

Decomposing Productivity Growth

One approach to decompose productivity growth is from Foster, Haltiwanger, and Krizan (2001). It uses base-year market shares as weights for each term of the decomposition:

$$\begin{aligned} \Delta P_t = & \sum_{\text{Continuers}} \theta_{it-k} \Delta p_{it} + \sum_{\text{Continuers}} \Delta \theta_{it} (p_{it-k} - P_{t-k}) + \sum_{\text{Continuers}} \Delta \theta_{it} \Delta p_{it} \\ & + \sum_{\text{Entries}} \theta_{it} (p_{it} - P_{t-k}) - \sum_{\text{Exits}} \theta_{it-k} (p_{it-k} - P_{t-k}) \end{aligned}$$

where Δ is changes over the k -years' interval between the first year ($t-k$) and the last year (t); θ_{it} is the share of firm i in the given industry at time t (expressed in output or employment); p_i is the productivity of firm i ; and P is the aggregate (weighted average) productivity level of the industry. The first term is the within component; the second term is the between component; the third term is the covariance or cross component; and the fourth and fifth terms are the entry component and exit component, respectively.

References

Detailed bibliographies on the topics covered in this book can be found in World Bank (2005a-c), (2006b), (2007a), and (2008a) below.

Alam, A., P. Mitra, and S. Zaidi. 2008. *Key Factors Affecting Satisfaction with Life in Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.

Bartelsman, E., and S. Scarpetta. 2007. "Reallocation and Productivity in Transition and Integration Phases." Background paper for World Bank (2008a). World Bank, Washington, D.C.

Bartelsman, E., J. Haltiwanger, and S. Scarpetta. 2004. "Microeconomic Evidence of Creative Destruction in Industrial and Developing Countries." Policy Research Working Paper No. 3464. World Bank, Washington, D.C.

Brown, D., and J. Earle. 2007. "Firm-level Components of Aggregate Productivity Growth in ECA Economies." Background paper for World Bank (2008a). World Bank, Washington, D.C.

Carlin, Wendy, Mark Schaffer, and Paul Seabright. 2004. "A Minimum of Rivalry: Evidence from Transition Economies on the Importance of Competition for Innovation and Growth." *Contributions to Economic Analysis & Policy* : Vol. 3 : Iss. 1, Article 17. Berkeley, CA: Berkeley Electronic Press.

EBRD (European Bank for Reconstruction and Development). 2005. *Transition Report 2005*. London: EBRD.

———. 2007. *Life in Transition, a Survey of People's Experiences and Attitudes*. London: EBRD.

Eschenbach F., and B. Hoekman. 2006. "Services Policies in Transition Economies: On the EU and WTO as Commitment Mechanism." World Bank Working Paper No.3951. World Bank, Washington, D.C.

- Foster, L., J.C. Haltiwanger, and C.J. Krizan. 2001. "Aggregate Productivity Growth: Lessons from Microeconomic Evidence." In E. Dean, M. Harper, and C. Hulten, eds., *New Developments in Productivity Analysis*. Chicago: University of Chicago Press.
- Grosfeld, I., and G. Roland. 1995. "Defensive and Strategic Restructuring in Central European Enterprises." Discussion Paper 1135. Centre for Economic Policy Research, London.
- Mitra, P., A. Muravyev, and M.E. Schaffer. 2008. "Convergence in Institutions and Market Outcomes: Cross-country and Time-series Evidence from the BEEPS Surveys in Transition Countries." World Bank, Washington, D.C.
- Rozelle, S., and J.F.M Swinnen. 2004. "Success and Failure of Reform: Insights from the Transition of Agriculture." *Journal of Economic Literature* 42 (June): 404–56.
- Tarr, D., and O. Shepotylo. 2007. "The Structure of Import Tariffs in the Russian Federation: 2001-2005." Policy Research Working Paper No. 4265. World Bank, Washington, D.C.
- World Bank. 2000. *Making Transition Work for Everyone: Poverty and Inequality in Europe and Central Asia*. Washington, D.C.: World Bank.
- . 2005a. *Growth, Poverty, and Inequality: Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.
- . 2005b. *Enhancing Job Opportunities: Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.
- . 2005c. *From Disintegration to Reintegration: Eastern Europe and the Former Soviet Union in International Trade*. Washington, D.C.: World Bank.
- . 2005d. *World Development Report 2005: A Better Investment Climate for Everyone*. Washington, D.C.: World Bank.
- . 2006a. *Anticorruption in Transition 3: Who is Succeeding . . . and Why?* Washington, D.C.: World Bank
- . 2006b. *Migration and Remittances: Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.
- . 2007a. *From Red to Gray: The "Third Transition" of Aging Populations in Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.
- . 2007b. "EU8 + 2 Regular Economic Report, September, 2007." World Bank, Washington, D.C.
- . 2008a. *Unleashing Prosperity: Productivity Growth in Eastern Europe and the Former Soviet Union*. Washington, D.C.: World Bank.
- . 2008b. "Globalization and Knowledge Absorption in Europe and Central Asia: The Role of Trade, FDI and Cross-Border Knowledge Flows." ECA Chief Economist's Working Paper Series. World Bank, Washington, D.C.

Index

- aging population, 22, 27, 121
 - effect on government and household savings, 125
 - migration as partial solution, 23–24, 127–28
 - policies to address, 126–27, 128f
- agriculture, 47–51
 - boosting productivity in poorest countries, 15–16
 - employment expansion for poor, 48–49
 - employment over transition, 37, 39f
 - high poverty rates, 89, 91
 - labor productivity growth, 51
 - low productivity of and overrepresentation of the poor in, 47–48
 - subsistence, 10
 - value added per worker, 49f
 - wage employment, 48f
- bank financing, 7f, 8f, 60t, 61f, 69n
 - de novo firms, 65f
 - for selected years, 62t
 - transition and developed economies, 63f
- between-firm effect, 40, 44–45, 45f
- business environment, 4, 10, 54
 - convergence of, 5–9
- Business Environment and Enterprise Performance Survey (BEEPS), 5, 53, 69n
- business growth, constrained
 - due to lack of skilled workers, 85
- buyer-driven networks, 106–9
- capital stock utilization, 33n
- cohesion countries, employment growth, 79–80

- Commonwealth of Independent States (CIS), 1, 27n
- employment growth, 81–82, 93f
- wage growth, 92f, 93f
- competition, 10, 54, 82
- and net entry of new firms, 45–47
- impact of country size, 56
- measured by number of competitors, 55
- measuring and market structure, 5–6
- no effect on deep restructuring, 68
- spurring innovation and cost control, 57
- competition, domestic, 5, 6, 58, 58t
- competition, foreign, 6, 57, 57t
- consumption inequality, 87
- convergence, 2
- employment, 12–13, 84
- financing, 64–65
- labor market outcomes, 77–79
- product development and cost control, 59
- corruption, 69n
- cost control to aid competitiveness, 57, 57t, 59
- country group classifications, 27n, 31b
- country size, affects scale of competition, 56
- cross-effect, 40, 45, 45f
- customer pressure driving innovation, 58, 58t
- demand, price elasticity of, 55–56, 56t, 68
- demographic transition, 22–24
- destinations of trade, 102–4, 103f, 104f
- downsizing, 12, 79, 80, 81
- Eastern Europe, 1, 27n
- economic growth, 14, 19, 87
- economic recovery, 91f
- education, 96
- educational performance, 123
- employment
- agriculture, 51
- and firm entry and exit impacts, 74–77
- changes, 83, 94f
- convergence patterns, 12–13, 84
- decline in early transition, 30, 121
- early transition, 1998, 2006, 32f
- in the EU8 and Southeastern Europe, 11–12
- of poor, 90, 90t, 91
- sectoral compared to market economy benchmarks, 39f
- services sector, 51
- shares of by sectors and country groups, 37
- shifts from less to more productive industries, 40
- skills shortage impact, 85
- employment growth, 10–13, 26
- and income distribution not favoring poor, 90
- and wage growth, 93f
- EU8 and cohesion countries, 79–80
- EU8 and Southeastern European, 80–81
- Southeastern Europe and CIS, 81–82
- employment, self-, 74

- employment, wage, sectoral for
poor and nonpoor by
country, 48f
- entry and exit effects, 3–4, 3f,
40, 41–44, 45f
generating competition,
46–47
on labor outcomes, 74–77
- equity financing, 60t, 62t
- EU10, 52n
- EU15, 28n
- EU8 employment, 11–12, 79–81,
93f
- exports, 17, 68, 101
capital-intensive and skilled
labor, 105–6
destinations, 102–4, 103f,
104f
factor intensity, 105f
from production-sharing net-
works, 108
global distribution by country
group, 103f
intra-regional, 103–4, 104f
merchandise, 105, 105f
production-sharing networks,
107
share of skilled labor and
capital-intensive products,
17, 17f, 108
- family financing, 7f, 8f, 60t, 61f,
62t
de novo firms, 65f
transition and developed
economies, 63f
- farm restructuring, 15
- farming, household, 49, 50f
- farming, subsistence, reliance
on, 48
- FDI. *See* foreign direct
investment
- financing, 6–9, 7f, 59
and firm characteristics simi-
lar in transition and devel-
oped economies, 64
and firm size, 64
and lending structure, 59,
61–62, 64–65
convergence in, 64–65
cost barrier, 59, 60f
evolution of, 62t
evolution of by country
groups, 61f
firm restructuring, 69
regional differences in access,
60f
similar for privatized and de
novo firms, 9, 9f
sources by country, 60t
sources by firm characteris-
tics, 61–62
structure comparison, 62
structure for private firms,
transition and developed
economies, 63f
- firms
changing size distribution,
82–84, 82f
characteristics in transition
countries, 53
cross-effect, 45, 45f
domestic competition spurs
productivity growth, 5
downsizing, 12
employment growth changes
by firm size, 83, 84
employment in large and
small, 12
entry and exit effects, 41, 42,
42f
on competition, 46–47
on labor outcomes,
74–77, 75f
- financing similar for priva-
tized and de novo, 9, 9f

- growth of small, 82
- job creation and destruction
 - by ownership type, 79f
- measuring competition by
 - number of competitors, 5–6
- net entry a source of productivity growth, 45
- new entrants and job creation, 75–77
- new entrants' survival, 43, 44f
- perception of competition, 55, 56–57
- privatized, state-owned, and de novo, 53
- productivity of new entrants, 42–43
- resource reallocation between existing firms (between-firm effect), 44–45, 45f
- restructuring, 65–67
 - deep, 66t, 67–69, 68
 - defensive, 45
 - impact of location, 68
 - intensified and decelerating, 66
 - measuring, 69n, 70n
- size distribution, 83, 83f, 84f
- turnover, 41, 47, 52n
- within-firm, entry and exit, between-firm, and cross effects, 40, 45f
- firms, de novo, 64
 - employment growth, 12, 80–81
 - financing resembling firms in developed economies, 9
 - financing structure, 9f, 65f
 - job creation and destruction, 79f
 - job growth, 11, 11f, 78–79
 - restructuring, 67
 - rising and state-owned and privatized falling, 12
 - firms, foreign, R&D, 111
 - firms, private, financing, 7–8, 8f, 62
 - firms, privatized, 64, 79f
 - firms, state-owned, 67, 79f
 - foreign direct investment (FDI), 17f, 107, 108, 108f
 - Georgia, 47f, 91f
 - Gini coefficient of consumption inequality, 87
 - global chains, 17, 17f
 - gross domestic product (GDP)
 - per capita, 27n, 30f, 129n
 - and sectoral employment, 39f
 - and working-age population growth, 28n
 - by country group, 31b
 - recovery from recession, 1, 29
 - health, 96, 126
 - household farms, 49, 50f
 - household savings, effect of aging, 125
 - HP7 countries, network trade, 106, 107
 - human capital positive impact on firm restructuring, 69
 - Hungary, job creation and destruction in manufacturing and services, 76f
 - imports, 17, 101
 - inclusion, 10–13
 - inclusive society, priority for well-being, 96
 - industry, wage employment in, 48f
 - inequality, 1, 2
 - informal financing, 7f, 8f, 61f
 - de novo firms, 65f

- for selected years, 62t
- transition and developed economies, 63f
- innovation, 18, 65, 68
 - driven by competition, 57–58, 57t, 58t
 - openness and growth, 19
- integration, 16–18, 109–10
- job creation and destruction, 74–77, 75f, 85n
 - by country group, 77t, 78f
 - in early transition, 77–79
 - in transition economies by ownership, 79f, 80t
- job destruction, de novo firms, 11
- job flows in transition economies, 75f
- job growth, 11, 79, 80t
- job reallocation, 77, 77t, 80t, 85n
- job vacancy due to skills shortage, 13, 85
- knowledge absorption, 65, 110
- knowledge flows, international, 18–19
- Kyrgyz Republic, agricultural transformation, 49
- labor force participation, 10, 97n
 - boosting through pension reform, 23–24
 - decline due to aging of workers, and falling rates for men and women, 123
 - EU15 and transition country groups by gender and age, 124f
 - increase needed to maintain levels in 2025, 124, 125f
 - lower in transition countries, 92–93
 - poor population, 89, 90t
 - working poor, 89
- labor market mismatch, 86n
- labor market outcomes reflect- ing transition stages, 10–11
- labor market outcomes, conver- gence of, 13–14, 77–79
- labor market shortages, 25, 128
- labor productivity growth, 3, 40
 - agriculture, 50, 51
 - decline in early transition, 29–30
 - due to land distribution, 49–50
 - manufacturing, 39
- labor, limited use of, 73
- labor, skilled, 17f
- land distribution, 15, 49–50
- leasing as financing source, 60t
- lending structure and finance, 59, 61–62, 64–65
- liberalization, 51–52, 101, 110
- loans, decline of informal, 7
- Making Transition Work for You*, 1
- manufacturing, 37
 - job creation and destruction, 74–75, 76f
 - labor productivity, 3, 38–40
- market structure, number of competitors, 55, 55t
- merchandise exports, 101, 103f, 105, 105f
- merchandise trade openness, 102f
- migration, 19–22, 24–27
 - agreements, 116–17
 - and demography, policy implications, 128f
- biaxial patterns, 20, 113–14
- circular, 117–18

- circular and reverse, 25–26, 128
- destinations, 114
- determinants of, 20–22, 115–16
- impacts of economic growth, 115–16
- motivations for, 21
- partial solution to aging workers, 24, 127–28
- remittances, 19, 114–15, 114f
- senders becoming receivers, 25f, 34–25, 127
- Southern Europe, 21, 22f, 115–16, 116f
- Turkey and transition countries, 113
- Moldova, 48f, 90t, 92f, 94f
- monopoly power, firm perceptions of, 56
- natural resources, 105, 105f
- net entry contribution to productivity growth, 46, 47f, 76–77
- network trade, integration into, 18
- networks. *See* buyer-driven networks; production-sharing networks
- patent citations and knowledge absorption, 110–11
- patents, indigenous and co-invented, 19, 111
- pension reform, 23–24, 124
- pensions, 95f, 125–26
- PISA. *See* Program for International Student Assessment
- Poland, 90t
 - employment, 48f, 94f
 - wage growth, 91f, 92f
- poor population, 88f, 95–96
 - majority are working adults and children, 14, 14f, 87–88
 - profile of, 88–89
- poor, inactive, 15, 92
- poor, working, 97n
- population, 121
 - aging of, 23–24, 27, 121
 - effects on savings, 125
 - policies to address, 126–27, 128f
- change by country, 122f
- shrinking in transition countries, 23f
- working-age, 25f, 32, 94f
- decline, 22–23, 121
- port reform for trade facilitation, 109–10
- poverty, 88f, 91
 - by sector and employment type, 90t
 - employed vs. unemployed, 89
 - nonincome dimensions of, 96
- poverty headcount, 87
- poverty lines, 97n
- poverty reduction, 14–16, 16, 87
 - effects of growth, 26
 - impact of wage growth, 89–90
 - public transfers, 93–95
- price elasticity of demand, 55–56, 56t
- private transfers, 94–95
- producer-driven networks, 106–9
- product development, 57, 57t, 58, 58t
 - and discontinuance, 65–67, 66t
 - convergence in, 59
- production fragmentation, 106–7

- production-sharing networks,
106, 107, 108
- productivity, 4, 23, 123
of new firms, 42–43, 43f
- productivity growth, 3, 16, 131
and effects of net entry, 45,
46f, 47f, 76–77
and wage increases, 91f
business environment
impacts, 10
defensive and strategic
restructuring, 40
developed, transition, and
developing economies, 41f
effect of liberalization on ser-
vices sector, 51
employment reallocation,
27n–28n
entry and exit effects, 3–4, 3f
sources by country, 45f
to offset aging society, 127
within firms, 4–5
- Program for International Stu-
dent Assessment (PISA),
123, 129n
- public transfers, 93–95, 95f
- R&D collaboration, 19, 111
- recession recovery, 29
- reform, trade, 109
- remittances, 19–20, 94–95, 97n
percentage of GDP, 114–15,
114f
- restructuring, 54, 65–67
CIS, 82
deep, 66t, 67–69
defensive, 40, 45
due to pressure from com-
petitors and customers, 6
financial access and human
capital, 69
intensified and decelerating,
66
measuring, 69n, 70n
productivity growth and job
destruction, 77
strategic, 40
- retained earnings financing, 59,
60t, 61, 61f, 62
- de novo firms, 65f
for selected years, 62t
private firms reliance on due
to autonomous factors, 62,
64
reliance on, 7, 7f, 9
transition and developed
economies, 63f
- retirement ages, 23–24, 126
- Romania, 90t, 91f, 94f
job creation and destruction
in manufacturing and ser-
vices, 76f
sectoral wage employment,
48f
wage growth, 91f, 92f
- Russian Federation, 20, 112n
employment rate changes,
94f
growth rate adjustment,
33n
net entry and productivity
growth, 47f
poverty profile, 90t
sectoral wage employment,
48f
wage growth, 92f
- satisfaction with life, 96–97
- savings, effects of aging popula-
tion, 125
- self-employment, 74
- services sector, 18, 51–52
employment over transition,
37, 39f
expansion of since transition,
38

- impact of firm entry and exit
 - on labor outcomes, 75
 - job creation and destruction, 76f
 - liberalization, 110
 - low poverty rate, 89
 - openness, 102f
 - trade, 101
 - value added per worker, 49f
 - wage employment, 48f
- skill shortages, 13, 85
- skilled labor, 105, 105f
- Slovenia, net entry and productivity growth, 47f
- social capital, for life satisfaction, 97
- social protection transfers, 93–94, 95f
- Southeastern Europe, 92f, 93f
 - employment, 11–12, 80–82, 93f
- Southern Europe, migration, 115–16, 116f
- Soviet Union breakup impact on migration, 113
- subsistence farming, 48
- technology development,
 - patents, 110–11
- total factor productivity growth, 32n
- trade, 16, 101, 102–4
 - factor composition, 105–6
 - factor intensity, 109
 - integration, 18, 109
 - intrafirm, 106
 - openness, 17, 102f
 - reform, 18
- transfers, 93–95, 95f
- transition, 1, 2, 4
 - demographic, 22–24
 - migration flows, 113
 - price liberalization a key reform, 101
 - sectoral distribution of trade, 105
 - sectoral employment, 39f
- Turkey, migration, 19–20
- Ukraine, 47f, 76f, 91f
- unemployed, 15, 26, 92
 - and poverty, 89, 91–92
- unemployment, 10, 13, 73, 74
- United States, net entry contribution to growth, 46f
- value added, 37–38, 38f, 49f
- wage growth, 89, 91f, 92f, 93f
- wellness, 96–97
- within-firm effect, 40–41, 45f, 52n
- workforce, aging of, 23–24, 27
- working poor, 97n
- working-age population, 28n, 30f, 32
 - decline of, 121–22, 122, 122f
 - ratio to employed, 94f

ECO-AUDIT

Environmental Benefits Statement

The World Bank is committed to preserving endangered forests and natural resources. The Office of the Publisher has chosen to print *Innovation, Inclusion and Integration: From Transition to Convergence in Eastern Europe and the Former Soviet Union* on recycled paper including 30% post-consumer recycled fiber in accordance with the recommended standards for paper usage set by the Green Press Initiative, a nonprofit program supporting publishers in using fiber that is not sourced from endangered forests. For more information, visit www.greenpressinitiative.org.

Saved:

- 1 ton of wood
- 7 million BTUs of total energy
- 837 pounds of total greenhouse gases
- 3,473 gallons of waste water
- 446 pounds of solid waste

