign Policy Goes Local: How Globalization Made São Paulo into a Diplomatic Power.” *Foreign Affairs*. October 2013. <http://www.foreignaffairs.com/articles/140091/rodrigo-tavares/foreign-policy-goes-local>

259 Ibid.

260 Ibid.

261 “The State of Baden-Wuerttemberg.” The Climate Group. <http://www.theclimategroup.org/who-we-are/our-members/the-state-of-baden-wuerttemberg>

262 OECD Territorial Reviews: Guangdong, China. OECD. 2010. http://www.keepeek.com/Digital-Asset-Management/oecd/urban-rural-and-regional-development/oecd-territorial-reviews-guangdong-china-2010_9789264090088-en#page1

With the strengthening of local power, the world's major cities and states/provinces have adopted international policies previously reserved for national governments and mustered resources to ensure the protection of their interests abroad. With globalization, these subnational governments can no longer fulfil their constitutional responsibilities in education, sanitation, economic development, transportation, the environment, and other areas, without interacting with the world. These local authorities rely on the international flow of capital, knowledge, and people to successfully implement their governmental programs. Instead, paradiplomacy empowers local governments and states/provinces to deal with the international dimensions of these issues on their own. There are early signs of economic para-diplomacy emerging in India. States like Gujarat and Punjab conduct international investor summits and cross-border trade.

WHY IS IT IMPORTANT?

The rise of para-diplomacy has potential impacts on the foreign relations between countries as well as trade patterns. Today, many private intelligence firms, think tanks and NGOs have better access to quality sources than diplomats do. Several countries have begun modernising their diplomatic corps and functions to meet growing economic and social demands as a result of globalization and free market reforms. Some countries including Germany, Singapore and the U.S. have reconfigured their missions abroad, turning them into business and investment centres.²⁶³

The broader consequence of this phenomenon is that it may force people to think beyond clearly defined countries and “nation building” towards integrating a rapidly urbanising world population directly into regional and international markets. Existing bilateral and multilateral institutions, forums and agreements may also be undermined or at least require significant adaptation.

263 Ibid.

