

Global and Regional Productivity and Economic Growth: The Fifth World KLEMS Conference

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This issue of the *International Productivity Monitor* includes a selection of papers presented at the Fifth World KLEMS Conference, held at the Kennedy School of Government, Harvard University, on June 4-5, 2018.² The World KLEMS Initiative was established at Harvard at the First World KLEMS Conference, held at the Kennedy School of Government in 2010.³ Five World KLEMS Conferences have discussed data on capital (K) and labour (L) services, as well as inputs and outputs of energy (E), materials (M), and services (S) for more than forty countries. These have been grouped into three major regions—EU (European Union) KLEMS, LA (Latin America) KLEMS, and Asia KLEMS.

A novel feature of the Fifth World

KLEMS Conference was the focus on a conceptual framework and data for the global economy. The first article in this issue on the conceptual framework for the global economy is by Jon Samuels and Erich Strassner (2019), “Toward a Global Integrated Industry-Level Production Account: A Proposal.” The key feature of this framework would be a world input-output table in current and constant prices, together with constant quality prices for capital and labour inputs by industry. The prices would be linked by conceptually appropriate purchasing power parities. These data could provide industry and country sources of global economic growth as well as measures of cross-country industry competitiveness. The data could also provide productivity level

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² The conference program with links to all papers presented is available on the World KLEMS website: <https://scholar.harvard.edu/jorgenson/schedule-presentations-papers>.

³ For more information about the World KLEMS Initiative, see Jorgenson (2012).

comparisons and the analysis of global production chains.

The second article in this issue is an empirical data set for the global economy, presented by Robert Inklaar, Pieter Woltjer, and Daniel Gallardo Albarron (2019) in their article, “The Composition of Capital and Cross-Country Productivity Comparisons.” This is based on the Penn World Table (PWT), a long-established data set with aggregate output and input for individual countries, covering the global economy.⁴ The latest version of this data set presents, for the first time, capital services and its price as a measure of capital input. This replaces capital stock as a homogeneous measure of capital input. The authors show that, when properly measured, differences in capital input can account for a greater share of income variation across countries but that total factor productivity still remains dominant in accounting for differences in GDP per worker.

The first regional component of the World KLEMS data set was the EU KLEMS data set, published in 2010 by Marcel Timmer, Robert Inklaar, Mary O’Mahony, and Bart van Ark, in their monograph, *Growth of the European Economy: A Comparative*

Industry Perspective.⁵ Europe is represented in three new contributions in this issue of the *International Productivity Monitor*. The first of these is by Cecilia Jona-Lasinio and Valentina Meliciano (2019) in their article, “Global Value Chains and Productivity Growth: Does Intangible Capital Matter?” This article links participation in global value chains with productivity growth through investment in intangible assets for 18 sectors of nine European economies for 1998-2013. The striking empirical finding of this research is the successful integration of investment in intangible assets and participation in global value chains, two previously separate bodies of empirical research on the sources of economic growth.

The second contribution on productivity and economic growth in Europe is by Gang Liu (2019) in his article, “Structural Change and Productivity in the Market Economy of Mainland Norway, 1997-2014.” An increased share of skilled labour in value added is found for the market economy as a whole, as well as almost all industrial sectors. The shares in value added for the total market economy have increased for software and research and development, while the

⁴ More information is available on the Penn World Table website maintained by Groningen University: <https://www.rug.nl/ggdc/productivity/pwt/>.

⁵ For a summary of the monograph, see Timmer *et al.* (2011)

share of hardware has decreased. Investment in intangible capital, combined with human capital, has played an increasingly important role in economic growth in Norway during the period of this study.

The third contribution on productivity and economic growth in Europe is by Nicholas Oulton (2019) in his article, “The UK and Western Productivity Puzzle: Does Arthur Lewis Hold the Key?” Oulton identifies the productivity puzzle in the United Kingdom as the combination of slow growth in labour productivity since the end of the last boom in early 2008, combined with an outstanding performance of the labour market during this period. The decline in labour productivity growth depends negatively on the growth of labour input and positively on the growth of export demand. In the UK labour input continued to rise at the same rate as before the crisis, while the growth of output fell. In continental Europe in contrast, the growth of labour input was constrained by slow growth of the working age population in most countries. The slowdown in labour productivity growth was less pronounced in continental Europe than in the UK. Oulton argues that the Great Recession produced the slowdown in

TFP growth. The next article considers the data for Japan, presented by Joji Tokui and Takeshi Muzuta (2019) in their article, “Japan’s Prefectural-Level KLEMS: Productivity Comparisons and Service Price Differences.” This article presents KLEMS-type data for the forty-seven prefectures of Japan. Using the Regional-Level Japan Industrial Productivity Database (R-JIP),⁶ which includes observations on service prices for different regions, Tokui and Muzuta estimate cross-regional price differences for each industry. The dataset also includes regional differences in the composition of labour input and wage levels. Finally, the study includes a test of the Balassa-Samuelson effect that consumer prices are higher in more developed economies because they have greater variation in traded good sectors than in non-traded sectors. This effect holds within Japan on the basis of prefectural differences in service prices.

The next article discusses how education affects economic growth, namely, through industry educational intensity. Educational intensity is defined as the share of an industry’s work force with a college degree or above. The article by Jorgenson, Ho, and Samuels (2019), “Ed-

⁶ A detailed description of the Regional-Level Japan Industrial Productivity Database (R-JIP) is presented in a new book edited by Tokui (2018).

educational Intensity, and the Sources of and Prospects for U.S. Economic Growth,” shows that the contribution of education intensive industries to growth in value added exceeds that of non-education intensive industries. This is driven by the larger share of growth in capital and labour services and growth in total factor productivity in education intensive industries. The shift toward educationally intensive industries is insufficient to revive growth in labour productivity and aggregate output. Growth over the next ten years will be constrained by the growth of capital and labour quality.

The article by Corby Garner, Justin Harper, Tom Howells, Matt Russell, and Jon Samuels (2019), “New BEA-BLS Estimates of the Sources of U.S. Economic Growth between 1987 and 2016,” presents new historical statistics for the BEA-BLS integrated industry-level production account. The dataset includes KLEMS-type data and integrated multi-factor productivity data for 1987-2016 by industry. The most important source of growth over the period was capital input; labour input was the second most important growth source. Multifactor productivity growth accounted for about 20 per cent of U.S. economic growth. Empirical results are presented for nine major sectors and less detail is provided for 63 industries. The article finds that the decline in

the aggregate income share of labour input over the period of the study was due to the decline of the income share of workers without a college degree.

The final contribution to this special issue of the *International Productivity Monitor* is the article by Matilde Mas, André Hofman, and Eva Benages (2019), “Knowledge Intensity in a Set of Latin American Countries: Implications for Productivity.” Knowledge intensity is measured by the economic valuation of productive services that incorporate knowledge, specifically, human capital and information and communication technologies. The contribution of each asset is determined by the price of services that they provide. This methodology is applied to four Latin American countries. Brazil, Chile, Columbia, and Mexico. Spain and the United States are used as benchmarks for these measurements. This methodology can be applied to countries that have databases developed within the framework of World KLEMS. The picture that emerges is one with sharp differences among the six countries. Developing economies are moving towards a more knowledge intensive pattern of production and the speed with which they approach more mature economies differs substantially.

I conclude that important new directions are emerging for the anal-

ysis of growth and productivity within the World KLEMS Initiative. The three regional organizations—EU (European Union) KLEMS, LA (Latin America) KLEMS, and Asia KLEMS—are continuing to generate new data for the world’s leading economies. However, the global economy as a whole is attracting greater attention, especially with the dramatic decline in the importance of the advanced economies of Europe and North America, relative to the rapidly emerging economies of Asia. The relative importance of investment and productivity has changed with investments in human and nonhuman capital assuming much greater significance than total factor productivity as sources of economic growth. The growth of capital input is more important than the growth of labour input with capital input measured in terms of capital services rather than capital stock. Finally, the income share of labour is declining relative to the share of capital.

Government statistical agencies, such as the U.S. Bureau of Economic Analysis and Statistics Canada have developed KLEMS-type data sets within their systems of national accounts. International organizations have integrated this information with statistics on international trade. The task that remains is to give appropriate significance to economic links

among countries and how these are evolving. The links among countries are increasingly taking the form of elaborate global value chains that began as regional trade organizations and have grown into world-wide systems that involve numerous transitions across international boundaries.

The evolution of these systems is increasingly driven by investments in forms of capital that emphasize rising flows of capital services. Meanwhile investments in human capital in advanced economies are showing signs of saturation, so that there is limited potential for further increases in average levels of educational attainment. Human capital investments in emerging economies are increasingly important in maintaining the rapid growth that would enable these economies to achieve the maturity of the advanced economies that have preceded them in economic development. The next step for the World KLEMS Initiative is to integrate world-wide production systems with World KLEMS data.

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