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# The Fragile Foundations of the 'Asian Century'

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## Abstract

The relative period of peace in East Asia since the Second World War has largely been underwritten by not just growing prosperity, but the prospect that peace and stability will automatically generate opportunities for countries to grow rich and contented – as has occurred in South Korea, Japan and Taiwan.

In reality, the arrival of this so-called 'Asian Century' is no sure thing. There are significant headwinds or obstacles which may prove difficult for many regional developing countries to overcome. These range from the declining effectiveness of an export-dependent growth model, developments in manufacturing technologies that will dilute the region's existing advantages, and the problems and cost of aging demographics which will be challenging for many countries to manage.

This means that in an environment where the lack of economic gains fails to temper deepening strategic competition and rivalry, the first few decades of this century may well be more traumatic and troubling than the last few decades of the previous century.

**Key words:** Asian century; export-dependent growth; regional trade; emerging manufacturing technologies; Asian demographics

## INTRODUCTION

It is widely accepted that we are now entering the second decade of what will become known as the 'Asian Century'. This argument is based on the argument that economic power is shifting from West to East, and such economic shifts will invariably have strategic and military implications. In short, the economic rise of East Asia, and relative economic decline of North America and Europe will fundamentally reorganise the distribution of power in the world.

The evidence that we are well into an Asian Century appears compelling. In 1960, and using World Bank figures, East Asia accounted for a mere 14 percent of global GDP, rising to about 27 percent currently. If linear trends continue, the region could account for about 36 percent of global GDP by 2030 and over half of all global output by the middle of the century. As if symbolic of a handover of economic pre-eminence, China which only accounted for about 5 percent of global GDP in 1960 will likely surpass the United States as the largest economy in the world over the next decade.

The link between rising economic wealth and increased military spending also seems compelling. According to figures produced by the Stockholm International Peace Research Institute or SIPRI, East Asia accounted for 6.4 percent of global military expenditure in 1988, rising to 13.2 percent in 1998, and 19.5 percent in 2014. (SIPRI 2015) If past record is an indicator of future performance, then the 'Asian Century' prediction is close to a sure thing.

In reality, the arrival of the Asian Century is no sure thing. More than this, there are significant headwinds or obstacles which may prove difficult for many Asian countries in the region to overcome. These range from the declining effectiveness of an export-dependent growth model, developments in manufacturing technologies that will dilute the region's existing advantages, and the problems and cost of aging demographics which will be challenging for many

countries to manage.

This means that while it might still be prudent for governments to prepare for the challenges and complexities associated with an 'Asian Century' such as increased military spending and competition normally associated with rising economies, serious thought should also be given to the possibility of problems associated with large and populous countries with struggling economies and unstable political-economies and societies.

## **STRAINS IN THE 'EAST ASIAN' ECONOMIC MODEL**

Rapidly developing East Asian economies since after the Second World War – Japan, South Korea, Taiwan, Singapore, Malaysia, Thailand, and most recently China - have all relied upon a remarkably similar export-manufacturing model. While there are differences as to the level of state involvement and intervention in these countries during their stage of rapid economic development, their developing models all essentially involve producing exported products for advanced economy consumers cheaper, faster and more reliably than can be done in other countries or regions. Those predicting the 'Asian Century' assume that what worked in the past and present will continue to work for populous countries such as China, Indonesia, Vietnam and Burma –still low- to middle-income economies seeking to replicate what fully industrialized neighbours have achieved.

At the heart of this so-called East Asian model of rapid economic development and industrialization is the emphasis on developing a strong export-manufacturing domestic sector that is bolted onto a highly protected domestic consumption market. In addition to the natural advantage of being able to offer a cheap and plentiful supply of low cost labour, state interventionist policies were implemented

to attract foreign firms and capital into the export-manufacturing sectors. These include tax concessions and subsidies given to domestic and foreign firms to locate manufacturing plants in various East Asian countries. Export-enhancing policies also include East Asian currency regimes that artificially suppress the value of the domestic currency from rising against Western currencies, making the cost of capital entering into these East Asian countries and buying products made in these countries cheaper for Western firms and consumers respectively.

The export-orientated model has also been aided by advances in logistics and transportation that allows transport of goods to become ever more economical, especially with the rise of container shipping. For example, one study estimates that transportation networks are now so efficient that if carried on a 55,000 ton 'super ship', it costs about 2.5 cents to ship a T-shirt from Asia to America, or 1 cent to ship a can of beer across the same distance using calculations from 2012. (George 2013)

In theory, export-manufacturing models can be applied to an economy with low labour and other costs. In practice, East Asia has out-done every other developing region in the world since the second half of the previous century. If there were any doubt this is the case, and export-manufacturing is at the heart of East Asia's rise, then one should consider that East Asian manufacturing trade as a proportion of global manufacturing trade has increased from about 12 percent in 1970, to 26 percent in 1990, to over 35 percent currently. The Association of Southeast Asian Nations or ASEAN's share of global export-manufacturing increased from a miniscule 0.3 percent in 1970 to about 6 percent currently. China is the contemporary outstanding individual performer increasing its share of global export-manufacturing from 0.5 percent in 1970 to over 15 percent currently. Similarly, and at the peak of Japan's economic rise in 1990, its global share of export-manufacturing exceeded 12 percent. (Lee 2013a, 2013b, 2014a, 2014b)

In East Asia, more than two-thirds of all manufacturing is for the export sector. For highly export-dependent countries such as Malaysia and Singapore, the figure is over 85 percent while for exporting powerhouse China it is about 60 percent.(Lee 2014a) Although the rise of East Asia as the central hub of global export-manufacturing production has been the driving force behind the impressive growth in the region, the economic gains in Asia are often treated as if they have occurred independently of the West. In reality, advanced Western economies, and America in particular, has been and remain essential to the growth story of East Asia for a couple of important reasons.

For starters is the obvious truism that export-orientated growth models require consumers. (Athukorala 2005; Ma et al 2013) While the relatively open and accessible domestic consumption markets of the U.S. and European Union are about US\$12 trillion each, the entire domestic consumption markets of East Asia is under US\$10 trillion (using World Bank figures and based on the author's calculations.) China's is about US\$.3.4 trillion and Japan's US\$3 trillion. Even then, Asian domestic markets are much more restricted to outside firms than Western markets and much of the consumption in low- and middle- income countries in Asia – including China – take in non-tradable and poor quality goods which are of little interest to exporters.

The importance of the advanced economy consumer to the prosperity of Asian economies is further reaffirmed by figures showing that having averaged 6-7 percent growth per annum a decade before the global financial crisis, average GDP growth in the developing countries in East Asia (excluding China) fell to 0.6 percent in 2009. Even China's GDP growth plunged momentarily to almost zero percent in 2008-09 as the economic turmoil in the West shaved an estimated 5 percent of its 2007-8 growth rate before Beijing responded with a four trillion yuan stimulus, the largest in economic history and equivalent to about 14 percent of its 2008 GDP.

Moreover, it is clear that Western markets remain the predominant driving force behind trade between East Asian countries. The majority of trade between East Asian countries is driven by 'processing trade' in which parts are shipped in for further assembly or modification before being shipped out again. The iconic illustration is that of Apple's iPod, which while designed in California, is made up of parts that could come from over 20 countries and traverses assembly lines that can encompass Thailand, Malaysia, South Korea, the Philippines, Singapore, Taiwan and China. It is estimated that around two-thirds to three quarters of all trade within and between East Asian countries is 'processing trade', with around 70 percent of all manufactured end products destined for advanced economy countries. Indeed, East Asia's share of global share in processing trade increased from 26 percent in 1995 to 35 percent in 2009. (WTO et al, 82-6)

This is evident in figures showing that while ASEAN-China trade had grown in high double digit rates per annum for the previous ten years, trade between China and ASEAN immediately contracted by 7.8 per cent with the onset of the 2008 global financial crisis that plunged the Western markets into recession. When it came to specific countries, Sino-Malaysian trade actually declined 1.7 per cent in 2009 from the previous year, having grown at a remarkable 21.7 per cent per annum (compounded) in the 10 years before. (Lee 2014a) It was even worse in terms of the decline of Chinese two-way trade with other neighbours in the same period. Figures for 2008-2009 show that Chinese two-way trade with Singapore, Japan and Thailand declined 15.7 per cent, 21.5 per cent and 9.8 per cent respectively. (Lee 2013a, 2013b, 2014b) Remember that this all occurred despite China's economy, the largest in Asia, growing at almost 9 percent over this period.

Second, it is worth noting that the importance of export-manufacturing to the region's economic future is not just about enlarging GDP through growth in net exports; it is also the primary way

significant improvements in innovation and competitiveness occur in these domestic economies. High and middle-income countries such as Japan, South Korea, Taiwan, Singapore, Malaysia and China all began by being importers of innovation and know-how, and the latter remains largely dependent on doing so for its continued development. This has occurred through an export-manufacturing model that encourages advanced economy firms to establish manufacturing operations in one's country, after which the positive flow-on effects will be passed on to the domestic economy.

Indeed, the leading sources for foreign direct investment (FDI) into China, Japan, South Korea, Singapore, Malaysia, and Vietnam are all advanced economy firms – all from the West as well as Japan and South Korea - with developing giants such as China not included in the top five source countries for FDI in any of East Asia's export-orientated economies. Around four fifths of all FDI into East Asia is destined for export-manufacturing sectors. To emphasize the dominance of advanced economy firms in the export-manufacturing sectors, firms owned by advanced economies are behind some two-thirds of all manufactured goods for export out of East Asia, with the figure rising to above 80 percent for countries such as Malaysia. (Lee 2015)

Besides dominating regional export-manufacturing, advanced economy firms are needed to develop the domestic capabilities of East Asian economies. Manufacturing drives over three-quarters of all research and development (R&D) in East Asia, most of it undertaken by foreign advanced economy firms for export. In the East Asian powerhouses of China, Japan and South Korea, export-manufacturing sectors account for the lion-share of national R&D. Industrialisation and innovation arising out of export-manufacturing was been the most powerful driving force for Japan when it reached second in the global rankings for manufacturing output by value in 1990, and has been the most powerful driving force for China when it claimed the number two position from Japan under this measurement in 2010.

For still developing countries, export manufacturing is particularly important. To offer China, as one illustration, the export-manufacturing sector directly employs up to 50 million people, offering Chinese citizens some of the best jobs in the country. The sector indirectly employs another 100-150 million people. (Xiaoyu et al 2013) In China, manufacturing (the majority of which is for export) creates hundreds of millions of dollars in services demand. In addition to the absolute number of jobs generated by export-manufacturing, the sector contributes more than twice as much to productivity growth as its employment share. (World Bank 2013)

More broadly, we know that technology transfer and know-how, as well as other beneficial industrial spill-over from advanced economy firms are accelerated when world class multinationals are obligated to form joint-ventures with local firms as is required in many sectors in China. This is an approach pioneered in Japan and South Korea during their decades of rapid development. The persistent bottom line is that the emergence of world class Asian companies and brands such as Samsung and LG in South Korea or Huawei and Lenovo in China would not be possible without the technology and know-how transfers from Western companies such as Nokia, Phillips, Hewlett Packard, Motorola or Dell locating manufacturing plants in the region.

To be sure, there are differences amongst those economies not yet fully developed. Middle-income countries like Malaysia, and those close to attaining that status such as China, are seeking to move up in the world by being able to match the innovation and productivity levels of fully industrialised peers. Even if China, in particular, is less dependent on net exports to generate growth now than it was in the previous decade, it is still heavily reliant on the activity of foreign firms in its export-manufacturing sector to further develop an innovative and world class domestic industrial base. In comparison, poorer countries such as Indonesia, Vietnam and Myanmar are seeking to exploit their plentiful supply of low cost la-

bour and do what China did in the 1990s and 2000s, and Japan did in the 1970s and 80s by grabbing a larger slice of the export-manufacturing pie and make products for the world's wealthy consumers.

Replicating what advanced economies have achieved through export-manufacturing makes sense for low- and middle-income countries in East Asia. It is a proven pathway toward mass job creation, higher wages and living standards for one's population, and promoting innovation and industrialisation in once moribund economies. But while the model has proven its effectiveness, these opportunities are becoming more contested for a number of reasons.

One is that East Asian countries will increasingly compete with each other for a larger share of export manufacturing in terms of volume, and compete with each other to seize the higher ground when it comes to adding value in processing trade. For example, and in 2000, China made 40 percent of Nike's shoes when wages were still relatively low, while Vietnam made 13 percent of the shoes. As wages have risen in China, its production share of Nike shoes is now about 30 percent while Vietnam's share has increased to 42 percent. (Harris 2015)

At the same time that China competes with countries such as Vietnam for the lower-skilled market, it is also determined to gain a greater share of regional production of high-value added exported goods. Beijing's 'indigenous innovation' drive and the billions in subsidies that have been offered to its exporters is focused on producing higher value goods for export markets. (Haley et al 2013)

Given the enormous size of its economy and the numbers of Chinese workers in its export manufacturing sector, the emergence of China as a trading superpower is becoming less an opportunity and more a threat to exporters in smaller East Asian countries, particularly since regional and global export markets become more saturated and over-capacity worsens in the region. This will increasingly put Chinese exporters in direct competition with low-income countries such as Vietnam, Myanmar and Indonesia, middle-income

countries like Thailand and Malaysia, and high-income countries like South Korea and Japan.

When one examines the non-uniform export growth performance throughout East Asia, one can already find evidence for this. From 1995-2009, Vietnam, China, Thailand, Singapore and Indonesia have enjoyed average annual export growth (in value terms) of intermediate goods of 23 percent, 16 percent, 8 percent, 6 percent and 6 percent respectively. In contrast, Japan, Malaysia, the Philippines, Taiwan and Singapore have had growth of only 1 percent, 4 percent, 4 percent and 5 percent respectively. (World Trade Organisation) China's rise as an export competitor for advanced economies in the region is particularly notable. Over the past two years, China's exports have grown by 5 percent on average in dollar terms. At the same time, exports from South Korea and Taiwan have grown by only 2 percent, while Japan's has fallen by 6 percent. (*Economist* 2015)

Moreover, the East Asian model will also become increasingly fragile for other reasons. Since the 1950s, this model of rapid development and industrialization has laid the foundations for a handful of countries with a combined population of around 250 million people to reach high-income status. Although a proven model, countries with a combined population of almost two billion people are now seeking to replicate the success of countries such as Japan, South Korea and Taiwan to reach middle-income status (US\$15,000 per capita), before escaping the 'middle-income trap' and become fully industrialised and wealthy nations.

The problem is that when Japan, South Korea and Taiwan embarked on this pathway in the 1970s, their combined populations was around 50 million. These countries were servicing the consumption needs of some 400 million people in the industrialised economies in North America and Western Europe.

The equation is now reversed. The one billion or so consumers in the handful of advanced economies (including in East Asia)

might no longer be sufficiently vast to help propel some two billion people in Asia beyond middle-income levels, while those in China with similar buying power to counterparts in advanced economies numbering 50-100 million consumers will not significantly change the equation. This is not even allowing for the very real possibility that low-wage countries with large populations in other parts of the world like Mexico, Ethiopia and Nigeria will also emerge as competitors and adopt export-manufacturing models.

In short, and whereas the growth of intra-Asian trade was once a boon for the whole region since advanced economy markets were large and rich enough to absorb ever increasing volumes of exports in the region, such advanced markets are shrinking in relative terms. This means that the previous opportunities that existed for low-, middle-, and high-income East Asian countries were then sufficiently adequate such that all new entrants to the regional and global trading system could benefit.

Such benign conditions are on the wane for the foreseeable future, and the emergence of 'predatory' or mercantilist mindsets may well take hold – not just vis-à-vis China but other East Asian countries as well. We may well be entering into an era of increased trade competition rather than complementarity in the form of extreme currency depreciation policies, unauthorised subsidies for local exporting firms, tariff or regulatory barriers against foreign firms accessing one's domestic market, or even intellectual property theft on a mass scale to move rapidly up value-chains, including by cyber means.

## **THE UNCERTAIN IMPACT OF MANUFACTURING REVOLUTIONS ON EAST ASIA**

Just as successful export-dependent models and the markets

they serve do not stand still, developments in manufacturing technologies could widen the gap between winners and losers in East Asia. The vast majority of technological changes are incremental – doing things better, faster or cheaper. But genuinely ‘disruptive’ manufacturing technologies are likely to grow in importance. These technologies will change how products are made, how value is created, and alter the basic cost structure of production. All this will likely have enormous and negative implications for low- and middle-income export-orientated countries in East Asia.

The first is advances in industrial robotics, or ‘advanced robotics’ for short. Industrial robots have traditionally taken on a variety of manufacturing tasks in the past, usually jobs that are difficult, dangerous or too physically onerous for humans to do, for example, spray-painting, welding and lifting heavy materials.

Although robots and automated processes have been around for decades, the emerging revolution to traditional manufacturing is occurring for a number of reasons.

The first is that these technologies are becoming less and less expensive, meaning that they will make more commercial sense even in smaller scale operations – already a reason for this exponential growth. For example, the average cost of robot prices have more than halved since 1990 even as they have improved in reliability and speed. Robots used in electronics manufacturing, a critical sector in East Asia’s export-dependent economies, cost less than half of the minimum wage in the United States. The calculation is similar in other crucial regional industries such as computers, transportation and machinery where reliance on robots is expected to increase significantly. (Boston Consulting Group 2015)

Another is that industrial robots are becoming ever more sophisticated in what they can physically do, making them truly ‘advanced’ and also disruptive. This means that they are no longer just machines used for assembly and packing type tasks. When ever-improving mechanical designs and capabilities are matched with al-

ready occurring advances in what industrialists call the 'automation of knowledge – encompassing advances in artificial intelligence, machine learning, voice and instruction recognition etc., - robots can be trained to follow new routines through user-friendly but powerful touch-screen interfaces and even via complex oral commands. In other words, robots are increasingly being used to not just perform repetitive task faster and more reliably than humans, but to also work within traditional human environments.

Moreover, advanced robots are increasingly capable of realising and correcting their own mistakes, and those of other robots or humans. They can increasingly sense problems in the manufacturing process and improve them without human instruction. Using other advances in information and communication technologies, they may even be able to communicate and coordinate processes with each other in real time, even with robots thousands of miles away.

The robotic revolution is already well underway. In 2010, the number of automatic robots in use passed the one million mark. In 2013, 179,000 were sold, jumping from 118,000 in 2010. Over the past five years, sales of manufacturing robots have increased by well over 20 percent each year.(International Federation of Robotics 2015) More than one third are bought and used by the electronics manufacturing and automotive industries – the two most important export-manufacturing sectors in East Asia - with rubber, plastics and metal products sectors also figuring prominently. The McKinsey Global Institute estimates that the advanced robotics sector could have an economic footprint of up to US\$1.4 trillion in manufacturing alone by 2025, focused mainly in the healthcare and manufacturing sectors. The same study predicts that advanced robots in manufacturing and services sectors could replace between 40-70 million full-time workers by this same period. (Manyika et al 2014)

A second technological revolution is additive manufacturing, commonly known as 3D printing. This is a process that builds objects layer-by-layer rather than through pre-existing moulds or

through melding pre-existing parts together. 3D printing can begin with basic materials such as powders, liquids, filaments or sheets to create objects made from materials such as plastic, metal, ceramics, glass, paper, and increasingly living cells.

Although describing the exact process of additive manufacturing is not this essay's concern, the significant aspect of the process is that products and the materials they are made from can be digitalised and turned into data, manipulated or altered digitally, then re-made into that new materials or product. This includes manipulation or alternation of not just the design or shape of the product, but also complex internal structures that might improve strength, durability, functionality, or decrease weight etc. The capacity to "turn data into things and things into data", as Neil Gershenfeld from the Massachusetts Institute of Technology puts it, make materials, product and design experimentation and innovation far cheaper since it can skip traditional manufacturing steps such as making moulds and sourcing new parts and materials. (Gershenfeld 2012) The digitalisation of manufacturing also means that many more minds with access to the data – designers, producers and end users - can fix flaws and add to the innovation process from the inside out.

Estimates are that 3D printing could be used for up to 10 percent of all consumer products and be used wholly or partially for half of all direct product manufacturing within a decade. The former could amount a US\$300 billion economic footprint by 2025 and the latter a US\$200 billion economic footprint. (Ministry of Trade and Industry 2014) This assumes that traditional manufacturing processes will remain more cost effective for the vast majority of products but with 3D printing taking the lead in more complex, low-volume and highly tailored products to end business or consumer users.

As fantastic as these two examples of manufacturing ingenuity and innovation are, it may not immediately clear why they are 'disruptive' to traditional manufacturing, and why such technologies

could spell trouble for East Asia's export-orientated growth strategy. Even if these technologies fulfil the hopes placed on them, could not the low- and middle-income East Asian countries use these to accelerate their development? After all, China is emerging as the largest purchaser of industrial robots in the world, with one in every five sold in 2013 being bought by a China-based firm. (Powley 2014)

It comes down to what could be the radical and game-changing erosion of East Asia's cost advantage in export-manufacturing. The cost of production is the sum of capital, labour and land costs. The lower cost of workers and land on which foreign firms locate manufacturing plants has been a five decade old boon for East Asia. For export-manufacturing giants such as China, rising labour and land costs has been offset by the economies of scale that China-based operations can achieve. In other words, in traditional manufacturing, the cost per unit of producing one product decreases as fixed costs are spread out over an increasing number of units produced.

As ever-improving advanced robots become cheaper to buy and install, the traditional manufacturing cost equation is fundamentally altered. For one, the greater the automation, the less and less relevant labour costs become in the manufacturing equation; especially if one considers that robots (unlike human workers) can, in principle, work 24 hours a day for no additional variable cost. In fact, once a firm has committed to the sunk fixed cost of automation equipment in a manufacturing plant, the unit cost of a manufactured product made by a robot decreases with every additional product made. If this is the case, then it will eventually become far less compelling on a cost basis for advanced economy firms to locate manufacturing operations in low- and middle-income countries. Indeed, one estimate is that one quarter of all manufacturing tasks will be undertaken by robots by 2025. (Boston Consulting Group 2015)

To offer one case study, consider the Taiwanese company, Fox-

conn, which makes products for a number of leading Western brands such as Apple in its major manufacturing plants in China. Foxconn located operations in places like Shenzhen because labour was much cheaper in the Chinese province. Employing more than one million workers, Foxconn is now replacing many of them with a growing army of robots. Some reports suggest that a US\$20,000 robot can assemble 30,000 iPhones in one year: a cost of 66 cents per unit assembled. (Apple Insider 2014) This should be the similar whether the robot is located in Shenzhen or Detroit. For Foxconn, or others like it, there may be less reason to build future automated plants in low- or middle-income countries in Vietnam or China.

Indeed, global brands consistently name supply chain risk as one of their major ongoing concerns when it comes to manufacturing. If a product is designed in America and sources the most valuable components from other advanced economies, using robots to assemble the product in developed countries with reliable regulatory, legal and judicial institutions seems to be a far less risky supply chain option than if the automated plant was located in China or Indonesia – developing countries with riskier environments and weaker commercial institutions. Bear in mind that while China emerged as the largest purchaser of robots in 2013, the majority of purchases of advanced robotics was by foreign owned firms headquartered in advanced economies with manufacturing operations in China. It seems only a matter of time before these firms move their automated plants to advanced economies in order to mitigate supply chain and political risks inherent in less developed countries with more opaque and unpredictable political-economies.

Moreover, if the primary consumption markets are in the advanced economies, and labour costs of manufacture are less of an issue, then it makes more sense to eventually locate automated plants closer to the end consumer. Doing so will reduce transportation costs (even if these have fallen dramatically over the past few decades) and duration from when a product is designed to when

it is completed and shipped directly to the consumer. It will also allow firms to be more responsive in terms of troughs in consumer demand by reducing outlays for redundant labour.

But advanced robotics is not only about making labour costs less relevant. As automation becomes more sophisticated and 'intelligent' in the ways described above, the factory manager will be less the boss of a team of production line workers and more likely a highly- skilled computer scientist, engineer, or systems analyst – skills which play into the hands of workers in advanced economies. As advanced robots communicate and work with each other – often with another robot some distance away – such manufacturing firms will need to exist in commercial environments where trust and cooperation between third parties is primarily the function of a political-economy that upholds the rule-of-law. This includes areas such as contract law, property and intellectual property rights, and commercial confidentiality rather than the *guanxi*-type societies that prioritise personal and social networks and loyalties as the foundation of trust and cooperation. The former are characteristics of advanced countries such as Japan, Taiwan, Singapore and South Korea rather than China, Indonesia or Vietnam.

Given the more limited application of the technology and the fact that the process is still cumbersome and slow (even if print speeds are rapidly improving,) the future of 3D printing is less assured than advanced robotics.

Like automation, 3D printing lowers the relevance of manufacturing workers, making labour costs less important in the cost equation. On a cost per unit basis, a 3D printed product is fairly constant whether we make one or one thousand products. This means that 3D printing could well be more cost effective when producing a low number of products. In addition to the fact that 3D printing operations can be done in smaller spaces, making it a technology eminently suitable to operate in crowded modern cities, advanced economy firms will have few incentives to locate 3D

printing operations in low-income countries.

The technology is highly suited to producing complex, low-volume and highly customizable products more applicable to advanced economy than developing markets. For example, highly advanced Western companies such as Boeing are using 3D printing for around 200 different parts for ten aircraft platforms.

But the true disruption is in the way 3D printing allows designers, end users and producers to experiment and innovate from the inside out. This means that advanced economy firms with a current stranglehold on products with advanced designs and materials will be the first to digitize their products and allow their stakeholders – generally other advanced economy entities – to improve the product and introduce innovations at low cost. For example, NASA and Boeing have signed a multi-billion dollar agreement to develop a giant rocket that could go into deep space. Imagine what scientists, engineers and other highly skilled workers from these two American organisations could come up with using 3D printing processes and technology to experiment and innovate?

Possibilities such as the one above are significant. While the traditional value-proposition of export-orientated East Asian economies was to produce commodity goods advanced economies needed at lower cost, 3D printing facilitates the development and production of tailored products and maybe even whole sectors that completely bypasses the low-cost cookie-cutter offerings of developing economies. Far from moving up the manufacturing value-chain as developing Asian economies hope to do, many will not be able to even add value when it comes to products designed and produced by 3D printing processes. Like many new technologies, 3D printing (and advanced robotics) may well exacerbate inequality between developed and developing countries rather than lessening it.

It is impossible to know which manufacturing technologies will take-off and become genuinely ‘disruptive’ in the future. This paper does not offer solid predictions of what manufacturing will look

like in one or two decades' time. Instead, it is to offer arguments – economic and technological - why an export-orientated model that worked for a small number of East Asian countries in the past may not work so well for the many into the future.

## CONFRONTING THE CHALLENGES OF AN AGING EAST ASIA

The ultimately purpose of economic growth and expansion is to improve the living standards of a country's citizens. Throughout Asia, especially in those countries yet to achieve full industrialisation, the stability of government and society depends on it. This applies particularly to authoritarian regimes in China and Vietnam, to fledgling democracies in Myanmar and Indonesia, and incomplete democracies in Malaysia, Singapore and Thailand.

The imperative of economic growth is made more urgent, and more difficult by the fact that much of East Asia is a rapidly aging zone. Throughout Northeast Asia, the median age will jump from about 30 years to over 40 years (which will make it a 'greyer' zone in 2035 than Western Europe is today.) In 2035, Japan's median age will be around 50 years, while South Korea's will be about 44 years.

As a rapidly growing but still developing country, China is of the greatest interest. China's economic reforms and subsequent spectacular growth began in 1979 when the country was just entering a boom period characterized by the massive availability of young labour and little need to care for those retiring from the workforce.

For example, the proportion of the working age population (15-64 years) was over 73% of the overall population in China in the early 1980s. Current at 68%, it will reach a peak (as a percentage of overall population) at around 2016, before declining to around 65% in 2020 and 60% in 2035.

To draw this out in a different way, there are currently around 115 million Chinese people over 65 years. By 2035, there will be around 320 million with the overall population only around 100 million larger than it is today. Even within the working population, there will be 4.5 older workers (50-64 years) for every three younger counterparts (15-29 years), which is the reverse of the situation currently. There will be over 100 million less young workers (15-29 years) in 2035 than there are today. Currently, less than 10% of the population is over 65 years. This will rise to around 13% in 2020 and 25% by 2035 – *which is worse than Western Europe*.

If we take the 2020 projections as a point of comparison, China's GDP per capita is less than one third of what Japan's was at a similar age demographic moment in the latter's history. (This generously assumes 8% GDP growth per year in China.) This means that China will almost certainly be the first major country in modern history *to grow old before it grows rich*. (Lee 2013c)

The age demographic makeup of Southeast Asia is also troubling in some contexts. There are significant age-demographic differences amongst major countries in this area. For example, up to 2020, Singapore, Vietnam, Thailand, Malaysia, Indonesia and the Philippines all have favourable working-age demographics.

However, by 2035, age demographics will favour only the Philippines, Indonesia and Malaysia. Rather than a 'demographic dividend' – economic growth arising out of young workers with few familial responsibilities - Singapore, Thailand and Vietnam (in descending order) will experience a growing 'demographic tax' as their population ages. Singapore is the only 'rich' country on this list, allowing it to punch above its population size. Malaysia is a middle-income country (over \$15,000 per capita) trying to escape the 'middle-income trap' while the rest are low-income countries (less than \$10,000 per capita.) Even so, Indonesia, the Philippines, Vietnam, Thailand and the Philippines remain significant players by virtue of population size which currently stands at about 240

million, 94 million, 87 million and 70 million respectively.

Incidentally, and within the broader Indo-Pacific, India's demographics – in addition to the size of its country – is likely to be highly significant. Over the next 20 years, its total population is set to grow by over 1% each year, and will probably overtake China in population by 2035. Importantly, almost all of the growth will be in the working age population, particularly 30-50 years old. By 2035, and with a median age of 31 years, only 8-9% of its population will be over 65 years.

It is also a little known fact that over the next two decades, America will be more youthful, and will be aging more slowly, than any of the Asian industrialized 'tigers' or China. Its population will grow by over 20% from now until 2035, meaning that its share of global population will remain steady up to 2035. Between now and 2025, the median age will only rise by about 2 years (from 35.5 to 37.5 years.) By 2035, the ratio of working age people to retirees will be around 3.3:1 compared to 2.5:1 in China. When China began its reform period in 1979, the ratio was about 7:1. (Lee 2013c)

## IMPLICATIONS AND CONCLUSION

The political and social pressure on developing countries and their governments to grow rich before they grow old will be considerable. The legitimacy and standing of many of East Asia's governments and established political parties depend heavily on national economic performance and opportunity.

Similarly, choosing stability and peace over instability and conflict in the region is commonly premised on the argument that the former will deliver economic prosperity to individual countries and the region, and that East Asia will rise or fall collectively.

Yet, and as the earlier sections argue, export-dependent growth

models from previous decades are unlikely to work as well into the future as they have in the past. In pursuing similar export-dependent models, regional economies are more likely to view each other as competitors rather than as partners – both in terms of competing for jobs and in attempts to move up the value chain within the integrated production and manufacturing networks in the region. Emerging technologies are forcing wages down rather than up, while many jobs crucial for developing countries will become redundant and non-existent.

This will make it far more difficult for several countries to grow rich before they grow old. And as their population ages and productivity improvements level off as is usual with aging societies, failure to reach middle- or high-income status on a per capita basis will increase the social and political pressures on those countries and governments. (World Economic and Social Survey 2007) In turn, the economic and fiscal costs for these countries will increase markedly.

It is a sure thing that some countries will not make it to middle-high income status before they grow old. In the region, only Japan, South Korea, Taiwan and Singapore have reached that happy destination. Should China fail to manage its transition and achieve the attainment of what its leaders call a ‘moderately prosperous society’ over the next decade or two, the consequences for the region, and perhaps the world will be unpredictable. (Xinhua 2015) Economic failure in Vietnam will have consequences for Indo-China, and the same for Indonesia throughout in Southeast Asia etc. Still existing rivalries between many countries – China-Japan, Indonesia-Malaysia-Singapore, Vietnam-Thailand, Myanmar-Thailand to name several – are more likely to worsen in the event of economic stagnation or turmoil. Managing the fallout of economic failures throughout the region should not be underestimated.

More broadly, the relative period of peace since the Second World War has largely been underwritten by not just growing pros-

perity, but the prospect that peace and stability will automatically generate opportunities for countries to grow rich and contented. In an environment where strategic and competition and rivalry may be growing rather than subsiding, and where actual or anticipated economic gains are failing to temper such strategic rivalries, the first few decades of this century may well be more traumatic and troubling than the last few decades of the previous century. Meaning the United States may well remain the indispensable power in East Asia this century as it was in the back half of the previous one.

## REFERENCES

**Books and Monographs**

Haley, Usha C.V. 2013. *Subsidies to Chinese Industry: State Capitalism, Business Strategy, and Trade Policy*. Oxford: Oxford University Press.

Lee, John. 2013a. *China's Economic Engagement with Southeast Asia: Indonesia*. Singapore: ISEAS.

Lee, John. 2013b. *China's Economic Engagement with Southeast Asia: Thailand*. Singapore: ISEAS.

Lee, John. 2014a. *China's Economic Engagement with Southeast Asia: Malaysia*. Singapore: ISEAS.

Lee, John. 2014b. *China's Economic Engagement with Southeast Asia: Vietnam*. Singapore: ISEAS.

George, Rose. 2013. *Ninety Percent of Everything: Inside Shipping, the Invisible Industry That Puts Clothes on Your Back, Gas in Your Car, and Food on Your Plate*. New York: Metropolitan Books

**Journal Articles**

Gershenfeld, Neil. 2012. "How to Make Almost Anything." *Foreign Affairs*. November/December.

Lee, John. 2013c. "Pitfalls of an Aging China." *The National Interest*. 123. Jan/Feb.

Lee, John. 2015. "China's Economic Leverage in Southeast Asia." *The Journal of East Asian Affairs* 29:1

Ma, Alyson C. and van Assche, Ari. 2013. "Is East Asia's Economic Fate Chained to the West?." *Transnational Corporation Review*. 5:3.

**Online Reports and Articles**

Apple Insider. 2014. "Foxconn's 'Foxbot' robots will assist human workers at major iPhone factory, report says." July 9. Available <http://>

appleinsider.com/articles/14/07/09/foxconn-foxbot-robots-will-assist-human-workers-at-major-iphone-factory-report-says Accessed February 9, 2016.

Athukorala, Prema-chandra. "Product Fragmentation and Trade Patterns in East Asia." Available <http://www.hiebs.hku.hk/aep/Athukorala.pdf> Accessed February 9, 2016.

Boston Consulting Group. 2015. *The Shifting Economics of Global Manufacturing. February*. Available <http://www.slideshare.net/The-BostonConsultingGroup/robotics-in-manufacturing> Accessed February 9, 2016.

Economist. 2015. "A faulty gauge." May 23. Available <http://www.economist.com/news/finance-and-economics/21651890-tumble-exports-asia-need-not-spell-gloom-world-faulty-gauge> Accessed February 9, 2016.

Harris, Dan. 2015. "China vs. Vietnam for Product Sourcing." March 31. Available <http://www.chinalawblog.com/2015/03/china-vs-vietnam-for-product-sourcing.html> Accessed February 8, 2016.

International Federation of Robotics. 2015. IFR Press Release. Available <http://www.ifr.org/news/ifr-press-release/global-robotics-industry-record-beats-record-621/> Accessed February 9, 2016.

Manyika, James. Chiu, Michael. Bughin, Jacques. Dobbs, Richard. Bisson, Peter. and Marrs, Alex. 2013. *Disruptive technologies: Advances that will transform life, business and the global economy*. McKinsey Global Institute. May. Available [http://www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Technology%20and%20Innovation/Disruptive%20technologies/MGI\\_Disruptive\\_technologies\\_Full\\_report\\_May2013.ashx](http://www.mckinsey.com/~/media/McKinsey/dotcom/Insights%20and%20pubs/MGI/Research/Technology%20and%20Innovation/Disruptive%20technologies/MGI_Disruptive_technologies_Full_report_May2013.ashx) Accessed February 9, 2016.

Ministry of Trade and Industry. 2014. *Future Tense*. May. Available [https://www.mti.gov.sg/ResearchRoom/SiteAssets/Pages/Future-Tense-July-2014/Future%20Tense%202014\\_final.pdf](https://www.mti.gov.sg/ResearchRoom/SiteAssets/Pages/Future-Tense-July-2014/Future%20Tense%202014_final.pdf) Accessed February 9, 2016.

Noble, Josh. 2015. "China's export woes mirrored across Asia."

*Financial Times*. August 20. Available <http://www.ft.com/intl/cms/s/0/bf81fa66-456d-11e5-af2f-4d6e0e5eda22.html#axzz3zXf3K3Td> Accessed February 9, 2016.

Powley, Tanya. 2014. "China becomes largest buyer of industrial robots." *Financial Times*, June 1. Available <http://www.ft.com/intl/cms/s/0/a5cca8c0-e70c-11e3-aa93-00144feabdc0.html#axzz3zX-f3K3Td> Accessed February 9, 2016.

SIPRI Military Expenditure Database 2015. Available [http://www.sipri.org/research/armaments/milex/milex\\_database](http://www.sipri.org/research/armaments/milex/milex_database) Accessed February 8, 2016.

United Nations. 2007. *World Economic and Social Survey 2007: Development in an Aging World*. New York: United Nations. Available [http://www.un.org/en/development/desa/policy/wess/wess\\_archive/2007wess.pdf](http://www.un.org/en/development/desa/policy/wess/wess_archive/2007wess.pdf) Accessed February 9, 2016.

World Bank. 2013. *China 2030: Building a Modern, Harmonious, and Creative Society*. Available <http://www.worldbank.org/content/dam/Worldbank/document/China-2030-complete.pdf> Accessed February 8, 2016.

World Trade Organisation and IDE-JETRO. Trade Patterns and Global Value Chains in East Asia: From trade in goods to trade in tasks. Available [https://www.wto.org/english/res\\_e/booksp\\_e/stat\\_tradepat\\_globvalchains\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/stat_tradepat_globvalchains_e.pdf) Accessed February 8, 2016.

Xinhua. 2015. "Xi calls for responsibility in sprint for well-off society." December 31. Available [http://www.china.org.cn/china/2015-12/31/content\\_37434430.htm](http://www.china.org.cn/china/2015-12/31/content_37434430.htm) Accessed February 9, 2016.

Xiaoyi, Shao and Koh, Gui Qing. 2013. "China exports rebound but 2013 remains murky." *Reuters*. January 10. Available <http://www.reuters.com/article/us-china-economy-idUSBRE90905T20130110> Accessed February 8, 2016.