

FORUM REPORT 008 Zero-growth Economy

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Exploring Alternative Economic Futures: A Zero-growth Economy

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Margaret Thatcher famously defended her policies with the words "there is no alternative." As a phrase born during a particularly triumphalist moment in neoliberal economic expansion, this Thatcherism aptly describes status quo thinking about economic growth: it can be immensely difficult to imagine alternative economic futures, in which growth might take a back seat to other concerns.

However, the notion that there is "no alternative" to growth is simply unacceptable from the perspective of ecological economics. Our ever-growing impact on the Earth both in terms of the resources required for growth, and the waste products that it produces—obliges us to consider alternative stories.

In the status quo story, progress and economic growth are synonymous. We expect governments to lead the way and give us economic growth. If they fail to deliver, we elect somebody else. However, this focus on growth as a primary policy objective is relatively new.

Consider the OECD. Established in 1960, the first Article of its founding Convention states the organization's aim to "promote policies designed to achieve the highest sustainable economic growth and employment..." The OECD continues to be a leading voice for growth. However, there was only a small amount of work on the subject prior to its institutionalization as a primary policy goal.

In the lead-up to the Global Financial Crisis, conventional wisdom held that, since 1985, we had entered an age of great moderation in macroeconomic volatility, mastering wild fluctuations and securing steady, predictable growth rates. It is no wonder that the Queen of England, upon visiting the London School of Economics, demanded why the world's leading economists had failed to see the crisis coming.

The answer, at least in part, is that prediction depends on what one looks at—and mainstream economists were not looking at finance and the explosive growth in debt.

This catastrophic failure in mainstream analysis should give us pause. In most of the world's wealthy countries—including Canada and Japan—the rate of economic growth is falling. Demographic factors and a slower pace of production gains from technological advances suggest that this will be the new normal. There are a number of compelling reasons to question whether the endless pursuit of growth can or even should be sustained.

Ecological economists start with a different image of what an economy is from the mainstream. In the mainstream understanding of the economic cycle, firms provide goods and services to households, which provide labour and capital to firms. Ecological economists put this economy in the context of the environment that surrounds it. The economy runs on a constant inflow of materials and energy, whose wastes are then discharged—in one form or another—into the environment. Ecological economics thus illuminates two key limits to growth that are largely invisible to the mainstream: growth can be constrained due to limits in the supply of energy and resources, as well as due to costs associated with growth's waste outflows. In turn, the latter can also feed back to reduce the amount of resources available.

We can use this framework to read the history of economic

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growth in more detail. From 1900–1950, there was a relatively gentle rise in global materials extraction. Since the second half of the 20th century, however, there has been an unprecedented increase in the material throughput (resources + energy in; waste out) of the economy. To truly understand economic growth, we must thus ask, "What does it take to produce a given amount of economic activity, and what are the costs associated with the waste?"







Once we ask this question, it is easy to see that our current growth trajectory cannot be sustained. Any number of metrics—from the rising concentration of greenhouse gases in the atmosphere, to the percentage of land mammals by mass that exist solely for human consumption—show us that we urgently need alternatives to the growth-for-growth's sake paradigm. Such alternatives need to be environmentally benign, economically robust, and politically feasible.



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In 2008, I wrote *Managing Without Growth: Slower by Design, Not Disaster* in an attempt to lay the groundwork for robust thinking about such alternatives. I argued that growth is simply not sustainable in the long term due the impossibility of endlessly increasing the required energy and resource inputs, the costs associated with overloading waste sinks, and the impacts this has on the services that we expect to receive from the natural world. The book also included a literature review on the relationship between economic growth and happiness, and found that, beyond a certain level of income—people do not get any happier as they get richer. Finally, I argued that growth has actually been disappointing, and has failed to live up to the claims and objectives of the people who have promoted it, for example in terms of its promised ability to reduce poverty and unemployment.

What might a zero-growth economy look like? There are lots of things that can grow in a zero-growth economy. For example, well-being, literacy, life expectancy, fairness, security, conviviality, community-mindedness, environmental quality, and the resource efficient sectors of the economy can all grow, in principle. However, the material and energy throughput of the economy must stabilize and even go down. Human population must likewise stabilize or even go down. The stock of physical capital and artifacts—infrastructure and all the things that we build—requires a huge amount of resources just to maintain, let alone grow, and thus may also need to stabilize or even contract.

But what about gross domestic product (GDP)? GDP is the standard measure of the output of an economy. It is a value measure (price x quantity), thus many economists including those in the "green growth" movement—see no reason why it cannot keep rising forever. However, the debate about growth is in fact largely a debate about GDP; when politicians promise growth, it is growth in GDP that they are talking about. If we are to imagine alternatives to mainstream notions of progress, we need new meanings and measures of success.

A viable zero-growth economy will also need a financial system that serves the real economy. This requires the development of a new model of Ecological Macroeconomics that can keep three key elements in play at the same time: (1) the real economy (goods, services, labour, capital, and land); (2) Ecological Economics, which puts the real economy in the context of the natural world; and (3) Modern Money Theory, which looks at how the real economy functions in relation to the financial system. Changes in any one of these areas will reverberate through the other two; thus the holistic perspective of Ecological Macroeconomics is necessary in order to understand the entire system.

Such a holistic understanding is especially important in order to grapple with questions of ownership and inequality. Thomas Piketty has argued that inequality rises as a result of slower growth; thus if we are going to have highly mechanized (capital-intensive) but constrained-growth societies, we must think critically and creatively about ownership if we are to avoid Piketty's result. Interventions such as a guaranteed basic income may help in this regard.

We must also consider the complex picture of the relationship between credit and growth. Since most money is created when banks make loans, there is a widespread belief that a debt-based lending system requires growth in order to pay for interest. However, modeling from the perspective of Ecological Macroeconomics suggests that this is not the case. Instead, a zero-growth economy can withstand shocks and random fluctuations and find its way back to its steady-state without putting the financial system into a tailspin. Longterm dynamic stability is possible .

There is a third narrative competing for attention alongside the status quo and the zero-growth scenarios. The "Green Growth" story promises the best of everything, taking care of the environment while producing more output. Politically, this is very attractive, as it allows leaders to appear to be saying and doing the right things, without fundamentally questioning the primacy of GDP and growth in policymaking. In the long run, however, the "Green Growth" narrative fails to address the fundamental challenge of material throughput. While efficiency gains are important, physics tells us that perfect efficiency is impossible; moreover, even modest growth rates will quickly swallow up any ecological benefits associated with more efficient resource use. Consider the case of greenhouse gas emissions: The faster the economy grows, the faster GHG emissions per dollar of GDP must be decreased annually in order to achieve and maintain reduction targets. If these efficiency gains (reductions in emissions per dollar of GDP) fail to keep up with growth, total emissions will rise even as the emissions intensity falls.

While green growth strategies may indeed be essential in transition, they do not offer a fundamental solution to the failure of growth to deliver on its past promises, nor to the impossibility of forever increasing the material throughput of an economy on a finite planet. Instead, we need to make a choice between traditionally conceived economic growth, and sustainable prosperity. The growing revolt against orthodox mainstream economists—especially among economics students—suggests that the young will lead this choice.

As we try to imagine alternative economic futures, a core priority will be trying to determine whether—and how—our institutions can best adapt to a zero-growth world.

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The first commenter asked about alternatives to GDP as a measure of progress. Professor Victor responded by pointing out that even though GDP was acknowledged to be a poor measure of well being when it got its start in the 1930s, economists and politicians began to see GDP growth as an end in itself anyway, especially during the Cold War. The danger is that if increasing GDP is a key policy objective, then policies are judged by the extent to which they increase GDP. However, while GDP is useful for measuring the level of activity in an economy, it does not tell us whether these activities are good or not. To take one example, no one goes to the symphony because it contributes to GDP. The problem is that, while potential alternatives exist (e.g. the Genuine Progress Indicator, the Ecological Footprint, the Human Development Index, etc.), neither the OECD nor any individual government is prepared to embrace one. There are also huge vested interests in favour of the GDP-oriented status quo.

The next question was about the role of capital mobility in the transition to a no-growth economy. To what extent might the risk of capital flight impose a policy constraint for zero-growth advocates? Professor Victor suggested that there will likely need to be a reintroduction of capital constraints of some sort, but that this is not likely to be carried out by one country acting alone, especially since the conversation around limits and alternatives to growth is happening in many places. It is also worth considering that capital movement might not be all bad in this context, since capital could move into developing economies where it is most needed. The real danger is rapid capital flight, not capital movement.

The next commenter asked whether negative-growth economies might offer even more advantages than zero-growth economies, at least theoretically. Professor Victor responded that there are things that should grow and things that should not. The goal of *Managing Without Growth* was to undermine GDP growth as a policy priority in and of itself rather than to advocate zero-growth per se. If we can show that we can do well without growth, we can argue that useful and necessary policies that might hurt growth (such as carbon taxes) should be implemented anyway. Thus whether negative growth would be better than zero-growth is in a sense the wrong question, because it is still tied to GDP. Instead, we need to ask how we can more holistically measure the impact of policy on well-being. That said, negative growth might be useful in certain places in transition.

The next question was whether individual countries could make moves towards zero growth without their major trading partners doing the same. Professor Victor responded that the more likely scenario is that many countries will respond similarly to common stresses at the same time. This could occur as part of an international plan, but could also arise simply as a result of like minds adopting similar policies in the face of common challenges and emergent thinking about the limits of growth-for-growth's sake.

Another commenter asked for Professor Victor's thoughts on the "Gross National Happiness" index promoted by Bhutan. Prof. Victor replied that the term was coined before the methodology for measuring it was developed. Without a procedure to define what to measure—and how—"Gross National Happiness" is little more than a slogan. That said, it is important and significant that a government took this step.

A follow-up question asked how zero-growth is applicable to emerging economies, where growth seems desperately needed. Professor Victor responded by pointing out that, rich countries now set the standard for the good life and poor countries can hardly be blamed for aspiring to meet the definition that they have set. It would be very useful for rich countries to re-define the good life. Our example could allow for different policy tools and advice to be offered.

The next question asked whether prosperity and well-being are really measureable in a cross-cultural way. Professor Victor responded by asserting that well-being is culturally defined—there are even different definitions within countries. As long as communities have definitions that work for them, then policies to promote well-being will seem sensible. It is also worth remembering that GDP itself is value-laden. A more diverse set of measures would be very healthy.

Next, Professor Victor was asked about the key drivers of "green investment" in an alternative economic model. He responded by pointing out that some green investment takes place because it is financially attractive. While these opportunities have yet to be fully internalized by the private sector, information initiatives could bear fruit. However, green investment with uncompetitive financial returns requires regulation, direct public investment, or both.

Another commenter pointed out that discussion of "environmental impact" almost always focuses on land-based resources to the neglect of oceans. Professor Victor replied that there has not been a single article on the costs of economic growth published in the *American Economic Review* in over 100 years. Economists pay little attention to these questions in general, let alone to where they happen. Accordingly, mainstream economists are not well positioned to talk about environmental issues.

Finally, Professor Victor was asked to comment on the EU's "Tobin Tax." The commenter pointed out that even this modest attempt at reform has struggled to find success. This seems to be a case where the ideas of ecological economics come into conflict with politics and international relations. Prof. Victor agreed that this case shows that it is extraordinarily difficult to bring these changes into play in the context of a financial system that is characterized by such strong vested interests and motivated reasoning. Nonetheless, we must face up to the costs associated with growth, the failure of growth to deliver on its promises, and the dangerous blind spots in mainstream economics.



Preparing for a Zero-growth Economy

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Today, there are signs that Japan is departing from the age of growth and moving towards a zero-growth economy. However, the path to realize a zero-growth economy is long and challenging. It will probably take a considerable length of time—it could be 200 to 300 years before we achieve real sustainability for human civilization. To decide on a concrete path to a zero-growth economy, we also have to discuss the framework of social systems and values that could be applied to make the 22^{nd} and 23^{rd} centuries sustainable. The process of discussing this framework and making concrete efforts to implement it is the "quiet revolution" that will help ease the transition to zero growth.

To usher in this quiet revolution, we first need to appropriately grasp the present situation that human beings find themselves in. The human population has been growing exponentially through three key stages. Exponential growth of the human population began 100,000 years ago, albeit at a slow pace. However, the pace of growth increased 10,000 years ago, and increased again even more substantially 300 years ago. This type of sustained and accelerating exponential growth is not sustainable and inevitably ends at some point. In fact, the faster the growth rate increases, the sooner exponential growth ends.

These changes in the pace of human population growth corresponded with changes in lifestyle and development patterns. The first lifestyle revolution took place 100,000 years ago, after humans had acquired large brains and language. These developments gave them advantages in hunting and gathering, which led to population growth. Nonetheless, human life—and the hunter-gatherer lifestyle—remained embedded in a natural cycle of material and energy. Although humans left Africa and migrated across the world, they still faced limitations, in particular with regard to the depletion of the wild animals that they hunted. Human populations might have soon stopped growing due to food shortages and arrived at a period of zero growth. However, something miraculous happened.

The last glacial period came to an end about 10,000 years ago and a period of warm and stable climatic conditions began. Taking advantage of this stable, friendly climate, people invented agriculture and began settling down in more permanent communities. Agriculture and grain storage eliminated a major obstacle to growth, greatly accelerating the exponential growth rate of the global population. This led to significant changes in people's lifestyle, including the emergence of new skills and trades, a greater division of labour, and more significant social stratification. As trade flourished and specialization increased, it was no longer necessary for every member of a community to be chiefly concerned with food provision and survival. People who built cities and offered new goods and services began living in their own independent spheres of life, surrounded by human artifacts, rather than being as fully and explicitly embedded in the natural material and energy cycle as their ancestors had been. In short, with the dawn of agricultural societies, human civilization became both abstracted and insulated from the natural world.

Agriculture, the main economic activity at the time, is an artificial operation in which human beings alter the natural world. However, human consumption grew faster than



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the rate at which the natural capital on which agriculture depends could restore itself. Thus, exponential population growth was not sustainable with this lifestyle either. Human beings still faced limitations, such as the depletion of forest resources (used as fuel and for building materials) and declining crop production due to the impoverishment of the soil.

The modern scientific and industrial revolution brought about the third major lifestyle shift about 300 years ago. Firewood was replaced by fossil fuel and reinforced concrete began to be used as a building material, which emancipated people from anxiety about the depletion of forest resources. The chemical industry produced chemical fertilizers, which resolved problems with soil nutrients. Medical advances lowered mortality rates and increased life expectancy. Together, these changes removed many of the limitations that people had faced for centuries, unleashing a population explosion and fostering the exponential growth that has continued accelerating up until today.



After the industrial revolution, the world's population and total energy consumption per capita increased ten-fold. With this increase, the flow of material and energy associated with the industrial cycle and human activities increased by a hundred times. The natural cycle of material and energy cannot sustain this level of consumption. The industrial cycle has been largely based on underground resources such as fossil fuels and nuclear fuels. The cycles associated with these resources, however, take place over time frames much longer than those contained by human history. Furthermore, in addition to the industrial cycle, human beings brought forth an independent financial cycle that is also built around exponential growth. The financial cycle has been expanding and today its material and energy throughput has grown to ten times that of the industrial cycle.

This enormous flow of materials and energy has led to a variety of problems, including resource depletion, global warming, and the challenge of storing or reprocessing spent nuclear fuel. Obviously humans need a fourth lifestyle revolution. However, this time it must be "a quiet revolution" that ushers in an era of true sustainability.

First, we need to create a sustainable cycle of materials and energy. Since the natural cycle of materials and energy is not able to support the modern industrial or financial cycles indefinitely, we need to use science and technology to create a new cycle of artificial materials and energy. Second, we need to keep the flows associated with the industrial cycle and the financial cycle on a similar scale to that of the natural material and energy cycle. Growth is unsustainable in the long-term because of the imbalance between the material and energy flows that are required for industry, finance, and other human activities on the one hand, and the natural cycles that support them on the other. Third, we need to eliminate growth as a guiding concept and actively pursue a zero-growth society, since exponential growth in population-and in the energy and materials required to support it—is by no means sustainable.

How should we prepare to create a zero-growth society? Let us look at the material and energy cycle first. An artifi-



cial regeneration system based on science and technology is needed here. Renewable energy holds promise for the future despite its low energy density. The production of fuel from algae is also a promising technology. Algae oil can have the same energy density as some fossil fuels and can be easily managed. We can also expect that some technological innovations will promote a more efficient and sustainable material cycle. For example, while there are growing concerns about the depletion of phosphorus resources, which are essential to agriculture, there has been promising research conducted on recycling phosphorus resources through the use of certain microorganisms. New techniques to use heavy ion irradiation to breed halotolerant plants, which can withstand conditions of high salinity, have been also developed. These and other technological innovations-if successful-should contribute greatly to solving humanity's food security challenges.

With regards to the industrial cycle and the financial cycle, it should be remembered that economics itself is based on a cycle of materials and energy. We have precedents for this type of analysis. In the 18th century, for example, the French economist François Quesnay described economics as being



based on agricultural productivity. Similarly, the Nobel-prize winning chemist Frederick Soddy developed a model of economics based on thermodynamics.

However, to achieve sustainable zero-growth industrial and financial cycles, we should go even further. In addition to being based on a proper understanding of the material and energy cycles, economics should be based on ethics and altruism. Under modern-day capitalism, people are expected to behave selfishly to maximize their interests. However, in order to maximize the interests of future generations for the sake of the sustainability of human civilization, we have to behave altruistically instead. Institutionalizing this imperative in our economic relations may look difficult, but it is not impossible.

One of the ways to create an economy and a social system based on ethics is to make commitments and make them habits. According to cognitive science, habituation is a mechanism through which ethics and values can be implanted in the brain. The commitment to a sustainable human civilization should include the function of sharing the costs associated with environmental conservation and welfare. These commitments will have to be made at the global and the local level.

Globally, we should establish rules to impose economic costs on countries with poor environmental and welfare policies. However, it will be difficult and take time to reach international agreement on such rules.

At the local level, it is important to build a mature social design. To address the challenges associated with Japan's low birth rate and aging population, for example, we should build a multi-concentration compact city where we can make full use of geographical information systems, eliminate waste, and make social systems, such as education, welfare, and healthcare, function more efficiently. This will enable us to reduce social security payments while maintaining service quality, and to remedy the problems that Japan is now facing, such as those associated with productivity, social security reform, and fiscal reconstruction.

As I have mentioned, it takes time to reach agreement on global rules, but this could be to Japan's advantage if the country spends time developing sustainable local designs while seeking international consensus. Due to worsening environmental problems, the world's countries are bound to reach consensus on environmentally sound rules eventually. With early local efforts, Japan can accomplish mature social designs by the time that global rules are agreed upon, and the country will need only a minimum effort to adjust. Early action, in other words, will give Japan more influence in rule and standard setting, lower inevitable transition costs, and help the country to gain early-adopter advantages.

We have seen what should be done to prepare for a zerogrowth society in terms of the three cycles of material and energy, industry, and finance. We also need to discuss how *people* should prepare to create and live in such a society. People should put more emphasis on liberal arts. By doing so, people would develop a longer-term perspective, which would help the political, administrative, and business worlds to internalize a longer-term focus as well. Additionally, we need good generalists to solve the world's problems, since every specialist field has its own inner logic and blind spots. A broad, liberal education can help to produce these generalists.

The time is ripe to prepare for a zero-growth future. Japan should take the lead in the global transition by building mature social designs that allow it to survive and prosper through the transition period and beyond. The "quiet revolution" is about to begin.

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The first commenter asked about the role that technology plays in changing society's incentive structure with regard to growth. Dr. Kishida responded that it is a complicated question. On the one hand, some people suggest that science and technology can have counterproductive effects, by obscuring the costs of our lifestyle and the need to move past endless growth. On the other hand, some people see science and technology as offering the solution to our socioecological troubles. However, Dr. Kishida pointed out that science and technology alone cannot solve the problems associated with growth, such as global warming, nor can science and technology alone move us to a zero-growth society. Moreover, there is always a danger that science and technology will be misused. However, science and technology can play a role, not only in providing for people's needs and desires, but also-as Steve Jobs said-in helping people to discover what kinds of solutions and answers there might be. So science and technology can help us to discover a wider range of lifestyle possibilities-but we still need to have incentives and values in place that help us to make the sustainable choices.

The next question was about what local communities are doing, and how rural and remote regions are being affected by the changes that Dr. Kishida described. Dr. Kishida responded by suggesting that local communities and rural areas in Japan are in many ways ahead of the urban areas, in particular because depopulation is already a very tangible reality. They are not in the planning or imagining stage—they are actually in the implementation stage where they have to make changes to their lifestyles. The aging, shrinking populations in rural communities are thus curious, eager, and above all required to deal with questions about growth and sustainability, and to learn about global and long-term perspectives in order to be actively engaged in developing sustainable societal designs.

The next question was about access to science and technology in general, and intellectual property rights (IPRs) in particular. How can we counteract the increasing privatization and ownership of science and technology, which can

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limit sustainable development in many regions of the world? Dr. Kishida responded that IPRs are indeed important. In general, they should be protected. However, there are undoubtedly real concerns about democratic access. Uneven access to IPRs can result in uneven growth and development outcomes. IPR governance thus requires a balance between incentivizing and rewarding research and discovery on the one hand, and disseminating knowledge and benefits on the other.

The next participant pointed out that calls for greater compassion and empathy are not new, and that Adam Smith and others talked about the difficulties associated with asking people to care about distant times and abstract communities. What will be required to catalyze moral change? Do we need a crisis or catastrophe? Dr. Kishida responded by suggesting that the moral revolution will require a process of habituation. Rule changes can result in internalized value changes over time. For example, many of our contemporary ideas about justice, fairness, and what is "right" and "wrong" are relatively new-they had to evolve over time and be institutionalized in rules and laws before becoming so fully internalized that we take many of them for granted today. So it is not so much a question of spiritual change, but rather of the ways in which we become used to ideas and ways of being that we were not accustomed to before. The historical record thus provides ample reason to be hopeful for the possibility of new thinking and behaviour in our institutions and practices.

The next question was about the potential for Japanese leadership in the transition to sustainable, zero-growth societies. Some institutions, such as the Breakthrough Institute, have advocated using technology to further abstract humanity from nature. What prospect is there for Japan to serve as a counterexample to this type of vision, because of the country's demographic story and head-start, its recognized leadership in technology, its wealth, its experience as an island society, and so on? Have these experiences fostered a greater appreciation of limits, and can Japan therefore play a global leadership role? Dr. Kishida responded by agreeing that Japan has enormous potential to be a good leader, and by suggesting that the real question is which actors in Japan will initiate the changes necessary for it to play this leadership role. At the national government level, for example, there has not been much interest; there is too much political investment in the status quo of endless growth. The greatest hope may be at the local government level, where communities and their leaders are dealing with zero-growth type changes first, most intensely, and for survival. Local-level approaches and initiatives could become models for Japan, and thereby for the world. However, the central government does have a lot of authority over many issues that affect the local level, so they ultimately need to be brought into the conversation.

The next question was about the relevance of Japan's Edo Period seclusion to conversations about these zero-growth issues. Dr. Kishida suggested that the Edo Period is very relevant and, in many ways, provides a historical case study of what a successful zero-growth society might look like. The population was pretty much flat, and there were significant efforts to remediate the environment, for example by tree planting. In terms of the matter and energy cycle, there were also many efforts made to develop and commercialize new and recycled sources of fuel, fertilizer, and other products. There are important caveats, however. For example, the population was only about one third of what it is today, and there were occasional famines, which reduced its size even further. Nonetheless, the period is fascinating case study.

The next commenter pointed out that if catastrophe is one way to catalyze change, reframing is another. One historical example is British abolitionism, in which activists successfully reframed slaveholders' thinking around slaves, such that they stopped thinking of people as property, and came to see slaveholding as a liability for getting into Heaven. What kind of reframing might we need to get to a zero-growth society, and what role might the scientific community have to play? Dr. Kishida responded by pointing out that in Japan, there is an intrinsic sense of aversion towards something that seems wasteful or mottainai. One role that scientists might play is to educate people about what is actually mottainai, what is harming the environment, and what contradictory views people might hold about what is wasteful and what is not. If we can help people to acknowledge the inevitability of zero-growth, then much of today's consumption might come to be seen as recklessly mottainai.

Turning to fairness and equity, the next participant pointed out that it is not easy even for a wealthy country like Japan to have low or zero growth. On the other hand, people in developing countries really want and need growth. How can we decide which countries and regions get to grow, and by how much? Dr. Kishida responded by acknowledging that developing countries' challenges are in many ways more severe, since growth is needed to lift people out of poverty. Some countries, like China, will reach zero-growth out of inevitability; that country is very aware of the negative repercussions of their current growth model. However, Dr. Kishida emphasized that his current work is most concerned with developed countries like the US who may be least likely to change and most likely to postpone or block action by others.

The next question was about the international politics of norm and rule making. In other issue-areas, for example around maritime resource management, Japan's norm and rule making ability has been constrained by that of other countries. In particular, the United States and China have tended to be rather ambivalent about Japanese initiative in international rule and norm making. History and identitybased issues have tended to overshadow rational, sciencebased resource management. Given these trends, how much freedom is Japan likely to have to set norms and rules with regard to the transition to zero-growth? Dr. Kishida responded by acknowledging that it will be very difficult for Japan to take initiative if major countries like China or the United States are opposed. However, Japan can develop models, tools, and expertise that it can offer to other countries when they are inevitably needed and desired. International negotiations are always challenging. However, by having models, tools, and expertise ready to go, Japan can increase its influence and negotiating power.

The final question was addressed to both Dr. Kishida and Dr. Victor, and asked what this conversation around zerogrowth means for the day-to-day operations of businesses and business people.

Dr. Victor responded by suggesting that one aspect of the conversation that needs to be sorted out is delineating what

individuals and firms should do, and what needs to be decided as a matter of public policy. If there were public policy providing effective incentives for aggregate reductions in material and energy use, for example, it wouldn't matter what particular firms and consumers did, because they would be operating under common rules and frameworks. That said, there are lots of things that firms can do, and each will need to find their own place. Some companies, for example, have moved away from quarterly reporting in favour of annual reporting, in order to facilitate longer-term thinking.

Dr. Kishida added that firm-level growth and its pursuit do not necessarily contradict zero-growth at the macro-level. In this sense, the most important task is to develop a common set of rules, norms, and values that facilitate the macrolevel changes that we require.

Reexamining Japan in Global Context Zero-growth Economy

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