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of Economic Growth

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by
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ABSTRACT/RÉSUMÉ

This paper provides a summary of an OECD workshop on the causes of economic growth, held 6-7 July 2000. The topics covered include the recent growth resurgence in the United States, the potential importance of ICT and the Internet, and the part played by continual reallocation and restructuring. The paper also discusses the growth role of education, institutions, social capital, the financial sector, international trade and foreign direct investment, and indicates how research on these topics might inform policy.

JEL classification: O40, O47

Keywords: growth, Internet, finance, education, institutions

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Ce document donne un résumé de l'atelier de l'OCDE sur les causes de la croissance économique qui a eu lieu les 6 et 7 juillet 2000. Les sujets de discussion traités étaient la remontée récente de la croissance aux États-Unis, l'importance potentielle des TIC et de l'Internet, et le rôle joué par la réallocation et la restructuration continues. Le document examine également le rôle, en termes de croissance, de l'éducation, des institutions, du capital social, du secteur financier, du commerce international et de l'investissement étranger direct, et il indique quels sont les enseignements de la recherche en ces matières pour la politique économique.

Classification JEL : O40, O47

Mots-clés : croissance, Internet, finance, éducation, institutions

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SUMMARY OF AN INFORMAL WORKSHOP ON THE CAUSES OF ECONOMIC GROWTH

Jonathan Temple¹

1. This document forms a record of an informal workshop held on the 6 and 7 July 2000, aimed at exploring the causes of economic growth.² The workshop included presentations by a number of leading academics including Robert Baldwin (University of Wisconsin-Madison), Angel de la Fuente (University of Barcelona), John Haltiwanger (University of Maryland), Dale Jorgenson (Harvard University), Xavier Sala-i-Martin (Columbia University), Jonathan Temple (Oxford University), and Luigi Zingales (University of Chicago). In addition, shorter presentations were made by Eric Bartelsman (University of Amsterdam), Paul Butzen (National Bank of Belgium), Bruno Crepon (INSEE), Chin Hee Hahn (Korea Development Institute), Kiyohiko Nishimura (Tokyo Centre for Economic Research) and Nigel Pain (NIESR).

2. This paper summarises the main points made in the presentations and subsequent discussion. Footnotes clarify the attribution of particular ideas and refer to some of the background papers made available at the workshop. These papers will soon be accessible as *OECD Economics Department Working Papers* on the OECD website (<http://www.oecd.org/eco/wp/online/wp.htm#2000>). Some important material covered at the workshop will be of primary interest to academics working at the research frontier, and may not have immediate policy implications. These topics are discussed in more detail in a Technical Appendix.

1. Economic growth: the basic framework

3. In principle, growth in output per worker hour can be decomposed into changes in factor inputs (notably, physical and human capital) and changes in the efficiency with which these inputs are combined (often called total factor productivity or TFP).

4. Many of the papers at the workshop sought to use this distinction to shed light on the causes of economic growth. The workshop covered the recent growth resurgence in the United States, including the contribution made by TFP growth in the information and communications technology (ICT) sector. Several speakers discussed the wider importance and implications of ICT, with a particular focus on the Internet and other aspects of the “new economy”. Both the growth resurgence and the wider importance of ICT will be covered in depth in this summary.

1. Nuffield College, Oxford and Department of Economics, University of Oxford.

2. The workshop was held at OECD headquarters and was sponsored by the National Bank of Belgium, the Bank of Italy, the Bank of Japan, the Swedish Riksbank and the Swiss National Bank. This summary was prepared by Jonathan Temple of the Department of Economics, University of Oxford.

5. There was general agreement that a deeper understanding of TFP performance is required. Explanations for differences in TFP levels and growth rates across countries might be sought in the efficiency of the reallocation process, the nature of institutions, social capital, the financial sector, and openness to international trade, among other factors. Each of these topics will be discussed further below. The workshop also covered the role of an important factor input, namely educational attainment or human capital.

6. The remainder of this summary is based on the presentations and discussion at the workshop, and treats individual aspects of the growth process in turn.

2. The US growth resurgence

7. The remarkable resurgence in US growth in the 1990s has attracted much interest. There was general agreement at the workshop that the evidence for a growth resurgence in other OECD countries is mixed. In particular, the evidence for a resurgence in other G7 members is rather weak, although total factor productivity growth does seem to have risen in the 1990s in some of the smaller OECD Member economies, including Australia, New Zealand and the Scandinavian countries.³

8. The continuing variation in growth rates across time and countries has encouraged much debate. Several presentations at the workshop aimed to deepen understanding of both recent US performance, and the nature of the “new economy” often emphasised during informal discussions.

9. Dale Jorgenson presented his recent research on this topic. Drawing on joint work with Kevin Stiroh, his presentation sought to explain the increase in US growth rates in the late 1990s. Relative to the early 1990s, annual output growth in the United States has increased dramatically, by nearly 2 percentage points. Some of this acceleration can be attributed simply to growth in hours worked, but rapid capital accumulation and faster total factor productivity growth have also played an important role.

10. To what extent does this represent a “new economy”, or the effects of an information age? The famous Solow (1987) paradox is that computers can be seen everywhere but in the productivity statistics. Jorgenson argued that, from around 1995, it has now become possible to discern a significant impact of the information and communications technology sector on aggregate economic performance. Rising productivity in the production of computer hardware, and also in software and communications equipment, have all made significant contributions to the growth resurgence.

11. One notable aspect of 1995 and since is that the decline in relative prices of computers (holding quality constant) has proceeded even more rapidly than in previous decades. Despite these falling relative prices, the share of the ICT sector in output has continued to rise, indicating that investment in information technology must be rising quickly in real terms. In other words, the fall in relative prices has given an impetus to investments in information technology, and this is an important part of the recent “capital deepening” observed in the United States. All forms of ICT investment have played a role, and this explains the increased importance of capital accumulation to recent growth.

12. Can these trends be expected to continue? Jorgenson suggested that the remarkably rapid decline in the relative prices of ICT may be difficult to sustain. To some extent, the dramatic changes of 1995-2000 could be attributed to increased competition in the market for semi-conductors, and a change in the length of the product cycle. It is not clear that relative prices will continue to fall at the same rate after 2000. The result may be that “economic growth would be hit with a double whammy - slower total factor

3. See Table 6 in Scarpetta *et al.* (2000).

productivity growth in important industries that provide high-tech equipment and slower capital accumulation in other sectors that invest in and use the high-tech equipment.” (Jorgenson and Stiroh, 2000).

13. Other reasons for caution on the new economy were noted. The recent growth in hours worked is not sustainable, and there has been a slowdown in the growth of labour quality. Perhaps most importantly, Jorgenson emphasised that currently there is little evidence to support the idea of spillovers from the use of information technology. More precisely, industries intensive in the use of ICT are not showing rapid growth in total factor productivity, perhaps contrary to many informal discussions of the new economy. For example, it is not yet possible to discern economy-wide effects of the Internet, a topic covered in more detail below.

14. Jorgenson also emphasised the uncertainty inherent in analysing some of these issues. He argued that intermediate term projections have become more difficult, as gaps in our knowledge widen. One research priority is the construction of constant-quality price indices for a wider variety of high-tech assets. This endeavour is much further advanced in the United States than other countries, but even so there remain significant gaps in the treatment of ICT, as in the current approach to software prices (perhaps especially for custom-designed software).

15. Analysis of the role of ICT has also been carried out for France, and some recent research on this topic was summarised at the workshop by Bruno Crepon. As for the United States, the findings for France indicate that the ICT sector is playing an increasing role in aggregate growth, even though it accounts for only 5 per cent or so of value-added. Work undertaken by Berthier and Heckel using firm-level data suggests stronger effects of computer use than are typically detected using aggregate data. Although the findings are necessarily qualified by mismeasurement in the more detailed data sets, use of firm level data may shed new light on these questions. Analysis of the data points to substantial variation in the importance of computers across sectors, and the effects appear to be most pronounced in service sectors.

16. Discussion at the workshop of the impact of ICT initially focused on measurement issues, principally of ICT output, and output in sectors that use ICT. In some sectors, such as the financial sector, measurement of the level of output is difficult, and so conclusions about total factor productivity levels may be misleading. Nevertheless, for these sectors, it may be possible to come to reliable conclusions about growth rates, despite persistent mismeasurement of the level of output. Measurement of ICT output in real terms presents difficulties that are perhaps more formidable. Dale Jorgenson discussed the need for better price indices for information and communications technology, including software. Uncertainty about price indices can make drawing conclusions about productivity difficult. It was noted that the OECD is addressing some of these issues, but the problem is a challenging one. Jorgenson discussed one way of improving the price indices for custom-designed software. Since the main cost of software development is the cost of employing computer programmers, he suggested using the price index for package software as a proxy for the custom software price index. This may be preferable to the current method, which tends to assume that there are no changes in the productivity of programmers over time.

3. The wider role of ICT and the Internet

17. Further discussion at the workshop focused on the wider benefits of ICT. To some extent, there have been productivity gains in sectors intensive in ICT, such as those associated with the introduction of ATMs in the financial services sector. The gains observed thus far appear to be mainly gains in labour productivity, rather than reflecting improvements in total factor productivity due to spillovers. The labour productivity gains can be thought of as a consequence of capital deepening, where the new investment is partly driven by changes in the relative prices of ICT goods and services.

18. One suggestion made at the workshop was that ICT may have far-reaching implications for management. Specifically, it was argued that in some firms, a high proportion of employees are engaged in managerial tasks. ICT may ultimately contribute to increasing the effectiveness of management, and perhaps reduce the direct costs associated with it. Others disputed the suggestion that a high proportion of employees have managerial roles. There was some related discussion as to whether ICT will tend to substitute for the less skilled, or will mainly change the nature and productivity of work by professionals and the highly skilled.

19. Other discussions at the workshop focused on the role of the Internet in particular.⁴ It was observed that, since many personal computers have traditionally been used mainly as word-processors, it is perhaps the Internet which offers most support for new economy ideas, and that could confirm the new importance of computer hardware, perhaps through spillovers. It was pointed out that services available through the Internet offer some interesting examples of 'disembodied' technical change. One illustration is the introduction in the United States of an Internet-based clearing house for road haulage. This allows trucks and loads to be matched with each other more efficiently, so that truck drivers make fewer journeys with empty or low loads. This is an example of how the Internet can enable improvements in efficiency that do not require the purchase of further intermediate inputs before they can be implemented.

20. Internet based commerce aimed at consumers (B2C) is likely to generate substantial changes in the nature and variety of some goods and services, as in banking and supermarket shopping. These developments may have implications for the quality of life that are not always captured in GDP statistics, but the likely consequences for productivity remain unclear.

21. Productivity effects have also been sought in the impact of the Internet on business-to-business commerce (B2B). Research by Goldman Sachs suggests that there may be substantial cost savings in a number of sectors, but overall the effect may be limited to an increase in GDP per worker of about 5 per cent. At this early stage, these numbers are necessarily speculative.⁵

22. Attention was also drawn to the possible role of the Internet in raising the productivity of researchers. In the models of the "new growth theory", the productivity of researchers is a key determinant of growth rates, and even small changes in this parameter may have important consequences for productivity levels or growth rates. Jonathan Temple drew attention to this possible role for the Internet, and argued that it may have been wrongly overlooked in most discussions.

23. The early history of the World Wide Web (WWW), the modern way of using the Internet, sheds interesting light on its possible impact on research productivity and hence economic growth. The initial development of the WWW is primarily associated with the CERN particle physics project in Geneva. A key motivation for the creation of the web was precisely that it would encourage collaboration, and more efficient use of research time. One tentative suggestion made at the workshop, acknowledged as speculative, was that the Internet and other ICT developments may have raised the return to research at the margin, possibly implying that a shift of resources towards certain kinds of research might be appropriate.

24. Some influential models of growth, however, highlight a drawback to this argument.⁶ Formal modelling of Schumpeter's notion of 'creative destruction' has captured the way in which restructuring and reallocation is a central element of sustained growth. As this restructuring takes place, companies

4. This part of the summary draws partly on the presentation by Jonathan Temple.

5. More details of the calculations can be found in Goldman Sachs (2000).

6. This point is due to Eric Bartelsman. The underlying idea is primarily associated with the theoretical model of Aghion and Howitt (1992).

implementing new ideas do not take into account the profits displaced elsewhere in the economy. This “business stealing” aspect of innovation can generate ambiguity in the relation between social welfare and parameters like the productivity of researchers. This is another reason for seeing the connection between the Internet, research productivity and growth as currently somewhat speculative.

4. Reallocation and restructuring

25. Several presentations at the workshop explored the role of reallocation in sustained growth. Researchers emphasised that Schumpeter’s idea of creative destruction is clearly visible in the microeconomic data, which allow a clear view of how developments at the firm and establishment level translate into aggregate productivity improvements.

26. One point given some emphasis was that reallocation is important within sectors, not just between sectors - and to some extent it is the reallocation within sectors that is most important for growth.⁷ In the United States, it is possible to observe large differences in productivity across plants even when sectors are defined narrowly. Differences across businesses in productivity are highly persistent, and help explain the entry and exit of firms. Entrants that survive tend to show faster productivity growth than incumbents, suggesting the importance of selection effects in company survival, and the relevance of learning-by-doing to productivity growth.

27. With sufficiently detailed data, it is possible to decompose TFP growth into the effects of entry and exit of different plants, reallocation across existing establishments, and productivity improvements within plants based on US data. The latter appear to account for about half of the observed growth in total factor productivity, although such decompositions are sensitive to the exact form of the data and the calculations.

28. Analysis of reallocation has also been carried out for Korea.⁸ Growth in Korea has been associated with rapid entry and exit of plants. In the short term, these changes are not necessarily reflected in productivity improvements, but there is a need to take a longer view which allows for the learning effects found in US data.

29. What are the implications for growth? A growing economy is continually restructuring, but there may be distortions in this process connected with institutions, and with specific investments associated with sunk costs.⁹ Obstructions to reallocation may have effects on aggregate productivity, and so differences across time and countries in living standards may partly originate in the efficiency of the reallocation process. In turn the efficiency of reallocation might be traced to the financial sector, the labour market, or other institutions. Yet one should be cautious in drawing policy conclusions, since the optimal rate of reallocation is an open and difficult question. In principle, reallocation could be too fast from the perspective of social welfare.

5. Education

30. The workshop moved beyond ICT and the new economy, to cover other aspects of long-run growth. One of the first to be considered was the role of education.

7. This part of the summary is based on the presentation by John Haltiwanger.

8. See Hahn and Joh (2000).

9. A more detailed review of the issues can be found in Haltiwanger (2000).

31. Empirical work on growth, notably Pritchett (1999), has sometimes failed to detect large effects of educational attainment. Angel de la Fuente, in his presentation, argued that an important reason for earlier findings lies in the quality of the data on attainment. In joint research with Rafael Domenech, he has combined the Barro-Lee data on attainment with data from national and OECD sources, to construct measures of attainment for the OECD that may be more reliable than those previously available. The adjustments are substantial for certain countries.¹⁰

32. Importantly, empirical work based on the new measures provides stronger support for the hypothesis that education plays a role in growth. This not only allows more precise estimation of the effect of education, but also allows a more accurate decomposition of international income differences between the contributions of factor stocks (physical and human capital) and total factor productivity.

33. One point raised at the workshop was whether correlations between education and growth could reflect reverse causality - that is, as countries become richer, they tend to spend more on education, and average attainment rises. In econometric terms, there would be a correlation between the regression error term and the education measure, leading to biased results. Professor de la Fuente argued that this is unlikely to be a worry in practice, because new entrants to the labour force are only a small fraction of those in work. This means that a measure of educational attainment in the labour force as a whole will change only slowly in response to changes in education policy. The reverse causality argument is of more concern when researchers use data on school enrolment rates, which are probably inferior to measures of attainment for this reason and others.¹¹

6. Institutions

34. Several presentations referred, at least briefly, to the design of appropriate institutions for promoting growth and other objectives. One of the most important institutions, the financial system, will be covered separately below.

35. In thinking about differences across countries in total factor productivity, differences in institutions may be one of the first places to look. Effective institutions can lower transactions costs. They also play a role in improving incentives, efficiency and rates of innovation, as in the case of the patent system, and in the definition and protection of property rights more generally. In judging institutional performance, the criterion of flexibility is frequently applied. It was suggested that the dynamic benefits and costs of such flexibility are perhaps not yet well understood, compared to the relatively simple calculations of static dead-weight losses associated with rigidities.

36. Other issues in institutional design were briefly highlighted. The effectiveness of a given institution is likely to depend on the wider context, a point made by many observers. Institutions may to some extent be interdependent, a point that will be returned to later, in the discussion of trade policy. Finally, in designing institutions there may sometimes be trade-offs between economic efficiency and other goals, including distributional concerns.

10. See de la Fuente and Domenech (2000). Their paper has been praised for the considerable care taken over measurement issues. A review of other macroeconomic evidence on education and growth can be found in Temple (2000a).

11. See Temple (1999) for more discussion of this issue.

7. Social capital

37. As well as thinking about physical capital and human capital, some academics have drawn attention to the possible importance of “social capital”. The presentation by Jonathan Temple briefly summarised some of this research, drawing heavily on the influential work of Robert Putnam.¹²

38. Putnam (1993) defines social capital as “features of social organisation, such as trust, norms and networks, that can improve the efficiency of society by facilitating co-ordinated actions”. Sometimes a wider definition is adopted, so that social capital might include the legal or regulatory framework. Yet there is a view in the field that the concept will be most useful if it is kept tightly focused.¹³

39. The notion of social capital is distinctively “social” in that it resides in, or at least is manifested in, relationships. It may not be a form of “capital” as conventionally understood, in that while some forms of social capital have a clear investment aspect (networking) this is less true of other forms (observation of social norms). Nevertheless, it may provide a useful way of thinking about aspects of society that influence social welfare, both directly, and through economic success.

40. In thinking about the economic impact of social capital, one of the best places to start may be in examining the effectiveness of public sector institutions. Putnam’s initial work on this topic was driven by close observation of Italian regions. Some regional governments appear to work much better than others, and one reason for the differences might be found in the substantial variation in “social capital” or civic culture across regions.¹⁴ However, some participants in the workshop argued that this case remains unproven.

41. Two key questions surrounding social capital are “Where does it come from?” and “What does it do?”. The first question is important because it will be difficult to draw conclusions for policy until researchers have a better idea of how social capital is formed or undermined. The second question, “What does it do?”, also matters, because the relevance of social capital for economic success is open to debate.

42. Mixed views on the economic role of social capital were expressed. One viewpoint is that, because social capital changes slowly over time, it will not be useful in explaining variations in growth rates. It seems perhaps implausible that growth differences among countries could be sustained solely through variation in social capital. A response to this was that ideally one would use social capital to explain variation in the level of living standards, not growth rates - but this is hard to do in a convincing way using empirical work.

43. Other participants suggested that social capital may become increasingly important. For example, the Internet may give a greater role to reputational considerations and networks. Some forms of social capital, notably business networks, may also play a role in international trade, again suggesting that its importance may increase over time.

44. A key problem in thinking about social capital is the difficulty in measuring it. One possible analogy might be useful: that with human capital, which in its early days also seemed to present formidable measurement difficulties, although now its usefulness is generally accepted. Dale Jorgenson pointed out that it will probably remain difficult to measure the returns to social capital, although it might be possible

12. A discussion and review of the macroeconomic evidence on social capital can be found in Temple (2000a).

13. Wider aspects of society, including regulation, could be grouped under the alternative “social capability” heading, popularised by Abramovitz (1986).

14. More detail can be found in Putnam (1993).

to do this using firm-level data. One disadvantage with the latter suggestion is that the overall benefits to social capital might only be discernible at the aggregate level.

8. The role of the financial sector

45. In the discussion of institutions and growth, the workshop covered the role of the financial sector in some detail.¹⁵ There is evidence that differences in financial systems across countries are reflected in growth performances, and in other areas such as the extent of industrial specialisation and the size distribution of firms. These issues are important, not least because there are substantial differences across countries in the nature of their financial systems. Explaining this variation is a research topic in itself, and one that Luigi Zingales emphasised in his presentation.

46. Empirical work on financial development and growth faces a number of problems. Some of these are standard to most work on growth (such as the potential importance of omitted variables) while others are specific to this field. A particular difficulty is that financial development may anticipate rapid growth, as in the measures based on stock market capitalisation, for example. Although this can make inference from the data problematic, there are studies that look at “natural experiments”, including bank deregulation by some US states (Jayaratne and Strahan, 1996). These studies tend to support the idea that the nature of the financial sector is one determinant of growth.

47. Recent research has begun to address the mechanisms by which finance matters. Work by Rajan and Zingales examines whether industries that have a greater degree of financial “dependence” (essentially a relatively strong need for external financing) perform better in those countries that have a more highly developed financial sector. The empirical evidence provides some support. Other work has also suggested that industries intensive in the need for equity finance (or the use of skilled labour) tend to do better in countries with better accounting standards.

48. There is also some support for the idea that financial development affects the average size of firms, growth in the average size of firms, and growth in the number of firms. Finally, it appears to affect the allocation of capital. In countries with more highly developed financial sectors, we tend to observe a greater share of investment being allocated to relatively fast growing sectors. Together, these results suggest that the financial sector may be particularly important for the prospects of young firms, and that financial development is associated with more rapid reallocation and restructuring.

49. If finance is so important, why do countries vary so widely in their approach to the sector? The changes within countries over time suggest that the differences are not simply due to the legacy of a particular country’s history (for instance, the varying importance of 19th century railway building, and its role in the early development of capital markets). Instead, Zingales argued that financial underdevelopment usually reflects a lack of political will. Policies towards the financial sector have important distributional effects; for instance, if access to finance is made easier for young firms, this tends to undermine the position of industry incumbents. A more developed financial sector may also make subsidies more transparent. Mechanisms like these suggest that the origins of financial underdevelopment can be traced at least partly to the economic wellbeing of interest groups.

50. Not everyone at the workshop agreed with these ideas. A key point was that an examination of the data ten years ago might have led to very different conclusions about the relative performance of different financial systems. Zingales acknowledged that the optimal design of institutions is likely to vary over time and with the economic context. In less developed countries, the key role of the financial sector is

15. This part of the summary draws on the presentation by Luigi Zingales.

perhaps to make funds available; in wealthier countries it is the choice of projects that matters. Zingales argued that the current strength of the US system can be seen in the rapid reallocation towards “new economy” sectors, something that might not have been possible with a less developed financial sector.

51. Dale Jorgenson suggested that research on the financial sector should give greater attention to private equity, and also the importance of protection for minority stock holders. In response, it was suggested that the usefulness of private equity partly depends on the liquidity of the market as a whole. Zingales agreed that protection for minority interests is crucial, and suggested this may be an area where Europe is lacking. In turn, this pointed again to the need to explain why countries showed such variation in their financial institutions.

52. One view expressed at the workshop is that domestic financial institutions may have become less important, with the increased role for international capital markets. The evidence is still open on this point. The high cross-country correlation between domestic saving and domestic investment (the “Feldstein-Horioka puzzle”) suggests that domestic markets retain a crucial role. Nevertheless, their importance may be diminishing over time.

53. Finally, there was also some discussion of the connection between financial development and the extent of financial instability. It is possible that certain financial institutions, including those of the United States, may be more prone to instability than others. This could be an especially important issue for smaller countries, and needs to be acknowledged in policy towards the financial sector.

9. Trade and foreign direct investment

54. A central issue in the growth and development literature has traditionally been the role of trade in economic growth. More recently, attention has also been given to the importance of foreign direct investment (FDI). Both topics were covered at the workshop.¹⁶

55. The evidence on trade policy and growth remains somewhat mixed. A full understanding of the issues is limited by the available data, and the conventional measures of trade policy (such as the coverage of non-tariff barriers) are probably flawed. Perhaps more influential than cross-country studies has been the historical experience of developing countries, particularly those who initially pursued policies of import substitution and protection for “infant” industries, either by design or inadvertently.¹⁷ These policies have usually been regarded as unsuccessful, especially when compared with the shift to more outward looking trade policies in East Asia in the 1960s, which has been associated with extremely rapid growth.

56. A number of influential econometric studies have also identified an important role for trade. In the study by Doppelhofer *et al.* (2000) of a large number of possible growth determinants, a standard measure of years open to international trade performs better than many other variables. Yet it should also be remembered that the cross-country support for the importance of openness to trade is far from conclusive. Some recent work suggests that earlier claims are not always robust (Rodrik and Rodriguez 1999). This dictates caution in drawing policy conclusions, perhaps especially for developing countries.

57. At the workshop, Robert Baldwin’s presentation included the suggestion that economists have sometimes made statements about trade that in retrospect look too strong, given the evidence currently available. He argued that one way of resolving the debate might be to give more emphasis to the

16. Trade by Robert Baldwin, and FDI by Nigel Pain.

17. In some countries, import substitution policies were a response to a shortage of foreign exchange reserves, rather than specifically aimed at raising growth.

importance of combining openness to trade with sound macroeconomic policies. It is possible that empirical work based on this idea would give stronger results.

58. One point made in the discussion was that openness to trade is likely to be associated with continual restructuring and reallocation. This in turn may require careful attention to the design of domestic institutions, to ensure the success of policies designed to raise openness to trade.

59. It was suggested that recent experience of trade liberalisation within the OECD has not always been associated with more rapid growth in total factor productivity. In building on this point, the questioner wondered if theoretical or empirical support could ever be found for the idea that more open trade policies result in lower growth rates or levels of income. Baldwin acknowledged that this outcome is possible in certain theoretical models, including those associated with the “new growth theory” developed in the 1980s and 1990s.

60. In the discussion, other questioners noted that trade policy may affect the level of living standards rather than their growth rate. This conclusion might be drawn from some of the microeconomic evidence, which tends to suggest that exporting firms have higher sales and a greater probability of survival, without necessarily displaying more rapid productivity growth. In the discussion it was also noted that trade liberalisation by OECD members may have important benefits for less developed countries, and these benefits should not be overlooked.

61. The workshop also covered the role played by foreign direct investment, and particularly the evidence on external benefits or ‘spillovers’ for domestic firms.¹⁸ There is some evidence for such benefits in the UK manufacturing sector, although the effects are not large relative to overall labour productivity growth. There are a number of questions that remain unanswered. For example, it is not clear whether the presence of spillovers is contingent upon labour mobility, product market competition, or regional location. Another question is whether small firms in particular can benefit from FDI elsewhere in the economy.

62. There was some discussion of whether spillovers from FDI might justify locational “tournaments” among countries or regions. It was agreed that the case for such “tournaments” ultimately depends on spillovers, rather than direct employment effects.¹⁹ If spillovers are present, and other countries or regions participate in “tournaments”, it may not be in the interests of any single participant to withdraw.

10. Towards a synthesis

63. There was general agreement at the workshop that the remarkable recent performance of the United States is not yet mirrored elsewhere. Even in the United States, there is considerable uncertainty surrounding the extent to which recent productivity growth is sustainable, rather than a special event associated with one-off changes in ICT markets. This dictates caution in providing forecasts and forming macroeconomic policy.

64. What are the wider lessons for policy? A recurring theme at the workshop was the importance of reallocation and restructuring. To some extent, the relatively strong performance of the United States may

18. This part of the summary is based on the presentation by Nigel Pain. See Hubert and Pain (2000).

19. The underlying argument here is that FDI is unlikely to affect the level of unemployment that can be sustained in tandem with stable inflation (the natural rate of unemployment or NAIRU). If the natural rate hypothesis is valid, or believed to be valid, then employment creation by means of FDI will not affect the level of employment that can be sustained in the long run.

be associated with institutions that promote resource shifts across and within sectors, in response to innovation.

65. With this in mind, Luigi Zingales emphasised the nature of the financial sector as a particularly important determinant of reallocation and growth. The most appropriate set of financial institutions is likely to depend on the context, including the nature of other institutions. Nevertheless, it is possible that remodelling the financial sector, perhaps in ways that favour innovative firms, would be one way to improve economic performance, at least for some OECD Member countries.²⁰

66. Several speakers emphasised the wider importance of institutional issues. One suggestion is that the effectiveness of public service delivery may partly depend on prevailing social norms and informal networks, or “social capital”. The work of Putnam has been especially influential in this respect, but the connections between social arrangements and economic success are not yet well understood.

67. Human capital continues to receive much attention. Recent macroeconomic evidence tends to support the research of labour economists in pointing to significant productivity effects of education. Combined with the observation of widening wage differentials for skilled and unskilled workers in some OECD countries, the macroeconomic evidence suggests that cutting back on provision might be a mistake. For policy, the key open questions are probably microeconomic ones, in choosing between alternative means of providing education, and also vocational training. The macroeconomic evidence for the importance of education reinforces the case for exploring these questions in more depth.

68. In other areas the evidence is probably less clear-cut, and the possible determinants of growth continue to be hotly debated. As Robert Baldwin emphasised, the case for openness to international trade is not yet established beyond reasonable doubt, although a number of influential studies provide broad support for its importance, at least for developed countries.

69. One of the most intriguing topics covered by the workshop was the future role of the Internet in economic success. A range of views were expressed, from the suggestion that it is not qualitatively different from previous innovations in communications, to the more familiar idea that it could have far-reaching effects. At this point, the case for large productivity effects appears to be generally regarded with some scepticism.

20. It should also be noted that there are a number of crucial open issues in the design of appropriate financial institutions, and more research is required on the possible consequences of particular institutions for financial instability.

TECHNICAL APPENDIX

1. This appendix summarises some of the material at the workshop that related primarily to technical issues, perhaps of most interest to researchers working at the frontier, rather than contributing immediately to judgements on policy.
2. There was general agreement that exploring the determinants of growth using econometrics can be a difficult task, given the limitations of the data and models presently available.¹ Xavier Sala-i-Martin emphasised the problem of model uncertainty in particular. There are many possible determinants of growth, and so it is usually difficult to construct a model that is clearly superior to all possible alternatives. This means that conclusions about parameters are usually less certain than the standard errors associated with a single preferred model may indicate.
3. In his presentation, Sala-i-Martin set out a new way of overcoming this difficulty, based on averaging over a large class of models using Bayesian methods. A remaining problem with this technique is that the interpretation of parameters depends on the conditioning variables. This implies that certain ways of presenting the results do not lend themselves to a straightforward economic interpretation. In the discussion, it was suggested that greater use of theory to form opinions about priors for certain variables (or to consider some variables jointly) might be one way of developing the approach further.
4. Other questioners wondered whether the approach was clearly preferable to conventional methods. In his response, Sala-i-Martin argued that the usual methods, based on presentation and interpretation of a preferred model, are often misleading in that other models cannot be ruled out with any degree of certainty. This calls for alternative ways of analysing the data, ones that can incorporate model uncertainty into the procedures used for examining specific hypotheses, and so render conclusions more reliable.
5. Another theme of the research presented was the difficulty of drawing conclusions about trends, particularly from recent data. In his presentation, Paul Butzen emphasised that “stylised facts” about business cycles are typically sensitive to the choice of detrending method. He advocated the use of a structural VAR in identifying trends. Although this requires identifying assumptions, it utilises more information than a univariate approach, allows the identification of shocks, and removes the need for the essentially arbitrary choices of “tuning” parameters that are associated with conventional approaches.
6. The approach advocated by Butzen used information from the labour market, as well as movements in output, to draw conclusions about trends. The underlying argument is that this could allow a more accurate identification and elimination of cyclical effects than other approaches. In the discussion, it was agreed that it would be useful to compare the results with other approaches to locating trends, including those based simply on averaging the data.
7. One of the most influential approaches to analysing growth is growth accounting. The conventional implementation of this idea is based on perfect competition and constant returns to scale.

1. Several of these issues are reviewed in Temple (1999, 2000*b*).

Kiyohiko Nishimura presented a paper that explores a generalisation of these assumptions, based on joint work with Masato Shirai. One of the principal conclusions is that the biases inherent in the conventional approach may be quite small.²

8. Finally, a number of presentations touched on the need for more and better data, if reliable conclusions are to be drawn. Several participants at the workshop also emphasised the potential usefulness of microeconomic data, perhaps especially at the level of individual firms.

2. See Nishimura and Shirai (2000) for more details.

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