

A literature review of research on Productivity and Growth

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International studies																																														
<p>PC and ASB Conference Productivity Perspectives 2006: <u>The World's Productivity Performance: How do Countries Compare?</u> By Bart van Ark (University of Groningen) and The Conference Board</p>	<p><u>Labour productivity</u></p> <ul style="list-style-type: none"> Labour productivity growth shows diversity across regions, with productivity levels showing a big divide between advanced and developing countries (estimated from chart, See page 3 of PowerPoint presentation) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Region</th> <th colspan="2">Labour productivity</th> <th rowspan="2">Comparative labour productivity level to US (US=100), PPP adjusted</th> </tr> <tr> <th>1987-1995</th> <th>1995-2004</th> <th>2004</th> </tr> </thead> <tbody> <tr> <td>World</td> <td>0.7</td> <td>1.9</td> <td>28</td> </tr> <tr> <td>Western Europe</td> <td>1.9</td> <td>1.2</td> <td>69</td> </tr> <tr> <td>North America</td> <td>1.3</td> <td>2.1</td> <td>98</td> </tr> <tr> <td>Oceania</td> <td>1.5</td> <td>1.8</td> <td>74</td> </tr> <tr> <td>East Europe/central Asia</td> <td>-5.2</td> <td>4.1</td> <td>24</td> </tr> <tr> <td>Asia</td> <td>3.5</td> <td>3.1</td> <td>16</td> </tr> <tr> <td>Latin America</td> <td>0.3</td> <td>0.6</td> <td>28</td> </tr> <tr> <td>Middle East</td> <td>0</td> <td>0.6</td> <td>28</td> </tr> <tr> <td>Africa</td> <td>-1.1</td> <td>1.3</td> <td>6</td> </tr> </tbody> </table> <ul style="list-style-type: none"> Employment dominates GDP growth in developing countries except Asia (chart compares GDP growth by GDP per person and growth in employment, see page 8). Chart shows GDP per person grew fastest in East Europe, followed by Asia, then North America, Oceania and Western Europe. Lowest growth was in Latin America, Middle East and Africa. Gap in GDP per capita explained by productivity gap (as opposed to participation gap). Interestingly the smallest participation gap is seen in North America and Asia, followed by Africa. <p><u>Total factor productivity</u></p> <ul style="list-style-type: none"> Sources of total factor productivity include: Motivation and competencies (of labour), Innovation and technological change (of capital), markets, institutions and regulations, Intangible investment (education and skills, R&D, patents, licenses, organizational innovations, marketing of new products) ICT is the key in advanced countries including Australia and US 3 channels for ICT TFP – capital deepening improved labour productivity, technological change in ICT producing industries, technological change in ICT using industries (eg. knowledge spillovers) Europe falls behind US on TFP particularly since 2000 4 measures of sources of labour productivity growth, ICT capital deepening, non-ICT capital deepening, ICT-production TFP, other TFP Finds market services (eg. business services, financial intermediation, transport & storage, hotels & restaurants, retail trade, wholesale trade and construction (also communications not shown in his chart)) are key to acceleration of productivity in US and Australia Also looks at manufacturing productivity, shows mixed performance, and that increasing manufacturing competition from emerging economies not just from cost but from technology (eg. large number of researchers per 10 000 employees and business enterprise researchers as a percentage of total researchers.) <p>Other findings:</p> <ul style="list-style-type: none"> Strongest labour productivity affects between 1995-2002 in US (also shows EU) in suppliers manufacturing and value chain in services (page 26). Innovation should be broader than high tech manufacturing (eg. organizational innovations) and also target services (page 27) but most originate from suppliers and clients. Limited room for innovation policies, may include quality of workforce and physical and technological infrastructure. Reforms are key to reallocate resources to high productivity activities, may include: easing entry and exit in industries, price-quality transparency, put pressure on margins in existing industries, allow firms to exploit new markets, exploit but not abuse scale advantages 			Region	Labour productivity		Comparative labour productivity level to US (US=100), PPP adjusted	1987-1995	1995-2004	2004	World	0.7	1.9	28	Western Europe	1.9	1.2	69	North America	1.3	2.1	98	Oceania	1.5	1.8	74	East Europe/central Asia	-5.2	4.1	24	Asia	3.5	3.1	16	Latin America	0.3	0.6	28	Middle East	0	0.6	28	Africa	-1.1	1.3	6
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<p>Total Factor Productivity, Human Capital and Outward Orientation: Differences by Stage of Development</p>	<ul style="list-style-type: none"> Do openness and human capital accumulation promote economic growth? While intuition argues yes, the existing empirical evidence provides mixed support for such assertions. We examine 																																													

<p>and Geographic Regions Stephen M. Miller (University of Nevada and University of Connecticut) Mukti P. Upadhyay (Eastern Illinois University) http://ideas.repec.org/p/uct/uconnp/2002-33.html</p>	<p>Cobb-Douglas production function specifications for a 30-year panel of 83 countries representing all regions of the world and all income groups. We estimate and compare labor and capital elasticities of output per worker across each of several income and geographic groups, finding significant differences in production technology. Then we estimate the total factor productivity series for each classification.</p> <ul style="list-style-type: none"> Using determinants of total factor productivity that include, among many others, human capital, openness, and distortion of domestic prices relative to world prices, we find significant differences in results between the overall sample and sub-samples of countries. In particular, a policy of outward orientation may or may not promote growth in specific country groups even if geared to reducing price distortion and increasing openness. Human capital plays a smaller role in enhancing growth through total factor productivity.
<p>Using a Programming Approach to Measure International Agricultural Efficiency and Productivity Arnade, Carlos USDA Journal of Agricultural Economics, vol. 49, no. 1, January 1998, pp. 67-84</p>	<ul style="list-style-type: none"> Multifactor agricultural productivity for seventy countries is calculated using a programming method. Productivity measures are divided into indices that measure technical efficiency and technical change. Agriculture in many developing countries is technically inefficient but technical change has had a greater impact on agricultural productivity. Multifactor productivity is declining in many developing countries where both agricultural output and the use of some agricultural inputs has rapidly grown. The level of education in a country and research services are factors which can explain differences in agricultural productivity growth between countries.
<p>Sources of Productivity Growth Series: National Institute of Economic and Social Research Occasional Papers 1996 Edited by David G. Mayes Reserve Bank of New Zealand http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=0521554373</p>	<ul style="list-style-type: none"> Over the past couple of decades there have been surges in productivity in a number of countries, in particular in the UK under the Thatcher government. Explanations of these changes have not been satisfactory. This book examines, for the first time, the data relating to these changes at an individual establishment level in a number of countries throughout the world. Using a variety of the most up-to-date methods of analysis, the contributors show that there is no single simple explanation. Changes in competitive conditions, skills, innovation and the growth of small firms all have their part to play, as does the widespread closure of the least productive establishments.
<p>Boosting Productivity via Innovation and Adoption of New Technologies: Any Role for Labor Market Institutions? Scarpetta, Stefano; Tresselt, Thierry World Bank The World Bank, Policy Research Working Paper Series: 3273, 2004</p>	<ul style="list-style-type: none"> Scarpetta and Tresselt present empirical evidence on the determinants of industry-level multifactor productivity growth. They focus on 'traditional factors,' including the process of technological catch up, human capital, and research and development (R&D), as well as institutional factors affecting labor adjustment costs. Their analysis is based on harmonized data for 17 manufacturing industries in 18 industrial economies over the past two decades. The disaggregated analysis reveals that the process of technological convergence takes place mainly in low-tech industries, while in high-tech industries, country leaders tend to pull ahead of the others. The link between R&D activity and productivity also depends on technological characteristics of the industries: while there is no evidence of R&D boosting productivity in low-tech industries, the effect is strong in high-tech industries, but the technology leaders tend to enjoy higher returns on R&D expenditure compared with followers. There is also evidence in the data that high labor adjustment costs (proxied by the strictness of employment protection legislation) can have a strong negative impact on productivity. In particular, when institutional settings do not allow wages or internal training to offset high hiring and firing costs, the latter reduce incentives for innovation and adoption of new technologies, and lead to lower productivity performance. Albeit drawn from the experience of industrial countries, this result may have relevant implications for many developing economies characterized by low relative wage flexibility and high labor adjustment costs. This paper--a joint product of the Social Protection Team, Human Development Network, World Bank, and the International Monetary Fund--is part of a larger effort to understand what drives productivity growth.
<p>Review of: R&D, education, and productivity: A retrospective Hulten, Charles R (Review of: Griliches, Zvi) Journal of Economic Literature, vol. 40, no. 3, September 2002, pp. 961-62</p>	<ul style="list-style-type: none"> Zvi Griliches passed away late in 1999, leaving an important legacy to the economics profession. This volume is, in a real sense, his intellectual last will and testament. It is a short book, written in the last months of his life as an expanded version of his 1997 Simon Kuznets lectures (supplemented by other published materials), but its brevity is not a measure of Zvi's impact on the field of productivity analysis. Chapter 1 traces the early development of the subject from its origins in agricultural economics and the national income accounting movement. Multifactor productivity (MFP) is, by definition, the ratio of a constant price index of output to an index of factor inputs also measured in constant prices. The estimates of productivity implied by the newly emerging data contained a surprise: the growth in MFP explained almost all the growth in output per employee or employee hour! This might not worry a growth theorist, since this is exactly the steady-state result predicted by neoclassical growth theory, but it is hardly good news for the growth accountant. For MFP is measured as a residual and, as Abramovitz put it, it is more a "measure of our ignorance" than a direct estimate of productive efficiency. This observation is the starting point of chapter 2, the Search for Explanations. This chapter details the unfolding of the Solow-Jorgenson-Griliches revolution, which brought formal neoclassical production theory to bear on the problem. The link between aggregate productivity indexes and production functions was often implicit in the literature (and sometimes explicit), but it was Solow's elegant 1957 article that set out sufficient conditions on technology and factor pricing under which the index of MFP could be

	<p>interpreted as a shift in an aggregate production function. Jorgenson and Griliches took the next step: a production function is essentially an "explanation" of the level of output, and once productivity analysis was embedded in production theory, it was logical to look for the factors explaining productivity as well. This idea led to the famous Jorgenson-Griliches hypothesis that careful measurement of all inputs would fully explain output and result in a zero productivity residual. This is precisely what Jorgenson-Griliches found in their 1967 article. However, the result was challenged by Denison in a now-famous exchange of papers. Zvi reviews this debate and concedes that Denison, who "took the paper apart brick by brick (p. 23)," won the day. Zvi attributes the original zero-residual result to "a certain youthful recklessness (p. 23)" but he also argues that he and Jorgenson were right to insist that the residual "should be 'explained' rather than just measured (p. 23)." Indeed, while Jorgenson and Griliches may have lost the battle, they won the war: their model of productivity analysis has prevailed decisively over Denison's.</p> <ul style="list-style-type: none"> • Chapter 3 sets out the second general theme of the book, human capital. This is a short chapter, perhaps reflecting the priority given to physical capital accumulation and MFP by growth accountants. However, its neglect was relative rather than total, and the role of human capital has increasingly been recognized as a key part of the growth process. A complete explanation of productivity growth (the Jorgenson-Griliches goal) is not possible without a better understanding of the R&D-productivity linkage. • Chapter 4 surveys this area and discusses many of the most important results, as well as such open issues as the accurate measurement of R&D capital, the role of knowledge spillovers, and problems posed by imperfect competition. • Chapter 5 resumes the story of productivity analysis from 1970 to the present, a period dominated by a slowdown in productivity growth. As Zvi puts it: "Just as we built up the evidentiary case for our explanations, the growth of the residual declined significantly, requiring a new round of different explanations (p. 86)." This new round is described in this chapter, with special emphasis on the role of R&D investments and the problem posed by certain types of output which are inherently hard to measure. • These two sources are linked in the final "summing up" chapter to come up with an overall explanation of the slowdown, but one which is "shrouded in the clouds of data uncertainty" (p. 87).
Asian studies	
<p>Economic Growth in the 1990s: Learning from a Decade of Reform 2005 World Bank</p> <p>http://publications.worldbank.org/ecommerce/catalog/product?item_id=4386199</p>	<ul style="list-style-type: none"> • This book is part of a larger effort undertaken by the World Bank to understand the development experience of the 1990s, an extraordinary eventful decade. Each of the project's three volumes serves a different purpose. <i>Development Challenges in the 1990s: Leading Policymakers Speak from Experience</i> offers insights on the practical concerns faced by policymakers, while <i>At the Frontlines of Development: Reflections from the World Bank</i> considers the operational implications of the decade for the World Bank as an institution. This volume, <i>Economic Growth in the 1990s: Learning from a Decade of Reform</i>, provides comprehensive analysis of the decade's development experience and examines the impact of key policy and institutional reforms of growth. • <i>Economic Growth in the 1990s</i> confirms and builds on the conclusions of an earlier World Bank book, <i>The East Asian Miracle</i> (1993), which reviewed experiences of highly successful East Asian economies. It confirms the importance of growth of fundamental principles: macro stability, market forces governing the allocation of resources, openness, and the sharing of the benefits of growth. At the same time, it echoes the finding that these principles translate into diverse policy and institutional paths, implying the economic policies and policy advice must be country-specific and institutional-sensitive if they are to be effective. • The authors examine the impact of growth of key policy and institutional reforms: macroeconomic stabilization, trade liberalization, deregulation of finance, privatization, deregulation of utilities, modernization of the public sector with a view to increasing its effectiveness and accountability, and the spread of democracy and decentralization. They draw lessons both from a policy and institutional perspective and from the perspective of country experiences about how reforms in each policy and institutional area have affected growth. <p>Comments</p> <ul style="list-style-type: none"> • Rethinking Growth Economists are reconsidering what they really know about economic growth and how to go about formulating policies in the absence of reliable models. A recent growth study by the World Bank concludes that there is no unique, universal set of rules to guide policymakers. The answer lies instead in less reliance on simple formulas and the elusive search for "best practices," and greater reliance on deeper economic analysis to identify each country's one or two most binding constraints on growth. • Getting Out of the Rut Results from a World Bank pilot study testing a new growth diagnostics framework suggests that the approach brings fresh insights to growth analysis but remains difficult to carry out. • Not all distortions are borne equal. Effective growth strategies tackle the one or two most "binding constraint(s)" as they emerge over time. This is the central lesson from the World Bank's review of growth experiences of the 1990s (World Bank, 2005). But applying this lesson is easier said than done. The growth diagnostics framework proposed by Harvard's Ricardo Hausmann, Dani Rodrik,

	<p>and Andrés Velasco (see "Getting the Diagnosis Right" on page 12) offers an appealing way forward because of its focus on the basic foundations of sustained growth—capital accumulation and entrepreneurship—its intuitive economic logic, and its ability to rank reforms according to their impact on growth. This approach helps differentiate reforms essential for growth from those that are merely desirable because of efficiency gains. The distinction is important because, in addition to growth, governments have many other welfare improving objectives—from protecting the environment to creating a more responsive public administration—all of which are important, but not necessarily related to growth.</p> <ul style="list-style-type: none"> • Getting the Diagnosis Right A look at a new growth diagnostics framework to help countries prioritize reforms. Once policymakers have identified the one or two most binding constraints holding back growth, they should focus on lifting those, setting aside for later other reforms that are desirable but not essential for growth.
<p>Breaking Down Barriers to Growth <i>Martin Neil Baily and Diana Farrell</i></p>	<ul style="list-style-type: none"> • Europe and Japan have suffered a sharp economic slowdown over the past decade. To rekindle growth, they need to encourage competition (especially in the services sector), which will, in turn, boost productivity growth, the most desirable source of growth in all economies.
<p>The Asian Miracle and Modern Growth Theory <i>by Howard Pack; Richard R. Nelson</i> World Bank, Published 1999</p> <p>http://caliban.worldbank.catchword.org/vl=2144608/cl=13/nw=1/rpsv/cgi-bin/wpapers?ini=wb&view=1881&frombrowse=1</p>	<ul style="list-style-type: none"> • The policy differences between "accumulation" and "assimilation" growth theories may be much smaller than the conceptual or analytic differences. Can the Asian miracle be explained in terms of capital investments? Or were entrepreneurship, innovation, and learning significant factors in the rapid growth of the Asian tigers? In the past 35 years, China, Hong Kong, Korea, Singapore, and Taiwan (China) have transformed themselves from technologically backwards and poor economies to relatively modern, affluent economies. Each has experienced more than a fourfold increase in per capita income. In each, a significant number of firms are producing technologically complex products competitive with firms in Europe, Japan, and the United States. Their growth performance has exceeded that of virtually all comparable economies. • How they did it is a question of great importance. Virtually all theories about how they did it place investments in capital stock at the center of the explanation. Nelson and Pack divide most growth theories about the Asian miracle into two groups: The "accumulation" theories stress the role of capital investments in moving these economies "along their production functions." What lies behind rapid development, according to this type of theory, is very high investment rates. If a nation makes the investments, marshals the resources, development will follow. The "assimilation" theories stress the entrepreneurship, innovation, and learning these economies went through before they could master the new technologies they were adopting from more advanced industrial nations. They see investment in human and physical capital as an essential but far from sufficient part of assimilation. In addition, people must learn about, take the risk of operating, and come to master technologies and other practices new to the country, if not the world. The emphasis for assimilation theorists is on innovation and learning, rather than on marshalling. If one marshals but does not innovate and learn, development does not follow. These are complex theories that raise as many questions as they answer. • Nelson and Pack discuss differences in the way the two groups of theorists treat four matters: Entrepreneurial decisionmaking. The nature of technology. The economic capabilities possible with a well-educated work force. The role exports play in a country's rapid development. The differences between the theories matter because they affect our understanding of why the Asian miracle happened and because they imply different things about appropriate economic development policy. This paper—a product of the Development Research Group—is part of a larger effort in the group to study the impact of public policy on growth
<p>Exports and Manufacturing Productivity in East Asia: A Comparative Analysis with Firm-Level Data by Mary Hallward-Driemeier Giuseppe Iarossi and Kenneth L. Sokoloff National Bureau of Economic Research, NBER Working Papers with number 8894. http://ideas.repec.org/p/nbr/nberwo/8894.html</p>	<ul style="list-style-type: none"> • This paper uses new firm level data from five East Asian countries to explore the patterns of manufacturing productivity across the region. One of the striking patterns that emerges is how the extent of openness and the competitiveness of markets affects the relative productivity of firms across the region. Firms with foreign ownership and firms that export are significantly more productive, and the productivity gap is larger the less developed is the local market. We exploit the rich set of firm characteristics available in the database to explore the sources of export firms' greater productivity. We argue that it is in aiming for export markets that firms make decisions that raise productivity. It is not simply that more-productive firms self-select into exporting; rather, firms that explicitly target export markets consistently make different decisions regarding investment, training, technology and the selection of inputs, and thus raise their productivity
<p>Gaofeng Han, Kaliappa Kalirajan, and Nirvikar Singh, "Productivity, Efficiency and Economic Growth: East Asia and the Rest of the World" (March 1, 2003). <i>Santa Cruz Center for International Economics</i>. Paper 03-02. (http://repositories.cdlib.org/scicie/03-02)</p>	<ul style="list-style-type: none"> • This study compares the sources of growth in East Asia with the rest of the world, using a methodology that allows one to decompose total factor productivity (TFP) growth into technical efficiency changes (catching up) and technological progress. It applies a varying coefficients frontier production function model to aggregate data for the period 1970-1990, for a sample of 45 developed and developing countries. Our results are consistent with the view that East Asian economies were not outliers in terms of TFP growth. Of the high-performing East Asian economies, our methodology identifies South Korea as having the highest TFP growth, followed by Singapore, Taiwan and Japan. Our methodology also allows us to separately estimate technical efficiency change, which is a component of TFP growth, and we find that, in general, the estimated technical efficiency of the high-performing East Asian economies was not out of line with the rest of the world. <p>See also</p> <ul style="list-style-type: none"> • Growth and Productivity in ASEAN Countries by Sarel, Michael, 1997 Full Text in PDF format

	<ul style="list-style-type: none"> • Growth in East Asia What We Can and What We Cannot Infer Michael Sarel IMF 1996 http://www.imf.org/external/pubs/ft/issues1/index.htm
<p>The Role of Institutions in Asian Development by Ha-Joon Chang, 1998 Asian Development Review, vol. 16, no. 2, pp. 64-95</p>	<ul style="list-style-type: none"> • The paper identifies three types of institutions that are particularly important for economic development: institutions for coordination and administration, institutions for learning and innovation, and institutions for income redistribution and social cohesion, and examines how they contributed to the development of different Asian countries. While developing countries can import and adopt some institutions from more developed countries, there is no “best practice” institutional structure that fits every country. Applying this conclusion to the current situation in Asia, it is argued that despite the currently popular argument that Asian countries should remodel their institutions along the Anglo-American line, institutional changes need to be made cautiously and in line with local conditions.
<p>Total factor productivity growth in East Asia: A critical Survey, Jesus Felipe, 1997, EDRC Report Series No. 65 http://www.adb.org/Documents/EDRC/Reports/ER065.pdf</p>	<ul style="list-style-type: none"> • This paper surveys the empirical literature on total factor productivity (TFP) and the sources of growth in the East Asian countries. It raises the question whether the literature has helped us understand better the factors that have propelled growth in the region. The paper discusses the main theoretical aspects in the estimation of TFP growth, as well as the empirical results, and provides a survey of estimates of TFP growth for nine East and Southeast Asian countries. It is concluded that: <ul style="list-style-type: none"> • (i) the main merit of the literature is that it has helped focus the attention of scholars on the growth process of East Asia, and has made countries in the region aware of the importance of productivity; • (ii) the theoretical problems underlying the notion of TFP are so significant that the whole concept should be discarded; • (iii) the TFP growth estimates are contentious: they vary significantly, even for the same country and time period, depending on assumptions and data sources; and • (iv) research on growth in East Asia based on the estimation of TFP growth is an activity subject to decreasing returns. If we are to advance in our understanding of how East Asia grew during the last 30 years we need new avenues of research.
<p>Conference of the Mediterranean Development Forum (MDF), held in Marrakech, Morocco on May 12-17, 1997 Productivity, Learning and Industrial Development by John Page, World Bank (http://www.worldbank.org/mdf/mdf1/1_eam.htm)</p>	<ul style="list-style-type: none"> • The East Asian countries have been growing more than twice as fast as the rest of the world for twenty-five years. While East Asia has grown continuously, the Middle East and North Africa region has faced a real crisis of growth. For the last ten years, average per capita incomes have declined in the major Middle East economies, which gives an urgency to the question of how to renew economic growth. • In 1960, the eight major Mashreq and Maghreb economies had a higher per capita income than the East Asian "superstars." By 1991, Middle East incomes had risen from about US\$1,600 to US\$3,300 (in dollars corrected for purchasing power differences among countries). In the eight East Asian "superstars," incomes had risen to about US\$8,000. If during that time the investment rate in MENA were to have increased from its 25 percent average to the East Asian average of 35 percent, these countries' economies would have gained about US\$500 of per capita income. If the average level of education per person in MENA had been at the level of East Asia, income would have increased by an additional US\$1,300. But there is still an income gap of nearly US\$3,000. The gap cannot be explained by differences in human or physical capital. It is due to productivity differences — the efficiency with which production factors are employed. In fact, while productivity growth in East Asia has been positive, it has been negative in the Middle East and North Africa over the last 25 years. • These estimates of the total factor of production (TFP) give a simple way to look at international competitiveness: Differences in TFP settled differences in production unit-costs between economies, and the higher the productivity growth rate, the faster the decline of economy-wide unit-costs of production. In the world productivity table, East Asia is the leader — ahead of the OECD. Latin America's track record over the last 30 years has not been as remarkable, but at least TFP growth has been positive. In MENA, in contrast, unit-costs of production have been rising over the last 30 years.
OECD	
<p>Sources of productivity growth in the 21st century – findings from the OECD Growth Project by Dirk Pilat, OECD 2003 http://www.euintangibles.net/library/localfiles/Pilat_sourcesofpvtgrowth.PDF</p>	<ul style="list-style-type: none"> • Growth and productivity are on the policy agenda in many OECD countries, and therefore also affect work of the OECD. The organisation was asked in 1999 by its member countries to examine the variation in growth performance in the OECD area, analyse its causes and provide guidance for policy making. The strong performance of the United States at the time and related claims about a “new economy” were among the reasons for this demand, as was the poor performance of several other OECD countries at the time. A final report was presented to the OECD Ministerial meeting in May 2001 (OECD, 2001<i>a</i>). Further results were released in 2003 (OECD, 2003<i>a</i>; 2003<i>b</i>). This note briefly summarises the main findings of the OECD work on growth and draws some implications for policy and statistical development.
<p>The Sources of Productivity Growth: Micro-level Evidence for the OECD Documents the decomposition of productivity growth in OECD member states using data from the OECD Firm</p>	<ul style="list-style-type: none"> • It is now well acknowledged that productivity can grow in two ways (see e.g. Bartelsman and Doms (2000) and Foster, Haltiwanger and Krizan (1998)). First, productivity can grow due to changes within existing enterprises, such as the introduction of new technology and organisational change. Second, productivity can grow due to the process of market selection whereby low productivity establishments exit and are replaced by higher productivity entrants, while higher

<p>Level Study. Author: Matthew Barnes 2002 http://www.statistics.gov.uk/cci/article.asp?id=24 http://www.statistics.gov.uk/cci/article.asp?id=24</p>	<p>productivity incumbents gain market share. This note reports some cross-country evidence on these two effects. It summarises the work done in a number of countries under the auspices of the OECD Firm-Level Study co-ordinated by Eric Bartelsman2.</p> <ul style="list-style-type: none"> • Finland, Netherlands, UK and USA • This paper documents the decomposition of productivity growth in OECD member states using data from the OECD Firm Level Study. The results suggest a substantial role for within effects in most countries. Relative to the US, other countries typically have exitors who are more productive than average, lowering the exit contribution to productivity growth. But entrants are also more productive than average, raising the entry contribution to productivity growth. In addition, the paper discusses future developments such as cross-country comparisons using micro-data.
<p>Understanding Productivity and Income Differentials Among OECD Countries: A Survey by Bart van Ark http://www.irpp.org/miscpubs/archive/eps1202/vanark.pdf</p>	<ul style="list-style-type: none"> • Using a conceptual framework, which is rooted in a traditional growth accounting framework — but with several extensions — we focused on two sources of growth differentials. • First we looked at the role of the “new economy,” in the sense that ICT has been a source of faster productivity growth in the United States. Then we looked at the impact of the creation of intangible capital, which has been identified as a necessary condition for exploiting the productivity advantages of ICT investment. • The analysis suggests that differential realization of the potential to generate productivity accelerations from ICT has contributed to the differential economic growth performance among OECD countries. At the same time, it is difficult to precisely measure the contribution of the various factors at the macroeconomic level. One may even argue that the traditional methods for analysing and measuring the relation between inputs and output at the macroeconomic level are, increasingly, increasingly, failing to describe the processes that drive changes and differences in growth performance between firms.
<p>Investment-specific and multifactor productivity in multi-sector open economies: data and analysis Guerrieri, Luca; Henderson, Dale W; Kim, Jinill Board of Governors of the Federal Reserve System (U.S.), International Finance Discussion Papers: 828, 2005</p>	<ul style="list-style-type: none"> • In the last half of the 1990s, labor <i>productivity</i> growth rose in the U.S. and fell almost everywhere in Europe. We document changes in both capital deepening and <i>multifactor productivity</i> (MFP) growth in both the information and communication technology (ICT) and non-ICT sectors. We view MFP growth in the ICT sector as investment-specific <i>productivity</i> (ISP) growth. We perform simulations suggested by the data using a two-country DGE model with traded and nontraded goods. For ISP, we consider level increases and persistent growth rate increases that are symmetric across countries and allow for costs of adjusting capital-labor ratios that are higher in one country because of structural differences. ISP increases generate investment booms unless adjustment costs are too high. For MFP, we consider persistent growth rate shocks that are asymmetric. When such MFP shocks affect only traded goods (as often assumed), movements in 'international' variables are qualitatively similar to those in the data. However, when they also affect nontraded goods (as suggested by the data), movements in some of the variables are not. To obtain plausible results for the growth rate shocks, it is necessary to assume slow recognition.
<p>An Inter Comparison Study of Labour Productivity in the European Union and the United States, 1979-2001 Korres, George M; Chionis, Dionysios P; Tsamadias, Constantine U Aegean; U Democrite De Thrace; Harokopio U Athens International Journal of Applied Econometrics and Quantitative Studies, vol. 1, no. 4, Oct.-Dec. 2004, pp. 85-112</p>	<ul style="list-style-type: none"> • This paper examines the possible macroeconomic consequences of changes in trend of <i>productivity</i> growth for European countries. Overall the results suggest that a rise in trend factor <i>productivity</i> will lead to higher levels of production and real income, however employment adjustment will depend on the extent to which the long-run equilibrium of an economy is affected. In this paper we present an international comparison of growth trends in the OECD countries, with a special attention to developments in labor <i>productivity</i>, allowing for human capital accumulation, and <i>multifactor productivity</i> (MFP). The main conclusions are that some "traditional" factors lay behind the disparities in growth patterns across the European countries.
<p>From R&D to Productivity Growth: Do the Institutional Settings and the Source of Funds of R&D Matter? Guelllec, Dominique; Van Pottelsberghe de la Potterie, Bruno European Patent Office, Munich; e Brussels Oxford Bulletin of Economics and Statistics, vol. 66, no. 3, July 2004, pp. 353-78</p>	<ul style="list-style-type: none"> • This paper presents estimates of the long-term impact of various sources of knowledge (R&D performed by the business sector, the public sector and foreign firms) on <i>multifactor productivity</i> growth of 16 countries from 1980 to 1998. The main results show that the three sources of knowledge are significant determinants of long-term <i>productivity</i> growth. Further evidence suggests that several factors determine the extent to which each source of knowledge contributes to <i>productivity</i> growth. These factors are the absorptive capability, the origin of funding, the socioeconomic objectives of government support, and the type of public institutions that perform R&D.
<p>Regulation, Productivity and Growth: OECD Evidence Nicoletti, Giuseppe; Scarpetta, Stefano World Bank The World Bank, Policy Research Working Paper Series: 2944, 2003</p>	<ul style="list-style-type: none"> • Nicoletti and Scarpetta look at differences in the scope and depth of pro-competitive regulatory reforms and privatization policies as a possible source of cross-country dispersion in growth outcomes. They suggest that, despite extensive liberalization and privatization in the OECD area, the cross-country variation of regulatory settings has increased in recent years, lining up with the increasing dispersion in growth. The authors then investigate empirically the regulation-growth link using data that cover a large set of manufacturing and service industries in OECD countries over the past two decades and focusing on <i>multifactor productivity</i> (MFP), which plays a crucial role in GDP growth and accounts for a significant share of its cross-country variance. • Regressing MFP on both economywide indicators of regulation and privatization and industry-level indicators of entry liberalization, the authors find evidence that reforms promoting private

	<p>governance and competition (where these are viable) tend to boost <i>productivity</i>. In manufacturing the gains to be expected from lower entry barriers are greater the further a given country is from the technology leader. So, regulation limiting entry may hinder the adoption of existing technologies, possibly by reducing competitive pressures, technology spillovers, or the entry of new high-technology firms. At the same time, both privatization and entry liberalization are estimated to have a positive impact on <i>productivity</i> in all sectors. These results offer an interpretation to the observed recent differences in growth patterns across OECD countries, in particular between large continental European economies and the United States. Strict product market regulations--and lack of regulatory reforms--are likely to underlie the relatively poorer <i>productivity</i> performance of some European countries, especially in those industries where Europe has accumulated a technology gap (such as information and communication technology-related industries). These results also offer useful insights for non-OECD countries. In particular, they point to the potential benefits of regulatory reforms and privatization, especially in those countries with large technology gaps and strict regulatory settings that curb incentives to adopt new technologies. This paper--a product of the Social Protection Team, Human Development Network--is part of a larger effort in the network to understand what drives <i>productivity</i> growth.</p>
<p>TIC et productivité: Une comparaison internationale. (With English summary.) Melka, Johanna; Nayman, Laurence CDC Ixis; CEPII Economie Internationale, vol. 0, no. 98, 2nd Trimester 2004, pp. 35-57</p>	<ul style="list-style-type: none"> This article proposes an accounting assessment of hourly labour <i>productivity</i> growth, in an international perspective. While <i>multifactor productivity</i> (MFP) gains appear lower in the United Kingdom and the United States than in France and Germany between 1995 and 2001, our results show that intensified use of information and communication technologies (ICT) accounted for twice as much <i>productivity</i> gains in the former two countries than in the latter two. The sectoral analysis carried out for France, the United Kingdom and the United States shows that <i>productivity</i> gains were especially large in ICT-producer sectors, in each of these countries. Large <i>productivity</i> gains are also found in ICT-user sectors in the United Kingdom and the United States, in particular in trade and banking, suggesting that diffusion of ICT-induced <i>productivity</i> gains did take place. This result is not found for France, but the statistical hurdles faced make this finding difficult to interpret.
<p>Comparing Apples to Oranges: Productivity Convergence and Measurement across Industries and Countries Bernard, Andrew B; Jones, Charles I MIT; Stanford U American Economic Review, vol. 86, no. 5, December 1996, pp. 1216-38</p>	<ul style="list-style-type: none"> This paper examines the role of sectors in aggregate convergence for fourteen OECD countries during 1970-87. The major finding is that manufacturing shows little evidence of either labor <i>productivity</i> or <i>multifactor productivity</i> convergence, while other sectors, especially services, are driving the aggregate convergence result. To determine the robustness of the convergence results, the paper introduces a new measure of <i>multifactor productivity</i> which avoids many problems inherent to traditional measures of total factor <i>productivity</i> when comparing <i>productivity</i> levels. The lack of convergence in manufacturing is robust to the method of calculating <i>multifactor productivity</i>.
Background	
<p><u>The Quest Continues</u> Lant Pritchett</p>	<ul style="list-style-type: none"> What exactly do economists know and not know about growth? And what direction should future research and policymaking take? Economists may have to abandon the quest for a single growth theory, focusing instead on developing a collection of growth and transition theories tailored to countries' particular circumstances.
<p>Productivity Commission <u>Productivity primer</u> A non-technical guide to the nature and importance of productivity</p>	<ul style="list-style-type: none"> What is productivity? Productivity is a measure of the rate at which outputs of goods and services are produced per unit of input (labour, capital, raw materials, etc). It is calculated as the ratio of the quantity of outputs produced to some measure of the quantity of inputs used. Productivity = Outputs/Inputs which also means Productivity growth = Output growth less Input growth. Multifactor productivity is the ratio of (the real value of) output to the combined input of labour and capital. Sometimes this measure is referred to as total factor productivity. In principle, multifactor productivity is a better indicator of efficiency than labour productivity. It measures how efficiently and effectively the main factors of production - labour and capital - combine to generate output. However, in some circumstances, robust measures of capital input can be hard to find. Trends Labour productivity and multifactor productivity both increase over the long term. Usually, the growth in labour productivity exceeds the growth in multifactor productivity (reflecting the influence of relatively rapid growth of capital on labour productivity). Productivity Commission calculations have shown that labour productivity growth accounts for all the growth in Australia's income per person since the mid-1960s. Multifactor productivity growth accounts for about half. Determinants National productivity growth stems from a complex interaction of factors. As just outlined, some of the most important immediate factors include technological change, organizational change, industry restructuring and resource reallocation, as well as economies of scale and scope. Over time, other factors such as research and development and innovative effort, the development of human capital through education, and incentives from stronger competition promote the search for productivity improvements and the ability to achieve them. Ultimately, many policy, institutional and cultural factors determine a nation's success in improving productivity. Box 1: Two views on the importance of productivity growth Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker. (Paul Krugman 1992, The Age of Diminished Expectations: US Economic Policy in the

	<p>1980s, MIT Press, Cambridge, p. 9.)</p> <ul style="list-style-type: none"> • 'Over long periods of time, small differences in rates of productivity growth compound, like interest in a bank account, and can make an enormous difference to a society's prosperity. Nothing contributes more to reduction of poverty, to increases in leisure, and to the country's ability to finance education, public health, environment and the arts.' (Alan Blinder and William Baumol 1993, <i>Economics: Principles and Policy</i>, Harcourt Brace Jovanovich, San Diego, p. 778.)
<p>Easterly, W., and R. Levin. 2001. "What Have We Learned from a Decade of Empirical Research on Growth? It's Not Factor Accumulation: Stylized Facts and Growth Models." <i>World Bank Economic Review</i> 15:177-219.</p>	<ul style="list-style-type: none"> • The article documents five stylized facts of economic growth. (1) The "residual" (total factor productivity, TFP) rather than factor accumulation accounts for most of the income and growth differences across countries. (2) Income diverges over the long run. (3) Factor accumulation is persistent while growth is not, and the growth path of countries exhibits remarkable variation. (4) Economic activity is highly concentrated, with all factors of production flowing to the richest areas. (5) National policies are closely associated with long-run economic growth rates. These facts do not support models with diminishing returns, constant returns to scale, some fixed factor of production, or an emphasis on factor accumulation. However, empirical work does not yet decisively distinguish among the different theoretical conceptions of TFP growth. Economists should devote more effort toward modeling and quantifying TFP.
<p>Total Factor Productivity: A Short Biography Charles R. Hulten NBER Working Paper No. 7471 http://ideas.repec.org/p/nbr/nberwo/7471.html</p>	<ul style="list-style-type: none"> • Economists have long recognized that total factor productivity is an important factor in the process of economic growth. However, just how important it is has been a matter of ongoing controversy. • Part of this controversy is about methods and assumptions. Total factor productivity growth is estimated as a residual, using index number techniques. It is thus a measure of our ignorance,' with ample scope for measurement error. • Another source of controversy arises from sins of omission, rather than commission. • A New Economy critique of productivity points to unmeasured gains in product quality, while an environmental critique points to the unmeasured costs of growth. This essay is offered as an attempt to address these issues. Its first objective is to explain the origins of the growth accounting and productivity methods now under scrutiny. It is a biography of an idea, is intended to show what results can be expected from the productivity framework and what cannot. The ultimate objective is to demonstrate the considerable utility of the idea, as a counter-weight to the criticism, often erroneous, to which it has been subjected. Despite its flaws, the residual has provided a simple and internally consistent intellectual framework for organizing data on economic growth, and has provided the theory to guide a considerable body of economic measurement.
<p>Intangible Capital and Economic Growth Corrado, Carol A; Hulten, Charles R; Sichel, Daniel E National Bureau of Economic Research, Inc, NBER Working Papers: 11948, 2006</p>	<ul style="list-style-type: none"> • Published macroeconomic data traditionally exclude most intangible investment from measured GDP. This situation is beginning to change, but our estimates suggest that as much as \$800 billion is still excluded from U.S. published data (as of 2003), and that this leads to the exclusion of more than \$3 trillion of business intangible capital stock. To assess the importance of this omission, we add capital to the standard sources-of-growth framework used by the BLS, and find that the inclusion of our list of intangible assets makes a significant difference in the observed patterns of U.S. economic growth. The rate of change of output per worker increases more rapidly when intangibles are counted as capital, and capital deepening becomes the unambiguously dominant source of growth in labor <i>productivity</i>. The role of <i>multifactor productivity</i> is correspondingly diminished, and labor's income share is found to have decreased significantly over the last 50 years. http://www.nber.org/papers/w11948.pdf
<p>Productivity CPDS http://cpds.apana.org.au/Teams/Archive/productivity.htm</p>	<ul style="list-style-type: none"> • US productivity rose faster in dot-com boom (2.5% pa - measured as output per hour) from 1995 to 2000 than over past 25 years. Since then it has risen 4% pa. However in output-hour US is merely catching up to some European countries (eg Belgium which has low employment / population ratio so that many less skilled are not in workforce). British manufacturing productivity grew rapidly in UK under Thatcher because many less efficient operations were forced to close. There is little value in increasing productivity by forcing the less productive out of workforce. The Belgium effect was not a problem during dot-com boom as overall employment grew. But subsequent acceleration in productivity is due to exclusion of low-productivity workers. Since 2000 the employment / population ratio has fallen from 65 to 62% There has been a decline in aggregate employment under Bush. A popular explanation of this is that fewer workers are needed to produce the same output. <i>Economist</i> has pointed out that in terms of multi-factor productivity growth US looks like European counties especially France. In both countries, MFP accelerated in late 1990s. Economist's emphasis on MFP has been criticised by Brad De Long (Uni of California, Berkley) who argues that main source of productivity growth is technological progress embodied in new / improved capital goods. Improvement in their quality is reflected in declining quality adjusted prices - so that for given level of investment to quality-adjusted addition to capital stock is greater. Hence embodied technological progress is embodied in labour productivity with no change in capital productivity. DeLong is right that improvement in ICT have driven productivity growth - and that measures that do not consider this are of little value. However there are reasons to use MFP measures (a) ICT benefits are available to everyone (b) there are big differences in the way statistical agencies in various countries take account of embodied technological progress - and these differences result in biases in estimating capital investment. For MFP such biases cancel out (as over-estimate of value of computers biases both inputs and outputs). When these biases are eliminated, international differences in productivity growth are reduced. US is experiencing large and growing deficits in goods and services trade. The optimistic interpretation is that US can

	<p>accumulate capital inputs because lenders expect rapid productivity gains that permitting debts to be serviced. However foreign investors are increasingly unwilling to invest in the US. Their place has been taken by Asia central banks. \$US has fallen against other currencies - and given strong productivity growth this should produce rapid turn-around in US trade deficit. But whether this will be so remains to be seen (Quiggin J. 'US productivity's underbelly', <i>FR</i>, 29/11/04)..</p> <ul style="list-style-type: none"> • Productivity may not be all that is contributing to difference between high and low living standards though it is the most important. Productivity roughly refers to ratio between outputs and inputs - eg in measures of labour productivity. However no single measure is satisfactory - noting different potential sources of productivity growth. All productivity comes from new knowledge about science, technology and economic organization. But the links are complex - so it is hard to get agreement on productivity measures. Simplest form is embedded technical change (eg new faster computer chip). But human capital effects are even more important - which depends on science and education. Technical innovations and better human capital create possibility of new investments - capital deepening as source of productivity. Finally there may be improvements in economic policy / organisation. It is claimed that MER in Australia led to a productivity surge. How different factors contribute is hard to determine. Labour productivity is hard to measure (eg problems in defining GDP; and changes in working conditions / hours). Increased work intensity could account for much of productivity increase. Other measures involve residual after allowing for increases in labour and capital - to produce multi-factor productivity. This was declining in 1970s and 1980s - and rose rapidly in 1994-99 (ie at 2.4%pa - a record). Some saw evidence of an economic miracle - while others saw a statistical blip. Case against miracle was based on: increased work intensity; growth was associated with upsurge in economic cycle as spare capacity was used; and problems in composition of index. Septics claimed vindication when index fell after 1999 - while supporters refer to economic downturn or slowdown in reform (Quiggin J 'Productivity's miraculous mirage', <i>FR</i>, 18/10/04). • Productivity growth is important to future welfare. In mid-late 1990s Australia's productivity growth was remarkable - 1.8 % multifactor productivity growth - about 3 times that of 1980s. Australia reversed previous trends by performing better than OECD average. Recent productivity slow-down is likely to be temporary. Skeptics (eg Quiggin) resist the view that micro-economic reform is major source of gains. ICT is given credit. Studies point to three sources of productivity gain: increased trade and foreign investment; R&D and take up of ICT. These accounted for 0.5, 0.3 and 0.2% point respectively in acceleration of productivity growth. However more important question is how Australia came to be more globally integrated, more R&D active etc. This was due to policy reform - which increased flexibility. Research at US Fed and OECD showed that labour market regulation (eg in Europe) would stifle take-up of ICT. Australia's policy reforms reduced those obstacles (Parham D. 'Productivity taking a breather', <i>FR</i>, 26/5/04). [See also 'Sources of Australia's Productivity Revival' in <i>Economic Record</i>, June 2004].
Single country studies	
<p>Total Factor Productivity Growth in the Philippines: 1960–2000 By CAESAR B. CORORATON</p>	<ul style="list-style-type: none"> • Average total factor productivity growth (TFPG) for the Philippine economy is negative, indicating that it has not been the source of growth in the Philippines. However, TFPG estimates showed an increasing trend in the 1990s when major economic reforms were implemented. The educational level of the labor force has improved consistently since the 1960s. However, based on the decomposition analysis the paper finds that its contribution to TFPG has declined.
<p>Total Factor Productivity Growth: Survey Report, Part II – National Reports, Japan by Dr. Takanobu Nakajima, Koji Nomura and Toshiyuki Matsuura, 2001-02 http://www.kojin.org/papers/06_Japan_TFP.pdf</p>	<ul style="list-style-type: none"> • The TFP derivation process itself is not very difficult once good data are obtained for sources of inputs and outputs. In other words, even with imprecise data we can calculate TFP indicators that could include both structural and stochastic errors, because the definition of TFP is a residual factor by subtracting input contributions from output growth. • Next, we apply TFP (fixed-effect panel) regression analysis to industry-level TFP indices and attempted to determine the influential factors. Although various combinations of independent variables were tested, it was difficult to obtain satisfactory results. One result is shown in Table 3. The coefficients of public finance ratio and R&D-related variables are positive and significant. The effect of public subsidy is negative and significant at the 5% level only in the first column. To some extent, R&D activities and the public finance system might be effective in increasing TFP growth. Concerning other industrial policies, the results are too ambiguous to derive robust implications. • The problem of output definition is more serious for a developed economy like Japan. In the early stage of economic development, the main actor is manufacturing that produces a visible and measurable output. As the economy becomes more mature, a structural change may occur from econdary to tertiary industry such as finance, retail, real estate, and many other service industries. How can we correctly define output for those industries? What should be their deflators?
<p>The impact of Regional Selective Assistance on sources of productivity growth: plant-level evidence from UK manufacturing, 1990-1998 http://www.niesr.ac.uk/pubs/searchdetail.php?PublicationID=648NIESR_Author1 Catherine (Kate) Robinson and Richard</p>	<ul style="list-style-type: none"> • Regional policy has been an enduring aspect of post-war industrial policy in the UK, based on a recognition of the need to reduce regional disparities in employment, earnings and the cost of living. DTI support schemes are designed to achieve a number of varying and occasionally conflicting objectives, but their overarching intention arguably must be to improve the economic performance of the plants they assist, in order to increase productivity growth in the regions. Research into the sources of productivity growth has indicated that the entry and exit of plants plays a significant role, but also the reallocation of inputs from plants within the industry. In this paper, we use decomposition analysis to look at sources of total factor productivity growth for UK manufacturing

Harris, 2005	plants, allowing for comparisons across regions, industries and between assisted and non-assisted plants, based on the Regional Selective Assistance scheme.
<p>Sources of Australia's Productivity Revival Parham, Dean Productivity Commission Economic Record, vol. 80, no. 249, June 2004, pp. 239-57</p>	<ul style="list-style-type: none"> • Australia's annual rate of <i>multifactor productivity</i> growth accelerated a full percentage point in the 1990s. The fact that most other OECD countries did not share this experience suggests that domestic factors must have provided at least a major part of the explanation. This article establishes six stylised facts about Australia's 1990s <i>productivity</i> performance and then surveys available analytical studies to find explanations for them. With few aggregate models available to shed light on recent output and <i>productivity</i> growth, the survey also covers cross-country, industry and firm-level studies. Despite various shortcomings in data and specification of models, a reasonably clear picture emerges. The accumulation of physical and human capital has laid a long-term foundation for <i>productivity</i> growth. On top of this foundation, the greater openness of the economy to trade and investment, increased R&D activity and a strong uptake and innovative use of ICT have been specific sources of the <i>productivity</i> revival. There is also evidence that policy and institutional factors have been important in driving and enabling these determinants.
<p>Productivity Growth in 'High-Tech' Manufacturing Industries Kask, Christopher; Sieber, Edward US Bureau of Labor Statistics Monthly Labor Review, vol. 125, no. 3, March 2002, pp. 16-31</p>	<ul style="list-style-type: none"> • Among manufacturing industries employing a substantial proportion of research and development and technology-oriented workers, the information technology industries exhibited particularly strong <i>productivity</i> growth over the 1987-99 period. This article examines <i>productivity</i> developments in a set of detailed industries representing the high-tech manufacturing sector and uses aggregate measures that were developed to permit comparison with the manufacturing industry as a whole. In addition to labor <i>productivity</i> and related measures, the analysis includes <i>multifactor productivity</i>. This analysis is based on data produced by the BLS Office of <i>Productivity</i> and Technology, and the industries used are classified at the three-digit SIC level.
<p>Long-Run Technical Change and Multifactor Productivity Growth in US Manufacturing Mullen, John K Clarkson U Applied Economics, vol. 33, no. 3, February 2001, pp. 301-08</p>	<ul style="list-style-type: none"> • This study utilizes a translog cost function to produce econometric estimates of the separate influences of technical change versus scale efficiency in contributing to <i>multifactor productivity</i> growth within the US manufacturing sector. The analysis generates (two-digit) industry-specific parameters that capture the effects of output versus time-related shifts in the cost function over the 1949-91 period. Thus initial evidence concerning the relative importance of technical progress (versus "scale") cannot be provided as a source of <i>productivity</i> gains within two-digit industries. The parametric estimates of total factor <i>productivity</i> growth are compared with existing Divisia measures to explore the shortcomings of the growth accounting technique. These long-run patterns hold implications for the <i>productivity</i> convergence hypothesis traced to knowledge spillovers between industries.
<p>Economic Statistics, the New Economy, and the Productivity Slowdown Triplett, Jack E Brookings Institution Business Economics, vol. 34, no. 2, April 1999, pp. 13-17</p>	<ul style="list-style-type: none"> • From 1949-73, the Bureau of Labor Statistics (BLS) estimates that nonfarm <i>multifactor productivity</i> grew at 1.9 percent per year. After 1973, the comparable number is 0.2 percent, in spite of the economy's substantial investment in computing equipment, the growth of the information economy, and the many innovations that have come to be known as the "new economy." Many economists believe that <i>productivity</i> must be growing more rapidly than the government numbers suggest. This article reviews two reasons--one wrong and one more plausible--for believing that inadequate measurement of output in our economic statistics may be hiding essential developments in our economy.