RIETI Highlight

2015 SPECIAL EDITION 53

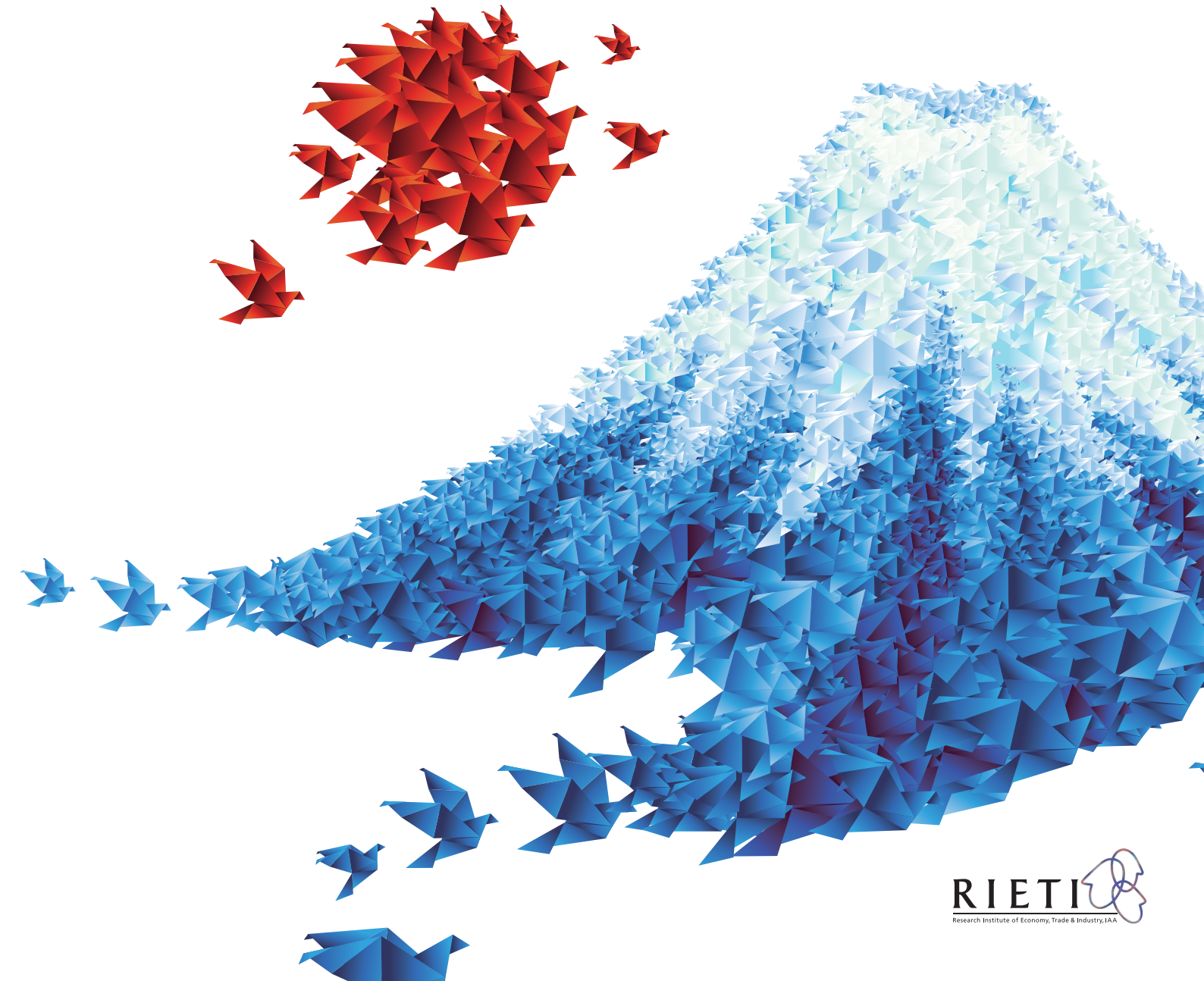
RIETI World KLEMS Symposium

Growth Strategy after the World Financial Crisis

RIETI Special Seminar

Creating Capabilities

James J. Heckman



RIETI
Research Institute of Economy, Trade & Industry, IAA

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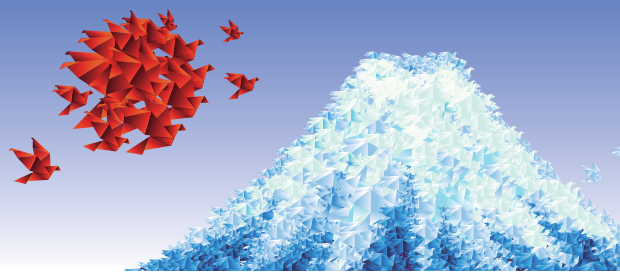

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What is RIETI Highlight?

RIETI's public relations magazine "Highlight" is published quarterly, featuring RIETI's most recent activities with the objective of disseminating research outcomes to a wider audience. This special edition has been edited in English in order to reach our international readers.

About RIETI

The Research Institute of Economy, Trade and Industry (RIETI), an incorporated administrative agency, was founded in April 2001 as a government-affiliated policy research institute with a certain degree of independence from the administrative authorities. RIETI endeavors to analyze and research various policy issues from a medium- to long-term perspective, thereby accumulating the necessary knowledge to formulate and recommend policy options.

Message from the Chairman

Atsushi Nakajima has served as the chairman of RIETI since 2011. Prior to his present position, he worked at Mizuho Research Institute, Ltd. as senior managing executive officer and chief economist. He also worked at Industrial Bank of Japan, Ltd. (IBJ), and took up various positions including the president of Banque IBJ (France) S.A. His works include: *Nihonkeizai: Saikyo no Seicho Senryaku* [Japanese Economy: The Most Effective Growth Strategy], Discover 21 Inc., 2013; *Nihon no Toppako* [Japan's Breakthrough], Tokyo Keizai Inc., 2011; *Sekaikeizai: Rensasuru Kiki* [Global Economy: Chain-reaction Crisis], Toyo Keizai Inc., 2009; *Chugoku Jinmingen no Chosen* [Challenge of China's Yuan], Toyo Keizai Inc., 2004; *Nihon Keizai no Risuku Shinario* [Risk Scenarios for the Japanese Economy], Nihon Keizai Shimbun, Inc., 2004.

Amid the economic doldrums in Europe, the weak growth in China's economy, and the uncertain prospects for market expansion, the world economic growth is sluggish. Similarly, in Japan, consumption continues to ebb in the wake of the consumption tax hike, and the trade deficit remains high in the absence of export growth.

While economic conditions are expected to recover gradually both in Japan and abroad, the future economic expansion will depend not only on cyclical trends in major regions, but also increasingly on a multitude of structural factors, including the aging demographics, labor market structures affecting wages, patterns of trade and industry, and social security and public finance frameworks.

RIETI is a policy think tank established to pursue pieces of research that contribute to policy making, and is now in the process of accomplishing its goals in its third medium-term plan covering the period from fiscal year 2011 to fiscal year 2015. In anticipation of the complex array of factors driving the economic growth of Japan and that of the world, RIETI has been involved strenuously in pieces of research, symposiums, and other activities spanning a range of fields, such as corporate competitiveness, human capital, trade and currencies, and innovation, guided by emphasis on its three Priority Viewpoints: (i) incorporating growth of the world economy, (ii) developing new growth areas, and (iii) creating new economic and social system for sustainable growth.

In 2014, empirical studies by RIETI's research fellows produced findings on numerous issues, including the productivity of Japanese firms, women's participation in the workforce, domestic and international foreign exchange issues, and legal and economic issues concerning commerce. We also hosted international symposiums featuring leading researchers from Japan and abroad, such as the Third World KLEMS Conference.

Maintaining our focus on the three Priority Viewpoints in 2015, we intend to continue intensifying our basic analyses of industries and economies to help develop more appropriate economic systems and contribute to the development of policies to this end. We will also make greater efforts to step up our research and organization of symposiums and other events to address new domestic and international economic developments, and strengthen our partnerships with researchers and other research institutes within Japan and around the world.

The 2015 RIETI Highlight will present RIETI's research outputs on domestic and international economic issues in an even more accessible format than in the past. This special edition of the RIETI Highlight contains articles by RIETI fellows in addition to reports on symposiums and seminars held in 2014, and it is designed to build greater awareness of our research activities and findings.

With the domestic and global economies at a turning point and Japan now entering a crucial phase in its economic revitalization, RIETI moves forward to commit further to broadening the scope of its research and bringing its findings to a broader audience through the RIETI Highlight.

中島厚志

Atsushi Nakajima
Chairman

RIETI's Events

Disseminating research findings and enhancing research collaboration

The role of policy research institutes does not end with the completion of research. They have an obligation to stimulate policy debates by broadly disseminating the results of their research. As a policy research institute, RIETI therefore organizes policy symposiums and various seminars as a means to activate policy debate and to disseminate and refine research results by putting forward the findings of each research project and eliciting public opinions from various points of view. With symposiums and seminars, RIETI is also seeking collaboration with overseas research institutes, experts and policymakers.

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BBL Seminars

RIETI's periodic Brown Bag Lunch (BBL) seminars, which are held during lunch hours, welcome an array of guest experts to share their research and views. The sessions encourage lively discussion that contributes to dynamic policy-related debate, transcending industry-government-academia boundaries.

Globalization and Inequality

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RIETI World KLEMS Symposium

Growth Strategy after the World Financial Crisis

Productivity plays a significant role in promoting economic growth. Particularly for the Japan's economy, which is facing a rapidly aging population, productivity improvement is the most important economic policy issue. In this symposium, discussions on the theme of "Growth Strategy after the World Financial Crisis" were made from a broad perspective with scores of domestic and foreign economists. In the first session, Professor Dale W. Jorgenson of Harvard University discussed the World KLEMS Initiative, and RIETI President Masahisa Fujita addressed the evolving spatial economy of the Asia-Pacific and the growth strategy. The second half of the program was a panel discussion, in which leading economists from Japan, Asia, Europe, and the United States exchanged their views and ideas on sustainable productivity, structural change to enhance growth, risk factors for sustainable growth, and prospect for the global economy.

Keynote Speech 1

The World KLEMS Initiative

Dale W. Jorgenson

Samuel W. Morris University Professor, Harvard University

The World KLEMS Conference is a worldwide undertaking that was established in 2010. The idea of the initiative is to analyze productivity by comparing inputs of capital, labor, energy, materials, and services, and how they interact with the outputs of all of the commodities that constitute a modern economy to produce economic growth.

The Third World KLEMS Conference was organized around the idea of growth and stagnation. In exiting the financial crisis, the countries of the world are challenged by the slow pace of recovery. Currently, there is a very active debate taking place between proponents of the view that the world economy is fated for another long stagnation period, and proponents who feel that we will see a period of economic growth. Is the world economy fated for stagnation? Will we have slower growth? Or will the world economy accelerate as the focus shifts away from advanced countries toward emerging countries?

Today, we will turn to the practical issues of how economic policy should be focused in the aftermath of the financial crisis. This is particularly relevant in Japan, where we await the "third arrow" of Abenomics which will be Prime Minister Shinzo Abe's growth strategy. Examples of growth strategies elsewhere in the world include China 2030 and Europe 2020. The United States is unique in resisting the idea of a growth strategy; however, there is substantial relevant discussion to economic growth.

Growth strategy is something that has to be formulated at a fairly abstract level. We have to think about the objectives, the short run and the long run character of these objectives, how strategy might be implemented, and what policy tools we have. It is very clear that, in the long run, the issues in Japan are, first of all, how to deal with the impending decline of the labor force. Should there be relaxed rules about immigration? Should there be pro-natalist policies to encourage childbearing? There is also the view of expanding participation in the labor force, mainly by women, and relaxing age restrictions to enable people to work beyond the conventional ages of retirement. Many other countries are facing similar issues such as the demographic issues in Japan. In the short run, Prime Minister Abe announced his two objectives of ending deflation and arriving at a reasonable level of economic growth.

How do we proceed from the abstract to the real work of making policy? The prime minister has been making speeches about a growth strategy around the world and has announced the major elements. One is a thorough reform of the electric generation industry. This issue has been brought to the forefront of the agenda by the tsunami and nuclear accident. The short run dimension is how nuclear plants will be brought back into production and under what conditions and safety regulations. A longer run problem is the idea of having a unified electricity market instead of regional monopolies. A second example is reform of the agricultural sector. As Japan moves toward the Trans-Pacific Partnership (TPP), it will not only be free trade, but also implement measures to stimulate cross-border investment and result in greater participation in the global economy.

What these examples have in common is that they are identified with specific industries. All of the various elements discussed by Prime Minister Abe involve looking at industry level information and implementing policies that have an industry dimension to them. That requires a new system for accounting of economic data, which is where the World KLEMS Initiative comes in.

Understanding economic growth and the role of productivity is crucial for understanding the choices faced by policy makers. These policies have to be designed considering how the economy could be developed, and how inputs and outputs and productivity could facilitate a new structure of the economy that would produce higher growth and more satisfactory outcomes than that of the existing economy. Also, in dealing with issues such as free trade or the TPP, it is very important to understand international competitiveness. That requires new data, which are included in the KLEMS Initiative. Finally, such data can be integrated with demographic projections which differ drastically among different countries.

The World KLEMS Initiative was created with the intention of filling a gap in the world statistical system relevant to growth strategy. When people in Europe found that the data available to them were inadequate for analyzing the growth strategy that they were trying to follow, they organized a consortium led by Prof. Bart van Ark and involving Marcel Timmer and 18 research institutes around Europe to create this new database in 2008. There is now a Latin American version of KLEMS that involves four countries, and, in 2011, Asia KLEMS came into existence. All of these come together in the World KLEMS Initiative and provide essentially common methodologies based on national accounting, enabling people to share experiences, and start to contemplate on how to use data not only for growth strategies, but also for trade strategies and analysis of special problems such as intangible investments. All of these things are unified under this umbrella of the World KLEMS Initiative.

In the case of Europe, the purpose of this project was to answer the very simple question of how to get Europe back on track. The results identified Europe's knowledge economy as the cause of its distress, specifically under investment in human capital, information technology, and innovation. Those are the main sources of the economic growth slowdown, and the Europeans drew a very important implication, which is the establishment of a single market for services in Europe is crucial to removing the barriers to the development of a knowledge economy.

This successful example has very important lessons for Japan. Japan is one of the world's most successful investors in human capital, and the quality of the Japanese workforce is renowned around the world for its educational and training quality. However, Japan until very recently was considerably weak in terms of innovation, and while Japan has now emerged as one of the most innovative economies in the world, its weakness in information technology still remains. Its research findings are in *Productivity in Asia: Economic Growth and Competitiveness* (*1) published in 2007. Asian KLEMS and RIETI's role will continue to remain as a very potent resource looking to the future.

Japan has just finished a period of stagnation, and, in emerging from this period, monitoring progress as the growth strategy was first designed, and implementing this on an ongoing process will be crucial. To do this, KLEMS type datasets must be created within the national accounts. Japan is very well equipped to handle the data requirements for a growth strategy with the work that RIETI has already established, and the Japan Industrial Productivity (JIP) database (*2) will be a very potent resource for the analysis of growth policy and growth strategy both in and outside Japan.

Beyond the level of specific industries, there is the issue of product competition and factor competition. Product competition refers to competition in markets for services and goods, and a leading example is a deficiency of product market competition in industries that absorb an enormous amount of the Japanese national product—namely, trade and services. Specifically, wholesale and retail trade and services including finance. These have been weak industries in terms of international productivity standards for decades, and require attention at a more general level. They are far more demanding than dealing with the specifics of a particular industry, and Japan will have to confront these issues up front.

Factor markets include the Japanese labor market, and Japan has among the world's most highly talented and highly educated labor forces, including many very talented women. However, Japan lacks labor market institutions that make it possible to allocate this very valuable human resource in an efficient manner. This is something that will need to be addressed and obviously is a very important initiative that will be part of this implementation of KLEMS type ideas.

The original vision of the World KLEMS Initiative was to create datasets that would fill a very important gap in our statistical system, and these datasets supply information not just about aggregate demand, consumption, investment, government, but also about aggregate supply. Aggregate supply is not represented in the national accounts without changing the fundamental character of the way in which data is collected and analyzed, which is the purpose of the World KLEMS Initiative. This is directly relevant to the most important policy issues we confront which are designing growth strategies after the financial crisis. It is also very important to link these data on growth and productivity through purchasing power parities to the determinants of international competitiveness. Finally, as I have already discussed, once this growth and productivity dataset is created, it will be an important resource to assist in the design of growth strategies and enable the monitoring of progress of growth policies that are implemented as part of an overall strategy.

The whole idea of a growth strategy is a legitimate subject for policy and is something which is best addressed in the aftermath of a very serious disruption like the world financial crisis, as well as part of an overall strategy that combines the different elements within a consistent framework, which has been created as part of the World KLEMS Initiative.

*1: see http://www.rieti.go.jp/en/publications/summary/07110010.html
*2: see http://www.rieti.go.jp/en/database/JIP2013/index.html

Keynote Speech 2

Evolving Spatial Economy of Asia-Pacific and the Growth Strategy

Masahisa Fujita

President, RIETI

My area of specialty is spatial economics. From this perspective, and looking at Asia and Japan in particular, I will review the last decade including the spatial transformation of the global economy. Based on that and looking at Asia in the mid and long term basis, I will discuss what growth strategy Japan should undergo in order to continue long term economic growth.

While there are numerous activities and projects ongoing at RIETI, the organization shares common viewpoints in the face of rapid globalization, technological changes, and a declining and aging population. Under this environment, RIETI continues to pursue research by always keeping in mind the following three priority viewpoints of economic and industrial policies: 1) how to incorporate the growth of the world economy, 2) how to develop new growth areas, and 3) how to create new economic and social systems for sustainable growth. By looking at this, we wish to enhance the productivity and vitality of the Japanese economy and society. We are attempting to make a significant contribution to the third arrow of Abenomics, the growth strategy.

The global spatial economy has transformed considerably due to rapid progress in information technology and transportation technology and the promotion of free trade through diverse mechanisms. Transportation costs, broadly defined, have gone down across the world, resulting in globalization in production, trade, investment, and finance. While globalization has occurred, there has been simultaneous local agglomeration of production and consumption. These dense networks connecting local agglomerations of production, consumption, and research and development (R&D) are highly complex. Such a networked world is quite efficient and growth-enhancing under normal conditions, but is quite vulnerable to local disasters or shocks. In order for both Japan and the global economy to grow smoothly, efficiency must be enhanced while overcoming this vulnerability.

Broadly speaking, transportation and communication costs have gone down, and, as a result, world gross domestic product (GDP) and trade have seen unprecedented growth in the last half century. GDP has grown annually by approximately 3% on average since the 1970s. Trade has seen about 6% growth per annum. However, there is a consistent threat of global financial shocks that could spill across the world. Under those circumstances, what would the impact of decreasing transportation costs be on economic distribution across the world?

Spatial economic theory tells us that when transportation costs are extremely high, production has to be close to consumption, which would be highly distributed. However, if transportation costs become sufficiently low, it could result in a concentration in particular locations, and there will be a major agglomeration in selected locations.

In terms of GDP shares, how are the activities distributed globally? The North American Free Trade Agreement (NAFTA), European Union (EU), and East Asia combined began to see increased GDP shares beginning in 1980, and reached 80% in 1985. Starting in 2000, however, the combined percentage of GDP shares began to decline because of lowering transportation costs.

In East Asia, one major change which has had a large impact on Japan is the breakdown of GDP shares inside East Asia. In 1986, Japan accounted for 70% of the GDP share within East Asia, which lasted for approximately a decade. However, as transportation costs continued to decline and Japan did not adapt to the new global system, Japan's GDP share started to fall. As Japan's share declined, China started to grow, and, in 2009, Japan and China shared the same percentage of GDP in East Asia.

Asia is referred to as the world's factory, and, in terms of intermediate goods, there is a large level of movement within Asia. However, in terms of consumption goods, movement is very limited within Asia. This is reflected in the large imbalance between East Asia's exports to the United States, and U.S. exports to East Asia. Looking at the U.S. trade deficit with East Asia and China, this large trade imbalance was considered to be one of the main causes of the world financial crisis.

A huge amount of intermediate goods passes through the East Asia region. One example is the automotive industry, which is one of the largest industries in the world. When looking at the volume of automobile production by region, for many years, Europe was number one, followed by NAFTA, and then Japan + Korea. However, in 2013, China surpassed Europe, reflecting its massive and continually growing market. With 22.5 million cars manufactured in China, this accounts for 26% of total world production.

There is an advanced global supply chain supporting the automobile industry, which means that there is also a high level of vulnerability given its interconnected nature. Assembling one car requires 20,000 to 30,000 parts. These parts and components are manufactured in limited areas and then moved from production to delivery through a very dense network. This is one of the characteristics of the automobile industry, and it utilizes a just-in-time procurement system to minimize inventory. Under normal conditions, this is an extremely efficient process, however, if a local disaster occurs, this system can be very vulnerable. After the collapse of Lehman Brothers in 2008-2009, Japan saw a 50% reduction in total domestic production volume and a similar drop in production following the Great East Japan Earthquake. Similarly, automobile production suffered from the 2011 Thailand floods, resulting in the Association of Southeast Asian Nations (ASEAN) region suffering as a whole.

Disasters can also take the form of political conflicts or disputes. When we compare the impact of natural disasters and international conflicts in automobiles sales in China for Japanese automakers, we see that the Senkaku conflict had a very strong negative impact on sales in the country for an extended period of time. Such disputes can have repercussions worldwide and must be avoided. Global

cooperation is simply indispensable.

Next, about the future of Asia. According to forecasts by the Asian Development Bank (ADB), in 2050, Asia will most likely account for 52% of global GDP, up from 30% today. While this is a very optimistic economic growth scenario, it is not guaranteed. Asia is utilizing a huge wage disparity to create this extensive supply chain, but this will have to change eventually, and a new system must be created in Asia. An advanced production network must be built as well as financial markets, real estate asset markets, and other high quality markets. Another important matter is creating innovation networks, as knowledge production becomes increasingly important globally. International cooperation is simply indispensable in this regard.

Now, I would like to focus on the brain power network in Asia. As a whole, especially in developed countries and big cities in developing countries, innovation is becoming a core economic activity, and Japan is expected to be a leader in this area. Therefore, Japan must adapt itself to this new system. However, in the past 20 years, this has not occurred and is one of the biggest causes of stagnation. Japan needs to adapt itself to this brain power society in order to enjoy growth.

Japan can be proud of the volume of patent applications it creates, which had been the largest in the world until 2011. However, in Asia as a whole, while innovation activities in Japan, South Korea, and China have been very active, inter-regional cooperation has been poor. Diversity is also crucial as seen for example in Silicon Valley, and this is a lesson that Japan and Asia should learn from. A well-established network is crucial.

How should we understand the third arrow of Abenomics—the growth strategy? What should the approach be? The population is declining. For the Japanese economy to enjoy growth, productivity improvement is a key, and there must be innovation involving the full participation of all of the people. In Japan, the population share of elderly people over 65 years old will continue to increase, and will be about 40% in 2060. There is an opportunity for Japan to be a leader in innovative elderly societies. Redefining what qualifies people as the elderly, such as changing the demarcation line to 65, will be required. Senior citizens are not only a major human resource as workers and managers, but also major consumers of new products and industries such as housing, goods and services, medical, nursing services, medical nursing equipment, robots, lifetime education, and so forth. More growth can be achieved if all persons are engaged in an innovative manner.

Another perspective of the growth strategy is the idea that "small and creative" is beautiful. Rankings of Japanese per capita GDP in the Organisation for Economic Co-operation and Development (OECD) over a roughly 40-year period show that while Japan was once second or third in the world, it has fallen since to 19th as of 2008. The current top 10 ranked countries are dominated by Northern European countries with relatively small populations compared to that of Japan. This indicates that population size is not essential to achieve economic growth in a brain power society. Education is more important. The top 10 countries in the rankings have sizable elderly populations as in Japan, but spend a higher proportion of GDP on education. Multinational firms are concentrated on knowledge-intensive activities (HQ-management, R&D, design), and workers receive relatively high wages.

Finally, regional and global integration is essential. Japan must conclude economic partnerships such as the TPP, as well as similar agreements within Asia. The trilateral relationship between Japan, China, and South Korea is not particularly strong at the moment, and if these three countries do not get along with one another, Asia as a whole will not fare well. However, if we can collaborate and cooperate with one another, we all can enjoy higher growth together.

Presentation 1 Lessons from Japan's Secular Stagnation

Kyoji Fukao
Program Director and Faculty Fellow, RIETI / Director, Institute of Economic Research, Hitotsubashi University

Japan is a pioneer in long term stagnation. What lessons can other countries draw from Japan? In many advanced countries, productivity increase in the long-term has been decelerating, resulting in lower investment, a shortage of demand, and recessions. Non-conventional financial policies can be utilized to keep the interest rate low, but may result in a bubble. However, industry sector productivity datasets are more advanced and detailed now than in the past, providing us with a helpful tool going forward.

Looking at Japan's current economic situation, through massive stimulus measures and active fiscal policies, Japan appears to be escaping from deflation. However, low IT investment and labor market rigidity in Japan remain, and the government's growth strategy must address these issues. Government policies should promote intangible investment, entrepreneurs and startups, mergers and acquisitions (M&As), and the restructuring of the labor market such as wage increases. In terms of adopting certain policies, assessments must be completed to determine how much productivity gain Japan can expect.

What are the lessons from Japan's secular stagnation? First, low real interest rates will not sufficiently solve fundamental problems and, combined with a positive inflation rate and full employment, could lead to new bubbles. Therefore, for growth to be sustainable, raising the rate of return on capital through productivity growth is necessary. Second, the productivity growth slowdown has not been caused by the drying up of innovation, but by structural factors of the economy, many issues of which could be fixed through better policies. Third, government expenditure must be used in a more efficient manner and public investment utilized to enhance productivity growth. Fourth, large corporations did not actively invest domestically, and used surplus funds for debt repayment and the accumulation of liquid assets. Fifth, countries such as Germany and China enjoy low real exchange rates and huge current account surpluses, which negatively affect other economies such as that of Japan. This imbalance requires a fundamental reform of the international monetary system. Lastly, the exit policies from non-conventional policies; Japan might be the first country to experience the failure of having an exit, and should avoid that risk.

Presentation 2 The Prospects for East Asian and Chinese Economies

Lawrence J. Lau
Ralph and Claire Landau Professor of Economics, The Chinese University of Hong Kong

The center of gravity of the world economy is shifting. In 1970, East Asia including Japan comprised only 10% of world GDP. In 2012,

East Asia accounted for 25% of world GDP, and this distribution will continue to shift toward this region. In terms of the distribution of total international trade in goods and services, East Asia is also growing while the United States and Western Europe are shrinking.

One noticeable development is the rise in intra-East Asian trade. Thirty years ago, most trade moved from East Asia to the West, but today 50% of exports and 50% of imports are intra-East Asian. That means that the East Asian countries have become markets rather than simply manufacturing centers. Another development is the partial de-coupling of the Chinese and East Asian economies from the rest of the world. The growth rate of the real GDP of the Chinese economy has been relatively stable compared to those of the other East Asian countries despite similar fluctuations in their rates of growth of exports and imports.

What are some advantages of the East Asian economies? First, a high saving rate means that there will be less reliance on foreign capital. Second, the principal sources of economic growth of East Asian economies going forward will be intangible inputs such as human capital and R&D capital, which are due to grow.

Regarding the future prospects of the Chinese economy, it is important to understand that growth has been underpinned by a high rate of investment enabled by a consistently high national savings rate of approximately 45% over the last 10 years. There is also an unlimited supply of surplus labor with room for improvement, such as through extending the Chinese retirement age. The one-child policy is also in the process of being ended.

A hard landing in China is not likely, since output in China is not constrained by supply, but by demand. The public debt to GDP ratio in China is roughly below 40%, which is manageable. Finally, shadow banking is a problem that the Chinese government is paying attention to and will hopefully manage.

Presentation 3 — Growth Strategy after the World Financial Crisis

Nobuhiro Kiyotaki Professor of Economics, Princeton University

I will speak about financial frictions and economic growth, particularly in the context of recovery from the recent recession. During the financial crisis, Japan had many problems including a shortage of liquidity, the substantial loss of equity of banks, and a sharp drop in macro stability.

Robert Mundell's assignment rule argues that we must assign the strongest policy to each issue. Regarding liquidity shortage, the strongest policy is various measures of liquidity provisions. For bank capital shortages, insolvent banks should be restructured and equity should be injected into solvent banks with insufficient equity. To achieve macro stability, monetary and fiscal policies are considered to be the most effective means. However, given the interconnected natures of these issues, it is important to think not just about the strongest policy, but how other policies can be used simultaneously and in conjunction with one another.

Recovery after the crisis depends on the balance sheet conditions, real rigidity, and the trend growth of the economy. Output, working capital investment, and stock prices come back relatively quickly within several years. However, credit, fixed capital investment, and real estate prices are areas closely related to financial systems, and thus take a long time to recover.

The balance sheet of non-financial businesses includes financial assets, working capital, and tangible and intangible capital. When a recession occurs, illiquid assets such as fixed capital are not easily reduced, and so liquid assets such as working capital investment are cut. Over time, fixed capital starts de-accumulating, and the economy returns to a more balanced position on a smaller scale of both liquid and illiquid assets. In the recovery phase, business first increases liquid assets before increasing fixed capital.

This is also true for employment. During the recovery phase, permanent employment does not increase so easily, and only temporary employment is increased initially. Only after the recovery is underway does permanent employment starts to return. That is why recovery typically comes first in output, working capital, or stock prices, while recovery is slower in fixed capital investment, permanent employment, and real estate values.

One of the long term consequences of the financial crisis is that public debt becomes unsustainable, which can then lead to further financial crises. Another dangerous consequence is reduced investment in intangible capital by businesses such as R&D and human capital, which can lead to slower growth and long recession periods following a financial crisis.

Presentation 4 — Competitiveness Today: A New View

Marcel Timmer Professor of Economic Growth and Development, University of Groningen

We require a new way of looking at trade and competition. The old view on competitiveness is based on products. The value of exports from a country is seen as an indicator of the competitive strength of an economy, however, with international production fragmentation and different activities taking place in different countries, cross-exports as an indicator of competiveness is rapidly losing its value. Rather than focus on the gross output value of products, we should look at the value added which is taking place in various regions in the world. It is no longer about what you sell, but what activities you do in the global production of a good or a service, and countries and firms can specialize in different activities along the pre-production and post-production phases of the global value chain.

One way to determine what activities countries perform in these value chains is to design a conceptual framework to analyze this value added perspective, and have data. A conceptual framework requires tracing back to all of the different stages of production which are needed to produce a certain product. By decomposing the output value of the products, the value added in the country itself and the value added from another country can be determined.

This conceptual framework will require two specific types of data. One is input/output tables which provide not only the flow of goods and services within an economy, but also across economies. Second, data are required on the intermediary inputs which are being used, both domestically produced and imported, as well as

data on the production factors which are needed in production. This allows the analysis of competitiveness in a completely new way.

International production fragmentation is a trend found in most global value chains, and the share of value added coming from outside the economy is rapidly increasing. Looking from the value added view at this trade of intermediate goods, the global foreign value added shares of countries are increasing. A trend to watch is globalization rather than regionalization.

This new perspective of trade has an impact on the way trade policies, social policies, and industrial policies are viewed, and it also has implications for our statistical systems because we need these new measures of competitiveness.

Presentation 5 Strategies to Revive Global Growth: A Scenario Analysis

Bart van Ark
Executive Vice President and Chief Economist, The Conference Board

What are some of the important strategies that we need to look at going forward in order to revive global growth? The diagnosis can be summarized into 10 major trends; five short-term and five medium-to long term.

Regarding the short-term trends, the mature economies are currently recovering from the world financial crisis, but the Japanese and European economies will remain fairly moderate for the next several years. There is also a significant slowing down in emerging markets largely because of structural problems and an elevated risk of financial crisis in China. Finally, political issues and tension will continue to be a major challenge going forward.

In terms of medium and long term trends, over the next 10 years, there will be a significant slowdown in the global economy largely driven by emerging markets. What trends are causing this? First, demographics in the mature economies, such as aging populations in Japan and in Europe, are going to be a major factor of slower growth. Another important element is the continuing global demand shift taking place toward rising middle classes. However, the most important aspect of slower growth in emerging markets is the fact that these economies are becoming richer. Finally, globalization is slowing down due to narrow trade agreements, major environmental challenges requiring international coordination, and substantial imbalances in the energy market in terms of increased demand for emerging markets.

What are the important implications for economic policy? A closely related investment agenda and productivity agenda will be required. A lack of investment in hard buildings and machinery must be increased. Investment must happen in the intangibles part of the economy—human capital, innovative property, R&D and non R&D, marketing and branding, and overall investment in economic competencies. Fiscal consolidation must be avoided and the creation of new and innovative firms and entrepreneurships encouraged.

The productivity agenda will need to focus on reforms in product, labor, and capital markets. These reforms will ensure that the most productive resources go to those areas which will yield the highest returns. To do so, global, regional, and economic integration must be accelerated and transparency to be increased.

Panel Discussion

Moderator: Tsutomu Miyagawa

Faculty Fellow, RIETI / Professor, Faculty of Economics, Gakushuin University

Miyagawa:
Professor Kiyotaki and Professor Fukao, what do you think about the U.S. monetary policy after the World Financial Crisis?

Kiyotaki:
During the crisis, the focus was on the spread between returns on risky and illiquid assets and those of safe and liquid assets. After the crisis, the focus was on reducing the spread between long and short term interest rates. This philosophy of quantitative easing has both advantages and side effects on the other countries. But, as long as a flexible exchange rate is maintained, the other nations must look after themselves.

Fukao:
The U.S. Federal Reserve Board's (FRB) tapering policy will affect the entire world. Japan has its own managerial policy, and one important point is the return of investment. In Japan, investment in tangible properties was high despite the drop in the rate of return and the low productivity. However, investment in information and communications technology (ICT), R&D, and assets other than tangibles—that is the area that has to be emphasized further, and, in particular, the SMEs will have to invest more in intangibles. While the advanced economies' growth is decelerating, there are many investment opportunities in other countries, and therefore reestablishing the international monetary system is another key point.

Miyagawa:
Professor Timmer, could you explain the current European economy?

Timmer:
In Europe, small businesses are very liquidity constrained, and profitable investments are not getting the finance needed.

Miyagawa:
Professor Lau, do you have any comments on Professor van Ark's view of growth and volatility in China?

Lau:
I believe growth in China will be way above 4%, with 7% potentially achievable. There will not be much volatility as the Chinese economy is almost immune to external events, and Chinese growth will be based on investment in public infrastructure investment and public consumption for the next 5-10 years, meaning education, health care, environmental control, and environmental preservation and restoration.

van Ark:
The Chinese economy has already slowed down significantly, and the growth rate will continue to decrease as the economy begins

to transform gradually from an investment, export, low-cost driven economy to one with higher wages, more consumer power, purchasing power, and, ultimately, more consumption. Regarding investment, the Chinese government is extremely confusing about its strategic policies, and China's transition is a very difficult process. China is a country which multinational businesses feel is one of the most difficult business environments to operate in, even though growth is still very fast.

Miyagawa:
Many Japanese economists expected the depreciation of the yen induced by Abenomics to lead to a trade balance surplus, but this expectation was not fulfilled. Prof. Fukao, do you have any comments?

Fukao:
From the viewpoint of real effective exchange rate, the yen is already very cheap. But we have a trade deficit, and the current account surplus is almost zero. Through our low productivity growth in the manufacturing sector and our foreign direct investment (FDI) and expansion of production in other Asian countries, the global value chain has changed, and Japan is losing its competitiveness. KLEMS data would be ideal as further analysis is necessary.

van Ark:
I think there is a very encouraging sign that the TPP recognizes the importance of global value chains. The TPP is also really deeply looking into things such as government procurement, labor laws, intellectual property, etc., I wonder if the TPP can ever be successful without China as a part of it.

Miyagawa:
Please discuss policies for enhancing innovation and productivity growth.

Lau:
If East Asian countries could maintain a system of stable relative parities among exchange rates, it could help promote intra-East Asian trade to an even larger extent.

Kiyotaki:
Regarding policies for growth, promoting R&D as well as human capital is crucial. Unfortunately, many companies are hesitating to hire younger people on a permanent basis, both in Japan and in European countries such as Italy or Spain. Alleviating this issue is an important element for promoting growth.

Q&A Session

Q **Professor van Ark, can you elaborate on U.S.-Japan trade negotiations?**

van Ark: I am not a fan of bilateral trade negotiations, and multilateral trade agreements are the most optimal type. Far reaching regional trade agreements are the second best option.

Q **Professor Fukao, can you elaborate on the Japanese yen's appreciation or depreciation toward the Tokyo Olympics in 2020?**

Fukao: It is a difficult prediction that depends on the investment saving balance. If savings continues to be high, investment remains low and productivity does not improve, then we will need a cheaper yen.

Q **Can panelists comment on social and income equality in relation to growth and the crisis?**

Kiyotaki: Concerning social inequalities, if we try to maintain the minimum standard of living, the cost will not be overbearing. At the same time, the welfare gain will be substantial.

Q **Regulations could be changed to mandate reporting by companies and governments to gather data related to productivity. What are your thoughts on this?**

Fukao: I believe the OECD gathered and held discussions on this topic but concluded that incorporating this data in the business account would be difficult.

Conclusion

Miyagawa:
The long term view is that human resources and innovation must be stimulated globally. In the case of Japan, policies and fundamental structures of business and government will have to be restructured and adapted in line with this changing world.

See also: http://www.rieti.go.jp/en/events/14052001/summary.html

Creating Capabilities

James J. Heckman, Nobel Laureate in Economics, Professor at the University of Chicago

Faced with an aging population combined with a low fertility rate as well as widening economic disparities, Japan urgently needs to better utilize its human resources through effective education and narrow its disparities in access to educational resources. Against this backdrop, we invited Nobel laureate Professor James Heckman to give a presentation entitled "Creating Capabilities." He introduced various studies from the perspectives of economics, psychology, and neuroscience on the creation of capabilities that function in economic activities and the entire society, and demonstrated their implications for policies to promote the development of capabilities and to analyze poverty, social mobility and economic and social opportunities. The lecture was followed by comments and a question-and-answer session with related researchers who had further discussions on such topics as non-cognitive and cognitive capacity development, family environment and capability disparities, and capabilities in different stages of the life cycle.

Opening remark

Atsushi Nakajima

Chairman, RIETI

Japan is faced with an increasingly aging population combined with a low fertility rate and therefore must better utilize and develop its human resources regardless of gender or age. At the same time, expanding economic disparities, including being the worst among the Organisation for Economic Co-operation and Development (OECD) countries in terms of the poverty rate of single-mother families, are also a priority issue requiring further attention. Against this backdrop, an important point is how to prevent these disparities from continuing and decreasing them through effective education and human resources development. I am certain that today's special lecture by Professor Heckman will offer us numerous suggestions and insights into solving the variety of serious challenges facing Japanese society and expect that it will be significantly fruitful.

Presentation

Creating Capabilities

James J. Heckman

University of Chicago and Human Capital and Economic Opportunity Working Group for New Economic Thinking

Inequality is on the rise around the world. In Japan, for family income after taxes and transfers, there is a slight upward trend in the Gini coefficient from 1985 through 2010. Wealth inequality and poverty rates are other ways of measuring inequality and also show upward trends. Poverty in Japan is especially striking among single parents where there is a high rate with an upward trend. Based on self-assessments, single parent mother-headed households in Japan are showing signs of stress. This is partly caused by gender inequality. The largest differences in hourly wages between men and women are found in the part time sectors.

Inequality is empirically associated with social mobility. The "intergenerational elasticity" (IGE) refers to the income of children compared to that of their parents. It is a measure of immobility in economic status across generations: the greater the IGE, the greater the immobility. A plot of the IGE against the Gini coefficient shows a positive relationship. More inequality in the cross-section is associated with greater dependence of a son's income on his father's income (i.e., a higher IGE). The evidence from Japan falls along a cross-country curve relating income inequality and intergenerational elasticities. The intergenerational elasticity for Denmark is 0.15 and 0.47 for the United States and the United Kingdom. For Japan, it is about 0.4.

Economic theory links income inequality and intergenerational mobility. Less income-advantaged families face difficulties in financing their children's education, and in providing other opportunities for them. This is a serious concern in many places around the world. Some economic theories claim that inequality is a cause of immobility. On the other hand, the causality might be reversed. My late colleague Gary Stanley Becker argued that higher intergenerational elasticities could explain greater inequality in income in the cross-section. People who have an advantage at birth by being born into better circumstances pass advantage on to their children, thereby creating greater inequality in society across generations.

On income redistribution

Some researchers conclude from the relationship between inequality at a point in time and the intergenerational elasticity that income redistribution can play a major role in promoting social mobility. However, this is not necessarily a correct conclusion based on the available evidence.

The traditional Western welfare state is based on "alms to the poor," i.e., redistribution. What are effective policies to foster social inclusion to reduce economic and social inequality, and to promote social and economic opportunity? Famous economists such as Frank Ramsey and James Mirrlees have talked about ways to combat inequality based on efficient transfer systems to keep incentives for individuals to work while increasing the social pie. One recurrent theme in this discussion is the tradeoff between inequality and efficiency. Reducing inequality by transfers reduces economic efficiency by taxing individuals and distorting incentives. This approach is a static one that only looks at the effect of taxation and redistribution on behavioral responses.

A complementary approach can be more effective in reducing long-run poverty and promoting social mobility. It is a broader strategy of human development that addresses the questions of inequality and opportunity. Based on studies of inequality in Japan, Western Europe, and the United States, skills are major determinants of inequality. People generally do better if they have more education, on-the-job training, and other skills.

Today I want you to consider a strategy of creating capabilities. I use the words "capabilities," "capacities," and "skills" as synonyms. Enabling people and creating capabilities allow people to flourish while reducing inequality and promoting economic efficiency. Instead of a strategy of "alms to the poor," think about how to create capabilities and empower people.

Having "capabilities" means being a functioning agent in the economy and society at large. Amartya Sen and Martha Nussbaum defined capabilities as "…the real freedoms people have to achieve and the beings and doings that they value and have reason to value." "Creating capabilities" is not a strategy for shaping people to behave in any particular way, but to shape their possibilities, allow them to choose who they can be, and provide them the maximum flexibility in responding to life challenges. People with larger capability sets have more freedom to shape their own lives. Those with fewer capabilities have more limited choices.

Eight lessons from the recent literature on creating capabilities

The first lesson is that multiple skills vitally affect performance in life across a variety of dimensions. Evidence shows that cognitive and non-cognitive skills affect labor market outcomes, the likelihood of marriage and divorce, the likelihood of receiving welfare, voting, and health. Non-cognitive skills include preferences, self-control, conscientiousness, staying on task, and engaging in a variety of social and economic transactions. They affect a range of behaviors. The multiplicity of skills is often overlooked, but it is important.

The second lesson is based on the research of child development experts, economists, neuroscientists, and sociologists. Gaps in both cognitive and non-cognitive skills across socioeconomic groups open up at early ages. Skill gaps open up even before children go to school, and in advanced societies like Japan, schooling itself does not have much effect on reducing the gaps.

The third lesson is in the role of genetics in the emergence of skill gaps. It makes sense that smart parents can earn more, achieve more, and pass on their genes to smart children. However, empirical, experimental, and non-experimental research also shows the power of parenting and environments in shaping skills. Heritability is important, but there is mounting evidence that gene expression can be modified, especially by early environments.

The fourth lesson is that there are critical and sensitive periods in child development. Different capacities are malleable at different stages of life. The intelligence quotient (IQ) becomes rank stable around the age of 10. Early life disadvantage shapes intelligence and other outcomes. However, children still have malleability in non-cognitive skills into their young adult years, which suggests a strategy of different types of interventions at different life stages.

The fifth lesson is that we find substantial differences in children's environments. Children with professional parents hear four times as many words at age three than those from disadvantaged families. This, along with parenting style, affects the development of children.

The sixth lesson is that there is resiliency over the life cycle. Initial disadvantage has a lingering effect, but society can partially compensate for this. The most effective *adolescent* interventions in children with neglected childhoods target the formation of personality, socio-emotional, and character skills through mentoring, and providing guidance and information. What happens in a successful family mirrors successful workplace environments, job training programs, and apprenticeship programs.

The seventh lesson is the importance of "scaffolding." This means staying with a child or adolescent, working with them, and challenging them to take the next step in the "proximal zone" of development. Lecturing a child is not as effective as engaging and interacting with them. Both the child and the teacher (or parent) in this relationship play roles similar to an "emergent system" as described by system dynamics theory.

The eighth lesson is the value of early investment. High quality interventions targeted to the early years are effective in promoting skills, which is a manifestation of "dynamic complementarity." A strong skill base today will create a larger one for tomorrow. Adolescents who have more ability and motivation make the best investments in schooling. Abilities are created through early investments and throughout the life cycle, and are not determined simply by genes. Instead of "alms to the poor," I propose "pre-distribution"—early skill formation—as an effective skill enhancement strategy.

A comprehensive understanding of capability formation

In devising effective social policy to promote skills, we need to think about the skills that we should target at each stage of the life cycle. This nuanced view is in contrast to the fragmented approaches of many governments that ignore the importance of skills. Examples of fragmented solutions include adding to police forces to combat crime or hiring doctors to improve health. Such measures may be effective, but strategies based on preventing problems are often even more effective. We need a unified strategy focusing on capabilities that avoids relying exclusively on these fragmented remediation-based solutions. In the case of skill development, it is frequently more effective to promote skills early on to prevent problems rather than focusing on treatment after problems occur.

To create effective strategies for capability formation, we need to understand the roles of family life, multiple capabilities, and the dynamics of capability formation. Low levels of capabilities explain

social problems such as crime, teenage pregnancy, low wages, and poor health. Japan focuses on the Programme for International Student Assessment (PISA) test scores. However, recent studies on the economics of skills show that cognitive skills are only part of the story of what makes for successful lives. Personality/soft skills and physical and mental health are often neglected, yet they are very important.

Schools, individuals, and nations help shape cognitive and non-cognitive skills. The family lives of children are major producers of cognitive and socio-emotional skills. Supplementing the family and its resources, enriching the lives of children, and supporting children in school can be effective strategies. By supplementing the family, we can promote skills and create policies that avoid focusing solely on fragmented solutions. Instead of one cabinet agency for each problem, there should be one cabinet agency for promoting capabilities and skills. Interventions that promote skills have high benefit-cost ratios and rates of return and have no equality-efficiency tradeoff. What is fair is also economically efficient. Enhanced skill bases create economic productivity, reduce inequality, and promote social mobility.

The importance of cognitive and character skills

Psychologists have come up with five measures of personality traits: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism/emotional stability. Those with high cognitive and non-cognitive ability are not likely to go to jail. However, those with low cognitive and non-cognitive skills are more likely to go to jail.

Each year, the General Educational Development (GED) test is taken by 15% of all students obtaining certificates for completing secondary school in the United States. High school dropouts take this exam to secure high school equivalency. GED certificate holders and high school graduates have about the same levels of cognitive skills. High school dropouts who do not take the GED have lower cognitive skills. However, GED certificate holders earn about the same as high school dropouts and make much less than high school graduates. High school dropouts and GED certificate holders also have similar non-cognitive skills, which explains this income gap.

Non-cognitive skills can be reliably measured. A new OECD report gives evidence on this question. Personality traits are patterns of behavior that are measured by performance on tasks measuring character and cognitive skills. Recent research shows how reliable measures of non-cognitive skills can be constructed from behaviors.

The Japanese research literature confirms studies conducted in the United States and in Western Europe. There are substantial gaps in cognitive scores between children of highly skilled parents and children of the less educated. Children of mothers who graduated from college perform much better on tests. Even at age three, gaps show up, and there are similar gaps in non-cognitive skills. Data from the work done by Hamano in Japan show similar gaps in the lexical ability of children based on family annual household incomes. Hideo Akabayashi shows that mathematical skills are higher for children with more educated mothers and from families with higher incomes.

How do we interpret this evidence and create an effective economic and social policy for skill formation? The quality of home environments by family type is predictive of adult success. Yukichi Fukuzawa believed that individual differences came down solely to differences in education, not in genetics. Although that position is too extreme, "education"—broadly defined—plays a powerful role in shaping outcomes.

Variation in family environments

Studying family environments in the United States, psychologists found that children of the advantaged hear nearly four times more words in an hour than those of the disadvantaged. There is also more encouragement of children among the more affluent and educated families and much less encouragement among the disadvantaged. This leads to large differences in vocabulary at age three. In Japan, educated mothers are more likely to take their children to museums, read books to them, and provide them with an important "verbal bath."

Families are changing around the world. 30% of children in the United States are in single parent families. Those families generally have fewer resources to make investments in the child. There is a secular increase in never-married single parent households with children under the age of 18. A similar but less striking pattern is true in Japan.

In the United States, children with greater ability are more likely to go to college. Family income also plays a role. Even for children at the bottom of the ability distribution, affluent families are more likely to send their children to college than those that are less affluent. In Japan, there is a strong correlation between family income and whether children will attend a four-year college.

What does all this mean for social policy? The intergenerational elasticity in Denmark is low at 0.15, whereas in Japan it is about 0.4. Many look at Denmark, Norway, and Sweden as ideals of low inequality. Social mobility is higher in those countries than in the United States and Japan and income inequality is lower. Yet there are small differences in the relationship only in the mother's education and the child's high school completion rate between the United States and Denmark. This is despite the fact that college tuition is free in Denmark, and there is a low level of inequality. Regardless of free tuition and a generous welfare state, parental education still plays a powerful role in both societies, and the statistics in Denmark are eerily similar to those of the United States. In both the United States and Denmark, there is a pattern where both parental income and wealth positively affect cognitive skills. Therefore, family advantage/disadvantage plays a similar role in the two countries. When cognitive and non-cognitive abilities in Denmark and the United States are measured, there is a pattern suggesting that these abilities are playing a major role in both countries that is far more important than family income or tuition paid in explaining schooling attainment gaps.

Genes, biological embedding of experience, and gene-environment interactions

Genes affect behavior through how they are expressed. A study looking at DNA methylation and histone acetylation patterns in identical twins showed substantial differences in gene expression at age three and even more so at age 50. Gene expression is experientially modified. Experiments conducted on monkeys show that those exposed to disadvantaged environments without stimulation or social interactions grew up with more health and

behavioral problems.

The evidence from intervention studies argues strongly against purely genetic explanations. Parenting can be very beneficial, especially for disadvantaged children. Nearly 50 years ago in the Perry Preschool Program intervention, disadvantaged black children in a suburb of the city of Detroit were given cognitive and socio-emotional stimulation for a couple of hours per day for two years when they were ages 3-4. They were put back in the same schools as the control group and were followed through age 40. Although there was an initial spike in IQ among the treatment group, it faded by age 10. Many saw this as a failed intervention. However, the Perry Program had a statistically significant rate of return of 7% to 10% per annum. It worked primarily through non-cognitive channels by promoting social behavior. Looking at employment, monthly income, tobacco usage, crime, and so forth, we find that non-cognitive skills play a substantial role in the success of the Perry children. Interventions also promote long-term positive effects on health with the treatment group showing improvements in diet, exercise, smoking behavior, and other dimensions.

The Abecedarian intervention was conducted 10 years after the Perry Program and embodied many of the same features. Looking at medical records at age 35, there were substantial improvements in the treatment group in reducing obesity, hypertension, and metabolic syndrome. Increasing basic capabilities allows people to expand their opportunities and function more broadly in life. Capabilities promote education, reduce crime, create engagement in society, and increase voting.

It is important to encourage attachment and engagement of parents. One hundred years ago, John Dewey wrote, "Successful schools do what successful parents do." A recent update would be, "Successful interventions to promote capabilities at any age do what successful parents and mentors do." One can produce substantial life-changing effects by changing the preferences of parents, having them respond to the child's curiosity, and changing the parent-child relationship. In the Perry Program, there were improvements in parental warmth, a reduction in family conflict, and higher levels of parental authority. Despite this evidence, many countries, including Japan, do not spend much on early interventions for their disadvantaged children.

Summary: Skills beget skills

Social and emotional skills help produce cognitive skills, while cognitive skills help produce greater health. It is easier to change the skill base of children at earlier ages than at later ages. The early years are especially important because of the malleability and flexibility of young children. Later in life, certain skills are still malleable, but the full base of skills is not. Into adulthood, the skill base plays a powerful role in producing adult outcomes.

However, early life conditions are not the full story. There is still resilience, recovery, and repair. However, it is much more effective to intervene during the early years. Later remediation is costly and often ineffective. Early life factors play a huge role in promoting education and strongly affect factors present before formal schooling begins. Preschool can promote both cognitive and non-cognitive ability.

Imagine that we are social planners trying to draw from the recently acquired knowledge of economists, sociologists, and child development experts. Investments should be focused on prenatal and other programs targeted towards the earliest years to build a skill base for the success of programs later in life. However, spending for the disadvantaged is now done in reverse order. We need prevention and pre-distribution, not just redistribution and remediation. Japan should create a "Department of Human Capabilities." Mentoring, teaching, and socializing with a child each play important roles in shaping child outcomes. Our emerging understanding is changing the way that we think about educational policy. We need pre-distribution to provide children with skills rather than just money when they are adults. Disadvantaged families need to be given the tools to become effective parents and provide an environment to nurture children's capabilities. Giving them more money is not an effective strategy compared to policies that make families more effective parents.

Comments and Q&A Session

Toshiaki Tachibanaki

Adviser, RIETI / Professor Emeritus, Kyoto University, Visiting Professor, Kyoto Women's University

The characteristics of the University of Chicago include its adherence to market mechanism and its emphasis on human capital. I felt that Professor Heckman, in his position as a professor at this esteemed university, naturally draws upon the tradition of human capital investment. His lecture emphasized the importance of pre-school education, and I would like to ask four questions regarding this point.

First, in thinking about early childhood investment, parents' situations are very important. In Japan, while the divorce rate is rising, the reality is that single mothers are occupied with work due to low income and cannot afford to spend time to foster their children. In such circumstances, who should take care of children? And, what would you think about the government's providing of support for such situations?

Second, there is a "three-year-old myth" that children's lives are determined by education up to the age of three. There are different views including that mothers should not work until their children reach three years old, and, on the other hand, that they can work even with children under three years old, given that women's higher educational backgrounds allow both men and women to work. Would you support the "three-year-old myth"?

Third, various kinds of after-school education are available—including *gakushujuku* or private tutoring schools, sports clubs, and culture lessons. Especially, tutoring schools are considered to play an important role in education. However, utilization of such education varies significantly depending on the parents' income levels. What do you think about this uniquely Japanese educational system? Furthermore, how would you suggest we solve the issue that children raised in low-income families cannot attend tutoring schools and that their likelihood of continuing education is not good?

Fourth, there is a persistent argument that families should be

responsible for bearing educational costs. Actually, the ratio of public expenditures for education in Japan remains one of the lowest among the OECD countries. I would like to hear your recommendation for increasing the government's expenditure on education for the purpose of enabling pre-school education.

Kazuo Yamaguchi

Visiting Fellow, RIETI / Ralph Lewis Professor of Sociology, The University of Chicago

Professor Heckman's lecture emphasized the malleability of non-cognitive skills in a diverse age range, the importance of the pre-school improvement of cognitive skills, the importance of "pre-distribution" to reduce poverty, and the importance of quality parenting and care.

Non-cognitive skills include various skills such as perseverance and motivation. There is a theory on studying that, among such various skills, those required in the society to which the person belongs will develop. However, the conformity to the majority's attitude that is preferred among Japanese youth is not suitable for innovations. More generally, socially rewarding personalities are not necessarily productive economically. Therefore, in order to develop productive non-cognitive skills, we need to change society.

Next, regarding the question on which is better—investment in pre-school cognitive skill development, a universal model that provide programs with all pre-school children (e.g., Finland's EduCare and neuvola), or a selective model that provide programs with targeted children (e.g., the United States' Head Start), the former model is costly, and the latter model involves the issues of adequacy and fairness in selection of targets. In Japan, a conservative idea is persistent that families are the most suitable environment for raising children and that mothers' roles in particular are important. However, it has become clear that differences in family environment cause significant disparities among children. Given the diverse causes of such disparities—e.g., poverty levels and mothers' educational background—it is difficult to provide only targeted children with educational programs. On the other hand, the universal model seems to pose no such issue.

In conclusion, Professor Heckman's theory is important—the attainment of equality of educational opportunity for pre-school children will lead to the attainment of equal social opportunities in a broader sense. As in the United States, Japan should also consider and implement effective policies on this issue based on empirical research and evidence.

James J. Heckman

As to Professor Tachibanaki's comment, familial instability is a feature of modern society around the world, and the trend likely cannot be reversed. We can establish policies that supplement single parent families by educating them and changing their parenting styles. We can support child care with education from teachers with social backgrounds that differ from those of disadvantaged mothers. These policies are not intended to replace parents, but to provide them with greater resources to create more productive parent-child relationships.

For disadvantaged children, being with qualified day care staff provides them socio-economic gains. Outside school education (*juku*) is a source of inequality in Japan. Advantaged children are getting extra quality education. Effective child care centers can compensate for these disadvantages.

Regarding the low expenditure on education in Japan, education has a very high social and economic return. The government can save money, reduce crime, and reduce healthcare costs by investing in education. Investments in preschool and traditional education have an annual return of between 7% and 10%. We can build on nature-endowed strengths through well-designed educational systems.

Non-cognitive skills are a form of human capital. Until recently, we could not measure those skills. Economists and psychologists have worked together to measure these skills and apply them toward educational improvement.

We should encourage people to pursue their comparative advantages. People have skills in different areas, and some are better at certain tasks than others.

How do we nurture productive personalities? The recent focus on IQ scores and cognitive skills misses the importance of non-cognitive skills. Society produces skills and reacts to the availability of these skills, which creates opportunity. Skills can substitute bodies in combatting the problems raised by an aging Japanese society by producing more output per worker.

Schools should not be separated from society. James Coleman's *The Adolescent Society* pointed out that secondary schools are a recent phenomenon. One hundred fifty years ago, people learned skills through workplace apprenticeships. Mentoring was important then and remains important now. Mentorship provides children with guidance and helps create productive capacities. John Dewey discussed the importance of combining school and work.

Day care should supplement the home and not replace it. Strategies should target disadvantaged families. A highly educated mother can teach more than an ordinary day care teacher, but a disadvantaged child can learn much more from an ordinary day care teacher than from their mother alone.

There is no need for conflict between family, life, and government in early childhood programs. Providing supplementary programs on a voluntary basis avoids this conflict by engaging all of the parties involved.

We can improve the familial environments of the disadvantaged. Nurses in the United States teach teenage mothers not to smoke or drink. This changes their behavior and creates an enhanced home environment. Recent research shows that disadvantaged parents are often ignorant about how to deal with child-related problems, so providing them with information will improve opportunities.

Although there is not much poverty in Japan, parenting environments for disadvantaged children need to be changed rather than just providing "alms for the poor." Financially poor parents can still be excellent parents. We need a nuanced view of improving the capabilities of parents and children. Childhood poverty should be thought of as a lack of parenting, not a lack of money. Indeed, in the United States, very poor immigrant families that value education and interact with their children produce a very successful second generation.

Moderator: Hidehiko Ichimura

Faculty Fellow, RIETI /
Professor of Economics, Graduate School of Public Policy, The University of Tokyo

Moderator: Hideo Akabayashi

Professor of Economics, Keio University

Q (Yamaguchi)
How do you address the issue of fairness when choosing to target certain families?

A Research has shown that the most effective programs target disadvantaged children. Japan could provide care universally with a varying fee schedule based on income.

We know which families to target. Targeting needs to be based on more than just money. Canada targets families at risk. Some middle class families participate. Disadvantage is not only about income.

Q This is a question from the floor. From birth to retirement, is there a universal measurement of skills?

A This is an active area of research that will be reflected in the new OECD report. Schools gather behavioral information. Teachers regularly evaluate students. These measures could be used for targeting.

What is lacking in many psychological tests is incentive standardization. We are developing task-based measures that correct for the environment and incentives that affect performance on tests. Evaluations by supervisors provide behavioral measures throughout the life cycle. We should focus on task-based measures, not just test-based measures, but some in the field of psychology resist this.

Q The next question from the floor is how do we get disadvantaged parents with poor parenting skills to accept intervention?

A Most parents want to make their children's lives better. Interventions provide the tools to achieve this. Flávio Cunha worked with disadvantaged children in Philadelphia. He found that parents are ignorant of strategies that promote reading and writing. Research shows that environments vary greatly across disadvantaged children.

A program that was started in Jamaica has a visitor come once a week to the home for an hour for a year and a half to teach the mothers how to play with and encourage their children using items found in the child's environment. 20 years later, improvements in parenting led to a 25% wage increase for the child receiving the intervention along with higher employment. Some parents were not literate, but they still encouraged their child. Even one stimulating hour per week can have a long-term effect on a child's future.

One has to make sure that programs are attractive to parents. There are already successful examples in the United States, Ireland, and less developed areas.

Q We will go on to the next question from the floor. What is the role of the government in improving the skills of middle-aged and older employees?

A It is more difficult to learn skills as you age, but we can teach resilience. We can also teach non-cognitive social and socio-emotional skills. Retraining programs offered to motivated older workers can be effective. However, employees close to retirement may not see the benefit of further training. More flexible retirement options would help. Recent research by Lars Ljungqvist and Thomas Sargent in the macroeconomics of labor supply incorporates retirement and shows the value of wise retirement policies.

Older workers learn cognitive skills at a slower rate which affects the benefit-cost ratio, so skill enhancement programs need to take this into account. However, some of these interventions are productive. Highly motivated professional workers participate in retraining programs to keep them current in their field. However, dynamic complementarity comes into play. If you are not motivated to learn new things, then an offer to learn is not inviting.

Q The last question from the floor is what is the key to your continued passion?

A I enjoy my research and keep learning from it. I also think the research is important for social policy. For example, 100 years ago, educated people such as Bertrand Russell and George Bernard Shaw were eugenicists or Social Darwinists. They believed that genetics determined social class and feared that unintelligent people were reproducing faster than the intelligent ones. This is a narrow view of human skill but one I was taught when young. I have learned that if we intervene early enough, we can promote IQ by providing nutrients to malnourished children and cognitive and socio-emotional stimulation.

In the 1960s, data showed that the Head Start program did not permanently affect IQ. Arthur Jensen said that the unintelligent should be removed from regular schools. In the 1990s, *The Bell Curve* by Charles Murray and Richard Herrnstein argued that intelligence solely determined one's success, that it was genetically determined, and suggested creating reservations for the unintelligent. This literature ignored non-cognitive skills and the important benefits of early education programs.

I am excited to realize that capabilities can be created. This makes for a much richer view of social policy that promotes social inclusion. It is interesting to understand how humans develop. Biology, neuroscience, economics, sociology, and psychology are coming together to help understand this process. I find this research compelling. I tell my graduate students to work on something that they cannot stop working on, and I have taken that lesson to heart.

Special BBL Seminar

Globalization and Inequality

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Moderator
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Increasing globalization is causing economic inequality to continue to widen in many countries around the world. Where is this disparity widening – between nations or within them? Is it caused more by globalization or by technological progress? And do different countries and regions exhibit specific characteristics?

This special BBL seminar featured Professor Elhanan Helpman, one of the world's leading figures in international economics. Professor Helpman provided clear insights backed by years of research findings into the numerous issues concerning such inequality, and also pointed to the question of wage differentials arising from factors other than personal attributes, such as education, skills, and work experience, as an area for future research.

Increasing globalization and increasing inequality

Trade has evolved over a long period of time as defined by the ratio of exports plus imports to the gross domestic product (GDP). There have been two big waves of globalization. The first started in the 19th century and ended essentially with World War I. The interwar period saw a decline in globalization. After World War II, globalization expanded again, and, although the figures here end in 1992, the growth of trade relative to income has continued at a pace roughly twice as fast as that of income. This long-term development actually is related to the growth rate of the world economy.

From 1820 until 1992 and up to the present, globalization and faster growth have been accompanied by increased personal income inequality in the world economy, treating every individual with equal weight. Inequality has increased continuously from the beginning of the 19th century up to the present. Interestingly, the sources of this inequality have changed dramatically over time. Both inequality within countries and differences in per capita income across countries have grown since the early 19th century, although the growth in inequality across countries was more significant. Inequality within countries as a contributor to total inequality in the world economy has declined, whereas inequality in the world economy has continued to rise, although not at an equal pace. This was due primarily to the rise of inequality across countries.

The percentage of people categorized as "poor" in the world economy steadily declined during this period. The World Bank tracks the percentage of people living on less than $1.25 and those on less than $2 a day. By these metrics, poverty has declined, and this accelerated after 1990 primarily due to the growth of India and China. Some argue that inequality has not increased over this long period of time because the income per capita of countries and the average income in the lowest quintile lie almost on a 45-degree line; growth in per capita income overall and in the lowest quintile has been about the same. However, much of the rise in inequality was at the upper end of the income distribution. In the United States, for example, the income share of the top 1% doubled during this period, and, in many countries, the top 1% gained much more than other parts of the income distribution.

Cause of inequality in the United States

We have very good data on inequality in the United States. Let's look at the college wage premium relative to the supply of college graduates. The college wage premium is the compensation received by college graduates relative to that of high school graduates. Starting in the early 1960s, the college wage premium was about 40%. A college graduate in the early 1960s earned about 40% more than a high school graduate. At the end of the period, in 1995, it was close to 70%. This was a major source of increased inequality. We then can compare this to the supply of college graduates relative to demand. The supply of college graduates increased during this entire period. Puzzlingly, despite the growth in supply, the relative price of these more numerous college graduates rose. This does not comport with our understanding of supply and demand. This generates polarization in compensation and earnings in the United States despite the rapid increase in the number of college graduates relative to non-college graduates.

Inequality in the United States is in a U-shape in the long term. It is well known that inequality began declining at the beginning of the 20th century, when it was extremely high, and then began

increasing at an accelerating rate in the 1960s, 1970s, and 1980s. The decline in the early 20th century was driven primarily by a decline in income from capital relative to income from labor. The rise in inequality in later years results primarily from rising labor income among top earners relative to other income earners. In very recent years, capital also has started to play a significant role, at least in the United States.

Today, we need to focus on different parts of the income distribution; we should not only look at indices of inequality covering the entire range of incomes, because very different shifts in inequality have occurred over time in different parts of the income distribution. This is a graph of two measures of inequality: one at the upper part of the distribution and one at the lower part. Two U-shaped lines appear over the long term. One represents the 50%-20% ratio of income distribution and the other represents the 80%-50% ratio. In the 1990s, there was a shift in inequality in the United States. In the upper part, inequality keeps rising but moderately. At the bottom, it declines. There is a prolonged period of decay in which the trends at the bottom and at the top go in opposite directions. This is very significant because people in the middle of the income distribution have lost relative to both the people at the top and the people at the bottom. This is known as the hollowing out of the middle class. A similar phenomenon is found in some other countries.

Looking at the trend of rising inequality over time, it does not rise to the same extent in different parts of the income distribution. Internationally, it is much richer than in the United States.

In the early 1990s, labor economists observed the rise in the college wage premium and the resulting inequality despite the increased supply of college graduates, and they first attributed this to globalization. The standard neoclassical theory prevailed, which held that the increasing integration of many less-developed countries into the world economy supplied many low-skill-intensive products, also called labor-intensive products, reducing the relative prices of these products. As the relative prices of these goods declined, there was a related decline in low-skilled workers in industrial countries. This generated the rising income gap between high- and low-skill workers and increased the college wage premium. The rise in the college wage premium was more extreme in the United States, but it also happened in other countries. An alternative explanation proposed that the rise in the college wage premium was due to a skill bias caused by technological change. This complementary relationship between skills and technology was the cause of the increase in the college wage premium.

Two of my colleagues, Claudia Goldin and Larry Katz, wrote a famous book titled, *The Race between Education and Technology*, which provides a very detailed analysis of the revolution in education and compensation in the U.S. economy going back to the 19th century. They pointed out that technological change did not always increase the demand for skills. Technological change in the late 19th/early 20th century was biased toward unskilled workers. This partly explains the attendant decline in the college wage premium. Later, technological change increased the demand for skills. Research by labor economists who have studied the composition of occupations in detail and the characteristics required for workers in these occupations supports this view.

Globalization vs. technology

The globalization vs. technology debate was settled 20 years ago in favor of technology. Empirical studies done at the time attempted to assess how much of the rise in the relative wages of skilled vs. unskilled workers could be attributed to globalization, and it was found to be a relatively small fraction; in some studies about 20%. Assessing changes in relative prices and how they translate into changes in relative wages quantitatively requires estimates of how much the relative prices of labor intensive goods change vis-à-vis those of skill intensive goods. This must then be translated into relative wages, which requires elasticity of substitution between skilled and unskilled workers. If the estimates of what happened to relative wages and the estimates of elasticity of substitution between skilled and unskilled workers at the time are aggregated, a very small fraction of the rise in the college wage premium can be explained through this mechanism. Additional globalization-related explanations were sought, such as foreign direct investment (FDI). One example was an extensive study of FDI between the United States and Mexico. U.S. companies shifted particularly labor intensive production-related activities to Mexico. Mexico is much more unskilled labor intensive compared to the United States. However, if you look at the labor intensity of the shifted activities, they were labor intensive in the United States, but compared to activities in Mexico, they were actually skill intensive. This helps explain the rise in the college wage premium in both Mexico and the United States, but it cannot close the gap. The contribution of offshoring is another question. Offshoring can be done by FDI or at arm's length, but its impact on relative wages in principle will be similar quantitatively. Taking this into account, you get an increase in the contribution of globalization, but the gap is still too big to be explained. Finally, if you look at what happened to the composition of employment, it is actually much more consistent with the technology explanation than with the trade explanation.

People who looked at what happened in different sectors of the economies of various industrialized countries and middle-income countries found that the ratio of skilled workers to unskilled workers has increased sector by sector. This is inconsistent with the globalization explanation: if the driver is the change in the relative prices of labor-intensive products, and this raises the relative price of skilled workers, then the increase in the relative wages of the skilled workers should reduce the use of skilled workers relative to unskilled workers in every sector of the economy. The opposite was true, which put the final nail in the coffin of globalization as the explanation of the rise in the college wage premium.

There recently has been renewed interest in the topic and a renewed attempt to determine whether other aspects of globalization might contribute to inequality of the type that we see. There are additional mechanisms which people were not aware of 20 years ago but which prove to be quite powerful in understanding the evolution of inequality and its relationship to international trade.

Shift in inequality in every country

The shift in inequality internationally is not uniform in two important ways. The first is that it is not the same in every country and the other is that it is not the same at the upper and lower edges of the distribution, varying much across countries. Data from the

Organisation for Economic Co-operation and Development (OECD), starting in 2000, give the ratios of the deciles: the fifth to the first, nine to five, and one each for the years 2000 and 2007. Even during these seven years, inequality increased both at the top and bottom of the distribution in some countries using this measure, including Ireland, Japan, Korea, Norway, and the United States. There are exceptions such as France, where inequality declined both at the top and bottom. In many countries, inequality at the bottom and at the top went in opposite directions: Canada and the United Kingdom are examples. This is the hollowing out of the middle class. There are countries such as Sweden and Germany where it moved in opposite directions. In countries for which we have detailed data on distributions, very rich movements can be seen in different segments which cannot be explained by technology alone. Understanding the extent to which the technology explanation needs to be supplemented by other mechanisms requires study not only of rough measures of inequality but also of details of the distribution in different parts of the income structure.

In the 1990s, new and much more detailed data sets about the structure of the global economy became available, enabling more detailed study of wages and the role of business firms and technology in the process. The data sets indicated that 1) industry-by-industry, in many countries for which data are available, only a small fraction of firms export, 2) exporters are typically larger and more productive than non-exporters, and 3) exporters pay higher wages. This is true in the United States, Japan, France, and many other countries.

Prospect for study on inequality

Understanding what is generating these patterns has implications for inequality. Various labor economics studies have found that much inequality is driven by what is known as residual inequality. Wages vary from person to person based on varying levels of education, skills, experience, etc. However, the return based on these various characteristics proves to be a mere fraction of the variance. There is a large residual amount which economists call residual inequality, which has increased greatly over time.

Two lines of research have evolved in response to these phenomena and to the availability of these new insights. One looks at the contribution of international trade or globalization to the rise in residual inequality. In a variety of countries for which there were studies, you find very similar phenomena. The other line of inquiry that has evolved looks at the contribution of trade inequality in different segments of the income distribution. There are few empirical studies at the moment, but quite a rich variation in shifting inequality can be explained with this type of theory.

Generally speaking, we find that a lot of the wage differences are within groups rather than across them. It almost does not matter how you cut the data. Within occupations as opposed to across occupations, 80% of the variation is there. About 90% of the growth over time is within occupations rather than between them. This is true in Brazil. If you look instead within sectors, again, 83% of the inequality is within sectors rather than across them. In terms of change over time, more than 70% occurs within the sectors. Cutting the data even finer, looking at occupations within sectors, you still get 67% of the inequality within sector occupation cells and about 1/3 across these cells, and again, you get a big contribution of what

happens within these cells over time. This is not unique to Brazil; we just happen to have their data available. It is similar though not identical in countries such as Sweden.

Turning to residual inequality, the residual wage in Brazil was close to 60%, 88% of which is within sector occupation cells. The amount of variation in wages seen in narrowly defined groups of workers after accounting for their education, experience, gender, and type of sector, is stunning. A great deal of the inequality within sectors can be attributed to differences in firm characteristics. International trade and globalization are relevant here because of what we call an "export wage premium"; firms that engage in foreign trade pay significantly higher wages than other firms accounting for their size. Labor economists uncovered a wage premium for firm size many years ago, but there is an additional premium for exporting firms.

The current theories have tried to develop analytical methods to explain this data and to provide a system that can be studied statistically. They emphasize the contribution of individual firms to foreign trade and globalization rather than looking at trade at a sectoral level. Because this viewpoint treats firms as heterogeneous, it can be expanded to account for different wage payments by these firms. Analytical models can be constructed to account for heterogeneous firms, heterogeneous workers, and frictions in the labor market interacting to generate this distribution of wages. The question of how globalization shifts this distribution of wages can then be asked. The emphases are on heterogeneity of firms, heterogeneity of workers, or what you might call ability beyond observables. The important thing is that earnings vary across firms. Two broad mechanisms can generate this type of variation. The first is that even where two people are identical on the observables, they may have different hidden abilities. A statistician cannot account for hidden abilities which firms are able to identify through the resources they invest in human resource management. This leads to variation across firms as larger, more productive firms hire better workers with similar observables, creating a wage gap between similar workers who work in different firms. Second, if labor markets are not fully competitive and have some inherent frictions, firms incur costs in hiring workers. A worker within a firm therefore is not equivalent to one outside the firm with the same characteristics. This gives workers within a firm leverage in wage negotiations which can generate differences in wages across firms depending on how substitutable the former is.

Inequality in different segments of the income distribution has not been studied empirically as intensively, but we have more reliable theories on this issue at present, and all point to a significant impact of globalization on inequality. The interplay between theory and empirical analysis in this field has been very important, but there remains a constant race between scholars and events.

Q&A

Q I have three questions. First, is the distinction between the non-tradable sector and the tradable sector still relevant? Second, Japan has seen a lot of discussion about the lack of inbound FDI, although we have a lot of outbound FDI. When you talk about globalization, you probably mean both, but is there any difference between them? The third relates to policy. In Japan, we are discussing corporate tax policies, which means globalization not only influences opportunities for a company but also the policy itself, the tax system, and other things which may have implications for changing inequality. Please let us know if you have any comments on that.

A
There are very few, if any, studies on non-traded sectors. The studies I mentioned focus on manufacturing, basically, because this is the majority of what is traded internationally. Services trade has been increasing rapidly, but there are no comparable studies of the service sector. Many phenomena look very much the same for all sectors, but the mechanisms may not be the same and alternative mechanisms have not been studied extensively. The role of FDI in inequality has not been explored in as much detail as has foreign trade. There will be a difference between outbound and inbound FDI. The common denominator for the impact of FDI and trade on inequality is that larger and more productive firms engage in FDI. A globalization-related wage gap feeds into inequality. We do not know how much of the rise in inequality can be explained with FDI. With regard to policy, there is some work on policy issues, but it is very limited in scope. One seemingly robust observation is that tax competition across countries mutes marginal tax rates. This reduces the distributive power of governments because countries are concerned that raising their marginal tax rates will cause them to lose business to other countries. The extent of this phenomenon and how much it translates into global inequality has not really been studied. There has been a lot of progress in this field of globalization and inequality, but many open questions remain.

Q You mentioned the hollowing out. I recently read a book which states that top-wage workers will be replaced by machines in the long term. I would like to hear your opinions about that and if that will affect global business activities or not.

A
This has always been a problem. New machines always replace workers. However, this is not the issue as far as I am concerned. The issue is whether workers can find useful employment even when new machines become available. One difficulty is that machines replace particular types of workers while simultaneously enhancing employment opportunities for other types of workers. It has a differential impact. It is not uniform across the entire labor force. This is why many people have argued that government should provide retraining programs to people who lose their jobs due to technological change to enable them to find new jobs. There is a delicate balance between the negatives of machines replacing workers and the positives of engaging in innovation.

Q I think firms operate a variety of businesses in a variety of sectors, so I am not sure what the relationship is between firms and sectors in your statistics. With regard to policy, wage inequality is enlarged by globalization of the world market, and it may in turn cause further inequality in education or skill training and enlarge the productivity heterogeneity of firms and eventually inequality. How can we mitigate the vicious circle between the globalization of the economy and rising inequality?

A
Typically, in the way data are classified, firms are classified according to their core operations. For many firms, this is reasonably satisfactory, although there are some exceptions where leakage will occur. On policy, we have to distinguish between the inequality due to economic forces leading to growth and that due to frictions within the system. When it arises due to frictions, the natural tendency is to formulate policies to reduce the frictions. When inequality arises due to growth, like innovation, there is a tradeoff. Each country needs to decide whether it will have more growth and more inequality or if it will give up some growth and pursue policies that limit growth and also inequality. It is not just an economic issue; it is a social issue. How much are we willing to pay for equality? The amount of concern over inequality also differs between countries.

Q You suggested that the matching of workers and firms in the labor market contributes to inequality or intensifies the effect of trade on inequality. My impression was that making the labor market better and more efficient intensifies the effect of trade on inequality. Just now, you mentioned better policies to remove friction. How can I understand the relationship between the removal of friction and inequality?

A
Not every friction is alike. Some frictions in the labor market enable inequality mechanisms while others do not. If you remove those that enable inequality across firms, mostly within sectors, you reduce inequality. For others, it might increase. It is not a uniform phenomenon.

Q You mentioned that scholars are in a race to develop new theories and catch up with events. You have shown that scholars are eager to face new events and develop new theories to explain new phenomena. In Japan, we must relate everything to Abenomics. The "third arrow" of the growth strategy, investigating the relationship between globalization and technological development and growth and inequality, is essential for us. According to today's presentation, Japan's inequality is not so serious comparatively and is not growing much, but there is almost no growth. That is our problem. Do you have any suggestions? With low inequality, how can Japan grow?

A
This is what we are currently researching. We are integrating the new view of trade and globalization and inequality with endogenous economic growth. Theoretically, what we find is that even if the growth mechanism leads to some convergence in growth rates, it can still leave a lot of inequality at different levels across countries.

Financial Crisis and Economic Policy

Nobuhiro **Kiyotaki**
Professor of Economics, Princeton University

The three arrows of Abenomics—monetary easing, fiscal policy, and growth strategy—have now been let loose. At this BBL seminar, Professor Nobuhiro Kiyotaki of Princeton University began by presenting the results of analysis of the factors behind economic conditions at the time of the economic bubble from the late 1980s in Japan, the downturn from 1992, the structural reforms between 2001 and 2007, the global financial crisis between 2008 and 2012, and the aftermath of the Great East Japan Earthquake and tsunami in 2011. Based on these results, he then drew attention to the importance of taking a long-term approach to future economic growth and the need for Japan to exit deflation, nominal income growth, fiscal adjustment, integrated reform of social security and taxation, structural reform, investment in intangible assets, and the creation of systems that allow people to lead long working lives.

Credit expansion and asset inflation in the 1980s

Land, buildings, and machinery are production factors. At the same time, these are also assets that can be used as collateral for bank credit. Following the Plaza Accord, the yen appreciated sharply from 1985 through 1986, pushing the Japanese economy into a temporary slump. In response, the Bank of Japan (BOJ) embarked on massive monetary easing from 1986 through 1989. Partly because of the influence of such monetary policy, Japanese land prices and stock prices soared two- and five-fold respectively over the 1980s.

In the case of a normal credit expansion, funds shift from non-productive players to productive players, resulting in the accumulation of capital. However, what Japan experienced in the 1980s is considered to be a distorted credit expansion. As funds shifted from risk-averse players to risk-tolerant players, easier credit did not necessarily lead to a boost in production. Rather, credit ballooned typically in the form of speculative financial investments.

When a decline in interest rates coincides with certain other factors such as growth in productivity, demand for assets will grow as net worth held by financially constrained players increases in value. An accumulation of such assets on balance sheets gives rise to the expectation that demand for the assets will continue to grow in the future, which in turn will lead to a further increase in the current prices of assets. This occurs because "prices move on expectations," which is a characteristic unique to asset markets. Furthermore, in the case of financially constrained players, their net worth could increase more sharply than market prices of assets. This is what we call the "leverage effect of debt financing" or referred to simply as "leverage."

Where such leverage is employed, there often occurs a phenomenon in which the higher the prices of assets are, the greater will be the demand for assets. And when this happens, the rise in asset prices will be amplified further. A phenomenon opposite to this is a financial crisis. Falling asset prices reduce the net worth on balance sheets, whereby demand for assets will decrease in spite of falling prices. This is the reason why investment banks were driven to sell their assets even at a huge loss in the course of the financial crisis.

Recession from 1992 onward

After hitting an all-time high above 38,900 yen in December 1989, the Nikkei index plunged to 14,000 yen in July 1992 and

then dipped below 8,000 yen in April 2003. Meanwhile, the index of urban land prices peaked at 148 in 1991 and dropped to 100 in 2000 and 54 in 2012.

As a result, non-performing loans increased. But both the government and banks did not act quickly, leaving losses on non-performing loans unrecognized and the problem of capital inadequacy unaddressed. For one thing, the tax system at the time was not in favor of immediate loss recognition. At the same time, however, they might have thought optimistically that the situation would reverse in due time. In the meantime, the government implemented traditional expansionary monetary and fiscal policies repeatedly. By doing so, the government ended up helping declining industries and regions.

A comparison of the government's growth forecasts against the actual trajectory of real growth in the gross domestic product (GDP) reveals that the economic policies of the government and the BOJ were overly optimistic (see Hoshi, T. and A. Kashyap (2013) "Will the US and Europe Avoid a Lost Decade?" working paper, Stanford and Chicago). Public investments operated in the direction of lowering potential growth as they were mostly made in the form of providing support to declining, low-productivity industries.

As a result, the recession aggravated. In 1997, major financial institutions—including a major bank and a couple of large securities companies—went bankrupt. This gave rise to the so-called "Japan premium," the extra interest rate charged to Japanese banks for borrowing money in the interbank market, and bank credit contracted drastically. It is against this backdrop that Japan slipped into deflation. Nominal GDP, which peaked at 523 trillion yen in 1997, has been on a declining trend since and stood at 470 trillion yen in 2012.

Structural reform in 2001 through 2007

The period from 2001 through 2007 was characterized by drastic structural reform implemented under the leadership of Prime Minister Junichiro Koizumi.

The government and banks took drastic steps to put an end to the problem of non-performing loans and capital inadequacy, and the scale of public spending and government loan and investment programs was curtailed. In parallel with this, the BOJ embarked on drastic monetary easing measures, which led to an economic recovery driven by a weak yen and exports.

According to data from the Federal Reserve Economic Data (FRED), a database of the U.S. Federal Reserve Bank of St. Louis, the ratio of non-performing loans to total loans in the Japanese banking system rose to 8% in 2001 after hovering around 6% for some time. However, with progress made on the Koizumi reform, the non-performing loan ratio declined sharply and fell below 2% in 2005 and thereafter. This led to the recovery of Japan's banking sector.

To sum up, for 10 years since the beginning of the financial crisis, Japan continued to tackle the problem of non-performing loans and Japanese banks remained undercapitalized. Things began to change drastically only after Prime Minister Koizumi took the helm. This pattern resembles the ongoing situations in Spain and Italy. In other words, these countries may follow the same path as Japan into a prolonged spell of recession.

The long-term trends of private-sector investment and government expenditure on goods and services as ratios to GDP (see Hoshi and Kashyap (2013)) exhibit a clear inverse relationship pattern, i.e., when the ratio of private-sector investment to GDP increased, that of government expenditure decreased, and vice versa. Although this cannot be taken as evidence of a causal relationship, we can see a pattern in which fiscal spending was reduced under the Koizumi government and that coincided with a recovery in private-sector investment.

In 2008, the world economy entered into a serious financial crisis. Japan and Switzerland were the only major economies whose currencies appreciated against the U.S. dollar in the midst of the crisis and Japan's exports declined sharply, posting a 40% year-on-year decrease in January 2009. This was coupled with other negative factors, such as a further deterioration in the government's fiscal condition and electric power rationing in the aftermath of the Great East Japan Earthquake. As a result, Japan's real GDP dropped sharply.

Abenomics from 2013 onward

One of the policy pillars of Abenomics launched in 2013 is monetary easing. The BOJ's policy prior to that was like stepping on the brake and gas pedal at the same time; the central bank was trying to end deflation by easing the monetary policy, but it was afraid of inflation. Since Prime Minister Shinzo Abe came into office, the BOJ has been compromising on the stability of the financial system to prioritize ending deflation. As a result, the yen has weakened significantly, which led to a recovery in exports, corporate profits, and stock prices. Japan's nominal GDP also bottomed out in 2012 and has been on a recovery trend since.

Another policy pillar, or the second arrow of Abenomics, aims to bring about economic recovery by increasing fiscal spending while at the same time raising the consumption tax rate. But I am afraid problems remain regarding fiscal reconstruction. With the third arrow, which is targeted at the successful conclusion of the Trans-Pacific Partnership (TPP) and the promotion of structural reform, the government wants to boost productivity and thereby achieve an increase in real national income.

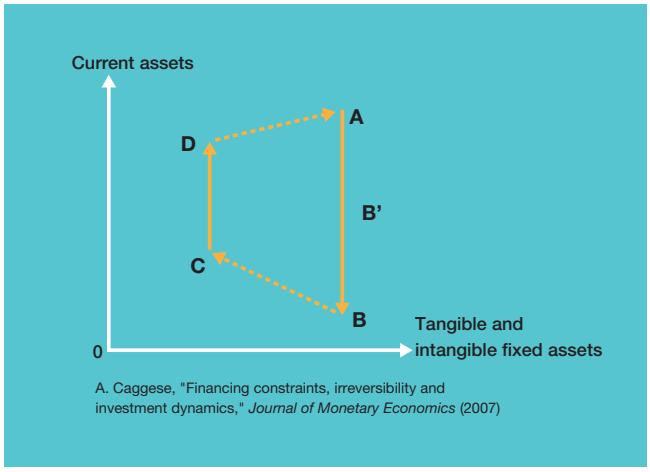
Importance of a long-term vision

In order to achieve those goals, it is crucial to have a long-term perspective. When corporations suffer a contraction in their business activities due to a recession or lower productivity, they want to reduce both fixed and current assets. However, since reducing fixed assets is no easy task, they are typically compelled to cut down only on current assets, and often they do so too much and way beyond the equilibrium point (moving from Point A to Point B in the figure) particularly where there exist financing constraints. This will be followed by a gradual decrease in the value of fixed assets toward a contracted equilibrium (moving from Point B to Point C in the figure). In the early stage of an economic recovery, current assets begin to increase first while fixed assets are slow to pick up (moving from Point C to Point D in the figure). Only after the recovery moves into a full-blown stage will fixed assets begin to increase. Such is the typical

pattern of adjustments in corporate asset holdings in response to business cycle fluctuations. Therefore, when the economy turns up, current assets show a relatively quick recovery, as seen in an increase in inventory investment and production, but investment in fixed assets is slow to follow.

Since the mid-1990s, Japanese companies have reduced the number of new hires and job-training opportunities, and they have been also cutting back on investment in research and development (R&D) and advertisement. In other words, they have reduced investment in intangible assets. Not only did this slow economic growth, but also it has created a situation where the lifetime income of the young and future generations falls below that of the older generations, causing many young people to postpone marriage and family making and thus resulting in a population decline. As Japan's fiscal condition continues to deteriorate, its social overhead capital is being depleted, people start worrying about their future pensions and medical benefits, and the government is not making sufficient investment in education. In order to cut this vicious circle, restoring growth is imperative.

Figure: Irreversibility of fixed assets and credit constraints current assets



A. Caggese, "Financing constraints, irreversibility and investment dynamics," *Journal of Monetary Economics* (2007)

Necessity of fiscal reconstruction

The International Monetary Fund (IMF) Fiscal Monitor published in April 2014 shows that Japan's net government debt-to-GDP ratio has been continuing to rise at an extremely high level, reaching 170% in 2013. Simply servicing the existing debt would require a fiscal surplus of 1.7% of GDP. That, however, is a far cry from the ongoing critical condition; Japan's primary fiscal balance—which was maintaining a surplus of 1.7% of GDP in the 1980s—turned negative in the 1990s with a deficit level at 0.6% of GDP, and the size of the deficit continued to increase to 4.4% in 2000 and 7.8% in 2013.

Shaping policies for the future of Japan

A 1.5 percentage point increase in the nominal interest rate on government bonds, whether due to an increase in credit spreads or growing inflation expectations, would increase Japan's fiscal deficit by 2.6 percentage points as a percentage of GDP. Furthermore, the outright purchases of government bonds by the BOJ would further increase credit spreads and inflation expectations.

Therefore, the BOJ must end deflation and increase nominal income. And the government should press forward with its comprehensive tax and social security reform and structural reform. Since social security represents the largest area of government spending, carrying out fiscal reform without cutting into this area is nearly impossible. The minimum pensionable age must be raised in a step-by-step manner. Otherwise, Japan's fiscal path would not be sustained.

Under the current taxation structure in Japan, the progress portion of the national individual income tax is not necessarily in accord with changes in price levels. Thus, an increase in the nominal income of people would be likely to lead to an improvement in the fiscal situation. With regard to structural reform, the impact of an expected population decline would be

negated to a significant extent by trading with countries with large populations. It is also about time for Japanese companies to adopt a long-term perspective and accelerate investment in intangible assets.

The household, corporate, and government sectors need to create a system where people can choose to work longer years when the minimum pensionable age is raised, but they would not necessarily need to work fulltime. Education and job training are important as a means to increase intangible assets. The Japanese system as a whole should make a gradual shift toward a system that facilitates the employment of women, elderly people, and foreign nationals by allowing for diverse working styles.

Q&A

Q Do you think that the lowering of corporate tax rates will lead to greater investment?

A

A reduction in tax burdens will certainly enable companies to accumulate net assets more easily. I believe it is correct to say that when that happens, financing would become easier and those companies that have many investment opportunities but face credit constraints would increase investment. A weaker yen also helps increase net assets of exporting companies.

Q Although Abenomics has led to an upturn in corporate earnings and a remarkable recovery in stock prices, exports have not recovered as strongly as expected. Is this just a matter of time lag or a result of certain structural problems?

A

It is true that the real volume of exports increased by only 2% despite a significant weakening of the yen. One reason behind this is the growth of vertical trade, in the course of which Japanese exporters have relocated much of their manufacturing operations to countries with a freer trade regime in a bid to avoid higher tariffs. Therefore, in addition to seeking a favorable currency exchange rate, Japan needs to implement further trade liberalization, not only in the area of tariff reduction and elimination but also in terms of removing regulatory impediments. In that context, the TPP holds the key to reviving Japanese exports.

Also, we should remember that Japan's exports and imports move in tandem as the vast majority of its trade is accounted for by intermediate goods. And, in order to boost both exports and imports, it is necessary to push forward trade liberalization. Overseas direct investment by Japanese companies does not necessarily reduce domestic jobs. I believe that the liberalization of capital and trade flows will become increasingly important in the coming years.

Q I believe that Japan is currently in the phase of shifting from deflation to moderate inflation. How do you assess the current situation in terms of its relation with the BOJ's quantitative easing policy?

A

Prior to Abenomics, the BOJ was keeping an eye on both deflation and inflation, and it was particularly concerned about the interest rate risk. At the moment, I am not so much concerned about the inflation risk. I would rather think that the interest rate risk might surface first. So, I think that prioritizing measures to stop deflation is the right decision.

Q If the government and the BOJ are to have a realistic, long-term vision by avoiding the upward bias, what goals and targets do you think should be included?

A

That is a difficult task because you cannot draw up a vision unless you assume a bright future to some extent. Also, it is the nature of politics to favor higher—rather than lower—growth forecasts because that would allow for greater fiscal spending.

However, a good economy does not come without cost. In order to improve fiscal health, it is necessary to cut expenditure and increase taxes. And, in order to achieve growth, we all have to work, by which I mean that both companies and households must do what they are supposed to and pay what they are supposed to pay. Things will not work themselves out.

Q Aggressive fiscal and monetary policies under Abenomics have achieved a remarkable economic turnaround. In addition to this, I believe it is also important to spur business activities. However, Japanese companies are not responding as quickly as to keep up with the pace of policy change. Business demand for funds remains weak, and I do not think that Japanese companies are fully demonstrating their vitality. What do you think is necessary in order to boost the vitality of the business sector and enable Japanese companies to develop a more forward-looking perspective on the future as quickly as possible?

A

The essential nature of business is to earn returns by contributing to the society. When companies find what contribution they can make, it will lead to profits in the long run. So, it is important to look for and identify what they can do. In this vast world, there are many things you can do for society. In many countries in Africa and other parts of the world, people are living in poverty. Helping to improve their living standards is a significant contribution to the society. You go there and you can see it yourself. There are many extremely poor countries where people live in incredibly harsh conditions.

In the past, when Japanese manufacturers were developing new products one after another, those engaged in the development loved and had a passion for their products, and they were confident that they would be able to contribute to the world through their products. Entrepreneurs should have such a spirit.

Q What problems do you find with Prime Minister Abe's growth strategy?

A

What I find most problematic is the old-fashioned way of public spending. The growth strategy calls for increasing public investment in areas where marginal productivity is low such as the further construction of roads and expansion of the shinkansen bullet train networks.

Research Activities at RIETI

Under the third medium-term plan (fiscal 2011 to fiscal 2015), RIETI makes it its mission to undertake theoretical and empirical research to create a grand design for putting the Japanese economy on a growth path and solidifying sustainable growth in the future. To this end, we will proceed with research activity by invariably bearing in mind the Three Priority Viewpoints on economic and industrial policies (see below). Based on the Three Priority Viewpoints, nine Research Programs have been established. With each Research Program representing a set of interrelated policies, altogether they will cover a broad range of policy areas. Several Research Projects are to be conducted under these nine Research Programs. Depending on the progress we are able to make in the nine Research Programs or the potential necessity to explore new research areas due to changing economic conditions, we will either alter or add to our current research programs as needed.

The Three Priority Viewpoints on economic and industrial policies:

1) **Incorporating growth of the world economy;**
2) **Developing new growth areas;**
3) **Responding to changes in society and creating new economic and social systems for sustainable growth.**

Research Process

To further improve on the quality of research, RIETI ensures that at least three discussion fora are organized for each research project through workshops and symposiums, where Japanese and foreign experts and policymakers participate to deepen the research.

Research Digest

Research Digest is a clear and concise summary of the main points and issues with policy implications that have been raised in RIETI Discussion Papers.

Recent Findings on China's Exports Taking Account of Exchange Rates throughout the Supply Chain

Willem Thorbecke
Senior Fellow, RIETI

Measuring the Value of Time in Freight Transportation

Yoko Konishi
Senior Fellow, RIETI

Columns

With columns that are written by RIETI fellows, the fellows share research project results and discuss key economic, political, and social policy issues.

Lost in Translation? National characters and perception of "innovation"

Akira Goto
Faculty Fellow, RIETI

Growing Flow of Technology Drain: Considerations in measuring impacts and planning measures

Isamu Yamauchi
Fellow, RIETI

The Chinese Labor Market: High unemployment coexisting with a labor shortage

Liu Yang
Fellow, RIETI

What Impact Does Restoration of Political Stability Have on the Real Economy?

Arata Ito
Fellow, RIETI

Introduction of the Nine Research Programs

01. **International Trade and Investment**
02. **International Macroeconomics**
03. **Regional Economies**
04. **Technology and Innovation**
05. **Raising Industrial and Firm Productivity**
06. **New Industrial Policy**
07. **Human Capital**
08. **Social Security, Taxation, and Public Finance**
09. **Policy History and Policy Assessment**

Recent Findings on China's Exports Taking Account of Exchange Rates throughout the Supply Chain

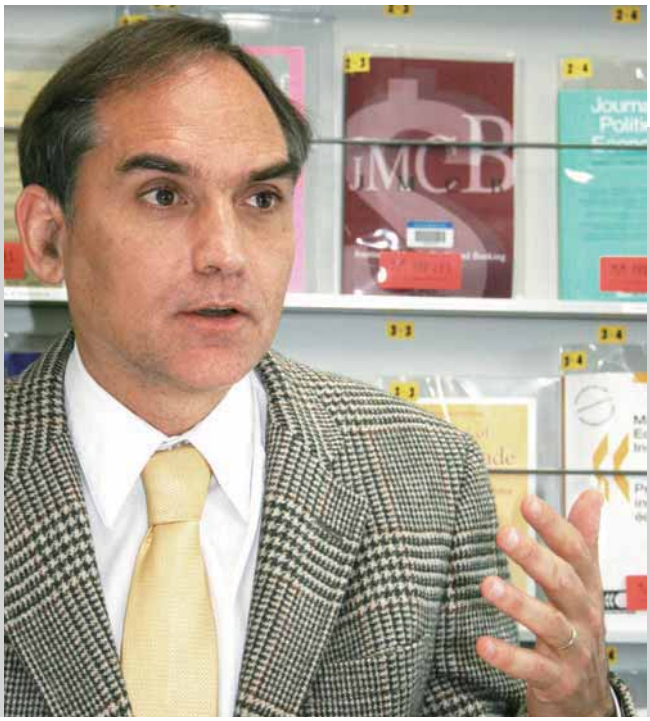
Willem **Thorbecke**
Senior Fellow, RIETI

Export-led growth was adopted by Japan and later by East Asian neighbors. An external orientation, high saving and investment rates, and flexible labor markets multiplied growth.

China's export-led growth is costly however. Pollution reduces life expectancies and contaminates arable land. China has accumulated U.S. bonds to reduce exchange rates. The resulting returns are lower than returns from investing in rural health and education. Banks have had to hold sterilization bills and excess reserves, eroding their profitability. China's currency intervention has also transferred resources from Chinese consumers to producers, reducing consumption.

Evidence indicates that a renminbi (RMB) appreciation would reduce labor-intensive exports. For sophisticated exports, much of the value-added comes from East Asian inputs. Exchange rates throughout the region should thus affect their price competitiveness. Results confirm this.

The RMB has appreciated by 36% since 2005 but exchange rates in supply chain countries have depreciated. Thus, according to Thorbecke's measure, the competitiveness of sophisticated exports has not changed, contributing to China's $400 billion surplus in these goods. The RMB appreciation has reduced China's labor-intensive exports, contributing to a deficit in these goods. Thorbecke also notes that, if central banks slowed their reserve accumulation, their trade surpluses would generate concerted appreciations of East Asian currencies and redirect exports to Asian consumers.



Profile

Willem Thorbecke is a senior fellow at RIETI. He was a professor of economics at George Mason University and has worked at research institutes such as the ADB-Institute in Tokyo, Japan; the Levy Economics Institute in Annandale-on-Hudson, New York; the Social Security Administration in Washington, DC; the Centre D'Etudes Prospectives et D'Information Internationales in Paris, France; and the Cowles Foundation at Yale University in New Haven, Connecticut. His recent works include: "The Contribution of the Yen Appreciation since 2007 to the Japanese Economic Debacle," *Journal of the Japanese and International Economies*, Vol. 31, 2014, 1-15; "Investigating China's Disaggregated Processed Exports: Evidence that Both the RMB and Exchange Rates in Supply Chain Countries Matter," *The World Economy*, Vol. 36, 2013, 1245-1260; and "Are Chinese Imports Sensitive to Exchange Rate Changes?" *China Economic Policy Review*, Vol. 1, 2012, 1-15, (with Gordon Smith).

— Could you tell us what motivated you to undertake your research project?

Export-led growth produced an economic miracle. In Japan, Saburo Okita and others developed this strategy in the 1950s. South Korea and Taiwan embraced this approach in the 1960s. The Association of Southeast Asian Nations (ASEAN) countries followed suit in the 1970s. An export-oriented approach combined with high public and private saving rates, high rates of investment in physical and human capital, flexible labor markets, and pragmatic policies helped increase per capita income in East Asia at rates that are unparalleled in economic history.

China adopted an outward orientation in the 1990s. Since then, its exports have followed two tracks. One track—processed exports—refers to final goods such as computers produced using parts and components that are imported primarily from East Asia. The other track—ordinary exports—refers to goods produced largely with domestic inputs. Initially, these were lower end goods such as apparel and toys, but over the last few years, ordinary exports have included sophisticated products such as smart phones. After 1993, China's processed exports increased 20 times to reach $860 billion in 2013 and its ordinary exports increased 25 times to reach $1.06 trillion.

Chinese economists, however, have pointed out several problems with this growth model. One factor is that market distortions have made China's exports more competitive. These include artificially low land prices, real interest rates, and real exchange rates as well as administered prices for fuel and electricity and environmental laws that are not rigorously enforced. These distortions have imposed large external costs on Chinese citizens. For instance, air pollution in China reduces people's life expectancy by many years and polluting industries have spewed toxins that contaminate the land and cause cancer.

Another problem with China's export-led growth is that, to maintain competitive exchange rates, it has accumulated trillions of dollars' worth of U.S. Treasury bonds and other foreign exchange reserves. Private and social returns from investing in U.S. Treasuries are far lower than the returns available from investing in rural education in China and in remedying economic deficiencies in ways that would benefit the non-tradable sector. In addition, accumulating foreign reserves increases the money supply. To mop up liquidity, the People's Bank of China must force commercial banks to purchase central bank bills and to hold excess reserves. This erodes bank profitability and interferes with the allocation of credit. It also causes small and medium-sized enterprises that employ the majority of workers to face difficulties in obtaining bank loans. Thus, China's strategy leads to a large misallocation of resources.

A third problem is that an artificially weak currency is a distortion that transfers resources from Chinese consumers to producers. Consumers face higher import prices due to the weaker currency while producers can lower their export prices.

A fourth problem is that China's capacity to supply is so large that the rest of the world may not be able to continue absorbing China's exports. Increasing domestic demand and allowing Chinese workers to enjoy the fruits of their labor is thus of particular importance.

For these reasons, I have been interested in understanding the determinants of China's exports and how China's trade can be rebalanced.

—What kind of data and methodology did you use to investigate China's trade and what problems did you encounter?

Investigating China's ordinary exports that are produced primarily using local inputs has been straightforward. Since much of the value added of these goods comes from within China, the RMB exchange rate is a key determinant of their price competitiveness. Chinese policymakers have argued that profit margins for labor-intensive goods are thin and that an RMB appreciation would cause labor-intensive exports to plummet.

In one RIETI Discussion Paper (DP) I investigated the determinants of China's exports of carpets, clothing, fabrics, furniture, knitwear, leather, and yarns. I employed a panel data set including China's exports of these goods to 30 countries. I sought to explain exports using the bilateral RMB exchange rate with each of the importing countries, income in the importing countries, and a weighted bilateral exchange rate between the 17 other leading exporters of these labor-intensive goods and each of the importing countries. This last variable was included to control for competition between China and other countries in third markets. China's capital stock in manufacturing was also included to control for supply-side factors.

The results indicate that an appreciation of the RMB would substantially reduce China's labor-intensive exports. The results also reveal that an increase in foreign income, an appreciation among China's competitors, and an increase in the Chinese capital stock would raise China's exports. These findings are consistent with the claim that profit margins for China's labor-intensive exports are thin. They also indicate that there is substantial price competition between exporters of these lower end goods.

Investigating China's processed exports is much more difficult. Much of the value added of tablet computers and smart phones comes from parts and components produced in South Korea, Taiwan, and other predominantly East Asian economies. Thus, exchange rates throughout the region should affect the price competitiveness of these goods.

In a series of RIETI DPs, I constructed value-added exchange rates for processed exports. For instance, in the recent DP entitled "Measuring the Competitiveness of China's Processed Exports" (No. 14-E-049), I used a panel data set on processed exports from China to the 24 leading importing countries. To compute an exchange rate across the supply chain for these countries, I calculated value-added in processed exports for China and the nine primary supply chain countries. The nine primary suppliers, ordered by their contribution in 2013, are South Korea, Taiwan, Japan, the United States, Malaysia, Thailand, Singapore, Germany, and the Philippines. I used this integrated bilateral real exchange rate between supply chain countries (including China) and each of the 24 importing countries as an explanatory variable. In addition, I included income in the importing countries and China's stock of foreign direct investment (FDI) as explanatory variables. China's stock of FDI is

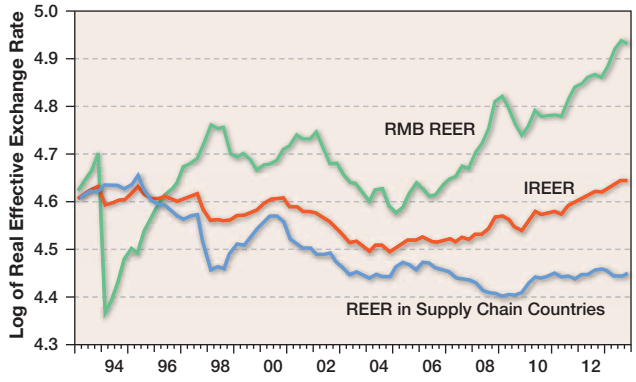
included because foreign invested enterprises play an important role in producing processed exports. The results indicate that exchange rates throughout the supply chain exert important effects on processed exports.

As a second test, I used China's aggregate processed exports to the world as the dependent variable. For explanatory variables, I employed the gross domestic product (GDP) in the rest of the world, the Chinese FDI stock, and real effective exchange rates (REER) in China and in the nine supply chain countries weighted by each of these countries' value added in processed exports. This variable is called the integrated exchange rate. The results again indicate that exchange rates throughout the supply chain and income in importing countries exert large effects on processed exports.

Another RIETI DP involved dividing China's processed exports into two categories. For one category, almost all of the value added comes from imported parts and components whereas for the other category the value added comes from both imported parts and components and from China. Regression results indicate that the first category was affected only by exchange rates in supply chain countries whereas the second category was affected both by exchange rates in supply chain countries and by the Chinese exchange rate.

Data on integrated exchange rates, the RMB REER, and the weighted REER in supply chain economies are presented in Figure 1. The figure shows that, although the RMB appreciated by 36% between 2005Q1 and 2013Q4, the integrated exchange rate only appreciated by 14%. The reason for this is that the exchange rates in key supply chain countries have depreciated.

Figure 1: The integrated real effective exchange rate (IREER), the RMB real effective exchange rate, and the weighted real effective exchange rate in supply chain countries



Source: The Bank for International Settlements, China Customs Statistics, the International Monetary Fund *International Financial Statistics*, and calculations by the author.

The appreciation of the RMB has especially reduced China's lower end ordinary exports. The offsetting depreciations in Taiwan, South Korea, and other supply chain countries imply that the price competitiveness of processed exports has been barely affected by the appreciation of the RMB. This helps explain why China's ordinary trade moved from a surplus of over $100 billion in 2007 to a deficit in 2013 while China's processing trade moved from a surplus of $250 billion in 2007 to surpluses approaching $400 billion in 2012-2013. Lower end ordinary exports are very sensitive to appreciations of the RMB while processed exports with high foreign content are less sensitive.

—What are you finding out about China's trade with the United States?

China has consistently run deficits with East Asian supply chain countries and surpluses with the United States. Figure 2 shows China's exports to the United States and U.S. exports to China. The figure shows that China's exports of all goods to the United States have soared and far outstripped U.S. exports to China. As a result, the U.S. trade deficit with China has grown, and in 2013 was almost equal to the U.S. trade deficit with all other countries combined. Since the Global Financial Crisis, there has been a major rebalancing of U.S. trade with all other countries but growing imbalances with China. U.S. exports to China equaled $120 billion in 2013 while that to the rest of the world equaled $1.5 trillion. Thus, U.S. trade with China generated the same-sized deficit as U.S. trade with all other countries, even though the value of U.S. exports to China was only 1/12th of the value of U.S. exports to the rest of the world.

In the DP entitled "China-U.S. Trade: A global outlier" (No. 14-E-039), I investigate how the RMB-U.S. dollar exchange rate and exchange rates in supply chain countries influenced China's exports to the United States. The results indicate that the RMB exchange rate matters significantly for China's exports to the United States. Thus, the more than $500 billion in foreign exchange reserves that China accumulated in 2013 to keep the RMB from appreciating against the dollar helped maintain the large imbalances that are evident in Figure 2.

Figure 2: The value of U.S. exports to China and Chinese exports to the United States

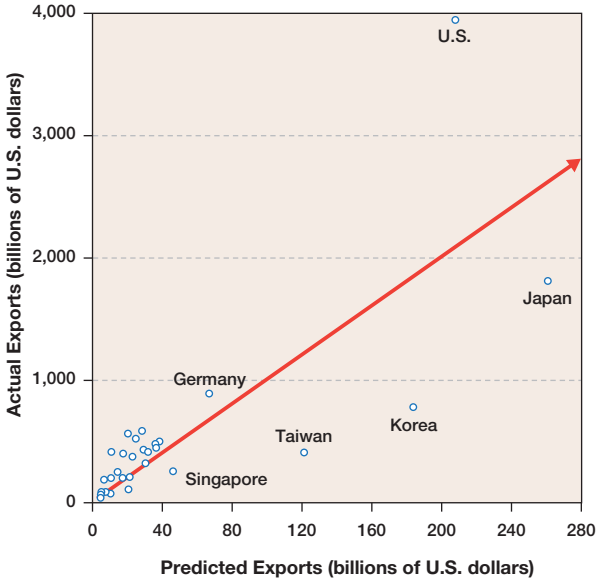
Source: U.S. Census Bureau.

Figure 2 suggests that there is something unusual about China's exports to the United States. In the DP No. 14-E-039, I investigate whether they are an outlier. Economists use gravity models as a workhorse for explaining bilateral trade flows. Traditional gravity models posit that bilateral trade between two countries is directly proportional to GDP in the two countries and inversely proportional to the distance between them. In addition to GDP and distance, these models typically include other factors affecting bilateral trade costs such as whether trading partners share a common language.

Figure 3 plots China's predicted and actual exports in 2012. In the figure, values above the diagonal line indicate that exports are more than predicted, and values below the line indicate that exports are less than predicted. The vertical distance between the observation and the diagonal line measures the degree of over- or under- prediction. The figure indicates that China's predicted exports to the United States in 2012 were $209 billion while China's actual exports were $395 billion. Thus, China's exports to the United States

were almost twice as large as predicted, with the difference between the actual and predicted values equaling $186 billion. Figure 3 also indicates that China's exports to South Korea, Taiwan, Japan, and Singapore in 2012 were much less than predicted. For South Korea, the shortfall was $107 billion; for Taiwan, $83 billion; for Japan, $81 billion, and for Singapore, $22 billion. In percentage terms of the predicted value, South Korea's exports were 42%; Taiwan's were 32%; Japan's were 69%; and Singapore's were 52%. The results in the paper indicate that there is especially robust evidence that China's exports to South Korea and Taiwan in 2012 were large negative outliers. For every year after 2007, China's exports to the United States have been between $140 billion and $190 billion more than predicted, and for China's exports to South Korea, Taiwan, and Japan, they were more than $50 billion less than predicted.

Figure 3: China's actual and predicted exports to 30 countries in 2012



Note: Predicted exports are determined by a gravity model for trade between 31 leading exporters over the 1988-2012 period.
Source: CEPII-CHELEM Database and calculations by the author.

—What are the policy implications of your work?

I agree with the Chinese economists who argue that reserve accumulation to maintain a competitive exchange rate is an inferior investment and that the associated sterilization policies to mop up liquidity misallocate resources. I think that Asia should move away from the export-led growth strategy that worked so well in the past.

The problem is that Asian countries devise their exchange rate strategies domestically while so much of their exports are produced within cross border production networks. The two largest suppliers of parts and components to China in 2013 were Taiwan and South Korea. Their global current account surpluses between 2005 and 2013 averaged almost 9% and almost 3% of GDP, respectively. However, Taiwan's REER depreciated over this period and Korea's REER appreciated by less than 5%. Taiwan and Korea both used foreign exchange reserve accumulation to slow the rate of appreciation. Then in 2014, as the Korean won appreciated, the RMB depreciated. So the price competitiveness of East Asia's exports is hardly affected and large surpluses with the West persist.

If central banks in China and other surplus countries together reduced their rates of reserve accumulation and gave greater play to market forces, the surpluses that they run in processing trade and in their overall current account balances would generate a concerted appreciation of East Asian currencies against importers' currencies and help to rebalance processing trade. Such an appreciation would have an attenuated effect on the export competition between East Asian economies in third countries because their currencies would be appreciating together. A joint appreciation would maintain intra-regional exchange rate stability and thus facilitate the flow of parts and components within production networks. It would also reduce the misallocation of resources that occurs when central banks sterilize the impact of reserve accumulation on domestic liquidity. Finally, it would increase citizens' purchasing power and redirect final goods to Asia. This would be helpful since less than 10% of China's, South Korea's, and Taiwan's imports in 2012 were consumption goods as compared to 20% for the eurozone and 22% for the United States.

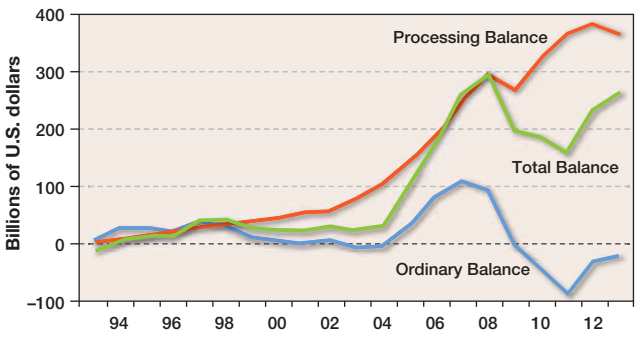
Related Disscussion Papers

Measuring the Competitiveness of China's Processed Express

Willem Thorbecke DP No. 14-E-049

China's surplus in processing trade remains large. Processed exports are final goods produced using parts and components that are imported duty free. Since much of the value added of these exports comes from East Asia, exchange rates throughout the region should affect their foreign currency prices. This paper presents data on value-added exchange rates for processed exports over the 1993-2013 period and reports that they significantly affect exports. While the RMB appreciated by 36% between the beginning of 2005 and the end of 2013, exchange rates in supply chain countries have depreciated. This has mitigated the effect of the RMB appreciation on the price competitiveness of processed exports.

Figure: China's ordinary, processing, and total trade balances



http://www.rieti.go.jp/jp/publications/dp/14e049.pdf

China-U.S. Trade: A global outlier

Willem Thorbecke DP No. 14-E-039

http://www.rieti.go.jp/jp/publications/dp/14e039.pdf

See "Introduction of the 9 Research Programs" on P.45

Measuring the Value of Time in Freight Transportation

Yoko **Konishi**
Senior Fellow, RIETI

Despite the obstacles caused by the data constraints and diversity of industrial structure, analysis of the service sector is growing in importance. Focusing on one service industry in particular—freight transportation—a research team led by Senior Fellow Yoko Konishi set about analyzing the time cost as well as the monetary cost—cost of gasoline, expressway tolls, drivers' wages, and so forth—of transportation. In contrast with prior research, which has used supply side data, this study uses shipper data on the demand side to offer a new approach to measuring the time cost of freight transportation. With repair of the nation's aging expressways now a topic of concern, this approach allows the social benefits of road improvements and new construction to be measured, thereby making possible objective discussion based on quantitative assessments.

Profile

Yoko Konishi is a senior fellow at RIETI. Starting as a fellow at RIETI in 2008, she was also an advisory committee member of the Statistical Commission, Cabinet Office in 2013; a visiting associate professor at the Institute of Economic Research, Kyoto University from 2013 to 2014; and a postdoctoral fellow for Research Abroad, Japan Society for the Promotion of Science (JSPS) from 2009 to 2011 (researched at Cowles Foundation for Research in Economics, Yale University). Her recent works include: "A Note on the Identification of Demand and Supply Shocks in Production: Decomposition of TFP," RIETI Discussion Paper, 13-E-099, 2013, (with Y. Nishiyama); "Decomposition of Supply and Demand Shocks in the Production Function using the Current Survey of Production," RIETI Discussion Paper, 13-E-003, 2013, (with Y. Nishiyama).

— What concerns prompted this paper?

We have been measuring productivity in projects which aim to decompose economic fluctuations into demand and supply factors. In economic theory, productivity is measured from the supply side as it shows the technological capabilities of the firm or business. When productivity is measured in practice using data, however, it is influenced by demand and temporary or unpredictable shocks. Our research aims to eliminate these effects in order to measure genuine productivity.

Decomposing economic fluctuations into productivity and other factors is especially difficult in the service industries, where provision (production) and consumption occur simultaneously. In service industries where patterns of production resemble those in manufacturing, conventional approaches can be employed. For example, the restaurant business bears a strong resemblance to manufacturing (excluding the final stage of service, i.e., dealing with customers) in that it procures materials, prepares meals (to produce), cooks ahead (to keep in stock), and delivers (to ship) to the waiters. In such case, it might appear that approaches used in manufacturing could be applied just as they are. However, owing partly to the absence of any measures of productivity designed specifically for service industries, it is necessary to test how productivity should be measured in each individual service industry sector.

As sectors within service industries are extraordinarily diverse, we initially focused on personal services. Ultimately, we aim to develop a model for everyday retailing. We chose

transportation this time as measuring productivity in logistics, which is part of firms' commodity purchasing, is crucial in measuring productivity in retailing. It should also be noted that transportation services play a role of linking consumers and producers.

— Measuring productivity in service industries looks tricky.

In order to investigate productivity in service industries, it is necessary first to define the sources of value added in each sector, specify the model of production structure, and then test this model using a wealth of micro-level data. In our paper, we analyzed freight transportation using microdata, and found it considerably difficult to understand the structure of transportation services.

The four of us gathered and discussed transporting goods in a great deal of depth. One of the authors, Professor Se-il Mun, is a leading expert in transport economics, but I was a novice in the field and thus started off by learning the basics in areas such as transportation law and how discounting works with electronic toll collection (ETC) systems. Before long, I also became interested in truck sizes and shapes and, for example, how loading capacities affect driving performance. Now I cannot help but check out a truck's maximum load and how many drive axles it has whenever I see one drive by. Some day I would like to go on a tour of a truck plant.

Key to understanding production structures in service industries is to know the time inputs

— What are the characteristics of service industries?

Let us answer this question by considering the freight transportation industry. The shorter the transport time is, the lower are the costs incurred by carriers, such as gasoline costs and drivers' wages. Thus, shippers in industries such as manufacturing and agriculture should enjoy greater benefits due to being able to deliver products to market more quickly and pay lower freight charges. Similarly, from the consumers' point of view, shorter transport times make it possible for perishable foods from distant locations to be delivered while still fresh, expanding the potential for consumption. Viewed in this light, "time" is evidently a factor of vital importance to transportation services.

Let us take another example: the beauty business. Professor Yoshihiko Nishiyama and I measured productivity in the beauty business and published in 2010 a discussion paper entitled "Productivity of Service Providers: Microeconometric Measurement in the Case of Hair Salons" (RIETI DP 10-E-051). Hairdressers may be assumed to offer a level of skill and quality of service commensurate with the salon where they work, with more highly skilled hairdressers being able to provide a certain level of haircut more quickly than less skilled ones. It may also be assumed that customer satisfaction declines if too much time is spent on giving the final touches to a haircut. In other words, time required declines as skill increases, and, as a result, customer satisfaction increases as the quality of service per unit of time increases. Additionally, a salon's turnover increases as its hairdressers' productivity increases. When we wrote this paper, Professor Mun observed that some aspects of this approach to "time" might also be applicable to the transportation industry, and that is how this research got underway.

— So in service industries, are time inputs important?

Although this is not the case across the board in service industries, time inputs are certainly an important factor in those industries in which "time" is closely related to skill and customer satisfaction with the service provided. In the transportation industry, reductions in transport time and technological progress are inextricably linked. In our paper, we assumed transport cost to be expressed by monetary cost and time cost. Working on this basis, our objective was to measure the time value of transportation services.

Monetary cost consists of expenditures for gasoline cost and wage payment to drivers, which are easy to grasp. Time cost, however, is less familiar and is calculated by multiplying transit time by the time value obtained by converting the reduction in transport time to the corresponding monetary saving (in yen).

This works out as follows:

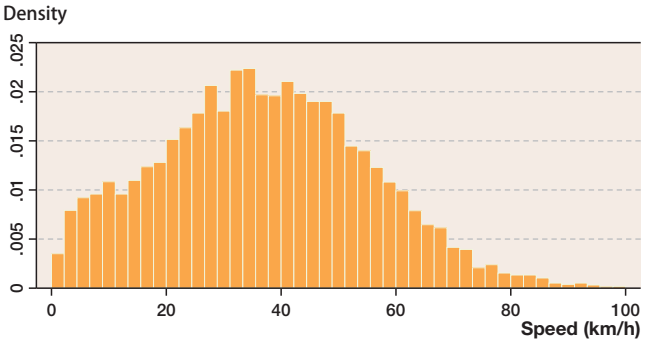
transport cost = monetary cost + time cost
time cost = value of time * transport time

With truck transportation, average speeds vary and delivery times are concentrated within 24 hours

— Could you give us an overall picture of the situation in truck transportation?

Figure 1 shows the average speeds in truck transportation, from which we can observe that they vary. Such variation cannot be explained solely by factors such as road conditions, vehicles' performances, and drivers' skills. This suggests that carriers adjust arrival times; shippers' demands regarding delivery times vary.

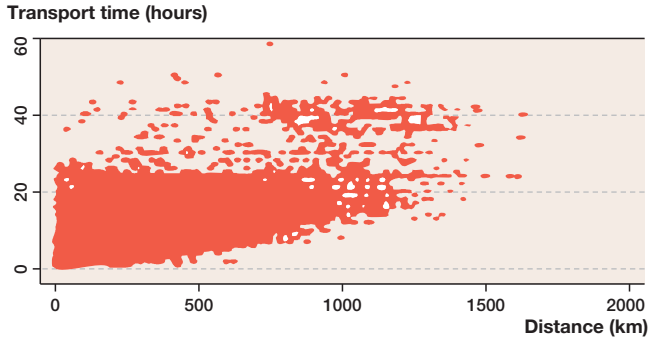
Figure 1: Distribution of average transportation speeds



Furthermore, let us consider the relationship between transport time and distance (Figure 2). Even over a distance of 500 km, for instance, transport times are quite different among shipments. It can be observed that transport times are concentrated around the 24-hour mark, regardless of distance. Whether or not transport time exceeds one day is an important concern when transporting goods.

Underlying the variations in average transport speeds and times among shipments, we assume that various adjustments and ideas are employed by carriers in an effort to provide transportation services efficiently while meeting shippers' requests.

Figure 2: Transport times against distance



— Could you let us know about the focus of analysis in your paper?

Our paper is distinguished by three features. First, it takes as its object of analysis freight transportation. Most of the existing literature on measuring value of time has focused on passenger transportation, and few contributions have been made on freight transportation due to the data constraints and its structural complexity. Furthermore, freight transport flows are highly heterogeneous: transported goods vary widely in size, weight, as well as in their contents. Pricing structures also differ depending on weight, distance, and other factors. As over 90% of freight in Japan is transported by truck, we selected truck transportation as the object of analysis for our paper.

Second, our paper is distinguished by its use of microdata from shippers rather than carrier data.

— What kind of microdata did you use?

Two methods of measuring the value of time for freight transportation services commonly used in previous studies are the "factor cost method" and the "willingness-to-pay method." The former is based on the calculation of the monetary value of time saving from a carrier's cost reduction, and the latter is based on how much a carrier is willing to pay in tolls in order to save time by using expressways and similar means. However, it is natural to assume that the value of time for freight transportation to be reflected in the freight charges depends on whether or not a shipper (demand side) requests time-designated delivery or pays expressway tolls.

In our study, therefore, we used shipper (demand side) data instead of carrier (supply side) data. More specifically, we used microdata from the Net Freight Flow Census (NFFC) conducted by the Ministry of Land, Infrastructure, Transport and Tourism. This is a survey of manufacturing and wholesaling establishments; in other words, shippers. This data can be used to obtain information on origins and destinations at the municipal level, cargo weights, transport times, use (or not) of expressways, and specification (or not) of a time-designated delivery for individual shipments over a designated 3-day period in 2005. As this study focused on truck transportation, we excluded observations in regions that are inaccessible via road networks, namely, Hokkaido, Okinawa, and other islands. We assumed one truck is allocated for each shipment and used 42,823 samples for time-designated delivery and 5,130 for no time-designated delivery.

The third feature is our focus on the variation in average speeds and transport times as shown in Figures 1 and 2. Factors such as advances in technology—e.g., improvements in the performances and fuel efficiency of trucks themselves—and improvement of infrastructures—e.g., expansion, maintenance of expressways—all contribute to reducing transport time. However, the efforts made by carriers off the road must also be noticed. These include, for example, the accumulation of expertise in the smooth loading and unloading of cargoes and the cumulative impact of minor innovations in the form of tweaks to drivers' break times and allocation of human resources. These are considered to contribute to improvements in the productivity and efficiency of transportation. In considering time cost, therefore, we distinguished between improvements in truck performance and carriers' efforts contributing to reducing transport time and included this in our model.

Modeling the freight transportation market: Higher charges for faster delivery

— Please describe the specific methods of your analysis.

In our paper, we analyzed the freight transportation market. On the demand side are shippers, and on the supply side are carriers. Shippers are assumed to prefer shorter transport times and therefore to choose carriers so as to minimize the sum of freight charges plus time cost.

Carriers, on the other hand, aim to maximize profits after deducting costs such as drivers' wage, truck rental, gasoline cost, and expressway tolls from freight revenues. We assumed that freight charges are determined when supply and demand are in a state of equilibrium. In our paper, expressway usage and transport time are supposed to be endogenous variables in determining the freight charge function. Carriers decide whether to use expressways according to circumstances, and this impacts transport time. Thus, we first estimated the expressway choice function, transport time function, and freight charge function, and then determined the value of time of transportation services.

— What are the results of your analysis?

Using our method, it is possible to measure the value of time for various combinations of distances and cargo weights. By measuring the values of transport time for shippers of a 4-ton cargo over 200 km, which was the average combination in the sample, we obtained a value of 1,232 yen/hour for time-designated delivery and 1,966 yen/hour for no-time designated delivery. These values represent the extra amount of money that a shipper would be willing to pay to reduce transport time by one hour.

The method developed for measuring freight transportation can also be applied for analyzing other social capital

— What are the policy implications of your paper?

We calculated the social benefit arising from time saving by constructing expressways. The social benefit is calculated by the following formula:

benefit = (freight charge without expressway + time cost) – (freight charge with expressway + time cost) + expressway toll

Table 1: Social benefit from time saving by expressway construction (For the case of time-designated delivery)

Weight (t)	Distance (km)	(A) Expressway toll (yen)	(B) Sum of freight charge + time cost (yen)	(A)+(B) Social benefit of expressway construction (yen)
2	100	1008.9	636.4	1645.3
	200	1857.3	989.1	2846.4
	400	3808.5	1469.9	5278.4
	800	8966.2	2233.9	11200.1
4	100	1181.8	626.8	1808.7
	200	2167.9	965.5	3133.4
	400	4411.9	1416.3	5828.3
	800	10298.9	2119.5	12418.3
6	100	1533.4	703.4	2236.8
	200	2747.6	987.4	3735.0
	400	5369.4	1309.4	6678.8
	800	11860.0	1683.9	13544.0
8	100	1540.4	706.9	2247.3
	200	2772.3	794.4	3566.7
	400	5458.4	1792.3	7250.7
	800	12191.3	4307.4	16498.6
16	100	1555.3	1503.6	3058.8
	200	2823.9	3313.0	6136.9
	400	5644.8	7588.5	13233.4
	800	12876.0	18625.2	31501.2

Note that the use of expressways involves toll payment. From the society as a whole, toll payments and receipts should cancel one another out, and, accordingly, we should add the revenue from expressway tolls to the last term of the above formula.

The benefit enjoyed by shippers in the case of new expressway construction (decline in freight charge + time cost: [B]) is shown in column 3 of Table 1. Column 4 (A+B) represents the social benefit, which can be obtained from adding the benefit to expressway tolls. The social benefit is greater for longer distance when cargo weight is constant, and for heavier cargos with fixed distance. The social benefit in the average case where cargo weight is four tons and distance is 200 km is 3,133 yen, which is greater than that calculated by other methods described above (3,088 yen and 2,084 yen) using data on carriers. Considering also that expressway construction mitigates traffic congestion, the social benefit of building expressways is likely to be still greater.

With Japan's expressways aging, the need for repairs to be made has become a topic of concern. However, objectively discussing the importance of elements of social infrastructure such as expressways and the need for injections of funds is no easy matter. Applying the method that we have developed will make it possible to measure the social benefit arising from, for example, the construction of new expressways and so contribute to furthering objective discussion.

— Could you tell us about what would be your future research agenda?

We try to perform more realistic analyses. At present, we use regional data to take into account the degree of competition of carriers at the prefectural level, population size, volume of physical distribution between two points, and other such factors. Yet, freight charges and value of time for transportation over, say, 300 km between Tokyo and Nagoya and the same 300 km travelled entirely on the island of Kyushu are likely to differ. In the future, therefore, we would like to create analytical and statistical models that allow the use of more detailed location and spatial data. For the sake of simplicity, in this study, we focused on transport service where a single chartered truck transports the goods ordered by a single shipper. In practice, though, trucks often transport consolidated shipments for multiple shippers, upon which we would like to try to model despite the greater complexity involved.

Looking further ahead, we aim to follow up our work on logistics by analyzing retailing. Here, too, there is a need for analyses based on information on the demand side, i.e., consumers, rather than relying on supply side data from retailers. In this sense, our analysis of the freight transportation industry represents an important step toward analysis of retailing.

COLUMN

Lost in Translation? National characters and perception of "innovation"

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What is perceived to be an innovation?

How innovative does something have to be in order to be perceived as an innovation? Is the expected degree of innovativeness the same across all countries? Consider the following case examples:

1. A photographic film manufacturer was first to use photographic film technology in developing a protective film for liquid crystal display screens.
2. A manufacturer, continuously advancing in energy-efficiency for their products, has reduced the annual energy consumption of its latest large home-use refrigerator model by 5%.
3. An anti-virus software vendor has released a virus detection program to counter a new type of computer virus.

Asked whether they perceive Case 1 to be an innovation, 34.5% of Japanese respondents said they do, compared to 54.1% of Americans and 46.4% of Germans. Likewise, Case 2 is perceived to be an innovation by 14.9% of the Japanese, 32.4% of Americans, and 30.4% of Germans, and Case 3 by 7.9% of the Japanese, 32.3% of Americans, and 23.0% of Germans.

These are some of the findings from a very interesting and meticulous survey conducted by Yutaka Yonetani, a researcher at the National Institute of Science and Technology Policy (NISTEP). The survey presented a total of 25 case examples such as those listed above and asked respondents in Japan, the United States, and Germany whether each of those cases constitutes an innovation. Overall, the proportion of respondents recognizing innovativeness is the highest in the United States and the lowest is in Japan with Germany in between. (For the details of the survey, refer to Yonetani, Y., "A Report on the Comparative Survey regarding the Perception of 'Innovation' in Japan, USA and Germany," NISTEP *Research Material* No. 208, March 2013).

The survey was conducted in a way to answer my long-standing question. In 1997, I conducted the first-ever innovation survey (questionnaire survey) in Japan, with the same survey carried out by my fellow researchers in the United States, to compare the two countries regarding the appropriation of innovations (See Cohen, W., A. Goto, A. Nagata, R. Nelson, and J. Walsh, "R&D Spillovers, Patents and the Incentives to Innovate in Japan and the United States," *Research Policy*, Vol.31, 2002, pp.1349-1367).

Perception of innovation differs across countries

In the course of this joint research, I realized that my American colleagues and I have different ideas of what constitutes an innovation. Simply put, even those that seemed to be no big deal to me were regarded as innovations by them. It would be reasonable to define "innovation" as a product or production method that is novel and different from existing ones. But this brought me to another question: Do we all have the same idea about the degree of differences that would make a product or production method an innovation? I suspect that different countries have different ideas.

In Japan, the term "innovation"—or *"inobeshon"* as pronounced in Japanese—is used as a borrowed word. As such, it may be the case that the term is taken as meaning something very impressive. If we conduct a survey of small and medium-sized enterprises (SMEs) and ask about their innovations, many of them would say that they are engaging in no such inordinately ambitious activities.

This may be related to the fact that innovation in areas other than technology such as organizational innovation has been often categorically excluded from "innovation" as perceived in Japan. The government's white paper on the economy once used *"gijutsu kakushin"* (which literally translates as "technological innovation") referring to innovation.

Innovation surveys often find that Japan has a lower percentage of businesses engaged in innovation than the United States and Europe. However, does this necessarily mean that Japanese companies are not innovative? Such survey findings might be in no small part attributable to differences in the perception of innovation.

The aforementioned survey by NISTEP was conducted in response to this long-standing question of mine, and, as discussed above, my suspicion has been confirmed. Professor Patarapong Intarakumnerd, my colleague from Thailand and an innovation researcher, points to the same tendency in his country where innovation is generally perceived to be something highly sophisticated and refined. It may be the case that non-English-speaking countries, developing countries, and SMEs actually have made few achievements that can be called "innovation" regardless of its definition. However, I infer that differences in perception have had an impact on the survey results.

Appropriate criteria for what constitutes an innovation

What degree of novelty or departure from the conventional standard is enough to be considered an innovation? This is a very difficult question that gives rise to another, more fundamental question: What constitutes an innovation? Some definitions of "innovation" are provided in the Frascati Manual of the Organisation for Economic Co-operation and Development (OECD) as well as in its Oslo Manual, a set of guidelines for innovation surveys, but

they do not provide an answer to the question. It is impossible just to draw a line on a continuous spectrum of the degree of novelty or departure from the conventional standard to separate those that are considered innovations and those that are not. This means that international comparative studies of innovations may end up providing wrong interpretations of survey findings if they fail to pay due consideration to country-specific systematic bias. Although we may all talk about innovation, what we have in mind can be quite different depending on our nationality.

COLUMN

Growing Flow of Technology Drain: Considerations in measuring impacts and planning measures

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Concerns over the growing flow of technology drain

Lately, cases of trade secrets and technology draining from Japanese companies to their foreign rivals have been making headlines in the media. Including those that have gone unnoticed, there may be a significant number of such episodes. Technology drain makes it difficult for originator companies to secure revenue stream from their successful outcomes of research and development (R&D) activities (because the appropriability of technology—i.e., inventing companies' ability to maintain possession of their inventions—decreases), and therefore may seriously hamper innovation activities, which are a key driver of economic growth.

Prompted by such concerns, Japan is currently reviewing the Unfair Competition Prevention Act for amendments to provide greater protection for trade secrets. However, in order to be eligible for protection under the law, trade secrets must fulfill certain criteria, and, in many cases, technological knowledge that has been acquired and become integral part of human knowledge fail to do so (Note 1).

We often hear people say that one big reason behind the decline of Japanese electrical and electronics manufacturers and the rise of their South Korean counterparts in recent years is the draining of Japanese engineers and their technological knowledge to South Korea. What they have in mind is exactly the type of technology that cannot be protected under the Unfair Competition Prevention Act.

However, to what extent can this argument be supported by objective data? Since we can track the migration of Japanese engineers to some extent by using data on the inventors of patent applications, it may be possible to find a relatively precise answer to this question.

In this column, I would like to show, in a simplistic way, how we can approach the problem of technology drain by using patent application data.

Roles of Japanese engineers in South Korean companies

The table, shown in the next page, lists some of the inventors who moved from Japanese companies to Samsung SDI extracted from data on patent applications in the field of lithium ion batteries, where the market share of Japanese companies has been overtaken by South Korean companies. For instance, H.Y. at the top of the list filed patent applications as an inventor belonging to Sanyo GS Soft Energy Co., Ltd. until some point in 2003, but, thereafter through 2006, his/her affiliation was filed with Samsung SDI in the applications (Note 2).

Similar attempts to capture the state of technology drain from Japanese companies to Samsung SDI have been made in an article published in the *Nikkei Business Online* (Muto (2013)) and another in the *Weekly Diamond* magazine (November 16, 2013 issue). However, what is more important is to analyze what types of engineers have moved to South Korean companies and what roles they are playing there. A Japanese engineer doing research alone in a South Korean company may help the company improve competitive advantage, but probably not to the point where it will pose a major long-term threat in terms of technology competition because a significant accumulation of technological knowledge is unlikely to occur.

Though this is just an overview of data, our research has found some general tendencies in the migration of engineers from Japan to South Korea, as described below. (Please note that these findings are hypothetical as they have not been subjected to rigorous econometric analysis or testing).

To begin with, headhunting of top class engineers is surely taking place (for instance, N.Y. listed in the table was among the top in Japan in terms of the number of patent applications in the field of lithium ion batteries). After migration, those engineers typically work on inventions jointly with researchers of their new companies. It is thus believed that they are making considerable contributions to the development of the engineers in their new companies.

However, there have been very few cases of such high end headhunting and the vast majority of engineers recruited by South Korean companies are of an average skill level—i.e., those comparable or slightly inferior to their original colleagues in terms of the number of patent applications filed—who must have been affected by the streamlining of operations by Japanese companies (for instance, the number of patent applications filed by H.Y. and K.M. prior to moving to Samsung SDI was about average at Sanyo

GS Soft Energy, which they joined around the time when GS-Melcotec Co., Ltd., their initial employer and a subsidiary of Japan Storage Battery Co., Ltd., was merged into Sanyo Electric Co., Ltd.).

The productivity of those average skill level engineers tends to improve after migration (achieving an average increase of one patent application per year, probably due to severe application quotas imposed by their new employer). As those engineers often work with other Japanese engineers (for instance, H.Y. and K.M. from Sanyo GS Soft Energy and M.H. from Toda Kogyo Corp. worked on inventions jointly at Samsung SDI), technology spillover to the new company would be limited.

By verifying those hypothetically with the quality of patents and changes in the productivity of new company inventors taken into account, we can expect to get a clear picture of what is happening (Note 3).

Table: Japanese inventors who moved to Samsung SDI (Examples)

Inventor	Affiliation before/after migration		Number of patent applications (5 years before/ after migration)	Period in which the inventor filed applications from Samsung SDI
H. Y.	Before	Sanyo GS Soft Energy Co., Ltd.	4	
	After	Samsung SDI (Yokohama Research Institute's Osaka branch)	5	2003-2006
K. M.	Before	Sanyo GS Soft Energy Co., Ltd.	4	
	After	Samsung SDI (Yokohama Research Institute's Osaka branch)	13	2003-2007
K. N.	Before	Canon Inc.	8	
	After	Samsung SDI (Yokohama Research Institute's Osaka branch)	10	2005-present
M. H.	Before	Toda Kogyo Corp.	10	
	After	Samsung SDI (Yokohama Research Institute's Osaka branch)	19	2005-2010
M. T.	Before	Sony Corporation	10	
	After	Samsung SDI (South Korea)	5	2002-2004
N. Y.	Before	Panasonic Corporation	100	
	After	Samsung SDI (South Korea)	12	2004-2005

Is technology drain always evil?

In Japan, engineers from Japanese companies moving on to their follower companies are usually talked about in a negative context. But this is the kind of practice that has been and is done in any country including Japan in the catch-up process, and this is how new technological opportunities and competition are generated.

In the United States and Europe, research on the migration of human resources tends to focus on the effects of knowledge spillover and brain drain. Here, the term "brain drain" refers to the phenomenon in which highly competent individuals who have acquired advanced knowledge and skills in their own countries emigrate, in pursuit of more favorable treatment and opportunities, to those countries where talented human resources concentrate. Thus, there are some commonalities with technology drain.

However, technology drain differs greatly from brain drain in the following two points: 1) human resources move from countries with a higher level of knowledge and technology to those with a lower level; and 2) the cost of human capital development is mostly borne by source companies. Thus, emotional issues aside, we can say that the focus of criticism on technology drain is on the problem of free riding on the human resources development and R&D borne by others for catch-up purposes (Note 4).

This free riding is difficult to prevent. Human resources development and R&D inevitably involve uncertainty. However, companies poaching established engineers do not bear any part of the cost of their training. They are also free from the risk of all such training producing nothing. That is why those new employers can offer higher wages than source companies and yet secure sufficient profits. Meanwhile, it is only natural for engineers to move on to a company where their technological skills and knowledge are more highly valued, if their current employer has poor performance and they are dissatisfied with how they are treated. If free riding becomes widespread in this manner, incentives for investing in the development of human resources and R&D will diminish.

Of course, migration may turn out to be a new opportunity for engineers to demonstrate their abilities, which have been sealed off and unused at their current workplace due to worsening business performance, at another company launching a new project, and, if so, increase social welfare (measured at the global level) will increase in the short term. However, considering its long-term effects on R&D incentives, it is questionable whether such migration truly contributes to a rise in social welfare.

Is it possible to prevent free riding?

In the end, the problem of technology drain comes down to the question of appropriability, i.e., to what extent companies are able to secure revenue from the outcome of their R&D activities (Note 5). In order to boost incentives for R&D, many countries have established a system for protecting intellectual property rights (IPRs) as a way to secure appropriability. If we apply the same idea to the development of human resources, a system for allowing companies to retain their trained researchers for a designated period of time should be established.

Increasing control over leaving employees and enforcing the contractual terms of confidentiality and non-competition agreements

more strictly would be effective. However, as an additional option and a way to safeguard the freedom of choice in employment, it is worthwhile considering introducing a system that would allow companies to charge transfer fees for employees leaving before completing the period specified in their contract (Note 6). This would have a deterring effect on free riding because companies poaching talented workers from their competitors would have to pay their share of the training cost for such workers. Although this kind of contractual terms is quite common in the world of sports, there will be many obstacles in introducing them into the general labor market. However, if there are sufficiently many Japanese companies that continue to be committed to the development and training of their engineers amid intensifying competition from their rivals from emerging economies, it may not be so long before we see the introduction of this type of contract for engineers in a somewhat modified form.

Notes

1. In order to be protected under the Unfair Competition Prevention Act, trade secrets must be: 1) managed properly as a secret, 2) useful, and 3) not in the public domain.
2. While the data used for the *Nikkei Business Online* article (Muto (2013)) are limited to applications filed with the Japan Patent Office (JPO), this article is based on patent data obtained from the JPO as well as patent authorities in China, South Korea, and the United States. It is important, when using information on inventors, to take measures to avoid problems arising from identical names by using information on the address of inventors or limiting the sample to sole applications. Meanwhile, there are an ample number of patent applications filed by major Japanese electrical and electronics manufacturers jointly with Samsung SDI, their rival. This suggests that the migration of engineers is not entirely negative as symbolized by technology drain but has its positive side as well, i.e., stimulating collaboration.
3. Though limited in the area of technology and the number of companies covered, Fujiwara and Watanabe (2013) is one of few Japanese research studies conducted using this approach.
4. The problem of free riding with regard to the cost of human resources development is not unique to engineers. However, because of the high uncertainty and the scale of investment involved in R&D activities, engineers tend to be considered separately from other types of workers.
5. The option of not migrating could be a rational choice, for instance, if migrating to a South Korean company makes it difficult to return and find a job with a Japanese company. But such a restraining mechanism would not work when inventors are nearing retirement age or in the presence of Japanese companies willing to absorb the technology of South Korean companies (actually, many of the engineers listed in the table have subsequently returned to Japanese companies). Meanwhile, if technical know-how acquired by engineers is mostly company-specific assets and not applicable in other companies, the combination of job security and seniority-based pay will increase incentives for receiving more training and effectively deter them from migrating to other companies. However, such will not be the case if the technical know-how is general assets that are useful to rival companies.
6. Under the Patent Act, rights to obtain patents for inventions resulting from corporate research activities are given—not to companies—but to individual inventors. Thus, a typical practice of many companies is to have such rights vested in them by means of bylaws such as employee rules and regulations. In return for this, employee-inventors are given the right to receive "reasonable value" for their inventions. Some people call for amending the Patent Act so that rights to obtain patents for corporate inventions would be given to companies. However, from the viewpoint of introducing some sort of transfer fee provision, employee-inventors' rights to receive "reasonable value" should be kept intact so as to help them secure reasonable bargaining power.

References

- Muto, Kenjiro (2013) "*Samsung ni Ookuno Tenshokusha o Dashita Nihon Maker wa?: Jinzai no ryushutsu mondai o tokkyo-joho kara bunseki suru* [Which Japanese manufacturers are major providers of migrant workers to Samsung?: Looking into the problem of human capital outflow by analyzing patent data]," *Nikkei Business Online*, June 5, 2013
- "*Dokusen Kokai!: Samsung ga nomikonda Nihon no gijutsu* [Exclusive Report: Japanese technologies absorbed by Samsung]," *Weekly Diamond*, November 16, 2013
- Fujiwara, A. and T. Watanabe (2013) "The Effect of Researcher Mobility on Organizational R&D Performance: Researcher Mobility and Innovation," IAM Discussion Paper Series #032.

COLUMN

The Chinese Labor Market: High unemployment coexisting with a labor shortage

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In China, both a labor shortage and unemployment have emerged as problems in recent years. The number of university students scheduled to graduate in June 2014 is 7.27 million (as of June 17, 2014), increasing by 280,000 from 2013. Following 2013, at the time considered the most difficult year for job seekers in history, 2014 is seen to be even harsher. Problems in the labor market in China, a key region for Japanese companies advancing overseas, are attracting attention also in Japan. This column provides a few perspectives on the Chinese labor market, which combines a labor shortage with challenges for job seekers.

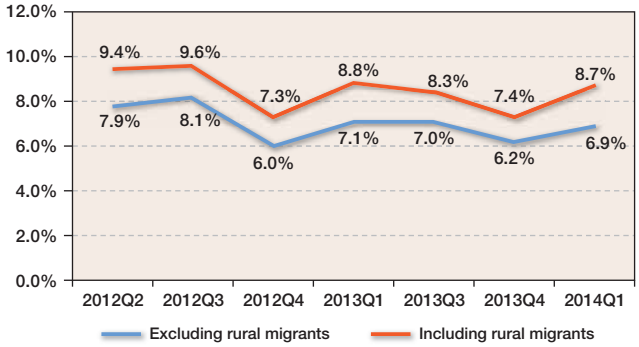
High unemployment amid a labor shortage

Although a nationwide labor survey did not include unemployment rates (Note 1), we will look at the Chinese labor market using statistics from job placement services. According to the latest

statistics on job offers and applications (Note 2), as of the January-March quarter of 2014, there were 1.293 million young job seekers who graduated in the last year or earlier but had yet to find a job through employment agencies in 102 major cities. As the population of these major cities accounts for approximately 46.7% of the total population of large and midsize Chinese cities, we can estimate that the number of young job seekers who have graduated but have yet to find a job totals more than two million in China.

Using data from the survey, I also tried to estimate the unemployment rate at those 102 major cities. The estimate used data on the working population in major cities and the number of job seekers who have not found employment (newly graduated unemployed persons and rural immigrant job seekers (Note 3)) based on the international standard set by the International Labour Organization (ILO) (Figure 1).

Figure 1: Unemployment rate in major Chinese cities



Source: Calculated by the author from statistics on job placement services in China (http://www.chinajob.gov.cn/).
(For the explanation on rural migrants, see notes at the end of this column (Note 5))

The unemployment rate including rural migrants in major cities in the first quarter of 2014 is 8.7%, while that excluding rural migrants is 6.9%. Unemployment rates before the first quarter of 2014 are also close to these numbers, suggesting that the high unemployment rate has continued.

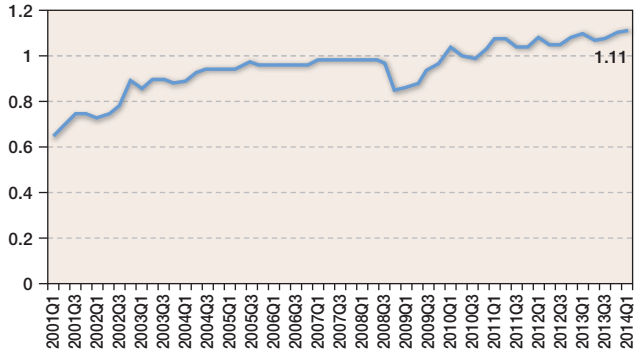
First, the reason why the unemployment rate is high is not because unemployed people lack the ability to work. Looking at the age structure of all job seekers in 102 major cities (of whom 96.0% are unemployed), workers aged 45 or younger account for 89.9%, indicating a large population of young workers. In addition, 54.7% of job seekers have specialist or vocational qualifications. Regarding the type of job, 44.1% of job seekers look for technical jobs, while 25.8% seek marketing, sales, or service jobs. There still exists abundant, high-quality labor in the Chinese labor market.

Job offers still buoyant

The high unemployment rate cannot be blamed for the sluggish job offers. Despite the slower economic growth, job offers from companies are still buoyant. As indicated in Figure 2, the job-offers-to-seekers ratio in the first quarter of 2014 was 1.1, showing that there are still more job offers than job seekers.

As for the reason for the buoyant job offers, I demonstrated in my recent book (Liu, 2013) (Note 4) that labor productivity is the most persuasive of the factors that have an impact on the job-offers-to-seekers ratio in China. As shown in search theory, the larger the income earned from a job, the larger will be the rate of return gained from job creation for companies, which will result in more job offers. Given that productivity in developing countries will improve through not only technological innovations on their own but also their efforts to catch up with developed nations, a higher rate of increase in productivity can be expected. For that reason, even if the economy slows down somewhat, buoyant job offers are likely to continue because of the support for higher productivity.

Figure 2: Job-offers-to-seekers ratio in China

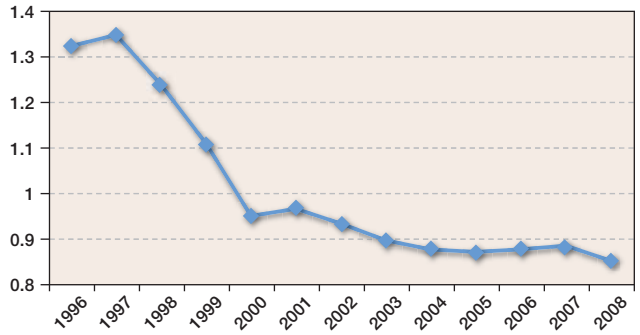


Source: Statistics on job placement services in China (http://www.chinajob.gov.cn/) and CEIC Database

Reasons why a labor shortage coexists with high unemployment

So why do labor shortage and high unemployment coexist in China? I analyzed this in my book. More specifically, I analyzed the matching efficiency in the labor market by estimating the matching function between job offers and job seekers in urban labor markets in China based on search and matching theory. Figure 3 shows the values of matching efficiency on the vertical axis. From the figure, we realize that matching efficiency in China declined sharply from the late 1990s to the 2000s.

Figure 3: Matching efficiency in the Chinese labor market



Source: Liu (2013 a, b)

As a cause for the sharp decline, it is conceivable that the inflow and outflow of workers into and out of companies increased, reflecting the establishment of new companies and the disappearance and downsizing of old state-owned enterprises following economic and corporate reforms, which led to friction in the labor market. This decline was also attributable to imperfect information between job offers and job seekers. I also found that a rise in productivity has a significant negative impact on matching efficiency and showed that a mismatch has arisen between unemployed persons and companies seeking highly skilled workers. Lastly, although it was not dealt with by quantitative analysis in the book, a skill mismatch and a geographic mismatch also have some bearing on this phenomenon. For example, the job-offers-to-seekers ratio for security maintenance staff is surprisingly high in Nanjing at 4.0, while it is only 0.2 in Shanghai.

With respect to measures to improve matching efficiency, I pointed out that the matching efficiency is very high in areas where there are many employment agencies. As employment agencies are organizations that provide information mainly on job offers and job seekers, they are useful for increasing matching efficiency by correcting imperfect information. Although it is, of course, difficult to increase substantially the number of employment agencies in a short period of time, it would be beneficial for companies to put more efforts into recruiting activities in order to bring many job seekers and secure the labor force.

Although the coexistence of unemployment and labor shortage is seemingly contradictory, it exists in labor markets not only in China but also in many other countries. Even though it is impossible to eliminate imperfect information in the actual economy, there is room for improvement. If the matching efficiency in the labor market increases, it seems possible to lower both the labor shortage and unemployment.

Favorable conditions for Japanese companies in China

The main reason why Japanese companies place emphasis on overseas investments has already shifted greatly from cheap labor to local demand for products. The Survey of Overseas Business Activities of the Ministry of Economy, Trade and Industry shows that while the percentage of Japanese companies that place emphasis on cheap labor has fallen to 21.4%, the percentage of companies that value demand for products in a country which they have entered, and its three neighboring countries, is 66.7% and 27.4%, respectively. The abundant university-educated labor force that exists in China despite the labor shortage appears to create favorable conditions for Japanese companies emphasizing the quality of human capital and innovation in an investment destination when they enter China.

Notes

1. The full name of the unemployment rate reported in China is the "registered unemployment rate," which includes only unemployed persons registered by the government. One of the conditions required for registration is the urban household registration. As it is difficult to acquire the urban household registration outside of one's birthplace, it is believed that there are many people who are not included in the "registered unemployment rate" although they are effectively unemployed.
2. Ministry of Human Resources and Social Security of the People's Republic of China, *China Employment*, http://www.chinajob.gov.cn/index.htm
3. For job seekers, those who take on a job are tallied in an independent statistical item. Therefore, they are not included in an item such as rural immigrant job seekers.
4. *China's Urban Labor Market: a Structural Econometric Approach*, Kyoto: Kyoto University Press and Hong Kong University Press, 2013 (received the Masayoshi Ohira Memorial Prize on June 12, 2014)
5. In China, as workers with rural household registration are given the right by the government to use land, they are assumed to have an agricultural profession. However, as their family already is farming, there are people who cannot take on an agricultural job and, as a result, there is a surplus of labor among them. Despite the right to use land, they do not engage in agriculture effectively and look for work in the cities. Therefore, in this column, two unemployment rates are calculated by distinguishing these job seekers in rural areas.

References

- Ministry of Economy, Trade and Industry, "Survey of Overseas Business Activities," http://www.meti.go.jp/english/statistics/tyo/kaigaizi/
- Ministry of Human Resources and Social Security of the People's Republic of China, *China Employment*, http://www.chinajob.gov.cn/index.htm
- Liu, Yang, *China's Urban Labor Market: a Structural Econometric Approach*, Kyoto: Kyoto University Press and Hong Kong University Press, 2013a.
- Liu, Yang, "Labor Market Matching and Unemployment in Urban China,"*China Economic Review*, Vol.24, pp.108-128, 2013b.

COLUMN

What Impact Does Restoration of Political Stability Have on the Real Economy?

Arata **Ito**

Fellow, RIETI

The change of administration at the end of 2012 has increased the stability of political management remarkably in Japan. The political situation, in other words, has taken a turn for the better, from indecisive to decisive politics. The nationwide newspapers at the time hailed the restoration of political stability, saying that the establishment of a stable political foundation would enable the government and ruling parties to take action on pending policies.

In a questionnaire-based survey by RIETI given to about 3,400 businesses between the end of 2011 and February 2012, 33% of businesses chose government and policy stability as an element with a major impact on their management (Note 1). This result indicates that political instability affects how businesses establish plans for production and capital investment, and thus could have implications for the real economy.

In light of this, many readers may have questioned what impact that restoration of political stability in 2013 is having on the real economy. Unfortunately, however, there appears to be no reports that quantitatively evaluate this point, so it may not be so easy for

readers to find an answer to this question.

This column's motive is to provide some material to help readers interested in the matter. Using an experimental new index on political management instability, a simple data analysis was performed. The research results derived from this analysis are tentative but very interesting.

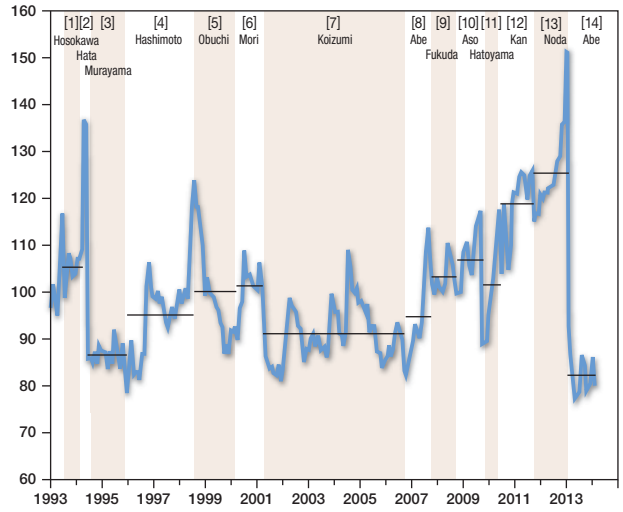
How is political instability measured?

One problem that hovers over any quantitative evaluation of political instability's impact on the real economy is how to measure political instability. In existing experimental studies, variables like the number of important government officials assassinated or the frequency of change of administration have been used as indexes of political instability. In Japan these days, however, there are no such cases, or extremely few, so these variables may not be suitable as indexes of political instability.

The number of seats that parties have in the legislature also has been suggested as a possible proxy variable. When the ruling parties have far more seats in the legislature than do the opposition parties, it seems that political management could be considered stable. However, even when the ruling parties have a considerable number of seats, situations can occur that make political management challenging. The events of 2012 are a good example of this. In such cases, it is natural to see government stability as low. Therefore the number of seats in the legislature is not an appropriate index of political instability.

There is another potent variable that makes up for the above-described weaknesses and could be used potentially as an indicator of political instability. That is the political party approval ratings that are reported in the opinion polls that newspaper publishers, television stations, and wire services conduct monthly. Figure 1 shows the political management instability index (below, iPM index) for the period January 1993 - January 2014.

Figure 1: Political management instability index



Note: The solid black line in the figure represents the average during the prime minister's term of office.

This index is derived as a weighted sum (with constant weight) of 10 series obtained after processing political party approval ratings published by Jiji Press, NHK, NNN, ANN, JNN, FNN, The Asahi Shimbun Company, Nikkei Inc., Mainichi Shimbun, and Yomiuri Shimbun. The more evenly matched that the approval ratings of the ruling and opposition parties are, the higher is the index value. When the ruling and opposition parties are evenly matched, it is difficult for the government and ruling parties to practice smooth political management because it is under harsh attack from the opposition parties. A rise in the index can be interpreted to mean that the government and ruling parties have come to a political management impasse, namely, political instability is increasing.

A look at the figure shows that the iPM index has risen and fallen repeatedly over the past 20 years. In January 2014, the index was 80, which is low historically. Looking at successive Cabinets, the current one has produced the highest level of political stability since the Hosokawa Cabinet.

A closer look shows that the index has shifted sharply (by at least 30 points) from the previous month on three occasions: July 1994, September 2009, and January 2013. Each case was immediately preceded by a very difficult political management struggle for the government and ruling parties, wherein the political situation was very unstable. Then there was a change of administration, and political stability returned to normal.

The index also shows a general rising trend since 2007, so political instability has persistently increased. There was an election for the House of Councillors (upper house of the Diet) in July of that year, in which the Liberal Democratic Party suffered a crushing defeat. The ruling coalition parties lost more than half of the seats of the House of Councillors, and, as a result, there was a "twisted" Diet, with the houses ruled by different parties. Observers at the time feared that the twist would lead unavoidably to political instability, and the index provides evidence to confirm this.

The relationship between political instability and the real economy

The previous section showed that the iPM index, in its way, is an indicator of political instability. The point of interest here is whether there is a relationship between this index and real economic variables. Figure 2 is a scatter plot of the iPM index and real economic variables, using data broken down by individual Cabinets. The employment growth rate and economic growth rate are used as real economic variables.

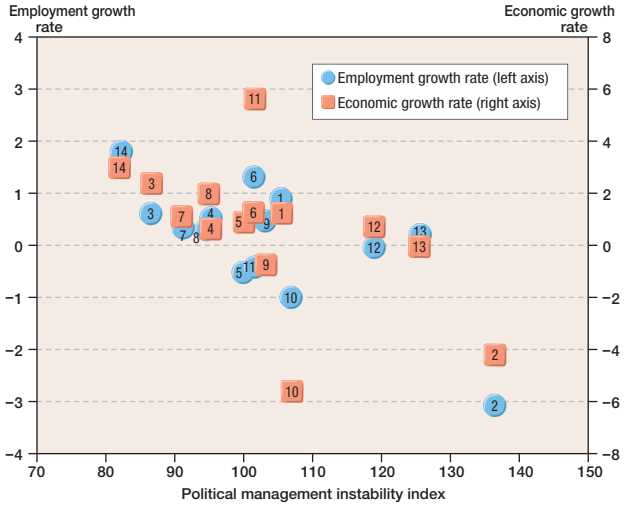
The figure suggests that when the iPM index is low, that is, when political stability is high, the employment growth rate and economic growth rate are also high. There is a negative correlation between political instability and the performance of the real economy. This fact appears to support the results of the previously mentioned questionnaire survey, namely, that political instability affects how businesses make decisions about their actions, and thus could have implications for the real economy.

It is possible, however, that this negative correlation shows that when the real economy is not doing well (i.e., employment growth is sluggish and the economic growth rate is small), it foments disapproval of the government and ruling parties, and the iPM index rises as a result. One method applied to verify this possibility is to use quarterly data, which has a shorter time interval. Figure 3 shows the time difference correlation coefficient for the iPM index and real economic variables. Moreover, the real economic variables use detrended employment and real GDP data.

Panel A shows the time difference correlation coefficient for the iPM index and employment. The iPM index at a given point in

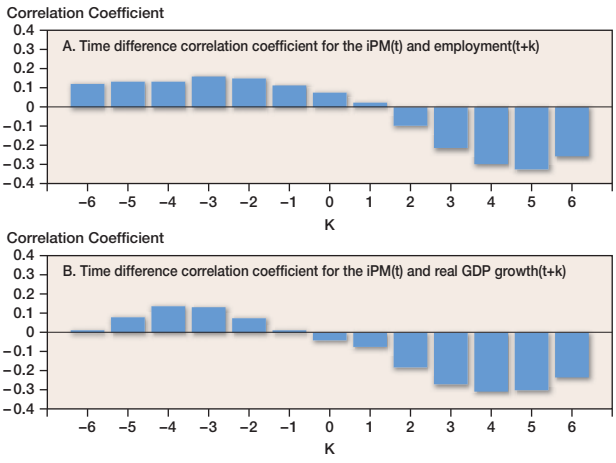
time has a high correlation to employment from four or five quarters earlier. If one assumes that political instability stems from sluggish employment growth, then the iPM index at a given point in time should have a negative correlation to employment at an earlier time. However, the figure does not confirm this. The same is true of real GDP (Panel B).

Figure 2: Scatter plot of political management instability index and real economic variables, data broken down by Cabinet



Note: Highlighted numerals correspond to numbers assigned to each Cabinet in Figure 1. The economic growth rate and employment growth rate are average changes (yearly rate) during the prime minister's term of office. For the second Abe Cabinet, calculations are based on the political management instability index and employment growth rate through December 2013 and the economic growth rate through the July-September quarter of 2013. Employment and real gross domestic product (GDP) data were found on the websites of the Ministry of Internal Affairs and Communications Statistics Bureau and the Cabinet Office

Figure 3: Time difference correlation between political management instability index and real economic variables

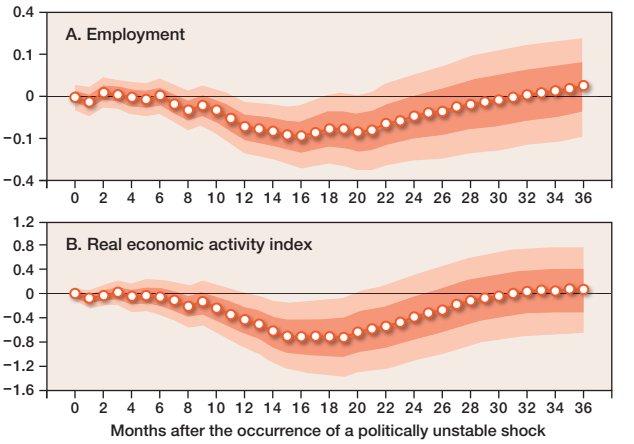


Note: Sample period was from Q3 1994 to Q1 2012. Employment and real GDP use detrended series. The trend of each variable is based on the Hodrick-Prescott filter. Employment and real GDP data were found on the websites of the Ministry of Internal Affairs and Communications Statistics Bureau and the Cabinet Office.

Quantitative evaluation of the impact that political instability has on the real economy

The previous section confirmed that real economic variables at a given time depend on the iPM index at an earlier time. So how do shocks, that is, unpredicted changes in political instability, affect the real economy? To investigate this, a multivariate autoregression (VAR) model made up of four variables (the iPM index, real economic variables, short-term interest rates, and share prices) was estimated. Based on the results derived therefrom, Fig. 4 shows an impulse response function of real economic variables when a political instability shock (big enough for the iPM index to rise 10 points) has occurred. Employment and a real economic activity index were used as real economic variables (Note 2).

Figure 4: Dynamic reaction of real economic variables to political instability shocks



Note: The highlighted solid line represents the estimated degree of reaction. The dark color and light color areas respectively represent the 68% and 95% confidence intervals. The period estimated was January 1994 to November 2013.

Looking at Panel A, employment gradually deviates from the trend and declines as a result of a shock; 16 months after a shock, it reaches a peak of 0.2% and then returns to the trend. The negative effect is statistically significant between one year and 1.5 years after the shock. Looking at Panel B, shocks have a significant negative impact on the real economic activity index 13-19 months after they happen, with the impact peaking (at 0.7%) after 17 months.

According to the results, calculations of which were based on political instability shocks identified by the model, the restoration of political stability that accompanied the change of administration at the end of 2012 had an impact as demonstrated in a 0.9% increase in employment in the first half of this fiscal year and a 3.1% increase in the real economic activity index in the second and third quarters of this fiscal year. The increase in the consumption tax rate to be implemented in April 2014 may have a negative impact on the real economy. However, the positive impact produced by the restoration of political stability is likely to soften the downturn in the real economy to a degree.

Notes

1. For the details of the survey, refer to Masayuki Morikawa (2012) "The Effects of the Great East Japan Earthquake and Policy Priorities for Restoring Economic Growth: Evidence from a survey of Japanese firms," RIETI Policy Discussion Paper Series, No. 12-P-010, May 2012
2. The real economic activity index is a weighted sum, with weights based on the agriculture, forestry, and fishery industries, mining and manufacturing industries, construction industry, and tertiary industries. This index is characterized by the fact that it tracks real GDP very closely, and, as such, it can be used as a proxy variable for monthly real GDP. For the period January 1993-December 2012, data created by the author are used, and for January 2013 and beyond, data created by using the Ministry of Economy, Trade and Industry's Indices of All Industry Activity (exclusive of the finance industry) are used.

International Trade and Investment #01

Program Director: Ryuhei Wakasugi, Faculty Fellow, RIETI

The growth of Japan's economy is inseparable from changes in the global economy. This program, focusing on the relationship between the globalization of firms (i.e., exports and overseas production) and growth of the Japanese economy, will study R&D and innovation of globalizing firms, international technology transfer, employment, and industrial clusters from theoretical and empirical perspectives, together with studying international trade and investment rules (i.e., the WTO and regional trade agreements) empirically and from both legal and institutional perspectives. Furthermore, it also will study the impacts on firms and industries of the external shock of the Great East Japan Earthquake, changes in production networks and the structure of trade following recovery, and the effects of restrictive energy and material supply on structural changes in the Japanese economy.

Introduction of Discussion Papers (DPs) published under this Program

DP Title

How Does Agglomeration Promote the Product Innovation of Chinese Firms?

Author(s)	Zhang Hongyong (RIETI)
Release date	May 2014
Research project	Global Markets and Japan's Industrial Growth
DP No.	14-E-022
URL	http://www.rieti.go.jp/jp/publications/dp/14e022.pdf

This study empirically analyzes the effect of agglomeration economies on firm-level product innovation (new products), using Chinese firm-level data from 1998 to 2007. In terms of new product introduction and new product output, Chinese firms benefit from urbanization economies (as measured by the number of workers in other industries in the same city and by the diversity of industries in the same city). Conversely, there were no positive effects of localization economies (as measured by the number of other workers working for neighboring firms in the same industry and in the same city). These results suggest that, in China, urbanization economies play an important role in fostering product innovation by urban size and diversity.

Table: Main results: The decision on new product introduction

New product firm dummy	(1)	(2)	(3)	(4)	(5)	(6)
	Full samples		Domestic firms		Foreign affiliates	
New product firm dummy last year	0.269***	0.268***	0.269***	0.269***	0.240***	0.240***
	[0.002]	[0.002]	[0.003]	[0.003]	[0.006]	[0.006]
Total factor productivity	0.001***	0.001***	0.001***	0.001***	0.001	0.001
	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]
Total employment	0.015***	0.014***	0.017***	0.015***	0.009***	0.008***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Average wage	0.003***	0.003***	0.003***	0.003***	0.002	0.002
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Production subsidy	0.002***	0.002***	0.001***	0.001***	0.002***	0.002***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Foreign affiliate dummy	0.008***	0.007***				
	[0.003]	[0.003]				
Localization economies		-0.001		0.000		−0.003**
		[0.001]		[0.001]		[0.001]
Urbanization economies – size		0.024***		0.033***		0.008**
		[0.002]		[0.002]		[0.003]
Urbanization economies – diversity		0.011***		0.012***		0.009***
		[0.001]		[0.002]		[0.003]
Competition		0.001		-0.001		0.006***
		[0.001]		[0.001]		[0.001]
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	1,388,718	1,388,718	1,086,209	1,086,209	302,509	302,509
r2	0.685	0.685	0.691	0.691	0.683	0.683

Note: All firm characteristics are lagged one year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.
All standard errors are heteroskedastic-consistent.

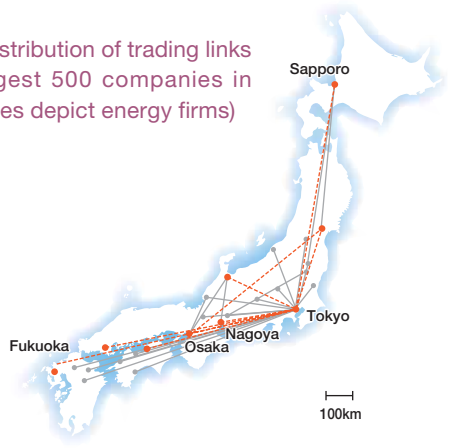
DP Title

The Effects of Endogenous Interdependencies on Trade Network Formation across Space among Major Japanese Firms

Author(s)	Petr Matous (University of Tokyo) Yasuyuki Todo (RIETI)
Release date	April 2014
Research project	Empirical Analysis on Determinants and Impacts of the Formation of Firm Networks
DP No.	14-E-020
URL	http://www.rieti.go.jp/jp/publications/dp/14e020.pdf

The network structures of interfirm interactions have been linked previously to disaster resilience. However, the dynamic drivers of interfirm network structures rarely have been explored in the literature. This paper uses stochastic actor-oriented modeling to examine how networks of economic interactions among the 500 largest Japanese companies were created and maintained between 2010 and 2011, i.e., before and after the Great East Japan Earthquake. Controlling for geographical distance between firms' headquarters and for firm size, we find that firms preferred trading partners that generally were popular among other firms, had clients in common with them, and also had bought some products or services from them, and that firms avoided firms with connections to independent suppliers in other cliques. These tendencies have potential implications for disaster resilience and the revival of the Japanese economy.

Figure: Geographical distribution of trading links among the largest 500 companies in Japan (Red nodes depict energy firms)



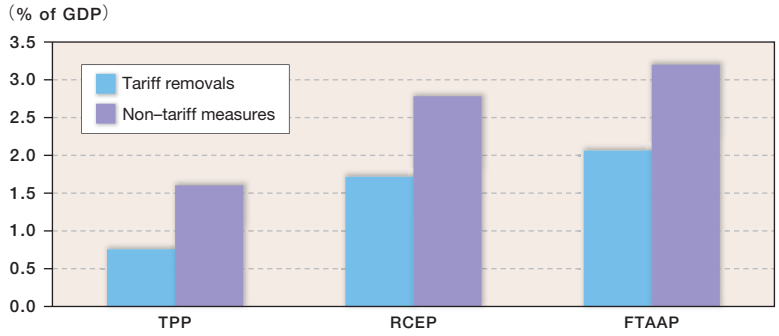
DP Title

The Relative Significance of EPAs in Asia-Pacific

Author(s)	Kenichi Kawasaki (RIETI)
Release date	January 2014
Research project	Economic Impacts of Free Trade Agreements: The case of Japan
DP No.	14-E-009
URL	http://www.rieti.go.jp/jp/publications/dp/14e009.pdf

This paper analyzes the relative significance of regional Economic Partnership Agreements (EPAs) in Asia-Pacific. The economy-wide impacts of tariff removals and reductions in non-tariff measures (NTMs) are estimated by using a Computable General Equilibrium (CGE) model of global trade. The Trans-Pacific Partnership (TPP) and the Regional Comprehensive Economic Partnership (RCEP) are shown to complement each other rather than be competitors. The income gains of Asia-Pacific Economic Cooperation (APEC) economies as a whole account for 1.2 percent of regional GDP by the TPP, 2.1 percent by the RCEP, and 4.3 percent by the Free Trade Area of the Asia-Pacific (FTAAP). Meanwhile, larger economic benefits are expected from NTMs reductions in addition to tariff removals. It is thus essential to reform domestic markets in order to enjoy greater economic benefits from international EPAs.

Chart: Japan's income gains from the TPP, RCEP and FTAAP



International Macroeconomics #02

Program Director: Takatoshi Ito, Faculty Fellow, RIETI

Amid rapidly advancing globalization, there is a need to consider how the Japanese economy should take on growth in emerging markets and realize balanced, sustainable growth within Asia. In addition to studying institutional infrastructures such as the role of a currency basket in the Asia region, this program also will analyze various issues related to exchange-rate pass-through and the choice of invoice currencies from both macroeconomic and corporate-level perspectives. Furthermore, it also will advance research spanning fields such as international trade and macroeconomics, international finance, macro finance, corporate foreign-exchange risk management, and corporate finance. We will endeavor to propose ideal macroeconomic policies for fiscal reconstruction, particularly their influence on exchange rates, as well as analyze the long-term deflationary mechanism and explore ways of overcoming it.

Introduction of Discussion Papers (DPs) published under this Program

DP Title

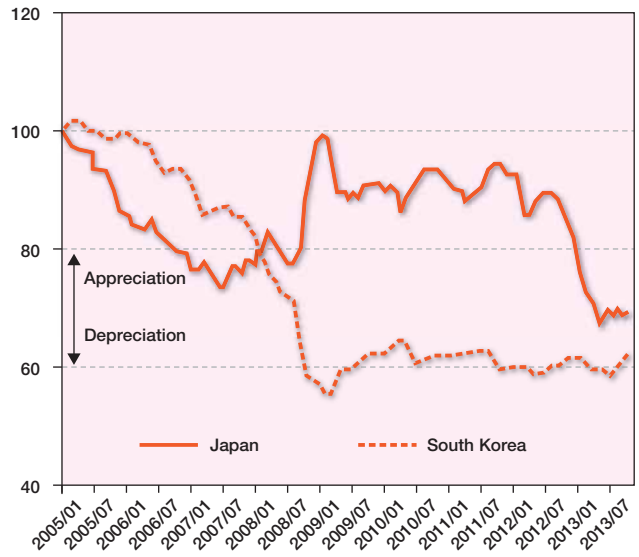
Abenomics, Yen Depreciation, Trade Deficit and Export Competitiveness

Author(s)	Junko Shimizu (Gakushuin University) Kiyotaka Sato (Yokohama National University)
Release date	April 2014
Research project	Research on Exchange Rate Pass-Through
DP No.	14-J-022
URL	http://www.rieti.go.jp/jp/publications/dp/14j022.pdf

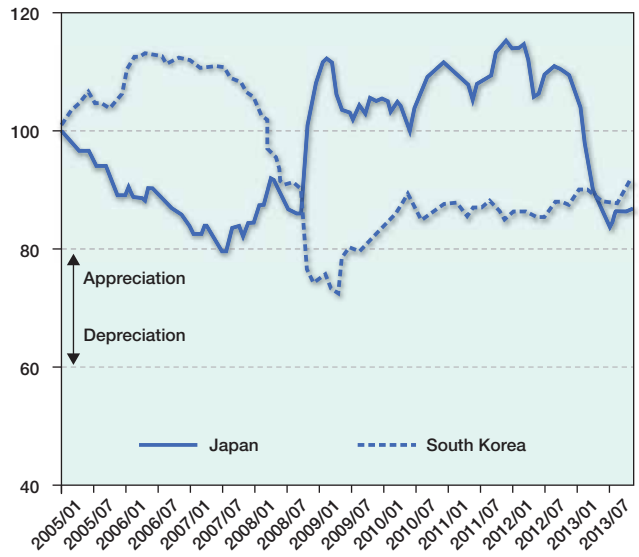
The sharp depreciation of the yen from the end of 2012 was expected to have a positive impact on the Japanese trade balance, since Japan had recorded large trade deficits since the Great East Japan Earthquake in March 2011. Trade balance tends to deteriorate at the beginning due to the J-curve effect. However, the Japanese trade balance has not shown any signs of improvement, even though one year has passed since the start of the yen depreciation. There is a growing concern that Japanese firms might lose export competitiveness in the global market. This paper empirically shows that Japanese firms expanded overseas production after the sharp appreciation of the yen from 2008 to 2012, which resulted in the increase in Japanese imports of intermediate inputs as well as finished products. The empirical result of an auto-regressive distributed lag (ARDL) model also indicates that the long-run impact of yen depreciation has weakened in recent years. It is demonstrated that Japanese manufacturing export prices in terms of the contract (invoice) currency have not changed in response to the large exchange rate fluctuations of the yen, which is empirically confirmed by the exchange rate pass-through analysis. Finally, a comparative analysis of the industry-specific exchange rate between Japan and Korea shows that the recent depreciation of the yen has improved the export price competitiveness of the Japanese manufacturing sectors.

Figure: Real effective exchange rates of the Japanese yen and the Korean won

Electric machinery industry



Transport equipment industry



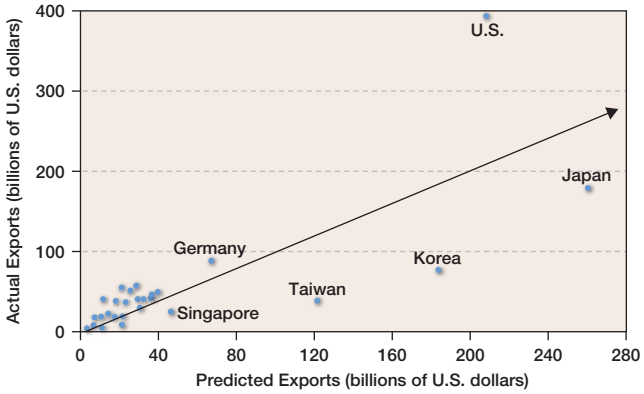
DP Title

China-U.S. Trade: A global outlier

Author(s)	Willem Thorbecke (RIETI)
Release date	July 2014
Research project	East Asian Production Networks, Trade, Exchange Rates, and Global Imbalances
DP No.	14-E-039
URL	http://www.rieti.go.jp/jp/publications/dp/14e039.pdf

China's computer exports to the United States increased 38 times between 1996 and 2013, growing from 4% to 66% of U.S. computer imports. China's exports of phones to the United States increased 32 times over this period, growing from 11% to 57% of U.S. phone imports. China's total exports to the United States also increased rapidly and are four or five times larger than U.S. exports to China. Cointegration evidence indicates that exchange rate depreciations in both China and in supply chain countries significantly increase China's exports. Evidence from gravity models indicates that China's exports to the United States have been twice as large as predicted every year since 2004. Thus, China's exports to the United States are a global outlier.

Figure: China's actual and predicted exports to 30 countries in 2012



Note: Predicted exports are determined based on gravity models for trade between 31 leading exporters over the 1988-2012 period.
Source: CEPII-CHELEM Database and calculations by the author.

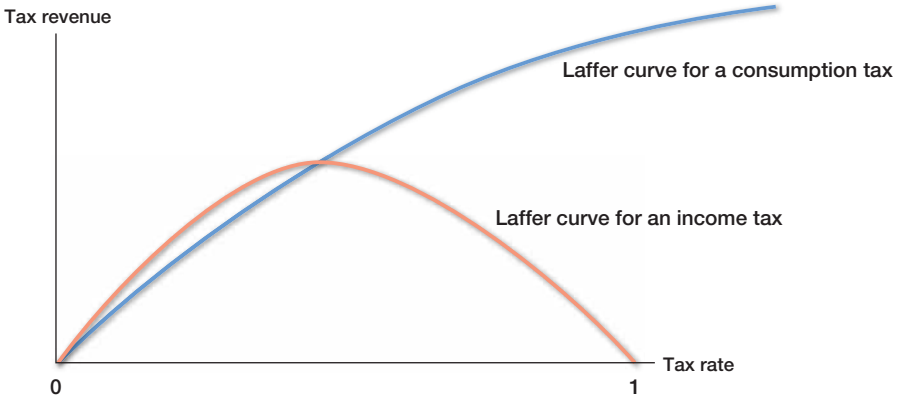
DP Title

There is No Natural Debt Limit with Consumption Tax

Author(s)	Keiichiro Kobayashi (RIETI)
Release date	July 2014
Research project	Macroeconomic Analysis on the Public Debt, Deflation, and Other Related Issues
DP No.	14-E-043
URL	http://www.rieti.go.jp/jp/publications/dp/14e043.pdf

In this paper, I demonstrate that the Laffer curve for a consumption tax increases monotonically and unboundedly in a closed economy in which the supply of one factor of production is fixed. Therefore, in this economy, an arbitrary amount of government debt can be made sustainable by choosing an appropriate tax rate. Tax revenue unboundedly increases due to a matter of accounting—tax revenue is transferred back to households as the redemption of government debt, which is used for the consumption, and is then taxed again.

Figure: The Laffer curve for a consumption tax



Regional Economies

#03

Program Director: Nobuaki Hamaguchi, Faculty Fellow, RIETI

This program will study urban, rural, and industrial growth viewing the regions of Japan in the context of the global economy, and using this to develop policy recommendations and other outputs. Specifically, it will analyze, both theoretically and empirically, matters such as formation of domestic and international regional systems through market mechanisms, the mechanisms of enterprise clustering, and the relationship between economic growth and urbanization, considering regional policies that would be desirable from the perspectives of national economic growth and maximizing policy effects, and also researching the optimal sizes of regional blocs and communities. Additional study will look at the ideal forms of the supply chains of Japanese firms and the recovery of areas affected by the Great East Japan Earthquake. Furthermore, the ideal management strategies for outstanding small and medium-sized enterprises utilizing regional resources and other advantages will be studied as well.

Introduction of Discussion Papers (DPs) published under this Program

DP Title

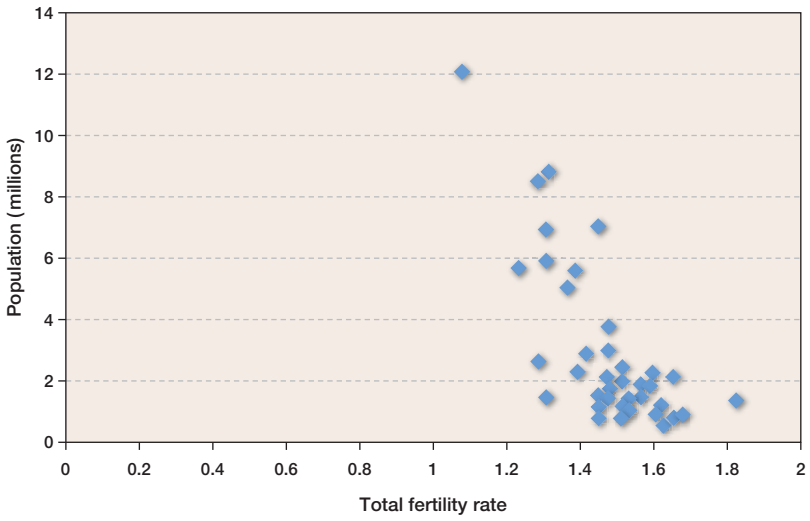
Economic Geography, Endogenous Fertility, and Agglomeration

Author(s)	Tadashi Morita (Kindai University) Kazuhiro Yamamoto (Osaka University)
Release date	July 2014
Research project	Spatial Economic Analysis on Regional Growth
DP No.	14-E-045
URL	http://www.rieti.go.jp/jp/publications/dp/14e045.pdf

In this study, we construct an interregional trade model that includes endogenous fertility rates. The presented model shows that the agglomeration of manufacturing firms in a large region causes fertility rates to become lower than that in a small region. The agglomeration of firms in a region lowers the price of manufactured goods relative to child rearing costs, which reduces fertility rates.

We also find that a decrease in transportation costs results in the agglomeration of manufacturing firms, which lowers fertility rates in both large and small regions. We then extend our two-region model to a multi-region model and find that the number of manufacturing firms in larger regions is always greater than that in smaller regions. Therefore, fertility rates in larger regions are always lower than in smaller regions.

Figure: Population density and total fertility rate for the year 2010



DP Title

Supply Chain Disruptions: Evidence from the Great East Japan Earthquake

Author(s)	Vasco M. Carvalho (University of Cambridge, CREi, and Barcelona GES) Makoto Nirei (Hitotsubashi University) Yukiko Saito (RIETI)
Release date	June 2014
Research project	Inter-organizational and Inter-inventors Geographical Proximity and Networks
DP No.	14-E-035
URL	http://www.rieti.go.jp/jp/publications/dp/14e035.pdf

This paper quantifies the spillover effect of exogenous shocks, such as earthquakes, on other firms through the supply chain network. Combining micro data on inter-firm transaction networks and geographic information systems, we examine firms' sales growth and transaction relationships outside the tsunami-hit areas before and after the Great East Japan Earthquake. We find that sales growth shows a negative but insignificant effect for firms with suppliers in the affected areas and a negative and significant effect for firms with customers in the affected areas. When we focus on exiting firms in the affected areas as the firms from where the spillovers originated, the sales growth of linked firms outside the affected areas exhibits negative and significant effects for both upstream and downstream firms. Furthermore, significantly negative effects on downstream firms are shown for not only directly linked firms but also indirectly linked firms, with two and three degrees of separation. Finally, we find that firms tend to establish new transactions when they have transaction partners in the affected areas.

Table

	Estimate 1	Estimate 2	Estimate 3	Estimate 4	Estimate 5	Estimate 6
Downstream 1	-0.201**	-0.204***	-0.210***			
Downstream 2		-0.0149***	-0.0181***			
Downstream 3			-0.00556***			
Upstream 1				-0.0610***	-0.0575***	-0.0417**
Upstream 2					0.0129***	0.0211***
Upstream 3						0.0145***
Ingrowth_before	-0.128***	-0.128***	-0.128***	-0.128***	-0.128***	-0.128***
Indegree	0.0221***	0.0227***	0.0238***	0.0221***	0.0215***	0.0187***
Constant	-0.0284***	-0.0291***	-0.0294***	-0.0283***	-0.0276***	-0.0257***
Observation	88246	88246	88246	88246	88246	88246

Note: ** and ***indicate that logs are statistically significant when significance levels are 5% and 1% respectively.

DP Title

Geography and Firm Performance in the Japanese Production Network

Author(s)	Andrew B. Bernard (Tuck School of Business at Dartmouth, CEPR & NBER) Andreas Moxnes (Dartmouth College, CEPR & NBER) Yukiko Saito (RIETI)
Release date	June 2014
Research project	Inter-organizational and Inter-inventors Geographical Proximity and Networks
DP No.	14-E-034
URL	http://www.rieti.go.jp/jp/publications/dp/14e034.pdf

Firms operate in complex supplier-customer networks that potentially range over long distances. However, the effects of supplier networks and supplier location on firm performance are largely unknown. This paper characterizes the domestic production network in Japan using detailed buyer-supplier data on over 950,000 firms. Beyond describing the characteristics of the Japanese production network, the paper examines the geographic features of the network links. Greater geographic distance plays an important role in reducing the probability of buyer-seller relations between pairs of firms. For a given firm, greater distance is associated with better performance measures of suppliers and customers. Geography, the density, and the quality of network connections are strongly correlated with downstream (customer) firm performance. Labor productivity, credit score, and size of a downstream firm are positively correlated with features of its upstream supply base including the number of suppliers and their average performance. In addition, geographic proximity of a firm's suppliers is associated with improved firm performance. The paper also provides the first evidence on the relationship between supplier network connections and downstream firm outcomes. Firm performance is better when its suppliers have more suppliers of their own. However, firm performance is lower when its suppliers are connected to more downstream customers.

Table: Supplier networks and firm performance

	Sales	Sales per capita	Credit scores
1 The number of suppliers	+	+	+
2 Suppliers' performance	+	+	+
3 Distances	-	-	-
4 The number of buyers	-	-	-
5 The number of suppliers' suppliers	+	+	+

Note: All variables are significant when significance level is 1 %.

Technology and Innovation

#04

Program Director: Sadao Nagaoka, Faculty Fellow, RIETI

The sources of innovation are the creation of new knowledge and its exploitation to solve real-world problems. This program will develop original data on innovation process with a view toward improving our understanding of such processes, including the surveys of inventors in Japan, North America, and Europe, and will conduct analysis from a global perspective so as to contribute to evidence-based policy formation conducive to technology development and innovation. Specifically, the program will analyze a broad range of issues, such as an assessment of intellectual property systems such as patent systems, knowledge transfer and mobility of people across organizations, university-industry cooperation, technical standards for innovation, collaboration in innovation, corporate organization and industrial organization to promote innovation, and international comparison of entrepreneurship.

Introduction of Discussion Papers (DPs) published under this Program

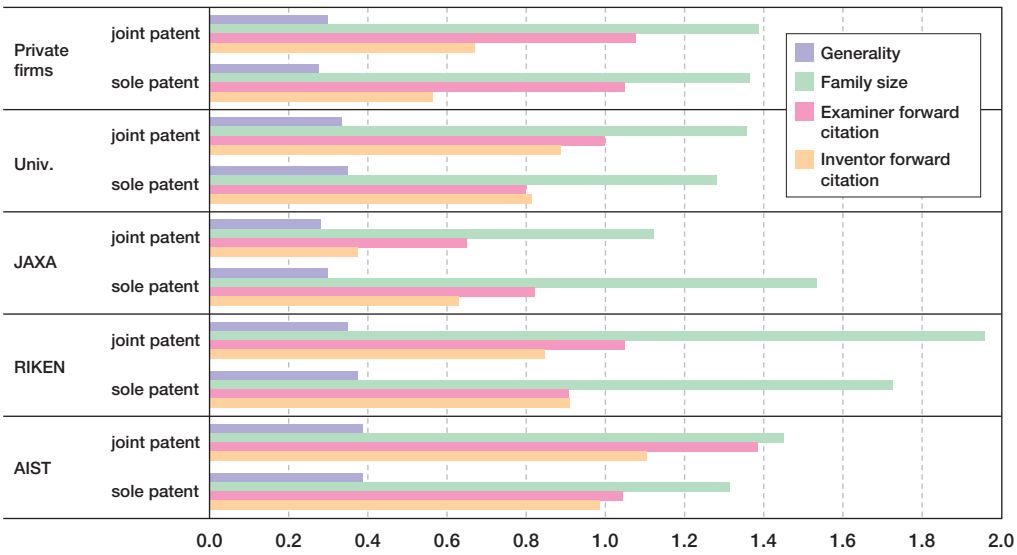
DP Title

Innovation and Public Research Institutes: Cases of AIST, RIKEN, and JAXA

Author(s)	Jun Suzuki (National Graduate Institute for Policy Studies (GRIPS)) Naotoshi Tsukada (RIETI) Akira Goto (RIETI)
Release date	May 2014
Research project	The Role of Public Research Institutions in the Japanese National Innovation System
DP No.	14-E-021
URL	http://www.rieti.go.jp/jp/publications/dp/14e021.pdf

In this paper, we focus on three large public research institutes (PRIs) in Japan—National Institute of Advanced Industrial Science and Technology (AIST), the Institute of Physical and Chemical Research (RIKEN), and the Japan Aerospace Exploration Agency (JAXA)—and investigate their roles in helping Japan's industry by examining their patents. First, the background and history of the development of these institutions are described briefly. We employ four measures drawn from patent data (inventor forward citation, examiner forward citation, family size, and generality index) to describe the inventive activities of PRIs. Universities' and firms' patents are used as benchmarks. The impact of the PRIs' research collaboration with the private sector is analyzed as well. We found that each of the three PRIs has been playing a unique role in Japan's innovation system. In addition, we found out that universities' patenting activity has been facing difficulties particularly in recent years. Finally, we discuss the factors that might affect the research outcome.

Figure: Average performance measures by organization and collaboration structure



DP Title

Incentive Design for Inventors: Theory and empirical evidence

Author(s)	Sadao Nagaoka (RIETI) Hideo Owan (RIETI) Koichiro Onishi (Osaka University of Technology)
Release date	September 2014
Research project	Research on Innovation Process and its Institutional Infrastructure
DP No.	14-J-044
URL	http://www.rieti.go.jp/jp/publications/dp/14j044.pdf

Given the expected fundamental reform of Article 35 of the Japanese patent law, which has been governing the transfer of ownership of employee inventions to firms, the freedom of designing the incentive system for inventors would increase significantly. In order to provide basic guiding principles for such design as well as for complementary policy measures, this paper presents new empirical evidence derived from the analyses using inventor surveys as well as insights from the survey of the theoretical literature on the optimal incentive scheme for innovation.

Major findings are the following: while a variety of motivations drive inventions, intrinsic motivations such as satisfaction from solving challenging technical problems and that from contribution to scientific and technical progress are especially important, and inventions that are importantly driven by such motivations tend to have high inventive-step as well as high economic value. A wide menu of economic incentives for an inventor is available such as payment at invention disclosure and patent application, payment based on the commercialization of the patent, research freedom, promotion, salary increase, as well as their combinations. Evidence suggests that high quality inventions in Japan are significantly associated with a promotion and/or a salary increase for the inventor. The theory of incentive designs also suggests that a multitude of factors must be taken into account in the incentive design, including the risk bearing capability of an inventor, the monitoring possibility of a firm, research and development (R&D) characteristics, and the commitment power of a firm to long-term incentive. We further argue that the characteristics of the workforce sorted into the firm should also be considered in designing the optimal incentive scheme, as the data show that the effect of monetary incentives declines with the strength of the intrinsic motivations.

Given the expected heterogeneity in the optimal incentive systems, it is imperative that firms compete in designing better incentive system for innovations. An important prerequisite for this is the freedom to design a clear ex-ante rule on the transfer of employee inventions' ownership. The government has to ensure that the contract and the agreement on the incentive system between the management and the employees to be respected as well as to support inventions with high spillover effects which otherwise might not be undertaken due to relatively small private benefits for the inventing firm.

DP Title

Scientific Sources of Corporate Inventions in Japan: Evidence from an inventor survey

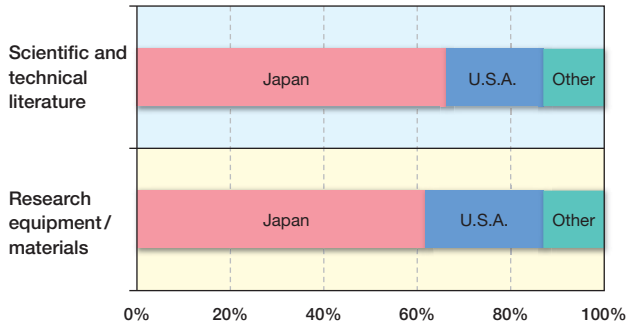
Author(s)	Sadao Nagaoka (RIETI) Isamu Yamauchi (RIETI)
Release date	August 2014
Research project	Research on Innovation Process and its Institutional Infrastructure
DP No.	14-J-038
URL	http://www.rieti.go.jp/jp/publications/dp/14j038.pdf

We conducted an inventor survey to examine the contribution of science to corporate inventions. The survey results show that for about one-quarter of the inventions, scientific knowledge embodied in literature, equipment, or research materials in the last 15 years was essential to conceive or implement research and development (R&D). If it were not for the collaboration with universities, 3% of the R&D projects would not have been implemented. In total, for two-thirds of the inventions, scientific knowledge contributed to implementing and accelerating R&D. These results indicate the importance of scientific knowledge as a public good to promote corporate inventions.

We also found that about 70% of the scientific knowledge source of Japanese inventions was generated in Japan: the suppliers of scientific sources were located domestically. If the scientific sources are cited in the patent document, they are more likely to be cited at where the prior art is described rather than where the invention is described.

Moreover, the results show that only 15% of the inventions with important scientific sources cite such important literature in the patent document, and only 16% of the inventions citing non patent literature actually cite the important scientific sources. This result means that the patent citation is an incomplete and noisy index to trace the knowledge flow.

Figure: Where do significant scientific knowledge sources to conceive or implement R&D come from?



Raising Industrial and Firm Productivity

#05

Program Director: Kyoji Fukao, Faculty Fellow, RIETI

The aim of this program is to measure industry- and firm-level productivity and its determinants for Japan and various East Asian countries and to conduct research on policies aimed at raising productivity. At the industry level, the program—in addition to updating and expanding the Japan Industrial Productivity (JIP) and China Industrial Productivity (CIP) databases in collaboration with Hitotsubashi University—will construct an industrial productivity database by prefecture for Japan and examine the impact of the recent earthquake on regional economies and policies for reconstruction. At the firm or establishment level, employing micro-data from government statistics and corporate financial data in Japan and abroad, the program will research the following: productivity differentials between firms, the impact of globalization, how changes in demand affect corporate performance, policies for raising productivity in the service sector, and productivity dynamics from an international perspective—including productivity differentials between Japanese, Chinese, and Korean firms—as well as other related issues.

At the industry and firm level, the program will measure investment in intangible assets such as research and development, software, in-house training, organizational structure—all of which are important sources of innovation and productivity growth—and will examine the economic effects of such investments.

Introduction of Discussion Papers (DPs) published under this Program

DP Title

Disemployment Caused by Foreign Direct Investment? Multinationals and Japanese employment

Author(s)	Kozo Kiyota (RIETI) Ryo Kambayashi (Hitotsubashi University)
Release date	August 2014
Research project	Competitiveness of Japanese Firms: Causes and Effects of the Productivity Dynamics
DP No.	14-E-051
URL	http://www.rieti.go.jp/jp/publications/dp/14e051.pdf

Using parent-foreign affiliate matched data on Japan from 1995 to 2009, this paper examines the effects of foreign direct investment (FDI) on domestic employment, especially in manufacturing. One of the contributions of this paper is that we utilize the matched data for each country in which Japanese multinational firms operate, which enables us to identify the differences in the impact of FDI between destinations. Results indicate that the increases in the investment goods price in China—but the decreases in it in the United States—negatively affected the domestic labor demand of multinationals in Japan. This contrast may reflect a difference in specialization patterns across countries. We also found that disemployment in Japan was driven mainly by substitution between capital and labor, rather than by the reallocation of labor from Japan to overseas.

Table: Calculating the impact of different aspects of globalization on parent labor demand: manufacturing

	Impact of 1 % increase in factor	Actual change in sample	Percentage change in labor demand
	(1)	(2)	(3) = (1) * (2) * 100
Domestic wage (log)	-0.103	-0.168	1.731
Foreign wage (log)	-0.001	0.077	-0.008
Domestic investment goods price (log)	0.984	-0.153	-15.072
Foreign investment goods price (log)	-0.061	-0.0097	0.059
Relative final goods price (log)	-0.084	-0.104	0.871
Net impact of above all variables			-12.418

DP Title

Is Productivity Growth Correlated with Improvements in Management Quality? An empirical study using interview surveys in Korea and Japan

Author(s)	Tsutomu Miyagawa (RIETI) Keun Lee (Seoul National University) Kazuma Edamura (National Institute of Science and Technology Policy) YoungGak Kim (Senshu University) Hosung Jung (Samsung Economic Research Institute)
Release date	August 2014
Research project	Study on Intangible Assets in Japan
DP No.	14-E-048
URL	http://www.rieti.go.jp/jp/publications/dp/14e048.pdf

Bloom and Van Reenen (2007) show that differences in management practices are correlated with productivity differences at the firm level. In this paper, we conducted similar interview surveys on management practices in Japanese and Korean firms in 2008 and 2012. We find that overall management scores in Japan—as an average of organizational and human resource management scores—are higher than those in Korea. However, the second survey shows that the gap in management scores between the two countries has shrunken over time. In addition, the average management quality in Korean large firms has surpassed that of Japanese large firms. This result is consistent with the literature comparing big businesses in Korea and Japan. This study also compares additional aspects of management styles, such as speed in decision making and the role of various communication channels, which is not done in the literature. When we estimate a production function including management score using all samples, we find a positive and significant relationship between management scores and productivity. Most estimation results show that organizational management scores are correlated with firm performances in Japanese firms, while human resource management scores are correlated with performance in Korean firms. We also find that management practices are correlated with improvements in capital and labor efficiencies. In the case of Japan, better organizational management practices in the past improve current firm performance. Our results show that the Japanese government and firms should promote management reforms to restore international competitiveness.

New Industrial Policy

#06

Program Director: Hiroshi Ohashi, Faculty Fellow, RIETI

Leading nations appear to have ventured into the formulation of strategies and policies that promote both their own domestic industries and companies in the global markets. This program will conduct research on formulating industrial policies in the aftermath of the Great East Japan Earthquake with a view toward resolving issues being faced by the Japanese economy. It will take into consideration the roles played by product innovations, while also looking into the perspectives of, for example, environmental, energy, and resource policies, competition policy, as well as agricultural policy.

Introduction of Discussion Papers (DPs) published under this Program

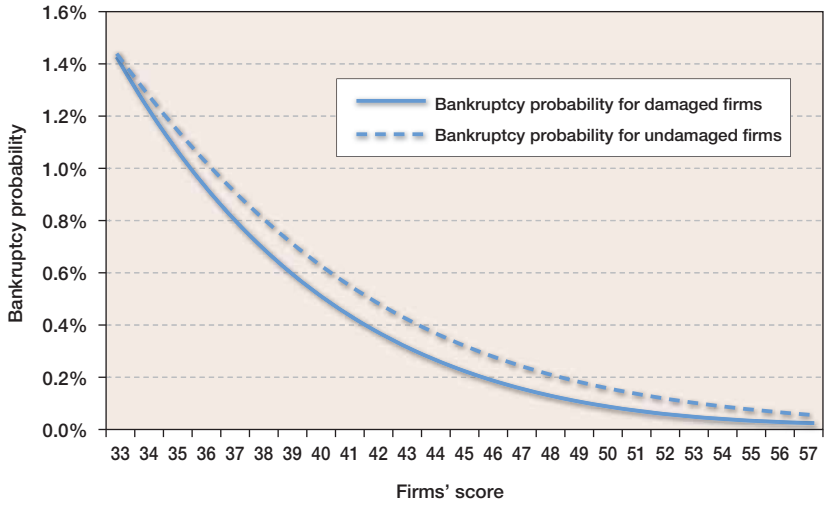
DP Title

Natural Disaster and Natural Selection

Author(s)	Hirofumi Uchida (Kobe University) Daisuke Miyakawa (Nihon University) Kaoru Hosono (Gakushuin University) Arito Ono (Mizuho Research Institute) Taisuke Uchino (RIETI) Iichiro Uesugi (RIETI)
Release date	August 2014
Research project	Study on Corporate Finance and Firm Dynamics
DP No.	14-E-055
URL	http://www.rieti.go.jp/jp/publications/dp/14e055.pdf

In this paper, we investigate whether natural selection works for firm exit after a massive natural disaster. By using a unique data set of more than 84,000 firms after the Great East Japan Earthquake, we examined the impact of firm efficiency on firm bankruptcy both inside and outside of the earthquake-affected areas. We find that more efficient firms are less likely to go bankrupt both inside and outside of the affected areas, which indicates the existence of natural selection. However, we also find that firms located inside the earthquake-affected areas are less likely to go bankrupt than those located outside of the areas. We also applied the same methodology to the case of the Kobe Earthquake, and find qualitatively similar results.

Figure: Bankruptcy probability and firms' score



DP Title

Effects of Lending Relationships with Government Banks on Firm Performance: Evidence from a Japanese government bank for small businesses

Author(s)	Iichiro Uesugi (RIETI) Hirofumi Uchida (Kobe University) Yuta Mizusugi (SHIFT Incorporated)
Release date	September 2014
Research project	Study on Corporate Finance and Firm Dynamics
DP No.	14-J-045
URL	http://www.rieti.go.jp/jp/publications/dp/14j045.pdf

Employing massive contract- and firm-level data provided by the Small and Medium Enterprise (SME) Unit of the Japan Finance Corporation (JFC), one of the largest government lending institutions for SMEs, and linking the data with other firm-level data from a business credit information company, we empirically examine (1) the lending behavior of JFC to SMEs, (2) the effects of JFC's lending on the credit availability and the ex-post performance of its borrowers, and (3) the role of JFC's information production. As for (1), JFC's lending behavior, we find (1-a) a statistically significant association between JFC's lending decision and a variety of variables including those from borrowers' financial statements, (1-b) JFC's counter-cyclical lending behavior to SMEs, and (1-c) a reduced emphasis on loans collateralized by real estate properties in recent years. As for (2), effects of JFC's lending, we find (2-a) its significant positive impact on borrowers' credit availability, capital investment, and employment, (2-b) occasional complementarities between JFC loans and loans provided by other financial institutions, and (2-c) no definitive evidence for its positive impact on the borrowers' ex-post performance including their profitability and the probabilities of having financial distress. As for (3), JFC's information production, we find evidence suggesting that JFC's internal credit ratings have sufficient power in identifying firms that are likely to survive and that the ratings are more informative than financial statement information.

Table: Marginal effect on borrowing from JFC

Year	2005	2006	2007	2008	2009	2010	2011
Return On Assets (ROA)	0.562 ***	0.925 ***	0.792 ***	0.767 ***	0.947 ***	0.233 **	0.212 *
Interest	−4.015 ***	−3.616 ***	−2.577 ***	−3.276 ***	−1.667 ***	0.099	−0.865 *
dlnSALES	0.115 ***	0.162 ***	0.198 ***	0.091 ***	0.100 ***	0.014	0.012

Note: ***, **, * significantly different from zero at the significance levels of 1%, 5%, and 10%, respectively.

Human Capital

#07

Program Director: Kotaro Tsuru, Faculty Fellow, RIETI

Amid the rapid aging of its society, intensifying global competition, and recovery from the Great East Japan Earthquake, utilizing its human resources is a significant key to Japan maintaining and strengthening its economic dynamism and increasing its growth potential, as a nation relatively lacking in natural resources. This program will carry out multifaceted, comprehensive research on measures for strengthening human capital and human resource capabilities, from a full life-cycle perspective including ideal labor market systems to increase worker incentive and ability, early childhood education through higher education, human-resources development in employment years, and utilization of elderly human resources.

Introduction of Discussion Papers (DPs) published under this Program

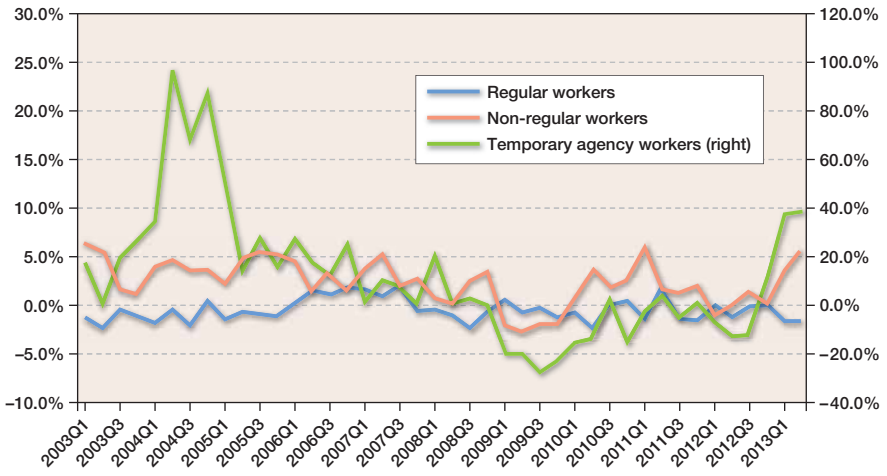
DP Title

The Impact of a Demand Shock on the Employment of Temporary Agency Workers: Evidence from Japan during the global financial crisis

Author(s)	Kaoru Hosono (Gakushuin University) Miho Takizawa (Toyo University) Kotaro Tsuru (RIETI)
Release date	August 2014
Research project	Reform of Labor Market Institutions
DP No.	14-E-046
URL	http://www.rieti.go.jp/jp/publications/dp/14e046.pdf

This study investigates the effect of a negative demand shock on the composition of the type of workers at firms, focusing on the change in the share of temporary agency in all workers. To clearly identify the causal link between the demand a firm faces and the composition of its workforce in terms of the type of workers and rule out any reverse causation, we use the 2007-2009 global financial crisis as a natural experiment, with the drop in demand experienced by exporting firms in Japan serving as an exogenous demand shock. We find that firms with a higher export ratio, a higher share of temporary agency workers, and a larger increase in the share of temporary agency worker ratio prior to the crisis decreased the share of temporary agency workers more than other firms in response to the demand shock. We also find that firms with a higher liquid asset ratio and higher volatility in their sales decreased the share of temporary agency workers less than other firms during the crisis. These results suggest that temporary agency workers serve as a buffer against demand shocks.

Figure: Annual rate of change in the number of regular workers, non-regular workers, and temporary agency workers in Japan



Source: *Labour Force Survey.*

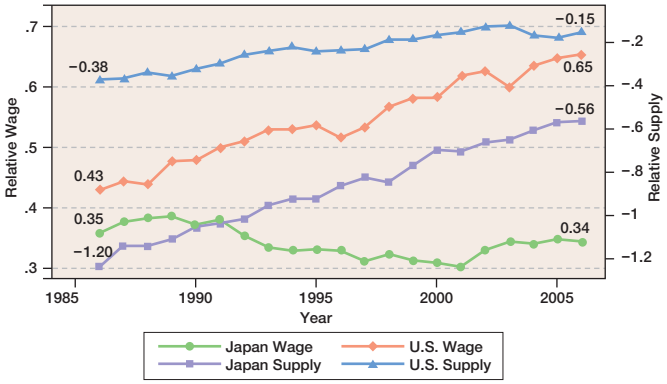
DP Title

Winning the Race against Technology

Author(s)	Daiji Kawaguchi (RIETI) Yuko Mori (Japan Society for the Promotion of Science (JSPS))
Release date	April 2014
Research project	Reform of Labor Market Institutions
DP No.	14-E-017
URL	http://www.rieti.go.jp/jp/publications/dp/14e017.pdf

This study examines the importance of the supply factor as a determinant of the college wage premium by comparing the trends of the college wage premium between Japan and the United States. The wage differential between college and high school graduates decreased from 0.35 log point to 0.34 log point in Japan between 1986 and 2008, while during the same period, it increased from 0.43 to 0.65 in the United States. This paper demonstrates that the more rapid increase in the number of college graduates in Japan explains about one-third of these contrasting trends. A simulation indicates that if the supply in the United States had followed that in Japan, the return to college would have increased by 0.15 point instead of the actual 0.23 point. The difference in post-war fertility trends largely explains the difference in the supply increase of college graduates between the two countries.

Figure



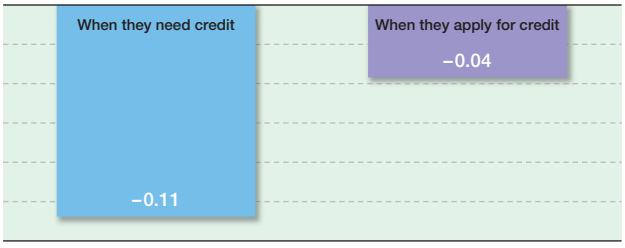
DP Title

Do Women-owned Start-ups Have a Lower Probability of Obtaining Loans? An empirical analysis using panel data from Japan

Author(s)	Yoshio Higuchi (RIETI) Naomi Kodama (RIETI)
Release date	March 2014
Research project	Impact of Diversity and Work-life Balance
DP No.	14-J-015
URL	http://www.rieti.go.jp/jp/publications/dp/14j015.pdf

Using data of start-up businesses in Japan, we compare the probability of women obtaining loans to that of men. We control for not only individual attributes but also firm characteristics containing yieldability, cash flow, and the ability of debt redemption. Women-owned start-ups have an 11-14 percentage point lower probability of obtaining loans when they need credit. On the other hand, once they apply for credit, they have just a 2-3 percentage point lower probability of obtaining it than do men-owned start-ups. This means that women are likely to give up on obtaining loans before applying. Are banks reluctant to lend money to women? We take this one step further and find that women-owned businesses with a similar propensity score in obtaining loans show a comparable performance to men-owned businesses. This indicates that banks make the proper decision in whether to provide credit based on each business' characteristics and expected performance.

Figure: Probability of women obtaining loans (compared to that of men)



Social Security, Taxation, and Public Finance

#08

Program Director: Mitsuhiro Fukao, Faculty Fellow, RIETI

Japan has to maintain its economic dynamism in the face of its rapid aging population and low fertility rate. This program will carry out multifaceted, integrated research on Japan's social security system, taxation, and public finance. The research subjects include (1) an analysis of comprehensive panel data on the elderly, (2) possible reforms to the social security and taxation systems, (3) a proposal for combining carbon taxes and investment subsidies in energy conservation, (4) optimal fiscal policy measures for reconstruction from the recent earthquake, economic recovery, and fiscal consolidation, and (5) new forms of public services, including the "third sector."

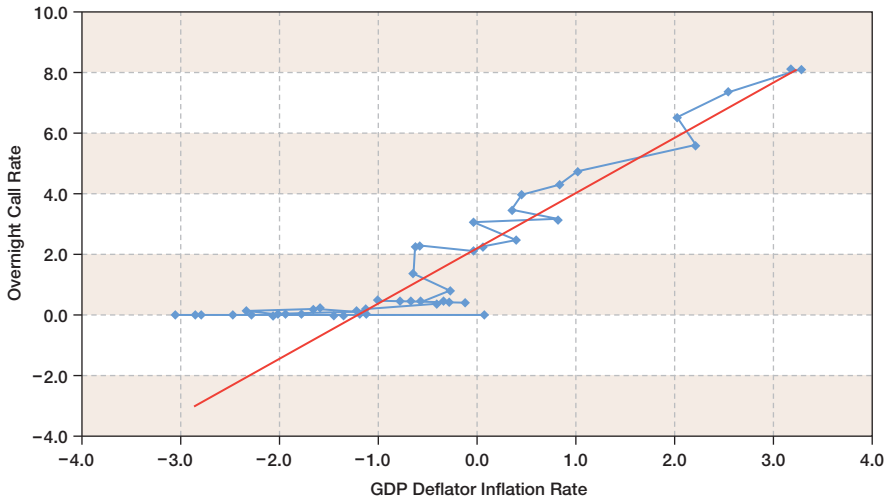
Introduction of Discussion Papers (DPs) published under this Program

DP Title **Fiscal Consolidation in Japan**

Author(s)	Mitsuhiro Fukao (RIETI)
Release date	April 2014
Research project	Policy Mix for Fiscal Consolidation Without Harming Japan's Economic Recovery
DP No.	14-E-015
URL	http://www.rieti.go.jp/jp/publications/dp/14e015.pdf

In order to maintain the stability of its financial system, Japan must control its budget deficit by continuing with a contractionary fiscal policy. Ideally, the negative effects of a tight fiscal policy should be countered with an expansionary monetary policy. However, the effectiveness of the conventional interest-rate policy has been diluted by the zero lower bound of interest rates. Prime Minister Shinzo Abe asked the Bank of Japan to set a 2% inflation target to be achieved in two years through a massive quantitative easing of the monetary base. In this paper, we first review Japan's macroeconomic performance since the collapse of the asset-price bubble in the late 1980s. Next, we make a long-term projection of Japan's fiscal balance by estimating the macro production function for Japan. We also estimate the required increase in the government's tax revenues under a few scenarios. After presenting a possible fiscal crisis scenario, we evaluate the effectiveness of quantitative easing and highlight its limitations. Thereafter, we propose some measures to consolidate budget deficits under a deflationary environment in order to avoid such a crisis. Some policy options include a combination of a gradual increase in indirect taxes and a reduction in payroll tax. In order to overcome the zero lower bound of nominal interest rates, the introduction of the Gesell tax has also been proposed. By levying a tax on the outstanding amount of government-guaranteed financial assets including cash, it is possible to set a negative nominal return on safe assets.

Figure: Inflation rate and short-term money market rate (1991 Q1-2004 Q1)



Note: The red regression line is estimated using data prior to 1999 Q1 when the BOJ faced a zero-lower bound.

DP Title

Desirable Immigration Policy for Japan: Based on a survey of economic empirical analysis

Author(s)	Risa Hagiwara (Keio University) Takanobu Nakajima (RIETI)
Release date	March 2014
Research project	Optimal Immigration Policy for Japan
DP No.	14-J-018
URL	http://www.rieti.go.jp/jp/publications/dp/14j018.pdf

The purpose of this paper is to survey research papers on the effects of immigrants to economies and consider a desirable policy for Japan, a country with an aging population due to a low birth rate.

We have confirmed that immigrants with fluent language and high level skills can accelerate growth and stabilize a budgetary balance. This finding is consistent with the fact that many industrialized countries recently have introduced a "selective immigration policy," which requires a certain level of language ability, income, and skills from immigrants. This kind of policy, on the other hand, shows the egoism of immigrant countries: "Good Immigrants Only."

In Japan, there is an opinion that stresses an urgent necessity to receive a number of immigrants who could fill the job vacancies of the labor-intensive service industries. The policy, based on such a myopic view, in no way leads to a solution because immigrants could become "Japanized" as long as the current social system remains unchanged.

The desirable immigration policy for Japan should aim at a society of inter-culturalism, which accepts different cultures and makes use of their comparative advantages. This new paradigm would also promote the employment of women and physically and mentally challenged people.

Policy History and Policy Assessment #09

Program Director: Haruhito Takeda, Faculty Fellow, RIETI

The objective of this program's research is to review and assess trade and industrial policy chiefly over the period from 1980 through 2000, as it looks at Japan's economy, society, and trade and industrial policies at the end of the 20th century.

At the same time the final two decades of the 20th century were a time of significant changes in Japan's economy and society, they also were a time of very major real and organizational changes in trade and industrial policy. This research will attempt to make clear how changes in trade and industrial policy at the turn of the century were effected, based on activities including assessment of the recognition of policy issues over the preceding quarter-century, choice of policy means in response, and their results.

Introduction of Discussion Papers (DPs) published under this Program

DP Title

Japanese Industrial Policy and the Enhancement of Nuclear Power Plants Efficiency: Promotion of domestic production and the "Improvement & Standardization Plan"

Author(s)	Susumu Ishii (Gakushuin University)
Release date	May 2014
Research project	Historical Research on the Major Topics of Japan's Trade and Industrial Policy
DP No.	14-J-026
URL	http://www.rieti.go.jp/jp/publications/dp/14j026.pdf

In the 1960s, the Japanese government promoted not only swift import of nuclear technology, but also domestic production of nuclear power plants. Japanese power companies and electric machinery makers conducted a joint study of importation and original development of the nuclear technology from their independent standpoints. They formed two groups—PWR group and BWR group—and promoted nuclear power plant projects. In the process of the construction of nuclear power plants, they not only improved the imported technology but also developed the new technology. After the oil crises in 1970s, the government upgraded its energy policy and strongly promoted the construction of nuclear power plants as an alternative energy to oil. The Japanese government then planned the "Improvement & Standardization Plan" of nuclear power plants in the view of enhancing safety

and efficiency. The Improvement Plan progressed, but the Standardization Plan performed poorly. Power companies and electric machinery makers took the initiative of the industrial policy over the government after mid-1970s, which resulted in a plurality of the types of nuclear reactors.

Table

	Reactor type	Power/MW	Commencement of operation						Contractors
			1970-79	1980-84	1985-89	1990-94	1995-99	2000-2005	
Japan	BWR	820-825			1		1	1	Hitachi 1, Toshiba 1, Toshiba/Hitachi 1
		1100-1137	2	2	4	5		1	Hitachi 4, Toshiba 6, Toshiba/Hitachi 2, GE/Toshiba 1, GE/Hitachi/Shimizu 1
		1356-1380					2	1	Toshiba/Hitachi 1, GE/Toshiba/Hitachi 3
		Others	9	1		1			
	PWR	559-579	2	2	1	1			Mitsubishi Heavy Industries 6
		826-890	3	1	3	1			Mitsubishi Heavy Industries 2, Mitsubishi Corporation 5, WH/Mitsubishi Corporation 1
		1160-1180	2		1	3	1		Mitsubishi Heavy Industries 5, WH/Mitsubishi Corporation 2
		Others	2						
France	PWR	917-956	5	23	6				Framatome 34
		1362-1382			14	6			Framatome 20
		1560-1561						4	Framatome 4
		Others							

Note: Framatome is current Areva
Source: *World Nuclear Power Plants 2006*, April, 2007, Japan Atomic Industrial Forum, Inc.

DP Title

The Effect of Large-Scale Retailers on Price Level: Evidence from Japanese data for 1977-1992

Author(s)	Katsumi Shimotsu (University of Tokyo)
Release date	March 2014
Research project	Historical Evaluation of Industrial Policies
DP No.	14-E-013
URL	http://www.rieti.go.jp/jp/publications/dp/14e013.pdf

Since its enactment in 1974 until its easing in the 1990s, the Large-Scale Retail Store Law (Daikibo Kouri Tenpo Ho) strictly regulated the entry of large-scale retailers in cities in Japan to protect local small and medium incumbent stores. This paper investigates the effect of large-scale retailers on the price level in Japan using city-level panel data from 1977 to 1992, the period when the Large-Scale Retail Store Law exercised strong entry restrictions. Using fixed effects estimation and instrumental variable estimation, we find that the presence of large-scale retailers, measured by their floor area relative to that of all of the retailers, has a negative effect on the price index of agricultural products, mass-produced food products, textiles, and durable goods. The estimation results suggest that a 10% increase in the relative floor area of large-scale retailers reduces the price level by around 0.3%-1.3%.

Table: Estimation results
Dependent variable: area of large-scale retailers / area of all of the retailers

Explained variable	Estimated coefficient	Standard error
Price index of agricultural products	-5.44	2.63
Price index of mass-produced food products	-7.74	1.59
Price index of textiles	-13.3	4.61
Price index of durable goods	-0.98	1.56
Observation: 632		

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