

May 
2012

Natural Disasters and Regional Science

The newsletter of the RSAI

New Series 7: May 2012

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1. Introduction from the President

1.1 Regional Science and Disasters (1): what regional scientists can learn from the Great East Japan Earthquake and Fukushima nuclear power plant crisis

Yoshiro Higano, RSAI President



Welcome to the latest newsletter from me, the RSAI President. In this short article, I would like to discuss what regional scientists can learn from the Great East Japan Earthquake and Fukushima nuclear power plant crisis.

The breakwater, the largest in the world at 2 km in length, 63 m in depth, 30 m in width and 6 m above sea level, was destroyed by the Japanese tsunami. Damage from large natural disasters cannot be prevented, but at least we may be able to decrease the extent of damage by utilizing technology better. The flood of water into the city area was delayed by 6 minutes by the breakwater, but the real effects of damage reduction must be scientifically estimated and evaluated. This may change the definition of cost-benefit analysis of investments for natural disaster preventing projects. The cost is the sum of money invested and the expected value of the damage that cannot be prevented by the project. The benefit is the expected value of the damage that would not have been prevented if the project was not implemented, minus the expected value of the damage in the above definition of cost. Of course, the time horizon must be a critically decisive policy parameter or it could be a

crucially important policy argument in a more general analysis.



Figure 1. All buildings were swept away during the 2011 tsunami in Sendai

Evacuation plans appear to have worked well because damage was reduced in communities with a plan. However, a considerable number of people died in the communities or schools, despite an evacuation plan and daily evacuation drills. The drill conducted in a virtual setting might have automatically driven evacuation behavior through inertia at the time of the crisis. Therefore, the design of an evacuation drill, as well as an evacuation plan, is essential.

One year has passed since the earthquake and Fukushima nuclear crisis. However, more than 300 thousand persons are still displaced from their homes. This means several alternative recovery programs for scenarios of disasters (dependent on an estimated scale of damage) should have been planned on a regular basis. Persons in damaged homes, and displaced people, have developed a distrust for planning, and for institutions, politicians and authorities because the progress of recovery has been slow. Rather, the people have come to trust volunteers. The estimated scenarios, designed evacuation plans and recovery programs must be consistent in decreasing damage so the trust of

displaced people (and those who have suffered damage) can be kept throughout the recovery process.

Historically, the design of disaster prevention planning has been affected by the impacts and characteristics of earlier large scale disasters. In 1896 a big tsunami hit the Tohoku District on the Pacific side of Japan. After this tsunami the community relocated houses to the upland areas. Many years passed and people began to build houses again on the lowlands, trusting the breakwater, and most of these homes were recently destroyed by the tsunami. After the Great Kanto Earthquake in 1923 (no big tsunami followed), and following the Second World War in 1945, Tokyo designed prevention plans against damage from the destruction of buildings and catastrophic fire. Several times strict quake-resistance standards have been established. It is critically argued that the Fukushima Nuclear Crisis was directly caused by errors in the estimation of the scale of earthquakes and tsunamis forecasted to hit the nuclear plants. The largest estimations, against which the aseismic design of the plants were made, had presumed the same scale of earthquake (magnitude 7.36) as hit the coast of Fukushima in 1938. The scale of the actual one, on the 11th March, 2011, was bigger than the estimated one and at the same level as the Jogan earthquake in 869 (or larger than it in fact). In 2009 a meeting of the sub-committee on earthquake resistant and structure design of the Study Committee for Natural Resources and Energy, Ministry of Economy, Industry and Trade (MEIT), was held to evaluate the aseismic design guidelines for nuclear plants that were revised in 2006. In the meeting, the Tokyo Electric Power Company (TEPCO) played down the possibility of errors (based on the very small probability argued on that day) in the estimation although it was pointed out by an expert in the field from the

Advanced Industrial Science and Technology (former National Research Institute of MEIT). The Nuclear and Industrial Safety Agency of MEIT confirmed the position of TEPCO in the meeting. Recently, the investigation commission of the Cabinet in charge of predicting scales of earthquake and tsunamis in the Nankai Trough, has reported new estimated scales of tsunamis that may be caused by earthquakes forecast to occur in the near future in the Tokai, Nankai and Tonankai areas (in the mid and western areas of Japan). Almost all estimated scales have been revised upward by two-thirds. This may have two interpretations: a disclaimer to prepare for what could happen in the future or a drastic shift in the system design parameters of disaster preventing projects.

After the Fukushima nuclear crisis, people that lack knowledge about radiation exposure were inclined to refrain from purchasing commodities produced in the area and visiting as tourists the three prefectures including Fukushima most affected by radioactivity. This has depressed the economy in these districts and further delayed recovery from the disaster. People appear to have confused radiation (sievert) with radioactivity (becquerel) and many do not know such radioactive materials naturally exist in nature. In addition, they have confused instant radiation exposure (e.g., micro-Sv/h) and cumulative radiation exposure over a long period (e.g. milli-Sv/year or milli-Sv/life). The situation is further confused because experts in the field of radiology have different opinions about the values of the critical parameters. Also, people are confused by differing arguments on the web with usually no way to identify whether the information is scientifically correct. Evacuation and recovery plans must be designed so that we can correctly gauge the risks of radiation.

The Science Council of Japan now argues that we must think 'science for policy'. This means that the sciences should contribute more to the implementation of policies. The government has considered a policy for science, namely policies for the development of technology based on sciences for a long time. This means the departments in charge of developing technology have tried to identify priorities in scientific fields, and intensively assigned budgets for fields following these priorities. It is critically argued that the Fukushima crisis has been a man-made disaster. Of course the errors in the forecasts of impact mentioned above is one of the direct causes. So-called "institutional problems" existed and created a closed community called a "Nuclear Village." The policy for science was one cause for the organization of the Village. Although the policy for science has contributed to the development of technology, the policy for science has strived to motivate researchers and promote high specialization in particular fields.



Figure 2. A boat adrift after the 2011 Tsunami in Kesen-Numa

Policies for science have induced budget fights among scientists and budgets have become concentrated in specific fields and government officers sometimes systematically involved in the Village. When we consider science for policy, we

realize such a specialized science alone does not work well to accomplish all purposes. The importance of the social-human sciences should also be highlighted. It is critically argued that at least for three days after the Fukushima crisis the integrity and unity of the decision-making mechanisms of the central government collapsed even though most cabinet members experienced no direct damage when the earthquake hit. 'Incapable' officers made critical decisions based on fragmented information and no minutes of the meetings were taken in which the decisions were made. A system that automatically generates a unified and integrated decision-making mechanism must be considered case by case and phase by phase for a critical and urgent crisis such as the Fukushima nuclear crisis. Robust governance must be established based on the knowledge of specialists as well as scientists including social-human scientists.

The damaged areas were vast. This raised difficulties in balancing the respective inherent cultural, historical and geographical characters of the damaged regions against the necessary integrity in designing a recovery project, e.g. keeping a unified civil minimum transportation plan operational in the damaged regions.

It is often argued the damaged regions were so-called *genkai shūraku* (marginal villages), namely de-populated and economically unsustainable peripheral regions, where the central government has granted subsidies for all sorts of industries for a long time. The legitimacy of the recovery plan must be proved in a socio-economical sense so that the efficiency of the central government taxation is maintained at a permissible level. In some sense the driving force of markets is more powerful than a tsunami. Construction of a low carbon system in the market may be an attractive counter proposition for this argument.

We should accept values for the pursuit of scientific truth because our inquisitiveness

is influenced and we can be deeply moved. Research, seemingly often ineffective at times, may indirectly contribute to public opinion over many generations. On the other hand, research and its implementation in society, developed with expectations of beneficial results for the public, can bring tragedies. Sometimes the root of such tragedy comes from the attitude of researchers. Different types of researchers rarely interact and have even fought against each other. This seems ever-lasting and can produce nothing beneficial for the public. Research that actually contributes to society is achieved by learning what is really required by that society, cooperating with researchers in different fields and providing the fruits of research that pursues the truth of science to society.

Regional science as an inter- and multi-disciplinary science must lead in contributions for disaster mitigation and prevention, and recovery from a disaster.

Yoshiro Higano, President of RSAI

1.2 Welcome from the Editors

Graham Clarke and Eveline van Leeuwen



This is the seventh newsletter we have produced and we are very thankful to all the contributors thus far. It is always nice to work with so many people to produce a newsletter that is hopefully interesting to all regional scientists. Since last year we have also published a printed version of the newsletter alongside the online one in order to

target even more researchers in our community. Over the last three years we have covered issues such as climate change, women in regional science, sport, the economic crises, amenities and in this issue the theme is natural disasters. If you missed any, you can look them up at <http://www.regionalscience.org/Publications/RSAI-Newsletters/>

In addition to three articles on natural disasters and the role of regional science we have our familiar articles on events, news and recent prize winners. We profile Sir Alan Wilson in our 'meet the Fellows' series. Alan has played a leading role in the development of the family of spatial interaction models, now one of the main methodologies in the regional science toolkit. He has also worked extensively on urban dynamics and chaos/bifurcation theory and was amongst the first to write about spatial microsimulation and the possibilities that modelling individual behavior could offer. We also profile the School of Public Policy at George Mason University in the US as a major centre of regional science training and research. As usual we hope you enjoy this latest edition.

2. Journal news

2.1 Papers in Regional Science

Edited by Jouke van Dijk



We are delighted to announce a higher impact ranking (ISI Journal Citation

Reports®) for Papers in Regional Science making the journal the most highly cited regional science Journal. The 2-Year Impact Factor 2010: 1.236 and the 5-Year Impact Factor 2010: 1.638. In addition it is now accepted in the Economics ISI Category!

Top 5 Most Read Articles 2011

Thirty years of spatial econometrics
Luc Anselin

Economic geography and African development
Anthony J. Venables

The new economic geography: Past, present and the future
Masahisa Fujita, Paul Krugman

Frontiers of the New Economic Geography
Masahisa Fujita, Tomoya Mori

Regional innovation systems, clusters, and knowledge networking
Thomas Brenner, Uwe Cantner, Dirk Fornahl, Martina Fromhold-Eisebith, Claudia Werker

Top 5 Most Read Articles 2011

Sorting winners and losers: using CGE models to assess income distribution effects of economic development choices
Katherine Chalmers, Stephan Weiler

Regional Innovation Systems, Clean Technology & Jacobian Cluster-Platform Policies
Philip Cooke

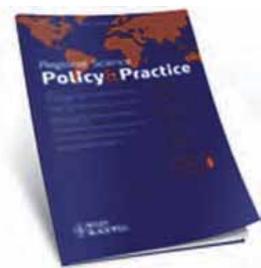
The importance of broadband provision to knowledge intensive firm location
Elizabeth A. Mack, Luc Anselin, Tony H. Grubestic

A note on the relation between inter-regional inequality and economic efficiency: evidence from the US states
Stilianos Alexiadis, Konstantinos Eleftheriou

Controversies in Local Economic Development: Stories, Strategies, Solutions – By Martin Perry
James E. Rowe

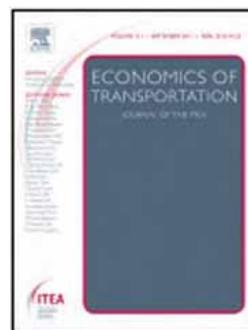
2.2 Regional Science Policy & Practice (RSPP)

Edited by: Michael Carroll



RSPP was launched to offer an additional outlet to regional scientists especially interested in policy issues. We are pleased to announce that RSPP has increased in frequency to 4 issues per volume such is the success of the new venture.

2.3 New Journal: Economics of Transportation



Economics of Transportation is the recently established journal of the International Transportation Economics Association (www.iteaweb.org). The journal publishes scholarly papers

that make important contributions to transportation economics. The journal also publishes papers that research the interaction between transportation and other economic activities; papers that seek to promote cross fertilization with other fields of economics including labor, trade, urban economics, and industrial organization; and substantive papers on

timely policy issues relating to transportation. The journal welcomes both theoretical and applied papers. Papers are welcome regardless of the originating discipline provided they contribute to the goals of the journal. Economics of Transportation aims to uphold the highest standards of scientific originality and quality.

The journal is edited by Mogens Fosgerau, Technical University of Denmark, and Erik Verhoef, Vrije Universiteit Amsterdam.

Submissions are now invited. The online submission is located at <http://ees.elsevier.com/ecotra/>. The inaugural issue is planned for the end of 2012.



3. Regional Science and Disasters (2): Regional Science after an Earthquake

*Paul Dalziel and Caroline Saunders,
Lincoln University, New Zealand*



In the normal course of events, applied regional science is able to help communities frame public discussions about how to promote their economic well-being, taking into account data gathering, scientific analysis and policy advice from experts in the field. Events are not always normal, however, and from time to time regional scientists are called upon to help a community plan its recovery from a major natural disaster.

Our own city of Christchurch in New Zealand has been struck by a series of earthquakes since September 2010, including four seismic events of magnitude 6.0 or higher on the Richter scale. The most damaging earthquake was on 22 February 2011, which caused 185 deaths and devastated the city's central business district, which is still closed to the public at the time of writing. The citizens have endured over 10,000 aftershocks.

The immediate response to the disaster was superb. Well established national and regional procedures for civil defence were activated. These were assisted by offers of international aid, including emergency rescue personnel sent from Australia, Israel, Japan, Thailand and the United Kingdom to help the local response teams. Authorities acted quickly to restore essential services and to ensure public safety was protected as much as possible.

A top priority for public safety was to assess all commercial and residential properties for damage. In the inner city, this identified 714 buildings that needed demolition and another 162 buildings requiring partial demolition, with 195 of these having heritage status. The face of Christchurch city has changed forever.

Alongside the demolition work, public agencies have been working on plans for the city's longer-term recovery. There are three tiers of institutional response: (1) the Canterbury Employers' Chamber of Commerce entered into a partnership with the Canterbury Development Corporation to provide financial and other assistance to individual businesses struggling to survive; (2) the Christchurch City Council has produced a Recovery Plan for the Christchurch central business district; and (3) central government has created the Canterbury Earthquake Recovery Authority (CERA) to prepare and implement a recovery

strategy for the greater Christchurch area, covering five key areas:

1. Community wellbeing
2. Culture and heritage
3. Built environment
4. Economy
5. Natural environment

This planning for longer-term recovery offers opportunities for contributions from regional science, but it is not immediately clear what form these contributions might take in such abnormal times. With so much physical damage to the built environment, and with such disruption to normal commercial networks, what advice can regional science make for the economic recovery of the region?

In this context, a very important Public Forum took place at Gran Sasso National Laboratory in L'Aquila, Italy, on 17 March this year, focusing on the theme "Building Resilient Regions after a Natural Disaster". Like Christchurch, L'Aquila is trying to recover from a devastating earthquake that had severely damaged a large number of buildings in the city's historical centre. Three years after the earthquake, the inner city is still cordoned off and its citizens are feeling powerless in the face of long delays in decisions about how to rebuild the city and return evacuated residents to their homes.

Consequently, the OECD and the University of Groningen have been commissioned to prepare a report on options for an integrated development strategy for the city's wider Abruzzo region and to counter the effects of the earthquake shock. Preliminary results from the study, coordinated by Monica Brezzi (OECD) and Professor Philip McCann (University of Groningen) on the basis of contributions by members of a larger research team, were presented at the Public Forum (see www.oecd.org/regional/L'Aquila).

The forum was a moving event. It was preceded by a public session in which

local citizens voiced their frustrations at being shut out of their homes and their city centre for so long. The forum was then chaired by the Italian Minister of Territorial Cohesion, Fabrizio Barca, and involved a series of presentations from OECD and Groningen researchers and from local office-holders about possible ways forward. The day finished with a speech by the Prime Minister, Mario Monti, in which he made specific commitments for the city's rebuild.

A feature of the forum was that it included regional scientists from Christchurch in New Zealand, from New Orleans in the United States, from Tohoku in Japan and from the Van province in Turkey, all of whom had an opportunity to share our respective reflections on how our communities are recovering from major natural disasters. It was in our view a valuable experience of solidarity.

It is hard to summarise the OECD-Groningen study, which contains a wealth of insight into how L'Aquila and the Abruzzo region might move forward from their present situation. One conclusion, however, strikes us as particularly relevant for answering the question about the role of regional scientists in offering advice to recovery planners.

After the destruction of a large earthquake, there is a natural and palpable grief for the heritage and other buildings that have been damaged beyond easy repair. At such a moment, there often emerges a strong desire to rebuild the city as it was (or as close to that state as seems feasible) as an end in itself. This tendency has certainly been important in our own city, focused in particular on the fate of the Anglican Cathedral situated in the heart of the city and often used as a primary symbol of the city's heritage and identity.

The OECD-Groningen study explicitly warns against approaches that are based on rebuilding the city as it was and only then looking for ways to move

forward. Instead it offers a vision for L'Aquila's redevelopment as 'a smart city' and the re-branding of the Abruzzo region as 'a place of science, sustainability, heritage and beauty'. It then adds what we think is a key insight:

"Implementing this new vision is fundamentally about shifting the emphasis from physical reconstruction to economic and social development; from the short and medium term to the medium and long term; from a rather fragmented to a socially integrated approach; and from a local and largely domestic view to a wider national and international perspective."

Within such a framework, the tools of regional science can assist planners to identify the long-term strengths and opportunities for regional development and to think about how the recovery can take advantage of those strengths and opportunities. We are fortunate in this regard in Christchurch since we already had in place a Canterbury Regional Economic Development Strategy before the earthquakes. But nevertheless there are still challenges in applying that strategy as we move forward.

The first challenge is that we should not take for granted that all of the strengths and opportunities identified before the earthquakes are still valid after the earthquakes. Initial assessments suggest that relatively little damage was experienced by the region's export-oriented industries (with the exceptions of tourism and international education), so that the basic framework of the pre-earthquakes strategy remains intact.

A more difficult challenge concerns the transition effects of a large earthquake. The issue is whether the short-term impacts of the disaster, including the path taken during the recovery phase, have long-term impacts on the region's economic and social development. With the closure of the central business district for more than a year, enterprises

have been forced to relocate in other parts of the city. It is an open question as to how many of those enterprises will return to the centre when it eventually reopens, raising difficult planning issues for the inner city rebuild.

Feedback on the L'Aquila forum has been very positive. The OECD is now taking steps to create a wider network of post-disaster regions to learn from our experiences (see www.oecd.org/dataoecd/58/59/49845026.pdf). The thinking behind this OECD initiative is that "creating a network of regions affected by or at risk of natural disasters can help to restore confidence by sharing experiences, avoid costly mistakes, and set priorities". Further, "given the natural and environmental spillovers of disasters, collaboration with regions in immediate neighbouring countries could also facilitate the elaboration of cross-border policy responses".

We support this initiative. We think the tools of regional science can be very valuable in helping communities frame their response to natural disasters. We need to create international forums where regional scientists and policy advisors can work together to develop robust principles of best practice that can be called upon when required.

4. RSAI prize winners

4.1 Peter Nijkamp Award



Fernando Salgueiro
Perobelli

The winners of the 2011 inaugural Peter Nijkamp RSAI Research Encouragement Award for an Early Career Scholar from a Developing Country were

Fernando Salgueiro Perobelli and Arief Anshory Yusuf.

Fernando Salgueiro Perobelli is Associate Professor at Department of Economics, Federal University of Juiz de Fora, where he works at the undergraduate and postgraduate level teaching courses in the area of Regional and Urban Economics, Input-output and Computable General Equilibrium.

Arief Anshory Yusuf is a senior lecturer at the Department of Economics of Padjadjaran University in Bandung, Indonesia. His research interests and publication works lie in the area of natural resource and environmental economics, poverty and inequality, and economy-wide modeling.



Arief Anshory Yusuf

Congratulations to both – and we hope to see regional science flourishing in these exciting, developing parts of the World.

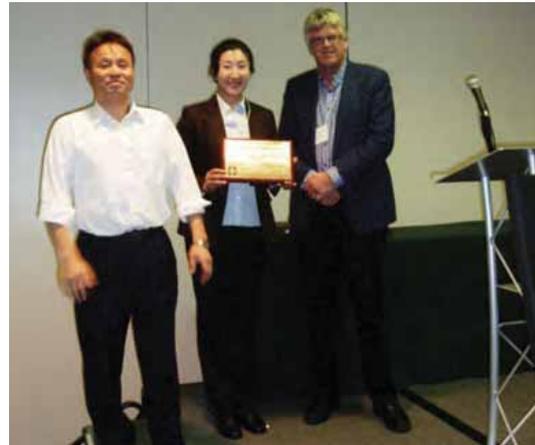
4.2 Hirotada Kohno Award



Graham Clarke, University of Leeds UK, receives the award from former president of RSAI, Roberta Capello at the NARSC meeting in Miami.

Graham was Executive Director of RSAI from 2003 to 2010 and did a great job in organizing many things, including this newsletter.

4.3 Martin Beckmann Award



The 2011 Martin Beckmann Award for the best article published in 2010 in Papers in Regional Science was awarded to Maarten Bosker and Harry Garretsen for their article 'Trade costs in empirical New Economic Geography' published in August 2010, Volume 89, Issue 3, 485–511 and to Akihiro Otsuka, Mika Goto and Toshiyuki Sueyoshi (see picture above) for their article 'Industrial agglomeration effects in Japan: Productive efficiency, market access, and public fiscal transfer' published in November 2010, Volume 89, Issue 4, 819–840. The jury was Masahisa Fujita, Jean Paelinck, John Quigley and Jouke van Dijk.



5. Meet the Fellows: Sir Alan Wilson



My academic origins were far removed from regional science. I graduated in Mathematics and I wanted to work as a mathematician. I had a summer job as an undergraduate in the (then new) Rutherford Lab at Harwell in the UK and this led to a full-time post when I left Cambridge. I was, in civil service terms, a 'Scientific Officer' which I was very pleased about because I wanted to be a 'scientist'. I even put that as my profession on my new passport. It was interesting. I had to write a very large computer programme for the analysis of bubble chamber events in experiments at CERN (which also gave me the opportunity to spend some time in Geneva). With later hindsight, it was a very good initial training in what was then front-line computer science. But within a couple of years, I began to tire of the highly competitive nature of elementary particle physics and I also wanted to work in a field where I could be more socially useful but still be a mathematician. So I started applying for jobs in the social sciences in universities: I still wanted to be a maths-based researcher. All the following steps in my career were serendipitous – pieces of good luck.

It didn't start well. I must have applied for 30 or 40 jobs and had no response

at all. To do something different, sometime in 1962, I joined the UK Labour Party. I lived in Summertown in North Oxford, a prosperous part of the city, and there were very few members. Within months, I had taken on the role of Ward Secretary. We selected our candidates for the May 1963 local elections but around February, they left Oxford and it then turned out that the rule book said that the Chairman and Secretary of the Ward would be the candidates, so in May, I found myself the Labour candidate for Summertown. I duly came bottom of the poll. But I enjoyed it and in the next year, I managed to get myself selected for East Ward – which had not had a Labour Councillor since 1945 but seemed just winnable in the tide that was then running. I was elected by a majority of 4 after four recounts. That led me into another kind of substantive experience – three years on Oxford City Council.

And then a second piece of luck. I was introduced by an old school friend to a small group of economists in the Institute of Economics and Statistics in Oxford who had a research grant from the then Ministry of Transport in cost-benefit analysis. In those days – it seems strange now – social science was largely non-quantitative and they had a very quantitative problem – needing a computer model of transport flows in cities. We did a deal: that I would do all their maths and computing and they would teach me economics. So I changed fields by a kind of apprenticeship. It was a terrific time. I toured the United States – where all the urban modellers were – with Christopher Foster and Michael Beesley and we met people like Britton Harris (the Penn State Study) and I. S 'Jack' Lowry (of 'Model of Metropolis' fame). It was through the people I met on this trip that I had my first introduction to regional science. Back in Oxford, I set about trying to build the model. The huge

piece of luck was that I recognised that what the American engineers were doing in developing gravity models could be restated in a format that was more Boltzmann and statistical mechanics than Newton and gravity and this generalised the methodology. The serendipity in this case was that I recognised some terms in the engineers' equations from my statistical mechanics lectures as a student. This led to 'entropy-maximising models'. I was suddenly invited to give lots of lectures and seminars and people forgot that I had this rather odd academic background.



Alan Wilson (centre) with colleagues, early 1970s

It was a time of rapid job progression. I moved with Christopher Foster to the Ministry of Transport and set up something called the Mathematical Advisory Unit, which grew rapidly, with a model-building brief. (I had been given the title of Mathematical Adviser: it should have been 'Economic Adviser' but the civil service economists refused to accept me as such because I wasn't a proper economist!). This was 1966–68 and then serendipity struck again. I gave a talk on transport models in the Civil Engineering Department in University College London and in the audience was Professor Henry Chilver. I left the seminar and started to walk down Gower Street, when he caught up with me and told me that he had just been

appointed as Director of a new research centre – the Centre for Environmental Studies – and “would I like to be the Assistant Director?” My talk had, in effect, been a job interview – not the kind of thing that HR departments would allow now! And so I moved to CES and built a new team of modellers and worked on extending what I had learned about transport models to the bigger task of building a comprehensive urban model – something I have worked on ever since. In the late 60s, regional science began to develop seriously in the UK and Europe and I recall giving a paper at a conference in London – was it the first British Section meeting or was it a European meeting? What I do remember is my naivety on conference presentations. I had written a very long paper – far too long – titled 'Towards a comprehensive urban model'. John Parry Lewis was chairing the session and to my horror, as I was around the end of my introduction to what I was planning to say, he told me I had about five minutes left! Somehow, I survived.

By the end of the 60s, quantitative social science was all the rage. Many jobs were created as universities sought to enter the field and I had three serious approaches: one in Geography at Leeds, one in Economics and one in Town Planning. I decided, wisely as it turned out, that Geography was a broad church and had a record in absorbing 'outsiders' and so I came to Leeds in October 1970 as Professor of Urban and Regional Geography. And so I became a geographer! There was a newspaper headline in one of the trade papers with words to the effect that “Leeds appoints Geography Professor with no qualifications in Geography!” However, again, the experience was terrific. I enjoyed teaching. It led to long term friendships and collaborations with a generation that is still in Leeds or at least academia: Martin Clarke, Graham Clarke, John Stillwell, Phil Rees, Adrian

MacDonald, Christine Leigh, Martyn Senior, Huw Williams and many others – a long list. Some friendships have been maintained over the years with students I met through tutorial groups. We had large research grants and could build modelling teams. Geography, in the wider sense, did prove very welcoming and it was all – or at least mostly! – very congenial. Sometime in the early 1970s, I found myself as head of department and I also started taking an interest in some university issues. But that decade was mainly about research and was very productive. In the mid 70s, I had three years as an Adjunct Professor in the Dept of Regional Science at Penn and I spent three weeks there each summer giving lectures. It was a period of close collaboration with Britton Harris that led to our 1978 paper on retail dynamics that has informed much of my work since. I attended many regional science conferences and odd remarks stick in my memory: Morton Schneider, for example, saying in a response to a presentation of mine, that I was the only person in the history of mathematics who used the letter 'O' as a variable!

By the end of the decade, there had been the oil crisis, cuts were in the air – déjà vu! – and research funding became harder to get. The next big step had its origins in a horse racing meeting on Boxing Day – was it 1983? – at a very cold Wetherby in Yorkshire UK. I was with Martin Clarke in one of the bars and we were watching – on the bar's TV – Wayward Lad, trained near Leeds by Michael Dickinson, win the King George Stakes at Kempton. Thoughts turned to our lack of research funding. It was at that moment, I think, that we thought we would investigate the possibility of commercial applications of our models. We first tried to 'sell' our ideas to various management consultants. We thought they could do the marketing for us. But no luck. So we

had to go it alone. We constituted a two-person very part-time workforce. Our first job was finding the average length of garden paths in rural Oxfordshire for the Post Office! Our second was predicting the usage of a projected dry ski slope in Bradford, UK. We did the programming, we collected the data. We wrote the reports. We were once moved on by the management from outside Marks and Spencers store in Leeds when we were standing outside with clip boards trying to collect origin and destination data from customers! But then it suddenly was better. We had substantial contracts with W H Smith (a major UK high street chain) and Toyota (UK and Belgium) and we could start to employ people. It is a longer story that can't be told here, but that is what grew into GMAP, with Martin Clarke as the Managing Director and driving its growth. At its peak, GMAP was employing 120 people (largely Leeds University geography students) and had a range of blue-chip clients. That was a kind of real applied geography and regional science that I was proud to be associated with.

Simultaneously in the 80s, I began to be involved in university management and I became 'Chairman of the Board of Social and Economic Studies and Law' – what in modern parlance would be a Dean. In 1989, I was invited to become Pro-Vice-Chancellor – at a time when there was only one. I left the Geography Department and, as it turned out, never to return. The then Vice-Chancellor became Chairman of the CVCP and had to spend a lot of time in London and so the PVC job was bigger than usual. In 1991, I found myself appointed as Vice-Chancellor and embarked on that role on 1 October in some trepidation. I was VC until 2004. It was challenging, exciting and demanding. It was, in Dickens' phrase, 'the best of times and the worst of times': tremendously privileged, but also with a recurring list

of very difficult, sometimes unpleasant, problems. But this is about geography and regional science: I somehow managed to keep my academic work going in snatches of time but the publication rate certainly fell.

I was Vice-Chancellor for almost 13 years and in 2004 I was scheduled to 'retire'. This, however, seemed to be increasingly unattractive. Salvation came from an unlikely source: the Department for Education and Skills (DfES) in London. I was offered the job of Director-General for Higher Education and so I became a civil servant for almost three years with policy advising and management responsibilities for universities in England. Again, it was privileged and seriously interesting, working with Ministers, having a front row seat on the politics of the day. But I always knew I wanted to be an academic again, so after a brief sojourn in Cambridge, I returned to academic life at University College London as Professor of Urban and Regional Systems – and that was over four years ago. This has been another terrific experience. I work with Mike Batty, an old modelling friend and Andy Hudson-Smith in the Centre for Advanced Spatial Analysis and a group of young researchers and students. I run a course for graduate students based on a book of mine which was published in 2010 – *Knowledge Power* – url: www.routledge.com/9780415553117 – and a course on urban modelling, written up as *The science of cities and regions* published by Springer in January 2012 – search Springer.com for details. What has been very exciting is that my research field, developed into the realms of what is now called complexity science, has become a hot topic. So research grants flow again. This includes £2.5M for a five-year grant from EPSRC for a five-year project on global dynamics – now 18 months under way – see the CASA web site for recent working papers. This embraces migration, trade, security and development aid: big

issues to which real geography and regional science can make a significant contribution. It funds half a dozen new research posts and five PhD studentships. The shopping list of research challenges is a long one and so 'retirement' seems, hopefully, a long way away!



6. Meetings in Regional Science

5.1 NARSC Miami



Delegates board the good ship Regional Science!

The 58th Annual North American Meetings of the RSAI were held last November 2011 in sunny Miami, Florida jointly with the Second Conference of the Regional Science Association of the Americas. This joint event featured several keynote speakers including RSAI fellow Rick Church, NARSC President Gilles Duranton, Dr. Martim Smolka (Lincoln Institute of Land Policy), and Professor Mike Batty (University College London, 2011 Laureate of the William Alonso Memorial Prize). Another highlight of the Conference was the boat cruise off the coast of South Florida, which provided memorable moments for conference participants to enjoy each other's company, Latin music, food, and drinks. This event was the largest Regional Science International conference ever organized in North America with 665 participants. Congratulations to the

organizers, Drs. Shelby Gerking, Neil Reid, Shaoming Cheng, and Jean-Claude Thill. The 59th North American meetings will take place in Ottawa, Canada and Drs. Bruce Newbold and Antonio Paez are working on another memorable conference. Go Team Canada!

5.2 WRSA Hawaii



The Western Regional Science Association held its 51st annual meeting on the warm and sunny island of Kauai, Hawaii in early February. The meeting was very well attended, with 40 paper and panel sessions and over 220 participants. As in previous years, the conference was quite international in terms of both provenance of participants and geographical focus of research presented. If you haven't attended a WRSA meeting before, give it a try! The 52nd annual WRSA meeting will be held February 24–27, 2013 in (hopefully warm and sunny) Santa Barbara, California. To take part in next year's meeting, papers should be submitted by October 15, 2012 to wrsa@brown.edu. For questions or inquiries, see the WRSA website (www.wrsa.info) or contact Rachel Franklin (rachel_franklin@brown.edu).

International Conference on Sustainable Development and Policy Decision of Mineral Regions & the 3rd Annual Meeting of the Regional Science Association International

March 31 st—April 1 st, 2012, International Conference Center of China University of Geosciences, Beijing



5.3 3rd Annual Meeting of the Regional Science Association in Beijing

The 3rd Annual Meeting of Regional Science Association took place at the University of Geosciences in Beijing from the 31st of March – 1st of April. More than 200 participants from China, Japan, India, Vietnam, Korea, France,

United States, The Netherlands and Portugal attended the conference providing more than sixty presentations. At the conference decisive meetings were held between RSAI representatives and regional scientists from various Chinese universities.

We are happy to announce that Prof. Hao is now officially President of the Regional Science Association China

(RSAC), and Prof. Sun (Renmin U.) is President-elect. RSAC has opened up its leadership to outsiders, with Dr. Lei now being a Vice-President. Dr. An has been elected a Councilor. Our friend Dennis Zhao will lead a working group being in charge of international affairs and cooperation.



7. Centres of Regional Science: The School of Public Policy at George Mason University

Kingsley E. Haynes (left) and Roger R. Stough, George Mason University, US



The School of Public Policy (SPP) at George Mason University (Mason) was rated the #1 program in sponsored research and development in public policy in the United States by the National Science Foundation in 2008. It remains one of the top schools of public policy. This is a description of how it rose to this level over its first 18 years and the strategy and tactics used to get there.

The School, located in the U.S. National Capital Region (NCR) was founded in 2000 following a 10 year incubation period as the Institute of Public Policy (TIPP). The NCR is one of the largest technology intensive economies in the country with hundreds of thousands of technology workers. It has three

geographic parts: Suburban Maryland, District of Columbia and Northern Virginia where the several campuses of Mason are located with the inner suburb of Arlington County campus being the home of SPP. Arlington is adjacent the District of Columbia. Over its 22 year history SPP rose from its origins in TIPP in 1990 with a director and three endowed chair professors to a top rated school of public policy in the latter part of the first decade of the new millennium based on its nationally recognized research capability in transport, science and technology, security, and regional economic development policy and modeling.

Assumptions

SPP was built on several assumptions. First was a desire to create one of the great public policy schools in the U.S. Second, was a decision to build the School from the top down beginning with three very senior professors and the initiation of a Ph.D program. Third, we assumed that globalization was not just an emerging trend but a lasting one. We perceived the rapid development of emergent economies like Korea, Malaysia, China, India and others would continue and because of the scale of some of these there would be new experiments in areas such as regional dynamics, regional equity, technology led development, transport and telecommunications infrastructure, and central vs. decentralized strategic planning and implementation. Fourth, we wanted to attract the best students regardless of where they came from in the world. Fifth, we decided that the School would have an interdisciplinary approach to curriculum and education programs, and thus that we would accept students from such academic pedigrees as economics, political science, geography, management, engineering, law, science, technology, and later, health and medicine. Sixth, because of this breadth and diversity,

we assumed that graduates of the program would have multiple career paths including academic, professional policy analysis and research, and formation of their own companies. Seventh, students would be expected to learn how to conduct publishable research in the first year and with faculty help begin publishing almost immediately. Finally, the program curriculum would expose students to many conceptual and theoretical bases and a broad, diverse and advanced range of methodologies that could be brought to bear on research in the broad area of public policy.

The Evolution and Performance of the School of Public Policy

With these assumptions we designed a curriculum for a Ph.D. in public policy and by 1992 we had the first class in residence. The program rapidly gained visibility and in turn so did student quality. Given it was the only academic program initially it rapidly became quite large with annual new enrollments as large as 45 in one year. This has meant that often more than 100 students are in progress working on their degree at any one time. This is a large doctoral program, regardless of whether compared to other programs in the U.S. or globally.

The faculty and program leadership understood from the outset that having a large Ph.D. program would require a large sponsored research and development portfolio in order to pay for student tuition and living costs.

SPP was quite fortunate to receive a \$1 million grant to study the institutional barriers to the application of information technology to surface transport including the vehicles and the infrastructure in the early 1990s. This was complemented with a series of subsequent grants and contracts for research in this area that continued until 2009. In all, funding at about \$45 million was raised for work in this theme area. Many doctoral students

in SPP were supported with funding from these programs. But this area was not the only productive one as a continuing stream of funded research was undertaken in the area of regional economic development as well as including the development of the Mason Enterprise Center with an annual budget today of about \$7 million. The MEC has a large number of entrepreneurship related programs including a statewide network of business assistance centers and multiple business and technology incubation and accelerators it directs and manages. These and other programs, not so closely related to regional science, provided the funding needed to support the large SPP doctoral program. The sponsored research and development portfolio also provided a wide range of venues and topics that were fertile laboratories for students to build research, publishing and presentation skills.

Over the history of the program there have been well over 300 doctoral students with 222 graduated as of spring of 2012. Almost 40% have been foreign with ample representation from Asia, Middle East, Europe and South America. Some, but fewer, have come from African countries. Graduates of the program now have academic positions at many universities in America and other countries. At the same time nearly 40% have either created analysis and research career paths (in both the private and government sectors) and/or their own companies. This leads to a large and diverse set of high value individuals that form the alumni of the program. Both while a student, and after, they have contributed to the many books, articles and official reports that have been produced over the program's history. These outputs include more than 100 books, more than a thousand articles and a huge portfolio of official reports to sponsoring agents in the government and private sectors.

Today the SPP has multiple degree programs at the master's level as well as its thriving Ph.D. program. In the late 1990s the School faced a decision as to whether to have a sole flagship master's degree program in public policy or to segment the master's market with multiple and more specialized degree programs. A decision was made to pursue the latter approach. So today SPP has over 800 master's degree students in 5 different programs. These include a master's in public policy, international commerce and policy, transport operations and logistics, peace keeping policy, organizational change and knowledge management. As a complement to the master's degree programs the School established an executive education program after 2005 with a focus on educating executives of large national and transnational corporations in the role and methods of policy formation in the U.S. federal government and a related set of programs at the sub-national region and globally.

Lessons Learned

There are many lessons to be learned from the SPP story. First, being designed as a top down School with only a Ph.D. for its first 8 years meant that a research culture was established from the outset. Faculty members were hired that had the demonstrated ability to generate support for their research and at a level that would support students. Further, when the program moved in the late 1990s to establish terminal professional master's degrees this had little effect on the research culture while at the same time producing well informed and career useful degrees. However, if the School had begun with professional master's degrees only it would have been much less successful at producing high value research. This has been the story of many (but not all) public affairs and public administration programs in the U.S.

Adopting a global perspective at the program design stage meant that the curriculum, the faculty and the students were selected in part for geographic diversity and interest in globalization. This explains the vast footprint the School has created in Europe, Asia and South America. While the Schools faculty has conducted projects in several countries in Africa the level of involvement has been less than in the other world regions.

Recognizing that students could emerge from the Ph.D with diverse career goals resulted in multiple career paths with only about half of the students pursuing academic careers. As noted above, others have moved into think tank research organizations, government analytical careers and more than a few have successfully started their own companies. Adopting this tenet has enabled supporting a large Ph.D. program and successfully placing the many graduates. It has also built an extraordinary network of graduates both in the U.S. and around the world.

Building a Ph.D. program in the above described fashion has enabled creation of a highly respected public policy program. This means that it is rated as a top program in the U.S. by the NSF and globally by a top 75 ranking by the Jaitong Global University annual ranking.

The authors are Professor Kingsley E. Haynes, Professor of Public Policy who stepped down as dean of the School of Public Policy in 2010 and Professor Roger R. Stough, Professor of Public Policy who was detailed to the central administration of George Mason University where he serves as it Vice President of Research and Economic Development.

Both Kingsley and Roger have been past Presidents of RSAI and very influential figures in the development of regional science globally.



8. Regional Science and Disasters (3): Global production disruption concerns from disasters: Potential use of bilateral trade databases by industry and by category

Norihiko Yamano, OECD, France



This article introduces empirical evidence to indicate the potential risks of supply disruptions, which leads to suspensions of global production networks using a recently developed bilateral trade

database from OECD. Many studies using similar bilateral trade statistics suggest evidence for the evolution of global value chains and deepening economic integration in manufacturing systems particularly in the Emerging Asian region (Kimura and Ando, 2005; Fukasaku *et al.*, 2011; Sturgeon and Memedovic, 2011).

The types of traded commodities therefore have been shifted in many countries by the evolution of fragmented production processes in Asia. In Eastern and South Eastern Asian regions, the intermediate export share has significantly increased in Chinese Taipei, Hong Kong China, Indonesia, Singapore, Malaysia and Thailand, while the increases in intermediate shares are marginal in China, Japan and Korea (Figure 1).

This international fragmentation of production networks has been facilitated by reductions in various transaction costs such as transportation and communication fees, agreements on free trade negotiations and liberalization processes (Jones *et al.*, 2002). Separated production processes presumably increase the international trade of intermediate parts and supplies and are likely to increase the intra-industry trade. The production processes have benefitted from evolutions of global value chains by utilizing the comparative advantages of factor prices and tasks of each country. The identification of specialization processes and scale economies in the context of inter-regional/national research

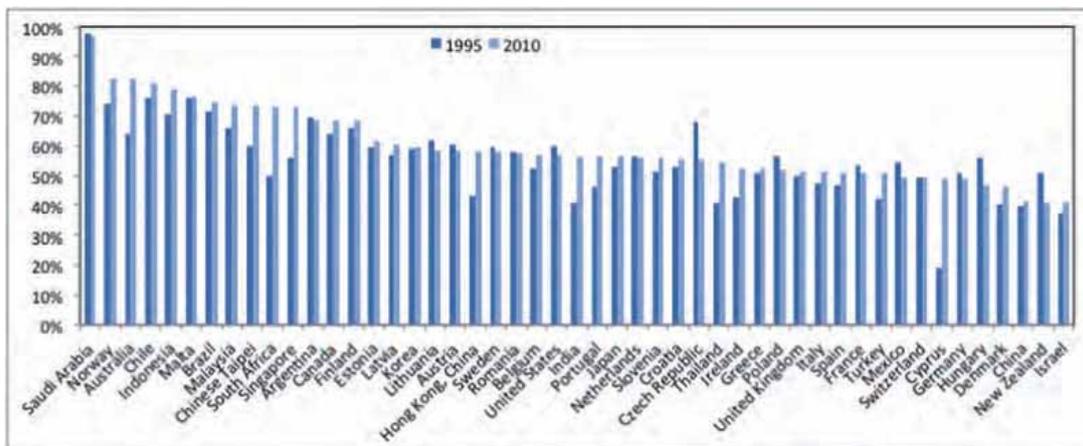


Figure 1. Intermediate export ratio (manufacturing goods) (Source: OECD BTDIxE export flows, 2011)

have been one of the mainstream research agendas in regional science and international economics.

On the other hand, we have recently experienced many production disruptions related to destructive disasters. Many of them are unexpected events such as earthquakes (e.g. The 2004 Indian Ocean earthquake and the 2011 earthquake off the Pacific coast of Tohoku) and great floods (e.g. 2005 Hurricane Katrina and 2011 Thailand floods). These natural disasters have made consumers and enterprises realize the fragilities of production disruptions resident in our production networks. Also, the magnitudes of external dependencies have increased in many countries (in terms of trade volume – GDP ratio, Figure 2). The concerns of suspended production activities are not exposed only in the disaster regions but also appear in the activities of disaster-unaffected economic partners.

In addition to the risk management studies on physical damages, protection and retrofit plans (e.g. OECD, 2006; OECD, 2009), the direct and indirect economic losses have been discussed using various economic models (e.g.

Okuyama and Chang, 2004). In particular, the regional Input-Output database is one of the most useful resources to measure both hypothetical and actual damages caused by disasters (see the special issue of Economic Systems Research, 2007). First, the economic impacts of disasters are typically short-term demand impacts on the regional economies. Second, the input-output databases explicitly allow us to measure the indirect economic impacts of direct impacts (damages of production capacities and reductions in final demands) by economic activities of specific disaster affected regions. It is also a useful tool to measure the rough estimates of retrofit impacts on regional economies.

Moreover, regional Input-Output databases have been extensively used in the context of multi-regional analysis to measure the inter-regional economic impacts such as the disruptions of transport networks (Sohn *et al.*, 2003; Tsuchiya *et al.*, 2007) and critical infrastructures such as electricity provision (Rose *et al.*, 1997) and suspension of production and demand networks to neighbour regions (Yamano

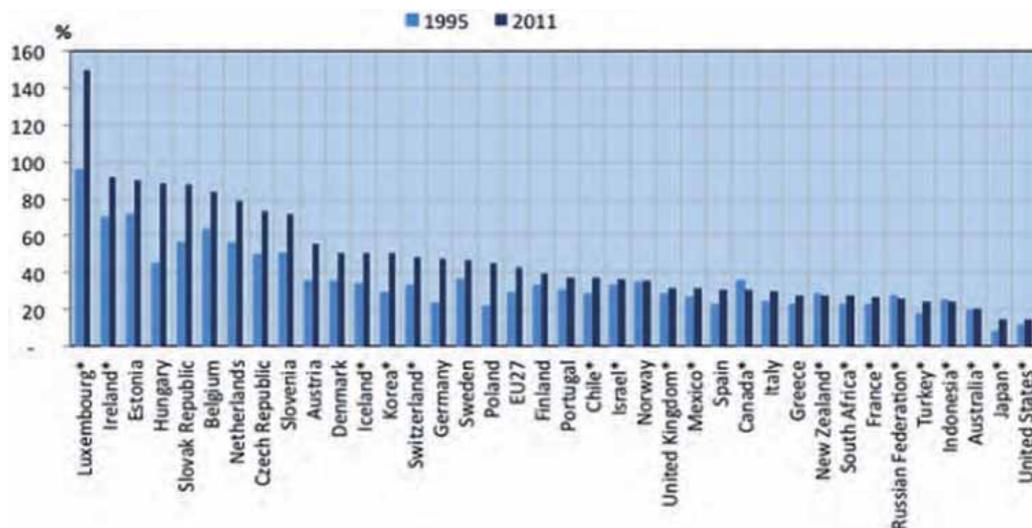


Figure 2. Trade dependency ratio = $0.5 \cdot (\text{imports} + \text{exports}) / \text{GDP}$ (Source: OECD National Accounts, 2012) *: 2011

et al., 2007) and countries (Okuyama and Sahin, 2009).

Having said that, the more comprehensive models of regional and global supply chains (e.g. the notions of Global Commodity Chain (GCC) by Gereffi and Korzeniewicz, 1994; Supply chains management by Nagurney, 2006;) require much more detail and frequently updated economic data rather than the publishing cycles and industry coverage of Input-Output and other National Accounts based statistics.

Other important limitations of industry-based (economic activity) statistics in the context of disaster analyses are the following:

1. Annual data is not appropriate. The retrofit and recovery expenditures of disasters start from the next day after such events.
2. Damage capital stock and flow-based statistics (e.g. GDP and production) are not explicitly linked.
3. As well as dynamic demographic changes by refugees, the consumption and income flows are very different from the patterns on a normal basis.
4. In addition to the above issues, there are no *official* statistics that explicitly record specific pairs of international linkages by sector.

We, therefore, propose to use Bilateral Trade Statistics by Industry and by End-use (OECD BTDIxE 2011 edition, www.oecd.org/sti/btd), a new trade database as an alternative data source to indicate the potential disruptions to global supply chains. The major advantage of using trade statistics is that previous year's data is available by the end of the following year and more than 5000 commodities can be explicitly obtained for almost all bilateral flows of imports and exports in the world.

The OECD has a long history of collecting trade statistics (OECD part of UN

Comtrade databases) and developing *analytical* trade database by industry (STAN Bilateral Trade Database). The BTDIxE database is compiled from the OECD's International Trade by Commodity Statistics (UN Comtrade equivalent) using the conversion keys from production classification schemes to an industry classification and end-use categories. The current version of BTDIxE contains all 34 OECD countries and 30 non-member economies for the time period 1995 to 2010. The three major end-use categories are household consumption goods and two industrial supplies, namely intermediate goods and capital goods. See Zhu *et al.* (2011) for the details.

The rest of this article shows the empirical results of trade patterns which indicate the evolutions of global production networks.

Trade network indicators

As discussed above, the bilateral trade statistics allow us to identify the evolutions of international specialization of production activities at the detailed commodity level. The trade indicators used in this article are related to identify 1) concentrations of production and procurement activities and 2) selection of trade partners.

Concentration or dispersion of industrial and household supplies?

Geographically dispersed supply chains increase vulnerability to operation disruptions. However, the dispersed procurement may contradict with scale economies of concentration and specialization of production processes. The magnitude of concentration of intermediate supplies can be simply measured by the variance of exported goods share in the global market of each country i.e. $\text{var} (T_i^{kl} / \sum_k \sum_l T_i^{kl})$ where T_i^{kl} is trade flow of good i from country k to country l .

Using the import trade flows for the target 65 economies of OECD's BTDIxE,

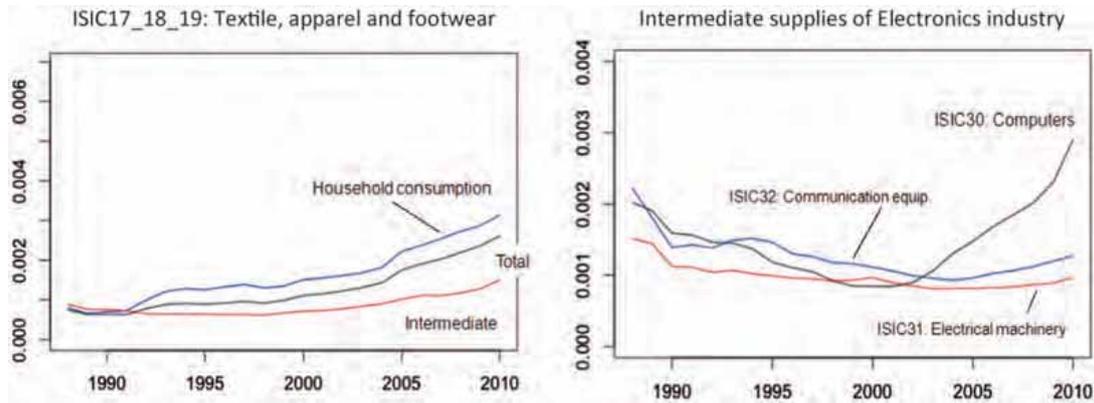


Figure 3. Export concentration index (variance of export global share) (*Source:* OECD BTDIxE, 2011)

this export concentration index can be measured (Figure 3). Constant increases in variance of export share for 'Textile, apparel and footwear' indicate the concentration of production activities in fewer countries which eventually increases the risk of supply disruptions. In the early and late 1990s, the exports of intermediates were geographically dispersed for electronics products (ISIC30-ISIC32), but the re-concentration has started since the early 2000s. This is mainly due to the fact that emerging Asian countries have initiated the production of intermediate supplies for electronic machinery in the early 1990s, and China has replaced the dominant supply share of developed economies in the late 2000s. However, the export activities of heavy industrial supplies such as chemicals and basic metals have been geographically dispersed for the last few decades.

Selection of import partners

Specialization and concentration of intermediate supplies within countries can be more directly observed by the import concentration index, the variance of import sourcing share to the total import of countries i.e. $\text{var} (T_i^{kl} / \sum_k T_i^{kl})$ where T_i^{kl} is trade flow of good i from country k to country l . The increases in this index indicate that the countries rely on intermediate supplies of specific

groups of countries in general. The U-shape type evolution pattern of Electrical machinery is similar to the one for import concentration index for the Computer industry seen in Figure 3 (compare to Figure 4). Countries have decreased the procurement ratio of all end-use types of goods i.e. intermediate supplies, household consumption and capital goods from specific countries from the early 1990s to the mid 2000s, but suddenly in the late 2000s, countries started to decrease the number of sourcing countries on average.

On the other hand, the number of sourcing countries for Radio, television and communication equipment (ISIC32) has different evolution patterns for intermediates and household consumption goods. It appears that the supplies of household consumption have constantly dispersed since the late 1980s, whilst the intermediate goods remain concentrated. Many can remember that the damages of dominantly supplied semi-conductor factories in Japan in the 2011 Earthquake resulted in stopping the production networks ICT products and automobile assemblies in the world for a certain period.

Potential chain impacts of production disruption in a foreign country can also be underlined using the average

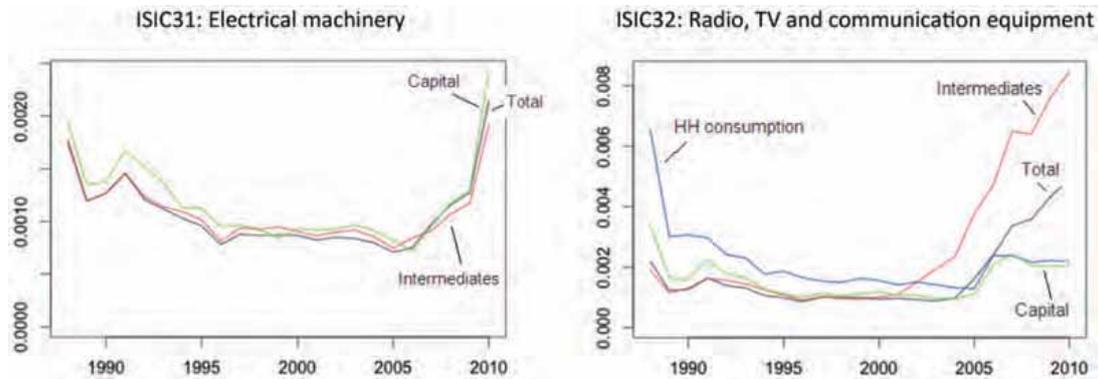


Figure 4. Import concentration index (variance of import global share) (Source: OECD BTDIxE, 2011)

procurement ratio by looking at the perspectives of partner's import flows.

Partners' average procurement ratio from country $k = (T_i^{k}/\sum_i T_i^{k})/n$, where n is number of partners.

Examining the intermediate supplies of machinery products, China has become the dominant supplier in the global supply chain (Figure 5). The average sourcing ratios for China recently surpass most of the other OECD competitors e.g. United States, Germany and Japan. In particular, the producers in the trade partner countries of China rely on about 20% of intermediate supplies of machinery industry in 2010 whereas the ratio was only about 5% in 2000. The increase in intermediate supplies of China for Textile, apparel and footwear are also apparent.

Having said that, there are some intermediate supply markets where the OECD large countries still hold the dominant share. They are the intermediate supplies of optical and precision instruments and motor vehicles industries.

These findings are basically in accordance with the findings of Sturgeon and Memedovic (2011) who have investigated the evolution of intermediate

trade evident in Textile, Electronics and Motor vehicle industries.

Summary

Increased external dependencies on both the supply and demand of economies, have raised concerns about production disruption risk caused by natural and man-made disasters. At the firm level, new management strategies are required such as the identification of potential disruptions and the collection of procurement information not only for the 1st tier suppliers, but also for inventory redundancy plans and the preparation for flexible procurement and sales destinations. At the national level, however, identification of potential risks of production networks is more complex because the indirect effects, especially the international linkages, are not as visible as the single enterprise's operation. The trade indicators presented in this article are able to be extended if we employ more detailed data sources such as enterprise level trade data and monthly trade statistics.

Acknowledgements: The author would like to thank Colin Webb for his helpful comments and suggestions. I am also grateful to my colleagues who jointly developed the Bilateral Trade Database and related indicators.

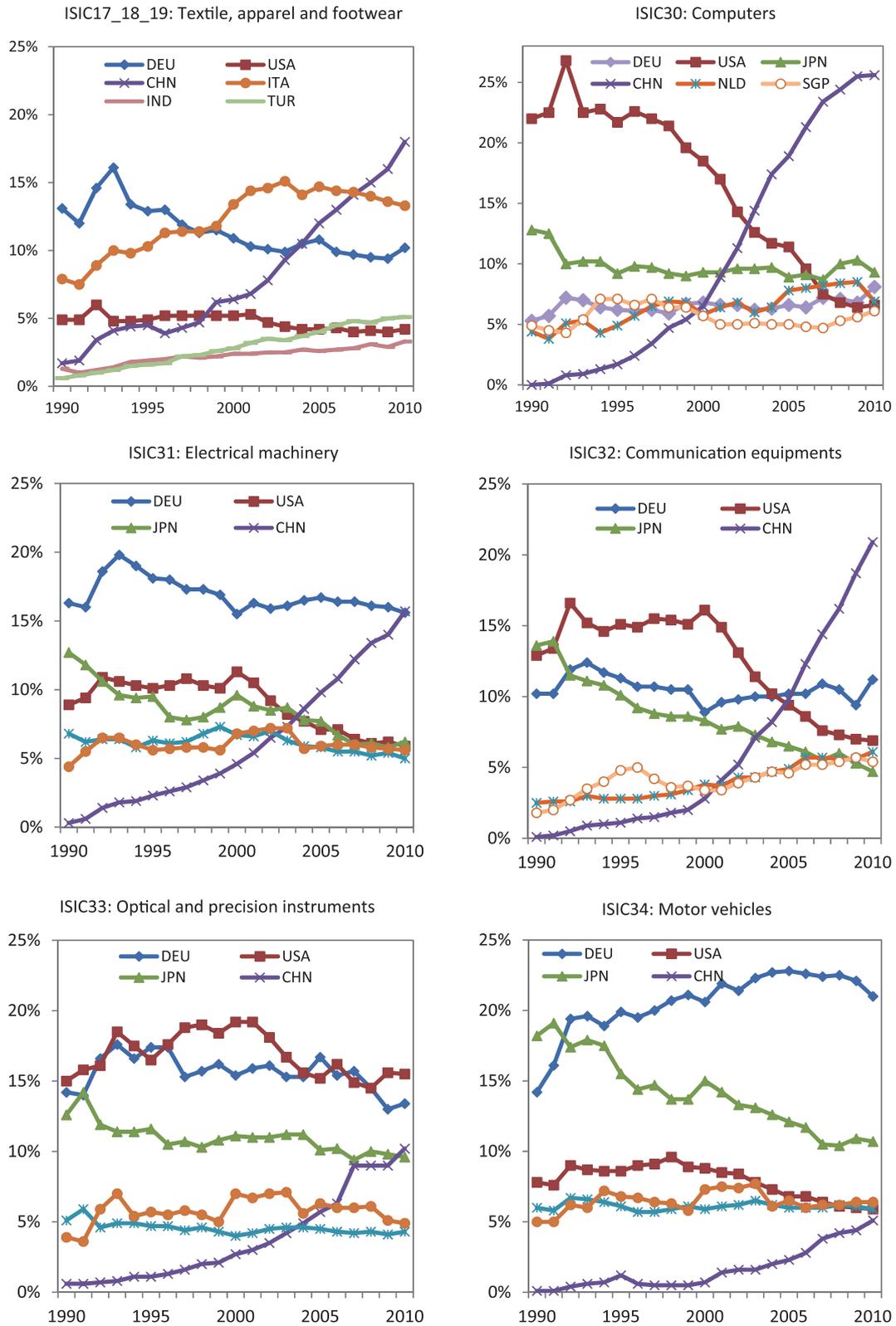


Figure 5. Partners' average procurement ratios of intermediate supplies (1990–2010) (Source: OECD BTDixE, 2011)

References

- Fukasaku, K., Meng, B., & Yamano, N. (2011). Recent Developments in Asian Economic Integration: Measuring Indicators of Trade Integration and Fragmentation. OECD Science, Technology and Industry Working Papers, 2011/3.
- Gereffi, G., & Korzeniewicz, M. (eds) (1994). *Commodity Chains and Global Capitalism*, Westport, Connecticut: Praeger.
- Jones, R., & Kierzkowski, H. (2001). Globalization and the consequences of international fragmentation in R. Dornbusch, G. Calvo and M. Obstfeld (eds) *Money, Factor Mobility and Trade*, Cambridge, Massachusetts: MIT Press.
- Kimura, F., & Ando, M. (2005). Two-dimensional fragmentation in East Asia: Conceptual framework and empirics. *International Review of Economics & Finance*, 14(3), 317–348.
- Nagurney, A. (2006). *Supply Chain Network Economics: Dynamics of Prices, Flows, and Profits, Series: New Dimensions in Networks*. Cheltenham, U.K. and Northampton, Massachusetts: Edward Elgar.
- OECD (2006), OECD Studies in Risk Management Japan: EARTHQUAKES
- OECD (2009), OECD Reviews of Risk Management Policies Japan: Large-scale Floods and Earthquakes.
- Okuyama, Y., & Chang, S. E.-L. (2004). *Modeling Spatial And Economic Impacts of Disasters*. Berlin: Springer-Verlag.
- Okuyama, Y., & Sahin, S. (2009). Impact estimation of disasters: a global aggregate for 1960 to 2007. Policy Research Working Paper Series, World Bank.
- Rose, A., Benavides, J., Chang, S. E., Szczesniak, P., & Lim, D. (1997). The regional economic impact of an earthquake: Direct and indirect effects of electricity lifeline disruptions. *Journal of Regional Science*, 37(3), 437–458.
- Sohn, J., Kim, T. J., Hewings, G. J. D., Lee, J. S., & Jang, S. G. (2003). Retrofit priority of transport network links under an earthquake. *Journal of Urban Planning and Development*, 129, 195.
- Sturgeon, T. J., & Memedovic, O. (2011). Mapping Global Value Chains: Intermediate Goods Trade and Structural Change in the World Economy. UNIDO DEVELOPMENT POLICY AND STRATEGIC RESEARCH BRANCH WORKING PAPER 05/2010.
- Tsuchiya, S., Tatano, H., & Okada, N. (2007). Economic loss assessment due to railroad and highway disruptions. *Economic Systems Research*, 19(2), 147–162.
- Yamano, N., Kajitani, Y., & Shumuta, Y. (2007). Modeling the Regional Economic Loss of Natural Disasters: The Search for Economic Hotspots. *Economic Systems Research*, 19(2), 163–181.
- Zhu, S., Yamano, N., & Cimper, A. (2011). Compilation of Bilateral Trade Database by End-use Categories. OECD Science, Technology and Industry Working Papers 2011/06.

9. Upcoming Events

9.1 NARSC 2012 Ottawa

Bruce Newbold, McMaster University, Ottawa



The Canadian Regional Science Association will host the 59th annual meetings of the North American Regional Science Association International in Ottawa, Ontario, November 7 -10, 2012. Our annual conference is structured around a number of thematically-focused sessions during which regional scientists present their work. The typical format involves four consecutive 20-minute scholarly presentations, followed by comments and critique offered by the appointed discussant, and questions and answers from the audience. The conference also incorporates discussion panels on timely topics of Regional Science. Preceding the conference, a series of workshops covering various

regional science methods and issues will be presented Wednesday, November 7th (pre-registration required), with paper and poster presentations November 8 – 10. Beyond the conference venue, Ottawa offers museums, nightlife, and great restaurants.

Full details, including call for abstracts, travel, and accommodation can be found at <http://www.narsc.org>.

We look forward to welcoming you to Canada's capital!



10. Next issue of the newsletter: 'The New Urban World'

The topic of the next issue will be 'The New Urban World'. Contributions can be sent directly to the editors at E.S.van.Leeuwen@vu.nl or G.P.Clarke@leeds.ac.uk.