http://appcseoul2018.kr

Asia-Pacific
Productivity Conference

APPC 2018

JULY 4 – 6, 2018
Seoul, Korea

THE 12th ASIA-PACIFIC PRODUCTIVITY CONFERENCE:

Productivity, Innovation, and Sustainable Growth
with Changing Technological Paradigm

Global Education Center
for Engineers (GECE, Bldg 38),
Seoul National University, South Korea

Hosted by

Sponsored by

Welcome Message!

The Asia-Pacific Productivity Conference 2018 (APPC 2018) will be held during July 4-6, 2018 at Seoul National University, Korea.

Following the successful 11th APPC in Tianjin, China in 2016, APPC 2018 will be the 12th fruitful event, based on the prior hosting experience and the help of active participants.

The main theme of APPC 2018 will be “Productivity, Innovation, and Sustainable Economic Growth with Changing Technological Paradigm”. Including traditional methodological topics such as SFA, DEA, decomposition, and dynamic analysis, APPC 2018 will accommodate various policy issues such as inequality, sustainable development, Asian model of production and innovation, entrepreneurship, etc.

The conference will be held in Seoul, South Korea. Seoul is the capital city of South Korea and offers diverse attractions from state-of-the-art technology to remarkable traditions. The hosting institution, Seoul National University, has created active intellectual communities among students and scholars and promotes innovative research in all fields of scholarship as the first national university in Korea.

Thank you for your interest and I hope seeing you at Seoul National University.

Prof. Jeong-Dong Lee
Principal coordinator of APPC 2018
Technology Management, Economics and Policy Program
Seoul National University

Acknowledgements

We would like to appreciate all hosting and supporting institutions for APPC 2018.

Contents

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Seoul National University, Korea

Program Coordinator

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Duksung Women's University, Korea

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Sanghoon Ahn

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Sukin Chang

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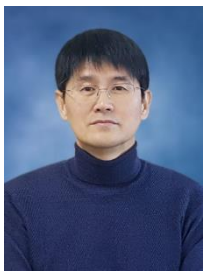
Sogang University, Korea

Dr.

Seogwon Hwang

Science and Technology Policy Institute, Korea



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Korea Labor Institute, Korea

Dr.

Dong-Suk Roh

Korea Energy Economics Institute, Korea

Overall program

Day 1 (July 4th, 2018)

Time	Convention hall	Large conference room	Large conference room	Medium conference room	Medium conference room	Medium conference room	Small conference room	Lecture room	Lecture room
	Rm.#520	Rm.#513	Rm.#517	Rm.#515	Rm.#516	Rm.#519	Rm.#512	Rm.#428	Rm.#429
08:30 ~ 09:00	REGISTRATION [Pre-Conference Workshop Attendees] (Foyer Hall on 5th Floor)								
09:00 ~ 09:50	Pre-conference Workshop **1**								
09:50 ~ 10:40	Pre-conference Workshop 2								

10:40 ~ 11:00	COFFEE BREAK (Foyer Hall on 5th Floor)								
11:00 ~11:50	Pre-conference Workshop 3								
11:50 ~12:40	Pre-conference Workshop 4								
12:40 ~ 14:00	LUNCH (Multi-purpose Auditorium on B1) REGISTRATION [Pre-Conference Workshop Non-Attendees] (Foyer Hall on 5th Floor)								
14:00 ~ 15:30	Special Session **A1**	Special Session **B1**	Parallel Session **C1**		Parallel Session **E1**		Parallel Session **G1**	Parallel Session **H1**	

15:30 ~ 15:50	COFFEE BREAK (Foyer Hall on 5th Floor)								
15:50 ~ 17:20	Special Session **A2**	Special Session **B2**	Parallel Session **C2**		Special Session **E2**		Parallel Session **G2**	Parallel Session **H2**	
17:30 ~	DINNER (Multi-purpose Auditorium on B1)								

Day 2 (July 5th, 2018)

Time	Convention hall	Large conference room	Large conference room	Medium conference room	Medium conference room	Medium conference room	Small conference room	Lecture room	Lecture room
	Rm.#520	Rm.#513	Rm.#517	Rm.#515	Rm.#516	Rm.#519	Rm.#512	Rm.#428	Rm.#429
08:30 ~ 08:50	REGISTRATION [Pre-Conference Workshop Non-Attendees] (Foyer Hall on 5th Floor)								
08:50 ~ 09:00	**Opening Ceremony**								
09:00 ~ 11:00	Plenary Session **A**								
11:00 ~ 11:20	COFFEE BREAK (Foyer Hall on 5th Floor)								

11:20 ~ 12:50	Special Session **A3**	Discussion **B3**		Special Session **D3**	Parallel Session **E3**	Special Session **F3**	Parallel Session **G3**	Parallel Session **H3**	Parallel Session **I3**
12:50 ~ 14:00	LUNCH (Multi-purpose Auditorium on B1)								
14:00 ~ 15:30	Special Session **A4**	Special Session **B4**		Special Session **D4**	Parallel Session **E4**	Parallel Session **F4**	Parallel Session **G4**	Parallel Session **H4**	Parallel Session **I4**
15:30 ~ 15:50	COFFEE BREAK (Foyer Hall on 5th Floor)								
15:50 ~ 17:50	Plenary Session **B**								
18:30 ~	WELCOME DINNER (Front yard of Bldg. 314 on campus, *See "Maps and direction, p.17"*)								

Day 3 (July 6th, 2018)

Time	Convention hall	Large conference room	Large conference room	Medium conference room	Medium conference room	Medium conference room	Small conference room	Lecture room	Lecture room
	Rm.#520	Rm.#513	Rm.#517	Rm.#515	Rm.#516	Rm.#519	Rm.#512	Rm.#428	Rm.#429
09:00 ~ 10:30	Special Session **A5**	Special Session **B5**		Special Session **D5**	Parallel Session **E5**	Parallel Session **F5**	Parallel Session **G5**	Parallel Session **H5**	Parallel Session **I5**
10:30 ~ 10:50	COFFEE BREAK (Foyer Hall on 5th Floor)								
10:50 ~ 12:20	Special Session **A6**	Special Session **B6**		Parallel Session **D6**	Parallel Session **E6**	Special Session **F6**	Parallel Session **G6**	Parallel Session **H6**	Parallel Session **I6**

12:20 ~ 13:30	LUNCH (Multi-purpose Auditorium on B1)								
13:30 ~ 15:00	Special Session **A7**	Special Session **B7**		Special Session **D7**	Parallel Session **E7**	Parallel Session **F7**	Parallel Session **G7**	Parallel Session **H7**	Parallel Session **I7**
15:00 ~ 15:20	COFFEE BREAK (Foyer Hall on 5th Floor)								
15:20 ~ 17:20	Plenary Session **C**								
17:20 ~ 18:00	**Closing Ceremony**								
18:00 ~	GALA DINNER (Multi-purpose Auditorium on B1)								

Maps and Directions

A. Conference venue

Global Education Center for Engineers(GECE) at Gwanak Campus, Seoul National University (http://www.gece.or.kr/)

[Address] GECE 38, Seoul National University, Daehak-dong, Gwanak-gu, Seoul, 08826, South Korea. TEL. 02-880-1544

[주소] 서울시 관악구 관악로 1 서울대학교 38동, 글로벌공학교육센터

B. How to get to Seoul from Incheon Int'l Airport

By Airport Railroad (AREX)

No matter where you arrive at Terminal 1 or Terminal 2, you can travel to downtown Seoul by taking the Airport Railroad, *AREX* within 1 hour. From '*Gimpo airport station*', you can transfer to Seoul metro. Please check the right transfer station according to your accommodation location, and refer to operating hours and travel time of trains as below.

Express Train

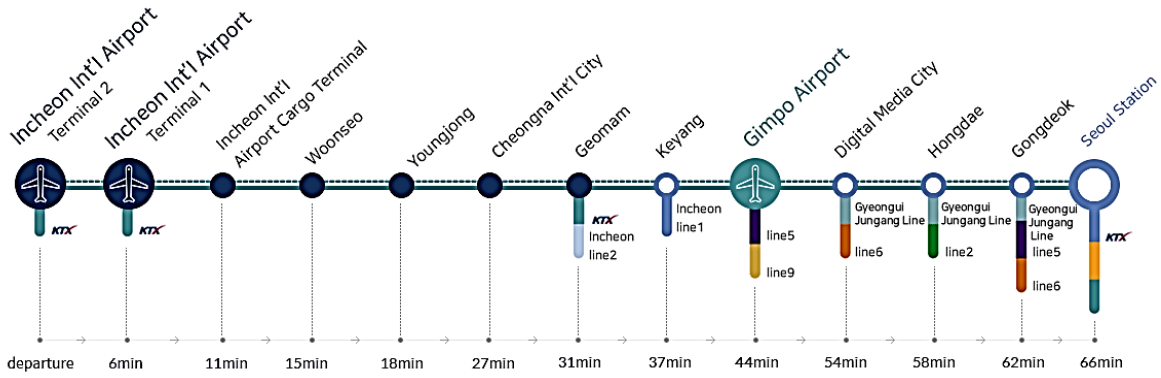
· Terminal 1 Station → Seoul Station, 05:23 (first train) - 22:48 (last train) / Approx. 43 min

· Terminal 2 Station → Seoul Station, 05:15 (first train) - 22:40 (last train) / Approx. 51 min

All Stop Train

· Terminal 1 Station → Seoul Station, 05:25 (first train) - 23:39 (last train) / Approx. 58 min

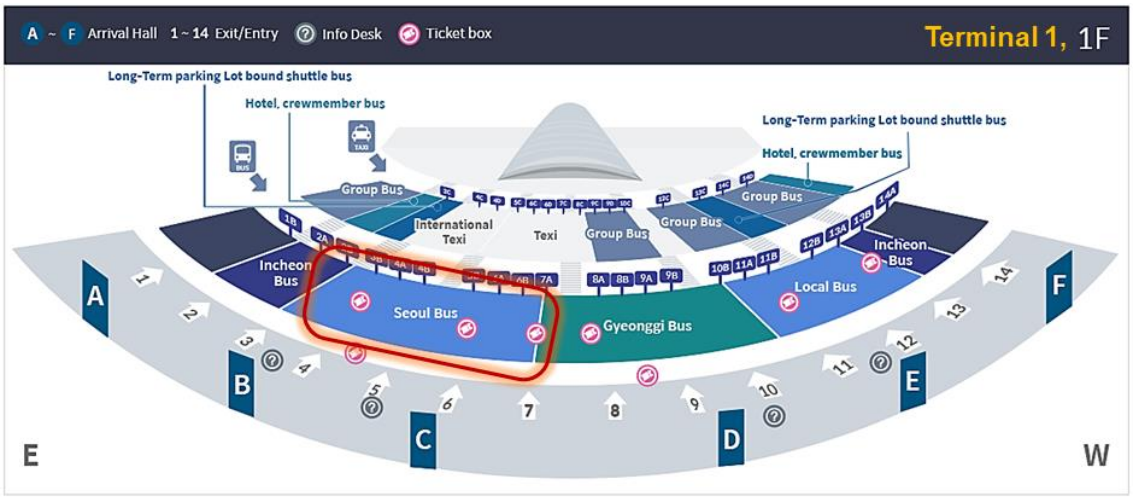
· Terminal 2 Station → Seoul Station, 05:18 (first train) - 23:32 (last train) / Approx. 66 min

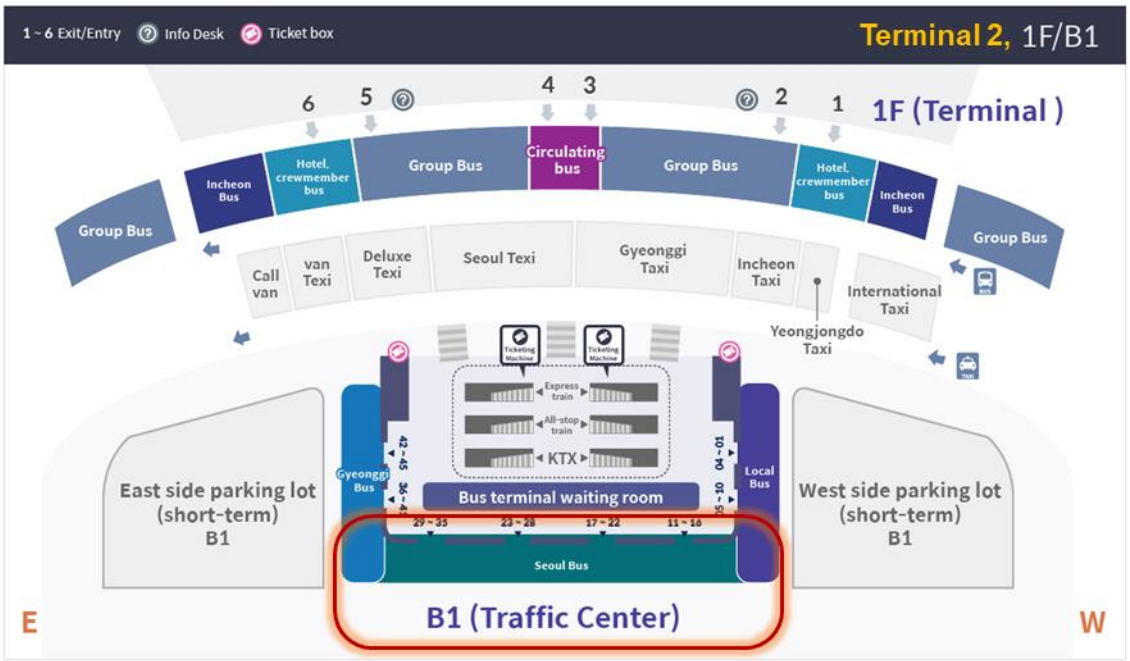


※ If you want more information, please check the official website of AREX; https://www.arex.or.kr/main.do.

By Airport limousine bus

You can also travel to downtown Seoul by Airport limousine buses, running from the Airport to many areas of Seoul. Tickets can be purchased at the ticket booths just outside the 1F Arrivals Hall of each terminal. Please check the right route number of buses according to your accommodation location.





※ If you want more information, please check the official website of Airport Limousine bus; http://www.airportlimousine.co.kr/eng/lbr/all/lbr02_2_6000.php.

C. How to get to the venue

By subway

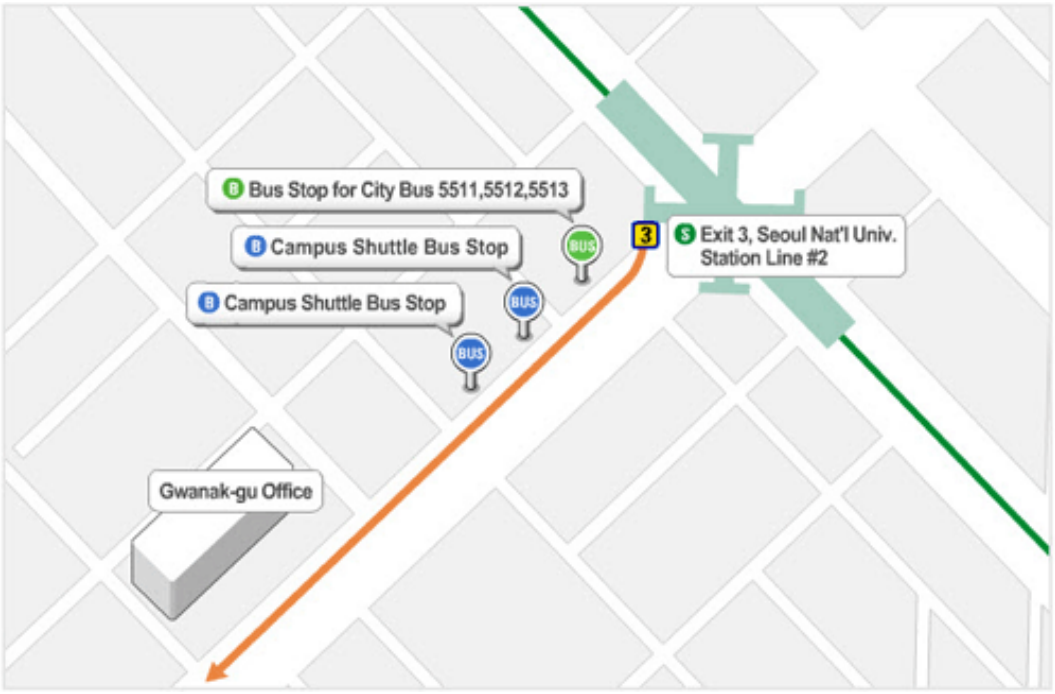
When using the subway to visit Seoul National University, make sure to take Subway Line No. 2(Green Line) and stop either at *Seoul National University Station*, *or at Naksungdae Station*. Even though Seoul National University is near the subway station, it is not within walking distance. You will need to take a bus or a taxi to get the university.

a. Subway Line No. 2, Seoul National University Station (Exit No. 3)

· After exiting exit no.3, walk straight towards Gwanak-gu Office. There you will find the bus stop of bus no. 5513 or 5511.

· When you take bus no. **5513** (recommended), please get off at *"College of engineering* (#21-273)".

· Or when you take bus no. **5511**, please get off at *"Sinsojae* (Research institute of Advanced materials, #21-274)".



b. Subway Line No. 2 (Green Line), Naksungdae Station (Exit No. 4)

· After exiting through exit number 4, walk straight and make a left turn at the gas station. There will be a bus stop in front of the bakery. Take the small green town bus **no. 2**.

· When you take the small green town bus **no. 2**, please get off at *"Sinsojae* (Research institute of Advanced materials, #21-274)".

By taxi or car

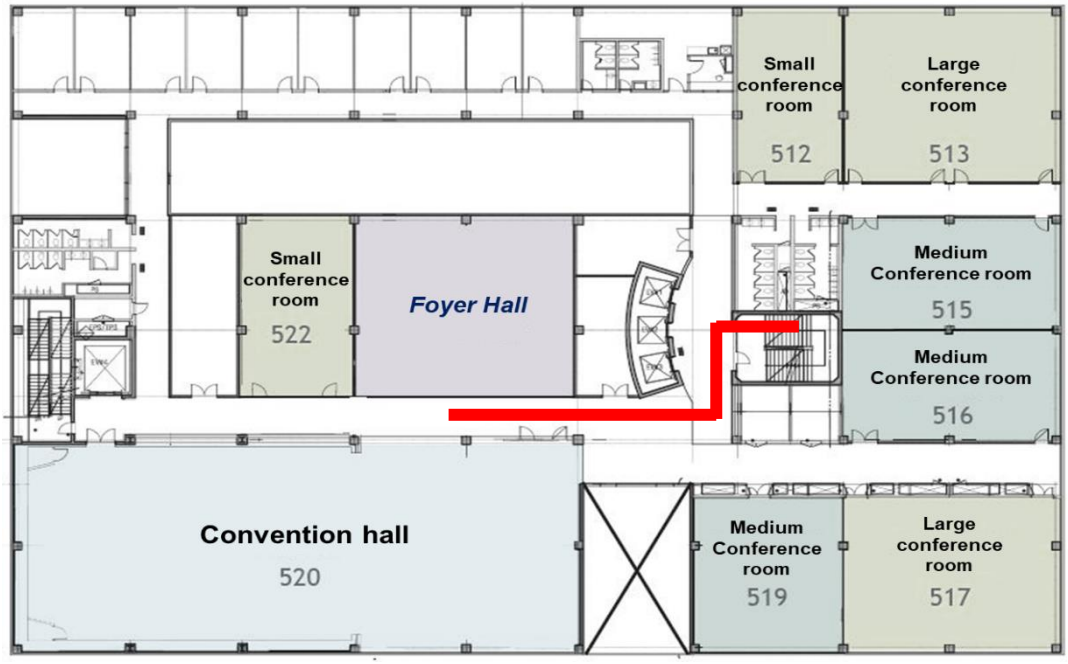
· When you travel to the venue by taxi or car, please go straight from the main gate of Seoul National University and enter **"Gate 5"**.

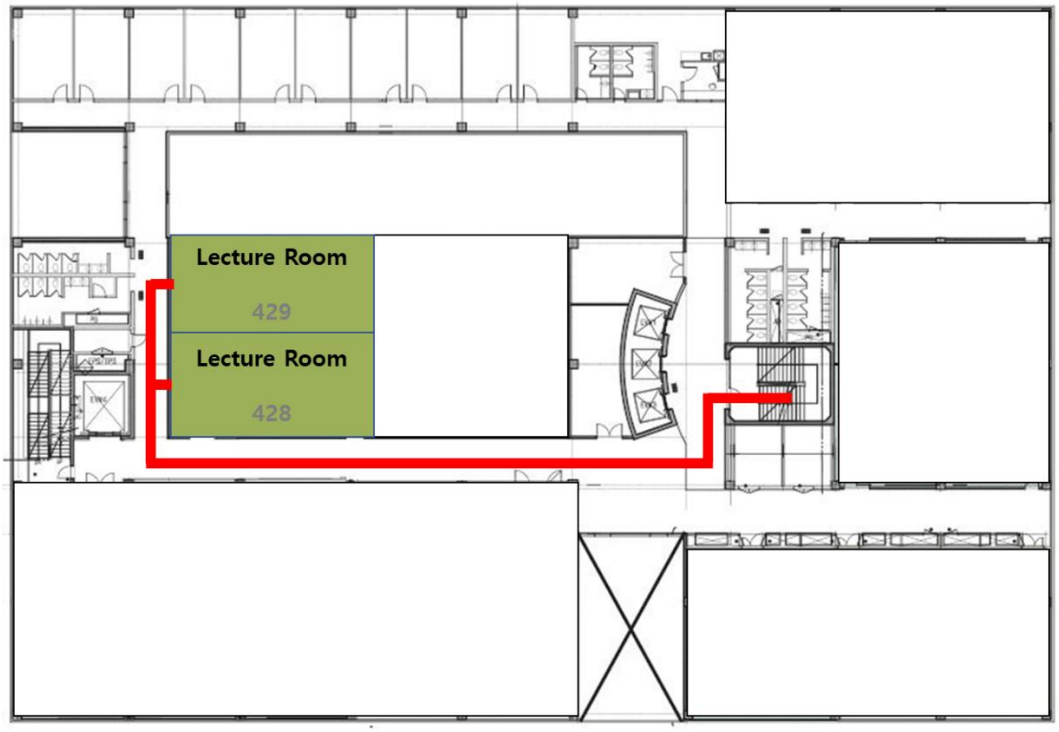
※ If you want to travel by bus, a detailed service route of each bus is provided on the *Seoul bus network online service website*: http://bus.seoul.go.kr.

D. Conference rooms and dining places

Conference rooms

All conference rooms are located mainly on **the 5th floor**, and also on **the 4th floor of GECE**. Please find the detailed information of each session in the detailed program.





Dining place for Lunch, Dinner, and Gala dinner

The dining places ‘Multi-purpose Auditorium’ and “*Rakgujung*” are located on **B1 of GECE.**

※ Dining place for Welcome dinner (Day2, July 5th)

We would like to have a special time for ‘Welcome dinner’ outdoors. The dining place is *the front yard of bldg. 314 on campus,* with nice greenery view.

Detailed program

Day 1 AM (July 4th, 2018)

Registration [Pre-conference Workshop Attendees] (Foyer hall)

Time	Title	
08:30 ~ 09:00	Registration [Pre-conference Workshop Attendees]	

Pre-conference Workshop 1 (Convention hall #520)

Time	Title	Speaker
09:00 ~ 09:50	Topics in DEA modeling and application	Rolf Färe

Pre-conference Workshop 2 (Convention hall #520)

Time	Title	Speaker
09:50 ~ 10:40	Econometric Issues in Stochastic Frontier Modeling	William Greene

Coffee Break (Foyer hall)

Time	Title	
10:40 ~ 11:00	Coffee Break	

Pre-conference Workshop 3 (Convention hall #520)

Time	Title	Speaker
11:00 ~ 11:50	Stochastic Frontier Models: Panel Data Models	Subal Kumbhakar

Pre-conference Workshop 4 (Convention hall #520)

Time	Title	Speaker
11:50 ~ 12:40	Practical Considerations in Efficiency and Productivity Analysis	Christopher O'Donnell

Lunch (Multi-purpose Auditorium, B1)

Time	Title	
12:40 ~ 14:00	Lunch	

Registration [Pre-conference Workshop Non-attendees] (Foyer hall)

Time	Title	
12:40 ~ 14:00	Registration [Pre-conference Workshop Non-attendees]	

Day 1 PM (July 4th, 2018)

Special Session A1: Economics and the Environment

Chair: Knox Lovell (Convention hall #520)

Time		Title	Speaker
14:00 ~ 15:30	1	Analyzing environmental technological efficiency of service industries in China and its affecting factors	Hui Meng
	2	Measuring efficiency when producing intended outputs and generating unintended ones	Finn R Førsund
	3	The environmental performance of Chinese manufacturing sector: Input-oriented approach	Xinju He
	4	Assessing the impact of agri-environmental management practices on farm productivity when adoption is endogenous	Moriah Bostian

Special Session B1: Efficiency and Capacity Utilization

Chair: Sangmok Kang (Large conference room #513)

Time		Title	Speaker
14:00 ~ 15:30	1	Analysis of cost-based capacity efficiency in Korean securities industry using stochastic frontier model	Koun Cho
	2	Performance measurement of production and abatement activities for Korea industrial complexes using a multi-activity network data envelopment analysis	KwangUk Kim
	3	Measurement of alternative energy efficiencies using stochastic frontier translog function	Sangmok Kang

Parallel Session C1: Analysis of TFP Growth

Chair: Almas Heshmati (Large conference room #517)

Time		Title	Speaker
14:00 ~ 15:30	1	Capital deepening and efficiency in Morocco	Elhadj Ezzahid
	2	Total factor productivity growth of the Indonesian economic sectors: A KLEMS approach	Maman Setiawan
	3	Technological changes in the pulp and paper industry in India: An inspection of traditional and advanced inputs use	Sandeep Kumar Kujur

Parallel Session E1: Analysis on Labor Productivity

Chair: Jesus C. Dumagan (Medium conference room #516)

Time		Title	Speaker
14:00 ~ 15:30	1	How biased is skill-biased technical change	Ming Li
	2	Endogenous spatial technological clubs across Europe: A panel data frontier model with cross sectional dependence	Camilla Mastromarco
	3	Modifying the "generalized exactly additive decomposition" of GDP and aggregate labor productivity growth in practice for consistency with theory	Jesus C. Dumagan

Parallel Session G1: R&D investment and Efficiency

Chair: Chulwoo Baek (Small conference room #512)

Time		Title	Speaker
14:00 ~ 15:30	1	Impact on innovation and development of Korean energy industry: analyzing intensity of national R&D investment and patent data	Jong-Hyun Kim
	2	Heterogeneous effect of business R&D spending by industry on economic growth	Euy-Young Jung
	3	The road to leadership: Patterns of technological upgrading, productivity and innovation in the Shipbuilding industry	André Cherubini Alves

Parallel Session H1: Innovation in Network

Chair: Dong-hyun Oh (Lecture room #428)

Time		Title	Speaker
14:00 ~ 15:30	1	The relationship between university-industry interactions and university scientific productivity: Evidence from China	Yanzhao Lai
	2	A social network analysis on the collaborative networks among regional innovation actors in Incheon	Seongho Han
	3	Role of platform providers in service networks: A study of innovation through software service provisioning in the Salesforce.com ecosystem	Kibae Kim

Coffee Break (Foyer hall)

Time	Title	
15:30 ~ 15:50	Coffee Break	

Special Session A2: Metafrontier Productivity Analysis

Chair: Cliff Huang (Convention hall #520)

Time		Title	Speaker
15:50 ~ 17:20	1	Measuring productivity of financial holding companies in Taiwan: A cost metafrontier Malmquist productivity index	Tsui-Yueh Cho
	2	Metafrontier profit-oriented Luenberger productivity indicator: an application to Taiwanese and Chinese commercial banks	Xiang Chen
	3	Estimation of the production profile and metafrontier technology gap: A quantile approach	Cliff Huang

Special Session B2: Green Innovation, Productivity and Efficiency

Chair: Almas Heshmati (Large conference room #513)

Time		Title	Speaker
15:50 ~ 17:20	1	Do environmental regulations affect foreign direct investment decision? The pollution haven hypothesis revisited	Haeyeon Yoon
	2	Direction of technical change and energy use efficiency - Empirical evidences from emerging economies	Ipsita Rakshit
	3	The effects of environmental regulation on the performance of manufacturing industries: Comparison between green and non-green industries	Seulgi Yoo

Parallel Session C2: Extended Topics on Productivity Analysis

Chair: William Greene (Large conference room #517)

Time		Title	Speaker
15:50 ~ 17:20	1	A novel decomposition of aggregate total factor productivity change	Bert M. Balk
	2	Assessing productivity of manufacturing firms in Indonesia	Masagus M. Ridhwan
	3	Research collaboration synergy and network in Journal of Productivity Analysis	Dong-hyun Oh

Special Session E2: Innovation System and R&D Performance (KISTEP Session)

Chair: Soon-Cheon Byeon (Medium conference room #516)

Time		Title	Speaker
15:50 ~ 17:20	1	A Study on performance analysis and policy implications of non-standard R&D work force of the government funded research institutes in the fields of science and technology	Seung Tai Kim
	2	Success factor analysis of the regional innovation-supporting facilities in Korea	Young-Hyun Jin
	3	The efficiency and determinants analysis of regional innovation systems in South Korea	Se-Bong Chon

Parallel Session G2: Industrial Competitiveness and Productivity

Chair: Shinn Sun (Small conference room #512)

Time		Title	Speaker
15:50 ~ 17:20	1	Acceptance of e-commerce in rural level: Villagers's perspective	Hardika Dwi Hermawan
	2	A second-best approach to the resource allocation China: A case study in manufacturing sector	Chun-kei Tsang
	3	Using weighted context-dependent DEA with value judgment in competitive analysis for EN-A paragliders	Shinn Sun

Parallel Session H2: Efficiency of Entrepreneurship and SMEs

Chair: Ruizhi Pang (Lecture room #428)

Time		Title	Speaker
15:50 ~ 17:20	1	Efficiency, financial constraints and innovation of European SMEs	Graziella Bonanno
	2	Returnee academic entrepreneurship in China	Yanzhao Lai
	3	The impact of foreign greenfield vs acquisition investment on domestic new firm creation: Accounting for types of industries and strategic alliances	Jungho Kim

Dinner (Multi-purpose Auditorium, B1)

Time	Title	
17:30 ~	Dinner	

Day 2 AM (July 5th, 2018)

Registration [Pre-conference Workshop Non-attendees] (Foyer hall)

Time	Title	
08:30 ~ 08:50	Registration [Pre-conference Workshop Non-attendees]	

Opening Ceremony (Convention hall #520)

Time	Title	
08:50 ~ 09:00	Opening Ceremony	Jeong-Dong Lee

Plenary Session A: New application fields of efficiency and productivity research

Chair: Knox Lovell (Convention hall #520)

Time		Title	Speaker
09:00 ~ 11:00	1	Productivity and Financial Performance in Management and Business	Emili Grifell-Tatje
	2	Spatial Econometrics: Applications to Efficiency and Productivity Measurement	Robin Sickles
	3	Environmental performance measurement: Index construction and technology representation	Fei Wu

Coffee Break (Foyer hall)

Time	Title	
11:00 ~ 11:20	Coffee Break	

Special Session A3: Performance Measurement in Education Sector

Chair: Tsu-tan Fu (Convention hall #520)

Time		Title	Speaker
11:20 ~ 12:50	1	Change of optimal scale of Norwegian institutions of higher education 2004-2013	Finn R Førsund
	2	Meta-frontier Analysis of Chinese and Taiwanese Universities: Linking the Past to the Future	Kok Fong See
	3	Does signaling theory play role on efficiency performance of colleges of business in Taiwan? - An application of stochastic metafrontier approach	Tsu-tan Fu

Discussion B3: Talk with academic journals' editors

Chair: Nicholas Vonortas (Large conference room #513)

Time		Title	Speaker
11:20 ~ 12:50	1	Journal of Productivity Analysis	William Greene
	2	Technology Forecasting and Social Change & IEEE Transactions on Engineering Management	Dirk Meissner
	3	Empirical Economics	Subal C. Kumbhakar
	4	Science and Public Policy	Nicholas Vonortas

Special Session D3: Emerging Issues in Productivity Studies in Korea: Innovation, Trade, and Wages (KDI Session)

Chair: Sanghoon Ahn (Medium conference room #515)

Time		Title	Speaker
11:20 ~ 12:50	1	Estimating the effect of competition and public subsidy on private R&D investment	Dong Ook Choi
	2	Impact of import competition on firm's innovation: Trading partner and firm size matter	Sunghoon Chun
	3	Decoupling of productivity and wages, and global frontier firms: Evidence from Korea	Changkeun Lee
	4	Trade in intermediate goods and plant productivity: The case of South Korea	Minho Kim

Parallel Session E3: SFA in Industry Sector

Chair: Hung-Jen Wang (Medium conference room #516)

Time		Title	Speaker
11:20 ~ 12:50	1	Firm heterogeneity and dynamic panel stochastic frontier model	Hung-pin Lai
	2	Access to infrastructures and the determinants of technical inefficiency among small and medium enterprises in Vietnam	Stefano Suardi Francesco Pitton
	3	Effects of ownership and business portfolio on production in the oil and gas industry	Binlei Gong

Special Session F3: Environmental and Energy Efficiency

Chair: Chia-Yen Lee (Medium conference room #519)

Time		Title	Speaker
11:20 ~ 12:50	1	A new approach to estimate environmental efficiency by considering abatement process as a distinct technology	Haleh Delnava
	2	Shadow prices of direct and overall carbon emissions in China's construction industry: a parametric directional distance function-based sensitively estimation	Kexin Yang
	3	Airline CO2 emission change with delays: a parametric malmquist index approach	Fei Huang
	4	Nash data envelopment analysis for allocation of emission permit	Chia-Yen Lee

Parallel Session G3: Effects of Technology on Productivity

Chair: Emili Grifell-Tatje (Small conference room #512)

Time		Title	Speaker
11:20 ~ 12:50	1	Making your Mercedes less noisy and more comfortable: Efforts made by a Taiwanese seating supplier via Industry 4.0	Min-Der Hsieh
	2	The effect of IT utilization on firm performance and employment	Inha Oh
	3	User cost of capital and factor demand modelling: Implications on energy demand and technical change analysis	Sourour Baccar

Parallel Session H3: Role of Innovation on Efficiency and Productivity

Chair: Almas Heshmati (Lecture room #428)

Time		Title	Speaker
11:20 ~ 12:50	1	Mission-oriented policy for innovation and growth: The case of shipbuilding and offshore industry in Brazil	André Cherubini Alves
	2	Mediating role of innovation capability between technical entrepreneurs and competitive advantage	Hyundo Choi
	3	Estimation of technical change and TFP growth based on observable technology shifters	Almas Heshmati

Parallel Session I3: Managerial Application of DEA

Chair: Shawna Grosskopf (Lecture room #429)

Time		Title	Speaker
11:20 ~ 12:50	1	Global value chain and firm productivity: The case of Turkish manufacturing firms	Yılmaz Kılıçaslan
	2	Benchmarking, contracting, and incentive power	Peter Bogetoft
	3	What do Facebook viewer want? An application of metafrontier for marketing message	Chin Yi Fang

Lunch (Multi-purpose Auditorium, B1)

Time	Title	
12:50 ~ 14:00	Lunch	

Scientific Committee Meeting (*Rakkujung*, B1)

Time	Title	
12:50 ~ 14:00	Scientific Committee Meeting	

Day 2 PM (July 5th, 2018)

Special Session A4: Network Data Envelopment Analysis

Chair: Chiang Kao (Convention hall #520)

Time		Title	Speaker
14:00 ~ 15:30	1	A value-chain network structures for Korean banks	Sangkyu Jo
	2	DEA network models for inference and estimation of scientific knowledge production: A pseudo-likelihood approach	Shawna Grosskopf
	3	Assessing the efficiency of conventional and Islamic banks in Bangladesh using two-stage network data envelopment analysis approach	Sunil Kumar

Special Session B4: Industry Dynamics and Productivity Performance

Chair: Chulwoo Baek (Large conference room #513)

Time		Title	Speaker
14:00 ~ 15:30	1	Dynamic industry productivity measures: The case of thermal electricity generation in Chinese regions 2000-2014	Finn R Førsund
	2	The effect of technological adoption on agricultural productivity: The case of a smart-farm in Korea	Kibum Kim
	3	The effect of knowledge accumulation strategies through experience and experiment on the firm growth	Taewon Kang
	4	Resurrection of zombie firms and role of finance	Hun-Jun Lee

Special Session D4: Implications for Enhancing Productivity of Climate Technology Diffusion (GTC Session)

Chair: Sungjin Kang (Medium conference room #515)

Time		Title	Speaker
14:00 ~ 15:30	1	A study on the effect of government R&D and policy financial support on growth performance, productivity and profitability in climate technology industry	Mina Lee
	2	A study on the entry of domestic industry into developing countries for leading climate technology cooperation	Sejin An
	3	Analysis of the R&D investment for the mission innovation low carbon technology and policy implications	Hwanil Park

Parallel Session E4: Productivity and Efficiency in Manufacturing

Chair: Man Jin (Medium conference room #516)

Time		Title	Speaker
14:00 ~ 15:30	1	Productivity, markup and price dispersion: Evidence from China	Shunan Zhao
	2	Assessing alternate channels of information technology impact on firm productivity: A case of Indian Manufacturing	Rupika Khanna
	3	How to survive and compete: the impact of information asymmetry on productivity	Man Jin

Parallel Session F4: Application of Malmquist Productivity Index

Chair: Rolf Fare (Medium conference room #519)

Time		Title	Speaker
14:00 ~ 15:30	1	Analyzing productivity of Taiwan's international tourist hotels: A bootstrapped malmquist framework	Li Yang
	2	Decomposing the Malmquist productivity index by productivity changes	Sung Ko Li
	3	Cost Malmquist productivity index: from output to group	Barnabe Walheer

Parallel Session G4: Productivity in Agriculture

Chair: Wirat Krasachat (Small conference room #512)

Time		Title	Speaker
14:00 ~ 15:30	1	Transgenic varieties and productive efficiency of cotton farmers in Pakistan	Deep Mukherjee
	2	Spatiotemporal analysis of Korean ginseng farm productivity	Heesun Jang
	3	Directional distance function technical efficiency of chili production in Thailand	Wirat Krasachat Yaisawarng Suthathip

Parallel Session H4: Knowledge, Innovation and Economy

Chair: Dirk Messiner (Lecture room #428)

Time		Title	Speaker
14:00 ~ 15:30	1	Knowledge spillovers and patent citations: Trends in geographic localization	Ryungha Oh
	2	China's "bubble" economy: The real effect of housing price booms on corporate innovation	Lu Zhang
	3	On the time lag of the effect of network position on service performance in software service networks	Kibae Kim

Parallel Session I4: Efficiency Analysis using SFA

Chair: Francesco Pitton (Lecture room #429)

Time		Title	Speaker
14:00 ~ 15:30	1	Empirical distribution of endogenous inefficiency of municipal hospitals in Japan	Atsushi Fujii
	2	Measuring the efficiency of Italian airports: How to counter unexpected shocks	Graziella Bonanno
	3	Capital investment and financial constraint in Indonesia: A SFA approach	Maria Ulpah

Coffee Break (Foyer hall)

me	Title	
15:30 ~ 15:50	Coffee Break	

Plenary Session B: Future of methodological development in efficiency and productivity analysis

Chair: Robin Sickles

Discussant: Hung-Jen Wang (Convention hall #520)

Time		Title	Speaker
15:50 ~ 17:50	1	Future of Methodological Developments in Efficiency and Productivity in Stochastic Frontier Modeling	Christopher Parmeter
	2	Future of Methodological Developments in Efficiency and Productivity in Data Envelopment Analysis	Valentin Zelenyuk
	3	Methodological Developments in Productivity and Firm Dynamics using Micro-Panel Data	Sanghoon Ahn

Dinner (Front yard of Bldg. 314 on campus)

Time	Title	
18:30 ~	Dinner	

Day 3 AM (July 6th, 2018)

Special Session A5: Productivity in Asia 1 (ASIA KLEMS Session)

Chair: Hak Kil Pyo (Convention hall #520)

Time		Title	Speaker
09:00 ~ 10:30	1	On the decline in R&D efficiency: Empirical studies using JIP and EUKLEMS data	Tsutomu Miyagawa Takayuki Ishikawa
	2	Source of growth analysis at industry-level for selected Asian economies using DEA malmquist and Asia KLEMS data bases	Hao-Tsung Chen
	3	Under-measured capital and the Lost Decades in Japan: How the data Has shrouded and prolonged the losses	Taehyoung Cho

Special Session B5: ICT, Innovation and Development 1 (ITPP Session)

Chair: Junseok Hwang (Large conference room #513)

Time		Title	Speaker
09:00 ~ 10:30	1	Higher order dynamic capabilities: organizational innovation complementarities and its effect on firm performance	Andres David Navas Perrone
	2	Role of institutions and ICT technology in avoiding resource curse: Lessons from the four successful economies	Birku Reta Entele
	3	The contribution of the Open Government to community-led democratic innovations in the Latin American countries (LAC)	Lorena Patricia Farias
	4	Analysis of digital transformation in Ecuadorian companies	Sandra Robles

Special Session D5: Efficiency in Electricity and Energy (KEMRI Session)

Chair: Inha Oh (Medium conference room #515)

Time		Title	Speaker
09:00 ~ 10:30	1	Will pollution taxes improve joint ecological and economic efficiency of thermal power industry in China? A DEA based materials balance approach	Ke Wang
	2	The effect of democracy on energy emissions efficiency	Li-Chen Chou
	3	The effect estimation of fourth industrial revolution technologies on electric energy consumption	Youngwook Kim

Parallel Session E5: Educational Efficiency Analysis

Chair: Tsu-tan Fu (Medium conference room #516)

Time		Title	Speaker
09:00 ~ 10:30	1	Persistent and time-varying academic underachievement: An education production function framework	Oleg Badunenko
	2	Efficiency and technological change at South Korean private universities	Mehdi Shamohammadi
	3	Effects of technology transfer policy on technical efficiency of Korean university TTOs	Jaepil Han

Parallel Session F5: Environmental Efficiency Analysis

Chair: Gerald Granderson (Medium conference room #519)

Time		Title	Speaker
09:00 ~ 10:30	1	A meta-frontier of data envelopment analysis on the emissions technology gap ratio	Ming-Chung Chang
	2	Cost efficiency of recycling and waste disposal in Japan	Satoshi Honma
	3	Green performance, energy efficiency, economic growth and marginal abatement cost of Chinses cities: A panel VAR approach	Danjun Ji
	4	Effect of reducing Nitrogen Oxide Emissions (via 1990 Clean Air Act), and ISO membership, on cost efficiency in the electric utility industry	Gerald Granderson

Parallel Session G5: Methodological Advances in Productivity and Efficiency Analysis

Chair: Victor Podinovski (Small conference room #512)

Time		Title	Speaker
09:00 ~ 10:30	1	Plant capacity and attainability: Exploration and remedies	Kristiaan Kerstens
	2	Fuzzy performance evaluation for network structures	Adel Hatamimarbini
	3	Statistical methods for computing proper index numbers	Christopher O'Donnell
	4	Dealing with undesirable outputs in DEA: An aggregation method for a common set of weights	Weiwei Zhu

Parallel Session H5: Efficiency in Health Care

Chair: Jiro Nemoto (Lecture room #428)

Time		Title	Speaker
09:00 ~ 10:30	1	Does new healthcare reform in China improve healthcare resources efficiency?	Ruizhi Pang
	2	Efficiency of New Zealand's district health boards at providing hospital services: A stochastic frontier analysis	Nan Jiang
	3	Mix stickiness and information economic rationale for the Farrell measure	Peter Bogetoft

Parallel Session I5: Factors of Performance Improvement

Chair: Jongsung Kim (Lecture room #429)

Time		Title	Speaker
09:00 ~ 10:30	1	Effects of external supplier uncertainty on the benefit of demand information sharing	Hyun-Woong Jin
	2	A study of the success factors of women's leadership in E-business in the Baltic states	Ieva Meidutė-Kavaliauskienė
	3	An analysis for urban competitiveness of global cities: Evidence from Oxford economics data	Jongsung Kim

Coffee Break (Foyer hall)

Time	Title	
10:30 ~ 10:50	Coffee Break	

Special Session A6: Productivity in Asia 2 (ASIA KLEMS Session)

Chair: Hak Kil Pyo (Convention hall #520)

Time		Title	Speaker
10:50 ~12:20	1	Japan's prefectural-level KLEMS: Productivity comparison and service price differences	Joji Tokui
	2	Structural change in Pakistan's economy based on KLEMS data, 1980 - 2010	Abid Aman Burki
	3	Labor share and market power : Evidence from the Korean manufacturing plant-level data	Jin Ho Park
	4	A Growth Accounting in Value-added Productivity: International Comparison based on EU KLEMS Dataset	Hyunbae Chun

Special Session B6: ICT, innovation and development 2 (ITPP Session)

Chair: Junseok Hwang (Large conference room #513)

Time		Title	Speaker
10:50 ~12:20	1	Analyzing innovation strategies of global IT vendors through TPC certification acquisition activity	Chan Lim Park
	2	Approach to developing an integrated Information Asset Management framework to increase the public value of citizen-centric e-Government : based on the Estonian and Korean cases	Hanna Shmagun
	3	The effect of the patent convergence on global competitiveness index for cross country analysis	Ahreum Hong

Parallel Session D6: Productivity Economics of Agriculture and Natural Resources

Chair: Wirat Krasachat (Medium conference room #515)

Time		Title	Speaker
10:50 ~12:20	1	The Impact of international trade on world agriculture production: Evidence from a panel of 126 countries 1962-2014	Binlei Gong
	2	Lifting up smallholder maize productivity using sustainable intensification: Evidence from Ethiopia	Ali Mohammed Oumer
	3	Natural rubber economics between China and Southeast Asia (The impact of China's economic slowdown)	Siskarossa Ika Oktora

Parallel Session E6: Efficiency of Public Spending and Policy

Chair: Subal Kumbhakar (Medium conference room #516)

Time		Title	Speaker
10:50 ~12:20	1	Verification of the influence of moral suasion on sovereign debt default risk	Chien-Jung Ting
	2	The efficiency of village government speeding in Indonesia: A meta-frontier analysis	Tengku Munawar Chalil
	3	Innovation-oriented science influence on academic assets combination: an assessment in Brazil	Clément Bert-Erboul

Special Session F6: Productivity in Management and Business

Chair: Emili Grifell-Tatje (Medium conference room #519)

Time		Title	Speaker
10:50 ~12:20	1	Decomposition of the profit difference: application in Chinese city banks and Taiwanese banks within exchange rate	Xiang Chen
	2	E-Commerce as a marketing strategy to increase small medium enterprises (SMEs) profit	Agatha Saputri
	3	Pre-evaluating efficiency gains from potential mergers and acquisitions based on resampling DEA approach: evidence from Chinese railway sector	Jin Zeng

Parallel Session G6: Productivity in Japan

Chair: Jiro Nemoto (Small conference room #512)

Time		Title	Speaker
10:50 ~12:20	1	Declining labour share and aggregate productivity growth	Hideyuki Mizobuchi
	2	The structure of the knowledge network: An exploratory study of the Japanese auto-parts product space	Eri Yamada
	3	A spatial autoregressive stochastic frontier model for panel data incorporating a Model of technical inefficiency	Takahiro Tsukamoto
	4	Empirical analysis on the openness of buyer-supplier relationships and productivity in the Japanese automobile parts industry	Hyeog Ug Kwon

Parallel Session H6: Industrial Analysis using DEA

Chair: Sangmok Kang (Lecture room #428)

Time		Title	Speaker
10:50 ~12:20	1	The dynamic productivity growth of the Indonesian food and beverages industry	Maman Setiawan
	2	Heterogeneity by Common Shocks in DEA Technical Efficiency	WooPyeong Yi
	3	Ranking based on expected structural efficiency impact: Evidence from Chinese banks	Lingling Li

Parallel Session I6: Econometric Analysis for Performance Measurement

Chair: Cliff Huang (Lecture room #429)

Time		Title	Speaker
10:50 ~12:20	1	Determinants of international tourism in Indonesia	Faiza Husnayeni Nahar
	2	Statistical analyses of Korean defense industry and its policy implications	Won-Joon Jang
	3	What are main sources of markup for state-owned enterprises? - Empirical study based on Chinese industrial enterprises database	Bing Qian

Lunch (Multi-purpose Auditorium, B1)

Time	Title	
12:20 ~ 13:30	Lunch	

Day 3 PM (July 6th, 2018)

Special Session A7: Advanced Stochastic Frontier Methodology

Chair: Christopher Parmeter (Convention hall #520)

Time		Title	Speaker
13:30 ~ 15:00	1	Comparing two groups of decision-making units based on semiparametric regression	Hohsuk Noh
	2	Inference for nonparametric stochastic frontier models	Valentin Zelenyuk
	3	Uncertainty and business cycle asymmetry: An application of a serially-correlated two-tier SF model	Hung-Jen Wang
	4	Endogeneity in a panel stochastic frontier model: A system approach	Subal C. Kumbhakar

Special Session B7: Methodological Advances in DEA

Chair: Victor Podinovski (Large conference room #513)

Time		Title	Speaker
13:30 ~ 15:00	1	Selective measures in DEA: input and output orientations	Mehdi Toloo
	2	Constructing the performance evaluation model of Asia's cultural and creative industry by dynamic network DEA	Shengwei Lin
	3	Ratio data in DEA models	Victor Podinovski

Special Session D7: Efficiency and Impact of R&D Investment and Policy (STEPI Session)

Chair: Seoggwon Hwang (Medium conference room #515)

Time		Title	Speaker
13:30 ~ 15:00	1	Characteristics and performance of firms that start R&D in the recession period	Inha Oh
	2	Analysis of the inter-industry spillover effect of government R&D investment	Pil-Seong Jang
	3	Innovation and economic growth: Exploring a time lag effect	Igor N. Dubina
	4	Measuring the effectiveness of technological guarantee program: evidence from Korea 2010-2015	Seogwon Hwang

Parallel Session E7: Financial Analysis using DEA

Chair: Emili Grifell-tatje (Medium conference room #516)

Time		Title	Speaker
13:30 ~ 15:00	1	Exploring mutual fund performance from the decision-making quality and capital magnet perspectives	Wen-Min Lu
	2	Measuring the loan efficiency of Japanese regional banks and its strategic implication - Analysis of Kanto-region based consolidation	Hirohisa Shimura
	3	A context-dependent efficiency evaluation of Japanese securities firms	Jin-Li Hu

Parallel Session F7: Efficiency and Productivity in International Economics

Chair: Sukin Chang (Medium conference room #519)

Time		Title	Speaker
13:30 ~ 15:00	1	TFP change and its components for Swedish manufacturing firms during the 2008-2009 financial crisis	Pontus Mattsson
	2	The Euro effects on EU trade flows and balances: Evidence from the cross sectionally correlated panel gravity models	Yongcheol Shin
	3	Determinants of external default and domestic default	Chien-Jung Ting

Parallel Session G7: Productivity in Korea

Chair: Young Hoon Lee (Small conference room #512)

Time		Title	Speaker
13:30 ~ 15:00	1	Servicification of manufacturing: Evidence from Korean multinational firms	Nyeong Seon Son
	2	Productivity issue of Korean companies: Multicriteria approach for risk reducing within investment project's evaluation	Olga A. Shvetsova
	3	Dynamic industry productivity measures: South-Korean thermal electricity plants 2001-2008	Finn R Førsund

Parallel Session H7: Environmental Performance Evaluation

Chair: Almas Heshmati (Lecture room #428)

Time		Title	Speaker
13:30 ~ 15:00	1	Forecasting fuel demand by income groups to stimulate environment and energy efficiency in Pakistan	Arsalan Hussain
	2	Environmental regulation and green total factor productivity: Dilemma or win-win? - Empirical test based on Chinese industry	Jiangfeng Hu
	3	Estimating trade-off between economic growth and environmental impact: An application of the modified by-production approach to European agricultural sector	Tomas Baležentis

Parallel Session I7: Malmquist Index Analysis on Productivity

Chair: Dong-hyun Oh (Lecture room #429)

Time		Title	Speaker
13:30 ~ 15:00	1	Profit Luenberger and Malmquist-Luenberger indexes for multi-activity decision making units: the case of the star-rated hotel industry in China	Linjia Zhang
	2	The Main Sources of Productivity Change in Taiwan's International Tourist Hotels: The Disaggregate Perspective	Chiang-Ping Chen
	3	Characterizing the difference between indirect and direct CO2 emissions: evidence from Korean manufacturing industries, 2004-2010	Sinwoo Lee

Plenary Session C: Finding new sources of productivity growth and economic development

Chair: Prof. Hak Kil Pyo (Convention hall #520)

Time		Title	Speaker
13:30 ~ 15:00	1	Two Lost Decades in Japan: What made the Japanese economy so unsuccessful?	Shinichi Fukuda
	2	Growth and productivity in 21st century in India: A disaggregated industry level analysis	Pilu Chandra Das Deb Kusum Das
	3	TBD	Jie Zhang
	4	Korean Growth Crisis and Policy Response	Se-Jik Kim

Closing Ceremony (Convention hall #520)

Time	Title	
17:20 ~ 18:00	Closing Ceremony	Jeong-Dong Lee

Gala Dinner (Multi-purpose Auditorium, B1)

Time	Title	
18:00 ~	Gala Dinner	

Parallel Session Abstracts

Special Session A1: Economics and the Environment

Title: Analyzing environmental technological efficiency of service industries in China and its affecting factors

Presenting author: Hui Meng (Shanxi University of Finance & Economics)

Co-author(s): Ruizhi Pang

Abstract

The service economy has gradually become the most important driving force to promote the development of China's economy with the economic growth in the transition period. According to Chinese Statistics, the energy consumption of the service industry in China is nearly same as the manufacturing industry. The popular recognition of "service industry is green" may be wrong at least in China. So the transition of China's economy growth model depends highly on the service industry development transition.

Energy efficiency is widely used as one of the evaluation criteria for the quality of development in the manufacturing industries. Few scholars have applied it in the service industries. Because of the energy efficiency measured by the traditional DEA method is inconsistent and biased, this paper adopts the Bootstrap-DEA method to make an empirical analysis of the energy efficiency on the 14 service industries in China. Based on the measurement, the paper selects critical indicators, such as environmental regulation, capital deepening, industrial structure, energy structure, ownership structure, industries heterogeneity, and economic opening, to analyze the factors that influence the energy efficiency of service industries.

Keywords: Service industries, DEA, Bootstrap, Energy efficiency, Affecting factors

Title: Measuring efficiency when producing intended outputs and generating unintended ones

Presenting author: Finn R Førsund (University of Oslo)

Abstract

The generation of unintended residuals in the production of intended outputs is the key factor behind our serious problems with pollution. The way this joint production is modelled is therefore of crucial importance for our understanding and empirical efforts to change economic activities in order to reduce harmful residuals. The materials balance tells us that residuals stem from the use of material inputs. The modelling of joint production must therefore reflect this. A multi-equation model building on the factorially determined multi-output model can theoretically satisfy the materials balance. Complex technical relationships are simplified to express each of the intended outputs and the unintended residuals as functions of the same set of inputs. Problems with the single-equation models that have dominated the literature studying efficiency of production of intended and unintended outputs the last decades are revealed. A functional trade-off between desirable and undesirable outputs for given resources, as exhibited by single-equation models, is not compatible with the materials balance and efficiency requirements on production relations. Multi-equation models should therefore replace single equation models. Three efficiency measures are introduced: desirable output efficiency, residuals efficiency, and abatement efficiency. All measures can be estimated separately using non-parametric DEA models.

Keywords: Materials balance; Joint production; Residuals generation; Single-equation and multi-equation models; End-of-pipe abatement; Efficiency measures; Data Envelopment Analysis (DEA)

Title: The environmental performance of Chinese manufacturing sector: Input-oriented approach

Presenting author: Xinju He (Hong Kong Baptist University)

Co-author(s): Sung Ko Li

Abstract

In the past several years, the Chinese government has been pursuing "green" economic growth. An important issue is to reduce the production of undesirable outputs (e.g., pollution) which are unavoidable during the production process. The environmental performance index (EPI) introduced by Färe, Grosskopf and Hernandez-Sancho (2004) is an appropriate tool to study this issue. There are two restrictions in current empirical studies that adopt EPI: (i) Only the "min-max" reference vectors are used. (ii) The empirical production technology in a panel data set is limited to the grand frontier constructed from all data. This paper discusses the weaknesses of these two restrictions.

We modify the existing formula to address the above two issues. It is shown that our modified EPI is well-defined for many choices of reference vectors and the empirical production frontier can differ over time.

This paper applies the new formula to study the environmental performance of the Chinese manufacturing sector with 294 cities from 2003 to 2014. Our empirical results show that there has been a continuous improvement of environmental performance in the Chinese manufacturing sector over the investigated period. We can say that the green policy of China was successful in promoting environmental performance but there is still room for improvement. In conclusion, this paper proposes an alternative approach of EPI which solves some of the problems faced by the current version. The empirical values computed from this modified EPI are in general more conservative than those of the existing formula.

Keywords: environmental performance index, undesirable outcomes, weakly disposable outputs, input-oriented distance function, Chinese manufacturing sector

Title: Assessing the impact of agri-environmental management practices on farm productivity when adoption is endogenous

Presenting author: Moriah B. Bostian (Lewis & Clark College)

Co-author(s): AJ A. Bostian, Marita Laukkanen, Antti Simola

Abstract

Many voluntary practices for reducing the environmental impacts of agriculture provide environmental benefits while lowering agricultural productivity. Policy analysis of the productivity aspect is complicated by the fact that decision-makers can choose their own policy levers, an action that ruins any notion of random assignment. We introduce an identification strategy for this kind of endogeneity, combining classic methods from stochastic frontier analysis and selection models. Applying it to micro-level data for Finnish grain farms, we find that more efficient producers are more likely to enroll in subsidized practices. And, because these practices tend to reduce yield, frontier analysis without the endogeneity correction greatly understates productivity losses. Average inefficiency more than doubles after the correction. An outlier investigation suggests that the lowest tenth of farms are responsible for most of the inefficiency.

Keywords: agri-environmental programs, environmental impacts of agriculture, productivity, stochastic frontier analysis, endogeneity, selection model, sparse grid

Special Session B1: Efficiency and Capacity Utilization

Title: Analysis of cost-based capacity efficiency in Korean securities industry using stochastic frontier model

Presenting author: Koun Cho (DGB Economic Research Institute)

Co-author(s): Sangmok Kang

Abstract

The purpose of this study is analyzing cost-based capacity efficiency which is applied to Korean Securities Industry. Capacity efficiency is defined as a non-optimal dimension of the fixed inputs in cost-inefficiency. It is obtained by calculating the relative ratio of short-run cost efficiency and long-run cost efficiency. The proposed evaluation process is applied to 39 statutory-audit Korean Stock company covering the period between 2009 and 2015.

Throughout the period analysed, the average of cost efficiency in short-run and long-run does not exceed 0.5 so that all firms is capable of improvement. As the result of calculating capacity utilization, Korean security firms should increase outputs because their position in the average cost graph is on the left side of the minimum point. For the capacity efficiency, the greater part of cost inefficiency is due to a non-optimal size of the fixed inputs. Among 39 firms, only 4 company have the value of 1 in the capacity efficiency.

Keywords: SFA(Stochastic Frontier Analysis), Capacity Efficiency, Capacity Utilization

Title: Performance measurement of production and abatement activities for Korea industrial complexes using a multi-activity network data envelopment analysis

Presenting author: KwangUk Kim (DGB Economic Research Institute)

Co-author(s): Orakzai Shahzad, Seok-Joon Hwang

Abstract

In this paper, we present a multi-activity network data envelopment analysis (DEA) model to evaluate the relative performance of 31 industrial complexes in South Korea. Within the integrated network framework, the proposed model estimates the inefficiencies of the whole production system as well as those in production process and pollutant abatement process simultaneously. industrial wastewater discharged from the production site is taken into consideration as an intermediate to connect two processes.

From the empirical results, it is found that there are great disparities in inefficiencies among the industrial complex production systems, and these are largely driven by the abatement process. In addition, the abatement activity appears to experience the economies of scale, implying that choosing optimal capacity of wastewater disposal facility is an important factor for improving the performance in this process.

Title: Measurement of alternative energy efficiencies using stochastic frontier translog function

Presenting author: Sangmok Kang (Pusan National University)

Co-author(s): Minji Kang

Abstract

The purpose of this article is to estimate energy efficiencies and energy intensity efficiencies using translog stochastic frontier function for 1996-2011 and to compare them among five income groups of countries as the alternative ways of energy efficiency measure. According to the empirical results, firstly, the increases of capital stock and non-fossil fuel for fossil fuel significantly decreased fossil energy use, and the increase of non-fossil energy decreased fossil energy intensity. Greenhouse gas emission has positive signs(+) with fossil fuel energy quantities and energy intensities. Second, the fossil energy efficiency for 113 countries in 1996-2011 was 0.526 on average. The fossil energy efficiency of the high income group (0.728) and the middle -high income group (0.552) group were the most efficient, and the OECD countries were not as high as expected. Third, the intensity efficiency of fossil energy is 0.557, which is slightly higher than that of fossil energy efficiency (0.526). When divided into five income groups, the OECD was the highest at 0.614, followed by the high income countries (0.576) and middle-low income countries (0.569). This is because the OECD Group's GDP, which makes up the fossil energy intensity, was relatively high.

Parallel Session C1: Analysis of TFP Growth

Title: Capital deepening and efficiency in Morocco

Presenting author: Elhadj Ezzahid (Mohammed V University)

Co-author(s): Abdelaziz Nihou

Abstract

Investment is at the heart of economic growth, It increases the available stock of capital for productive activities and allows the introduction, in the productive process, of improved technology embedded in new capital items. Monitoring accumulation and use of this capital is a big issue. Our paper aims to bring a diagnostic of the Moroccan case by responding to these two questions: is capital stock sufficient? Is it efficiently used? Our results show that Morocco recorded an overinvestment since mid-2000s. The estimation of the rate of return to capital in the Moroccan economy indicates that RRK was under 10% until the beginning of the 1990s. Since then, it recorded a steady increase that culminated at 18% around 2004. After this date, it began to decrease. We attribute the low level of capital-labor ratio in Morocco to the high price of investment goods compared to consumption goods especially before 2000, to the insufficiency of human capital accumulation and absorption, and to the low level of TFP. The major conclusion of this paper is the debate about the efficiency of capital use must go hand in hand with an exploration of why capital accumulation in Morocco is insufficient.

Keywords: Investment, capital, efficiency of capital use, rate of return to capital, factors' total productivity, Morocco

Title: Total factor productivity growth of the Indonesian economic sectors: A KLEMS approach

Presenting author: Maman Setiawan (Universitas Padjadjaran)

Co-author(s): Guntur Sugiyarto

Abstract

This research investigates the trend of the total factor productivity growth in the Indonesian economic sectors. This study uses the data of economic sectors sourced from the Indonesian Bureau of Central Statistics with the period from 1996 to 2012. The sectoral total factor productivity growth estimation is applied on the 33 economic sectors listed in the ASIA KLEMS database. Moreover, the contribution of the inputs on the output growth is also estimated. This research found that the trend of the average total factor productivity growth in the Indonesian economics sectors tended to decrease during the period 1996-2012. This research also found that few economic sectors had negative average of the total factor productivity growth.

Keywords: Indonesian productivity, ASIA KLEMS, total factor productivity, Indonesian economic sectors

Title: Technological changes in the pulp and paper industry in India: An inspection of traditional and advanced inputs use

Presenting author: Sandeep Kumar Kujur (Institute of Public Enterprise)

Abstract

With a gradual shift in manufacturing production from industrialized economies to industrializing economies due to the comparative advantage of lower labor costs and increasing domestic demand shaped by rising income levels, technological progress remains the key to sustain growth in the long-run. On this premise, this study makes an attempt to understand the role of traditional and advanced inputs use in technological changes in the Pulp and Paper (P&P) industry in India, measured in terms of Total Factor Productivity Growth (TFPG). Considering the structural differences within the industry, the study makes a maiden attempt at classifying the P&P industry into its three major raw material-based sectors, namely, the wood-based P&P sector, the agro-based P&P sector and the recycled paper-based P&P sector, in order to comprehend the internal dynamics of technological changes within this industry in India. We adopt the semi-parametric method of Levinsohn and Petrin (2003) to measure technological change using 5-digit industry level Annual Survey of Industries (ASI) data from 1998-99 to 2009-10. Although a few recent studies have captured the effects of service input on the TFPG in the aggregate manufacturing industry, this attempt is distinct in terms of segregating the effects of traditional inputs (capital, labor, energy, indigenous material and imported material), and advanced inputs (services, information and communication technology, and pollution control equipment) on the technological changes in the P&P industry as a whole and its raw material-based segments. In addition, it evaluates the technological changes in India's P&P industry in terms of the changes in the level of basic input consumption and pollution load overtime. Furthermore, the technological change in the industry, particularly during the last one decade is also inspected by analyzing the installation of modern technology and equipment in the production process, level of inputs use, and pollution load in the sample factories. The hybrid analysis confirms that technological change varies across the different raw material-based sectors of the P&P industry in India. The effects of traditional and advanced inputs use on the technological change too differ within the sub-sectors of the industry. The findings of the study prompt useful policy suggestions for the resource-based industries in transitional economies.

Keywords: Technological changes, Total factor productivity, Pulp and paper industry, Traditional inputs and Advanced Inputs

Parallel Session E1: Analysis on Labor Productivity

Title: How biased is skill-biased technical change

Presenting author: Ming Li (Maastricht University)

Co-author(s): Jaap W. B. Bos

Abstract

The rise in wage inequality across many countries has been a crucial concern for policy makers. One of the drivers is said to be skill-biased technical change, which can increase high-skilled labors relative productivity and relative demand, and thus contribute to the rising skill premium, a ratio of skilled to unskilled wages. In other words, with the development of technology, more skilled labor will be needed to replace unskilled labor in order to increase output. Consequently, skill-biased technical change will induce a higher demand for high-skilled labor and a lower demand for low-skilled labor, which thus may push up the relative price of high-skilled labor. Due to the huge impact on education and unemployment, measuring skill-biased technical change is of great importance to policy makers. So far, one of the aspects of skill-biased technical change that is less well understood is learning on the job. After all, if newly hired high-skilled workers are not as efficient as experienced workers, we may underestimate skill-biased technical change.

In this paper, we tackle this issue. We recognize that labor is not homogeneous, and assume new labor, the entrants, is less efficient than experienced labor. First, we theoretically derive the bias in the measurement of technical change, which is attributed to inefficient labor. We start with a simple two-firm setting and then generalize our model to show how this can result in a biased measurement of non-neutral (skill-biased) technical change. Then, we demonstrate the potential for this bias to be economically significant through a set of simulations. Finally, we conduct an empirical analysis based on the World Input-Output Database, which consists of panel data covering 40 countries and 34 industries during the period from 1995 to 2009. The estimation results provide evidence of the biases in skilled-biased technical change, suggest overcompensation of high-skilled labor, and help explain the differences in technical change between industries and countries. These findings indicate that the measurement error in skilled-biased technical change contributes to changes in the wage differential, and explain why high-skilled and medium-skilled labor may be overcompensated.

Title: Endogenous spatial technological clubs across Europe: A panel data frontier model with cross sectional dependence

Presenting author: Camilla Mastromarco (University of Salento)

Co-author(s): Yongcheol Shin, Laura Serlenga

Abstract

The evolution of income per capita across the regions of the European Union has been a key policy concern since the 1986 Single European Act, when the community's regional policy was formally established. One of the primary objectives of EU regional policy is the reduction of regional income disparities, cohesion and regional convergence.

Considering the EU-15, total cross-regional disparities have tended to decline since the 1980s, as indicated by measures of the dispersion of per-capita income such as the coefficient of variation (European Commission, 2010). Nevertheless, persistent differences between regions have remained. For example, the Greek region Epirus, located to the south of Albania, and the Portuguese Central region were at the bottom of the per-capita income distribution across the EU-15 regions in 1980, 1990 and 2000. On the other hand, Brussels, Hamburg and Inner London were at or near the top of the distribution at these points in time. More generally, levels of regional economic development have been much lower in the peripheral regions of Greece, Portugal, Spain and Southern Italy compared to the richer capital regions and the urban and industrial agglomerations in the center of Europe. These persistent disparities in regional per-capita incomes suggest that growth processes differ considerably between the European regions.

In the context of economic growth, spatial heterogeneity might connected to the issue of convergence by ″clubs”. If the convergence club hypothesis is correct, for example, if two regimes are present, with each regime converging to a different state and at a different rate, estimations based on a single regime may produce a non-significant estimate for the convergence parameter, see Arbia and Basile (2003). As in Arrow's (1962) and Romer's (1986, 1990) models, we assume that the capital investment not only increases the physical capital stock in the region but also increases the level of production technology interdependence for all regions in the economy through knowledge spillover. Following Ertur and Koch (2007), we suppose that these externalities of knowledge, embodied in capital, extend across regional borders.

The aim of this paper is to evaluate whether the European regions form regional clusters that differ from the political borders. By estimating a panel data frontier model, we analyse interdependence across regions of production efficiency and technology clusters and estimate the degree of regional technological interdependence generated by the level of spatial externalities. The net effect of these spatial externalities on the level of

productivity of each region depends on the relative connectivity between this region and its neighbors and the closeness to the efficiency frontier regions (with highest production levels). The more a given region is connected to its neighbors, the more it benefits from spatial externalities. The more efficient is a region, the more it profits from technological externalities.

We extend the methodology proposed in Kapetanios et al (2014) and Mastromarco et al (2015) in the framework of panel data frontier model, which considers both strong and weak spatial dependence and model productivity spatial clusters endogenously. Further, we are particularly interested to the regional patterns of those clusters over time.

By considering regions and countries over time, we model a multidimensional error components specification that takes into account of residual cross sectional dependence (CSD) via unobserved heterogeneous global factors and spatial dependence. The multidimensional country-time fixed (CTFE) and random effects (CTRE) estimators proposed by Balazsi, L., L. Matyas and T. Wansbeek (2015) and Balazsi, L., B.H. Baltagi, L. Matyas and D. Pus (2016) fail to remove heterogenous global factors, suggesting that they are biased in the presence of the nonzero correlation between the regressors and unobserved global factors. In this regard, we will develop a consistent estimation procedure following Kapetanios et al. (2017) and Mastromarco et al. (2016).

We use data from Cambridge Econometrics European Regional Database contains annual observations for the period 1980-2012 for NUTS3 EU 27 regions and Norway on: employment (thousands of people); hours worked; gross fixed capital formation in millions of Euros 2005 prices; gross value added in millions of Euros 2005 prices. We expect to contribute to the issue of convergence clubs among European regions. Our methodology enables us to investigate how European regions clusters together in terms of productivity growth. Total factor productivity (TFP) is regarded as the most important driver behind economic growth (e.g. Prescott, 1998; Caselli, 2005; Parente and Prescott, 2005). In this paper, we aim to examine whether there exists a common TFP pattern among European regions. Thus, we wish to shed light on the issue of whether common fiscal policies can be justified for fostering economic growth in similar regions and to detect core and peripheral EU regions.

Title: Modifying the "generalized exactly additive decomposition" of GDP and aggregate labor productivity growth in practice for consistency with theory

Presenting author: Jesus C. Dumagan (De la Salle University)

Abstract

The “generalized exactly additive decomposition” (GEAD) of GDP and aggregate labor productivity (ALP) growth, originated by Tang and Wang (2004), is gaining attention in the literature and acceptance in practice (de Avillez, 2012; Diewert, 2010, 2015; Dumagan, 2013, 2014a, 2014b, 2016, 2017; Dumagan and Balk, 2016; Reinsdorf, 2015; Tang and Wang, 2014). This paper shows, however, the original GEAD is not always consistent with theory and, therefore, modifies it for consistency, subject to the requirement below, depending on the GDP quantity index that in current practice is either (1) chained Laspeyres, (2) direct Laspeyres, or (3) chained Fisher. GEAD employs relative price—ratio of a sector’s GDP deflator to the economy's GDP deflator—to obtain contributions that exactly add up to GDP or ALP growth. Sector contributions equal pure growth effect plus price change effect (PCE) to GDP growth and with-in sector productivity growth effect plus inter-sectoral reallocation effect to ALP growth. When relative prices change, a sector’s PCE could be positive, zero, or negative but consistency with theory requires Sum of PCE = 0 overall to ensure GDP growth is “pure” quantity growth and ALP growth depends only on productivity and labor share changes (Denison, 1967; Dumagan and Balk, 2016). However, this paper shows the original GEAD yields Sum of PCE = 0 only if the GDP quantity index is (1) above and, therefore, modifies GEAD for theoretical consistency if the index is (2) or (3). The findings are globally relevant because these three indexes underpin GDP in all countries in current practice.

Keywords: Growth decomposition, productivity analysis, relative prices, index number theory

Parallel Session G1: R&D investment and Efficiency

Title: Impact on innovation and development of Korean energy industry: Analyzing intensity of national R&D investment and patent data

Presenting author: Jong-Hyun Kim (Inha University)

Co-author(s): Yong-Gil Lee

Abstract

Energy industry is one of basic component to sustain national economic behaviors. So, many countries have invested a huge amount of fund in energy R&D. In early 2018, the Korean Ministry of Trade, industry and Energy(MOTIE) announced a plan to invest in energy industry. The amount of the investment is about one hundred twelve billion dollars(in US dollar, $ 1,117,151,324; in Korean currency, \ 1,206,300,000,000). This amount increases 4.1% compared to 2017 year and exceed 10.3% of government recommending amount to invest. In this era, it is commonly accepted notion that sufficient investment on R&D is one of mandatory factor for economic development and innovations. But, the economic development or innovation could not exactly accordance with R&D investments. Many studies examined a performance of R&D investments and found conditions for a successful R&D investment initiating economic developments and innovations.

This study will conduct some empirical analysis to examine the Korean energy R&D investment and suggest some political advises. So, this study will check the intensity of the energy R&D investment by using patents data. Further, this study will show more detailed information by analyzing network and structure of patents.

Keywords: intensity of R&D investment, Network, structure, patent, investment, development, innovation

Title: Heterogeneous effect of business R&D spending by industry on economic growth

Presenting author: Euy-Young Jung (Seoul National University)

Abstract

According to many papers and empirical evidence, R&D investment is known to have a positive (+) relationship with economic growth (Aghion and Howitt, 1992; Cameron, 1996; Grossman and Helpman, 1991; Romer, 1990). Furthermore, there are many studies on the relationship between R&D expenditure and economic growth, which are divided into high-tech industry and low-tech industry (Griliches and Mairesse, 1984; Nadiri, 1993; Tsai and Wang, 2004; Ortega-Argilés et al. Thorwarth., 2012). However, individual industries have different characteristics and their impact on economic growth is different. In addition, the analysis of individual industries can provide more implications for the establishment of industry and innovation policies. Thus, this paper extends previous studies by examining the heterogeneity of R&D spending by industry on economic growth. I analyzed the relationship between R&D expenditure and GDP per capita using fixed-effect panel models with various time-lag, covering manufacturing and service industries in 30 OECD countries during 1998 - 2014. R&D spending in the chemical, pharmaceutical, automotive, and software industries has a positive relationship with GDP per capita, and R&D spending in clothing, machinery, and telecommunications services has a negative relationship. Based on the results of the analysis, I derive the common characteristics of industries with positive or negative relationships, and suggest implications for more specific industry and innovation policies.

Title: The road to leadership: Patterns of technological upgrading, productivity and innovation in the Shipbuilding industry

Presenting author: André Cherubini Alves (University of Campinas)

Co-author(s): Paulo Antônio Zawislak

Abstract

The purpose of this paper is to analyze the patterns of technological upgrading in a Complex Product Systems (COPS): shipbuilding and offshore industry. We conduct a literature review on the technological path and the economic shifts in competitiveness in leading nations over the years, in special: United Sates, Japan, South Korea, China, Norway and Singapore. We identify four conditions that help explain the successful catch-up and subsequent leap-frogging: national institutions, national firm's existing capabilities and technology transfer process and innovation. Missing elements in this strategy, seem to lead to unsuccessful implementation.

Keywords: technology upgrading, shipbuilding, industrial leadership, innovation

Parallel Session H1: Innovation in Network

Title: The relationship between university-industry interactions and university scientific productivity: Evidence from China

Presenting author: Yanzhao Lai (The George Washington University)

Abstract

This paper aims to answer a long-standing question for academic research: does university-industry proximity increase academic output and performance? This paper argues that different types of university-industry (UI) interactions will have different impact on academic research output (academic publication and citation). Based on the empirical analysis of 61 Chinese research-intensive universities from 2009 to 2015, this paper find that contract research commissioned by industry has an inverted U-shaped effect on research output and technology transfer has the negative effect on university scientific productivity. Big size firms will have more negative impact on university research output than small size firms through university technology transfer.

Title: A social network analysis on the collaborative networks among regional innovation actors in Incheon

Presenting author: Seongho Han (Incheon Business Information Technopark)

Co-author(s): Dong Kwan Kim, Gwang Min Yoo

Abstract

This study was conducted for effective management of collaborative networks and relationships between regional innovation actors. Using a networking analysis, this study analyses characteristics and modes of collaboration networks of regional innovation actors, and describes characteristics of networks by innovation function.

The study shows what institutions are at the center of regional innovation networks, and how institutions are networked in Incheon. In addition, the results also show that as the intensity of collaboration increases, the density of network between regional innovation actors weakens. The more common type of collaboration is joint projects than contracts. And by innovation function networking, supporting research and development, and supporting start-ups is active.

According to the results of this study, organizations have a central role in networks is different by function. Thus policy to promote regional innovation network should strengthen programs of institutions that have more connections in regional innovation networks.

Keywords: Regional innovation actor, Collaboration Network, Social Network Analysis, Incheon

Title: Role of platform providers in service networks: A study of innovation through software service provisioning in the Salesforce.com ecosystem

Presenting author: Kibae Kim (Korea Advanced Institute of Science and Technology)

Co-author(s): Sodam Baek, Jorn Altmann

Abstract

Following a new type of innovation strategy, leading software vendors move their software onto their software service platforms and open up their platforms to third-party software vendors. Although many studies state that enlarging the scope of software service offerings is the goal of platform providers, only few studies focused on the roles that platform providers take on to achieve the goal. These studies have identified that platform providers are not only software vendors but also promoters and regulators of third-party software. In this paper, we extend this research by analyzing how platform providers can promote innovation. For the analysis, we use empirical data about software services gathered from Salesforce.com's platform. The analysis identifies clusters of software services and the positions of Salesforce. com's software services in relation to the clusters. Our results show that Salesforce.com promotes innovation by provisioning software services that are seeds for clusters, while third-party vendors release software services that are complementary to those of Salesforce.com. Our analysis results verify that Salesforce.com's strategy of becoming a platform provider has been successful. The results also suggest that a division of roles between platform providers and third-party vendors is necessary, in order to build a sustainable software ecosystem.

Keywords: Open Innovation, Platform-as-a-Service, Salesforce.com, Platform Leadership, Network Analysis, Software Industry

Special Session A2: Metafrontier Productivity Analysis

Title: Measuring productivity of financial holding companies in Taiwan: A cost metafrontier Malmquist productivity index

Presenting author: Tsui-Yueh Cho (National Taichung University of Science and Technology)

Co-author(s): Han-Yun Chen

Abstract

This study attempts to provide a framework under the variable returns to scale hypothesis to account for the effect of the scale cost efficiency change (Δ(SCE)) and scale cost technical change (Δ(SCT)) in the decomposition of the cost metafrontier Malmquist productivity index (CM^M). A total of 34 banks in Taiwan are empirically analyzed from 1999 to 2012. The banking industry in Taiwan is found to have an improvement in cost metafrontier Malmquist productivity. The subordinate banks of financial holding companies (FHCs) are also found to exhibit positive CM^M and decomposition components. The empirical results recommend that Taiwanese banks place more policy focus on the issue of scale adjustment, which should be beneficial. Based on the CM^M decomposed results, we can gain further resources of the growth path to enhance operational performance.

Keywords: cost metafrontier Malmquist productivity index, the banking industry, financial holding company, variable returns to scale

Title: Metafrontier profit-oriented Luenberger productivity indicator: an application to Taiwanese and Chinese commercial banks

Presenting author: Xiang Chen (Soochow University)

Co-author(s): Tsu-Tan Fu, Jia-Chin Juo

Abstract

To provide a consistent comparison on profit performance between banks in two different groups, this study applies the data envelopment approach and extends the group-specific profit Luenberger productivity indicator to develop a matafrontier profit-oriented Luenberger productivity indicator under meta production technology. By using the gap of the group-specific technology and its meta potential technology, this study defines the productivity gap as the difference of these two group productivity indicators to estimate the convergence between the group profit frontier and the meta profit frontier. We further decompose the profit Luenberger productivity indicator into components of technical inefficiency, allocative inefficiency, technical change, and price effect under both group and metafrontier frameworks. For an empirical illustration, this study applies the proposed methodology and uses 31 Taiwanese banks and 50 Chinese banks over 2010-2014 to empirically measure and compare the productivity changes and profit Luenberger decomposition components between two groups. We also measure the gaps and corresponding convergences for banks in Taiwan and China.

Keywords: productivity change; gap; bank performance, metafrontier, profit Luenberger

Title: Estimation of the production profile and metafrontier technology gap: A quantile approach

Presenting author: Cliff Huang (Vanderbilt University)

Co-author(s): Hung-pin Lai, Tsu-Tan Fu

Abstract

In this paper, a quantile function is suggested as an alternative description of a production technology. Since the quantile function may not share the same functional properties as the frontier function, it is argued that the quantile-based production function serves as a better benchmark for a firm's production structure analysis. This argument is extended to the metafrontier analysis. The quantile metafrontier is defined as the envelopment of all groups' quantile frontier at the same quantile level. The quantile technology gap serves as a more relevant indicator of efficiency in the adopted technology than the traditional measure of the metafrontier technology gap. The quantile approach is illustrated using survey data to estimate the earning profiles for men, and the impact of human capital on the industrial wage distributions in the service industry, the manufacturing industry, and all other industries in Taiwan.

Keywords: metafrontier, production function, production efficiency, quantile regression, technology gap

Special Session B2: Green Innovation, Productivity and Efficiency

Title: Do environmental regulations affect foreign direct investment decision? The pollution haven hypothesis revisited

Presenting author: Haeyeon Yoon (Sogang University)

Co-author(s): Almas Heshmati

Abstract

This study attempts to verify the pollution haven hypothesis by investigating the impact of environmental regulations on foreign direct investment (FDI). It uses Korean outward FDI data covering the manufacturing sector for the period 2009-15. This study not only considers the stringency when measuring the degree of the host country's environmental regulations but also the enforcement of these environmental regulations. Since the pollution haven's effects indicate moving the polluting production stages from the home country to other (host) countries, we differentiate between investments in the 'production' part from those in the non-production part using location information about the host country. The main results of a FDI's model estimation show that the stricter the regulations in host countries in Asia the lower the FDI both intensively and extensively in these countries. This supports the prevalence of the effects of a pollution haven. However, before we separate FDI into the production and non-production parts, the effects of environmental regulations on FDI are hindered by FDI in the non-production part. The results indicate that while environmental regulations are determinants of FDI in the production part they do not have a significant effect on FDI decisions when the entire FDI is considered.

Title: Direction of technical change and energy use efficiency - Empirical evidences from emerging economies

Presenting author: Ipsita Rakshit (Indian Institute of Technology)

Co-author(s): Sabuj Kumar Mandal

Abstract

In the recent years, emerging economies have contributed significantly to world economic output. According to World Bank estimates, most of the world economic growth will be driven by emerging economies with an average rate of growth of 2.7% by 2020. This has been propelled by intense utilisation of energy and in most of the cases lead to generation of environmentally detrimental pollutants. It becomes imperative for economic growth to be accompanied by energy efficiency. Energy efficiency may be brought about either by technical progress or by optimising the input mix. In the former scenario, while neutral technical change affects all the inputs proportionately, biased/non-neutral technical change affects output via particular inputs. In order to sustain economic growth it is essential that energy-saving technical change dominates the other kinds of technical changes such as neutral technical change or labour/capital-using technical change. Against this backdrop, the present study attempts to analyse the direction of technical change and its association with energy efficiency in 23 emerging economies over the period 1993-2013. We use DEA-based Malmquist productivity index (MPI) approach for estimating the direction of technical change and data envelopment analysis (DEA) for analysing energy efficiency. To avoid the bias in energy efficiency estimates, we incorporate CO2 as undesirable output while estimating energy efficiency. Direction of technical change has been computed for year-to-year basis and also for the overall sample period. On a year-to-year basis, for economies experiencing biased technical change, E-saving (K-using) bias was observed in majority of the years while in almost half of the time period, E-using (L-saving) bias was witnessed. It was also observed that during the years of economic downturn, most of the economies went for E-saving bias but that could not result in higher energy efficiency. This could be indicating preliminary evidence of rebound effect in the short-run. There has been a clear match between input mix and direction of technical change in most of the economies. However, in some exceptional cases, technical change did not coordinate with input mix and there were evidences of neutral technical change as well. In the long-run, the overall findings mirrors the short-run findings. As theory suggests, none of the economies experienced neutral technical change over the sample period. Most of them underwent biased technical change that magnified TFP growth and, subsequently, GDP over time. Energy efficiency showed improvement over the sample period except in the years 1997-1998 and 2008-2009. A similar trend was also observed in oil prices. Majority of the economies took up E-saving technology and used relatively more capital than energy leading to energy use efficiency improvements. But for E vs L pair, E-using innovation was taken up and energy was used relatively more than labour in 10 out of 23 economies (includes major economies like India, Malaysia and Turkey to name a few) which lead to higher economic growth at the cost of energy use efficiency. When the direction of technical change

was not consistent with input mix, economies like Brazil, China, Peru, Thailand and Ukraine took up E-saving technology and used comparatively more energy than capital or labour. These economies experienced dampening of both energy efficiency and economic growth (due to shrinking of TFP growth) indicating preliminary evidence of rebound effect over the sample period. Conclusively, it may be observed that with respect to capital, most of the economies' energy-saving innovation is consistent with achieving higher energy efficiency while it is the reverse when energy is compared to labour in the short-run and long-run. Hence, it may be deduced that substitution of inputs among capital, labour and energy may be affected with change in relative factor prices and by the structure of factor markets. To achieve energy efficiency as well as economic growth, the direction of technical change bias must be consistent with respective economies' factor endowments.

Keywords: Energy efficiency, Technical change, Economic growth, Malmquist productivity index, Data envelopment analysis

Title: The effects of environmental regulation on the performance of manufacturing industries: Comparison between green and non-green industries

Presenting author: Seulgi Yoo (Sogang University)

Co-author(s): Almas Heshmati

Abstract

This paper examines the relationship between environmental regulation and employment growth in Korean manufacturing industries using panel data from 2007 to 2015. The empirical results show several facts. First, the environmental policy stringency measured by energy and environmental expenditure at industry sector level decreases the employment rate contemporaneously, but the effects are offset over time. Secondly, the negative effects of the environmental regulation tend to be exacerbated in the polluting sector which are targeted for the regulation and would afford more burden caused by the environmental policy than less-polluting sector. Third, we have identified that environmental stringency has a positive impact on job growth rate in the environmental industries. In terms of employment vs. environment, these results give a possibility for the sustainable development of manufacturing industries. While regulation negatively affected employment by increasing the costs of highly contaminated industries, in the case of environmental industries, there were effects of regulations promoting labor productivity and employment. This shows that even manufacturing industries with high carbon dioxide emissions, if they produce environment-related products, then they adapt faster than non-environmental industries to the strengthened constraints of environmental regulations. These empirical results imply there would be labor allocation from non-environmental industries to environmental industries.

Keywords: Environmental regulation, Employment, Manufacturing, Environmental policy stringency, Labor Productivity, Korea

Parallel Session C2: TFP in industry and Firms

Title: A novel decomposition of aggregate total factor productivity change

Presenting author: Bert M. Balk (Erasmus University)

Abstract

An industry is an ensemble of individual firms (decision making units) which may or may not interact with each other. Similarly, an economy is an ensemble of industries. In National Accounts terms this is symbolized by the fact that the nominal value added produced by an industry or an economy is the simple sum of firm-, or industry-specific nominal value added. From this viewpoint it is natural to expect that there is a relation between (aggregate) industry or economy productivity and the (disaggregate) firm- or industry-specific productivities.

In an earlier paper (Statistica Neerlandica 2015) three (time-) symmetric decompositions of aggregate value-added-based total factor productivity change were developed. In the present paper a fourth decomposition will be developed. A notable difference with the earlier paper is that the development is cast in terms of levels rather than indices. Various aspects of this new decomposition will be discussed and links with decompositions found in the literature unveiled.

It turns out that one can dispense with the usual neo-classical assumptions.

Title: Assessing productivity of manufacturing firms in Indonesia

Presenting author: Masagus M. Ridhwan (Bank Indonesia)

Abstract

The main objectives of this paper are two fold, and the first is to compute Total Factor Productivity (TFP) growth based on data of Large and Medium Manufacturing Industries in Indonesia over the period of 2007–2014. Second, it is also aimed to investigate whether there is economic relationship between firm productivity and their export performances. The result indicates that those firms tend to have a high TFP growth especially in pre Global Financial Crisis period (2007–2010). While in the crisis aftermath (2011–2014), the TFP growth tends to decline and even indicates negative growth in most of subsectors. Some notable variations in terms of productivity and technical efficiency across regions are also discussed. Finally, this study finds that there is positive relationship between firm productivity and their export intensity, which could be explained by economic scales, cost efficiency, and firm size, while foreign ownership is found statistically insignificant.

Keywords: Total Factor Productivity, Manufacturing Industry, Export Performances

Title: Research collaboration synergy and network in Journal of Productivity Analysis

Presenting author: Dong-hyun Oh (Inha University)

Abstract

Journal of Productivity Analysis (JPA) is the pioneering academic journal that aims at developing new methodologies for efficiency and productivity measurement as well as applying those into various fields such as manufacturing, utility, banking, agricultural, fishery industries. Authors in JPA comes from various countries, institutions, and fields, which make it possible to affect the quality of articles through collaboration. This paper aims at finding research collaboration synergy in JPA by using bibliographic information such as institution type (university, government, and industry), and countries of authors. In order to measure the collaboration synergy effect we employ the concept of triple helix. It also finds stylized facts on network across authors in JPA using references information of each article, for which we used text mining and network analysis. Empirical findings show that collaboration across various institution types increases the synergy, and the network structure across authors changes over time. Although this paper does not apply the conventional efficiency and productivity measurement techniques to economic data sets, such findings using JPA's bibliographic information are believed to help to increase the quality of papers published in JPA.

Special Session E2: Innovation System and R&D Performance (KISTEP Session)

Title: A study on performance analysis and policy implications of non-standard R&D work force of the government funded research institutes in the fields of science and technology

Presenting author: Seung Tai Kim (Korea Institute of Science and Technology Evaluation and Planning)

Co-author(s): Chulwoo Baek, Sangyun Han, Meansun Noh

Abstract

Non-standard work force (NSWF) is rapidly institutionalized as a form of employment after the East Asia economic crisis occurred in the late 1990s and was causing new social problems such as intergenerational conflicts. Governments in financial and labor tried various policies to dealing with, but it makes a sort of unexpected effects in labor environment like a kind of backlashes at business sectors. Even it's not suitable approaches for the Government Funded Research Institutes in the science and technology (GFRIs) for National Innovation System (NIS). To find a solution out, we need a consideration that takes into account the specialty of GFRIs with overcoming defects of NSWF.

This study aims at confirming a desirable role and employment system of NSWF of GFRIs and to suggesting a NSWF employment system as an ultimate alternative. This study is conducted to analyze the trajectory of labour policies, to examine the comparative study of global public research institutes in developed countries, and to analyze the R&D contribution of NSWF in GFRIs.

As a result, we can confirm that NSWF is the one of notable influencing factors of R&D effectiveness of GFRIs. It means that the role of NSWF has gradually been reinforced to the core work force from support or assist of GFRIs' standard work force. We suggest a term system of researcher employment as an alternative to make a developmental progress of GFRIs in NIS. We expect that this study contributes to broaden the discussion of NSWF policy from finance or labor perspective to NIS perspective.

Keywords: Non-Standard R&D Work Force, Performance Analysis, Government Funded Research Institutes

Title: Success factor analysis of the regional innovation-supporting facilities in Korea

Presenting author: Young-Hyun Jin (Korea Institute of Science and Technology Evaluation and Planning)

Co-author(s): Chang-Dae Park

Abstract

Korean government has established innovation-supporting facilities in the outside of national capital region. The so-called "Regional R&D Centers" are equipped with R&D equipment and aim to support R&D activities of the small and medium sized enterprises in the nearby regional industry cluster. Since 2006, more than 582 facilities have been established using more than 10 billion USD. However, there are many debates on the efficacy of the regional R&D centers.

In this study, we analyzed the success factors of the selected regional R&D centers using DEA and tobit regression. To measure the efficiency of the regional R&D centers using DEA, we selected budget invested, man-power and operation duration as the input variables and the number companies who utilized the facilities, number of utilization and awareness among the cluster as the output variables. The results showed that the efficiency of the regional R&D centers depends on the types of the host institute of the regional R&D center. We tested the relationship between the efficiency measured by DEA and factors in the planning and operation stages of the centers and environmental factors like GRDP. The tobit analysis showed that the number of partner institutes has strong positive influence to the efficiency in all the efficiency models. The location and support of operational expenses also showed positive influence in some models.

The policy implication as well as detailed analysis procedure and results will be discussed in the presentation.

Keywords: regional innovation-supporting facility, DEA, tobit regression, success factor analysis

Title: The efficiency and determinants analysis of regional innovation systems in South Korea

Presenting author: Se-Bong Chon (Korea Institute of Science and Technology Evaluation and Planning)

Co-author(s): Ik-Cheon Um

Abstract

In the meantime, various studies have been carried out to diagnose efficiency and analyze the determinants of innovation in terms of regional innovation systems (RIS). However, there are some limitations such as ① insufficient consideration of the internal process of the RIS, ② establishment of a data envelope analysis (DEA) model that does not take into account the specificity of research and development, ③ insufficient validity of setting input and calculation index, and ④ insufficient sensitivity analysis of the calculated efficiency index. In particular, the dynamics of how the efficiency of RIS have changed as a result of short-term approaches within 5 to 10 years have not been examined in detail.

In this paper, we use a two-stage approach to network DEA by constructing balanced panel data for 16 local governments during the last 16 years (1999-2014) approach to the Korean innovation system and its determinants. The results of the analysis are as follows: (1) to resolve the gap between regional imbalances through an comprehensive approach to fostering research institutes at regional bases and to establish industrial infrastructure linked to them; (2) to promote strategic roles and mutual cooperation between central and local governments; (3) strengthening the institutional foundation of promoting technical commercialization to enhance the economic efficiency of the RIS and (4) establishing the long-term approach and statistical support base considering the regional differentiation for enhancing the total efficiency of the RIS.

Keywords: Regional innovation system, Efficiency, Network-DEA

Parallel Session G2: Industrial Competitiveness and Productivity

Title: Acceptance of e-commerce in rural level: Villagers's perspective

Presenting author: Hardika Dwi Hermawan (The University of Hong Kong)

Co-author(s): Dwi Pamuji Ismoyo, Muhammetmyrat Yarmatov

Abstract

Nowadays, e-commerce is proliferating around the world, and also Indonesia with hundreds of trillions of transactions and will reach hundreds of billions by 2025. E-commerce acceptance on the provincial level is significant because half the Indonesian population lives in rural area. This study aims to determine the level of acceptance of e-commerce at the provincial level in Indonesia, viewed from the perspective of the villagers. Data obtained from the questionnaire and interview, 90 respondents answered the survey. First of all, the paper examines profiles of respondents, mastery of IT, and knowledge of e-commerce and level of acceptance of it. Secondly, focus on the preferences of villagers between the traditional shop and online shop and prediction whether villagers will buy products via an online store in the future. Finally, provide recommendations to e-commerce companies to be more acceptable based on interview results. The conclusion that can be taken is the villagers have mastered the technology well and accepted the existence of e-commerce, the young generation ages 12-25 years is the group that most agree with e-commerce. On the other hand, the villagers still prefer the traditional shop with 92%, but they also revealed that in the next ten years they would shop through the online store with a percentage of 65%, the young generation dominates with a rate of 82%. Based on the interview, there are some steps that e-commerce companies can do to reach rural communities, including advertising, improving product quality and collaboration with rural communities.

Keywords: mobile, e-commerce, rural level online shopping

Title: A second-best approach to the resource allocation China: A case study in manufacturing sector

Presenting author: Chun-kei Tsang (Hong Kong Baptist University)

Co-author(s): Sung Ko Li

Abstract

Facing bottlenecks of economic growth, two important policy concerns of the Chinese government are the regional disparity and ownerships of enterprises. This paper extends the method of measuring structural efficiency of a group of firms to the existence of subgroups of firms to evaluate such issue. We argue that this is a second best solution to the economy. We then apply this new method to the manufacturing sector as a case study. We found that resources are allocated efficiently among different regions but not within regions. In contrast, resources are allocated efficiently within different ownerships but not among ownerships. Specifically, by eliminating inefficient resource allocation among different ownerships, outputs of the whole manufacturing sector can be increased by 40% of the observed levels. These two findings cannot be derived directly from other existing methods. Our results advocate different directions on further regional and ownership reform in China.

Title: Using weighted context-dependent DEA with value judgment in competitive analysis for EN-A paragliders

Presenting author: Shinn Sun (Fo Guang University)

Abstract

Purpose: The purpose of this study is to individually evaluate 26 Initiation type Initiation type Initiation type Initiation type Initiation type (EN -A) of) of paragliders made bymade by made by wor ld top 42 d top 42 d top 42 man ufacturers ufacturers that are best sale that are best sale that are best sale that are best salethat are best sale s in in TaiwanTaiwan . The study selects two inputs (price and maintenance cost) and three outputs (surface, ratio and wing-weight) for measuring the sampled paragliders.

This study uses context-dependent data envelopment analysis with value judgment (VJ-CDEA)and cross efficiency measure as the evaluation tools.

Research Questions: This study explores six research questions: (i) What are levels of efficiency frontiers of EN-A paragliders? (ii) Which is the best practice on each frontier of EN-A paragliders; (iii) Which is the benchmarking paragliders on each frontier ? (iv) Which manufacturers are potential competitors of the benchmarking paragliders? (v) What are attractiveness and progress of EN-A paragliders? (vi) What is the relationship between attractiveness and progress of EN-A paragliders?

Research Methods: This study uses context-dependent DEA with value judgment proposed by Seiford and Zhu (2003). The study adpots the input orientation because that these manufacturers can easily control the inputs.

Research Findings: The results of this study show: (i) the efficiency frontiers under VJ-CDEA for EN-A are 8 ; (ii) the best practice for EN-A is Ozone - ELEMENT 2; (iii) Nova–PRION is the benchmarking paraglider; (iv) Niviuk-KOYOT2 and Sol-START are potential competitors; (v) Dudek-NEMO has the biggest attractiveness while U-TURN - EMOTION 2 has the biggest progress for EN-A; and (vi) there is a negative relationship between attractiveness and progress and it is not statistically significant.

Keywords: context-dependent DEA, value judgment, competitive analysis, paraglider

Parallel Session H2: Efficiency of Entrepreneurship and SMEs

Title: Efficiency, financial constraints and innovation of European SMEs

Presenting author: Graziella Bonanno (University of Trieste)

Co-author(s): Annalisa Ferrando, Stefania P.S. Rossi

Abstract

This paper aims at investigating the relationship between firms' performance, access to external sources of finance and innovation capabilities. We enrich our understanding on firms' performance by adopting the stochastic frontier approach (SFA), which allow us to estimate profits functions and to obtain efficiency scores for a large sample of European SMEs. We pioneer the use of a novel dataset that merges survey-based data derived from the ECB Survey on access to finance for enterprises (SAFE) with balance sheet information - from AMADEUS by Bureau van Dijk. Our evidence documents that firms that perceived difficulties in accessing finance or objectively financially constrained display an incentive to improve efficiency, as well as firms that have embarked in product innovation.

Keywords: Stochastic Frontier Approach, Innovation, Financial constraints, Panel data analysis, SME

Title: Returnee academic entrepreneurship in China

Presenting author: Yanzhao Lai (The George Washington University)

Abstract

This study focuses on returnee academic entrepreneurship and aims to offer initial clues that how oversea experience affect academic's entrepreneurial activities. To address this issue, we bring to bear a unique dataset covers the entrepreneurial activities of 450 computer science faculties from 21 research-intensive universities in China. Moreover, I will examine the potentially effects of academic's local embeddedness and prior industry experience on the entrepreneurship entry.

Title: The impact of foreign greenfield vs acquisition investment on domestic new firm creation: Accounting for types of industries and strategic alliances

Presenting author: Jungho Kim (Swinburne University of Technology)

Co-author(s): Chang-Yang Lee

Abstract

This study investigates the effect of foreign direct investment (FDI) on new firm creation within a host country (or domestic entry), by analysing a unique panel dataset of Korean industries. The study finds that the impact of FDI differs depending upon types of FDI, industries, and strategic inter-firm alliances. In general, FDI with time lag have a positive impact on new firm creation, implying that after a certain time FDI significantly contributes to creating new firms via spillovers and demand creation. Greenfield type of FDI has a relatively greater impact in manufacturing sector, whereas the impact of acquisition type is greater in service sector. In addition, inter-firm alliances moderate the relationship between FDI and new firm creation, depending upon the types of FDI and industries. Both types of FDI substitute domestic alliance and complement international alliance for new firm creation in manufacturing sector, while only acquisition type complements domestic alliance in service sector. An integration of inter-industry alliance and FDI (especially greenfield type in manufacturings and acquisition type in services) promotes domestic entry, implying that cross-industry fertilization of knowledge spillovers from FDI can create further opportunities for entrepreneurship and new business.

Keywords: foreign direct investment (FDI), new firm creation, strategic alliances, knowledge spillovers

Special Session A3: Performance Measurement in Education Sector

Title: Change of optimal scale of Norwegian institutions of higher education 2004-2013

Presenting author: Finn R Førsund (University of Oslo)

Co-author(s): Dag Fjeld Edvardsen, Sverre A. C. Kittelsen

Abstract

Policymakers in Norway have in the last years pursued a policy of merging institutions of higher education in order to promote productivity and efficiency. However, there is little serious empirical research to support this claim. The purpose of this paper is to extend the study by Edvardsen et al (2017) of Norwegian institutions of higher education using a Malmquist index of productivity change for the period 2004 - 2013, with optimal scale measures. To reduce heterogeneity (Johnes 2008) three groups of units are used. Universities giving Ph.D. degrees (large units), regional colleges without right to give Ph.D. degrees (middle-sized units) and small units established to cater for special interest groups like the Sami population, rural agriculture, missionary education, etc. A benchmark frontier fulfilling basic index properties proportionality and transitivity are constructed using the pooled sample of subgroups. For a cone as benchmark optimal scale as an absolute number is not defined. In order to decompose the Malmquist index measure into catching-up and technical change over time a contemporary cone benchmark is estimated. Frontier units spanning these benchmarks will then be of technically optimal scale (Frisch 1965). If a contemporary VRS frontier is used, the frontier units spanning the CRS cone will be optimal scale units on the VRS benchmark. It is not necessary to actually estimate a VRS frontier if only the frontier units are used. Another approach, based on contemporary VRS frontiers, is to utilise the change in scale efficiency for more units, for instance units within a 5- to 20 percentage points from full scale efficiency.

The technically optimal scale changes for different output- and input mixes (Førsund and Hjalmarsson 2004). An index for observed optimal scale is established by dividing the range of observed scale on the range of estimated frontier scale for outputs in order to portray the accuracy and influence of output and input mix using frontier units on contemporary cone frontiers estimating absolute optimal scale.

Title: Meta-Frontier Analysis of Chinese and Taiwanese Universities: Linking the past to the future

Presenting author: Kok Fong See (Universiti Sains Malaysia)

Co-author(s): Tsu-tan Fu

Abstract

With increasingly frequent interactions between the students across the Taiwan Strait, improving the productivity levels of higher education institutions (HEIs) is an important issue of the governments of both Taiwan and Mainland China. This study uses global Meta-frontier framework and consider the quality of the input of school and the consistence of relative researches output variables to estimate the total factor productivity changes in HEIs on both sides of the Strait during the period from 2008 to 2014. Firstly, we find the HEIs in Taiwan and China's inefficiency come from pure technology inefficiency. By the way, the efficiency of Taiwan is better than China. Second, during above period, Taiwan's TFP averagely declined 1.9% in two years, but China grew at rate 6.2% that is triggered by technology change. Finally, the quality of school has a positive relation with operating efficiency and TFP change. Apparently, an increase in the quality of school not only improves operating efficiency but also increases TFP.

Title: Does signaling theory play role on efficiency performance of colleges of business in Taiwan? - An application of stochastic metafrontier approach

Presenting author: Tsu-tan Fu (Soochow University)

Co-author(s): Kok-Fong See

Abstract

To incorporate the property of heterogeneity in Taiwan higher education industry, this paper adopts the stochastic metafrontier approach to evaluate the operation efficiency of commercial college in university of Taiwan. Using college graduates' starting wage and current wage survey data, we develop the wage frontier functions. We empirically estimate the proposed wage frontier functions to evaluate the operation efficiency of commercial colleges and to examine the appropriateness of the Signaling theory of Spence (1973) and the Human Capital theory of Mincer (1974) applied to the job market of Taiwanese college graduate. The results of comparing efficiency scores between two types of wage indicated that difference between these two efficiency scores seem to be limited. But a positive bias of signaling theory is found to the Fu-ze university, in which employers pay higher starting wage, than the productivity based wage, to Fu Ze University new graduates at their first job market. Thus it causes a positive reputation effect and over value of its starting wage. On the contrary, a negative bias of signaling theory is found to the Chinese Culture University. Thus the Chinese Culture University has a negative reputation effect, which under value its productivity value, for their new graduates upon entering the job market.

Special Session D3: Emerging Issues in Productivity Studies in Korea: Innovation, Trade, and Wages (KDI Session)

Title: Estimating the effect of competition and public subsidy on private R&D investment

Presenting author: Dong Ook Choi (Sangmyung University)

Co-author(s): Juwon Hong

Abstract

This paper studies the relationship between direct public R&D subsidies and private R&D investment considering market concentration. The potential of government subsidy either discouraging or encouraging private R&D incentive cannot be properly identified without taking account of the competitive pressure of the market for firms to innovate. We utilize film-level microdata to analyze both the average effect of government subsidy and the effect of market structure on firm's private R&D incentive.

Title: Impact of import competition on firm's innovation: Trading partner and firm size matter

Presenting author: Sunghoon Chung (Korea Development Institute)

Abstract

Using novel data of patent applications, this paper investigates how import competition affects domestic firm's innovation activities in Korea during 2003–2015, the period of substantial trade liberalization. The Korean case allows us to separate the overall import competition into two parts, one from high-income countries and the other from low-income countries, and thereby to distinguish the Schumpeterian force of competition from the escaping motivation. Consistent with the theory in Aghion et al. (2005), we find that the import competition from high-income countries discourages domestic firm's innovation activities, whereas the import competition from low-income countries stimulates them. More interestingly, large firms turn out to be much more sensitive to the import competition, both from high- and low-income countries, than small firms are.

Title: Decoupling of productivity and wages, and global frontier firms: Evidence from Korea

Presenting author: Changkeun Lee (Korea Development Institute)

Abstract

Recent literature in the decoupling of productivity and wages, or the decline in labor share, highlights the importance of firm heterogeneity. In particular, so-called “superstar firms” or “global frontier firms” attract increasingly more attention. One of the main arguments is that their wage growth does not keep up with much faster output growth, which contributes significantly to the widening gap between productivity and wages. I test this hypothesis against the Korean context as the country is well known for the stellar performance of global frontier firms and their growing importance in the economy. Specifically, I examine establishment- and firm-level data to investigate how the productivity-wage relationship evolved across productivity distribution and how the relationship varies by industry and firm activities.

Title: Trade in intermediate goods and plant productivity: The case of South Korea

Presenting author: Minho Kim (Korea Development Institute)

Co-author(s): Lee Hyojung

Abstract

Recent studies have focused on the role of international trade in allocative efficiency gains by improving the allocation of resources across heterogeneous firms. When import competition intensifies, less productive producers are forced to exit the market while production inputs are reallocated to surviving and newly entering producers. Gains from trade occur when this reallocation process leads to increased productivity levels of industries. This paper assesses the extent to which the integration of China into Korea's market has had an impact on the employment and productivity growth in manufacturing industries in Korea. The study also investigates the role of intermediate goods trade to find the source of China's impact on the growth of productivity and employment.

Parallel Session E3: SFA in Industry Sector

Title: Firm heterogeneity and dynamic panel stochastic frontier model

Presenting author: Hung-pin Lai (National Chung Cheng University)

Abstract

This paper considers the estimation of dynamic panel stochastic frontier (DSF) models with firm heterogeneity. We assume that the technical inefficiency follows an AR(1) process, which allows the firm to improve its efficiency from past experiences. Moreover, the model contains two sources of unobserved firm heterogeneity. One is from the heterogeneous distribution of the inefficiency. The other is either from the firm fixed effects, which implies heterogeneity in the production technology; or from the heterogeneity in the speed of adjustment of inefficiency. In the latter case, the AR(1) coefficient is firm specific. We discuss using the likelihood-based approaches to estimate the models. The finite sample performance of the proposed estimators are also investigated by Monte Carlo experiments.

Keywords: Panel stochastic frontier, dynamic technical inefficiency, fixed effects

Title: Access to infrastructures and the determinants of technical inefficiency among small and medium enterprises in Vietnam

Presenting author: Stefano Suardi, Francesco Pitton (Valdani Vicari & Associati)

Abstract

Small and Medium Enterprises (SMEs) account for a major proportion of the total Vietnamese business population. Recent statistics from the Ministry of Planning and Investment (MPI) identifies that more than 97% of enterprises in Vietnam are SMEs.

Vietnamese SMEs represent a fundamental contributor to the development of Vietnam and of the overall South-East Asian region. By the end of 2014, those companies contributed to 45% of Gross Domestic Product (GDP) of Vietnam, 50% to the national economic growth rate every year and 51% to total employment of active population (Ministry of Planning and Investment, 2014).

In the past recent years, the Vietnamese Government has implemented specific policies to support SMEs' development, including in key areas as access to capital; securing production premises; enhancing technological capabilities and technical efficiency and market promotion and expansion.

The manufacturing sector is increasingly important in the Vietnamese economy. Sectors including the food-processing industry, furniture sector and electronics are among the ones who experienced the fastest growth in the past 5 years. Although those sectors are seeing a progressive concentration around few multinational players, spin-off and satellite activities represent fertile ground for SMEs.

Access to technology and credit are two of the most critical determinants of competitiveness in the manufacturing industry. The purpose of this paper is to investigate how the uneven access to infrastructures and public services may impact the efficiency of Vietnamese SMEs active in the manufacturing industry in rural and urban areas.

The following papers aims to contribute to current literature on the topic in three different ways. First, presenting updated estimates of technical efficiency for SMEs in Vietnam by manufacturing sector, based on a multi - year and country-wide panel sample. Second, analyzing and modeling not only the level of technical efficiency, but also the factors that influence its variability across firms in a stochastic frontier setting. Third, estimating separate impacts of infrastructure and societal challenges on technical efficiency.

The paper is structured in the following way: section 2 briefly review the literature on the impact of infrastructure and societal challenges on technical efficiency. Empirical methods are discussed in section 3. Section 4 presents estimation results and section 5 concludes with preliminary conclusions and potential implications.

Title: Effects of ownership and business portfolio on production in the oil and gas industry

Presenting author: Binlei Gong (Zhejiang University)

Abstract

The Shale Revolution and the two oil crises have overwhelmingly reshaped the petroleum industry in the last decade. Heterogeneity across companies is also a big concern as many multiproduct (oil and gas) and multi-segment (upstream and downstream) firms exist, both stateowned and privately-owned. Therefore, a varying coefficient model is introduced to capture the effects of time, ownership, and business portfolio on both productivity and input elasticities to closely observe the fundamental transition, which is further interpreted using decomposition equations. The shape of the production function is indeed firm- and time-variant, which confirms the transition of the industry and the necessity of using the varying coefficient model. The average productivity achieved tremendous growth after the 2007–2009 financial crisis but lost momentum following the 2014 price crash. Finally, privately-owned, gas production and downstream activities are more productive than state-owned, oil production and upstream activities, respectively. Some policy implications are also discussed.

Keywords: Stochastic Frontier Analysis, Varying Coefficient Model. Oil and Gas Industry. Effects of State Ownership, Segment-wide and Product-wide Business Portfolio

Special Session F3: Environmental and Energy Efficiency

Title: A new approach to estimate environmental efficiency by considering abatement process as a distinct technology

Presenting author: Haleh Delnava (National Cheng Kung University)

Co-author(s): Chia-Yen Lee, Peng Zhou

Abstract

Coal as an accessible resource through the worldwide, supply a large proportion of the energy needed for electricity generation in this era. Burning coal to generate electricity inevitably produces by-products such as carbon dioxide (CO2), sulfur dioxide (SO2), and nitrogen oxide (NOx). To handle issues such as environmental deterioration and climate change, it is necessary to pursue the joint goals of producing electricity more efficiently and minimizing undesirable outputs that accompany with generating electricity. Traditionally, the principal approaches to controlling SO2 emissions include the use of low-sulfur fuel, the pollution prevention and Control removal of sulfur in the feed, the use of appropriate combustion technologies as well as emissions control technologies such as sorbent injection and flue gas desulfurization (FGD). According to comparison of removal efficiencies (Kataoka, 1992) of two major emission control methods (sorbent injection and FGD) the latest one take into account as a dominant technology with more than 90% reduction.

Classical data envelopment analysis (DEA) has been widely used to evaluate energy efficiency of firms with multiple outputs. In energy and environmental efficiency estimation, numerous papers addressed this issue as a black box which include both production and abatement processes. On the contrary, some production systems have network structure that consider overall system as a combination of different processes link to each other. Some managerial insight of such a network structure (shown as Fig. 1(b) compare with traditional structure shown as Fig. 1(a) noted below. Firstly, according to Fig. 1(a), typical traditional models consider generating desirable output (Y) and abated bad output (ba) under consumption of inputs while, the resulted abated contaminants has undergone a process to reach to this amount. Note that ba is the bad output remained after the abatement process. Indeed, this neglected process is called as an abatement process that we consider in our two-stage network structure as Fig 1(b). Secondly, according to Fig. 1(b), strategies can be operated by controlling attributed inputs in each stage, respectively, whereas acknowledging corresponding inputs that has fundamental role as a source of inefficiency seems not easy task. In other words, policy makers are involved in the role of inputs to enhance the performance better than before. Note that, in Fig. 1(a) inputs (X) is the only factor in generating desirable and abated undesirable outputs but in Fig. 1(b) in spite of inputs (X), we consider an additional factor abatement inputs (Xa) which shows a significant effect on outputs and consequently, performance estimation.

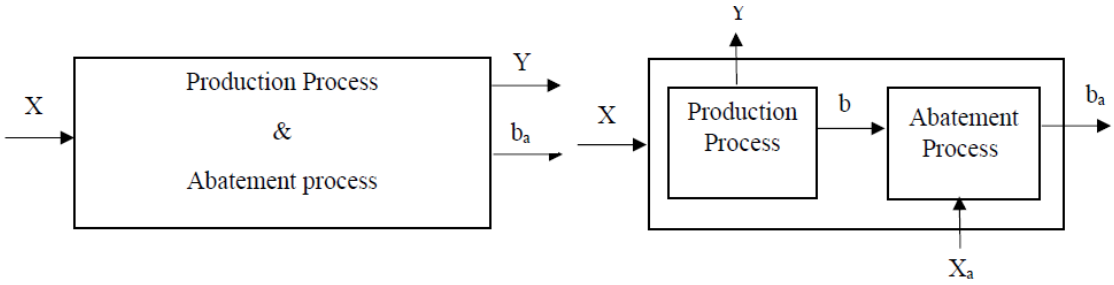


Fig. 1.a: Traditional framework

Fig. 1.b: Two-stage production process

This study integrates the SBM and by-production technology (Murty et al. 2012) into proposed network structure. Hence, by-production efficiency calculates the weighted sum of three efficiency scores namely, operational efficiency, environmental efficiency and abatement efficiency. To enhance the discrimination power of efficiency estimation, we slightly extended the SBM to an entropy slack-based measure (eSBM) using the entropy approach (Shannon, 1948). Indeed, eSBM corrects the equal-weight issue of input and output factors used in a typical SBM and generates objective weights in each production process to enhance the efficiency discrimination. To validate the proposed model, an empirical study of the by-production coal-fired power plants operating in the south and southeastern U.S. in 2012 is conducted. The proposed eSBM indicated the poor environmental efficiency and suggests the two-dimensional performance positioning with respect to operational efficiency and abatement efficiency for guiding the productivity improvement. We apply the mean of the two efficiency scores to categorize the coordinates into four quadrants: Quadrant 1 is allocated to the DMUs that have both better operational and abatement performance (Leader); Quadrant 2 is allocated to the DMUs that have poor operational performance but better abatement (Abatement Focus). Quadrant 3 is allocated to the DMUs that have poor operational and abatement performance (Backward); Quadrant 4 is allocated to the DMUs that have better operational performance but weak abatement (Operational Focus). Three benchmarks were suggested to improve the performance of each DMU. For the DMUs belonging to abatement focus, increasing non-polluted inputs was a suitable remedy to enhance operational performance. For the DMUs belong to operational focus, increasing the abatement inputs was an effective, but costly solution. Third, corresponding to quadrant 3 or backward both adding the non-polluted inputs as well as abatement inputs can be impressive. In particular, Texas and Florida states generally show the leader or operational focus while Georgia presents the best practice of abatement process. These three states can lead to the public good nature of technology that leads to spillover effects from leaders to followers as the laggards learn from the innovators and catch-up.

Keywords: by-production efficiency measure, network DEA, abatement technology, Shannon entropy, coal-fired power plant

Title: Shadow prices of direct and overall carbon emissions in China's construction industry: a parametric directional distance function-based sensitively estimation

Presenting author: Kexin Yang (Beijing Institute of Technology)

Co-author(s): Ke Wang

Abstract

The significance of carbon emissions reduction is increasingly recognized as essential in mitigating global climate change. Construction industry together with the building materials industries supplying it is one of China's largest exploiters of energy and emitters of carbon. This paper estimates direct carbon emissions shadow price of construction industry and overall carbon emissions shadow price of this industry together with its supporting materials industries in China. The estimation of shadow price of carbon emissions provides information on marginal abatement cost of carbon emissions in this industry which could be used to identify and assess the impacts of policies aiming in carbon emissions control in this industry. A parametric directional distance function model taking into account all possible direction vectors is applied for estimation so as to address the critical and unsolved issues regarding the arbitrary selection of direction that will non-negligibly affect the estimation result of shadow price. Furthermore, since the possible direction vectors suing in this estimation represent different carbon mitigation strategies, the estimation of shadow prices provide more informative policy implications in cost effectively reduction of carbon emissions in China's construction industry. The results show that there are larger potentials on carbon emissions reduction in the supporting material industries than the construction industry itself, and the shadow price of overall carbon emissions is much lower than the that of direct carbon emissions. There was significant and enlarging heterogeneity in shadow prices of carbon emissions among different regions which provides strong support to China's national carbon trading market for benefitting the construction industry and its supporting industry in reducing abatement cost.

Keywords: carbon emissions, shadow price, construction industry, convergence, directional distance function, possible direction vector

Title: Airline CO2 emission change with delays: a parametric malmquist index approach

Presenting author: Fei Huang (Nanjing University of Aeronautics and Astronautics)

Co-author(s): Dequn Zhou, Qunwei Wang

Abstract

This paper evaluates the airline CO2 emission performance change by applying a modified parametric Malmquist index model based on stochastic frontier analysis with flight delays as an environmental variable. An empirical research is conducted in 15 international airlines during 2011-2016. Results find that flight delays have important effect on the airline CO2 emission performance, airlines with excellent punctuality performance tend to have higher efficiency scores when considering delay rates into the evaluation model; The 15 airlines' CO2 emission performance had been decreasing during the sample period, mainly due to the stagnant technology development and minor improvement in efficiency; Among the 15 airlines from different countries, 3 airlines from America and 1 airline from China performed well on the CO2 emission performance for they had been devoted into the improvement of efficiency during 2011-2016, while Qantas Airways (QFA) from Australia and the "Big three" airlines from China were the opposite. Thus, more efforts need to be put into the operational efficiency improvement and technological innovation to improve airlines' CO2 emission performance.

Title: Nash data envelopment analysis for allocation of emission permit

Presenting author: Chia-Yen Lee (National Cheng Kung University)

Abstract

China continues to be one of the world's major CO2 emitters. Since 2007, China has become the world's largest contributor to carbon emissions from fossil fuel burning and cement production, and responsible for approximate 25 percent of global carbon emissions; its manufacturing and power generation sectors accounted for 85 percent of China's total carbon emissions (Liu, 2015). Since 2013, seven pilot provinces and provincial cities, Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Chongqing, and Hubei, successively launched their own emission trading schemes (ETS) (Lee and Zhou, 2015). These regional pilot carbon markets are regarded as indispensable experiments prior to establishing a national ETS.

From the perspective of policy-makers, a deeper understanding of AEP will help China's regional government formulate appropriate carbon abatement policies, such as carbon pricing through emission allowance allocations. To investigate China's emissions, this paper focuses on coal-fired power plants and uses the North and the Northeast regions as a case for suggesting AEP allocation of CO2 due to a high concentration of CO2 emissions in the two regions in 2015 (Deng et al., 2015).

Data envelopment analysis (DEA) is a nonparametric method which can consider the desirable outputs and undesirable outputs simultaneously to estimate the production function and technical efficiency without a specified functional form. Due to some drawbacks mentioned in literature, the current study formulates the weak disposability between desirable and undesirable outputs, distinguishes the fixed inputs from the variable inputs in the production technology, considers an imperfectly competitive energy market with an endogenous price, and finally develops a decentralized AEP models toward the Nash equilibrium with respect to individual profit maximization. The current study contributes to the following three points in literature.

Keywords: emission permit, Nash equilibrium, data envelopment analysis, decentralized allocation, coal-fired power plant

Parallel Session G3: Effects of Technology on Productivity

Title: Making your Mercedes less noisy and more comfortable: Efforts made by a Taiwanee seating supplier via Industry 4.0

Presenting author: Min-Der Hsieh (Metal Industries Research & Development Centre)

Co-author(s): Yi-Long Jaw

Abstract

The sensation of driving and seating comfortably in an automobile not only depends on the available space, good seats and pleasant interior design, but also on the noise levels and noticeable vibrations. The brand quality of the EU automotive industry traditionally includes an optimal design for quiet running and vibration comfort. This comfort not only underscores the high-value appeal, but is also a factor in the high level of driver-fitness safety. The EU automotive industry are generally to give these sounds a high-quality, suitable and unmistakable design while reducing others to the point where they are no longer bothering.

One significant effort made is the aiming at all motors in the automobile where are the major sources of vibration and noise. On top of this, industrial motors are an important energy consumption index. In accordance with the Kyoto Protocol, various industrial countries have made a commitment to achieve the target of a 20% reduction in carbon emissions by 2020, with the extra stipulation of minimum motor efficiency restrictions. Higher efficiency electric motors can lead to significant reductions in the energy consumption and also reduce the environmental impact. In order to promote a competitive motor market transformation, a new international standard, the IEC 60034-30-1 has been approved. In this standard, four efficiency classes are proposed, namely Standard Efficiency (IE1), High-Efficiency (IE2) equivalent to EPAct, Premium Efficiency (IE3) equivalent to NEMA Premium and Super-Premium Efficiency (IE4). Super-Premium Efficiency (IE4) motors offer high performance with maximum energy efficiency. This motor provides high efficiency and low cost of ownership throughout the entire motor lifetime. This design maximizes performance and energy savings.

Whatever the flow rate is set, static pressure and acoustic noise are always trade-off. It is very difficult to think over these factors at the same time. Meanwhile, a lot of troubles are caused by improper applications too. For example, fan mounted to chassis improperly may cause vibration and flow disturbance, and then got higher acoustic noise. The case company regarding to low noise design including: a proper system air impedance design, choose a proper fan that base on Qeff (Effective Flow Rate), review a fit mechanism design between fan and application system, advance fan speed control by your thermal profile, sound quality analysis. And it introduced the Sound Quality Analysis System of HEAD ACOUSTIC in German. Those include an Artificial Head and

analysis tool and also the most popular measuring and analysis system in automotive industry.

The Industry 4.0 Project of the case company including order fast line change, intelligent robots, production scheduling, design integration, big data analysis, production line prevention and diagnosis, quality control, smart manufacturing and other functions. Past the production process is under hand-work. Due to the automated capacity and testing quality that customers often have concerns and lack of confidence in the factory powerful requires third-party riser smart manufacturing energy to ensure that production and quality, otherwise difficult to obtain high-end order, or even no longer.

The results of the study show through intelligent application services layer factories, production management, smart manufacturing level, from work to automated production and primary productivity indicators: including improved cost-effectiveness that it reduced to four operators and reduced personnel costs by about NT.2.25 million annually, and increased the annual per capita productivity by 3 times, improved production yields to 98.5% , improved productivity which the automatically detect performance has increased 50%, the annual production capacity increased by about 500,000.

On the whole, the case companies have reached the cable manufacturing automation and expansion of automated production line, other applications include that can be applied to the fan assembly, circuit board assembly, gear case assembly, motor assembly part type, assemble the product diversification.

This study also provides some conclusion from Taiwan empirical evidence. First, by reviewing the policy of upgrading and restructuring of manufacturing in major countries, it is obvious that all the target countries will choose their own internationally-competitive related industries and their goal is to maintain their international leading position. Therefore, in the initial stage of the relevant policies of Industry 4.0, we all hope to find solutions to smart factories that meet the needs of individual industries at the actual industrial sites. Second, the business model of the manufacturing in the future may also benefit from the birth of a smart factory, moreover, it will not be bound by geographical boundaries. There will be a smart factory of higher technology and a higher and more integrated production capacity. This will enable existing manufacturing to pay more attention to changes in the business model in the post-industrial 4.0 era and to have stronger links with customers that provide a total solution. In closing, as for SMEs and emerging industries, they need to worry about SMEs in other countries and may successfully cooperate with the new smart factories of large enterprises to extend the scale and efficiency of manufacturing.

Keywords: Intelligent Production, NVH (Noise, Vibration, Harshness), Motor Efficiency, Cooling Fan, Automation Capability

Title: The effect of IT utilization on firm performance and employment

Presenting author: Inha Oh (Konkuk University)

Co-author(s): Wang-Jin Yoo

Abstract

Utilizing and investing in corporate IT applications, such as ERP (Enterprise Source Planning) and SCM (Supply Chain Management), is known to increase firm productivity by IT capital deepening and efficient use of labor. However, there exists discrepancies in evidences on the effect of IT utilization on firm performances and some literatures argue that it only helps to reach more customers and expand locations. IT utilization can also affect employment and labor structure. Corporate IT applications can substitute unskilled workers with routine tasks, while increasing demand for skilled workers with problem solving abilities. However, it is unclear whether the total employment of a firm will increase or not. If productivity and market share are increased by corporate IT utilization, employment can be increased. There is also the possibility that employment will decrease due to IT labor substitution. In addition, many studies have claimed that it takes a certain period of time to observe changes in corporate performance due to IT utilization, especially at least four years for total factor productivity changes. Considering the above points, I am aiming to observe how the performance and employment structure of firms that started utilizing IT applications in Korea in the early 2010s changed. And for this, I constructed long-term firm-level panel data representing Korean industries. A simple comparison between IT utilizing and non-utilizing companies raises the issue of selection bias, and the propensity score matching methodology is applied to relieve it. Indicators on firm performances and employment structures are tracked and compared up to 4 years after starting IT applications for firms utilizing IT and others. The results for firms in manufacturing and service sector are also compared.

Keywords: Corporate IT applications, Productivity, Labor substitution, Propensity Score Matching, Korea

Title: User cost of capital and factor demand modelling: Implications on energy demand and technical change analysis

Presenting author: Sourour Baccar (University of Sfax)

Abstract

In this paper we report results of a rather successful attempt to provide evidence on the substitution possibilities between capital, labour, and energy in the three branches of manufacturing industry. In order to assess the sensitivity of results to the choice of the functional form and to data construction procedures, alternative specifications of the cost function are estimated, based on three flexible functional forms (i) the Translog, (ii) the Generalized Leontief, and (iii) the Symmetric Generalized McFadden - while two different series of the user cost of capital are constructed (i) the implicit ex ante price (including fiscality parameters), obtained by extending the theoretical model of Jorgenson and (ii) the ex post price computed as the residual rate of return to capital, when zero profits are imposed at full equilibrium position. We show that the choice of the regressors is even important in the context of the choice of the functional form. We also consider the validity of the ex post approximation of the user cost of capital, frequently used in studies of production and investment behaviour, and find that our data do not support it.

Our most important innovation is then in confronting results and interpretations yielded by three flexible approximations of the cost function when the two measures of the user cost of capital are alternatively used. In cases where we can precisely estimate an elasticity, our results seems robust to the choice of the functional form and the method of calculating the user cost of capital. Nevertheless, inconsistencies are enough frequent since this circumstance is scarce with the ex post approximation. This explain the fact that regressions with the ex post price of capital yield elasticities that can diverge from theirs true values and discrepancies between the estimates suggests that care should be taken during the interpretation of the econometric results. The issues analysed in the preesent paper are therefore not merely of theoretical interest, but also of practical concern.

Keywords: user cost of capital, flexible cost function, factor demand, energy elasticities, technical change, variability of the regressors, precision of fit

Parallel Session H3: Role of Innovation on Efficiency and Productivity

Title: Mission-oriented policy for innovation and growth: The case of shipbuilding and offshore industry in Brazil

Presenting author: André Cherubini Alves (University of Campinas)

Co-author(s): Paulo Antônio Zawislak, Nicholas Vonortas

Abstract

Recent literature has called the attention to the significance of mission-oriented policies (MOP) for Innovation in setting the directions of change, market creation and economic development. However, while there are a few examples of success of such policies, the tools used by the Estate to achieve the 'nirvana' of development are still up for debate, which often lead to wrong policy design. The purpose of this paper is to analyze the mission-oriented policies in the recent development of the Brazilian shipbuilding sector where an entire institutional setting was put in place to boost technological and industrial development. Based on a literature review and case study, we analyze in detail the policies set for the sector to create a market, stimulate the industry and the practical outcomes. Results show that, while the MOP put in place was able to give an initial boost in the sector, coordination uncertainties generated high capability building costs that render the industry fall. We argue that there a fuzzy boundary between innovation for market creation vs building capabilities to innovate.

Keywords: Mission-Oriented Policy, Market Creation, Fuzzy Boundary, Innovation, Capability building costs

Title: Mediating role of innovation capability between technical entrepreneurs and competitive advantage

Presenting author: Hyundo Choi (Chosun University)

Co-author(s): Won-Sik Hwang, Jungwoo Shin

Abstract

This study contributes to the empirical literature on the relationships between individual competency, innovation capability, and competitive advantage in the context of high-technology small and medium-sized enterprises (SMEs) in Korea drawing on the resource-based theory. We focused on entrepreneurial technical expertise and management skills, as our main interest is technical entrepreneurship in high-technology SMEs. We conducted empirical analyses through partial least squares structural equation modeling (PLS-SEM) to identify the role of innovation capability and the sources of competitive advantage. This study considered innovation capabilities as core mediators to investigate the process through which entrepreneurs' competencies are manifested in the firm's sustained competitiveness. The results show that a technical entrepreneur's competencies can help foster the initial development of innovative products and the accumulation of R&D capability, a core component of innovation capability. Moreover, innovation capabilities, especially R&D capability, facilitate the sustainability of a firm's superior position, mediating the relationship between entrepreneur competency and competitive advantage.

Keywords: technical entrepreneur, competency, innovation capability, competitive advantage

Title: Estimation of technical change and TFP growth based on observable technology shifters

Presenting author: Almas Heshmati (Sogang University)

Co-author(s): Masoomeh Rashidghalam

Abstract

This paper models and estimates total factor productivity (TFP) growth parametrically. The model is a generalization of the traditional production model where technology is represented by a time trend. TFP growth is decomposed into unobservable technical change, scale economies and observable technology shifter index components. The empirical results are based on an unbalanced panel data at the global level for 190 countries observed over the period 1996-2013. A number of exogenous growth factors are used in modeling four technology shifter indices to explore development infrastructure, finances, technology and human development determinants of TFP growth. Our results show that unobservable technical changes remain the most important component of TFP growth. By comparing the performance of the time trend and technology index models, we arrive at the conclusion that the technology index model predicts a more realistic picture of the TFP growth pattern as compared to the traditional time trend model.

Keywords: Technical change, total factor productivity growth, technology indicators, technology shifters

Parallel Session I3: Managerial Application of DEA

Title: Global value chain and firm productivity: The case of Turkish manufacturing firms

Presenting author: Yılmaz Kılıçaslan (Anadolu University)

Co-author(s): Uğur Aytun, Oytun Meçik

Abstract

The exporting-productivity nexus has been discussed both at the macro and micro levels for a long time. The macro-economic channels through which export expansion enhances aggregate productivity and growth are well-known. Exports allow for specialization in a country's comparative advantage and thereby raise growth. The new trade theory of Helpman and Krugman (1985), then generalized by Grossman and Helpman (1991), shifted the focus from the static gains from trade to dynamic ones in which increased investment, knowledge and technology associated with increased productivity growth can transform trade patterns and accelerate overall economic growth.

At firm level; R&D, human capital, firm size, firm location, export behavior, the technology gap, type of ownership, and sectoral competition are the mediating factors that allow countries to adopt complementary policies for levering the opportunities of global value chain (GVC) participation. These factors, in fact, determine the local firm's absorptive capacity. The literature suggests that there is solid evidence for the supportive role of R&D in local firms in high income countries (Barrios and Strobl, 2002; Barrios et al., 2004; Keller and Yeaple, 2009; Karpaty and Lundberg, 2004). However, it is less known how GVC which was proliferated because of ICT revolution and labor cost differences between developed and developing countries (Baldwin, 2012) affects firm productivity. This study therefore aims to examine the impact of the firms' different positions along the GVC in productivity increase in the Turkish manufacturing industry. GVC integration of the firm may bring productivity gains through at least two channels: First is the direct productivity enhancing effect through learning, scale economies etc. Second is through structural change: misguided government policies, especially in developing countries, may bring about structural changes detrimental to the productivity growth. This study is said to be the first attempt in exploring the impact of the integration of firms to global value chains on productivity generation in Turkish manufacturing industry at the firm level.

Production chains transform raw materials into intermediate products, and then, into final goods. The activities involved in this process range from design, through manufacture of parts and accessories, assembly of final products, and finally to marketing and distribution. Each stage must be coordinated with the others, either through arm's-length transactions or a vertically integrated firm. In a GVC, production is subdivided into fine

slices of specialization along the chain, which leads to trade across international boundaries in order to take advantage of efficiencies in different jurisdictions. In a GVC, "each activity that adds value to the production process can be carried out wherever the necessary skills and materials are available at competitive cost" (Globerman, 2011). The scope and speed with which worldwide production has become integrated into GVCs has drawn attention about their effects on productivity. A growing theoretical and macro-level empirical studies found that a country's integration into GVCs can improve its productivity performance (Criscuolo et al., 2015; Criscuolo and Timmis, 2017; Grossman and Rossi-Hansberg, 2008).

In this research, we examine the mode of GVC integration from the side of the supplier, purchaser, and both. While being intermediate purchaser might be beneficial for the productivity (via backward linkages, technology spillovers or skills demand, etc.), the supplier position in the GVC might make the firm more vulnerable to the crisis due to the inventory adjustment (bullwhip effect) of final firms and sharp reduction in the sales (Bekes et al, 2011; Accetturo and Giunta, forthcoming), their captive position along the GVC and price-competition because of the low capabilities lag behind the rest of the final firms (Agostino et. al, 2011). The value added of this work is therefore is a contribution to the clarification of these linkages between GVC integration and the productivity of the firm for a developing country, Turkey.

Let subscripts i, j and t show firm, industry and time, our model to be estimated to test the impact of GVC positions on productivity is as follows:

$$LPit=\beta 0+\beta 1ln(KL/)it+\beta 2(SUP)it+\beta 3(CON)it+\beta 4(SUP*CON)it+Dj+Dt+\varepsilon it$$

In the equation above, LP and $(KL/)$ are labor productivity and capital intensity of firm, respectively. Our variables of interest take three forms. SUP (supplier) is a dummy variable which takes the value of 1 for the firm if the share of sales of produced-to-order to total turnover is greater than the 60% and the firm is exporter. A final firm in GVC is represented with variable CON, which equals 1 if the firm purchases intermediate goods from abroad. Finally, $SUP*CON$ is interaction term showing the firms both supplier and consumer along the GVC.

Our preliminary results based on random effects model estimated by using a combined firm level panel data (about 36 thousand firms) of the Annual Industry and Service and Foreign Trade Statistics by TurkStat for the period between 2003-2015 show that while being supplier in GVC is detrimental to productivity, purchaser position provides positive returns to the firm. If we divide sample by firm size, negative effects of supplier position are getting larger with firm size but positive effects remain constant for purchaser position. However, as supplier firms operate in more technology intensive industries, their productivity losses disappear. This finding is consistent with Agostino et. al (2011) and Brancati, Brancati, and Andrea (2016), stating that suppliers with high skill and engaging in innovative activities are not statistically different from final firms in terms of performance.

To compare our results with firms which are positioned in value chain (VC) within national borders, we re-estimated the models for the non-exporter suppliers and non-importer purchasers. We found that more productivity loses for suppliers and less productivity gains for purchasers along the VC than the suppliers and purchasers along the GVC, meaning that internalization of firms has beneficial effects to the Turkish firms.

Title: Benchmarking, contracting, and incentive power

Presenting author: Peter Bogetoft (Copenhagen Business School)

Abstract

Benchmarking is a very popular management tool. It is used both to facilitate decision making and incentive provision. In this paper, we show that different benchmarking measures react differently to changes in performance. The incentive power of benchmarking based performance contracts therefore depends intimately on the benchmarking approach used. In turn, the optimal design of benchmarking based performance contract requires an explicit analysis of the data generation process of the benchmarking approach.

As an illustrative application, we investigate the use of Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA) and combinations hereof in revenue cap incentive schemes. Such schemes are applied in the regulation of network companies in many countries.

Keywords: Incentive power, Benchmarking, Data Envelopment Analysis (DEA), Stochastic Frontier Analysis (SFA), Key Performance Indicators (KPIs), Regulation

Title: What do Facebook viewer want? An application of metafrontier for marketing message

Presenting author: Chin Yi Fang (National Taiwan Normal University)

Abstract

This study assessed the customer attention performance of Facebook marketing messages including the heterogeneous greeting, promotional and event messages from the perspective of the dual code theory. Three inputs (number of color, text length, number of photo) and three outputs (number of likes; number of comments, and shares; and number of clicks on post) are used to develop this marketing message performance assessment model in the social medial based on the literature and expert opinions through the metafrontier-to-data envelopment analysis (DEA)model (MDEA). The first phase of the DEA model illustrated the attention performance of 60 marketing messages in the franchised hotel. However, due to the heterogeneity of three types of marketing messages, the meta_technology ratios(MTR) are assessed in the second phase of this paper. The results of MTR indicate that the technology ratio of the greeting's message is better than that of the event and promotion. This finding indicated that indirect marketing information, such as the greeting message, would not forcefully persuade the purchasing behavior of on-line viewers to have more attention than did banner advertising. Future research would further apply this performance model to more diversified hotels for generalization.

Keywords: Dual code theory, Metafrontier-to-data envelopment analysis, Meta_technology ratios, Greeting message

Special Session A4: Network Data Envelopment Analysis

Title: A value-chain network structures for Korean banks

Presenting author: Sangkyu Jo (Korea Institute of Intellectual Property)

Co-author(s): Sangmok Kang

Abstract

This study analyzes the network efficiency based on the value chain theory of Porter (1985) for Korean banks. Existing efficiency studies on banks have analyzed the three main functions of the bank separately: production function, intermediation function, and value-added function. In this study, we analyze the network efficiency based on the value chain that integrates three functions of bank. In the analysis, banks are divided into commercial banks, local banks, and special banks and the analysis period covers for 10 years from 2004 to 2013. Special bank showed the highest efficiency in production function and intermediation function, while profit function showed the lowest efficiency. Since special banks are operated for specific purposes, it can be deduced as a result of operating based on the purpose of the establishment rather than profit. Local banks are more profitable than other groups. It is inferred that local banks are smaller in size than other groups and concentrate on profitability as a strategy to optimize competition. In the case of the commercial bank, the efficiency is shown to be moderate for each function, but the overall efficiency is the lowest.

Title: DEA network models for inference and estimation of scientific knowledge production: A pseudo-likelihood approach

Presenting author: Shawna Grosskopf (Oregon State University)

Co-author(s): Moriah B. Bostian, Cinzia Daraio, Rolf Fare, , Maria Grazia Izzo, Luca Leuzzi, Giancarlo Ruocco, William L. Weber

Abstract

Networks are general models that can represent the relationships within or between given systems. They are more and more applied in economics. The structure and function of complex networks is widely studied in the statistical mechanics. Nonparametric productivity analysis (Data Envelopment Analysis) based on networks (Network DEA) is widely diffused. Network DEA typically analyzes the networks in a descriptive rather than statistical framework. Our goal is to fill this gap by developing a general framework for modeling the production process. It is based on the axiomatics of Network DEA connected to the Georgescu Roegen funds and flows model. This framework relates approaches from information science, machine learning and statistical inference tools from the physics of complex systems. The proposed statistical approach is based on recent pseudo-likelihood techniques, allowing us to infer the network topology in a Bayesian framework, for nonparametric frontier models (Network DEA or NDEA). We illustrate the approach with an application to assess knowledge production and the interdependencies of scientific disciplinary productivity at a world-country level.

Keywords: Network DEA, Bayesian statistics, Generalized multicomponent Ising Model, Georgescu Roegen flows and funds model, knowledge production, interactions, Input-output models

Title: Assessing the efficiency of conventional and Islamic banks in Bangladesh using two-stage network data envelopment analysis approach

Presenting author: Sunil Kumar (South Asian University)

Abstract

The main goal of this paper is to assess the efficiency of conventional and islamic banks operating in Bangladesh using a state-of-the-art two-stage network data envelopment model (NDEA) developed by Kao and Hwang (2008). The NDEA model used in the present study opens the 'black box' of bank efficiency in Bangladesh and provides a decomposition of overall bank efficiency. In the availability of panel data set of 34 banks for the period 2010 to 2016, we assume the presence of dependence between the production sets across time and therefore applied the NDEA model in the sequential data setting framework rather than the contemporaneous framework. To obtain more consistent efficiency estimates for Bangladeshi banks, we follow a novel approach to define the production process of a typical bank. We assume that the bank production process consists of two distinct stages. In the Stage 1, the bank uses employees, fixed capital and financial capital (as proxied by the equity) to produce deposits. These deposits are then used by the bank as an input in the Stage 2 to produce advances, investment and non-interest income. Thus, we treat deposits neither an input nor an output, but consider them as an intermediate product as suggested by Holod and Lewis (2011). In particular, we emphasise the dual role of deposits in the bank production process. The two-stage bank production process used in the present study resolves the "deposit dilemma" that is existing in the bank efficiency literature due to the disagreement among researchers on whether deposits should be considered as an input (as treated in the financial intermediation approach) or an output (as treated in the production approach). We found that Islamic banks stood far behind conventional banks in terms of overall efficiency.

Special Session B4: Industry Dynamics and Productivity Performance

Title: Dynamic industry productivity measures: The case of thermal electricity generation in Chinese regions 2000-2014

Presenting author: Finn R. Førsund (University of Oslo)

Co-author(s): Ke Wang

Abstract

A framework for applied production theory should focus on the crucial features of the industry to be studied. First of all, to be useful for a dynamic study, a distinction has to be made between the theoretical production possibilities before investment takes place and the actual empirical production possibilities in the short run after investment has taken place. Then there is the distinction between production possibilities at the micro level of a plant or even division within a plant, and the aggregate production possibilities for the industry as a whole. The dynamics are driven by entry and exits of plants and embodied technological change at the micro or plant level.

The purpose of the paper is to show how such production function concepts can be applied to Chinese coal-fired electricity generating plants aggregated to the province level in order to get valuable structural information for policy analysis. Development in total variable factor productivity (TVFP) and bias of technical change are estimated and illuminated using figures for isoquant maps, capacity regions in input coefficient space and average- and marginal cost functions.

Keywords: Thermal electricity generation, Short-run production function, Dynamic structural change, Total Variable Factor Productivity measure, Factor bias

Title: The effect of technological adoption on agricultural productivity: The case of a smart-farm in Korea

Presenting author: Kibum Kim (Seoul National University)

Co-author(s): Tai-young Kim

Abstract

Agricultural business is known to be a very labor intensive primary industry where innovation remains as a challenge. Unlike manufacturing industry, technological diffusion of new automation software or robotics occurs relatively slowly. Although agricultural companies have the needs to implement new technologies, many agricultural companies struggle to make a transition as their routine has been optimized to the current labor intensive process. As a new trend of Smart Farm, Agri-Tech is receiving much attention, agricultural companies are considering adopting new technologies that can significantly enhance production efficiency and reduce labor cost through automation and mass production.

This paper examines how the introduction of robotics and automation technology transform productivity in the agricultural business. To this end, we narrate an in-depth case study of a project conducted in Korea. This project was carried out to an agricultural company that cultivate mushroom, of which its business encompasses most of the value chain from seeding to packaging. Prior to the adoption of new technology, almost all processes were handled manually, and thus, the project started from identifying the current state and then finding what are needed to enhance productivity. Through analysis, we identified key items that needs to be done and then we evaluated each of their ROI through simulation. As this paper explains some of the key challenges we faced throughout the project, it provide guidance on how to initiate and adopt new technology especially to those in the agricultural business.

Keywords: Smart farm, Agri-Tech, Robotics, Simulation, ROI, Technology adoption, productivity

Title: Resurrection of zombie firms and role of finance

Presenting author: Hun Jun Lee (Seoul National University)

Co-author(s): Jeong-Dong Lee, Chulwoo Baek

Abstract

Firms experience the process of birth, growth, decline, and exit in a similar fashion to human beings. If a firm has accumulated competitiveness internally and the market environment is favorable to the firm, the firm will grow. Even if a firm is competitive, its growth can stagnate or decline if the market condition is unfavorable. The opposite also holds. In a booming market, a firm may not grow if it lacks competitiveness. Therefore, it is possible that the firm continues to grow only when both internal and external conditions are met. On the other hand, if either the internal or the external situation is disadvantageous to the firm, the firm is likely to stop growing and to become insolvent. In particular, when the growth of the economy as a whole slows down, corporate insolvency accelerates, because it is impossible for the company to cope with the decline of the economy. When a corporation becomes insolvent, the choice has to be made of whether to revive restructure the firm or allow it to exit. The discussion on restructuring is still debatable. There is a perspective that delaying restructuring is undesirable for the efficient use of resources (Baird & Jackson, 2002). On the other hand, there is also a view that excessive restructuring can reduce efficiency and negatively affect long-term growth (Crotty & Lee, 2001). If a firm becomes insolvent due to external shocks such as the global financial crisis, the firm performance may improve as the economy recovers. However, if a firm loses its competitiveness, it is common for the firm to become insolvent over a long period of time. These firms are called zombie firms; firms that are unable to generate profits and introduce external funds through borrowing or the issuance of corporate bonds for subsistence. From the perspective of industrial dynamics, a number of studies on the issue of zombie firms argue that zombie firms need to be exited, not just because they are not productive, but also as they are a barrier to the process of resource reallocation in the market. From this perspective, it is reasonable to see that a zombie firm deserves to be exited from the market. However, the very heart of the zombie phenomenon is that there be a capacity to identify the real zombie firms and those firms that are in business difficulty and look like zombie firms. The definition of zombie firms is that firms that have a serious problem in their business activities and have a low probability of recovering, yet do not exit and rely on external financial support. On the other hand, firms that look like zombie firms face issues of liquidity due to problems in their operations in the short term. It is not uncommon that a firm experiences problem because of a large-scale investment for long-term growth, or when the market environment deteriorates and profit is not generated. Therefore, it is essential to identify these firms when discussing their exit from the market. Also, preferential support is required for firms that are expected to recover in the short term.

Special Session D4: Implications for Enhancing Productivity of Climate Technology Diffusion (GTC Session)

Title: A study on the effect of government R&D and policy financial support on growth performance, productivity and profitability in climate technology industry

Presenting author: Mina Lee (Green Technology Center)

Co-author(s): Sungchan Yeom, Hyungju Kim

Abstract

The international community is actively promoting technology development and technology transfer to cope with climate change, and Korea has been carrying out various policy support and economic investment in related industries. Despite the fact that many investments have been made and continue in the future, there are not enough studies to comprehensively examine the performance evaluation of the Government's policy and economic support from the enterprise side. In particular, the analysis on the effects of government R&D and policy loans on the technological and economic performance of climate technology companies is still lacking in qualitative and quantitative aspects. This study attempts to analyze the industrial effects of the private sector on the Government's economic support related to climate change with such awareness. To do this, we first set up a climate industry population for companies involved in climate change, and selected SMEs that utilized government R&D investments and policy finance (loans). In this study, we confirm that R&D investment and policy finance investment for SMEs have positive effects on growth, productivity, and profitability of companies. However, companies that use policy finance over the long term have the potential of influence ineffective business performance. Considering these problems in the future, we should support aggressive investment in the field of responding to climate change, and consider it as an effective investment.

Keywords: R&D investment, Policy financial support, efficiency, Productivity, Profitability

Title: A study on the entry of domestic industry into developing countires for leading climate technology cooperation

Presenting author: Sejin An (Green Technology Center)

Co-author(s): Chul-Ho Park, Jisun Ku

Abstract

The demand and investment in climate technology and related industries are continuously expanding since the Paris Agreement came into effect, and greenhouse-gas reduction and adaptation assistance in developing countries are expected to emerge as an important task in new climate regime of the Paris Agreement. In this situation, Korea should secure national determined contributions of 37% from business as usual levels by 2030, especially 11.3% of overseas reductions. It also should actively promote the entry of domestic climate technology industry into the developing countries as a new industry engine. However, the term climate technology has not been widely used in Korea until recent years, and support for the entry of domestic companies into overseas countries has also been carried out from the perspective of exporting goods rather than cooperation with the target developing countries. Climate technology cooperation projects with developing countries should be based on not only funds for business development, feasibility study, engineering, procurement and construction but also networks with governments and international organizations. Therefore, they should be examined from a different perspective than the export-oriented entry support. In this paper, we conduct crosstabs on the demand related to climate change and the distribution of domestic companies in developing countries based on the Technology Needs Assessment (TNA) Report under the United Nations Framework Convention on Climate Change (UNFCCC) to present implications. We also propose a plan to develop and promote domestic climate technology-related industries in developing countries by comparing and analyzing the support systems of the US, Japan, Germany, and Korea for entry into developing countries.

Keywords: Climate technology cooperation, industry development, Technology needs assessment, greenhouse-gas overseas reduction, Paris Agreement

Title: Analysis of the R&D investment for the mission innovaiton low carbon technology and policy implications

Presenting author: Hwanil Park (Science & Technology Policy Institute)

Co-author(s): Inhye Yoo

Abstract

The Mission Innovation declared that the public R&D investment for the low carbon technology should be doubled within 5 years from 2016 and that private sectors' participation is necessary to accomplish the goal. We analyzed the input and outcomes of the Korean public R&D investment for the low carbon technology from 2011 to 2015. The low carbon technology can be categorized into 6 groups, including renewable energy, energy efficiency, energy demand management, clean power & smart grid, safety & decomposition of nuclear power and CCUS. The renewable energy has the largest R&D investment in total and the clean power & smart grid and energy efficiency follow. The outcomes are measured in three terms, which are publication & patent performance, technology growth potential, and economic performance. In terms of publication & patent performance, the energy efficiency shows the highest ranking, and the renewable energy and the clean power & smart grid follow. In the area of technology growth potential, the safety & decomposition of nuclear power exhibits the best outcome. The second place goes to the renewable energy and the third the energy demand management. The last variable, the economic performance locates the energy efficiency into the first place and the clean power & smart grid and the renewable energy follow. The final outcome can be varied depending on the weight placed on which terms out of the three. However, the energy efficiency shows the highest outcome whatever weight is put among the three terms. We suggest that the low carbon technology R&D policy should consider how to promote both the technology and economic performance of the technologies to meet the goal of the Mission Innovation.

Keywords: Mission Innovation, Low carbon technology, R&D investment, Technology performance, Technology growth potential, Economic performance

Title: When and how many will coal power plants be stranded in Korea?

Presenting author: Young-Hwan Ahn (Korea Energy Economics Institute)

Abstract

As the urgency of climate change increases, there will be a greater demand for the transition to a low carbon energy system. During the transition process, carbon intensive technologies and practices may not be able to provide sufficient service which were originally intended and might phase out early even if they are not physically or technically obsolete. A coal power plant is one of the technologies that are most vulnerable to becoming stranded in the low carbon transition. This study investigates when and how many coal power plants can be stranded in Korea and the options to minimize the stranded assets. To the aim, we develop various scenarios for the Korean power sector until 2050 based on the 8th Basic Plan for Power Supply and Demand of Korea. As a result of analysis using the METER(Model for Energy Transition and Emission Reduction), up to 19 units of coal power plants of 500 MW are estimated to be stranded in the 2040s. The cost in this case could be about 1 trillion Korean Won (KRW) or more annually. If CCS technology is commercially available around 2030, coal power plants could become stranded as early as the year 2033, and stranded assets could be as many as 10 units of 500MW and cost up to 560 billion KRW. To minimize stranded assets, one of good options is retrofitting the coal-fired power plants of which life end in the 2020s and 2030s. In addition, coal power plants currently under construction may consider securing spare space in the sites for CCS retrofittability to avoid being stranded in the future.

Keywords: Climate Change, Coal Power Plant, Stranded Assets

Parallel Session E4: Productivity and Efficiency in Manufacturing

Title: Productivity, markup and price dispersion: Evidence from China

Presenting author: Shunan Zhao (State University of New York at Binghamton)

Co-author(s): Bing Qian, Subal C. Kumbhakar

Abstract

In this paper we propose a model to estimate firm productivity and markups in the presence of heterogeneous output and input prices. We assume that firms are monopolistically competitive in the output market, and given the well documented fact that state firms are favored in China's economy thanks to their political connections, we argue that they are likely to have lower input prices. The widely-used proxy variable methods to structurally identify production functions and productivity are customized to our model. We also show that allowing heterogeneous prices solves the under-identification problem inherent in the traditional proxy variable methods. We apply the proposed model to the Chinese transportation equipment industry – one of the most state-involved manufacturing industries during the 1998 – 2008 period, and find significant differences in the estimated output elasticity, productivity and markups between our model and an alternative model with homogeneous prices, which is a special case of our model. On average, material prices of state firms are 9.5% lower than the industry average.

Keywords: production function, price dispersion, productivity, markup, Chinese manufacturing

Title: Assessing alternate channels of information technology impact on firm productivity: A case of Indian Manufacturing

Presenting author: Rupika Khanna (Indian Institute of Management Lucknow)

Co-author(s): Chandan Sharma

Abstract

This paper explores the effects of technological investments in information technology (IT) on the productivity performance of firms. Utilizing a micro-level dataset of 3600 firms for the period 1998-16 from Indian manufacturing, we identify four channels through which the impact of IT reflects on productivity. Besides, assessing the effects of IT on both labour productivity and total factor productivity, examine network spillovers of IT through which the investment by one firm creates value for other stakeholders. Furthermore, we assess the synergies resulting from the complementary leverage of innovational investments on embodied and dis-embodied technology in the firm. Besides providing evidence on these unconventional channels of IT impact, this is the first study to assess to examine the question of IT-leveraged innovation and network effects on Indian manufacturing. Our results indicate significant effects of IT on productivity through both input consumption and technological change channels. Our analysis also indicates large inter-industry and intra-industry network effects linked with firm's accumulated stock of IT. We find that IT may have a substitute relationship with investments on disembodied technology. Lastly, we show that our results are unlikely to be driven by transmission bias in production function set up, reverse causality, measurement errors induced by aggregation of data at various levels and other econometric issues such as, serial correlation and heteroscedasticity.

Keywords: productivity, information technology, endogeneity, production function estimation, panel data, firm-level

Title: How to survive and compete: the impact of information asymmetry on productivity

Presenting author: Man Jin (Oakland University)

Co-author(s): Huiting Tian, Subal C. Kumbhakar

Abstract

This paper studies the impact of information asymmetry on productivity through the foreign direct investment (FDI) channel. Higher information asymmetry (lower transparency) could increase the difficulties/cost for investors to distinguish between good and bad investments and thus impede investment, particularly, FDI in which investors are \information disadvantageous of alien". And FDI is an important determinant of economic growth. Naturally, we bridge the two key economic variables and study the influence of information asymmetry on productivity through the channel of FDI. We use data from China's publicly listed manufacturing firms in our empirical analysis. Based on a market micro-structure model, we estimate the unobserved information asymmetry using the probability of informed trading (PIN). We estimate the unobserved firm-level productivity using the proxy method assuming that the evolution of productivity is not exogenous but can be shifted by FDI. We find that information asymmetry affects the productivity of domestic firms both positively and negatively, depending on firms' technology-intensity. When domestic firms are technology-intensive, they can benefit from the knowledge spillovers of FDI. In that case, we find lower information asymmetry, associated with more FDI will result in higher productivity. When domestic firms are non-technology-intensive, they can be hurt by the foreign competition. In this case, we find that lower information asymmetry will result in lower productivity.

Keywords: productivity, information asymmetry, foreign direct investment, spillover

Parallel Session F4: Application of Malmquist Productivity Index

Title: Analyzing productivity of Taiwan's international tourist hotels: A bootstrapped malmquist framework

Presenting author: Li Yang (Tianjin University of Commerce)

Co-author(s): Wei Wei, Xiaoying Guo

Abstract

Benefited from the expansion of international tourist market, the tourist hotel industry has also experienced a rapid growth. Given the simultaneous and perishable nature of hotel service, managing demand from customers and service capacity influences the profitability of the tourist hotel industry notably. Hence, how to appropriately evaluate the service performance of the tourist hotel industry attracts the attention of scholars and governments.

The Malmquist productivity index (MPI), proposed by Fare et al. (1994) and based on the data envelopment analysis (DEA), is commonly used to measure total factor productivity (TFP). The primary problem is that being a linear-programming-based measure and lack of statistical nature, MPI may give incomplete information about TFP and its components and thus, guides incorrect policy and/or managerial implications. Hence, this study uses the bootstrapping approach, proposed by Simar and Wilson (1999) which takes into account the time-dependence structure of the data, to generate the appropriate bootstrap samples for analyzing productivity changes of the tourist hotel industry of China.

Keywords: DEA, tourist hotels, Malmquist indices, bootstrap

Title: Decomposing the Malmquist productivity index by productivity changes

Presenting author: Sung Ko Li (Hong Kong Baptist University)

Co-author(s): Rolf Färe, Long Zhao

Abstract

Since the Malmquist productivity index was popularized by Färe et al. (1994), there have been many attempts on the decomposition of this index. Constant returns to scale (CRS) frontiers are adopted predominantly in empirical studies. When variable returns to scale (VRS) frontiers are used, there may be no solutions. Although many authors have proposed various approaches, see Balk (2001), Lovell (2003), Afsharian and Ahn (2015), etc., such problem has not been completely solved when we consider the productivity change between two VRS frontiers. This paper introduces a new unified framework to study the decomposition of Malmquist productivity index. Specifically, to study the productivity change from one input-output vector to the other, we identify a path between them. By computing the productivity changes of input-output vectors in the path, we derive natural decomposition of the Malmquist productivity index. In this new approach, (i) solutions always exist; (ii) each component reflects a productivity change; (iii) we are comparing points on the "true" frontiers.

Keywords: Service industries, DEA, Bootstrap, Energy efficiency, Affecting factors

Title: Cost Malmquist productivity index: from output to group

Presenting author: Barnabe Walheer (Xi'An Jiaotong-Liverpool University)

Abstract

The cost Malmquist productivity index (CMPI) has been proposed to capture the performance change of cost minimizing Decision Making Units (DMUs). Recently, two alternative uses of the CMPI have been suggested: (1) using the CMPI to compare groups of DMUs, and (2) using the CMPI to compare DMUs on each output separately. In this paper, we propose a new CMPI that combines both procedures. The resulting methodology provides group-specific indexes for each output separately, and therefore offers the option to identify the sources of cost performance change. We also define our index when input prices are not observed and establish, in that case, a duality with a new technical productivity index, which takes the form of a Malmquist productivity index. We illustrate our new methodology with the case of the US electricity plant districts.

Keywords: cost Malmquist productivity index, Malmquist productivity index, groups, cost efficiency, electricity

Parallel Session G4: Productivity in Agriculture

Title: Transgenic varieties and productive efficiency of cotton farmers in Pakistan

Presenting author: Deep Mukherjee (Indian Institute of Technology Kanpur)

Co-author(s): Mahendra Kumar Singh

Abstract

Pakistan is heavily dependent on textile industry and hence cotton farming for economic development. Cotton farming is a major source of income for more than 40% of the rural population in Pakistan (GOP, 2015). Moreover, cotton sector has multiplier effect on the Pakistan economy as a whole (Hameed et al., 2014), since cotton related intermediate activities such as ginning and transportation services also enhance rural income. Attributable to the importance of cotton crop in the Pakistan economy, examining technical efficiency (TE) of cotton farmers and finding subsequent ways to improve it, might result in overall increase in the rural income furthered with poverty alleviation. In other words, such a study can highlight ways to surge productivity, profitability as well as sustainability of the cotton farming in the nation.

To achieve prolonged cotton productivity, Pakistan's National Biosafety Committee recommended release of variety specific insect resistant Bacillus thuringiensis (Bt) cotton for the very first time in 2010. But, per hectare cotton yield growth in Pakistan stagnates around 1% for more than a decade even after rapid adoption of Bt cotton (FAOSTAT, 2017). Since it remains difficult to increase total cropped area, therefore to mitigate such prevailing conditions, one plausible approach could be to increase efficiency of cotton production (Watto and Mugera, 2014).

Delving into the issues mentioned above, we employ stochastic production frontier (SPF) analysis to assess TE of cotton farmers in Pakistan. We estimate Battese and Coelli (1995) model by utilizing farm-level cross-section data from a nationally representative sample of cotton growers in Pakistan, collected by the International Food Policy Research Institute (IFPRI) in 2013. Classification of Bt/Non-Bt variety is done based on the Strip test and enzyme-linked immunosorbent assay (ELISA) test as opposed to the farmers' belief about the seed planted. Estimated production frontiers entail that factor inputs–land, fertilizer, seed, machine, and labor–impact total harvest positively whereas total number of irrigation hours negatively. One of the plausible reasons behind getting negative irrigation coefficient could be that cotton growers might have over irrigated their fields which attracted pest infestation. Predicted TE values show that, Pakistani cotton growers are 68% efficient on average. Bt cotton and Non-Bt cotton producers have mean TE scores of 65% and 70% respectively. Besides, farmers cultivating in the Northern irrigated (plains) Punjab are less efficient (mean TE score of 67%) than other

cotton growers in Pakistan (mean TE score of 68%). In furtherance, we conduct likelihood ratio (LR) test to examine the plausibility of having meta-frontier (O'Donnell et al. 2008) for these partitioned samples. Estimated LR test statistic indicates that cotton growers in the Northern irrigated (plains) Punjab are cultivating under different set of technologies than rest of the cotton growers in Pakistan. However we don't find such evidence in the case of Bt v/s Non-Bt sample partitioning. Therefore, a direction of future research could be to estimate a meta-frontier for the agro-climatic zone based samples and obtain comparable TE scores for all cotton growers in the nation.

Title: Spatiotemporal analysis of Korean ginseng farm productivity

Presenting author: Heesun Jang (Korea Energy Economics Institute)

Co-author(s): Hyunhee Kim, Hojeong Park

Abstract

The past two decades has seen the new methodological debates on the identification of production function in the liaterature(Olley and Pakes (1996), Levinsohn and Petrin (2003), Ackerberg et al. (2015), and Gandhi et al. (2013)). These approaches introduced nonparametric approaches to control for the unobserved productivity and to correct for the endogeneity of input choices in the estimation of production function, which requires the availability of panel data. there has been another body of the literature that argued models that are typically estimated on the basis of panel data can also be identified with repeated cross-sections under certain conditions (Verbeek and Vella (2005)). This incudes, for example, estimating fixed effects or dynamic panel data models with lagged dependent variables based on grouping repeated cross-sections of individuals into cohorts to construct pseudo-panels. The objective of this paper is two-fold. First, built on the insight of Verbeek and Vella (2005), this paper proposes an idea to estimate the nonparametric approaches based on repeated cross-sections. Second, using cross-sections of Korean ginseng farms over 2006 to 2013, we apply our method to examine the evolution of farm-level productivity over time and across major production regions. This is important because there is a lack of panel data where agents are followed over time, while in many studies repeated cross-sections may be available.

Title: Directional distance function technical efficiency of chili production in Thailand

Presenting author: Wirat Krasachat (King Mongkut's Institution of Technology Ladkrabang) & Suthathip Yaisawarng (Union College)

Abstract

This paper uses directional distance function to measure technical efficiency of small chili farms in Thailand. Our sample of 107 farms in 2012 crop year includes "Good Agricultural Practices" (GAP) farms as well as conventional (i.e., non-adopting GAP) farms. Some of these farms grow chili in dry season while others grow it in rainy season. Contrasting to other agricultural efficiency studies, our study departs from existing literature in two important ways. First, our measure of technical efficiency allows each farm to expand its output while reducing its inputs simultaneously. Second, our DEA efficiency frontier is constructed from best GAP farms only. We divide our sample by season and measure efficiency scores for individual farms, adopting and non-adopting GAP, relative to best GAP adopting frontier for the given season and test whether farms adopting GAP are, on average, more efficient than non-adopting GAP farms. We find that chili farms in the sample are equally efficient in the current direction of their use of inputs to produce chili output for both GAP and non-GAP farms. Both GAP and non-GAP farms appear to have similar access to the same GAP technology. These findings are consistent for dry-season farms as well as rainy-season farms. Thus, the decision not to adopt GAP practice to produce safe chili does not depend on in accessibility of GAP technology. Analysis of characteristics of best GAP farms and less efficient farms did not provide a clear picture as to why conventional farms do not adopt GAP technology. Our in-depth interviews of chili experts and farmers reveal that the greatest factor affecting the farmers' decision to adopt GAP technology is better health of farmers and their neighbors. Our finding is the first to point out the health benefit as an influential factor for the decision to adopt GAP technology. We also find that consumers' perception about safe products and their trust in suppliers alleviate GAP farmers to fully enjoy the benefit of high product price which attracts them to adopt GAP technology in the first place. Our findings would be beneficial for government agencies and NGOs to develop and implement appropriate training workshops to help farmers from both groups improve their productive efficiency, raise quality of their chili to meet manufacturing and export standards, and thus income. In addition, our findings can be useful for environmental advocates to help potential consumers develop proper awareness and perceptions about safe produces. This, in turn, would reinforce Thailand 4.0 goal.

Keywords: chili farm, good agricultural practices, directional distance function, technical efficiency, technology adoption

Parallel Session H4: Knowledge, Innovation and Economy

Title: Knowledge spillovers and patent citations: Trends in geographic localization

Presenting author: Ryungha Oh (Seoul National University)

Co-author(s): Hyuk-soo Kwan, Jihong Lee, Sokbae Lee

Abstract

This paper examines the trends in geographic localization of knowledge spillovers via patent citations, considering US patents from the period of 1976-2015. Our analysis adopts the matched-sample framework pioneered by Jaffe, Trajtenberg, and Henderson (1993). Despite accelerating globalization and widespread perception of the "death of distance," a multi-cohort study reveals significant and growing localization effects of knowledge spillovers at both intra- and international levels after 1980s even when the control patents are generated using disaggregate levels of technology subclass `a la Thompson and Fox-Kean (2005). We also develop a novel network index based on the notion of "farness," which an instrumental variable estimation shows to be a significant and sizable determinant of the observed trends at the state-sector level.

Keywords: Innovation, knowledge spillovers, patent citation, agglomeration, network index, farness

Title: China’s "bubble" economy: The real effect sof housing price booms on corporate innovation

Presenting author: Lu Zhang (CPB Netherlands Bureau for Economic Policy Analysis)

Co-author(s): Yi Zhang

Abstract

This paper examines the effects of housing price booms on corporate R&D investments. Our analysis is based on a unique large sample of Chinese private firms collected from 4 biennial surveys during 2004-2010. Employing variations in housing price growth of more than 100 cities and difference-in-difference methodology we find that land-holding firms invest significantly less in R&D than no-land-holding firms in cities with higher growth in housing prices. This result suggests that the speculation channel is more important than the collateral channel in explaining the real effects of housing price booms in China. Our analysis has important implications for the long-term productivity growth and economic development of China.

Title: On the time lag of the effect of network position on service performance in software service networks

Presenting author: Kibae Kim (Korea Advanced Institute of Science and Technology)

Co-author(s): Jorn Altmann, Wonjoon Kim

Abstract

We examine whether a time lag exists before the network position of a software service in a service network affects its performance. Moreover, we analyze different time lags, using empirical data about software services compositions and their usages. Our results show that software services in central positions (i.e., high betweenness centrality) attract users the most. The highest effect exhibits, if the time lag is 26 to 32 months. Our findings are relevant, as they can guide developers in marketing their software services and are expected to impact innovation studies regarding the importance of considering time lags and analyzing complementary knowledge.

Keywords: Network Position, Service Performance, Time Lag, Software Services, Knowledge Complementarity, Innovation Study

Parallel Session I4: Efficiency Analysis using SFA

Title: Empirical distribution of endogenous inefficiency of municipal hospitals in Japan

Presenting author: Atsushi Fujii (The University of Kitakyusu)

Abstract

This note presents an attempt to check the shape of empirical inefficiency distribution in stochastic frontier estimation, by regarding inefficiency as a consequence of some subjective equilibrium of an economic agent. As an example, application to the cost data of municipal hospitals in Japan is considered. The influence of subsidy has been focused in this field. With a simplified model specification in which the role of subsidy is emphasized, the degree of deficit shrinkage by subsidy forms the distribution of cost inefficiency. We check the distribution with actual data controlling location of the hospitals (main source of inefficiency) than our previous study.

Title: Measuring the efficiency of Italian airports: How to counter unexpected shocks

Presenting author: Graziella Bonanno (University di Trieste)

Co-author(s): Tiziana D'Alfonso, Alberto Nastasi

Abstract

This paper investigates the efficiency of Italian airports. It uses a sample of 43 airports and covers the period from 2008 to 2016. The contributions of the analysis are twofold. The first novelty comes from the considerations of low cost flights operated to/from Italian airports. To the best of our knowledge, this aspect has been considered in the case of American airports. Since American airports are mostly public, while Italian airports are mostly private, we expect different findings as to the efficiency of vertical relationship between airports and airlines. Secondly, the estimations of efficiency refer to some recent methodological advances in the Stochastic Frontier approach (SFA) which relax the hypothesis of independence between the two error terms of a stochastic frontier, that is, the erratic and the inefficiency components (Bonanno et al., 2017). In a context like the airport industry current managerial decisions are influenced by past natural shocks, thereby rendering the assumption of independence too stringent. A shock may impact on the random error component and, at the same time, may affect future decisions, influencing the inefficiency component. This makes the random noise and the inefficiency of airport two dependent variables rather than independent as assumed in standard SFA models. Our findings provide airport managers with a robust tool to suitably deal with unexpected frequent shocks and increase efficiency.

Keywords: Airports, Stochastic Frontier Approach, Efficiency, Dependence, Low cost flights, Panel data analysis

Title: Capital investment and financial constraint in Indonesia: A SFA approach

Presenting author: Maria Ulpah (Universitas Indonesia)

Abstract

The neoclassical theory of investment provided a foundation for the imperfect substitution between internal and external finance (Modigliani and Miller, 1958). Since then, a number of studies have been done to justify the effect of financial factors on a firm's investment decisions. When internal finances are insufficient to finance a positive NPV project, firms need to obtain funds in order to ensure the life of the business. Empirical research that has been conducted regarding the financing constraints has many approaches on how to measure financial constraint. One of the most popular approach is the indirect approach, when using a link between cash flow and investment to measure the financing constraint. Fazzari, Hubbard and Peterson (1988) first adopted an empirical methodology to study the investment cash flow sensitivity (hereafter ICFS) by grouping the sample firms into financially constrained firms and unconstrained firms.

Despite its popularity, a debate associated with ICFS is the issue of using a priori classification. Cleary et al. (2007) argued that it is rather difficult to find a good variable as a measure of financial constraint. Therefore, empirical research has provided a set of alternative variables that can be used as a priori classification for firms; these range from a single variable to multiple variables. However, As discussed in Hu and Schiantarelli (1998), it is unlikely that the use of a single or multiple variables are successfully proxy for the information asymmetry problems underlying each sub-sample and reliably differentiate between constrained and unconstrained firms. Farre-Mensa and Ljungqvist (2016) however, even more 'sophisticated' indexes of financial constraints which have been developed often perform poorly with firms identified to be constrained displaying relative ease in obtaining external finance. While to address the potential problem using priori classification, Hu and Schiantarelli (1998) offers a different research methodology by using a switching regression model of investment to endogenously classify firms into constrained and unconstrained (see also Almeida & Campello, 2007; Hobdari et al (2009)).

Following the critique associated with the use of ICFS to infer financial constraints, this paper tries to re-examine the impact of cash flow on capital investment and the extent to which a firm can be considered to be financially constrained by using Stochastic Frontier Analysis (SFA) on financial constraints derived by Wang (2003).

Keywords: Financial constraint, Stochastic frontier, Investment efficiency

Special Session A5: Productivity in Asia 1 (ASIA KLEMS Session)

Title: On the decline in R&D efficiency: Empirical studies using JIP and EUKLEMS data

Presenting author: Tsutomu Miyagawa (Gakushuin University), Takayuki Ishikawa (Hitotsubashi University)

Abstract

There are two types of supply side views on the secular stagnations in the advanced countries: one is an optimistic view from Brynjolfsson and Aghion; the other is a pessimistic view from Gordon. Like Gordon (2016), who argues that major innovations have all been completed Bloom et al. (2017) state that R&D efficiency -- which is defined as productivity growth / effective R&D -- has declined.

Using JIP and EUKLEMS databases, we examine the plausibility of the decline in R&D efficiency that Bloom et al. (2017) suggested. The direct measure of R&D efficiency using KLEMS databases does indeed show that the R&D efficiency has declined in advanced countries. However, in some Japanese industries such as textile, paper, and ceramics, R&D efficiency has increased in the past 15 years due to the restructuring that has occurred in these industries.

We also estimate R&D efficiency using the JIP database, and find that R&D efficiency declined drastically in the1990s. In our estimations, we also find that intangible investment contributes to the recent increase in R&D efficiency.

Advanced countries have made an effort to increase in R&D expenditures to improve productivity. However, our study implies that governments and research institutions should also look to increase R&D efficiency at the same time.

Keywords: R&D efficiency, secular stagnation, KLEMS database

Title: Source of growth analysis at industry-level for selected Asian economies using DEA malmquist and Asia KLEMS data bases

Presenting author: Hao-Tsung Chen (Soochow University)

Co-author(s): Tsu-Tan Fu

Abstract

Recent cross-country productivity source of growth comparisons at the industry-level have widely used the KLEMS database. While these studies adopted growth accounting methods, they failed to thoroughly explore technical changes and efficiency changes as they influence total factor productivity. This may cause unreliable estimates of productivity and thus lead to misleading policy implications. The purpose of this research is to integrate panel data production frontier models (DEA Malmquist) with the Asia KLEMS database to measure the source of output growth and the productivity components in the economies of Taiwan, Korea, and Japan. We also identify the major drivers of output growth for each industry in each country for three ten-year time periods between 1980-2010. This research provides cross-country comparisons on industrial structure and growth patterns for manufacturing and service industries, as well as results from analyses of the sources of growth and productivity changes. This unique research also integrates the KLEMS data with production frontier models. The results provide both academic value and reference for policy makers.

Keywords: KLEMS, Production frontier, source of growth, DEA Malmquist

Title: Under-measured capital and the Lost Decades in Japan: How the data Has shrouded and prolonged the losses

Presenting author: Taehyoung Cho (The Bank of Korea)

Co-author(s): Sungmin Park

Abstract

Japan's dynamic postwar growth reversed into anaemia upon the asset bubble burst in 1991, to the point that the period since then has come to be called the Lost Decades. Numerous ideas have been suggested to explain the causes for this anaemia, but none has emerged dominant; they include the credit crunch, irresolute fiscal policy, liquidity trap, aging demographics, slowdown in total factor productivity, over-investment, zombie lending and debt deflation. We offer yet another alternative explanation: that the official capital stock data in Japan has continuously been under-measured up to the present, which has contributed to shrouding the economic reality and prolonging the losses. In addition, it seems that due to the very imperfect information, Japan may have gotten itself stuck into an overly capital-heavy state, missing the timing for transforming itself into a capital-light one. Japan's Lost Decades suggest that economies such as Korea and China should be much more cautious of further investment in fixed capital, especially since the accumulated capital stands or heads above 3 times GDP. With such a capital-output ratio, countries should focus their investments less in long-lived heavy construction assets and more in relatively short-lived light assets like intangibles and ideas, together with institutionalised business restructuring and continued innovation.

Keywords: Lost Decades, capital-output ratio, over-capital, depreciation rate

Special Session B5: ICT, Innovation and Development 1 (ITPP Session)

Title: Higher order dynamic capabilities: organizational innovation complementarities and its effect on firm performance

Presenting author: Andres Navas (Seoul National University)

Co-author(s): Hyenyoung Yoon, Junseok Hwang

Abstract

Organizational innovation positively affects technological innovation and firm performance. Based on previous research, this study perceives organizational innovation as a higher order dynamics capabilities. However, organizational innovation practices and its complementarities must be evaluated in order to observer firm's specific path of the innovation process. Firm-level data from Latin America and based on supermodularity test it is shown that organizational innovation affects other forms of firm innovation and serves as a mediator of dynamics capabilities on performance.

Keywords: Dynamic capabilities, organizational innovation, performance

Title: Role of Institutions and ICT Technology in Avoiding Resource Curse: Lessons from the Four Successful Economies

Presenting author: Birku Reta (Seoul National University)

Co-author(s): Jongsu Lee

Abstract

Natural resources can be used as a factor of production in the domestic industry and as a primary export commodity to earn foreign currency particularly in developing countries. At least in either of the case, it adds capital accumulation and increases the economic growth of the nation endowed with abundant resources. However, in real practice we hardly observe all resource abundant nations being rich. As a result, the study aims to investigate reasons for the success of some resource rich countries and not for others, focusing on the role of institutions and information communication technology perspectives. The study used panel data model and at the end considered 3SLS method in order to overcome endogeneity problem within the estimated panel model. The source of the data is world development indicator data base from 2010 to 2015. The result shows that natural resource abundance and institutional performance has significant positive impact on economic growth rate in successful economies whereas negative significant in the case of resource curse economies. This shows that there is resource curse and institutional curse problem in low income with primary resource rich countries. However, these economies have potential to escape the resource curse given that they have good institutions and better complement with ICT services that enable them to diffuse knowledge, information and services across institutions. Implications of the study are that: firstly, since countries with higher institutional quality are able to escape the resource curse problem, so the resource curse economies should build good institutions in order to be able to escape from the curse. Secondly, countries with higher ICT services i.e. internet service penetration have strong institution which impacts positively on economic growth. Hence resource cursed countries should invest on information communication technology services to build strong capable institution which enable to play the game in order to able to escape from the curse.

Keywords: economic growth, institution, Internet service, resource curse

Title: The contribution of the Open Government to community-led democratic innovations in the Latin American countries (LAC)

Presenting author: Lorena Farias (Seoul National University)

Co-author(s): Junseok Hwang

Abstract

Although the literature about Open Government is abundant and generous in term of the expected political, social, economic outcomes, the empirical studies are just emerging. This work pursues to contribute to reducing this gap with an impact evaluation of the Open Government Partnership (OGP) over the generation of community-led democratic innovations. These innovations emerged in LAC, after a hard period of military dictatorship and the violation of the human rights. The return to the democracies and the enthusiasm to creates a new institutionality it is the starting point for its development. Thus, a Synthetic Control Method (SCM) is used to demonstrate that countries which have not joined the OGP such as Ecuador and Bolivia generated less community-led democratic innovation that the OGP members.

Keywords: Open government, open innovation, impact evaluation, public policy, Latin America

Title: Analysis of digital transformation in Ecuadorian companies

Presenting author: Sandra Robles (Seoul National University)

Co-author(s): Jorn Altmann

Abstract

The continuing convergence of the real and the virtual world will be the main driver of innovation and change in all sectors of the economy, adding also the growing amount of data and the convergence of different technologies (Kagermann, 2015). Digital transformation has high importance for contemporary organizations in order to survive and achieve competitive advantage in a digital economy (Liu, Chen, & Chou, 2011; Bharadwaj, 2000).

In the case of SME, in contrast to larger companies, SMEs usually face many challenges due to limited resources for research & development, investments, consulting or qualification of personnel (Müller & Hopf, 2017). In most developing countries, and particularly in the LDCs, the level of digitalization is still very low (UNCTAD, 2017).

In Ecuador where SMEs represent the 67% of the productive sector, only 43% of SMEs have invested in ICT, and 20% make transactions through the internet (INEC, 2014) affecting their competitive advantage. Although digital technologies are improving the prospects for small businesses in developing countries cutting costs, streamlining supply chains, and trading products and services worldwide with greater ease than before, they still need to overcome various barriers to successfully exploit the new opportunities. Some of these barriers might be related to inadequate connectivity, lack of skills, motivation, resources and appropriate systems (UNCTAD, 2017). Some research also mentions the cultural barrier which is often underestimated (Von Leipzig, et al., 2017).

Due to the importance of companies' digital transformation, and SMEs for Ecuadorian economy, this research seeks to analyze the main factors influencing the Digital Transformation in Ecuadorian SMEs and its influence on SMEs performance, thus proposing government policies to support companies to compete in the digital era. An online survey will be used to gather data, with the support of chambers or government institutions that hold companies' data, in order to reduce problems related to nonresponse. Finally, Structural equation modelling (SEM) will be employed to the test the model.

Keywords: SMEs, digital transformation, policies

Special Session D5: Efficiency in Electricity and Energy (KEMRI Session)

Title: Will pollution taxes improve joint ecological and economic efficiency of thermal power industry in China? A DEA based materials balance approach

Presenting author: Ke Wang (Beijing Institute of Technology)

Abstract

Previous efficiency measurements limited in providing less policy implications on trade-offs of economic and environmental outcomes inherent in China's electricity industry. This study proposes a modified data envelopment analysis (DEA) method combined with the materials balance principle (MBP) to estimate ecological and cost efficiency of this industry in China. The economic cost and ecological impact of energy input reallocation strategies for improving efficiency is identified. Furthermore, possible impacts of pollution taxes upon the levels of SO2 emissions are assessed. Estimation results show that (i) both energy input costs and SO2 emissions could be reduced simultaneously through increasing technical efficiency. (ii) It is possible to adjust energy input mix to attain ecological efficient, and correspondingly, SO2 emissions would reduce by 15%. (iii) This industry would reduce unit cost by 9% if it attained ecological efficient and reduce unit pollution by 13% if attained cost efficient, implying that there are positive ecological synergy effects associated with energy cost savings and positive economic synergy effects associated with SO2 pollution reductions. (iv) Estimated shadow costs of SO2 reduction are very high, suggesting that in the short term this industry should attaint cost efficient point instead of moving forward ecological efficient point, since alternative abatement activities are less costly and some of the abatement cost could be further offset by energy input cost savings. (v) There would be no significant difference between the impacts of pollution discharge fees and pollution taxes on SO2 emissions levels because of the relatively low pollution tax rate.

Keywords: Data envelopment analysis (DEA); Emission reduction; Energy efficiency; Environmental economics; Material balance; Sulfur dioxide (SO2)

Title: The effect of democracy on energy emissions efficiency: An empirical analysis

Presenting author: Li-Chen Chou (Wenzhou Business College)

Co-author(s): Wan-Hao Zhang, Hsing-Chun Lin

Abstract

This study explores whether the development of democracy can significantly affect energy emission efficiency. Database reference from Freedom House, International Country Risk Guide (ICRG) and World Development Indicator (WDI) were applied to analyze the relationship between the democracy development and energy efficiency of 121 countries from 1990 to 2013. Empirical result shows that the deepening democracy has a significant positive impact on the improvement of national energy efficiency. The further application of quantile regression estimation indicates that the positive impact of democratization on energy efficiency is stronger as the countries' energy efficiency improves from a status of low energy efficiency to a higher level. The empirical outcomes may reflect that the improvement of energy efficient outcome from the enhancement of democratic institution, or the economic development inspires the rise of environmental protection awareness, thereby affecting the use of energy and enhancing energy efficiency.

Keywords: Democracy, Energy Emission, Energy Efficiency

Parallel Session E5: Educational Efficiency Analysis

Title: Persistent and time-varying academic underachievement: An education production function framework

Presenting author: Oleg Badunenko (University of Portsmouth)

Co-author(s): Kristof De Witte, Subal C. Kumbhakar

Abstract

This paper deals with an analysis of underachievement of pupils. We measure underachievement as a shortfall between observed and potential performance (received school grades). Although this topic has been widely studied, all previous studies fail to control for pupil-heterogeneity. We employ a model where we control for pupil-heterogeneity, and introduce persistent and time-varying underachievement. Additionally we incorporate determinants of both persistent and time-varying underachievement. We apply this model to analyze underachievement of pupils in math and language, using Flemish data from kindergarten until grade three. To estimate the models, we draw on the longitudinal SiBO ('Schoolloopbanen in het Basisonderwijs') database in which approximately 7800 pupils are followed from age five (final year of kindergarten) until age eight (grade three, primary school) in the Flemish region of Belgium. The dataset comprises 212 schools for the period 2002-2006. The education production function is approximated by Fourier flexible form of grade four. In this study we account for opinion of parents about their child, teacher-specific characteristics such as teacher experience and exhaustion, class-size, as well as class- and school heterogeneity. We first examine the underachievement under the assumption that the underachievement in both math and language are same, then we allow underachievement to be different in these two subjects.

Title: Efficiency and technological change at South Korean private universities

Presenting author: Mehdi Shamohammadi (Inha University)

Co-author(s): Dong-hyun Oh

Abstract

Similar to all developed economies, the tertiary education has been focused for decades in the South Korean education system. This paper investigates the recent shift in teaching and research performance of South Korean private universities. Using the endogens and exegeses indicators via the development of a two-stage model in network DEA, this study attempts to achieve a new approach to university performance evaluation. The collected data for this study is obtained from the academic years, 2010 to 2016 for the 57 South Korean private universities. We employed a set of analytical procedure to evaluate the efficiency change and classify the targeted universities based on efficiency pattern analysis. The main findings indicate that generally, there is a negative trend in efficiency level among South Korean private universities in recent years. Moreover, the findings reveal concentration on research outputs plays a significant role in university performance. Specifically, the results demonstrate that the average of efficiency scores for the research-oriented universities are much higher than the teaching-oriented universities. Finally, this study attempts to propose the several approaches to state the policy implications, aiming to enhance the higher performance for the private sector of tertiary education in South Korea.

Keywords: Higher education, Efficiency, Network DEA, Research; Teaching, South Korean private universities

Title: Effects of technology transfer policy on technical efficiency of Korean university TTOs

Presenting author: Jaepil Han (Korea Development Institute)

Abstract

The Korean government has provided a variety of policy devices to boost technology transfer between academics and industry since the establishment of the Technology Transfer Promotion Act in 2000. Along with the enactment of the law, the Korean government made it mandatory for the national and public universities to install a department responsible for technology transfer. Accordingly, there was quantitative expansion of technology licensing offices(TLOs) but operational inefficiency issue was brought up. As a supplementary policy, the Korean government implemented a program to support the leading TLOs0 labor and business expenses. This paper questions whether the program has a significant effect on the technical efficiency of TLOs. We analyse publicly available university panel data from 2007 to 2015 using One-step Stochastic Frontier Analysis. The results suggest that the program was marginally effective for shifting the technical efficiency distribution to the right on average but it failed to maximize the policy impact by diversifying the policy means by target. The marginal effects of the program on technical efficiency differ according to the research capability and the size of each school. Additionally, we compare the technical efficiency against the licensing income in the starting and ending of the program. We found that both measures are improved for the leading TLOs, but only the technical efficiency is increased for the unsupported TLOs. Our empirical results imply that diversification of the program for schools with different characteristic can improve the policy effectiveness.

Keywords: Technology Transfer, Technology Licensing Office, Efficiency, Stochastic Frontier Analysis

Parallel Session F5: Environmental Efficiency Analysis

Title: A meta-frontier of data envelopment analysis on the emissions technology gap ratio

Presenting author: Ming-Chung Chang (Kainan University)

Abstract

This study finds a connection among the room for improvement in emissions efficiency (RIm), emissions efficiency and emissions technology gap ratio under the meta-frontier framework. The observations of this study include a total of 28 European Union member countries and divide them into Baltic Sea region (BSR) and non-Baltic Sea region (NBSR) countries in order to compare regional economic and environmental matters. After a comparison among them, we find that introducing advanced emissions technology is one available way for the BSR and NBSR countries to shrink their RIm. Based on the analysis on the Environmental Kuznets Curve (EKC), the conclusion is that no matter for BSR or NBSR countries, they all ignore an improvement in emissions technology when their GDP per capita increases. In addition, this paper also suggests that the inverted-U shape relationship between Rim and GDP per capita is a better economic and environmental development mode.

Keywords: Room for improvement in emissions intensity, emissions technology gap, Environmental Kuznets Curve

Title: Cost efficiency of recycling and waste disposal in Japan

Presenting author: Satoshi Honma (Tokai University)

Co-author(s): Jin-Li Hu

Abstract

Using the panel and the stochastic cost frontier models, this paper investigates recycling cost efficiency for 1,717 municipalities in Japan for the period 2011-2015. Our major findings are as follows. We find that cooperation of adjacent municipalities reduce waste management cost. We also find that more segmentation of recyclables, e.g., from bin to colored and non-colored bins, contributes to cost saving. The collection frequencies of paper, paper case, and non-white tray are cost-reducing factors and those of glass and plastic cost-rising factors. The cost-minimizing recycling rate is 5.2%, in more detail, 4.6% for organized and 5.9% for non-organized municipalities whereas the actual mean recycling rate is 22% and the policy target is 27%. The cost per waste ton can be reduced from 35,524 yen (approximately 444 US dollars) to 25,655 yen (322 dollar), by excluding the inefficiency. Furthermore, changing recycling rates from 22% to 5.2%, the cost would be reduced to 23,422 yen (293 dollar). Estimates of the three-stage waste management service that applies only for non-organized municipalities due to data availability allow us to investigate a source of the U-shaped cost structure with respect to recycling rate. It may come from increasing processing cost and decreasing disposal cost with an increase with recycling rate.

Keywords: stochastic cost frontier, recycling, waste, Japan

Title: Green performance, energy efficiency, economic growth and marginal abatement cost of Chinses cities: A panel VAR approach

Presenting author: Danjun Ji (Nanjing University of Aeronautics and Astronautics)

Co-author(s): Peng Zhou

Abstract

Fostering economic growth in a green way is the main concern for global policy-makers today. However, the environmental problems are unequally distributed around the world. The richer countries tend to transfer the pollution-intensive industries to jurisdictions with less stringent environmental standards, which is sometimes called the “pollution haven” phenomenon. Some developing economies are suffering from severe environmental problems while enjoying fast economic growth. China, the largest developing economy of the world, has made a growth miracle at the expense of its environment in the past two decades. The rapid economic growth of China has been mirrored by the rising energy demand and continuing environmental degeneration. In recent years, China’s central government have begun to realize the importance of environmental protection, and the green goals are integrated into the social and economic development policies.

In the environmental economics filed, estimations of Marginal abatement cost (MAC) have become an important policy evaluation tool in assessing the cost arising from carbon or pollutant emission mitigation. Another strand of literature evaluates the energy efficiency and environmental performance through various methods and indicators.

The economic and environmental policy evaluations have increasingly paid attention to the dynamic interdependencies among energy, environment and macroeconomy. The panel VAR approach can analyze the causal and dynamic relationships of various variables in a system by allowing for endogenous interactions and unobserved individual heterogeneity. Exploring the dynamic interactions among energy use, abatement cost, environmental performance and economic growth in an economic system can shed some light on the relationship between green economy and growth. Motivated by concern about how to achieve continued economic growth in a green way for developing economies, we analyze the dynamic interactions among energy efficiency, environmental performance, MAC and economic growth by the Panel VAR approach, on the basis of China’s city-level panel data. Our study can lend insight into policy designs related to energy, emission and economic growth for China’s government.

Keywords: Green performance, economic growth, marginal abatement cost, VAR

Title: Effect of reducing Nitrogen Oxide Emissions (via 1990 Clean Air Act), and ISO membership, on cost efficiency in the electric utility industry

Presenting author: Gerald Granderson (Miami University)

Co-author(s): Finn R Førsund

Abstract

This paper investigates the impacts reducing Nitrogen Oxide emissions (via having to comply with 1990 Clean Air Act), and Independent System Operator (ISO) membership, on cost efficiency in the U.S. Electric Utility industry. Under Phase 1 (effective 1995 to 1999) of Title IV of the 1990 Clean Air Act (CAA), several power plants were required to reduce their nitrogen oxide (NOX) emissions. Firms can reduce NOX emissions by (i) using fuel sources such as oil or natural gas, (ii) injecting an NOX reducing agent (this typically involves ammonia) into either the exhaust gas (process called selective catalytic reduction) or into the flue gas (process called selective non-catalytic reduction), (iii) retrofitting power plants with low nitrogen oxide burners or employing modifications that control fuel and air mixing to limit the emissions. Both oil and natural gas have typically been more expensive fuel sources than coal. The other methods to reduce NOX emissions can contribute to higher production cost. We examine whether Phase 1 compliance impacted production cost, higher marginal cost, and cost efficiency.

Second, beginning in 1997 FERC approved the formation of Independent System Operators (ISOs). These organizations (which were typically non-profit) would coordinate the generation of electric power across large geographic areas (typically one state). Firm membership in an ISO could lead to more competition among electric utilities, and possibly lower profits for electric utilities. ISO member firms may try to operate more efficiently (to maintain profits) by undertaking actions such as improving heat rates of power plants, and relying more on newer fuel efficient power plants (compared to the older plants). If the older plants that relied more on fossil fuels were subject to Phase 1, then relying less on these plants could impact the cost of complying with Phase 1. Relying on newer fuel efficient plants could lead to (1) lower NOX emissions, but also (2) higher production costs (newer units being more expensive). We test for the impact of ISO membership on how having to reduce NOX emissions affected cost efficiency.

Independent System Operator membership (denote variable iso, measured as binary (value of 1 if organization member, 0 otherwise) is (a) an endogenous explanatory variable in the cost function and cost efficiency equation (firms apply for membership). To handle the potential bias parameter issue this study follows the three-stage regression procedure used by Adams, Almeida, and Ferreira (2009), which in this case involves estimating a Probit model (stage 1), then performing Ordinary Least Squares (OLS) regression (stage 2), then estimating the stochastic frontier using the instrument from OLS regression (stage 3).

Parallel Session G5: Methodological Advances in Productivity and Efficiency Analysis

Title: Plant capacity and attainability: Exploration and remedies

Presenting author: Kristiaan Kerstens (IESEG School of Management)

Co-author(s): Jafar Sadeghi, Ignace Van de Woestyne

Abstract

The output-oriented plant capacity notion has been around since more than two decades. It has mainly been applied empirically in the fishery and the hospital sectors. A problem known since its introduction into the literature is that it may not be attainable, in that it presupposes potentially unlimited amounts of variable inputs to determine the maximum of outputs available. This issue of the lack of attainability has never been explored. This paper fills this void both theoretically and empirically. It finds that the attainability may be problematic, and that bounds on the amounts of variable inputs may well need to be imposed.

Keywords: Technology, Plant Capacity, Attainability

Title: Fuzzy performance evaluation for network structures

Presenting author: Adel Hatamimarbini (De Montfort University)

Co-author(s): Seyed Mojtaba Sajadi

Abstract

The objective of two-stage data envelopment analysis (DEA) models is to assess the performance of a group of production systems with two operational stages. This internal structure can be typically found in numerous situations such as seller-buyer supply chain, health care provision and banking systems. The vital advantage of two-stage DEA is to provide further insight into sources of inefficiencies and take the appropriate actions for improvement the system as a whole. In addition, setting aside the qualitative and subjective information leads to biased evaluations, both for the processes and the system efficiency. In this paper, we present the fuzzy input and output-oriented two-stage DEA models to calculate the global and pure technical efficiencies of a system and sub-processes when some data are characterised by fuzzy numbers. To this end, a possibilistic programming problem is first adapted and then transformed into a deterministic interval programming problem using the α-level based method. Compellingly, the method proposed in this study maintains the connection between two stages in a way that the total efficiency of the system is equal to the product of the efficiencies calculated from two stages. We illustrate the applicability of the proposed approach by an empirical study.

Title: Statistical methods for computing proper index numbers

Presenting author: Christopher O'Donnell (University of Queensland)

Abstract

I develop arguments and evidence supporting a claim that so-called "superlative" index numbers, as widely used by economists and statisticians to measure changes in quantities and prices, suffer from some significant deficiencies. Specifically, they do not satisfy common notions from measure theory. This deficiency has implications for almost all empirical work done by economists. In this paper, I show how statistical methods can be used to compute proper index numbers with varying degrees of characteristicity.

Title: Dealing with undesirable outputs in DEA: An aggregation method for a common set of weights

Presenting author: Weiwei Zhu (Nanjing University of Posts & Communications)

Abstract

The existing approaches that deal with undesirable outputs tend to either increase the efficiency scores of DMUs or keep the efficiency scores constant and do not allow undesirable outputs to achieve the opposite effect on the efficiency scores, which is inconsistent with the characteristics of undesirable outputs. To solve this problem, You and Yan (2011) proposed a new ratio model to allocate penalty coefficients for the undesirable outputs according to their economic costs, but there are differences of magnitude and dimension in various undesirable outputs under practical application. Therefore, this study uses common weights to obtain the aggregate weights of undesirable outputs instead of the penalty coefficients in the original method. We propose two new models to calculate the aggregate weights of undesirable outputs and illustrate the methods by using data on China's textile industry given by You and Yan (2011).

Keywords: Data Envelopment Analysis, undesirable output, common weights, efficiency

Parallel Session H5: Efficiency in Health Care

Title: Does new healthcare reform in China improve healthcare resources efficiency?

Presenting author: Ruizhi Pang (Nankai University)

Co-author(s): Ting Lin

Abstract

Since the implementation of China's New Health Care Reform Program in 2009, substantial progress and positive results have been achieved, but it has also caused some problems at the same time. How to evaluate the performance of the new health care reform and then help to improve the allocation efficiency of the very limited medical resources in China so as to solve the double problems of 'Both Difficult and Expensive in seeing doctors'. Chinese medical system is neither different from the U.S. nor from the Britain system. China's health care reform is significant to the world.

In this paper, based on the panel data sets of 30 Chinese provinces during the period 2008-2016, we adopt the translog distance function and GTRE model to estimate the persistent and transient efficiency of medical resource allocation in China. After considering the regional environmental heterogeneity, we analyze the factors that affect the persistent and transient efficiency. The results show that the coverage rate of medical insurance, per capita income and education level has a positive impact on the short and long term efficiency. Although we find that the overall efficiency of the allocation of medical resources has increased, the effectiveness of Public Hospital Reform, Hierarchical Diagnosis and Treatment, Medical and Pharmaceutical Separation was not significant, and the short-term efficiency has not obviously increased. Last, we put forward the further reform suggestions for improving the persistent and transient efficiency respectively.

Keywords: New Health Care Reform, Generalized True Random Effects Model, Transient and Persistent Efficiency, Determinants of Efficiency

Title: Efficiency of New Zealand's district health boards at providing hospital services: A stochastic frontier analysis

Presenting author: Nan Jiang (Auckland University of Technology)

Co-author(s): Antony Andrews

Abstract

New Zealand Public hospitals are set up to provide acute care, and to ensure that as many people as possible have access to elective services. The majority of secondary and tertiary healthcare services are provided through public hospitals managed by 20 local District Health Boards. Endeavours to measure efficiency in the health sector have been agonizing, primarily due to data gaps and generic perceptions around public sector performance monitoring. However, the rising investment in healthcare presents a substantial challenge to government budgets and highlights the importance of optimising resource utilization. Integrating multiple administrative datasets over the period of 2011-2017, this paper is the first to investigate both the technical and cost efficiency of NZ public hospitals. To accommodate multiple outputs and the problem of small number of census observations, stochastic input distance function and cost frontier are employed. Our empirical results indicate that the mean technical efficiency are within the range of 77% - 87% and cost efficiency is averaged at 85%. The results are sensitive to specifications of the inefficiency error term, but reasonably robust to the choice of functional form and different proxies for capital input. Factors that are found to have positive associations with efficiency performance include the proportion of Maori and Pacifica population, as well as the percentage of surgical cases out of total inpatient discharge. The proportion of those living in the most deprived areas and the average costs of inpatient discharges are having negative associations with efficiency performance.

Keywords: NZ hospitals, Stochastic Frontier Analysis, Technical Efficiency, Cost Efficiency

Title: Mix stickiness and an information economic rationale for the Farrell measure

Presenting author: Peter Bogetoft (Copenhagen Business School)

Abstract

In most organizations, the agent has superior information about the relative costs of different products or activities. This handicaps the principal when he seeks to adjust the product mix. It also impacts how we can best measure efficiency.

Our main conceptual finding is that there is "mix stickiness". The agent's superior information about the relative costs of different products or activities leads to an advantage for the status quo; i.e., there is inertia (or stickiness) in the mix of products or activities pursued. The historical mix has an advantage because the asymmetric information about relative costs has less of an impact when the mix does not change. If the mix changes, the producer can extract information rents by claiming high costs on the least reduced or most expanded products. Only in the case of larger shifts in the environment will the mix change. Changing the mix comes with the advantage of making rationing cheaper.

This finding gives an information economic rationale for the proportional adjustments of inputs or outputs used in the Farrell measure. It shows that for moderate adjustments, proportional adjustments are superior. When more extensive rationing is called for, sub-vector efficiency becomes more relevant.

Our analysis also gives new insight into several business practices. It suggests, for example, that for moderate downsizing, a reinforcement approach of proportionally cutting all activities (lawn mowing) is optimal. When more dramatic downsizing is called for, a reorientation approach of eliminating certain activities (divesting) is optimal. It also suggests that outsourcing may come at the cost of reduced adaptability, and it may help explain why most, if not all, healthcare systems struggle to control cost.

Keywords: Production mix, Production scope, Asymmetric Information, Rationing, Downsizing, Outsourcing, Health care cost

Parallel Session I5: Factors of Performance Improvement

Title: Effects of external supplier uncertainty on the benefit of demand information sharing

Presenting author: Hyun-Woong Jin (Hannam University)

Abstract

This study aims to analyze the effect of external supplier uncertainty on the performance of supply chain where internal players share information on the customer demand. Three types of external supplier uncertainty including supply lead time, supply volume and supply capacity are considered. To evaluate the effect of each type of uncertainty on the supply chain performance in various environments, the simulation methodology is used. For the simulation test, a supply chain that shares demand information and a supply chain that does not share demand information are modeled based on the system dynamics approach, and the performances of two supply chains are compared. Test results and managerial implications of this study are expected to provide meaningful insights to companies that intend to employ collaboration policies sharing customer demand information with other companies.

Title: A study of the success factors of women's leadership in E-business in the Baltic states

Presenting author: Ieva Meidutė-Kavaliauskienė (Vilnius Gediminas Technical University)

Co-author(s): Jurgita Raudeliūnienė, Vida Davidavičienė, Viktorija Radeckytė

Abstract

Women make up almost 50 percent of all workforce in the European Union (EU) countries, but their average hourly EU rate is 16,3 percent lower than men's (respectively, in Lithuania 14,2 percent, Latvia 17 percent, and Estonia 26,9 percent) (Eurostat 2017). In 2016, in only 21 companies out of 500, which is 4,2 percent, women held executive positions (Fortune 2016). In entrepreneurship statistics based on the founder's gender, women make up only 34,4 percent of independently working employees and 30 percent of business founders (European Commission 2014). More women than men possess higher education, but only a small part of women hold executive positions or make a decision to establish their own business (Hurley and Choudhary 2016). Academic sources often analyze the success factors of women's leadership in the context of managing large international companies, politics, medicine, war industry, and ed-ucation, whereas the factors of successful women's leadership in small and medium-sized enter-prises while establishing and developing e-business are very rarely taken into account. That is why this study seeks to complexly evaluate the success factors of women's leadership in the Baltic states and provide recommendations for how to encourage women to establish and develop their own businesses. To achieve the objective of this study, such research methods as analysis of scientific literature, multi-criteria and expert assessment (a structured survey, and an interview) were applied. While analyzing the success factors of women's leadership in the scientific litera-ture, 83 primary assessment factors, specified with 103 female experts who have established businesses in the three Baltic states, were identified through the multi-criteria and expert assess-ment method. During the study, it was determined that personal and professional competences have most impact on successful women's leadership in e-business.

Keywords: women's leadership, e-business, success factors, multi-criteria assessment, the Baltic states

Title: An analysis for urban competitiveness of global cities: Evidence from Oxford economics data

Presenting author: Jongsung Kim (Bryant University)

Co-author(s): Jae Ho Cho

Abstract

This study ranks the major global cities by developing a comprehensive competitiveness index of those cities using the Global Cities Forecast (2013) data provided by Oxford Economics. The city competitiveness index is developed from 18 indicators including scale index, ratio index, and growth rate index. The Gini coefficient is used for the distribution index. We use the logit panel regression model to analyze the relationship between the competitiveness index and the distribution index. We find that an increase in income inequality has a statistically significant negative effect on the economic growth rate in 5-year time lag. We also have compiled global rankings of 770 cities' competitiveness by combining the global competitiveness index and the distribution index. The trend of rank shows that U.S. cities will continue to be competitive and the cities in China, Oceania and the Middle East are expected to be more competitive. On the other hand, the competitiveness of cities in Japan and Korea is expected to decline. Accordingly, by 2030, the global competitiveness landscape will change substantially, except for the United States. The city's global competitiveness should include not only economic performance but also various aspects such as quality of life, infrastructure, role of the public sector, and civic consciousness. Although the data used in this study is the most comprehensive by including 770 major global cities, the variables in the data mainly consist of economic performance such as the regional gross production, the value of the local gross value, population, and employment, making it difficult to analyze overall urban competitiveness.

Keywords: Urban competitiveness index, Gini coefficient, Logit analysis

Special Session A6: Productivity in Asia 2 (ASIA KLEMS Session)

Title: Japan's prefectural-level KLEMS: Productivity comparison and service price differences

Presenting author: Joji Tokui (Shinshu University)

Co-author(s): Takeshi Mizuta

Abstract

We compile Japan's prefectural-level KLEMS database and conduct productivity comparison among Japanese 47 prefectures. One of the difficulties in compiling regional KLEMS database is how to handle possible variation in service prices across different regions. To cope with this problem, we estimated cross-regional price-level differences in each industry in the service sector (construction, electricity, gas and water, real estate, transportation and communication, and other services in the private sector) based on prefectural-level item-wise data of service prices compiled by the Japan's Statistic Bureau. In estimation, we applied the Country-Product-Dummy (CPD) method, a method used to estimate absolute purchasing power parities among countries, to cross-prefectural data in Japan. As a result of re-calculation, the standard deviation of cross-regional TFP difference indices in 2009 decreased by around 13 percent. In addition, by using the derived cross-regional price difference indices, we tested whether the Balassa-Samuelson effect, which holds among international economies, also holds among regional economies in Japan.

Keywords: Regional price level differences, Regional productivity differences, Absolute purchasing power parities

Title: Structural change in Pakistan's economy based on KLEMS data, 1980 - 2010

Presenting author: Abid Aman Burki (Lahore University of Management Sciences)

Co-author(s): Syed Muhammad Hussain, Mushtaq Ahmad Khan

Abstract

This paper attempts to measure structural change in Pakistan's economy by taking data of seven industries covering the period from 1980 to 2010. The paper uses Pakistan KLEMS data developed on the pattern of internationally comparable data of EU KLEMS and Asia KLEMS. The paper begins by presenting the growth accounting results, evaluates the sources of growth and derives measures of multifactor productivity at the industry level. The descriptive statistics of each industry based on data from 1980 to 2010 displays interesting patterns in the time-path of MFP growth. On average, MFP has been positive in all industries, especially in post-1995 period, except one industry. The agriculture industry along with the basic metals, textile, and non-metallic mineral products industries have become more labor intensive in post-1995 period while food & beverage, pulp & paper and machinery industries have become more capital intensive in period from 1980 to 2005. Then it presents new evidence on patterns of structural change in Pakistan by applying the shift-share methodology to labor productivity. It also conducts the sensitivity analysis of the shift-share results to the level of aggregation of the respective industries and identifies heterogeneity among industries.

Title: Labor share and market power : Evidence from the Korean manufacturing plant-level data

Presenting author: Jin Ho Park (The Bank of Korea)

Co-author(s): Ruizhi Pang

Abstract

The aggregate labor share in Korea has risen since the 1970s different from the widely held view, as well as many papers' assertion that the labor share, reflecting the self-employee sector, has declined on the contrary. However, those discussions not only show their evidence solely based on the aggregate or industry-level data, but also explain the causes of the falling labor share with the limiting factors influencing the change in the labor share.

Using micro data from the Statistics Korea, I provide the empirical evidence that in Korea the labor share of the manufacturing sector declined over the last decades and the fall in the labor share is associated with an increase in average market power of large firms having higher productivity and lower labor share. In addition, I show that the decline in the labor share is considerably due to a reallocation component between firms, rather than due to the lower labor share within firms. The results suggest that the relationship between the labor share and the market power in firm level is negative in the Korean manufacturing sector.

Special Session B6: ICT, Innovation and Development 2 (ITPP Session)

Title: Analyzing innovation strategies of global IT vendors through TPC certification acquisition activity

Presenting author: Chan Lim Park (Seoul National University)

Co-author(s): Junseok Hwang

Abstract

Certification is widely used as the management innovation strategy to verify quality and performance of products (or process). The more public confidence in certification has made by number of stakeholders' participation of enactment or standardization. Since various opinions have gathered, enacted document contain powerful representativeness. Moreover, certification is useful to compare among products when it has verified within same standards. Global IT vendors are treating certification related activity as one of the important business strategies. Within development of ICT and information system, computing industry, foundation of those of system, have deeply participated in these certification process not only for proving quality and performance but for marketing effects. This study analyzes Global IT vendors' innovation strategies within the certification activity. We select TPC (Transaction Processing Performance Council), which has high public confidence in industry, to see their certification strategies. Then, we utilize SNA (Social Network Analysis) methodology to find the effect of cooperation and relationships among vendors.

Keywords: Innovation Strategy, Global IT Vendors, TPC Certification, Social Network Analysis

Title: Approach to developing an integrated Information Asset Management framework to increase the public value of citizen-centric e-Government : based on the Estonian and Korean cases

Presenting author: Hanna Shmagun (Belarusian State University)

Co-author(s): Hyenyoung Yoon

Abstract

Despite the huge growth of information- and data-related technology, the insufficient conceptualisation of information as an asset has become increasingly obvious. Consequently, the implementation of Information Asset Management (IAM) in organisational practice faces serious challenges. It is vital to embed effective and transparent IAM in e-Government – one of the most dynamic and complex socio-technical systems – in order to increase its public value. A properly developed IAM can ensure sustainability and further development of e-Government systems, improve decision-making processes, and lead to greater citizens' satisfaction with, and trust in, the public sector. The complexity of the e-Government context, especially the issue of inter-agency, inter-actor and inter-sector information exchanges (with associated interoperability issues), poses additional challenges for IAM implementation. This paper applies a multi-method approach to address this problem and proposes a set of Information Asset Taxonomies integrated into an initial conceptual model. The latter seeks to present an integrated framework of IAM embedded in an e-Government Enterprise Architecture. This model will be tested, and then developed and described further based on empirical data obtained from the Republic of Korea and Estonia as exemplars of global e-Government leadership. The model verification and potential validation will later be conducted in a country where e-Government is still at an early stage of development.

Keywords: information assets (IAs), information asset management (IAM), e-Government, e-Government services (public e-services) to citizens (G2C e-services), IA Taxonomies, IAM integrated framework, e-Government Enterprise Architecture

Title: The Effect of the Patent Convergence on Global Competitiveness Index for Cross Country Analysis

Presenting author: Ahreum Hong (Kyung Hee University)

Co-author(s): Kyongoui Kim, Sungdo Jung, Kyunghoi Kim

Abstract

The most distinctive trend of innovation is industry convergence. Indeed, the development of the convergence industry today is a large part of the economic value added, and it has come to create a new 'convergence age' through the bio-nano era. The concept of convergence was first suggested in the study of Rosenberg (1963) in the early 1960s in terms of industrial convergence. In general, convergence is the convergence of at least two items, or a combination of at least two separate science, technology, markets, and industries (Dowler and Hagedoorn, 1998; Sahal, 1985) (Choi and Valikangas, 2001). A product-service integration system that combines products and services to meet customer needs is an example of recent convergence trends (Kim et al., 2011).

The study examines whether there is an association or causal relationship between the competitiveness of the country that prepares for the revolutionary fourth industrial revolution in a country where characteristics of knowledge converged through the research process of the national competitiveness index (GCI, WEF). This paper show the ways to innovate to increase national competitiveness by Industry Convergence with the measurement of Patent Convergence.

Keywords: Convergence Patent, National Competitiveness Index, Convergence Industry, Convergence Patent Index

Parallel Session D6: Productivity Economics of Agriculture and Natural Resources

Title: The Impact of international trade on world agriculture production: Evidence from a panel of 126 countries 1962-2014

Presenting author: Binlei Gong (Zhejiang University)

Abstract

This article aims to evaluate the impacts of international trade on world agriculture production, especially the changes between the GATT and WTO periods. International trade may cause spillover effects across countries and affect total factor productivity. Spatial production functions and model averaging methods are utilized to jointly consider cross-country dependence due to international trade and geographic proximity. Using a panel of 126 countries from 1962–2014, this article derives not only spillover effects that were overlooked, but also provides more accurate productivity than was estimated with bias in literature. In the GATT period, international trade caused negative spillover effects and hindered productivity growth. In the WTO period, however, international trade generated positive spillover effects and improved productivity. Moreover, GATT offered no benefits, whereas WTO provided a premium through international trade to its members. We find that the benefits of international trade and WTO accession are currently enjoyed in agricultural production.

Keywords: Agricultural spillover effects, world agricultural productivity, international trade, spatial econometrics and model averaging, GATT and WTO periods

Title: Lifting up smallholder maize productivity using sustainable intensification: Evidence from Ethiopia

Presenting author: Ali Mohammed Oumer (The University of Western Australia)

Co-author(s): Michael Burton, Amin Mugera, Atakelty Hailu

Abstract

Enhancing agricultural productivity without degrading the natural resource base is seen as a key policy strategy in ensuring food security across sub-Saharan Africa (SSA) amidst natural resource-degradation and changing climate. An emerging consensus is that these twin goals can be achieved through sustainable intensification (SI). In this article, the SI is defined as efficient optimization of inputs, use of sustainable agricultural practices (SAPs) and enriching socioeconomic innovations. However, empirical evidence on the benefits of SI across SSA and, in particular, the mechanisms by which SI can improve smallholder farmers' agricultural productivity is contested and debated.

Few recent empirical studies have reported positive effects of natural resource management and conservation agricultural practices on technical efficiency. However, these studies do not control for environmental conditions, socioeconomic and institutional factors and other farm-specific characteristics, which can lead to poor identification of production models and hence, imprecise policy inferences. Moreover, these studies aggregate conservation and natural resource management practices into a single index which does not reflect farmers' production goals. Smallholder farmers often use a portfolio of conservation practices as complements and substitutes to deal with their multitude of constraints such as moisture stress, pests, high cost of fertilizer, soil erosion and so on.

This paper investigates the productive efficiency of smallholder farmers and the effects of SI practices in offsetting output shortfalls and productivity gaps. We use nationally representative farm household large panel data set from Ethiopia for our investigation. Alternative time-varying heteroscedastic stochastic production frontier modelling techniques, which account for factors affecting inefficiency, heterogeneity across farms and heteroscedasticity in the variance of inefficiency are employed. The results are robust to alternative specifications and modelling approaches.

Our results suggest that substantial output shortfalls (32%) is due to inefficiency in production, implying the scope for expanding output with existing resources and technology is significant. Cultivated land area is found to be the key driver for output followed by nitrogen application and farm labour, whereas oxen-drawn power is found to reduce output. Further, farmers appear to face diminishing marginal productivities for labour and seed, but increasing marginal productivity for nitrogen. We find that some inputs are substitutable while others are complementary, suggesting that farmers could exploit synergistic effects while optimizing inputs. We also find

evidence that use of SAPs significantly increases output and efficiency. Thus, output shortfall can be offset by the use of SAPs, exploiting synergies in the inputs and substantial increases in niche-tailored fertilizer supply. Suitable and affordable farm power alternatives to the traditional animal-traction system and prudent use of herbicide may also help reduce labour demand and soil erosion. Overall, our results underscore that SI can be used to improve productivity more effectively than often presumed, and its broad premises appear to be crucial in fostering food security goals in developing countries such as Ethiopia. These results are important for policy makers concerned about increasing smallholder food productivity sustainably in resource-constrained production environments.

Keywords: maize productivity, inefficiency, optimizing inputs, sustainable intensification, smallholder farmers, stochastic production frontier, heteroscedasticity, panel data

Title: Natural rubber economics between China and Southeast Asia (The impact of China's economic slowdown)

Presenting author: Siskarosa Ika Oktora (Politeknik Statistika STIS)

Co-author(s): Alfada Maghfiri Firdani

Abstract

China has become the second largest economy in the world since 2010. China's economy is supported by the rapid growth of its automobile manufacturing industry. The rapid growth of automobile and tire industry will increase the demand of its main raw materials. It is natural rubber. China is one of major producers in the world. But huge consumption can not be supplied by its domestic production. Thus China relies heavily on imports. The main producer of natural rubber in the world comes from Southeast Asia countries. Thus China and Southeast Asia are dependent on their economy in terms of availability of natural rubber as raw materials. The economic slowdown in China since 2008 is expected to affect the economy of countries who have trade relations with China, especially Southeast Asia countries. This research aims to analyze the determinants of natural rubber trade flow from Southeast Asia countries to China since 2000-2016 using panel data analysis. The results show that natural rubber price, real effective exchange rate and China’s economic slowdown have significant effect on natural rubber trade flow to China. While Southeast Asian natural rubber production has no significant effect on natural rubber trade flow to China. China as the main importer of natural rubber from Southeast Asia has a big role to grow natural rubber export in Southeast Asia. So if China's economy does not improve soon it will affect the economy in Southeast Asia.

Keywords: International Trade, Natural Rubber, Panel Data Analysis

Parallel Session E6: Efficiency of Public Spending and Policy

Title: Verification of the influence of moral suasion on sovereign debt default risk

Presenting author: Chien-Jung Ting (Shu-Te University)

Abstract

The motivation of this paper is to verify if moral suasion reduces sovereign debt default risk. Using the dynamic panel data model, and controlling for global common factors and specific country factors with fundamentals, we specify the effect of portfolio home bias toward domestic assets on sovereign debt default. Differing from other studies on this topic, we use the Merton model (contingent claims analysis) to calculate the sovereign default risk because this constructed-indicator reflects variations in credit risk and the market value of balance sheet of a country. Our empirical results point out that periphery countries (Greece, Italy, Ireland, Portugal, Spain, or GIIPS) indeed reduce sovereign debt default risk via portfolio home bias toward domestic equity and bonds. Core countries tend to reduce sovereign debt default risk via home sovereign bond holdings. However, we conclude the moral suasion in the aftermath of sovereign debt default increases sovereign debt default risk in periphery countries.

Keywords: Moral suasion, sovereign debt default, portfolio home bias, Periphery countries, the Merton model (contingent claims analysis)

Title: The efficiency of village government speeding in Indonesia: A meta-frontier analysis

Presenting author: Tengku Munawar Chalil (Osaka University)

Abstract

Two decades of Indonesia decentralization quests, recent decentralization regime acknowledges autonomous village, which is the smallest level of government. Following the policy for direct intergovernmental transfer led to skepticism in the extent to another backfired policy and prone to be corrupted. This study investigates the efficiency of village government using meta-frontier analysis and found that extending decentralization to village level indeed relatively efficient. Bureaucracy size, capacity, and ineffective representative became significant effects on its efficiency.

Keywords: decentralization, efficiency, bureaucracy, Indonesia

Title: Innovation-oriented science influence on academic assets combination: an assessment in Brazil

Presenting author: Clément Bert-Erboul (University of Campinas)

Co-author(s): André Cherubini Alves

Abstract

How do academic entrepreneurs manage and mix resources such as intellectual capital, financial support and social networks when they engage in innovation-oriented research? Through the human capital theoretical framework, we assess usual and unusual combination of these resources. We investigate this question through an empirical case study in Brazil with 779 profiles of researchers involved into the Sao Paulo State program, promoting small business innovation research from 1998 to 2017. We highlight the difficulties to combine private financial support and an international scientific qualitative label with other resources such as public funds, or publication quantity. The data sample reveals an important role of social capital through co-authoring and supervision to combine other assets. Finally, we propose three strategies of academic entrepreneurs following the three most combined assets which are publications, co-authoring and supervisions.

Keywords: academic entrepreneurship, human capital, research assets, social capital, economic capital, intellectual capital

Special Session F6: Productivity in Management and Business

Title: Decomposition of the profit difference: application in Chinese city banks and Taiwanese banks within exchange rate

Presenting author: Xiang Chen (Soochow University)

Co-author(s): Tsu-Tan Fu, Emili Grifell-Tatjé

Abstract

This study applies the data envelopment approach and combined the profit change model by Grifell-Tatje and Lovell (2015) and group comparison model by Camanho and Dyson (2006) to propose a decomposition of the profit difference between two groups by considering separately production and price effects. On the production side, we identify factors related to differences in technical efficiency, dominance of one group-specific technology over the other (technical gap) and size differences. On the price side, price differences among inputs and outputs prices explained by competitive advantages can also explain a big part of the profit gap. This study also introduces the exchange rate to compare price effect and its components between different groups with different currencies. For an empirical illustration, this study applies the proposed methodology and uses 31 Taiwanese banks and 46 Chinese city banks in 2010-2014 to empirically measure and compare the profit change and profit difference decomposed components between two groups.

Keywords: profit difference, decomposition, productivity, group performance

Title: E-Commerce as a marketing strategy to increase small medium entreprises (SMEs) profit

Presenting author: Agatha Saputri (Yogyakarta State University)

Co-author(s): Sukirno, Hardika Dwi Hermawan

Abstract

In the 21st century, development of science and technology has encouraged SMEs for using E-Commerce to advertise their products. In Indonesia, sales with E-Commerce system have done by ten big companies such as Lazada, Tokopedia, Elevania, Blibli.com, Bukalapak, Matahari Mall, Alfacart, Blanja, JD.ID, and Bhinneka. Based on the Central Bureau of Statistics data in 2013, SMEs has a significant contribution to Indonesia's gross domestic product about 1.536.918,80 billion. SMEs as business actors can expand market share by using E-commerce as a marketing strategy. However, in reality not all SMEs in Indonesia implement E-commerce. They are still accustomed to the type of conventional selling that causes them not develop. BeadHaus is one of the SMEs in Indonesia that's start using E-Commerce as a marketing strategy. BeadHaus utilises social media such as Instagram, web, Tokopedia, and Shopee to market its products to consumers widely. Based on this phenomenon, this research focuses on the used of E-Commerce as a marketing strategy to increase Beadhaus profit. This research used descriptive analysis method of quantitative data approach with case study research type. Based on data obtained BeadHaus able to increase its profit by using E-Commerce as a marketing strategy about 9,9 %.

Keywords: E-Commerce, Marketing Strategy, SMEs

Title: Pre-evaluating efficiency gains from potential mergers and acquisitions based on resampling DEA approach: evidence from Chinese railway sector

Presenting author: Jin Zeng (Nankai University)

Co-author(s): Xuejie Bai

Abstract

This study combines resampling DEA and potential merger gains model to pre-evaluate the efficiency gains of three representative M&As schemes (i.e. regional M&As, megamerger and coalitions between 'strong' and 'weak' railway bureaus) for Chinese railway sector over the period from 2011 to 2015. The results reveal that regional M&As are better than other two schemes in creating economies of scale. The social function and state-owned property make it difficult for Chinese railway bureaus to exit market freely as normal firms. This is also the reason why megamerger can not generate efficiency gains at all. A proper M&As can produce a so-called 'stimulant' effect in short run. However, as the 'stimulant's efficacy' has been exhausted over time, the effect of M&As will become weak gradually. At this time, it is particularly important for policy-makers to introduce a series of desirable institutions. Finally, our empirical findings also support the view that M&As between two (efficient or not) DMUs does not ensure positive efficiency gains.

Keywords: Resampling DEA, Virtual M&As, Potential efficiency gains, Railway bureaus

Parallel Session G6: Productivity in Japan

Title: Declining labour share and aggregate productivity growth

Presenting author: Hideyuki Mizobuchi (Ryukoku University)

Co-author(s): Sotashi Honma, Yung-Han Lee

Abstract

In recent years, many countries experienced the declining labour share of their national income. Several explanations have been proposed for this development such as globalization, automation and higher mark-up. However so far, few papers examine how it affects the aggregate productivity growth of each country. This paper provide a simple and tractable framework for decomposing the aggregate productivity growth into important contributing factors which allows us to detect the impact of the declining labour share. Fully attributing the changes in factor shares to augmented technical changes, we generalize the conventional growth accounting framework so as to incorporate an additional term of technical bias. In the end, we apply this methodology to the US industry data during 1998-2015. The US labour share has been steadily declining since 2002 and its aggregate productivity has stagnated especially since the financial crisis of 2007. We show that the impact of the declining labour share on the aggregate productivity is positive on average. Thus, we can conclude that if the factor share had been stable during that time, the US aggregate productivity growth would have been even slower.

Keywords: Context-dependent data envelopment analysis (DEA); Securities firms; Japan; Online securities firms

Title: The structure of the knowledge network: An exploratory study of the Japanese auto-parts product space

Presenting author: Eri Yamada (Nagoya City University)

Co-author(s): Jiro Nemoto, Tetsu Kawakami

Abstract

The Japanese automobile industry uses cutting-edge technologies and is expected to play an important role in technological innovation and economic growth. Because of the characteristics of vertical and hierarchical organizational structures, consistent development is believed to be associated with extensive knowledge spillover among car manufacturers (OEMs) and auto-parts suppliers.

The purpose of this study is to provide quantitative facts about the structure of auto-parts supply knowledge networks, which remain illusive in the literature. In particular, we pay attention to the heterogeneous nature of different auto-parts products with different technologies. Applying an exploratory network approach, we measure the knowledge/technological relatedness between all pairs of auto-parts and map the auto-parts product space. Then the evolution of the core-periphery structure of that space is examined.

Following the geography of innovation literature, we apply the calculated proximity measures to construct the auto-parts product space, which is a network-based representation of the structure of the Japanese automobile industry. During past two decades, a growing body of empirical literature in the geography of innovation (Hausmann and Klinger, 2007; Hidalgo et al., 2007; Boschma et al., 2015; Balland et al., 2017) has analyzed the specific knowledge base of regions and their evolution over time. Hidalgo et al. (2007) developed the product space framework, which is a network-based representation of the economy. They use the export data by country and measure a network-based representation of economy. The central idea of this approach to capture relatedness is to look at how often two products are co-exported by countries (Balland, 2016). This outcome-based, or ex post, measure is agnostic on the sources of relatedness in the sense that 'if two goods are related because they require similar institutions, infrastructure, physical factors, technology, or some combination thereof, they will tend to be produced in tandem, whereas dissimilar goods are less likely to be produced together' (Hidalgo et al., 2007, p.484). We consider that specific technology / knowledge of auto-parts suppliers is embedded in the type of their products and uncover the structure of the Japanese automobile industry.

To systematically investigate the relatedness between auto-parts we collect data from a published book of surveys, which provides information on 255 auto-parts supplied in Japan. The information of supply relationships between Tier 1 suppliers and OEMs is summarized in an input-output matrix format by auto-parts. Each row in the matrix accounts for the deliveries by the suppliers named at its left to the OEMs identified at the top of the matrix. The unique large-scale data enables us to make the useful analytical contributions.

Title: A spatial autoregressive stochastic frontier model for panel data incorporating a Model of technical inefficiency

Presenting author: Takahiro Tsukamoto (Nagoya University)

Abstract

By integrating Battese and Coelli's (1995) model and the spatial autoregressive model, we develop a spatial autoregressive stochastic frontier model for panel data. The main feature of this frontier model is a spatial lag term of explained variables and joint structure of a production possibility frontier with a model of technical inefficiency. This model addresses both spatial dependence and heteroskedastic technical inefficiency. This study applies maximum likelihood methods considering the endogenous spatial lag term. The proposed model nests many existing models. Further, an empirical analysis using data of Japanese manufacturing industry is conducted, and these existing models are tested against the proposed model, which is found to be statistically supported. The findings suggest that the estimates in the existing models may exhibit bias because of the lack of determinants of technical inefficiency, as well as a spatial lag. This bias also affects the technical efficiency score and its ranking.

Keywords: Stochastic frontier analysis, Technical efficiency, Spatial econometrics, Spatial autoregressive dependence, Spatial lag, Production possibility frontier

Title: Empirical analysis on the openness of buyer-supplier relationships and productivity in the Japanese automobile parts industry

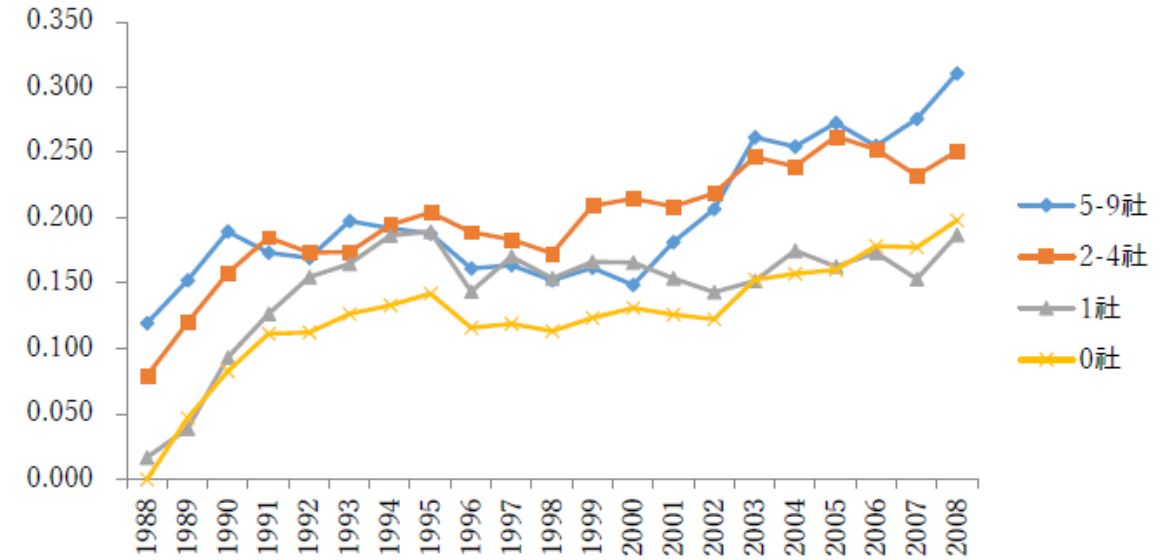
Presenting author: Hyeog Ug Kwon (Nihon University)

Co-author(s): Kenta Ikeuchi, Kyoji Fukao, Hiromichi Goko, Young Gak Kim

Abstract

In this paper, we investigate the causes and impacts of the recent changes in the inter-firm business relationships in the Japanese automobile industry from 1994-2010. Our main results are the following: First, we find that buyer-supplier relationships in the automobile industry in Japan have become more open. Furthermore, productivity differences between suppliers with multiple clients and those with only one assembler client have expanded gradually in recent years.

TFP index (logarithm) of automobile parts manufacturer by number of supplier finished car manufacturers



Second, by estimating a cost function, we find that the efficiency of supplier firms declines with an increase in the number of assembler clients, but that the magnitude of the negative effect of the number of clients

on production efficiency has been diminishing over time. Third, comparing the attributes of suppliers with multiple assembler clients to those of suppliers with only one assembler client and the second or lower tier suppliers, we find statistical differences not only in structural factors such as firm size and foreign ownership rate but also in firm activities such as research and development (R&D) and export as well as business performance such as productivity, profitability, and survival rate. These results indicate that a technological change such as "modularization" in parts and components probably weakens the importance of inter-firm coordination in the automobile industry in Japan, enhances the openness of the buyer-supplier relationships, and increases the differentials between suppliers with and without open relationships with assembler clients.

Keywords: modularization; transaction relationships

Parallel Session H6: Industrial Analysis using DEA

Title: The dynamic productivity growth of the Indonesian food and beverages industry

Presenting author: Maman Setiawan (Padjadjaran University)

Abstract

This research investigates the dynamic productivity growth and its decomposition in the Indonesian food and beverages industry during the period from 1981/1980 to 2014/2013. This research uses panel data of 44 subsectors in the Indonesian food and beverages industry for the period 1980-2014. To estimate the productivity growth, this research uses the Luenberger indicator of dynamic productivity growth. The indicator is defined through the concept of a dynamic directional distance function. This research also uses the technical inefficiency measure which accounts for the presence of adjustment costs. This research found that the dynamic productivity growth reaches to approximately 0.65% during the period 1981/1980-2014/2013. The technical inefficiency change and scale inefficiency change contribute to the positive productivity growth while the technical change contribute negatively to the technical change, on average. The dynamic productivity growth also can be different between the firms or the subsectors depending on the ownership, location, level of investment and the size of the firms.

Keywords: dynamic productivity growth, Indonesian food and beverages industry, directional distance function, Luenberger indicator

Title: Heterogeneity by common shocks in DEA technical efficiency

Presenting author: WooPyeong Yi (Pusan National University)

Co-author(s): Sangmok Kang

Abstract

This paper introduces a problem which is from heterogeneity in DEA technical efficiency caused by each DMU's different sensitivity to common external shocks and suggests a way to measure the size of the heterogeneity with long term panel data based on statistically driven an artificial shock free efficiency measure. We apply the method to firm level data of steel industries of Korea as an example. We name size of the effect in DEA technical efficiency of a DMU based on a standard a Cycle Variation Error. By measuring Cycle Variation Errors, the decision making using the DEA technical efficiency can be improved.

Title: Ranking based on expected structural efficiency impact: Evidence from Chinese banks

Presenting author: Lingling Li (South China University of Technology)

Co-author(s): Jens Leth Hougaard, Zhiqian Yu, Ning Zhu, Xiaoping Xie

Abstract

In the present paper, we introduce a new way of obtaining league tables for bank performance. That is, we provide tools for making a complete ranking of the banks based on their expected structural efficiency impact. The most popular approach, by far, is based on the so-called super-efficiency index of Andersen and Petersen (1993). However, we see at least three problems, including infeasibilities, no common reference, and extreme (unrealistic) weights, with conventional super-efficiency approach which may cause ranking results to be incomplete and/or distorted. Therefore, we try to overcome these drawbacks above by designing new types of ranking indexes. The fundamental idea behind the new ranking approach is inspired by an elegant approach from economics of fair division introduced by Shapley (1953): agents are rewarded according to their expected marginal contribution to different coalitions of other agents.

We apply two main indices to evaluate performance of Chinese banks. The first, Average Efficient Contribution Index, is following the original DEA and super efficiency approach in the sense that firms are partitioned into efficient and inefficient firms, whereas the second, Average Contribution Index, uses the idea of measuring individual firms' impact on structural efficiency for every individual firm using the complement (and coalitions hereof) as reference.

We find important differences between our ranking result and that of the conventional super-efficiency approach. We argue that the new way of ranking the banks is more in line with expectations based on various key performance indicators. The findings further reconfirm that overall the efficiency of Chinese banks is improving, and the performance of the large commercial banks surpass that of the small to medium sized commercial banks.

Keywords: Banking, Marginal efficiency change, Ranking method, Data envelopment analysis

Parallel Session I6: Econometric Analysis for Performance Measurement

Title: Determinants of international tourism in Indonesia

Presenting author: Faiza Husnayeni Nahar (Universitas Muhammadiyah Yogyakarta)

Co-author(s): Mufti Alam Adha, Muhammad Azizurrohman, Izzani Ulfi, Husna Karimah

Abstract

Tourism is considered as big industry which growing up faster compare to other industry in this recent year. It is reported that Indonesia received approximately 11.5 million of international tourists in 2016. Because the tourism shows significant trend in Indonesia and getting strong position in the third rank as the foreign revenue for this country, the government willing to boost up the factors that might contribute more on attracting international tourist. This study tried to analyse the determinant factors of international tourist in Indonesia by using Random Effect Model. The variables are GDPs origin and destination country, exchange rate of origin country, free visa impact and length of distance in Indonesia during the period of 2006 to 2016. The study found that all variables are statistically significant at the 5 percent of level of significance. GDPs origin and destination country and country with visa-free entry have positive effect to the number of international tourist arrival while the rest which is exchange rate of origin country and length of distance have negative effect to the international tourists. Hence, to increase the number of tourist in Indonesia, the government needs to promote aggressively to the international tourist by conducting important events, increasing the number of countries that receive Indonesia free visa and maintain the GDP in both origin and destination country.

Keywords: Tourism, Fixed Effect Model, GDPs origin and destination country, exchange rate of origin country, free visa impact, length distance

Title: Statistical analyses of Korean defense industry and its policy implications

Presenting author: Won-Joon Jang (Korea Institutes of Industrial Economics and Trade)

Co-author(s): Ho-Sung Kim, Mi-Jung Kim, Jai-Pil Song

Abstract

The defense industry is important not only for national security but also for economic growth. In this regard, the Moon Jae-in administration has pledged to support the defense industry as part of its platform. This paper statistically describes the sales, exports, employment, R&D investments and global status of 289 Korean defense companies, analyzing data collected through surveys taken from in 2012 and 2016.

According to results of a statistical analysis of the defense sector, Korea ranked 10th in terms of defense budget and arms production in the world as of 2016. It also ranked highly in arms exports, which have skyrocketed in recent years, to 9th in the world, but export volume remains just 13.6 percent of total sales volume, and Korean arms exports constitute a mere 2.5 percent of the global export market. In terms of global competitiveness, Korean defense firms' products recorded scores of 85 to 90 percent, while government and business posted figures of 80 to 81 percent compared to other advanced economies.

The defense industry envisions a future in which arms exports account for 5 billion USD by 2022. In order to achieve this vision, outlined in the G7 Defense Industry plan, the domestic-oriented monopoly must be broken, which will allow competition to take root, maximizing economies of scale and strengthening global competitiveness.

Keywords: Defense Industry, Statistical Analyses, Policy implications

Title: What are main sources of markup for state-owned enterprises? - Empirical study based on Chinese industrial enterprises database

Presenting author: Bing Qian (Changzhou Institution of Technology)

Abstract

The relationship between administrative monopoly and markup has become a hot topic in recent research. Some researches show that government plays an important role in the intervention of market access (also called administrative monopoly). In order to analyze the main sources of markup, we propose a model of estimating firm's productivity and markup based on the method of De Loecker et al.(2012). We use Chinese industrial enterprises database from 1998 to 2008 in 29 industries to estimate markup of state sector and private sector, and then use panel data and instrumental variables to conduct empirical tests for administrative monopoly and markup. The results show that state-owned firms have distinct characteristics of lower capital price than private ones. Administrative monopoly strengthen such role and increase the markup of the firm. However, subsidies did not increase the firm's markup under the effect of administrative monopoly because subsidies make more non-productive expenses such as the management fees, which in turn push up the cost of the firms.

Keywords: Administrative monopoly, Markup, Instrumental variable

Special Session A7: Advanced Stochastic Frontier Methodology

Title: Comparing two groups of decision-making units based on semiparametric regression

Presenting author: Hohsuk Noh (Sookmyung Women's University)

Abstract

In this paper, we consider the stochastic frontier model where the deviation of the output from the production frontier is composed of two components, a one-sided technical inefficiency and a two-sided random noise. In such situation, we develop a semiparametric-regression-based test to compare the efficiencies of different groups of DMUs. Our test not only shows better performance in numerical studies than the previously proposed ones for the same purpose but also has a theoretical advantage that it is working under more general assumptions. We illustrate our method by utilizing the developed test to detect the difference in inefficiency mean between two groups which differ in a task-performing structure for Industry-University-Institute Collaboration.

Title: Uncertainty and business cycle asymmetry: An application of a serially-correlated two-tier SF model

Presenting author: Hung-Jen Wang (National Taiwan University)

Co-author(s): Yu-Fan Huang, Sui Luo

Abstract

In this paper, we propose a two-tier SF model where the inefficiency components are serially correlated. We show that by extending the frontier function to a stochastic trend, the model can be interpreted as an unobserved component model (UCM) of business cycle (BC) studies. A Bayesian estimation method is proposed where the result of a scaled mixture normal distribution from Yue and Rue (2011) is adopted to help the estimation. Compared to existing UCM in the BC literature, the new SF model is more intuitive and provides greater flexibility in modeling BC asymmetry. Using this model we are able to test three types of BC asymmetries: intrinsic, dynamic, and no asymmetries. To our knowledge, this is the first paper to discuss the different types of BC asymmetry in the literature. The model also allows us to study the correlation between the asymmetry and the macro/policy variables. In particular, we are interested in how economic uncertainties affect the asymmetry and the BC in general. Using measures of macro uncertainty and financial uncertainty as examples, we find that macro uncertainty is strongly linked to output deviation in the U.S. and the effect is asymmetric. The impact of financial uncertainty on business cycles is less prominent.

Title: Endogeneity in a panel stochastic frontier model: A system approach

Presenting author: Subal C. Kumbhakar (Binghamton University, State University of New York)

Co-author(s): Hung-pin Lai

Abstract

In this paper, we address the endogeneity of inputs in a panel stochastic production frontier model from economic behavioral point of view. We assume that firms minimize cost (for a given output level) in choosing the input quantities. That is, the inputs are endogenously chosen by the firm and are correlated with inefficiency, as well as any other unobserved factors. The optimal input choice rule under cost minimization together with the production function constitute a system of equations that solve the endogeneity problem. We control for fixed firm-effects in each equation and propose using the concentrated likelihood approach to estimate the model. We also correct for the incidental parameter bias by using the half-panel jackknife estimator.

Keywords: Endogeneity, panel stochastic frontier, technical inefficiency, allocative inefficiency, incidental parameter problem, half-panel jackknife estimator

Special Session B7: Methodological Advances in DEA

Title: Selective measures in DEA: input and output orientations

Presenting author: Mehdi Toloo (VSB-Technical University of Ostrava)

Co-author(s): Esmaeil Keshavarz

Abstract

Data envelopment analysis (DEA) is a nonparametric data-driven approach to evaluate the performance of a set of homogeneous decision making units (DMUs) with multiple inputs and multiple outputs. The number of performance measures plays a crucial role in DEA and if the number of performance measures is high in comparison with the number of DMUs, then a large percentage of DBUs will be identified as efficient, which practically is not favourable. Some selecting models have been extended in order to tackle this issue by selecting a set of most influential performance measures which meets a rough rule of thumb in DEA. These models attempt to minimize inputs while satisfying at least the given output levels. This study extends a selecting approach aims to maximize outputs without requiring more of any of the observed input values. Practically, we utilize a real data set of banking industry as an example to illustrate the potential application of these two approaches. The results point out that different selective measures are selected by different orientations.

Keywords: DEA, Evaluation, Selective measures, Input orientation, Output orientation, Banking industry

Title: Constructing the performance evaluation model of Asia's cultural and creative industry by dynamic network DEA

Presenting author: Shengwei Lin (National Taipei University of Technology)

Co-author(s): Yueh-Cheng Wu

Abstract

Cultural and creative industries (CCIs) are playing an increasingly vital role in the era of the postindustrialized knowledge-based economy. These vigorous industries have driven enterprise-level innovations and have consequently received academic attention. Identifying the method to construct a model that effectively and fully develops the economic capacities of these industries and comprehensively evaluates their performance is worthy of investigation. This study conducted a data envelopment analysis (DEA) model to construct a model for evaluating Asian CCIs. A dynamic perspective was incorporated alongside DEA to assess the performance of Asian CCIs in terms of value creation. The analysis results can serve as a comprehensive reference for evaluating the effectiveness of CCIs. In this study, this analysis approach not only revealed differences in the effectiveness of internal operations among Asian CCIs but also considered the intertemporal effect of carryover on performance variables, thereby effectively mitigating the drawbacks of traditional DEAs. This study conducted empirical analyses of national economic development data and financial data from Asian cultural and creative enterprises. The study results can facilitate the development of methods for evaluating industry effectiveness and extend the scope of discussion from that of previous studies.

Keywords: Cultural and Creative Industry, Data Envelopment Analysis

Title: Ratio data in DEA models

Presenting author: Victor V. Podinovski (Loughborough University)

Co-author(s): Niels C. Petersen, Ole B. Olesen

Abstract

It has long been recognised that ratio data, including variouspercentages and fractions, should generally not be used in conventional DEA models. Examples of ratio data are found in many applications, including health care, education and banking. In this paper we explain why the standard DEA models are generally notsuitable for applications with ratio data. We argue that a model of production technology in which some inputs and outputs are ratios should satisfy a modified set of production axioms, in particular a new axiom of convexity that treats ratio and volume data differently. Based on these axioms, we formally derive a new ratio-VRS technology in which ratio inputs and outputs are native types of data and are given a theoretically correct treatment. We also outline extensions of this technology to the case of constant returns to scale.

Special Session D7: Efficiency and Impact of R&D Investment and Policy (STEPI Session)

Title: Characteristics and performance of firms that start R&D in the recession period

Presenting author: Inha Oh (Konkuk University)

Co-author(s): Seogwon Hwang

Abstract

Starting an R&D activity is a costly decision for a firm. Especially during the economic crisis period, it will be very difficult to start R&D unless there is confidence in future performance for a firm. In this study, we use firm-level panel data from Korea to observe the performance of companies that have been doing R & D since the mid-2000s. The company's performance is measured using various indicators such as sales, exports, employment, rate of return, and productivity. In particular, we want to see how companies that start R&D during the global financial crisis period, 2008 to 2009, differ in terms of characteristics and performance when compared to companies that started R&D in other periods. A simple comparison between R&D and non-R&D firms raises the issue of selection bias, and the propensity score matching methodology is applied to relieve it. As a result, companies that started R&D during recession showed superior performance on various indicators compared to companies that started R&D at other times. Korea is one of the countries with the largest expenditure of R&D expenditure relative to GDP, and this study will bring policy implications related to R&D support.

Keywords: R&D, global financial crisis, propensity score matching, Korea

Title: Analysis of the inter-industry spillover effect of government R&D investment

Presenting author: Pilseong Jang (Science and Technology Policy Institute)

Abstract

Scientific and technological innovation is the driving force for long-term growth of the nation and industry. On the other hand, the growth rate of the economy is shrinking due to aging, low growth, and financial crisis. And it is difficult to increase the investment size of the government and the private sector. Discussions on R&D investment are being narrowed to achieve higher R&D investment efficiency.

In order to assess the performance and impact of government R&D investment, it is important to judge whether it is promoting knowledge production that maximizes social benefits. The representative characteristic of knowledge that maximizes the social benefits to be supported through public funds can be judged by whether it has a high ripple effect. The ripple effects of research and development are often referred to as external effects in traditional economics terms, or as spillover effects. The more the benefits of innovation and the other members of the society get through the R&D activities, the greater the spillover effect of R&D activities.

Government R&D investment is not the same as private R&D investment. In spite of the private research and development activities for private profit, the economic spillover effect should be high, and it is necessary to play a role to lead private innovation. Rather than being limited to a specific industry or a substitute for civilian innovation input, it should function as a complementary to the industry. Therefore, it is necessary to constantly check whether government R&D investment has sufficient spillover effect.

The purpose of this study is to analyze whether the spillover effect of government R&D investment is sufficient. The subject of analysis can be divided into four major. First, it is largely divided into spillover effects in the industry and spillover effects between industries. And each spillover effect is analyzed by indirect spillover which promotes long-term effect by promoting direct spillover and additional innovation directly affecting economic value-added value and sales.

The analysis methodology is based on the path analysis based on the growth accounting model. In order to estimate the direct spillover effect of government R&D investment, government R&D investment and private R&D investment are divided into R&D investment stock, and it is estimated by inserting it into growth accounting formula. In order to estimate the indirect spillover effect that additionally creates private innovation, we construct a path model that estimates the private R&D investment equation including government R&D investment stock. Based on the results of the simultaneous analysis of the two estimating equations, it is possible to confirm the direct and indirect spillover effects of government R&D investment.

In this analysis, we examined the direct / indirect effects of government / private R&D investment in

the industries. In the case of government R&D investment, it has the effect of promoting private research and development of other industries and creating the added value of other industries. On the other hand, private R&D investment has the effect of reducing the value added of other industries and private R&D investment in other industries while increasing the value added of self-industry. Government R&D projects have a positive spillover effect that does not affect the industry in any way and has a positive spillover effect on the industry as a whole. While private research and development activities have a certain value-added effect on specific industries, Which has a negative spill-over effect. In addition, government R&D investment has a positive spillover effect, which increases private R&D investment in other industries, and private R&D investment has a negative spillover effect which reduces private R&D investment in other industries.

This analysis shows that the government R&D investment has a high ripple effect, and it is suggested that the performance analysis of the government R&D investment should be performed considering the concept of spillover. In contrast to private R&D investment to boost return on investment, government R&D investment is aimed at high social impact, so it is necessary to analyze the effect of spillovers to analyze the economic effect of government R&D investment.

Title: Innovation and economic growth: Exploring a time lag effect

Presenting author: Igor N. Dubina (Novosibirsk State University)

Abstract

This conference paper will present a new conceptual model and a new methodology of the comprehensive assessment of intellectual and innovation activities of regions and territories. This model includes such comparatively new and rarely discussed categories as “regional intellectual and innovation potential”, “regional intellectual and innovation climate” and “regional intellectual and innovation capital”. In the context of regional intellectual and innovation activities, the capital implies some tangible outcomes of R&D activities such as invention, patent and know-how that can be realised in various forms of new technologies, products and services, and thus generate income, contribute to GRP and increase regional investment attractiveness; the potential reflects the availabilities of certain opportunities and resources for forming intellectual capital in a long term; the climate reflects the current state, R&D infrastructure and socioeconomic environment for transforming the potential into the capital. Intellectual capital of a region influences its economic development that, in turn, has an influence on the components of the regional intellectual and innovation activities.

A corresponding methodological approach integrating a deductive conception of the components of regional intellectual and innovation activities with inductive and empirical methods will be presented as well. This approach helps to construct corresponding indexes for the assessment of intellectual and innovation potential, climate and capital of a region. Grouping the indicators for the index calculation is based on assessing their internal consistency with Cronbach’s alpha and other methods of measurement theory. The validity and reliability of the developed indexes are proved with special statistical techniques. The integral index of regional intellectual and innovation activities demonstrates a good balance and consistency in term of its components.

This approach was tested on the basis of a set of economic and statistical data characterising the development of 12 Russian regions for 15 years with methods of factor analysis, correlation and regression analysis and measurement theory. Correlation and regression analysis of the aggregated indexes and indicators of regional economic development (GRP, GRP per capita, and income per capita) demonstrates a stable and statistically significant relationship between economic development of the regions and their intellectual and innovation activities. At that, a level of accumulated intellectual capital most strongly influences all the analysed economic indicators, and a level of available intellectual and innovation potential exerts the least influence. This result is quite logical and explainable from the view point of our conception of regional intellectual and innovation activities.

This paper also hypothesises a “deferred effect” of the innovation and economic inter-influence that may be related to a time lag from the moment of creation of an object of intellectual property to its implementation

in a form of some tangible economic outcomes. Since the investment in intellectual and innovation spheres depends on a recent level of regional economic development and outcomes and vice versa, the mutual influence of economic and innovation development has a deferred effect. An effect of the accumulation of intellectual and innovation potential and its transformation into intellectual and innovation capital and, consequently, the influence on regional economic development is not immediate, but it has some time lag. The growth of regional economy also does not lead to an immediate acceleration of the accumulation of the intellectual and innovation capital, since this influence is indirect (through a change of the potential and climate). And these effects may be amplified on the principle of a positive feedback in the course of time.

The panel data regression analysis performed in this research proves the hypothesis of the mutual influence of regional innovation and economic development with a deferred effect. Thus, changes of regional intellectual and innovation climate lead to noticeable changes in regional economy on average 7 to 8 years later and the accumulation of intellectual and innovation capital most visibly influences on regional economic development on average in 5 to 7 years. Such an inference is also explicable from the view point of our concept of intellectual and innovation development of a region, since we consider the climate as an environment and conditions for the transformation of intellectual and innovation potential into the capital. Recently, methods and models for assessing the inter-relations and inter-influence of a level of regional intellectual and innovation activities and economic development are relatively rarely considered in the literature and used in practice, especially with the use of formal mathematical methods and tools. In particular, a deferred effect and time lags in this inter-influence have not been sufficiently studied and presented in the literature yet. The development of approaches to assessing such inter-influence may contribute to improving a system of monitoring intellectual and innovation potential of regions and countries, the accumulation of intellectual and innovation capital, and the intensity of their transformation into economic outcomes and outputs.

Parallel Session E7: Financial Analysis using DEA

Title: Exploring mutual fund performance from the decision-making quality and capital magnet perspectives

Presenting author: Wen-Min Lu (National Defense University)

Abstract

Mutual funds have enjoyed rapid growth in recent years and have become one of the most important investment vehicles for investors. To assist mutual fund managers in performance management and to help investors select outstanding mutual funds, this study employs a two-stage network data envelopment analysis model to evaluate the decision-making quality and capital magnet efficiencies of 155 equity mutual funds registered in Taiwan over the period 2007-2016. In addition, this study also applies cluster analysis and multidimensional scaling to discuss the competitive advantage of mutual funds. The empirical results show that the mutual funds environment is highly competitive; although fund managers have already improved their decisionmaking quality, their capital magnet efficiency still declines. By using benchmarking analyses, this paper finds out that there are 10 mutual funds performing outstandingly in decision-making quality and capital magnet efficiencies, from which practical suggestions are provided to investors. Finally, this study constructs a market competition matrix to help fund managers (and investors) improve their operating and portfolio performance, as well as resource allocation.

Keywords: Data envelopment analysis, Network DEA, Mutual fund performance, Multidimensional scaling

Title: Measuring the loan efficiency of Japanese regional banks and its strategic implication - Analysis of Kanto-region based consolidation

Presenting author: Hirohisa Shimura (Soka University)

Abstract

I develop a new indicator for bank's loan efficiency which is based on the two-stage data envelopment analysis(DEA) using parameters of the deposits, outstanding loan amounts, and net interest income. The paper illustrates the power of the indicator by investigating the relationship between the loan efficiency and consequent industry consolidation in Kanto region, a largest financial region in Japan. The Japanese banks has faced a challenge due to a slow lending growth, zero interest policy, and others; thus, consolidation among regional banks were inevitable. From 2004 to 2017, there were 19 regional bank consolidations in Japan and 5 were observed in the Kanto region. From 2014, there were 7 consolidation cases and 4 were observed in Kanto region. There are few researches conducted to analyze a relationship between the loan efficiency and the industry consolidation.

This study creates a loan efficiency map (see Figure 1) to measure a relative loan efficiency among the reginal banks under the consideration. The loan efficiency of a bank was decomposed to two factors: lending efficiency (loan amount/deposits) and profitability (net interest income/loan amount). Utilizing these parameters, a two-stage DEA was applied to measure a relative distance of individual factors (lending efficiency and profitability indices) from the industry benchmark. The model is based on Chen-Zhu model which incorporates the two sub-processes seamlessly. Furthermore, these scores were plotted scores on the map to visualize the current status of individual bank's loan efficiency within the

industry. Furthermore, analysis on a strategic implication by using the loan efficiency map were discussed. Data from 16 regional banks in Kanto region were employed as of March 31, 2013; 9 banks were involved in 3 subsequent consolidations.

The results show that 7 banks were on the loan efficiency efficient frontier and 6 banks were on the loan profitability efficient frontier, and two were both optimal in loan efficiency and loan profitability (See Figure 2). Four banks with the optimal loan efficiency were involved in the industry consolidation. Furthermore, the loan efficiency map suggests that one consolidation was due to complement its loan efficiency, two were due to improve profitability while a combination of single DEA models cannot reveal the similar implications. The loan efficiency map can be employed by management to oversee the current landscape of the loan efficiency.

Figure 1: Loan efficiency map

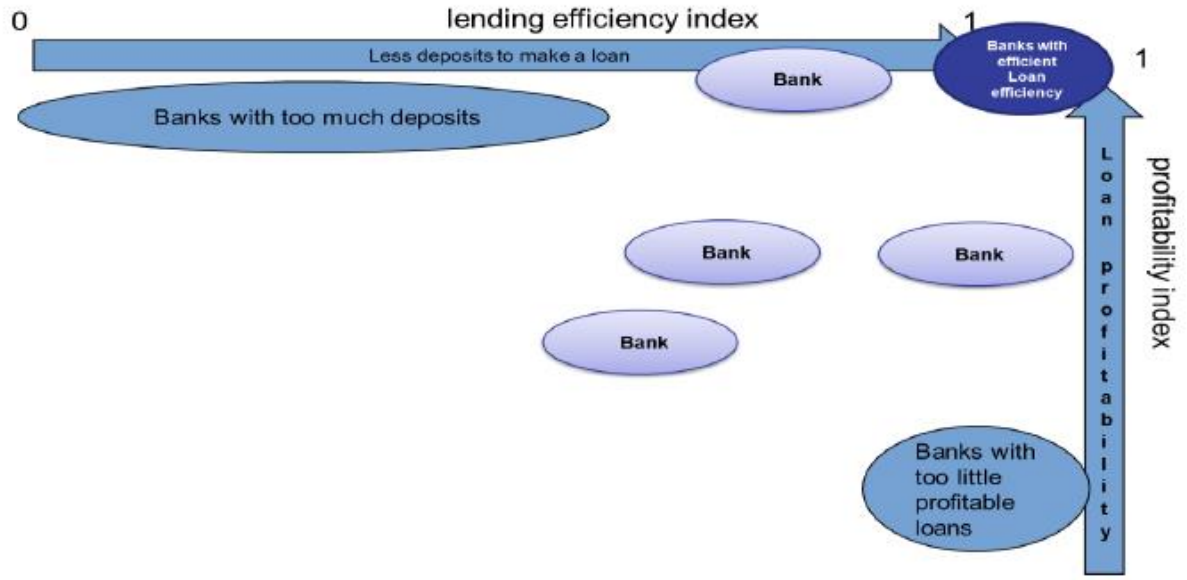
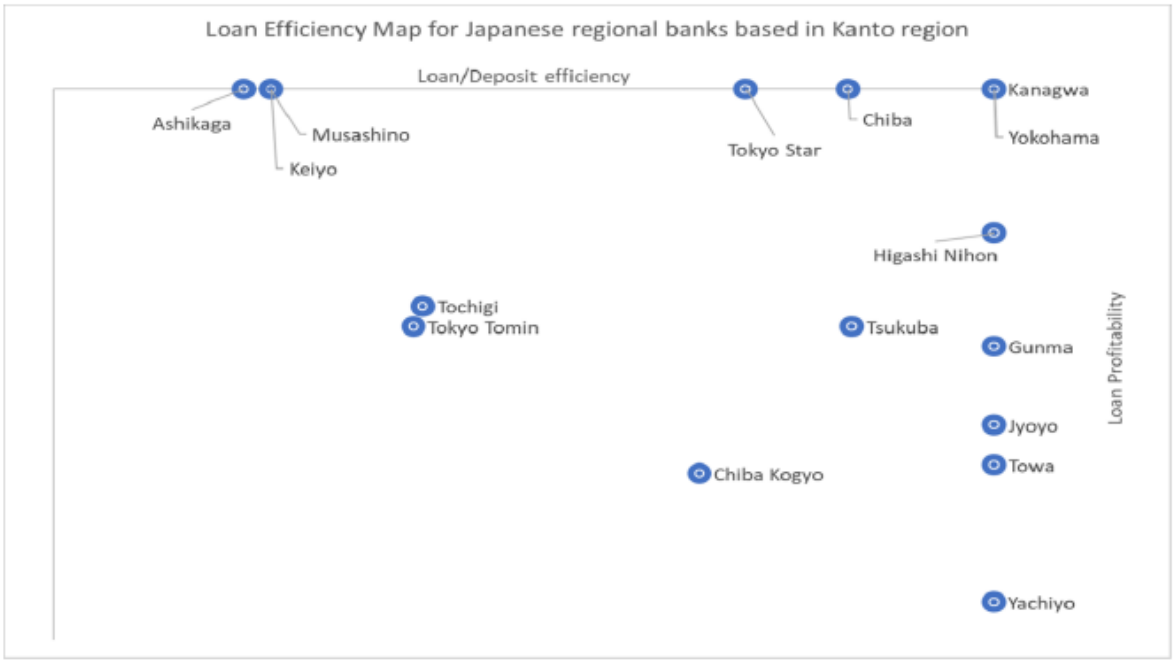


Figure 2 Loan efficiency map for Japanese regional banks based in Kanto region



Keywords: Data Envelopment Analysis, Japan, Banking, Consolidation, Regional banks

Title: A context-dependent efficiency evaluation of Japanese securities firms

Presenting author: Jin-Li Hu (National Chiao Tung University)

Co-author(s): Sotashi Honma, Yung-Han Lee

Abstract

This study adopts the context-dependent data envelopment analysis (CD-DEA) proposed by Seiford & Zhu (2003) to compute the efficiency of Japan's 23 securities companies during 2010-2015, and discusses whether or not online securities firms are relatively more efficient. We use three inputs and one output to compute the efficiency scores and a set of DMUs are divided intodifferent levels of efficiency frontiers. Several levels of efficiency frontiers are constructed to provide the inefficient securities firms with achievable targets and sub-targets as role models in management practice. Online securities firms concentrated on brokerage business with lower cost are stable on levels 1 and 2 for six years. However, quasi-major and mid-ranked securities firms operated the counter services in local area shows a downward trend of the efficiency during the period. On the other hand, the major securities firms and securities firms affiliated with major banks managed diversified businesses including retail and wholesale are up and down in middle level. The empirical results show that online securities firms are more efficient than other types of securities firms in Japan. The middle-ranked regional securities firms show the lowest efficiency.

Keywords: Context-dependent data envelopment analysis (DEA); Securities firms; Japan; Online securities firms

Parallel Session F7: Efficiency and Productivity in International Economics

Title: TFP change and its components for Swedish manufacturing firms during the 2008-2009 financial crisis

Presenting author: Pontus Mattsson (Linnaeus University)

Co-author(s): Jonas Månsson, William H. Greene

Abstract

A driving force of economic development is growth in total factor productivity (TFP). Manufactured goods are, to a large extent, exports, and represent an important part of the Swedish economy. This study investigates TFP change and its components for the Swedish manufacturing industry, compared with the service sector, during the years 1997-2013, centering on the financial crisis. Stochastic frontier analysis (SFA) is used to disentangle persistent and transient efficiency from firm heterogeneity and random noise, respectively. In addition, technical change (TC), returns to scale (RTS) and a scale change (SC) component are also identified. Along with the empirical analysis, an elaborative discussion regarding TC in SFA is provided. The persistent part for manufacturing (service) is 0.796 (0.754) and the transient part is 0.787 (0.762), indicating improvement potentials. Furthermore, TFP change is substantially lower between the years 2007-2013, compared to 1997-2007, driven by lower technological progress. Policy should, therefore, target interventions that enhance technology. However, care needs to be taken so that policies do not sustain low-productive firms that otherwise would exit the market.

Keywords: financial crisis, manufacturing, persistent and transient efficiency, technical change, total factor productivity

Title: The Euro effects on EU trade flows and balances: Evidence from the cross sectionally correlated panel gravity models

Presenting author: Yongcheol Shin (University of York)

Co-author(s): Vanessa Gunnella, Camilla Mastromarco, Laura Serlenga

Abstract

Following recent developments in panel data studies, we propose the cross-sectionally dependent panel gravity models which deals with both strong and weak cross-section dependence, simultaneously. Our approach allows to control for trade barriers and multilateral resistance through the use of unobserved factors and an endogenously selected spatial cluster. Applying this methodology to the dataset for 91 country-pairs of EU14 countries over the period 1960-2008, we find that the Euro impact on trade is modest, but the Euro is found to promote EU integration by eliminating exchange rate-related uncertainties. The Euro is also found to contribute to significantly deteriorate the trade balance of the Southern against the Northern Euro members, though its magnitude seems to be rather modest as compared to massive current account imbalances observed in the Euro area. Hence, countries, pondering to join the Euro, would benefit from the ongoing process of integration, but should also be wary of unexpected build-up of unsustainable current account imbalances.

Keywords: Heterogenous gravity panel data models, weak and strong cross-section dependence, multilateral resistance, the Euro effects on trade flows, balances and the EU integration

Title: Determinants of external default and domestic default

Presenting author: Chien-Jung Ting (Shu-Te University)

Co-author(s): Ruizhi Pang

Abstract

Purpose of this paper is to explore the determinants of external default and domestic default. As a methodological innovation of this paper, we go beyond standard probit analysis and use a decision-theoretic classification technique known as Random Forest (Breiman et al., 1984). For measuring variable importance, we adopt the long-dated cross-country data on public debt developed by Reinhart and Rogoff (2009), which covers 66 countries in 1970 to 2012. The robust conclusions as follows. 1. “Debt-related variables” have higher importance on eruption of external default. 2. “Macroeconomic-related variables” reflecting the background of a country have higher importance on eruption of domestic default. 3. “The interest payments from debt” have higher importance on eruption of banking crisis. Especially, the determinants of external default are corresponding with those of banking crisis. In the past, the relationship between macroeconomic variables and debt default is hard to conclude. However, we get robust conclusions, reflecting that “macroeconomic-related variables”. “debt-related variables” are indeed important determinants of external default, domestic default and banking crisis.

Keywords: external default, domestic default, Probit model, Random Forest, Data Mining

Parallel Session G7: Productivity in Korea

Title: Servicification of manufacturing: Evidence from Korean multinational firms

Presenting author: Nyeong Seon Son (Sogang University)

Co-author(s): Hyunbae Chun, Jung Hur

Abstract

Servicification of a manufacturing firm is related to within-firm resource reallocation toward service activities. Using Korean firm-establishment matched data, we study changes in service employment share within firms over the period of 2008 to 2013. In particular, we emphasize a leading role of multinational firms in Korean in the progress of firm-level servicification. Our hypothesis is that because they have relocated their production facilities to foreign countries they might transform their labor structure within firms faster than non-multinational firms. Our empirical findings suggest that the Korean multinational firms owning subsidiaries in emerging countries has changed their employment structure toward service workers more than non-multinational firms. Furthermore, the servicification appears more evident with regular workers than with temporary workers. Also, Korean MNEs increased share of service workers in R&D than in Wholesale-and-Retail trade industries.

Keywords: Servicification, Multinational Enterprise, Employment

Title: Productivity issue of Korean companies: Multicriteria approach for risk reducing within investment project's evaluation

Presenting author: Olga A. Shvetsova (Korea University of Technology and Education)

Abstract

Multi-Criteria Decision Making (MCDM) methods have evolved to accommodate various types of applications. The quality of the decisions made is essentially determined by the selected alternatives based on the analyses. Dozens of methods have been developed, with even small variations to existing methods causing the creation of new research branches. This paper performs an original research of Multi-Criteria Decision Making methods in investment management, examines the advantages and disadvantages of the identified methods under risk environment, and explains how their common applications relate to the effectiveness of investment projects. The analysis of MCDM methods performed in this paper provides a clear guide for how MCDM methods should be used in investment project's analysis for Korean industrial companies. Multi-criteria decision-making (MCDM) methods are types of Operations Research tools that can be used to solve complex problems with high uncertainty, conflicting objectives, different forms of data and information, and multiple interests and perspectives, and can account for complex and evolving biophysical and socio-economic systems.

Keywords: multicriterial approach, risk management, Pareto set, investment project, Korean company

Title: Dynamic industry productivity measures: South-Korean thermal electricity plants 2001-2008

Presenting author: Finn R Førsund (University of Oslo)

Co-author(s): Almas Heshmati

Abstract

Production function for an industry level are often based on estimating an average function and then blown up to the aggregate level. However, if the production relations of the micro unit (plant) follow a vintage structure with differences of substitution possibilities ex ante and ex post such an aggregation may give both limited and misleading information. The crucial difference at the micro level between substitution possibilities ex ante (before an investment is made) when capital is to be invested and ex post when capital is committed is that substitution between all factors of production including capital is possible as in a standard neoclassical production function, while the input coefficients of variable factors of production are frozen to given values. Capital with its technology characteristics is sunk and has no independent role except as defining the output capacity of the unit.

A vintage model is the most appropriate model for production activities transforming inputs with material content and being capital intensive, as is the case for thermal electricity plants. A high degree of embodied technology implies that a cross-section of plants will generally show significant heterogeneity. This should be reflected at the aggregate industry level. A way of doing this is to construct an aggregated industry production function by performing a classical maximization of industry output given the total amounts of variable inputs, the input coefficients and the production capacities of the micro units, e.g. plants. This function is termed the short-run industry function. The assumption is that all variable inputs (labour and primary energy) are footloose and can be allocated on micro units to achieve maximal industry output. Thus, the short-run industry function is the construct of the analyst and cannot be observed and will in general yield a higher production for the observed total variable input quantities than the observed total industry output. The relative difference in output for given amounts of inputs is an immediate measure of industry efficiency.

The short-run industry function cannot in general be solved explicitly analytically, but isoquants can be found numerically as well as expansion path and scale properties. In order to show the heterogeneity productivity can be calculated for different levels of output, using relevant points on the expansion path for calculations. Total variable factor productivity can be defined as the ratio between value of output and an index of inputs using fixed input prices as weights calculated for the relevant point on the expansion path.

The short-run function provides a snapshot of the industry structure and as entry of new units with new embodied technology enters and old units becoming uneconomic exit, the change in the short-run function over time gives us a picture of dynamic structural change. The change in productivity over time can then be captured

by comparing productivities for the same isoquant for different time periods using the fixed input prices.

The data set of yearly observations is for the period 2001-2008 for 74 plants. The variables are production of electricity, number of employees, capacity of generation and total consumption of primary energy in calories.

Parallel Session H7: Environmental Performance Evaluation

Title: Forecasting fuel demand by income groups to stimulate environment and energy efficiency in Pakistan

Presenting author: Arsalan Hussain (Lahore University of Management Sciences)

Co-author(s): Abid Aman Burki

Abstract

This paper estimates fuel demand system for Pakistani households by employing a Quadratic Almost Ideal Demand System (QUAIDS) model on a sample of about 18,000 households. Six fuel types included in the demand system are electricity, gas, kerosene oil, firewood, petroleum and 'other fuels' which includes charcoal, coal, dung cakes and crop residue. Based on the estimates for price and expenditure elasticity, it forecasts changes in demand for these six fuels under various distributional assumptions. The paper predicts that a pro-rich distribution of income will decrease demand for low quality fuels and increase demand for high quality fuels. Conversely, a pro-poor income distribution will increase demand for low quality fuels. A pro-middle-income growth will lead to mixed results. Increase in demand for low quality fuel is likely to risk environmental sustainability, which warrant policies that can reverse this outcome. The paper also predicts that the demand for firewood is likely to increase under both pro-poor and pro-rich income growth scenarios indicating that deprivation in fuel consumption may continue to increase thus needing policy makers' attention. Estimates of cross-price elasticity indicate that subsidized price of LPG can reduce demand for firewood and 'other fuels', which warrant policies that encourage liberal LPG imports for increased LPG supply and reduced prices to bottom income groups. Demand for electricity is favored by all income groups suggesting that policy makers may help reduce use of low quality fuels by lowering price of electricity for rural consumers and minimizing power shortages so that electricity is easily substituted with low quality fuels that are environmentally unsafe.

Keywords: QUAIDS, Fuel demand, Demand forecasts, Pakistan

Title: Environmental regulation and green total factor productivity: Dilemma or win-win? - Empirical test based on Chinese industry

Presenting author: Jiangfeng Hu (Southwest University)

Co-author(s): Qinghua Huang, Xiding Chen

Abstract

The empirical research on environmental regulation and productivity is mostly focused on the test of unidirectional relations, ignoring the reverse effect of productivity on environmental regulation, that is, there may be a bidirectional dynamic relationship between environmental regulation and productivity. In an attempt to fill this gap, this paper uses slacks-based measure (SBM) and Luenberger Productivity Index to calculate the green total factor productivity (GTFP) of 36 industrial sectors in China from 2003 to 2015. Pollution emission intensity (PEI) and pollution control cost (PCC) are regarded as proxy variables of environmental regulation respectively. Finally, the Panel vector autoregression (PVAR) model tests whether there is a bidirectional dynamic relationship between " PEI–PCC–GTFP ". The results show that causality between GTFP and PCC is bidirectional, but there is only unidirectional causality relationship with PEI. In the short term, the impact of government's emission reduction policies on GTFP has a timeliness. Current environmental policies can indeed promote GTFP growth. At the same time, GTFP can also help reduce PEI and offset PCC. But in the long run, due to the characteristics of the policy lag, the old environmental policy not only fail to promote the continuous GTFP growth, but also induce firms to accelerate pollution-based economic output to compensate the abatement cost. further exacerbating environmental conditions. Thus, the government should make efforts to design reasonable environmental regulation and increase subsidy for green technology innovation.

Keywords: China, Environmental regulation, green total factor productivity, PVAR model

Title: Estimating trade-off between economic growth and environmental impact: An application of the modified by-production approach to European agricultural sector

Presenting author: Tomas Baležentis (Lithuanian Institute of Agrarian Economics)

Co-author(s): Zhiyang Shen, Dalia Štreimikienė, Stéphane Blancard

Abstract

Identifying and maintaining the relationship between economic development and environmental pressures has always been a controversial topic for economic agents (firms, sectors, countries). The revenue and the costs of pollution generated due to productive activities can be quantified by following different approaches. In this paper, we propose an extended by-production model which ensures a link between the production and the pollution-generating sub-technologies. This novel approach is able to consider the trade-off between economic growth and environmental impact based on a multiple-frontier model when evaluating productive performance. The corresponding dual formulations are provided to interpret the economic role of pollution-generating inputs in the sub-technologies. Finally, we integrate the proposed model with the environmental Luenberger-Hicks-Moorsteen productivity indicator based upon input and output directional distance functions. The proposed model is applied to measure the green economic growth of agricultural sectors of the selected European countries.

Keywords: By-production approach; Environmental performance; Undesirable outputs; Luenberger-Hicks-Moorsteen indicator; European agriculture

Parallel Session I7: Malmquist Index Analysis on Productivity

Title: Profit Luenberger and Malmquist-Luenberger indexes for multi-activity decision making units: the case of the star-rated hotel industry in China

Presenting author: Linjia Zhang (Xi'An Jiaotong-Liverpool University)

Co-author(s): Barnabe Walheer

Abstract

Due to the vigorous economic development of the tourism industry in China, the number of star-rated hotels has rapidly increased. As a result, techniques to evaluate the performances of the star-rated hotels have gained in popularity. In this paper, we develop two indexes for dynamic settings: the profit Luenberger and Malmquist- Luenberger indexes. The distinguishing features of our indexes are three-fold. One, we adopt an economic perspective by considering that hotels are profit maximizers. Two, we model hotels as multi-activity decision making units by considering that they provide multiple services. Three, our indexes are nonparametric, and work when prices are partially observed. We apply our technique to 30 provinces in 2005-2015. We find that star-rated hotels present better performances over time, but not for every activity. Next, we highlight particular patterns for the provinces. These results are useful for managers to better target their investments, and also for policy makers.

Keywords: profit efficiency, Luenberger index;, Malmquist-Luenberger index, multiactivity, hotel, China

Title: The Main Sources of Productivity Change in Taiwan's International Tourist Hotels: The Disaggregate Perspective

Presenting author: Chiang-Ping Chen (Taiwan Shoufu University)

Co-author(s): Chih-Hai Yang and Jin-Li Hu

Abstract

With the rapid demand of the international tourism and more competitive market, the International Tourist Hotels (ITHs) industry must pay more attention to the productivity performance whether their output have reached the optimum stage or not, to cope with the overall market environment and enhance their competitiveness. Therefore, this study utilizes a panel dataset of 56 ITHs in Taiwan over the 2005–2014 period to evaluate the main source of productivity change from the disaggregate perspective by using the Luenberger productivity index based on directional distance function. Our main findings are as follows: First, the overall productivity change of ITHs in Taiwan shows a growing trend and the main source of productivity change is the technical change rather than the efficiency change. Productivity growth mainly from the innovative effect, which non-chain operated of ITHs have a higher productivity growth than the chain-operation ITHs. Second, from disaggregate perspective, the non-chain operated ITHs show an increasing trend in the productivity of room and other facilities, but the chain-operation ITHs have a growing trend in the productivity of food and beverages. Third, the main source of productivity change among the 56 ITHs is the room and other facilities items.

Keywords: The disaggregate perspective, International tourist hotels (ITHs), Directional distance function, Luenberger productivity index

Title: Characterizing the difference between indirect and direct CO2 emissions: evidence from Korean manufacturing industries, 2004 - 2010

Presenting author: Sinwoo Lee (Inha University)

Co-author(s): Dong-hyun Oh

Abstract

This study measures and decomposes the green productivity growth of Korean manufacturing industries between 2004 and 2010 by using the Malmquist–Luenberger productivity index. We focus on the differences in the measures of treating carbon emissions when generating electricity, namely either reallocated to end-user industries or absorbed by the electricity generation industry. The empirical results suggest three main findings. First, the efficiency of total emissions is higher than that of direct emissions except for the shipbuilding industry. Second, green productivity in the manufacturing sector increased during the study period. Finally, green productivity depends on the indirect emissions of each industry; therefore, we must implement policy considering these industrial characteristics.

Keywords: Green productivity, Malmquist–Luenberger productivity index, 9 greenhouse gas emissions, total emissions, direct emissions, indirect emissions

Presenting author list

No.	Presenting author	Affiliation	E-mail
1	Ahn, Sanghoon	Korea Development Institute, Korea	ahn@kdi.re.kr
2	Alves, Andre Cherubini	University of Campinas, Brazil	andre.alves82@gmail.com
3	An, Sejin	Green Technology Center, Korea	
4	Baccar, Sourour	University of Sfax, Tunisia	sbac.university@gmail.com
5	Badunenko, Oleg	University of Portsmouth, UK	oleg.badunenko@port.ac.uk
6	Baležentis, Tomas	Lithuanian Institute of Agrarian Economics, Lithuania	tomas@laei.lt
7	Balk, Bert M.	Erasmus University, Netherlands	bbalk@rsm.nl
8	Bert-Erboul, Clément	University of Campinas, Brazil	clementberterboul@gmail.com
9	Bogetoft, Peter	Copenhaben Business School, Denmark	pb.eco@cbs.dk
10	Bonanno, Graziella	University of Trieste, Italy	gbonanno@units.it
11	Bostian, Moriah	Lewis & Clerk College, United States	mbbostian@lclark.edu
12	Burki, Abid Aman	Lahore University of Management Sciences, Pakistan	burki@lums.edu.pk
13	Chalil, Tengku Munawar	Osaka University, Japan	tengkumunawarchalil@gmail.com
14	Chang, Ming-Chung	Kainan University, Taiwan	changmc@mail.knu.edu.tw
15	Chen, Chiang-Ping	Taiwan Shoufu University, Taiwan	bjqs25@gmail.com
16	Chen, Hao-Tsung	Soochow University, Taiwan	htchen@scu.edu.tw
17	Chen, Xiang	Soochow University,	cx040942@163.com

		Taiwan	
18	Cho, Koun	Pusan National University, Korea	koun1115@gmail.com
19	Cho, Taehyoung	The Bank of Korea, Korea	unclecho@bok.or.kr
20	Cho, Tsui-Yueh	National Taichung University of Science and Technology, Taiwan	yueh@nutc.edu.tw
21	Choi, Dong Ook	Sangmyung University, Korea	
22	Choi, Hyundo	Chosun University, Korea	hyundo_choi@chosun.ac.kr
23	Chon, Se-Bong	Korea Institute of Science and Technology Evaluation and Planning, Korea	sbc@kistep.re.kr
24	Chou, Li-Chen	Wenzhou Business College, China	edcv2581013@gmail.com
25	Chun, Hyunbae	Sogang University, Korea	hchun@sogang.ac.kr
26	Chun, Sunghoon	Korea Development Institute, Korea	
27	Das, Deb Kusum	University of Delhi, India	dkdas@ramjas.du.ac.in
28	Das, Pilu Chandra	kidderpore College, India	arpiludas@gmail.com
29	Delnava, Haleh	National Cheng Kung University, Taiwan	halehh.del@gmail.com
30	Dubina, Igor N.	Novosibirsk State University, Russia	igor_dubina@yahoo.com
31	Dumagan, Jesus C.	De la Salle University, Philippines	jesus.dumagan@dlsu.edu.ph
32	Entele, Birku Reta	Seoul National University, Korea	birku@snu.ac.kr
33	Ezzahid, Elhadj	Faculty of Law and Economics, Morocco	ezzahidelhadj@yahoo.fr
34	Fang, Chin Yi	National Taiwan Normal University, Taiwan	chinyifang@gmail.com
35	Färe, Rolf	Oregon State University, USA	rolf.fare@oregonstate.edu

36	Farias, Lorena Patricia	Seoul National University, Korea	
37	Førsund, Finn R	University of Oslo, Norway	finn.forsund@econ.uio.no
38	Fu, Tsu-tan	Soochow University, Taiwan	tfu@scu.edu.tw
39	Fujii, Atsushi	The University of Kitakyusu, Japan	afujii@kitakyu-u.ac.jp
40	Fukuda, Shinichi	University of Tokyo, Japan	sfukuda@e.u-tokyo.ac.jp
41	Gong, Binlei	Zhejiang University, China	gongbinlei@zju.edu.cn
42	Granderson, Gerald	Miami University, USA	grandegd@miamioh.edu
43	Greene, William	Stern School of Business, New York University, USA	wgreene@stern.nyu.edu
44	Grifell-Tatje, Emili	Autonomous University of Barcelona, Spain	emili.grifell@uab.cat
45	Grosskopf, Shawna	Oregon State University, USA	shawna.grosskopf@oregonstate.edu
46	Han, Jaepil	Korea Development Institute, Korea	jaepil.han@kdi.re.kr
47	Han, Seongho	Incheon Business Information Technopark, Korea	findflow@hanmail.net
48	Hatamimarbini, Adel	De Montfort University, UK	adel.hatamimarbini@dmu.ac.uk
49	He, Xinju	Hong Kong Baptist University, Hong Kong	
50	Hermawan, Hardika Dwi	The University of Hong Kong, Hong Kong	u3542317@connect.hku.hk
51	Heshmati, Almas	Sogang University, Korea	heshmati@sogang.ac.kr
52	Hong, Ahreum	Kyung Hee University, Korea	
53	Honma, Satoshi	Tokai University, Japan	honmasatoshi@tokai.ac.jp
54	Hsieh, Min-Der	Metal Industries Research & Development Centre, Taiwan	hmd@mail.mirdc.org.tw

55	Hu, Jiangfeng	Southwest University, China	jiangfenghu2018@163.com
56	Hu, Jin-Li	National Chiao Tung University, Taiwan	jinlihu@g2.nctu.edu.tw
57	Huang, Cliff	Vanderbilt University, USA	cliff.huang@vanderbilt.edu
58	Huang, Fei	Nanjing University of Aeronautics and Astronautics, China	hfei_11@163.com
59	Hussain, Arsalan	Lahore University of Management Sciences, Pakistan	arsalan.hussain@lums.edu.pk
60	Hwang, Seogwon	Science and Technology Policy Institute, Korea	hsw100@stepi.re.kr
61	Ishikawa, Takayuki	Hitotsubashi University, Japan	ed162001@g.hit-u.ac.jp
62	Jang, Heesun	Korea Energy Economics Institute, Korea	heesun.jang@keei.re.kr
63	Jang, Pil-Seong	Science and Technology Policy Institute, Korea	psjang@stepi.re.kr
64	Jang, Won-Joon	Korea Institutes of Industrial Economics and Trade, Korea	wjjang47@kiet.re.kr
65	Ji, Danjun	Nanjing University of Aeronautics and Astronautics, China	danjunji83@gmail.com
66	Jiang, Nan	Auckland University of Technology, New Zealand	nan.jiang@aut.ac.nz
67	Jin, Hyun-Woong	Hannam University, Korea	jin@hannam.ac.kr
68	Jin, Man	Oakland University, USA	mjin@oakland.edu
69	Jin, Young-Hyun	Korea Institute of Science and Technology Evaluation and Planning, Korea	yhjin@kistep.re.kr
70	Jo, Sangkyu	Korea Institute of Intellectual Property, Korea	sangkyujo@kiip.re.kr

71	Jung, Euy-Young	Seoul National University, Korea	assari2@snu.ac.kr
72	Kang, Sangmok	Pusan National University, Korea	smkang@pusan.ac.kr
73	Kang, Taewon	Seoul National University, Korea	dream264@snu.ac.kr
74	Kerstens, Kristiaan	IESEG School of Management, France	k.kerstens@ieseg.fr
75	Khanna, Rupika	Indian Institute of Management Lucknow, India	fpm15013@iiml.ac.in
76	Kılıçaslan, Yılmaz	Anadolu University, Turkey	ykilicaslan@anadolu.edu.tr
77	Kim, Jong-Hyun	Inha University, Korea	kjhpov@gmail.com
78	Kim, Jongsung	Bryant University, USA	jkim@bryant.edu
79	Kim, Jungho	Swinburne University of Technology, Australia	junghokim@swin.edu.au
80	Kim, Kibae	Korea Advanced Institute of Science and Technology, Korea	kibaejjang@gmail.com
81	Kim, Kibum	Seoul National University, Korea	kb.kim@snu.ac.kr
82	Kim, KwangUk	DGB Economic Institute, Korea	kukim@dgbfn.com
83	Kim, Minho	Korea Development Institute, Korea	
84	Kim. Se-Jik	Seoul National University, Korea	skim@snu.ac.kr
85	Kim, Seung Tai	Korea Institute of Science and Technology Evaluation and Planning, Korea	seungtkim@kistep.re.kr
86	Kim, Youngwook	KEPCO Economy & Management Research Institute, Korea	
87	Krasachat, Wirat	King Mongkut's Institute of Technlogy Ladkrabang, Thailand	kkwirat@kmitl.ac.th

88	Kujur, Sandeep Kumar	Institute of Public Enterprise, India	sandeepcds@gmail.com
89	Kumar, Sunil	South Asian University, India	skumar@econ.sau.ac.in
90	Kumbhakar, Subal C.	Binghamton University, State University of New York, USA	kkar@binghamton.edu
91	Kwon, Hyeog Ug	Nihon University, Japan	kwon.hyeogug@nihon-u.ac.jp
92	Lai, Hung-pin	National Chung Cheng University, Taiwan	ecdhpl@ccu.edu.tw
93	Lai, Yanzhao	The George Washington University, USA	yzlai@gwmail.gwu.edu
94	Lee, Changkeun	Korea Development Institute, Korea	
95	Lee, Chia-Yen	National Cheng Kung University, Taiwan	cylee@mail.ncku.edu.tw
96	Lee, Hun-Jun	Seoul National University, Korea	hunjunlee@gmail.com
97	Lee, Jeong-Dong	Seoul National University, Korea	leejd@snu.ac.kr
98	Lee, Mina	Green Technology Center, Korea	minalee@gtck.re.kr
99	Lee, Sinwoo	Inha University, Korea	lsw3478@gmail.com
100	Li, Ming	Maastricht University School of Business and Economics, Netherlands	m.li@maastrichtuniversity.nl
101	Li, Sung Ko	Hong Kong Baptist University, Hong Kong	skli@hkbu.edu.hk
102	Lin, Shengwei	National Taipei University of Technology, Taiwan	shengwei.lin1985@gmail.com
103	Li, Lingling	South China University of Technology, China	lilingling@gzhu.edu.cn
104	Lu, Wen-Min	National Defense University, Taiwan	wenmin.lu@gmail.com
105	Mastromarco, Camilla	University of Salento, Italy	camilla.mastromarco@unisalento.it

106	Mattsson, Pontus	Linnaeus University, Sweden	pontus.mattsson@lnu.se
107	Meidutė-Kavaliauskienė, Ieva	Vilnius Gediminas Technical University, Lithuania	ieva.meidutekavaliauskiene@vgtu.lt
108	Meissner, Dirk	National Research University Higher School of Economics, Russia	dmeissner@hse.ru
109	Meng, Hui	Shanxi University of Finance & Economics, China	elaine_meng0511@163.com
110	Miyagawa, Tsutomu	Gakushuin University, Japan	19990230@gakushuin.ac.jp
111	Mizobuchi, Hideyuki	Ryukoku University, Japan	hideyuki.mizobuchi@gmail.com
112	Mukherjee, Deep	Indian Institute of Technology Kanpur, India	deepm@iitk.ac.in
113	Nahar, Faiza Husnayeni	Universitas Muhammadiyah Yogyakarta, Indonesia	faizahusnayeni@gmail.com
114	Navas Perrone, Andres David	Seoul National University, Korea	navas2014@snu.ac.kr
115	Noh, Hohsuk	Sookmyung Women's University, Korea	hsnoh@sookmyung.ac.kr
116	O'Donnell, Christopher	The University of Queensland, Australia	c.odonnell1@uq.edu.au
117	Oh, Dong-hyun	Inha University, Korea	donghyun.oh@inha.ac.kr
118	Oh, Inha	Konkuk University, Korea	inha.oh@gmail.com
119	Oh, Ryungha	Seoul National University, Korea	ryungha@snu.ac.kr
120	Oktora, Siskarossa Ika	Institute of Statistics, Indonesia	siskarossa@stis.ac.id
121	Oumer, Ali Mohammed	The University of Western Australia, Australia	ali.oumer@research.uwa.edu.au
122	Pang, Ruizhi	Nankai University, China	prz0525@nankai.edu.cn

123	Parmeter, Christopher	University of Miami, USA	cparmeter@bus.miami.edu
124	Park, Chan Lim	Seoul National University, Korea	charliepark1988@gmail.com
125	Park, Hwanil	Science and Technology Policy Institute, Korea	hwanilpark@gmail.com
126	Park, Jin Ho	The Bank of Korea, Korea	jinhopark@bok.or.kr
127	Pitton, Francesco	Valdani Vicari & Associati, Italy	f.pitton@vva.it
128	Podinovski, Victor	Loughborough University, UK	V.Podinovski@lboro.ac.uk
129	Qian, Bing	Chinese Academy of Social Sciences, China	qianbing73@163.com
130	Rakshit, Ipsita	Indian Institute of Technology, India	ipsitacookie@gmail.com
131	Ridhwan, Masagus M.	Bank Indonesia, Indonesia	mha_ridwan@bi.go.id
132	Robles, Sandra Elizabeth	Seoul National University, Korea	san_robles82@hotmail.com
133	Saputri, Agatha	Yogyakarta State University, Indonesia	agathasaputri87@gmail.com
134	See, Kok Fong	Universiti Sains Malaysis, Malaysia	kfsee@usm.my
135	Setiawan, Maman	University of Padjadjaran, Indonesia	maman.setiawan@unpad.ac.id
136	Shamohammadi, Mehdi	Inha University, Korea	22141759@inha.edu
137	Shimura, Hirohisa	Soka University, Japan	shimura@soka.ac.jp
138	Shin, Yongcheol	University of York, UK	yongcheol.shin@york.ac.uk
139	Shmagun, Hanna	Belarusian State University, Belarus	hanna.shmagun@gmail.com
140	Shvetsova, Olga A.	Korea University of Technology and Education, Korea	vshvetsova57@gmail.com
141	Sickles. Robin	Rice University, USA	rsickles@rice.edu

		Loughborough University, UK	
142	Son, Nyeong Seon	Sogang University, Korea	nsson@sogang.ac.kr
143	Suardi, Stefano	Valdani Vicari & Associati, Italy	stefano.suardi@coleurope.eu
144	Sun, Shinn	Fo Guang University, Taiwan	ssun@mail.fgu.edu.tw
145	Ting, Chien-Jung	Shu-Te University, Taiwan	cjting@stu.edu.tw
146	Tokui, Joji	Shinshu University, Japan	tokui@shinshu-u.ac.jp
147	Toloo, Mehdi	VSB-Technical University of Ostrava, Czech Republic	mehdi.toloo@vsb.cz
148	Tsang, Chun-kei	Hong Kong Baptist University, Hong Kong	14485117@life.hkbu.edu.hk
149	Tsukamoto, Takahiro	Nagoya University, Japan	tsukamoto.takahiro@j.mbox.nagoya-u.ac.jp
150	Ulpah, Maria	Universitas Indonesia, Indonesia	mulpah@ui.ac.id
151	Vonortas, Nicholas	George Washington University, USA	vonortas@gwu.edu
152	Walheer, Barnabe	Xi'An Jiaotong-Liverpool University, China	Barnabe.Walheer@xjtlu.edu.cn
153	Wang, Hung-Jen	National Taiwan University, Taiwan	wangh@ntu.edu.tw
154	Wang, Ke	Beijing Institute of Technology, China	wangke03@yeah.net
155	Wu, Fei	Nanjing University of Aeronautics and Astronautics, China	wf_245430@126.com
156	Yamada, Eri	Nagoya City University, Japan	yamadaeri@econ.nagoya-cu.ac.jp
157	Yang, Kexin	Beijing Institute of Technology, China	yangkexin320@yeah.net
158	Yaisawarng, Suthathip	Union College	yaisawas@union.edu
159	Yang, Li	Tianjin University of Commerce, China	isu.yangli@nbs.edu.cn

160	Yi, WooPyeong	Pusan National University, Korea	yiwoopyeong@gmail.com
161	Yoo, Seulgi	Sogang University, Korea	sophyyoo@sogang.ac.kr
162	Yoon, Haeyeon	Sogang University, Korea	hyyoon@sogang.ac.kr
163	Zelenyuk, Valentin	The University of Queensland, Australia	v.zelenyuk@uq.edu.au
164	Zeng, Jin	Nankai University, China	2120153087@mail.nankai.edu.cn
165	Zhang, Jie	Renmin University, China	zhangjie0402@ruc.edu.cn
166	Zhang, Linjia	Xi'An Jiaotong-Liverpool University, China	Linjia.Zhang@xjtlu.edu.cn
167	Zhang, Lu	CPB Netherlands Bureau for Economic Policy Analysis, Netherlands	l.zhang@cpb.nl
168	Zhao, Shunan	Centre College of Kentucky, USA	szhao15@binghamton.edu
169	Zhu, Weiwei	Nanjing University of Posts & Communications, China	kirbyzhu@163.com

Appendix

A. Tour Information

Seoul Official Tourist Guide Book

http://english.visitseoul.net/map-guide-book

Transportation of Seoul City

http://english.visitseoul.net/essential-Info-article/Getting-Around_/211

Tourist Information Centers

Tourist information centers are located in Incheon International Airport, Gimpo International Airport, Apgujeong Station (Subway Line 3), Myeong-dong, etc.

http://english.visitseoul.net/essential-Info-article/Tourist-Information-Centers_/396

Seoul City Tour Bus Guide and Usage

Seoul City Tour Bus provides shuttle tours to the city's most popular attractions. It follows a variety of routes, divided by theme.

http://english.visitseoul.net/essential-Info-article/Seoul-City-Tour-Bus_/534

http://www.seoultrolley.co.kr

http://www.seoulcitybus.com

Discover Seoul Pass

Discover Seoul Pass is a tourism pass that allows entry of famous attractions in Seoul with transportation card.

http://english.visitseoul.net//essential-Info-article/Discover-Seoul-Pass-EN_/18400

DMZ (DeMilitarized Zone) Tour

DMZ is the area that stretches for 2km on either side of the border between South Korea and North Korea. As one of the last traces of Cold War, DMZ attracts huge interests.

http://www.dmztours.com/

B. Kyujanggak Institute for Korean Studies, Seoul National University

Kyujanggak is the library of former Joseon Dynasty in Korea. After World War Ⅱ, Seoul National University started to operate Kyujanggak as affiliated library of SNU. From 2006, Kyujanggak and Institute for Korean Studies of SNU combined into one institution.

Kyujanggak is located in Gwanak campus of Seoul National University, which is conference venue.

Kyujanggak provides both free and guided tour. Reservation is required for the guided tour.

For more details, please visit following link or contact inquires.

http://kyu.snu.ac.kr/LANG/en/main/main.jsp

Inquiries: +82-2-880-6030

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