

Towards a Global Civilisation: An Evolutionary Perspective

By
Hamish Clift
Tom Mandeville

School of Economics
The University of Queensland

14th International Schumpeter Society Conference (ISS)

2-5 July 2012

Brisbane, Australia

Since the 1950s famous and talented story tellers such as Isaac Asimov, Arthur Clark, and Robert Heinlein have imagined the human civilisation coherently controlling the whole of Earth and courageously colonising solar systems and galaxies. Now, such science fiction looks to be turning into reality. The emergence of a planetary civilisation- a higher scale of social organisation above the nation state or group of nation states- is nearly upon us. Innovation in information and communication technologies (ICTs) and the advancement of the knowledge-based economy (KBE) is driving the evolution of a world which is becoming more globally integrated. This paper will discuss the evolutionary aspect of the KBE, and ideas by two eminent thinkers regarding a planetary civilisation, within the remit of the evolution of a planetary shift toward greater economic and social integration.

The notion of human society evolving towards a truly global or planetary civilisation has appeared on the agenda of serious ideas, thanks to the efforts of people such as U.S. physicist/futurist, Michio Kaku and Australian of the Year/scientist/environmentalist, Tim Flannery. The thrust of these thinker's ideas about the emerging planetary civilisation will be outlined in the context of the online, globalised, knowledge-based economy (KBE) era, identified by the OECD in 1996. It will be highlighted how the KBE provides some of the essential, evolutionary building blocks for moving 21 century human society toward a civilisation that is distinctly planetary in scope.

Kaku and the Type I Civilisation

In his book, *Physics of the Future*, Michio Kaku, an American theoretical physicist makes the case for our convergence toward a planetary civilization. However it can be demonstrate that the fulcrum of his compelling thesis is the knowledge-based economy. To gauge how far human society has travelled towards a planetary civilisation, Kaku uses and extends the Kardashev scale, developed in the 1960s by Russian astronomer Nikolai Kardashev to measure the technological output of civilisations. The Kardeshev scale, and Kaku's adaptation, describes technology advance in terms of energy harnessing and consumption. Types I to III were postulated by Kardeshev, with Kaku extending the scale to include the possibility of a Type IV civilisation. Type I civilisations are capable of harnessing the constituent energy of their planet, Type II of their star,

Type III of their galaxy and Type IV civilisations, Kaku suggests, are capable of harnessing extragalactic power sources. Kaku, agreeing with Carl Sagan (who developed a method for calculating the threshold values of each type in megawatts) postulates that humanity presently sits at about 0.7 on the scale and is likely to become a type I civilisation, with it the ability to harness all the power on the planet, by around 2100.

To set the scene Kaku describes the four stages of technology evolution, using paper as an example. In stage I, the commodity is rare and precious so products are expensive and coveted – when the Egyptians invented papyrus, a single scroll was extremely valuable. When paper reached stage II (as a result of the Gutenberg press) it was possible for a single person to possess a whole book's worth of scrolls. In the 1930s, when the cost of paper fell to the point that it was possible for the personal library to exist, it entered stage III, becoming ubiquitous - a commodity sold by the tonne. Now paper is entering stage IV, where it is used as decoration and a fashion statement. Kaku points out that the largest source of urban waste is paper; it has evolved from a coveted luxury into being waste.

Supporting our ideas about the KBE era, Kaku contends that the evolution of computing and the Internet follow the same process and that the evolution is far from over. He quotes John Steele Gordon to illustrate the fact: "we are now at the point with the Internet that they were with the railroad in 1850. It's just the beginning."¹ The evolution of ICTs toward stage III will correlate with our own evolution toward a Type I civilisation, the socioeconomic path to global civilisation and the evolution of ICTs are fundamentally linked. Key indicators of this evolution are already clear. "In the past, people said that the pen was mightier than the sword. In the future, it will be the chip that is mightier than the sword."²

This paper takes as a starting point that the Internet is the biggest single innovation driving the progress toward a planetary civilisation. The Internet lowers the barriers to entry for citizens across the world interested in creating small businesses and gives these businesses a possible global customer registry. Greater economic and trade

¹ Kaku, 279

² Kaku, 313

integration is also caused, in part, by the enabling effects of the Internet. And talk is now not of military might, but of economic might when measuring the power of nations. Kaku suggests that, since the end of the Cold War, “nuclear wars are simply too dangerous to fight, so it is economic might that will largely determine the destiny of nations.”³ Reinforcing this idea within an evolutionary context, Peter Allen notes that “the evolution and dynamics of knowledge and ignorance therefore becomes the fundamental currency of human systems, largely replacing that of physical strength, manual skill and dexterity.”⁴ It can be postulated that the greater relevance of economic might, coupled with the systems complexity that arises from ICT evolution in the KBE era, will increase global trade and research ties. Evidence of this is present in the mechanisms of NAFTA and the EU. Time will tell whether the current flux is merely a result of teething problems or some, greater, malposition.

Kaku uses a number of examples to illustrate our evolution toward a global civilisation, all of which are driven by innovation and evolution inherent to the KBE era. Since WWII and the baby boomer generation, youth culture has become homogenised. Global cultural trends, enabled and delivered by the Internet, are resulting in the further homogenisation of youth culture to the point that there is a planetary youth culture. This includes not only includes pop music and cinema but sports, which are becoming increasingly globally competitive. Global news cycles and the new ability to instantly access news from around the world is also shaping the attitudes and ideas of everyday citizens and has implications for foreign policy, conflict, tourism, global public health, the environment and business. The always-on, always-connected nature of the internet will, as it reaches ubiquity through ICT innovation, level the cultural and social playing field; blogs, Twitter, Tumblr, Pinterest and the gamut of social media geared toward the delivery and consumption of media is the vanguard of the homogenising cultural revolution.

Finally, human kind is progressing "from masters of nature to conservators of nature"⁵ as environmental concerns are globally discussed and acted upon (albeit slowly).

³ Kaku, 309

⁴ Allen, 314

⁵ Kaku, 320

Flannery and the Global Human Superorganism

Tim Flannery regards a planetary civilisation as the current emerging phase of humanity's scale of social organisation that began with clans. Then, enabled by the development of agriculture, came villages, followed over time by towns, cities, empires, nation-states, and mega-cities, leading to today's dawning of a 'global civilisation'. He calls this a 'global superorganism'. Superorganisms being biological species like bees, ants, humans that can manifest very large scales of social organisation. Such large social entities also exhibit synergistic - whole greater than sum of parts - and 'collective intelligence' features, in terms of competence and productivity capabilities.

Flannery's ideas link to aspects of the KBE, discussed below, when he observes that "the invention of the internet, mobile phones and cheap air travel are dramatically challenging the boundaries and capabilities of the old human superorganism - the nations."⁶ Information and communication technologies (ICTs) are, of course, part and parcel of what is driving the KBE era.

By the 20th century, a world civilisation was taking shape. The legacy of European colonisation was rendering the capitals of the West multicultural. Politically, democracy, especially by the end of the 20th century, was rapidly becoming the preferred system of governance. A global human culture was also emerging, its genesis informed from the U.S. Importantly, American popular culture is inclusive of all. English has become the global language of universal communication. It may evolve into a 'Chinglish' as the emerging future world language.

But our industrialised global civilisation has proven so catastrophic for the Earth's ecosystem that humanity's very survival as a species is threatened. Flannery observes that the planetary human superorganism is being tested by the climate crisis before it is properly matured. But he is optimistic that we'll pass this crucial test, as with ten thousand years experience of building ever larger political units, we are now just a few steps from the global cooperation needed to manage our atmospheric and oceanic global commons. This need not imply world government, just nations ceding some of their authority, in order to act in common, via enforcement of common rules, for the welfare of all.

⁶ Flannery, 119

Given our world now has a homogeneous gene pool, universal communication and an increasingly common political system, perhaps over time, it will increasingly act as one entity; a global superorganism; a truly planetary civilisation. We explore this further through the lens of the KBE.

The Knowledge-Based Economy as a Driver

The KBE era has placed as emphasis on knowledge, the transmission and dissemination of that knowledge through networks, and the creation and acquiring of knowledge as being key to economic growth. The Internet and ICTs facilitate this and act as a catalyst to the creation of networks for knowledge creation and dissemination in business and the community. A truly planetary civilisation emerges as a possibility since never before has humanity been so connected and so globally interdependent. About 25 to 30 percent of the world is connected to the Internet, while at least half of humanity now has access to a mobile phone. “The heyday of the information revolution is yet to come.”⁷

Economic and social benefits from network externalities, which increase exponentially as the size of networks increase, have flourished in the KBE era. This is all about value being created from abundance and inclusion versus traditional value via scarcity and exclusion. Thus as more of the world’s people become connected via ICTs, more value is being created for all. These aspects will be illustrated in the context of discussion of other features of the KBE era.

Globalisation, or the increased integration of worldwide economic activity, has been an ongoing process, especially since the 1950s. Arguably, it entered a new and more intensive-interdependent phase with the onset of the KBE era in the mid 1990s.⁸ Manifestations of this new phase include the globalisation of knowledge jobs, the democratisation of entrepreneurship, and the globalisation of the finance and higher education sectors.

Prior to the 1990s, low level manufacturing jobs were regularly being outsourced to emerging economies. Since then, of course, this has continued with China now deemed the ‘world’s factory’. But also, since the 1990s, for the first time, knowledge

⁷ Kaku, 282

⁸ Rooney et al.

jobs and increasingly, higher level knowledge jobs, are also being outsourced, particularly to India. ICTs have enabled many such jobs to be done anywhere, anytime. Of course, the globalisation of knowledge jobs isn't just about outsourcing to developing countries. It also means that the opportunities for professionals, as well as others traditionally not involved in the production process, have been vastly expanded. For example, about five percent of Australia's population, or one million persons, work overseas - most in highly paid knowledge jobs. We have a large, highly successful overseas diaspora, not only furthering our national interests, but also developing a more international outlook.⁹

In 2005 there were over 190 million migrants worldwide, or 3 per cent of the world population.¹⁰ Migrant networks are becoming larger, more significant economic entities as the KBE and globalisation mechanisms lower barriers to working around the world and make travel easier and cheaper. As a result of increased migration, remittance payments are increasing in prevalence and importance. Remittances paid by migrant workers to their origin families are unrequited, usually packets of only a few hundred dollars at a time and astonishingly sizeable; reported world migrant remittances totalled US \$380 billion in 2007.¹¹ There are vast numbers of unreported remittances. Recent studies have shown that increases in world migration "could have far more profound effects in enhancing world production that would complete removal of all policy barriers to trade."¹²

The above, plus the trend to open sourcing, has helped enable the democratisation of entrepreneurship. As the introduction of ICTs lowered barriers to entry in many service and knowledge-based activities, entrepreneurs began to move into these areas. The online nature of such economic activity now means that almost anyone can take part in productive enterprise from nearly any place in the world. As English is a key skill and thus India, being a former British colony, has a competitive advantage. Indian entrepreneurs have been among the first to access online, knowledge-based economic

⁹ See Hugo, 11; and Lucas, 14

¹⁰ United Nations 2009a

¹¹ United Nations 2009b

¹² Lucas, 3-4

activity, such as software, ICTs and business services. Today, many business start-ups, in any country, are 'born global'.

Finance and higher education have become leading sectors in this new phase of globalisation and associated increased world interdependence. While the globalisation of financial services has increased vulnerability to systemic breakdown, this has inadvertently strengthened international collaboration/global governance institutions. For example, G8 evolving into the more inclusive G20 for global macroeconomic coordination, and the movement to more rigorous global financial regulation mechanisms, such as the Basel III accord.

The globalisation of universities in the KBE era has manifested in the emergence of a rapidly growing international higher education market, increased collaboration between universities enabling international student exchange programs, and branch campuses springing up in the Middle East and Asia. These developments suggest that the world's university students- future decision makers in industry and government- will increasingly have an international, dare we say, planetary, outlook.

Australia has been at the forefront and thus a major beneficiary of these developments. Our finance sector is among the Globe's most robust, and higher education was recently our 3rd most valuable export after coal and iron.

The growth of the services sector and the emergence of services innovation as a major driver of productivity and economic growth has been a hallmark of the KBE era. Luckily, Australia is very good at services innovation, as the above points illustrate. This is a quiet revolution, as most in industry, government and the community seem unaware of it. Perhaps this is because it is not about resources (except our highly educated human resources), and it is not driven by R&D. But it bodes well for our continuing success in, and our continuing notable contribution to, an increasingly globalised, integrated Earth.

The Internet culture of 'information wants to be free' is aiding the global spread of ideas of increased transparency, accountability and democracy. Wikileaks and its likes may be improving transparency and accountability in existing democracies, while social networking sites may be aiding the spread of people power-democracy throughout the tyrannies of the Middle East and North Africa. More and better democracy is likely to mean increased respect for human rights, a more peaceful world, a more prosperous

and equitable world, and we suggest in the light of observations above, a more cooperative, focused, integrative Planetary Civilisation.

We have already made the first few steps toward a global civilisation. The evolution toward ubiquity of the Internet and simultaneous rise of the KBE has been and will continue to be a driving force of this convergence.

Evolution and Complexity Perspectives

The scope for an evolutionary analysis of these ideas is wide. The *prima facie* evolutionary nature of these processes is clear, but there are multitudinous realisations of evolutionary processes - particularly creative destruction, at each economic level. "The rise of science and technology has modified Adam Smith's capitalism in many ways, from the way that goods are distributed to the nature of wealth itself."¹³ The rise of the KBE is a catalyst of our shift toward a global, Type I, civilisation. The foundation of the processes described by Kaku and Flannery is knowledge, and the production and dissemination thereof. And the biggest driver of knowledge is the Internet. As an economic entity, the internet is a prime example of complexity -- it is the grandest archetype of a networked system where it is the connections, and not the individuals, which are key. Complexity, particularly on such a scale, is the ultimate attractor of evolution and creative destruction. As espoused by Herb Simon in his seminal *The Architecture of Complexity*, complexity frequently takes the form of hierarchy.¹⁴ These are not the narrow hierarchies of organisational structures and offices though. The hierarchies described by Simon do not follow a rigid structure of subordination but are "complex systems analysable into successive sets of subsystems."¹⁵ Within the framework of the KBE, many of key drivers of our march toward Type I civilisation take these hierarchical forms.

In the introduction to *The Economy as an Evolving Complex System II*, the editors of the tome outline six key attributes of complexity theory which are important within the sphere of economics: dispersed interaction; no global controller; cross-cutting hierarchical organisation; continual adaptation; perpetual novelty niches; and out-of-

¹³ Kaku, 288

¹⁴ Simon, 468

¹⁵ Simon, 468

equilibrium dynamics.¹⁶ Importantly for the KBE, in systems which exhibit these attributes, it is connections between individuals - or the strength of any one network or Simon hierarchy - which is important, not the individual agents of the system. This is seen in the flourishing of global migration networks, including the payment of remittances and incentives to migration. The links between migrants and their families at home are enriched by ICTs and the Internet. The KBE era, which has promoted the global mobility of labour, helps keep people attached to their home countries.

The internet is also driving complexity in social networks, ICTs, entertainment and news delivery - which Kaku outlines as key aspects of our progression toward global civilisation. Foster and Metcalfe note, "the distinctive, complex, evolutionary property of economic and social systems is that they are knowledge based and that the primary interactions between them are exchanges of information."¹⁷ Organisations such as Kickstarter¹⁸, Kiva.org¹⁹ and Pozible,²⁰ which have built sites based on the idea of crowd-sourcing funding for creative projects, microfinance and ideas respectively, flourish in the new global economy. These sites have developed platforms which make use of the complex networked relationships inherent to the internet. Nowhere else is the evolutionary process of creative destruction more fecund than within these ecosystems; the nature of crowd-sourcing means an equilibrium state is never reached. This lack of equilibria is one of the key features of complexity economics, as noted by Arthur et al.²¹

Foster and Metcalfe describe the processes of evolutionary systems thus: "evolving systems change according to particular kinds of process, and two processes take pride of place: selection and development... They are naturally dynamic -- evolutionary theory is naturally 'growth' theory; they may involve selection and development at a multiplicity of distinct, interdependent levels; they give rise to the possibility of positive, reinforcing feedback behaviours."²² This description fits many elements of the KBE era and can be

¹⁶ Arthur et al, 3-4

¹⁷ Foster & Metcalfe, 4

¹⁸ <http://www.kickstarter.com/>

¹⁹ <http://www.kiva.org/>

²⁰ <http://www.pozible.com/>

²¹ Arthur et al, 4

²² Foster & Metcalfe, 4

used to characterise modern finance and education sectors, which continue to be dynamic, even while growth slows across many OECD countries. Processes of selection and development are successful in driving dynamism in these sectors because of their hierarchical structure and strong reliance on knowledge.

The emergence of portable devices and ‘app stores’ are another fine example of how mechanisms of our progression toward a global civilisation - in this case not only technological innovation but methods of communication and entertainment and news delivery - are driven by evolutionary processes. In the app store context the process of differentiating between and selecting apps drives niche creation which increases novelty. This increased novelty drives both growth and complexity and results in dynamic, bidirectional feedback; the complexity of the system further acts as an evolutionary attractor and the system adapts and continues. The Apple App Store logged one billion downloads in its first nine months of being live.²³ And, less than three years later, an incredible 25 billion downloads had been logged.²⁴ The app store ecosystem exhibits, *inter alia*, two key traits of complexity: dispersed interaction; and no global controller. What happens in app store markets is determined by a heterogenous, global gamut of agents, from Japanese housewives to Brazilian CEOs (the 25 billionth app downloaded from the Apple App Store was bought by a man from Qingdao, China). How these agents act has only a limited effect on how other agents act, with some decisions being made based on reviews, amounts of downloads and other aggregated information. Further, the lack of a global controller (or universal competitor) means that controls are limited almost entirely to competition and coordination mechanisms.

Public Policy Considerations

There is an abundance of creative policy opportunity available to foster our progression. Nelson and Winter note that “public laws, policies, and organisations are an important part of the environment that shapes the evolution of private sector activities.”²⁵ Public policy will become ever more important the closer we come to becoming a global civilisation. As we converge upon a Type I civilisation, global economic power will

²³ <http://www.apple.com/pr/library/2009/04/24Apples-Revolutionary-App-Store-Downloads-Top-One-Billion-in-Just-Nine-Months.html?>

²⁴ <http://www.apple.com/pr/library/2012/03/05Apples-App-Store-Downloads-Top-25-Billion.html>

²⁵ Nelson & Winter, 371

become more important, while national sovereignty will become less important. By taking advantage of the increasing importance of economic might over military might, nations can stand to gain far more in the long term.

With regard to the big global issues that the planetary human superorganism faces, there is clearly a need for some more serious work on the architecture of intergovernmental collaboration/global governance mechanisms. Morphing G7/G8 into G20 and thereby bringing important new players on board, as well as extending its mandate, looks promising in this regard. But beefed up, new, global institutions to deal with global public good provision such as a clean environment/robust ecosystem; a stable financial system; a fairer, more just society; and global security seem to be very urgently needed.

Fostering research and development -- knowledge creation, not merely synthesis -- will be key because in the KBE, knowledge is the driver of growth, innovation and evolution. "The importance of the stakes, the diversity of industrial situations, and the complexity of the technical issues all combine to suggest that, in the future as in the past, policy interventions relating to R&D will be numerous, diverse, and situation-specific."²⁶ It is vital to strike a balance between fostering this sort of behaviour without controlling or over-regulating industries that perform knowledge creation. "The attempt to optimise and accordingly to control technological advance will, according to the evolutionary theory..... lead not to efficiency but to inefficiency."²⁷ Crowd-sourcing is the ultimate in non-control. The richness of the evolutionary mechanisms that are embodied by promoting the creative destruction of giving the entire internet the ability to fund a project via Kickstarter, Kiva.org, Pozible or any of the plethora of other options results in innovation writ large.

Kaku succinctly crystallises what the inspiration driving public policy ought to be in the KBE era: "to reach higher levels of science and technology, you need creativity, imagination and innovation."²⁸ Pairing this with the ideas of Nelson & Winter results in a policy template that must foster education and creativity; ICTs are a key mechanism of

²⁶ Nelson & Winter, 413

²⁷ Nelson & Winter, 395

²⁸ Kaku, 301

both as they enable access to learning and collaboration, so investment in ICT and internet infrastructure will yield multiple and increasing returns.

Another key area of policy design lies in the increasingly lowered barriers to travel and business that the KBE era has heralded: migration. The potential of a nations' diaspora to have a positive economic influence is slowly being realised²⁹ with research and policy being driven by the World Bank and International Monetary Fund. Encouraging remittances by removing any barriers to payments ought to be a priority, as well as public investment in internet infrastructure and ICTs to facilitate better communication between migrants and those left behind and to allow easier access to remitted funds by origin country family members. Surprisingly, there has been no policy implementation by high income nations,³⁰ other than Ireland, to engage with their diaspora or encourage economic interaction between migrants and origin country citizens. Encouraging extranational links will break down barriers and strengthen connections between people across the world. This will promote the evolutionary processes discussed above and help to further our progress toward a global civilisation.

The best thing about policies geared toward such function is that they not only benefit migrants and diaspora networks, but strengthen the links between the networks that migrants form in their destination countries with their legacy networks from home countries. By encouraging pan-global networks, systems of these networks with evolutionary characteristics emerge -- with all the benefits to growth, dynamism and knowledge creation and sharing that such a nexus creates.

Striding toward a becoming a Type I, global, human superorganism will be realised by concentrating efforts on these key areas: building infrastructure to encourage communication and collaboration; encouraging education, R&D and innovation; and building strong links between diasporas and home countries, as well as between migrants and non-migrants.

²⁹ Hugo et al, 72

³⁰ Hugo et al, 72

Conclusion

*The generation now alive is the most important to walk the earth, for we will determine if we will reach a Type I civilisation or fall into the abyss.*³¹

We have already made the first few steps toward a global civilisation. The evolution toward ubiquity of the Internet and simultaneous rise of the KBE has been and will continue to be a driving force of this convergence.

In the global KBE era, evolutionary processes are the drivers of growth and innovation catalysed by the development and social penetration of the Internet and ICTs. Foster and Metcalfe's observation that "the distinctive, complex, evolutionary property of economic and social systems is that they are knowledge based and that the primary interactions between them are exchanges of information"³² is becoming a modern aphorism. Online platforms such as Kickstarter, Kiva.org and Pozible are new drivers of microeconomic growth. The advancement of the KBE and innovation in ICTs is driving global integration through networks of knowledge, crowd-sourcing ideas and funding and increases in labour migration; as more and more of humanity access the internet, mobile phones, satellite news and education the social networks that form humanity become increasingly complex. These processes have already provided the essential building blocks for moving humanity toward planetary civilisation. As they become more entrenched, our evolution will accelerate.

The evolutionary perspective confirms both that the planetary human superorganism is a new phase of human and planetary evolution, and as such, provides some credence to the idea that it will pass its first test.

³¹ Kaku, 323

³² Foster & Metcalfe, 4

Bibliography

Peter M. Allen, "Knowledge, ignorance and the evolution of complex systems" in Foster & Metcalfe eds *Frontiers of Evolutionary Economics*, Edward Elgar, Cheltenham, 2001.

W. B. Arthur, Steven Durlauf, David Lane (eds), *The Economy as an Evolving Complex System II*, Perseus Books, Reading, 1997.

Tim Flannery, *Here on Earth-An Argument for Hope*, Text Publishing, Melbourne, 2010.

John Foster & J. Stanley Metcalfe, "Modern evolutionary economic perspectives: an overview" in Foster & Metcalfe eds *Frontiers of Evolutionary Economics*, Edward Elgar, Cheltenham, 2001.

Graeme Hugo, Kevin R. Harris and Dianne M. Rudd, *Australia's Diaspora : Its Size, Nature and Policy Implications*, Ceda Information Paper ; No. 80. (Melbourne, Vic.: Committee for Economic Development of Australia, 2003).

Michio Kaku, *Physics of the Future*, Doubleday, New York, 2011.

Robert E. B. Lucas, *International Migration and Economic Development : Lessons from Low-Income Countries* (Cheltenham, U.K. Northampton, Mass.: Edward Elgar Pub., 2005).

Richard Nelson & Sidney Winter, *An Evolutionary Theory of Economic Change*, Belknap Press, Cambridge, 1982.

OECD, *The Knowledge-Based Economy*, Paris, 1996.

David Rooney, Greg Hearn, Thomas Mandeville and Richard Joseph, *Public policy in Knowledge-Based Economies- Foundations and Frameworks*, Edward Elgar, Cheltenham, 2003.

H.A. Simon, "The architecture of complexity" (1962) 106(6) *Proceedings of the American Philosophical Society* 467–482.

United Nations, *International Migration Report 2006: A Global Assessment* (New York: The Department of Economic and Social Affairs, Population Division, UN, 2009a).

United Nations, *International Migration Report 2009: Wall Chart* (New York: The Department of Economic and Social Affairs, Population Division, UN, 2009b).