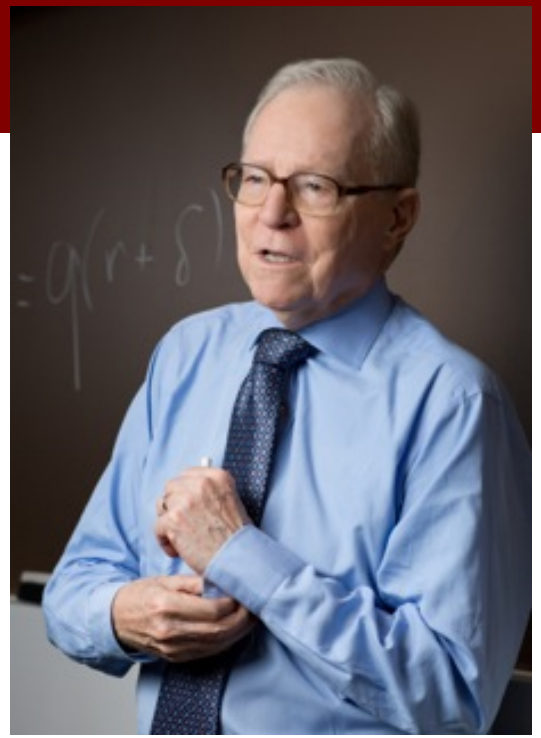
PRODUCTION AND WELFARE: PROGRESS IN ECONOMIC MEASUREMENT



Presentation by Dale W. Jorgenson at the LA KLEMS Plenary Conference

LAKLEMS : CRECIMIENTO ECONÓMICO Y PRODUCTIVIDAD EN AMÉRICA LATINA

IDB Improving lives

Interamerican Development Bank, Washington, DC,

November 30, 2018

KEY REFERENCES

- Paul Schreyer, *OECD Manual: Measuring Productivity,* Paris, OECD, 2001.
- *United Nations System of National Accounts 2008*, New York, United Nations, 2009.
- Dale W. Jorgenson, "Production and Welfare: Progress in Economic Measurement," *Journal of Economic Literature* 2018, 56t(3), 867-919.
- Andre Hofman, Matilde Mas, Claudio Arevena, and Juan Fernandez, de Guevara, "LA KLEMS: Economic Growth and Productivity in Latin America," Ch. 5 in Dale W. Jorgenson, Kyoji Fukao, and Marcel P. Timmer, eds., *World Economy: Growth or Stagnation*, Cambridge, Cambridge University Press, 2016, pp. 153-198.

BLUEPRINT FOR AN EXPANDED AND INTEGRATED SYSTEM OF NATIONAL ACCOUNTS

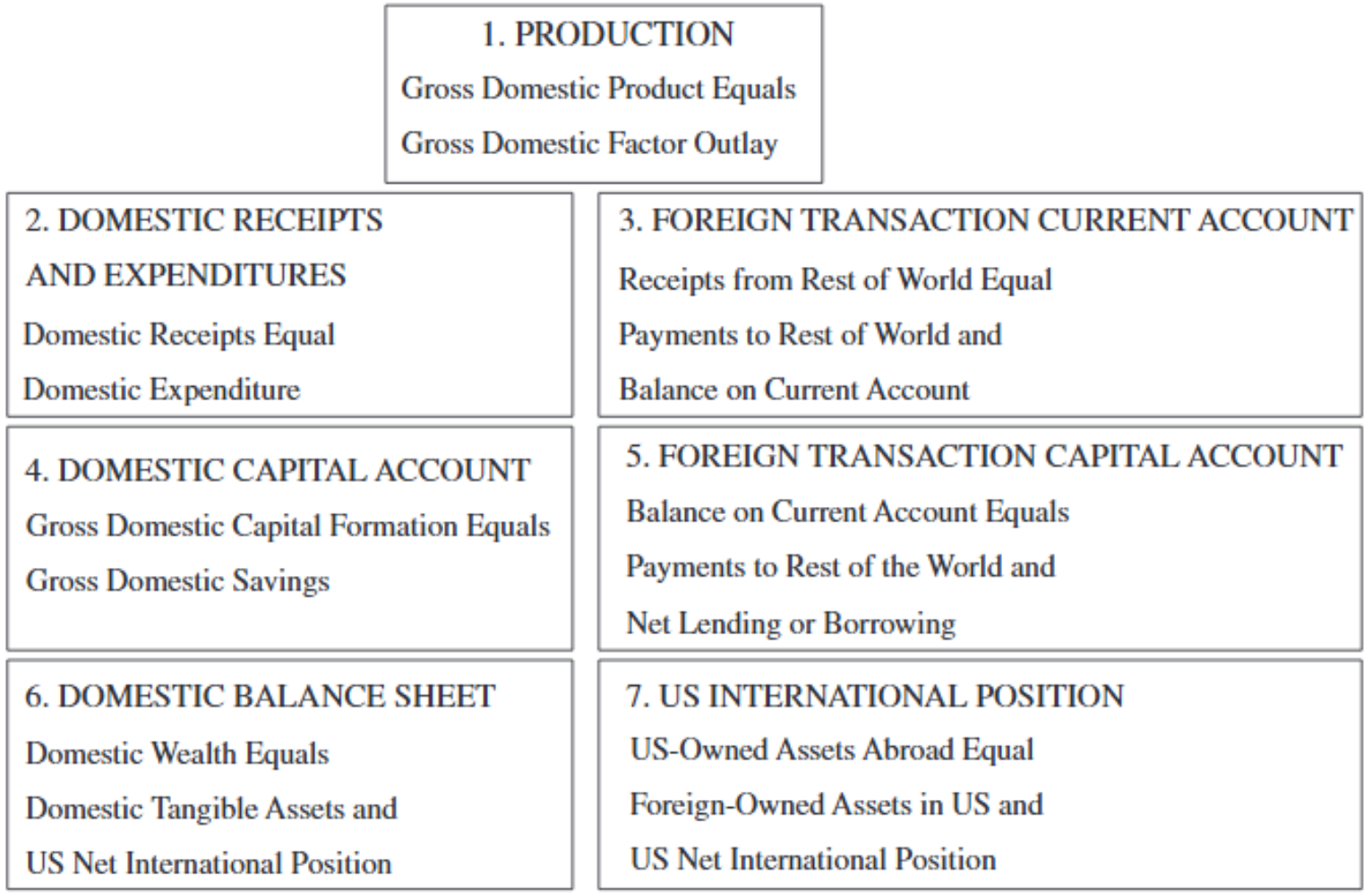


Figure 1. Blueprint for an Expanded and Integrated Set of National Accounts for the United States

PRODUCTION ACCOUNT

- Gross Domestic Product Equals Gross Domestic Factor Outlay in Current Prices.
- Gross Domestic Product in Constant Prices Divided by Gross Domestic Factor Outlay in Constant Prices Is Equal to Productivity.
- Gross Domestic Factor Outlay Includes Inputs of Capital and Labor Services in Constant Prices, so that Productivity is Total Factor Productivity.
- Incorporation of Capital and Labor Services and Productivity into the National Accounts is the First Major Advance in Economic Measurement.

RECEIPTS AND EXPENDITURES

- Domestic Receipts Equals Domestic Expenditures in Current Prices.
- Integrated Macroeconomic Accounts Incorporate the National Income and Product Accounts and the Flow of Funds.
- Welfare is Incorporated into the National Accounts Through the Distribution of Personal Consumption Expenditures; the Level of Living is the Sum of Efficiency and Equity.
- Incorporation of Receipts and Expenditures in Constant Prices, and Social Welfare into the National Accounts Is the Second Major Advance in Economic Measurement.

INDUSTRY-LEVEL PRODUCTION ACCOUNT

- The Industry-Level Production Account Gives the Output of Each Industry As a Function of Inputs of Capital (K), Labor (L), Energy (E), Materials (M), and Services (S).
- For Each Industry the Value of Output Is Equal to the Value of Inputs in Current Prices. The Ratio of Industry-Level Output to All Inputs Is Industry-Level Productivity.
- Industry-Level Production Accounts Have Been Compiled for More than Forty Countries, Including Europe, North and South America, and Asia.
- Industry-Level Production Accounts Have Been Incorporated into Systems of National Accounts; This Is the Third Major Advance in Economic Measurement.

THE WORLD KLEMS INITIATIVE

- The World KLEMS Initiative Was Established by Dale W. Jorgenson, Bart van Ark, and Marcel P. Timmer at Harvard University in Cambridge, Massachusetts.

- LA KLEMS, the Regional Organization for Latin America, Was Coordinated by ECLAC in Santiago, Chile.

- LA KLEMS Was Transferred to the Interamerican Development Bank (IDB) in Washington, DC, in 2016.

- A Remarkable Finding from the Initial Phases of the LA KLEMS Project Is That There Has Been No Productivity Growth Over the Two-Decade Period, 1990-2010.

INTERNATIONAL COMPARISONS OF INDUSTRY-LEVEL PRODUCTIVITY LEVELS

- Data Sets for Two More Countries, Linked by Industry-Level Purchasing Power Parities Are Essential for Analyzing the Role of International Trade and Investment in Economic Growth.

- Purchasing Power Parities and Price Level Indices for the U.S. and Japan Show that the Yen Was Under-Valued Until 1985 and Has Been Over-Valued Since Then.

- The Overall Productivity Level for the U.S. Has Exceeded the Overall Productivity Level for Japan for the Period 1955-2012.

- Industry-Level Productivity Levels for the U.S. and Japan Have Been Very Similar for Manufacturing Industries, But U.S. Productivity Levels Have Exceeded Those for Japan for Services.

U.S.-JAPAN PPP's AND PRICE LEVEL INDICES, 1955-2012

TABLE 1
PPPs and Price Level Indices for Output and KLEMS

	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2012
PPPs (Purchasing Power Parities)													
Output (GDP)	210.2	215.1	237.0	247.3	279.4	247.3	206.8	185.1	164.3	146.3	124.9	114.0	107.3
Capital	166.6	235.7	217.9	291.2	222.4	227.2	207.9	194.4	145.7	141.9	125.0	112.7	103.2
Labor	60.7	66.2	101.5	123.6	200.2	178.4	153.3	147.7	144.6	114.1	90.4	79.2	75.4
Energy	627.4	625.1	618.9	581.6	600.6	521.3	461.1	308.9	271.9	231.1	169.1	151.3	143.8
Material	270.8	254.3	259.3	255.3	255.8	218.8	193.6	154.3	135.5	128.3	112.3	100.1	93.1
Service	175.2	168.3	197.4	206.4	259.7	246.3	205.6	181.7	163.0	142.5	122.6	108.4	103.3
(ref) GDP-expenditure based	—	170.6	204.1	226.0	266.0	245.6	206.9	189.2	174.5	155.0	129.6	111.6	104.6
Exchange rate	360.0	360.0	360.0	360.0	296.8	226.8	238.5	144.8	94.1	107.8	110.2	87.8	79.8
PLIs (Price Level Indices)													
Output (GDP)	0.58	0.60	0.66	0.69	0.94	1.09	0.87	1.28	1.75	1.36	1.13	1.30	1.34
Capital	0.53	0.74	0.68	0.90	0.83	1.09	0.93	1.40	1.59	1.32	1.14	1.29	1.30
Labor	0.17	0.18	0.28	0.34	0.67	0.79	0.64	1.02	1.54	1.06	0.82	0.90	0.95
Energy	1.74	1.74	1.72	1.62	2.02	2.30	1.93	2.13	2.89	2.14	1.53	1.72	1.80
Material	0.75	0.71	0.72	0.71	0.86	0.97	0.81	1.07	1.44	1.19	1.02	1.14	1.17
Service	0.49	0.47	0.55	0.57	0.88	1.09	0.86	1.25	1.73	1.32	1.11	1.24	1.29

Notes: The PPP for GDP-output based is defined as a translog index of industry-level PPP for value added, which is calculated by the double deflation method. The Price Level Indices are defined as the ratio of PPP to exchange rate. The PPP and exchange rate are defined by Japanese yen/ US dollar. The PPP for GDP-expenditure based is the estimate by the Eurostat-OECD.

Source: Jorgenson, Nomura, and Samuels. 2016. "A Half Century of Trans-Pacific Competition: Price Level Indices and Productivity Gaps for Japanese and US Industries, 1955–2012." In *The World Economy: Growth or Stagnation?* Edited by Dale W. Jorgenson, Kyoji Fukao, and Marcel P. Timmer.

U.S.-JAPAN PRODUCTIVITY LEVELS, 1955-2012

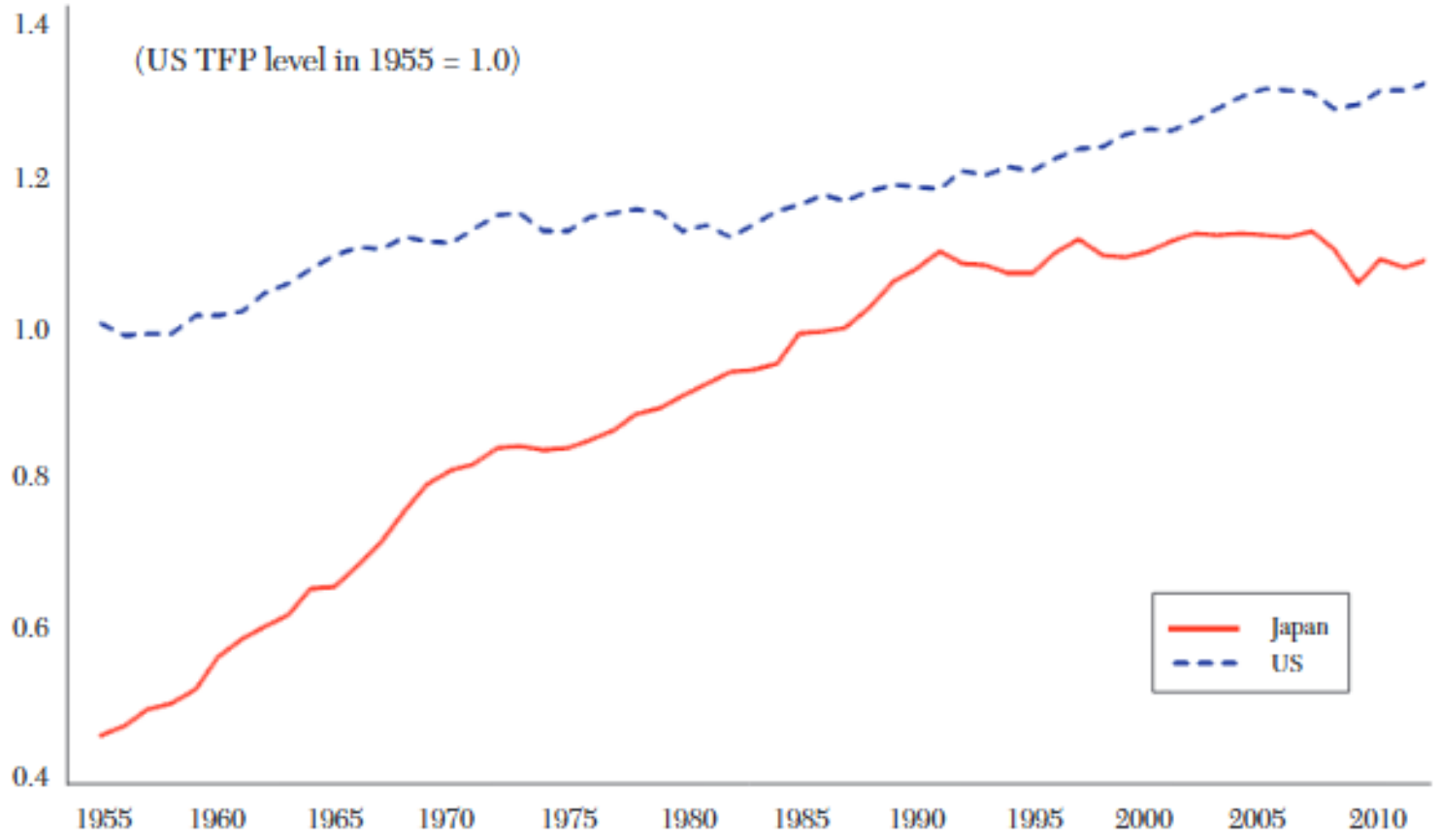


Figure 8. Japan and US Total Factor Productivity Levels, 1955–2012

Source: Jorgenson, Nomura, and Samuels. 2016. "A Half Century of Trans-Pacific Competition: Price Level Indices and Productivity Gaps for Japanese and US Industries, 1955–2012." In *The World Economy: Growth or Stagnation?* Edited by Dale W. Jorgenson, Kyoji Fukao, and Marcel P. Timmer.

U.S.-JAPAN INDUSTRY-LEVEL PRODUCTIVITY, 2005

Figure 10. Industry Contributions to the Japan–US Total Factor Productivity Gap, 2005

SUMMARY

- Industry-Level Productivity and Efficiency, Equity, and the Standard of Living Have Been Incorporated into the United Nations System of National Accounts 2008.
- Industry-Level Productivity Comparisons Are Essential for Analyzing the Impact of International Trade and Investment on Economic Growth.
- Welfare Measurements Are Essential for Evaluating Economic Policies and Making International Welfare Comparisons.
- Important Progress Has Been Made in the Measurement of Both Production and Welfare.