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### **Personal**

Born: October 18 1960, Malaysia; U.S. naturalized citizen  
Married: 1999, Chorching Goh  
Children: son Yimfoong aged 12; daughters Wengfay and Wengyin, aged 9 and 7

### **Education**

Ph.D. Economics, Harvard University, 1989  
A.B. Mathematics, Northwestern University, 1983

### **Research and Teaching Interests**

Public and Environmental Economics  
Economic Growth and Technical Change

### **Work Experience**

1993-present. Senior Economist, Dale Jorgenson Associates.  
2012-present. Visiting Scholar, China Project, School of Engineering and Applied Science, Harvard University.  
2006-present. Visiting Scholar, Institute for Quantitative Social Science, Harvard University  
2011-2012. Ethiopia Development Research Institute (EDRI), Addis Ababa  
1999-2011. Visiting Scholar, Resources for the Future.  
1992-2005. Fellow, Program on Technology and Economic Policy, Kennedy School of Government, Harvard University.  
1989-92. Assistant Professor, Economics, SUNY at Buffalo.

## Papers in Journals

“Information Technology and U.S. Productivity Growth: Evidence from a Prototype Industry Production Account,” *Journal of Productivity Analysis*, 36(2):159-175, 2011.  
(Draft presented at *World KLEMS Conference*, Cambridge, MA, August 19, 2010.)  
(with Dale Jorgenson and Jon Samuels)

“The Distributional Impact of Climate Policy”, *The B.E. Journal of Economic Analysis and Policy*, 10(2) (Symposium), Article 17, 2010.  
(with Dale Jorgenson, Richard Goettle, Daniel Slesnick and Peter Wilcoxon)

“Technology, Development and the Environment,” *Journal of Environmental Economics and Management*, 59(1):94-108, January 2010.  
(with Karen Fisher-Vanden).

“China's 11th Five-Year Plan and the Environment: Reducing SO<sub>2</sub> Emissions,” *Review of Environmental Economics and Policy*, 3(2):231-250, Summer 2009.  
(with Jing Cao and Richard Garbaccio)

“The Local and Global Benefits of Green Tax Policies in China,” *Review of Environmental Economics and Policy*, 3(2):189-208, Summer 2009.  
(with Jing Cao and Dale Jorgenson)

“Industrial and Aggregate Measures of Productivity Growth in China, 1982-2000”, *The Review of Income and Wealth*, 55(s1):485-513, July 2009.  
(with Jing Cao, D. Jorgenson, Ruoen Ren, Linlin Sun, Ximing Yue).

“Cap and trade climate policy and U.S. economic adjustments,”  
in *Journal of Policy Modeling*, 31(3):362-381, May 2009.  
(with D. Jorgenson, Richard Goettle, Peter Wilcoxon)

“U.S. Labor Supply and Demand in the Long Run,”  
in *Journal of Policy Modeling*, 30(4):603-618, July 2008.  
(with D. Jorgenson, Richard Goettle, Daniel Slesnick, Peter Wilcoxon)

“A Retrospective Look at the U.S. Productivity Growth Resurgence,”  
*Journal of Economic Perspectives*, 22(1):2-24, Winter 2008.  
(with D. Jorgenson and Kevin Stiroh)

“The Industry Origins of the American Productivity Resurgence”

(with Karen Fisher-Vanden)

"Intake fractions of industrial air pollutants in China: Estimation and application"

*Science of The Total Environment*. 354:127-141, 2006.

(with Shuxiao Wang, Jiming Hao, Ji Li and Yongqi Lu)

"Potential Growth of the U.S. Economy: Will the Productivity Resurgence Continue?"

*Business Economics*, January, 67-76, 2006.

(with D. Jorgenson and Kevin Stiroh)

"Will the U.S. Productivity Resurgence Continue?" in *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, Vol 10, No. 13, December 2004.

(with D. Jorgenson and K. Stiroh)

"International Labor Migration and Social Security: Analysis of the Transition Path"

*Journal of Population Economics*, 17(3):535-551, 2004.

(with Doris Geide-Stevenson)

"The Near-Term Impacts of Carbon Mitigation Policies on Manufacturing Industries"

(with R. Morgenstern, J. Shih, X. Zhang)

*Energy Policy*, 32:1825-1841, 2004.

(previously as RFF Disc. Paper 02-06, March 2002)

"Growth of U.S. Industries and Investments in Information Technology and Higher Education,"

(with D. Jorgenson and K. Stiroh)

*Economic Systems Research*, 15(3) : 279-325, September 2003.

"Lessons for Europe from the U.S. Growth Resurgence"

(with D. Jorgenson and K. Stiroh)

in *CESifo Economic Studies*, 49(1):27-47, 2003.

"Lessons from the U.S. Growth Resurgence"

(with D. Jorgenson and K. Stiroh)

in *Journal of Policy Modeling*, 25(5):453-470, 2003.

"Projecting Productivity Growth: Lessons from the U.S. Growth Resurgence"

in *Economic Review*, Federal Reserve Bank of Atlanta, Q3:1-13 2002.

And in *Technology, Growth and the Labor Market*, eds. Donna K Ginther and Madeline Zavodny, Kluwer, 2003.

(with D. Jorgenson and K. Stiroh)

"A Comparison of Industrial Productivity Growth in Canada and the U.S."

(with Wulong Gu)

*American Economic Review* 90(2): 172-175, 2000.

“Why has the energy output ratio fallen in China?”

(with Richard Garbaccio and Dale Jorgenson)

*Energy Journal*, July 1999, 20(3): 63-91

“Controlling Carbon Emissions in China”

(with Richard Garbaccio and Dale Jorgenson)

*Environment and Development Economics*, 4(4): 493-518, 1999

"Revenue, Progressivity and the Flat Tax"

(with Kevin Stiroh)

*Contemporary Economic Policy*, 16(1): 85-97, 1998

"Finding Cointegration Rank in High Dimensional Systems Using the Johansen Test. An Illustration Using Data Based Monte Carlo Simulation"

(with Bent Sorensen)

*Review of Economics and Statistics*, 78(4): 726-732, 1996

"Sunspots, Currency Substitution, and Inflationary Finance"

(with Richard Barnett)

*Journal of International Economics*, 41(2): 73-93, 1996.

"A Continuous Time Arbitrage Pricing Model with Stochastic Volatility and Jumps,"

(with William Perraudin and Bent Sorensen)

*Journal of Business and Economic Statistics*, 14(1): 31-43, 1996.

"Trade Policies and U.S. Economic Growth,"

(with Dale Jorgenson)

*Journal of Policy Modelling* 16(22):119-146, 1994

## **Books**

*Double Dividend: Environmental Taxes and Fiscal Reform in the US*, MIT Press, Cambridge, MA, 2013.

(with Dale Jorgenson, Richard Goettle and Peter Wilcoxon)

*Clearer Skies over China: Reconciling Air Quality, Climate and Economic Goals*, MIT Press, Cambridge, MA, 2013.

(contributor and co-editor with Chris P. Nielsen)

*Clearing the Air: The Health and Economic Damages of Air Pollution in China*, MIT Press, Cambridge, MA, 2007.

(contributor and co-editor with Chris P. Nielsen)

*Information Technology and the American Growth Resurgence*, MIT Press, Cambridge, MA, 2005.

(with Dale Jorgenson and Kevin Stiroh)

### **Papers in books and Discussion papers**

“Energy, the Environment and U.S. Economic Growth,” in Peter Dixon and Dale Jorgenson (eds.) *Handbook of Computable General Equilibrium Modeling*, Elsevier, 2012. (with Dale Jorgenson, Richard Goettle and Peter Wilcoxon)

“Reconciling Control of Carbon and Air Pollution with Economic Growth in China,” in *The Chinese Economy: A New Transition*, (eds) Masahiko Aoki and Jinglian Wu. Palgrave Macmillan, 2012.

Part of the Proceedings of the 16<sup>th</sup> World Congress of the International Economic Association. (with Jing Cao, Dale Jorgenson)

“Carbon Pricing with Output Based Subsidies: Impact on U.S. Industries over Multiple Time Frames,” *Resources for the Future Discussion Paper*, 12-27, June 2012. (with Liwayway Adkins, Richard Garbaccio, Eric Moore, Richard Morgenstern)

“Information Technology and U.S. Productivity Growth: Evidence from a Prototype Industry Production Account,” in Matilde Mas and Robert Stehrer (eds.) *Industrial Productivity in Europe: Growth and Crisis*, Edward Elgar, 2011. (with Dale Jorgenson and Jon Samuels)

“The Impact on U.S. Industries of Carbon Prices with Output Based Rebates over Multiple Time Frames,” *Resources for the Future Discussion Paper*, 10-47, December 2010 (draft presented at Workshop on *Carbon Policies, Competitiveness and Emissions Leakage: An International Perspective*, Washington DC, February 22, 2010). (with Liwayway Adkins, Richard Garbaccio, Eric Moore, Richard Morgenstern)

“Analyzing Environmental Policies with IGEM, an Intertemporal General Equilibrium Model of U.S. Growth and the Environment,” Report to EPA Office of Atmospheric Programs, Climate Economics Branch, October 2009. (with Richard Goettle, Dale Jorgenson, Daniel Slesnick and Peter Wilcoxon)

“Impact of Carbon Price Policies on U.S. Industries,” *Resources for the Future Discussion Paper*, 08-37, December 2008. (with Richard Morgenstern and Jhih-Shyang Shih)

*The Economic Costs of a Market-based Climate Policy*, Pew Center on Global Climate Change White Paper, April 2008. (with Dale Jorgenson, Richard J. Goettle, Peter J. Wilcoxon, Hui Jin, Patrick Schoennagel)

“The Sources of Growth of U.S. Industries” in Jorgenson, Kuroda, Motohashi (eds.) *Productivity in Asia. Economic Growth and Competitiveness*, Edward Elgar, 2007.  
(with Dale Jorgenson and K. Stiroh)

"Growth of U.S. Industries and Investments in Information Technology and Higher Education," in Carol Corrado, John Haltiwanger, Daniel Sichel (eds.) *Measuring Capital in the New Economy*, National Bureau of Economic Research, The University of Chicago Press, Chicago, 2005.  
(with D. Jorgenson and K. Stiroh)

“Measuring the Contribution of ICTs to Economic Growth in Canadian and U.S. Industries,” presented at Social Sciences and Humanities Research Council of Canada (SSHRC) *Conference on Index Number Theory and the Measurement of Prices and Productivity*, Vancouver 2004.  
(with Someshwar Rao and Jianmin Tang)

“Lessons for Canada from the U.S. Growth Resurgence”  
in *International Productivity Monitor*, 6:3-18, Spring 2003.  
(with D. Jorgenson and K. Stiroh)

"The Health Benefits and Costs of Controlling Air Pollution in China"  
in Warford and Li (eds.) *Economics of the Environment in China*, China Council for International Cooperation on Environment and Development, 2002.  
(with D. Jorgenson and Wenhua Di)

"A Comparison of Industrial Productivity Growth in Canada and the United States",  
in *Industry-level Productivity and International Competitiveness Between Canada and the United States*, eds. Dale W. Jorgenson and Frank C. Lee, Industry Canada Research Monograph, 2001.  
And in *Productivity Issues in Canada*, eds. Someshwar Rao and Andrew Sharpe, University of Calgary Press, 2002.  
(with Wulong Gu)

*The role of substitution in understanding the costs of climate change policy*,  
report to Pew Center on Global Climate Change, September 2000.  
(with Dale Jorgenson, Richard J. Goettle, Peter J. Wilcoxon)

“The Health Benefits of Controlling Carbon Emissions in China”  
in OECD, *Proceedings of Workshop on Assessing the Ancillary Benefits and Costs of Greenhouse Gas Mitigation Strategies*, Washington, March 2000.  
(with Richard Garbaccio and Dale Jorgenson)

“Education Policies to Stimulate Growth”

in *Using Dynamic General Equilibrium Models for Policy Analysis*, Contributions to Economic Analysis, 248, North-Holland, ed. Glenn W. Harrison, Svend E.H. Jensen, Lars H. Pedersen, Thomas F. Rutherford, 2000.  
(with Dale Jorgenson)

"Stabilization of Carbon Emissions and International Competitiveness of U.S. Industries"  
in *Growth Vol.2*, Jorgenson, MIT Press 1998.  
(with Dale Jorgenson)

"Environmental Regulation and U.S. Trade"  
in *Growth Vol.2*, Jorgenson, MIT Press 1998.  
(with Dale Jorgenson)

"Modeling Trade Policies and U.S. Growth: Some methodological issues"  
(with Dale Jorgenson 1998)  
in *The Economic Implications of Liberalizing APEC Tariff and Nontariff Barriers to Trade*, U.S. International Trade Commission Publication 3101, April 1998.

"China's Economic Growth and Carbon Emissions"  
(with Dale Jorgenson and Dwight Perkins)  
in *Energizing China: Reconciling Environmental Protection and Economic Growth*  
Harvard University Press, 1998.

### **Selected Presentations and Mass Media**

"Clearing the Air in China", *New York Times*, October 26, 2013 (with Chris Nielsen).

"Benefits of carbon control policy", *China Daily*, September 2, 2011, page 9 (with Dale Jorgenson and Jing Cao).

"Green Tax Policies for China," Resources for the Future *Policy Commentary Series*, January 22, 2010. <http://www.rff.org/Publications/WPC/Pages/Green-Tax-Policies-for-China.aspx>.

"Greening China: Market-based policies for air-pollution control," *Harvard Magazine*, 111(1), September 2008.  
(with Dale Jorgenson)

Testimony before the US-China Economic and Security Commission, June 14, 2007.  
*China's Energy Consumption and Opportunities for US-China Cooperation to Address the Effects of China's Energy Use*, [http://www.uscc.gov/hearings/2007hearings/written\\_testimonies/07\\_06\\_14\\_15wrts/07\\_06\\_14\\_ho\\_statement.php](http://www.uscc.gov/hearings/2007hearings/written_testimonies/07_06_14_15wrts/07_06_14_ho_statement.php)

UNFCCC, COP 9, Milan, Dec 5, 2003. Side event by Harvard Center for the Environment and U.S. EPA, *"Reconciling China's Economic Development with Global and Local Environmental Protection"*.

**Ph.D. Thesis (1989)**

The Effects of External Linkages on U.S. Economic Growth: A Dynamic General Equilibrium Analysis.

Committee: Dale Jorgenson (chair), Shantayanan Devarajan, Lawrence Goulder

**Completed Papers**

"Economic Growth in the Information Age: A Prototype Industry-Level Production Account for the United States, 1947-2010," (earlier version presented at World KLEMS Conference, Cambridge, August 2012) (with Dale Jorgenson and Jon Samuels).

"Household Energy Demand in Urban China: An Application of the Linear Expenditure System-Almost Ideal Demand System (LES-AIDS)" presented at 3<sup>rd</sup> EAAERE Conference, Huangshan, February 2013; presented at RUSE 2<sup>nd</sup> International Workshop, Beijing June 2013. (with Jing Cao and Huifang Liang).

"The Sub-Sector Sources of U.S. Productivity Growth in Information Technology," presented at Society of Government Economists Annual Conference, Washington, October 2012 (with Jon Samuels).

"Effects of Provisions in the Internal Revenue Code on Greenhouse Gas Emissions," report to the Board on Science, Technology and Economic Policy of The National Academies, April 2012.  
(by Dale Jorgenson Associates).

"Reconciling Control of Carbon and Air Pollution with Economic Growth in China: Costs and Benefits of a Carbon Tax and SO<sub>2</sub> Controls of the 11<sup>th</sup> Five Year Plan," report to the China Sustainable Energy Program of the Energy Foundation, January 2010.  
(with Chris Nielsen).

"Changes in China's Energy Intensity: Origins and Implications for Long-run Carbon Emissions and Climate Policies"  
(with Jing Cao, 2009).



*IGEEM: Inter-temporal General Equilibrium Model for Health Expenditures*, report to Centers for Medicare and Medicaid.

(with Dale Jorgenson, Daniel Slesnick and Peter Wilcoxon, June 2008)

“The Local and Global Benefits of Pollution Control in China: An Integrated Analysis of Market-Based Policies”

(with Jing Cao, 2006).

"The Embodiment Controversy: You can't have two prices in a one-sector model"

(with Kevin Stiroh, 2006)

“Energy and U.S. Economic Growth in the next Thirty Years: The Role of Information Technology and Technical Change,” Report to U.S. Department of Energy.

(with D. Jorgenson and Peter Wilcoxon, September 2004).

### **Work in Progress**

“Trade Effects and Emissions Leakage Associated with Carbon Pricing Policies,”

(with Liwayway Adkins, Richard Garbaccio, Richard Morgenstern)

Household Consumption in China.

(with Jing Cao and Huifang Liang)