



A Report from the Chair

N. F.

Dear Alumni & Friends,

Thank you for taking the time to look at our newsletter. We appreciate your interest in and support of the department. Below I highlight a few of the exciting things that have recently taken place in the department. There are also many specific events reported in faculty, student, and alumni notes. I hope you enjoy the read.

Student News

As you have probably seen or heard in the news, there has been and continues to be a significant realignment of student major choice in colleges and universities. Enrollments in the humanities and some of the social sciences have declined precipitously over the past five years. Here at CU, some of these departments have lost over half of their enrollments and majors. Our majors have grown along with those in STEM (science, technology, engineering, and mathematics) disciplines. Economics is the third largest major in the College of Arts and Sciences and the fourth largest major on campus. This realignment is a nationwide phenomenon. In the short term the student realignment creates problems because we suddenly need more economics and STEM discipline professors and not so many professors in humanities or political science based on student demand. Since the total number of students is growing, there is funding to increase the number of faculty to address this problem but realignment of faculty lags behind student realignment. Fortunately the College of Arts and Sciences is backing us with new hires each year in order to meet student demand. The department is also redeploying current faculty to meet demand as efficiently as possible.

Our major is popular because a BA in economics is highly valued in the marketplace. The analytical training we offer our students prepares them for diverse workplace environments. Forbes magazine reported that the average annual starting salary for an economics major is \$58,600. This is slightly higher than the average starting salary for a finance major (\$58,000) or an accounting major (\$52,900) and only behind computer science (\$66,800), engineering (\$65,000), and mathematics/statistics (\$60,000). A study by Patricia Flynn and Michael Quinn published in the *American Economic Review* in 2010 finds that the fraction of economics graduates who become CEOs of major companies is greater than

any other undergraduate major. The upshot of all of this is that our majors are well compensated and extremely versatile, finding good jobs in literally all industries. The versatility of the major allows our graduates to move about the economy and from my perspective this leads to the potential for an interesting life.

Since 2010, we purposely reduced the size of our PhD program from 87 students to 69. We did this in order to ensure funding for our students while they are in the PhD program and this in turn allows us to be a more attractive and competitive PhD program. All of our PhD graduates find good jobs with starting salaries nearing twice that of the average annual starting salary for our undergraduates. Over the past few years about 60% of our PhD graduates have started in tenure-track professor jobs at universities and colleges with another 20% going to postdoctoral or visiting professor jobs and the rest going to government or industry. In the past ten years, approximately two-thirds of our PhD graduates end up in tenure track university/college jobs after i

Coal, Gas, and Wind

Understanding Our Evolving Electricity System

The electricity generation profile of the US has changed significantly over the last decade. Coal-fired generation, once representing a majority of US electricity generation, has declined approximately 25% from 2007 to 2013, reducing associated annual carbon emissions from coal by a substantial 500 million tons of CO₂. At current estimates of the social cost of carbon, this represents approximately \$20 billion dollars in avoided social damages annually from CO₂ alone. At the same time, a dramatic decrease in natural gas prices, largely due to an increase in supply brought about by hydraulic fracturing extraction techniques, has led to substantial increases in gas-fired generation. Furthermore, renewable generation, particularly wind, has also increased dramatically, driven by state-level renewable portfolio standards (RPS), federal production and investment tax credits, and technological advances. Clearly, these changes in coal, gas, and wind are related, but how?

Understanding the relationship between coal, gas, and wind in the electricity sector is the goal of current research with Professor Harrison Fell of the Colorado School of Mines. In particular, we empirically examine how decreased natural gas prices and increased wind generation have individually and jointly affected coal-fired generation and emissions. We aim to quantify the source of these historic shifts in generation profiles and to predict effectiveness of future energy and environmental policies.

The focus on the electricity generation sector is motivated by several important factors. The electricity generation sector is an important anthropogenic source of local and global pollutants, such that even small changes in this sector may have profound impacts on air quality and total climate-related emissions. The US has actually witnessed a decline in CO₂ levels from 2005 to the present, with the majority of this decline attributable to the electricity sector, despite relatively flat electricity demand over this time period. As such, the shift out of coal towards wind and gas looks to be driving a large portion of the decline in US CO₂ emissions.

Furthermore, the interaction between wind, gas, and coal is a complex relationship based on generation costs, demand levels, and intermittency issues. Understanding these relationships is a pressing need, as policies such as renewable portfolio standards and potential greenhouse gas pricing (in addition to market factors such as fracking and natural gas export) suggest that the electricity sector will continue to evolve in dramatic ways over

the next several decades. It is not a stretch to say that understanding the future evolution of coal-fired generation is a key and crucial aspect in terms of US sources of carbon emissions and impact on global climate change.

While previous studies have separately examined the impact of renewables and low natural gas prices on the electricity generation sector, there are reasons to believe there may be important interactions. Historically, cheaper coal-fired generation was used to meet baseload demand, while more expensive gas-fired generation met peak demand. Under these conditions, wind generation would primarily offset the more expensive gas-fired generation. However, the recent substantial decline in natural gas price has led some coal generation to become more expensive than some gas generation, implying more coal would be offset by increased wind generation. Additionally, the fact that gas turbines are better suited than coal for ramping in response to the intermittency of wind may increase the demand for gas generation to handle the volatility associated with higher levels of wind generation.

To better understand these complex interactions between gas and wind, our research examines daily generation and emissions from hundreds of coal-fired generators across the US from 2008 to the present. These generation and emissions levels are matched against daily regional gas prices and daily regional wind generation to obtain a comprehensive view of how coal-fired generators respond to these factors independently and jointly.

Results-to-date find that low natural gas prices and increased wind generation have both led to large reductions in coal-fired generation and emissions. Furthermore, we find evidence that the interaction between natural gas prices and wind generation is important in most regions of the US, and led to a greater reduction in coal-fired generation and emissions than would be explained by either factor alone. In other words, the large increase in wind generation from 2008 to 2013 led to more coal-to-gas switching, while the large decline in natural gas prices from 2008 to 2013 led wind to offset more coal-fired generation and emissions.

Our findings have substantial policy implications. New carbon intensity standards proposed at the federal level will implicitly place a price on carbon emissions, while renewable portfolio

Coal, Gas, and Wind

Colorado 3

standards passed by states continue to grow in stringency. The existence of the interaction effect between wind and gas implies that implicit carbon pricing under a carbon intensity standard would lead to more coal-to-gas switching if wind generation continues to grow. Similarly, the impact on coal-fired generation

and emission from increasing renewable portfolio standards would be even greater if carbon pricing is implemented.

About the author:

George J. Borjas, Ph.D.

About the author:

Alicia L. Tamura, Distinguished
Economics Professor, University of Colorado

A Passion for Solving the Climate Change Problem

Photograph by Robert Castellino

CU economics alumnus Robert Castellino (BA 1985) has a passion for mountain adventure that led him into all of Colorado's mountain regions over the past forty years. As a professional photographer, Castellino shared inspirational vistas by publishing notable photography books on Colorado: *Beauty: Home & Sky*, (1998), *Colorado: Home & Sky*, (1999), *Down the Grand, a Realistic* (2001), *Colorado Realistic* (2002), and *Beauty: The Year a Ta A* (2006). With so much mountain experience and given his keen eye as a photographer, Castellino noticed changes occurring to the places he loves. He observed the retreat of mountain glaciers in the Indian Peaks Wilderness Area and the Maroon Bells followed by the invasion of Colorado's forests by the mountain pine beetle. Pine beetle infestation and drought have devastated tracts of forest in the San Juan Mountains, one of his favorite areas. As a lover of nature, Castellino became aware of the problem of human-induced climate change, a problem science links to the changes he was observing.

Unsettled by these observations, Castellino decided to make a difference. He put together photographic presentations to educate people about rapid changes occurring right here in Colorado. His presentations stressed that climate change is not some future generation's problem, but a problem facing Coloradans today. Renewable energy innovations and economic analysis were also central to his presentations as solutions people can implement on their own. His presentations were well received by CU classes, business groups, and civic groups, leading him to think of bigger ways to educate and equip people with the means to make a difference. To this end Castellino founded the non-profit Climate Colorado (Climatecolorado.org) in 2014 with a vision of approaching the global climate change problem as a local problem that people can work together toward solving. Under Castellino's leadership, Climate Colorado implemented several new and exciting programs with more on the way.

In November of 2014, Climate Colorado created the Colorado Climate Summit on the CU Campus. The Summit brought together experts on renewable energy, electric utilities, and transportation along with interested students and citizens. In addition to expert talks, there were moderated brainstorming sessions for responding to the challenge of achieving net zero carbon emissions in energy production by 2020. Participants were led through a planning and design process for meeting this goal us-

ing rapid prototyping, a technique applied in manufacturing and high tech development. A recent high-profile application of rapid prototyping is the development of Google Glass led by Tom Chi. Rapid prototyping applied to the climate challenge required Summit teams to articulate a concrete plan for meeting the climate challenge within an hour then revisit and revise the plan in rapid succession resulting in a prototype plan. According to Tom Chi, rapid prototyping induces people to partake in what he refers to as expansive learning—learning done on behalf of humanity that has the potential to discover new possibilities in a short time. The rapid march using only immediately available information forces people to think independently and outside of the box. Colorado Climate Summit participants were very pleased with their rapid prototyping experience and walked away feeling empowered and engaged as a community committed to making the change they envisioned together.

Most recently Climate Colorado created a new program, Schools to Zero for K-8 and high school students. The kickoff event happened in October of 2015 with the STEM Magnet Lab School Climate Challenge Summit. The Summit engaged third and eighth grade students with a climate challenge for their school building to achieve net zero emissions, zero waste, and reduce water by one half in five years. Using the same rapid prototyping principals and guidelines the event was moderated by school faculty and Climate Colorado's professionally trained team of rapid prototyping specialists. Students came up with plans for meeting the climate challenge while school district administrators and board members observed. The Summit not only engaged students in the climate change problem, but also gave them a voice in the redesign of their school building that is being planned now that remodeling funds are available.

Castellino's efforts as the CEO of Climate Colorado are attracting attention. Climate Colorado has been endorsed by a long list of other non-profit organizations and Castellino has been invited to address Colorado State officials, delivered testimony to the US EPA on the Clean Power Plan, and given a talk at TEDxVail. Castellino's love of the backcountry and desire to preserve it led him down a path he had not foreseen. His mantra is making a difference one person at a time, one school at a time, one city at a time so that together the climate change problem can be resolved.

DEPARTMENT OF ECONOMICS

2012-13 Graduates

DOCTOR OF PHILOSOPHY

Luis Fernando Castro Penarrieta
Jieun Chang

Randall Scott Hiller
Joyce Chia-Heng Loh

Catherine Massey
Christopher Ryan McMahan

Soojae Moon
Kyungsoo Oh

MASTER OF ARTS

Patrick Gourley
Mariesa Ho
Timothy Bywater Larsen
Seamus Xiaoyang Li

Gregory Madonia
Eric Osborne-Christenson
Se Mi Park
Eric Penner
Kristina Sargent

Joseph Vavrus
Xin Wang
Nan Xu
Tianxiao Zheng

BACHELOR OF ARTS

Christopher Robert Aarvig
Ahmad Frank Abderrahim
Sean Christopher Abramson
Cecilia N. Achuka
Nathan Lee Adams
Ross John Adams
Hasan Ayel Al Ahbabi
Rami Ahmad Al Zamel
Jon Andre Alanis
Zachary Ziad J. Alaywan
Matthew Graham Allen
Benjamin Matthew Ambrose
Kristopher James Amstutz
Trent William Anderson
Aaron Michael Aragon
Garrett Lee Aschermann
Brian Gregory Ash
Hamid Reza Ashtiani
Frederic Vincent Askham
Daniela Alejandra Avendano
Andrew Tomas Barnes
Zachary Dain Barone
Alex Charles Baumgart
Andrew Brian Beach
Caleb Myer Benson
Evin V. Berg
Elliott Berger
Alexander William Bieker
Samuel Bay Binder
Tyler Colton Bodine-Smith
Dominic Edward Boggeri
Vivienne A. Born
Douglas Steven Bosswick
Richard Daniel Boyd
Michael Richard Boylan

Jake Patrick Bradley
William W. Braun
Kevin John Breen
Walton Barnes Brown
Jonathan Michael Bruno
Nathan Bruno
Brandon Carrigan Buse
Conner O'Dell Buttermore
Justin Ray Cahoon
Ryan Joseph Campagnola
Jonathan Winston Campbell
Nicholas Stephen Caron
Christian Del Carpio-Tomas
Jordan M. Cevaal
Yu-Chun Chen
Jeremy Michael Chmielewski
Hunseok Choi
Adam Samuel Ciesielski
Trevor Joseph Clayton
John Francis Cody IV
Joseph Michael Conboy
Alexander Gillen Cosso
William Bartley Cox
Samuel Austin Creamer
Adam James Cribari
Danielle Rebecca Cro
Jennifer Lauren Csaszar
Spencer Bradford Cuiper
Stephanie Renee Curry
Jonathan Clark Cutler
Alexander Mark Czernik
Sean Patrick Daley
Christian Dalsgaard
Meaghan Lilja Darwin
Jessica Davido
Clifford Arlen Davis II
Hayley Rae Davis

Jose Jorge Federic Deman Garcia
Timothy Mark Demus
Michael Tomas Destito
Mark Anthony Diaz
Michael Mark Domanico
Ryan Russell Donnel
Michael Dopp
Angela Christine Dowdy
Sean Patrick Driscoll
Stephanie Eaton
Matthew Joseph Elmer
Nico Salvatore Enea
Edward Richard Ericson
Andrew Gardner Evans
Stuart Brent Eynon
Austin Kenneth Faroni
Elliott James Farquharson
Yazan Fattaleh
Edward Jorge Fernandez
Stephen Edward Feuerstein
Michael Patrick Field
Nicholas Donald Finch
Cassie Reyna Finer
Nina Rene Fiorillo
Alexander Wynne Fisher
Nadia Gabriela Florez
Max Cooksey Forster
Wesley Edwin Foudriat
Margaret Elysia Fox
Charles Shelby Frank
Lauren Rachel Fredrick
Hayden Scott Fries
Yang Gao
David Harris Gardner
Conner Pius Gertje
Kyle David Gillette
Timothy Paul Gleason
Shelby Lynn Goldenberg

Christopher Julian Grain
Nicholas Tomas Gray
Samuel William Gray
Alison Janelle Grove
Brendon Stewart Guichet
Jing Guo
David Mark Hackworthy
Ilir Hajdari
Sean Michael Hall
Tomas Edward Hammer
Matthew James Hammett
Kristie (Jimin) Han
Tyler William Harch
James R. Harmoush
Hailey Anne Harrington
Scott Michael Hausmann
Brice Alton Heller
Walker Hill
Hugi Hilmisson
Kronan Burns Holman
Christine Elizabeth Holloway
Joshua Richard Hosch
Connor Hoy
Michael Benjamin Isaacson
David Jonathan Jaeger
Laura Ospino Jaramillo
Timothy Evan Jenkins
Biying Jiang
Alexandra Mae Kahn
Vasilena Vasileva Karaivanova
Zachary Alexander Karr
Taylor Michael Keddington
William Peter Kelley
Dana Alan Kennedy
Alexander Frederick Kilen
Diana Kimberly Kim
George Edward Kinsella III
Dailey Alexander Kluck

Andrew Paul Koller
Garrett Kramer
Laura Marie Kraus
John Hayden La Rue III
Scott Martin Lagana
Brendon Westley Larson
Perry Vance Latimer
Alexander Michael Lauderbaugh
Sean Michael Layden
John Lee
Paul William LeNeveu
Daniel Leon Levine
Kenneth Allan Lewis, Jr.
Zishen Li
Derik Andrew Linch
Nicholas Lor Lind
Erika Dane Lohmann
Benny Lu
Jack Geyao Lu
Zachary C. Lyon
Robert John Macauley II
Tomas James MacPherson
William Alexander Madden
Allison Leigh Madigan
Tatyana Malinina
Christopher Marshall
Keith David Martinez
Alexander James Martini
Mae Takiko Matsuura
Ryan Michael Matzen
Tyler Andrew McBride
Devin George McCarty
Will Grant McCaskill
Lauren McDavid
Tomas Alexander McKee
Jeremy Allan McKinnon, Jr.
Corbin E. McNutt

2014-15 Graduates

DOCTOR OF PHILOSOPHY

Yucheng Ding
Zachary Lee Feldman
Dustin Dale Frye

Xin Geng
Gisella Anne Kagy
Jongheuk Kim

Edward Lawrence Kosack
Na Kyeong Lee
Sooyoung Lee

Jose Ivan Rodriguez
Sanchez
Paulo Quinderé Saraiva

Austin Crowley Smith
Zachary Alexander Ward
Weisi Xie

MASTER OF ARTS

Javier Andres Santiago
Scot Beattie

Matthew Ridge Butner
Mallory Joan Keeler

Hoyn Kim
Samara Virginia Mendez

Doyoung Park
April Christine Ross

Brandon Michael Spears
Li Yao

BACHELOR OF ARTS

Joshua Ryan Adams
Bryan Yuuki Albaugh
Faris Al-Jassim
Ahmed Alkendi
Liyah Ayman Alkhadhra
Zohair Jawad Al-Sharshani
Bradley Anderson
Christopher Doukas
Anderson

Adam Christopher
Boggeri
Mac David Bolling
Bryan Richard Bonack
Sidney William Grant
Bonser

Jacob Ethan Bornstein
Cameron Fabian Botts
Paolo Ste ey Bouchard

David James Anderson
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John Frederick Anderson
Trent William Anderson

Isaac Jaymes Andresky
Aidar Aralbayev

Sebastian Arango

Bradley D. Arnold

Alexander Audi

omas Bruce Augason

Christopher Mark Baines
Cory Balk

Alexander Herrick Barber

Charles Claude Henry
Barkmeier

Avery Michael Bengé

Cody Jess Bennett

Tyler Dale Bentley

Martin Berg

Ru Bi

Lingyu Bian

Bo Christian Birkeland

Jacob John Bishop

Willem Raleigh

Bloemsma

FACULTY NOTES

F a A A a published “Spousal Employment and Intra-Household Bargaining Power,” *American Economic Review*, 21(8): 560-63, 2014; “Incentives to Identify: Racial Identity in the Age of Affirmative Action,” (with Brian Duncan), *Racial Economics*, 97(3): 710-13, July 2015; and “Gender Discrimination in the Allocation of Migrant Household Resources,” *Journal of Economic Surveys*, 28(3): 565-92, July 2015. In 2013 she received the University of Colorado Population Center Small Grant (\$2,500): “Incentives to Identify: Racial Identification in the Age of Affirmative Action.” She also received in 2013 the Implementation of Multicultural Perspectives and Approaches in Research and Teaching (IMPART) Award (\$2,000): “Incentives to Identify: Ethnic Identification in the Age of Affirmative Action.” In 2012 she was appointed to the American Economic Association (AEA) Committee on the Status of Minority Groups in the Economics Profession (CSMGEP). Her presentations in 2015 include: National Bureau of Economic Research Summer Institute, Development of the American Economy; Society of Labor Economists/European Association of Labor Economists Meeting, Montreal; University of California Santa Barbara, Broom Center for Demography Workshop; the Ohio State University, Department of Economics; Case Western Reserve University, Department of Economics; and Pacific Conference for Development Economics (PACDEV at UCSD). Her 2013 presentations include: Tufts University, Fletcher School, Medford, MA; Northeast Universities Development Consortium (NEUDC) Conference at Harvard University; University of Arizona, Department of Economics, Tucson, AZ; Arizona State University, Center for Population Research, Tempe, AZ; University of New Mexico, Department of Economics, Albuquerque, NM; Western Economic Association International Meeting, Seattle, WA; 12th IZA/SOLE Transatlantic Meeting of Labor Economists, Germany; University of Connecticut, Department of Economics, Storrs, CT; Society of Labor Economists Annual Meeting, Boston, MA; Emory University, Department of Economics, Atlanta, GA; Federal Reserve Bank of Atlanta, At-

C i B published “Discrete Time Dynamic Oligopolies with Adjustment Constraints,” (with L. Gardini, and F. Szidarovszky), *Journal of Dynamic Games* 2: 65-87, 2015; and “Corruption and Socially Optimal Entry,” (with Amir, R.), *Journal of Economic Surveys*, 123: 30-41, 2015. She also had a data grant, CoreLogic Academic Research Council (CLARC) in September 2014.

B i a C a a published “Can Self-Control Explain Avoiding Free Money? Evidence from Interest-Free Student Loans,” (with Ben Keys), *Racial Economics* 95(4), October 2013; “Native Competition and Low-Skilled Immigrant Inflows,” *Journal of Human Resources*, 48(4) pp. 910-944, Fall 2013; “Recent Immigrants as Labor Market Arbitrageurs: Evidence from the Minimum Wage,” *Journal of Urban Economics* 80, pp. 1-12, March 2014; “Immigrants Equilibrate Local Labor Markets: Evidence from the Great Recession,” (with Brian K. Kovak) forthcoming January 2016 in *American Economic Review*; “Human Capital and the Lifetime Costs of Impatience,” (with Ben Keys), *American Economic Review* 7(3), pp. 126-153, August 2015; and “The Labor Market Integration and Impacts of US Immigrants,” (with Brian Duncan and Steven J. Trejo), in *Handbook of Economic Immigration*, Barry R. Chiswick and Paul W. Miller eds., Vol. 1B, pp. 1197-1259, Elsevier, 2015. He gave seminars at the University of Western Ontario, the NBER, the Federal Reserve Board, and the Institute for Research on Poverty at the University of Wisconsin. He made presentations at the University of Michigan’s Ford School of Public Policy, a meeting of the National Academy of Sciences panel on the Economic and Fiscal Consequences of Immigration, the Unieneces pnces pr(w0.01 Tw Tfp5(a)914(c)s6g mh)7(e Ec)7(o)10(

Poverty Research. His working paper, "Immigrants Equilibrate Local Labor Markets: Evidence from the Great Recession," (with Brian Kovak), funded by a grant from the Russell Sage Foundation, was released as an NBER working paper and received media coverage in several news outlets including: *Washington Post*, *Washington Journal*, *Los Angeles Times*, *Saturday Review*, and the *NBER Digest*. He has a new working paper "Investment over the Business Cycle: Insights from College Major Choice," (with Erica Blom and Ben Keys) that has been featured in multiple media outlets also including: *Washington Journal*, *MarketWatch*, *CNN*, *Time*, *International Herald Tribune*, *IZAN*, *Business Week*, *Reuters*, and *Business Daily*. He was appointed as Associate Editor at *Journal of Health Economics* and as a Research Fellow at IZA.

Alicia took over as the co-editor of the *Journal of Economic History* on July 1, 2014 and published "Share Portfolios and Risk Management in the Age of Financial Capitalism: London 1690-1730," (with Erin Fletcher and Larry Neal), *Economic History Review*, vol. 68, no. 2, May 2015, pp. 574-599. She also presented seminars at California Institute of Technology and Fudan University.

Pieter published "The Educational Choice Anomaly for Principles Students: Using Ordinary Supply and Demand Rather than Indifference Curves," *Journal of Economic Education*, Vol. 42, no. 3, (July 2011) pp. 310-314 (with R. Sexton, L. Calimeris); "An Implementable Institutional Reform that Transfers Control of Governmental Spending Levels from Politicians to Voters," *Journal of Public Economics* Vol. VI, no. 4, (December 2011) 14 pp.; "Linking Regional Science and Urban Economics: Long-Run Interactions Among Preferences for Amenities and Public Goods," *Market Economics*, Vol. 3, no. 3 (May 2012), pp. 253-262; "Benefit-Cost Analysis of Environmental Projects: A Plethora of Biases Understating Net Benefits," *Journal of Business Ethics* - A manuscript 1041, August 2012; "Productive Complementors: Too Often Neglected in the Principles Course?" (with G. Galles, R.

Sexton), *Journal of Economic Education*, Vol. 13, no. 2 (Winter 2014) pp. 81-89; "A Note on Monitoring Costs and Voter Fraud," (with G. Galles, R. Sexton), *American Economic Review*, Vol. LIX, no. 2 (Fall, 2014); "Spatial Equilibrium in the Labor Market," Chapter 2, Volume I of the *Handbook of Regional Science*, Peter Nijkamp and Manfred Fisher (eds), section editors Alessandra Faggian and Mark Partridge, Springer, New York, pp. 17-33, 2014; "The Hedonic Method of Valuing Environmental Policies and Quality," Chapter 50, Volume VI of the *Handbook of Regional Science*, Peter Nijkamp and Manfred Fisher (eds), section editor, Amit Batabyal, Springer, New York, pp. 993-1008, 2014; and a new environmental economics textbook: *Environmental Economics: A Global Approach*. Boca Raton/London/New York: CRC Press, Taylor & Francis Group, 2014, 264 pp.

Chang and **Robert** have completed a water demand forecasting study for the Mecca Region of Saudi Arabia. The unique issue in this study is the strong seasonal pattern of water use occasioned by the great Hajj pilgrimage that brings millions of pilgrims to Mecca and other holy places during the last month of the Islamic calendar year.

The month shifts annually relative to the Georgian calendar, since it is based on the lunar calendar. As the month of the Hajj changes, so do the climatic conditions: very high temperatures during the summer period increase water demand per capita but reduce the number of pilgrims. Thus, to estimate demand and to make forecasts, it was necessary to project the numbers of pilgrims and future climate conditions. Forecasts of these variables were made out to the year 2030. Two articles based on the project are under journal review. The study was sponsored by the Unit for Ain Zubaida Rehabilitation & Groundwater Research of the King Abdulaziz University, in Jeddah, Kingdom of Saudi Arabia. Professor Omar Aburizaiza, Director of the Research Unit is the Co-PI.

Fa Hsia and Mei-Chu Hsiao have been working on a book, *Economic Development: The East Asian Experience*.

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really achieve first-best in the presence of environmental spillovers?" (with Harrison Fell), in the *Journal of Environmental Economics and Management* 68(1): 46-53, 2014; "Scrap prices, waste and recycling policy" in *La Ecología* 90(1): 169-180, 2014; and "Community-based tradable permits for localized pollution," (with Peifang Yang), forthcoming in *Economics*

Government in January 2015; University of Economics Annual Conference (Keynote Speaker) in Bratislava, Slovakia in December 2014; the APJAE Symposium on Economic Development in Asia (Keynote Speaker) in Kitakyushu, Japan in September 2014; and CESifo Institute, Conference on the Global Economy (Keynote Speaker), Munich, May 2014.

On his 2013-14 leave and sabbatical, **Robert MAN** and his wife, Lauri McNown of Political Science, taught on Semester at Sea during the fall 2013 term. One highlight in Africa was the chance to visit with CU Economics PhD Said Boakye, who has been working for the Ministry of Finance in Ghana. For the spring 2014 term Robert and Lauri both received Fulbright Specialist Grants to support collaborations and faculty workshops in Penang, Malaysia. Robert was hosted by Soo Khoon Goh, who had earned her Masters degree in Economics at CU and also visited our department in 2012 as a Fulbright Scholar. In the workshops Robert presented simulation

methods for econometric research to faculty of universities across Malaysia. These methodologies became the basis for still ongoing collaborative research projects with colleagues at his host institution, University Sains (Science) Malaysia. The projects in Malaysia were followed by another workshop on time series econometrics and simulation models at the Bank of Korea in Seoul. Robert and Lauri's time in Asia ended with an extraordinary visit with the family of Sasiwimon Warunsiri Paweenawat, another recent CU Economics PhD. Sasi is on the faculty at the University of the Thai Chamber of Commerce in Bangkok, and she and Robert continue to collaborate on research on Thai labor market issues.

Sasi Paweenawat published "Network Unbundling and Retail Prices: Evidence from the Telecommunications Act of 1996," *Journal of Law and Economics* 56(2), 2013; "Market Restructuring and the Efficiency of Electricity Generation: Plant Level Evidence From the United States 1995 to 2006," *Energy Journal*,

34(1), 2013; "Market Structure and Media Diversity," *Economic Inquiry*, 53(2), 2015, 872-888; and "Instructor Attire and Student Performance: Evidence from an Undergraduate Industrial Organization Experiment," (with J. Dean Craig), *International Review of Economics and Finance*, 17, 2014, 55-65. He received a Google Research Award, 2013/14 for "Measuring Broadband Price Indices" <https://doi.org/10.1016/j.iref.2014.05.004>

testified as an expert witness in federal court on behalf of the State of Colorado defending the Colorado State law which prevents the sale of large-capacity magazines for firearms. The decision, issued in June, upheld the law unreservedly. In June 2015 Jeffrey Zax presented “Provincial valuations of human capital in urban China, inter-regional inequality and the implicit value of a Guangdong hukou” at the 4th International Workshop on Regional, Urban, and Spatial Economics in China, Tsinghua University, Beijing, China, the Conference on Deepening

Economic Reforms, National School of Development, Peking University, Beijing, China, the Chinese Economists Society 2015 Annual Conference, Chongqing University, Chongqing, China, the 2015 Henan Symposium on Development and Institutional Economics, Henan University, Kaifeng, China, the Conference on Urban Development in China, Xi’an Jiaotong—Liverpool University, Suzhou, China, and the 2nd Biennial Conference of China Development Studies, Shanghai Jiaotong University, Shanghai, China.

S_a_Z_a presented at the Harvard China Economy Seminar, NBER Conference on the Economics of Environmental Protection in China, AEA Annual Meeting (Philadelphia), NEUDC (Harvard), PacDev (UCLA), Stanford Asia Health Policy Seminar, Barcelona GSE Summer Forum: Workshop “Children’s Health, Well-being, and Human Capital” and received the Chiang Ching-Kuo Foundation Junior Scholar Grant, 2014.

2013-14

Stanford Calderwood Faculty Teaching Award: Carlos Martins-Filho

Stanford Calderwood Student Teaching Award: Dustin Frye

Graduate Award for Public Policy Research: Gisella Kagy

Reuben A. Zubrow Fellowship in Economics: Austin Smith & Zachary Ward

Leslie Whittington Endowed Fellowship in Economics: Rebecca Jennings

Leslie Whittington Memorial Fellowship in Economics: Patrick Turner

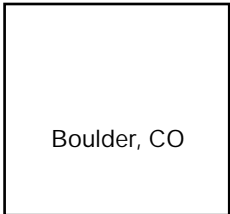
Yordon Prize in Microeconomics: Patrick Turner

Prize in Macroeconomics: Patrick Turner

Prize in Econometrics: Patrick Turner & Amit Patel

Sieglinde Talbott Haller Endowed Economics Scholarship Fund: Harry Pascarella

Val B. and Helen W. Fischer Scholarship for Academic Superiority in the Social Sciences:



Half Dome at Sunrise. June 2011, photograph by Robert Castellino