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Scenarios: Structural and
Policy Issues

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by
Nick Vanston (Rapporteur)

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SUMMARY OF A WORKSHOP ON GLOBAL CONVERGENCE SCENARIOS: STRUCTURAL AND POLICY ISSUES

by Nick Vanston (Rapporteur)

1. This document forms a record of a workshop held on 16 January 2006¹, aimed at examining the mechanisms underlying cross-country convergence of per capita GDP, to what extent they operate in practice, and the implications for policies, including those requiring plausible long-term projections of economic growth by country or region. The workshop included presentations by leading academics and OECD staff from the Economics Department, the Directorates of the Environment, Science and Technology, and Statistics and the Development Centre. A list of the main participants, and links to their presentations, are given in an Annex. At the end of the workshop, a panel of senior policy advisers discussed the policy implications for OECD countries.

2. This paper summarises the main points made in the various presentations (which were mostly in power-point form) and subsequent discussions. The presentations are available on the OECD website.²

1. Introduction

“Everything that rises must converge”³

3. Differences in per capita GDP between OECD countries and, especially, between OECD and developing countries are large. Poland and the Slovak Republic have about one third the per capita GDP (measured at purchasing power parity exchange rates, PPPs) of the United States, while several African countries have per capita GDPs ten times lower still. According to Maddison (2001) average per capita incomes in OECD countries were about 7 times higher than the average in non-OECD countries towards the end of the 20th century. These differences reflect several factors: the numbers of people employed relative to total population; the number of hours they work per year; endowments of capital, both physical and human; and (especially) levels of technology. Factors such as climate, endowments of fertile land, the presence of low-cost raw materials (with some exceptions) and distance to markets play a much smaller role than in the pre-industrial world. Both physical and human capital can be accumulated through saving, and superior technology can be acquired via diffusion or by investing in innovation. Since it is normally cheaper to acquire superior technology by imitation than by innovation, it follows that countries far from the technology frontier should be able to grow faster than those close to the frontier, where there is less scope for imitation. Per capita incomes should eventually converge to those in the technological leader, everything else being equal. This is an intuitively appealing hypothesis which could provide a basis for long-term growth projections.

4. Everything else is not equal. Demographic structures, mobilisation of labour, national saving rates, efficacy of institutions and efficiency in the utilization of resources may differ even in a hypothetical future steady state, so that there would remain differences in per capita income *levels* but in principle not in

1. The workshop was held at the OECD’s Tour Europe offices and was sponsored by the governments of Australia, New Zealand and the United Kingdom. The workshop was organized by Joaquim Oliveira Martins and Giuseppe Nicoletti and Irene Sinha and Wendy Stokle provided technical assistance.

2. www.oecd.org/document/18/0,2340,en_2649_33733_35857618_1_1_1_1,00.html.

3. The title of a story by the American writer, Flannery O’Connor (1965).

growth rates which would converge to those of the technological leaders (Barro and Sala-i-Martin, 1992; Mankiw *et al*, 1992). This constitutes *conditional* convergence. Inappropriate policies could reduce growth rates⁴, but in principle, bad policies can be reversed. Long-term growth projections, for example those underlying global climate projections of the Intergovernmental Panel on Climate Change (IPCC) (2000) assume a convergence process. It is therefore important to know if the convergence hypothesis receives empirical and theoretical support, and to understand the role of policies in influencing the convergence process, if there is one. Participants to the workshop addressed the following questions in the first session:

- Is convergence observed in practice?
- Are standard economic growth theories compatible with a convergence process?
- Are international flows of finance and labour conducive to convergence?
- How sound are long-term growth projections that are based on convergence?

A second session was devoted to a discussion of policy and institutional factors that can speed, or hinder, convergence (although in practice, it proved difficult to make a clean separation between a discussion of convergence theories, and of policies that impact on convergence). A third session focused on growth and convergence in major non-OECD countries. Finally, senior policy advisers from Australia, Canada and France discussed policy implications for OECD countries.

2. Convergence in the past

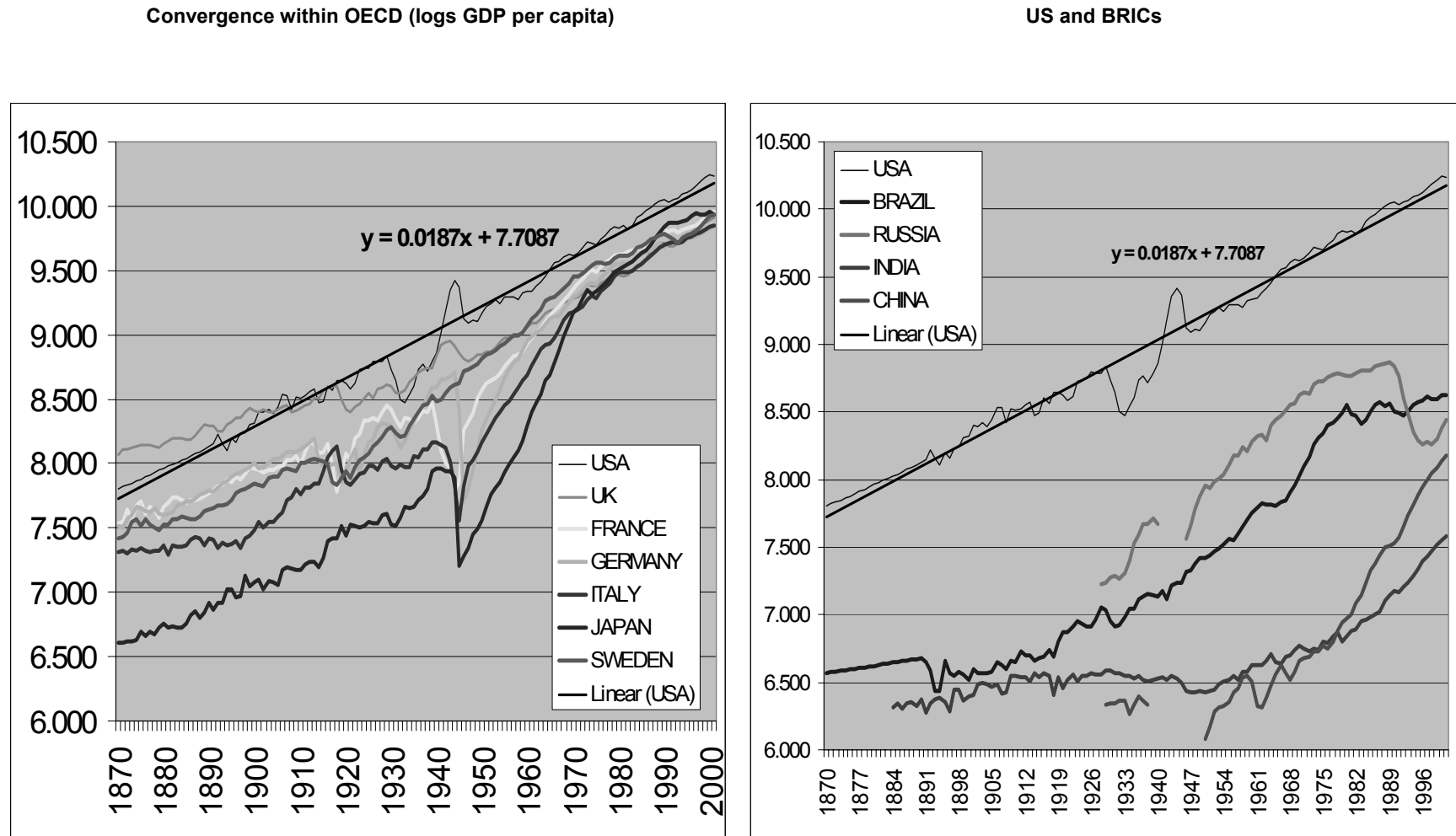
5. Long time series of data compiled by Angus Maddison and his colleagues (2001) show that per capita incomes in the US have been significantly higher than in almost every other major country since the late 19th century⁵. The US can thus be considered to be the technological leader. US per capita incomes have grown on average by nearly 2% per year since then (Figure 1). Apart from the major blips related to the 1930s depression and the World War II recovery, the trend has been quite stable, much more so than in other major industrialised countries. These showed no particular tendency to grow faster than the US before WWII, but there was clear evidence of convergence, both within this group and relative to the US, from the early 1950s to the early 1970s. By then, these other major countries had per capita incomes about 80% of those in the US. Thereafter, until the late 1990s, there was no significant further convergence in levels, but growth rates were similar. In the recent past, there has been divergence, with the US growing faster than the OECD average. Within the group of non-US OECD countries, the picture is similar. The poorer countries tended to grow faster than the more advanced ones until the 1970s, but subsequent catch-up has been slow at best. Ireland is a major exception: a sustained growth spurt from the early 1990s has brought it from being one of the poorer OECD countries to one of the richest in terms of per capita GDP (though not GNI).

6. The picture outside the OECD is mixed. Growth rates have been more erratic, but again, there seems to have been a period of convergence after WWII, which halted for most countries in the 1970s. In the majority of non-OECD countries, growth rates have been lower on average since 1970 than in the OECD area (Table 1). China and some other countries in S.E. Asia are the major exceptions, where convergence continues. Indeed, per capita incomes in Singapore and Hong Kong are now similar to those in the richest EU countries and still expanding significantly faster.

4. See Part 1 of the 2005 edition of the OECD publication "Going for Growth" for a discussion and analysis of policies that impact on economic growth rates.

5. The Maddison estimates put UK per capita incomes above those of the US until the 1920s.

Figure 1. Conditional convergence, clubs and accelerations



Source: Maddison (2003), data 1990 US\$ PPPs.

Table 1. **Per capita GDP levels and growth rates**

Measured in 1990 PPP dollars

Country/region	Per capita GDP level, 1998	Annual average growth rate		
		1950- 1973	1973- 1998	1998- 2004
USA	32 833	2.4	1.9	2.0
OECD Europe	17 921	4.1	1.8	1.8
Japan	20 413	8.1	2.3	0.9
Other Asia	2 936	2.9	3.5	5.1
Latin America	5 795	2.5	1.0	0.2
Africa	1 368	2.1	0.0	1.8
World	5 709	2.9	1.3	2.5

Source: Maddison (2001); IMF World Economic Outlook.

7. Hence the empirical support for a strong convergence hypothesis, i.e. convergence in levels of per capita GDP, is very weak. There has been convergence in growth rates within the OECD area after convergence in levels halted, but not for many countries outside the OECD. Insofar as the OECD is a “convergence club”, sharing information from all member countries about best practice in many fields, it would be alarming if there was no convergence at all. It is nevertheless disquieting that convergence in levels has halted, and that divergence has occurred more recently, with the United States, the technological leader in many sectors, pulling away from many other OECD countries. This raises two questions: can the empirical findings be satisfactorily explained by standard theories of economic growth; and can policies help to spur convergence from below?

3. Convergence and growth theories⁶

8. In a statistical sense, standard empirical analysis shows that technological progress, rather than rising levels of labour and capital inputs, “explains” most of the growth that has taken place in output per hour over the long term. The neo-classical Solow-type model of growth takes this into account through the labour-augmenting technical progress term, i.e. an unexplained residual. Careful measurements of the inputs of labour and capital, adjusting them for quality changes that themselves require investment, reduce but do not eliminate the residual. Nor can this model by itself explain how and why the technical progress term changes over time and differs across countries. Analysts, including at the OECD (e.g. Nicoletti and Scarpetta, 2003), have had some success in relating different GDP growth rates (though not specifically the size of the residual) across OECD countries to the impact of various factors and policies that affect the efficiency of resource allocation in the broadest sense. However, puzzles remain, notably the causes of the sudden and very marked growth slowdown in most countries outside the US after the early 1970s, and the reasons why some countries can suddenly embark on a long period of sustained high growth. In any case, the neo-classical Solow model is not well-adapted for long-term projections, since arbitrary assumptions have to be made about the future evolution of the residual.

6. This section draws heavily on the 2005 Joseph Schumpeter Lecture by Philippe Aghion and Peter Howitt. Prof. Aghion was a lead speaker at this Workshop.

3.1. *The “AK” embodied technical progress model*

9. The “AK” paradigm developed by Uzawa (1965) and Lucas (1988) assumes that technological progress is embodied in capital, both physical and human. There are thus no diminishing returns to capital or labour, and the growth rate of output in the steady state is determined by the growth rate of capital, which in turn is determined by the saving ratio⁷. An implication of this approach is that a higher saving ratio, or an investment subsidy financed through lump-sum taxes, will lead to permanently higher growth. Another implication of the AK paradigm is that the distance of a country from the technological frontier is irrelevant: there is no frontier. If the US were to match EU-saving ratios, its economy would expand even faster than at present, and forever. The AK approach does not predict convergence or catch-up.

3.2. *The “product variety” model*

10. The “product-variety” model of Romer (1990) by contrast specifically relates growth to innovation. There are diminishing returns to every type of intermediate product, but overall diminishing returns can be staved off indefinitely via the invention of new types of products. Product variety allows the capital stock to be spread over an increasingly large number of production processes, each of which is subject to diminishing returns. Average productivity is thus a function of the number of product varieties. Invention is costly, so in equilibrium, the marginal benefit from investing in R&D is just equal to its marginal cost. Note that the newly-invented products are not necessarily “better” in any sense than those already existing, and the latter continue to be produced. Higher rates of firm entry lead to higher numbers of products (and hence productivity) whereas higher rates of firm exit result in lower output (and hence productivity). The notion of a technological leader is hard to reconcile with the product-variety model, since any firm anywhere can innovate at the same rate as any other (however, the efficiency of R&D spending may vary across firms and between countries).

3.3. *The “Schumpeterian” model*

11. The Schumpeterian “creative-destruction” approach, in the Aghion-Howitt version, also focuses on innovation as the motor of growth, distinguishing between “true” innovation, which is costly, and imitation (implementation of a superior technology developed elsewhere), which is much less costly. Successful innovations are superior to previous products or processes, and eventually displace them, and their producers enjoy monopoly profits until their innovations are displaced in their turn. Insofar as successful new products or processes are introduced by new firms, it follows that entry is growth enhancing, and so is exit.

12. The further away a sector or economy is from the technological frontier, the greater the boost to productivity it will experience by adopting a technology which is much closer to the frontier (by assumption, true innovators retain monopoly control of cutting-edge technologies). Hence sectors/economies that are far from the frontier can in principle grow quickly at comparatively low cost. As they approach the frontier, the incremental productivity gains that result from imitation become rarer, while true innovation remains expensive. This accounts for Gerschenkron’s (1962) “advantage of backwardness” and helps explain why, within the OECD area, non-US countries grew considerably faster than the US during the 1950s and 1960s but then slowed down. This analysis also opens the possibility that policies and institutions that encourage the implementation of superior but already-existing technologies are not necessarily well-adapted to encouraging true innovation at the frontier.

7. Insofar as there are different types of capital, the growth rate will also depend on how savings are allocated across the different types.

13. The distance from the frontier impacts on the incentive to innovate, depending on the strength of competition between firms. If product market regulations and institutions favour strong competition, including easy entry, firms on the frontier face strong incentives to innovate, pushing the frontier outwards, to stay ahead of their nearest rivals, actual or potential, and to continue to reap monopoly profits. If competitive pressures are weak, firms that are on the frontier have much less incentive to escape competition via further innovation, and multi-factor productivity growth will be lowered⁸.

14. By contrast, firms that are just below the frontier face a difficult choice. If they do not innovate, they will eventually face competition from firms that were initially even further behind, but are catching up via the low-cost implementation strategy. If they successfully innovate, then they will reap monopoly profits for a while, provided that there is no entry by rivals with a comparable technology. Hence in this case, the greater the threat of entry, the less likely it is that firms somewhat below the frontier will innovate.

15. Hence in economies where competitive pressures are strong and entry is easy, and many firms are on the frontier, innovation will be rapid, successful innovators will earn monopoly profits for a while, but those who rest on their laurels will quickly be eliminated. In sectors or economies where most firms are well below the frontier, they can “get by” via implementation of already-existing superior technologies. An entry threat by a firm with better technology does not create an incentive to innovate because if entry occurs, there will be no monopoly profits to justify the investment, and if entry does not occur, the firm can continue to make normal profits using mature technologies. Hence leapfrogging will be rare, occurring mainly when an incumbent well below the frontier stumbles across a low-cost highly profitable innovation.

4. Convergence and policies

4.1. *Distance from the frontier and optimum policy design*

16. Insofar as true innovations that raise productivity are introduced by new firms, which displace older, less-productive firms, then policies that favour both entry and exit will result in higher frequency of true innovation and continued brisk growth. This could help explain why catch-up eventually slowed down in Europe and Japan, where financial systems and bankruptcy laws are less conducive to rapid firm turnover than in the US. Far from the frontier, competition policy should focus on preventing existing firms from colluding (as is the case in Europe and Japan); education and training policy should (*inter alia*) focus on encouraging the flow of information concerning new technologies and processes, and ensuring that there are enough adequately trained engineers who can appreciate their relevance; and trade policy should focus on opening the economy to flows of foreign goods and investment, which bring with them exposure to more advanced technologies. There is no particular role for financial system policy, except to ensure that the banking system is sound, and that investors in the stock market are adequately informed. Most “innovation” will be the implementation of already-existing technologies, a safe strategy that can be financed by the banking system or by the retained earnings of established firms. Macro policy should be countercyclical, focussing on public investment during downturns (as opposed to public consumption and transfers).

17. The environment changes as the frontier approaches. Competition policy and business regulations need to focus increasingly on encouraging entry and exit, education policy needs to focus on training large numbers of scientists and engineers to a high level, and the financial system needs to be deep, liquid and able to finance start-up firms with little collateral, probably no track record, but a significant probability of

8. In a globalised world, innovation may be taking place in a country where pressures are strong to escape competition via innovation. In that case, sooner or later the domestic firms will face competition in their own or third markets, and will be forced either to innovate or to exit from their markets.

eventually making large monopoly profits. If the financial system is well-developed, a pro-cyclical macroeconomic policy need not be a barrier to growth: firms can borrow their way through a recession.

18. The Aghion/Howitt view expressed in the workshop is that EU countries by and large have not made a successful transition to “frontier” type policies. Compared with the US, entry and exit frequencies are lower, as is spending on tertiary education, while financial systems in EU countries are still lagging behind as regards venture capital and business angel finance. Hence per capita output in the EU will remain below that of the US unless policies adapt. The finding that different policies can be appropriate at different levels of development can also help explain why Easterly (2005) finds that when GDP growth rates are regressed on policy variables, the results are not significant once outlying (non-OECD) countries with extreme policies are dropped from the regressions.

4.2. *Discussion*

19. Workshop participants generally agreed with the messages of the Aghion/Howitt (AH) paradigm, while disagreeing on some of the details. The basic AH analysis applies to sectors, not entire countries, and nothing in the theory implies that a given country would be the technological leader in all sectors. It was pointed out that Japan for example is the technological leader in some important sectors, even though innovation there tends to take place in large established firms. Hence background policies in the US and non-US countries might be appropriate for some sectors, but not for others. Other participants emphasised that productivity levels in some sectors are higher in a number of non-US countries, and even aggregate productivity per hour worked in a few EU countries exceeds that in the US. On this view, the higher per worker output in the US reflects longer working hours rather than superior technology, and higher per capita incomes in addition also reflect higher employment rates. Against this, it was argued that the high hourly productivity levels in many EU countries result from labour market policies and institutions that exclude low-productivity workers from employment, rather than the use of high-productivity technologies.

20. A participant noted that the **impact of firm turnover on productivity** is complex. The leading productivity quartile in the US contains firms that are growing rapidly, while in the EU, the fastest growing firms are found in the lowest productivity quartile. The bottom line is that although entry and exit are important, the behaviour of incumbents is also important. Furthermore, productivity gains stem not only from technological advances, but also from better management and training, which are more difficult to quantify than spending on R&D. Even the latter is difficult to compare across countries in real terms, as there are no plausible deflators.

21. Attention was drawn also to the **implications for education policies**. In the AH paradigm, once a country approaches the frontier, continued growth requires large numbers of highly trained engineers, scientists and MBAs. By implication, tertiary education should be subsidised. But not all tertiary education helps to push the productivity frontier outwards, and it is well-established that the private returns from tertiary education outweigh the social returns. This would argue (at most) for targeted subsidies for some types of tertiary education.

5. **Convergence and migration**

22. Long-term projections of labour forces and employment by major world zones were presented to the workshop. By the middle of this century, by far the largest pool of working-age non-employed is likely to be found in Africa and some Asian countries, notably India. There will be strong pressures on them to migrate to richer countries, because even if per capita GDP convergence continues (or recovers, in some cases), income differentials will probably remain very wide for the foreseeable future (see below, paragraph 26), for both the unskilled and the skilled. Currently, there are only a few countries where the skills profiles of immigrants are very similar to those of natives. New Zealand and Australia are examples.

In most OECD countries, immigrants typically have lower skills than the host-country average, and a bimodal distribution is common. Most immigrants are low-skilled, but there is a significant minority of very high-skilled.

23. OECD countries are tilting their immigration policies in favour of lower immigration rates overall, while favouring high-skilled immigrants, especially those who can assimilate rapidly. In this context, there is no evidence that countries with generous social assistance programmes attract a disproportionate number of inactive immigrants: in general, immigrants, legal or otherwise, come seeking work⁹. Insofar as OECD countries succeed in attracting the highest skilled from developing countries, per capita GDP convergence between the two groups would slow and conceivably reverse. This would encourage even larger numbers of low-skilled workers from developing countries to emigrate. It was argued that this potential conflict of interest can be counteracted via spillover effects such as immigrants' remittances, and eventual transfer of acquired human capital. There would also be incentives for citizens of developing countries to build up their human capital by remaining longer in education, but the public return to this education would be lowered if large numbers emigrate. And in fact a high proportion of the best-educated from some regions (e.g. Caribbean countries) do emigrate.

6. Convergence and financial integration

24. The steady removal of barriers to international financial flows should in theory spur convergence, by reallocating global savings to investment projects in capital-poor countries where returns are assumed to be higher, and increase global welfare also by lessening country vulnerabilities to asymmetric shocks (including demographic shocks). A question discussed by the workshop was, has financial integration actually taken place, and has it delivered the promised benefits?

25. As regards the first question, the home-country savings/investment bias noted by Feldstein/Horioka seems gradually to be eroding. Financial inflows, especially of FDI, into developing countries have risen sharply since the early 1990s. The evidence that integration is yielding faster growth in poorer countries is less compelling: a part of inflows finances consumption rather than investment – although this may reflect nothing more than intertemporal preferences that were previously unsatisfied – while the fastest growing countries in Asia have domestic saving rates that are even higher than their investment rates. Some of the poorest countries are effectively cut off from private international financial flows. Furthermore, financial markets typically discriminate against developing countries that have current-account deficits that exceed 5% of GDP, and insofar as governments resist higher deficits by restrictive macro policies, the mechanism breaks down.

26. The main conclusion is that although financial integration can help convergence, the process is likely to be very slow, so other measures are needed. A simple regression of population-weighted growth rates against per capita incomes implies that poorer countries grow faster – but also that countries with one tenth the income levels of rich countries grow only about 2 percentage points faster. If it is assumed that per capita incomes in the richest countries are rising at a rate of 2% per year, it would take nearly 120 years for the poorest countries to catch up. The policy conclusions are that special attention needs to be accorded to countries that are cut off from capital markets; that reliable measures of the sustainability of current-account deficits should be developed; and that more care needs to be taken by the major multilateral lenders to ensure that inflows finance investment – and perhaps especially R&D investment -- rather than consumption.

9. In some countries, however, immigrants who are accorded political refugee status may face relatively low incentives to search for jobs.

7. Convergence in the future

7.1. *Convergence assumptions in long-term climate models*

27. The world is warming up, in part because of man-made emissions of greenhouse gases, themselves related to economic activity worldwide. Because climate change has important policy implications but is a slow process, long-term GDP growth projections are needed. Those underlying the “Special Report on Emissions Scenarios” (SRES) of the Intergovernmental Panel on Climate Change (IPCC) have been criticised by Ian Castles and David Henderson (2003a, b) for their use of market exchange rates to weight together output in different regions of the world.

28. In considering long-term projections, a number of points were made. It was emphasised that different economic sectors typically have different energy intensities and their relative importance changes as average incomes rise. Hence energy use will not usually be a simple linear function of GDP. Economists also argue that energy intensities are not a simple function of exogenous energy-using technologies; rather these technologies themselves are endogenous to the price of energy which itself is to some extent endogenous to world GDP growth. Noting that GDP growth models that have reliable econometric support are based on only 30 years or so of data, it was argued that statistically robust projections can be made for only ten years or so beyond the estimation period. In addition, a participant noted that as incomes rise, prices of non-tradable, where productivity growth is typically slow, rise faster than those of tradable. Hence there is a clear empirical relationship between PPP price levels and per capita incomes which needs to be taken into account when making long-term projections. Other participants emphasised that climate change itself might have an impact on R&D and hence innovation and growth rates.

29. Alternative projections were presented up to 2050 using the “G-cubed” model (McKibbin and Wilcoxon, 1998). This has 14 countries/regions and 12 sectors. Sectors have different energy intensities and exchange inputs and outputs between each other both domestically and internationally. Greenhouse gas emissions depend both on the overall energy intensity of production, and the types of fossil-fuel energy sources used. These can be traded internationally, depending on relative prices and transport costs. The model projections imply that there can be no simple relationship between GDP and emissions at either the country or the world level in the future (as in the past), although in general, the higher is GDP, the higher is the level of emissions. The implications that were drawn for climate-related policies are that the economic projections need to be much more detailed than in the SRES, and based on the understanding that it is not GDP that is exogenous, but rather population growth, sectoral productivity levels, and how they evolve over time. It was also argued that, given that energy use is price-sensitive (as indicated by the change in behaviour after the oil-shocks of the 1970s), climate change policies must include use of the price mechanism.

30. Another set of projections was also presented to the workshop, based on the OECD’s recursive dynamic neo-classical general-equilibrium ENV-LINKAGES model. These, too, underlined the importance of using a sectorally-disaggregated approach to long-term energy demand forecasts.

7.2. *Determinants of future convergence*

31. The discussion of growth-rate determinants noted that standard convergence rates are based on regression analyses that weight countries equally, so that small countries carry too much weight. Furthermore, most estimates are based on data from the 1970s and 1980s, when international feedback mechanisms were less important than currently. Hence the empirical support is shaky for some of the parameters used in the projections. Variables and parameters that are plausibly exogenous even in the long term are hard to find. Growth models that regress endogenous variables on what may well be other endogenous variables will give misleading results. Demographics react to GDP via both the fertility

transition and longevity; innovation rates depend on the number of researchers worldwide, and this is rising rapidly because of fast increases in human capital in China and India; geographical position is exogenous, but intra-regional trade dynamics are not; institutions are crucial, but they, too, may well be endogenous to income levels; capital equipment prices are substantially higher in poorer countries, but will they remain so as those countries grow? Global warming itself is very likely to impact on growth and its composition across countries in the out years of the projections. All this makes for great prudence and reticence when producing very long-term growth projections, and single-valued projections are misleading. Nevertheless, there is a legitimate demand for long-term projections, so economists must do their best, emphasise the caveats, and not leave such projections to non-economists.

8. Factors influencing economic growth

32. At bottom, the convergence mechanism is driven by imitating superior technologies invented elsewhere, at the same time investing in physical and human capital. In this sense, convergence is merely a transitional process, albeit one that could last many decades. But a growth process that lasts for decades can certainly be regarded also as “long-term growth,” and hence there is interest in examining the factors that can help or hinder economic growth as such.

8.1. *The relevance of institutions and policies*

33. The workshop discussed institutions and framework policies affecting technical progress -- the long-term motor of growth. One view expressed was that the democratic process is an effective way of getting rid of governments that pursue bad policies, and encourages all governments to build up growth-friendly institutions. Non-democratic regimes encourage corruption and rent-seeking. Against this, it was argued that the relationship between the type of political regime and the rate of accumulation of capital is not straightforward: investment rates and GDP growth have been high under some non-democratic authoritarian regimes. Political stability may be more important than the type of regime for countries well below the frontier, but democratic institutions become important once the frontier is approaching. Empirical analysis shows without doubt that institutions matter, especially control of government and the rule of law. But it cannot be ruled out that these are endogenous to growth, the chicken and egg problem. Further research, involving micro-analysis, and analysis by sub-regions and sectors will be needed to settle this question.

34. Inadequate framework policies can hinder growth by creating bottlenecks. Examples are lack of integration into world markets in Latin America, poorly-functioning infrastructure and financial markets in Africa, and low levels of human capital in the Middle East. Argentina was cited as an example of a country where there were few indigenous people when it was colonised by Europeans with high human capital, became relatively rich, but then stagnated because of bad policies, including barriers to trade in goods and services, but open capital markets.

8.2. *The relevance of natural resource endowments*

35. It was argued that *abundance* of natural resources, but not dependence on them, can be positive for growth, if receipts are invested at arms length from the government, rather than consumed. Norway is one of the few good examples. *Dependence* on high-value low-cost natural resources is usually harmful, as it encourages complacency (and hence poorly-functioning institutions), rent-seeking, “Dutch disease” and under-investment in human and physical capital. Against this, it was argued that if the Chinese economy continues to expand rapidly while producing low-cost manufactured goods, the terms of trade for commodity exporters will likely improve.

8.3. *The importance of small differences*

36. A participant emphasised that since the (neoclassical) production function is multiplicative, comparatively small differences in endowments of physical and human capital, and in the level of TFP, lead to major differences in per capita GDP. Thus a 25% lower level of these compared with an OECD country results in a per capita GDP that is 70% lower, and would be lower still if the state of infrastructure is taken into account. Per capita output in African countries is less than 20% of the OECD average, and although it is growing briskly at present, the absolute size of the gap is still widening. Although even faster growth would be feasible if there were adequate investment in human and physical capital, this does not happen. Increased investment in human capital is worthwhile only if life expectancy exceeds 50 years, while investment in physical capital is held back both by a fear of expropriation and the high price of capital goods in developing countries. The high price of capital equipment in developing countries reflects both low productivity in their manufacturing sectors and high tariffs on imported goods. In the case of Africa, an OECD-type policy review process (the African Peer Reviews) could be important to help identify for some countries policies that are good for growth.

37. The main conclusion for policies is that structural policies are key for efficient use of existing resources, and also for ensuring that resources accumulate and that technical progress is rapid. Inappropriate policies will hinder growth whatever the income level. But the appropriateness of particular policies (and institutions) is itself a function of the level of development, and so policies have to change, and institutions adapt, as incomes rise. This is a political economy challenge, because governments and their supporters may be reluctant to abandon a policy and institutional paradigm that worked very well in the past.

9. **Major non-OECD country experiences**

38. Brazil has experienced divergence since the early 1980s after a period of rapid post-war convergence until then. The so-called “lost decade” of the 1980s in the end lasted 25 years, with GDP growth rates only one-third of the 1960-1980 average. Capital accumulation rates fell, in part because of rising prices of capital equipment, but capacity utilisation also fell. The per capita GDP gap with OECD countries has widened by nearly 10 percentage points, and TFP growth has sometimes been negative. Doing business suffers from bureaucratic delays in starting up a firm, and in enforcing contracts. Most recently, macro policy settings have improved, trade openness has risen, internal markets have become more flexible and the external constraint has lessened. Nevertheless, potential GDP growth is now believed to be in the 2½ to 3½ % range, too low for convergence. Low levels of human capital, even for young adults, constitute a barrier to faster growth.

39. By contrast, China is converging rapidly, and the question is how long can it continue to do so? The very high saving rate (well over 40% of GDP) will probably fall as the population ages, but there are offsetting factors: the educational system is moving from giving priority to primary and junior secondary schooling to providing more senior and tertiary education (although average years of full-time education are expected to remain below the OECD average for the foreseeable future); as internal immigration laws are softened, the switch from low-productivity agriculture towards manufacturing and services will accelerate; and low-productivity state enterprises are increasingly allowed to exit and be replaced by private firms, where TFP levels are twice as high. If the fast economic growth of the past 25 years continues for another 25 years, Chinese per capital incomes by then would attain current US levels.

40. The Russian economy is picking up again. TFP has been the main contributor to growth in the past five years, though recovering from very low rates previously. Oil and gas production have been increasing. The real effective exchange rate continues to reflect the non-oil trade balance. The longer-term outlook is unpromising, though. The population is projected to both shrink drastically and age in coming

decades, so that the labour force could fall by almost half. Investment has been a minor contributor to growth in recent years, and the authorities are aware that it needs to be boosted. But it is not clear whether policies will favour an authoritarian state-directed solution of diverting resources towards the non-resource sectors, or whether the rules of the game will move towards a more liberal private-sector approach.

10. Policy discussion

41. Senior policy advisers from Canada, France and Australia discussed conclusions for OECD countries that had emerged from the workshop:

Convergence: if convergence means that poor countries grow faster, this will have positive spillovers for richer countries in terms of bigger markets and more variety, but it will also entail more CO₂ emissions, higher commodity prices and more competition for skilled workers. The market for CO₂ emissions will get tighter also as the Russian economy picks up.

Growth policies: although convergence is a hypothesis about relative performance, in practice most of the policy analysis and discussion is in terms of GDP growth by country or region without distinguishing between moving towards the frontier, and pushing-out the frontier. The growth focus should be on capital investment – human and physical – and innovation. These can be encouraged via macro stability, a competition-friendly regulatory framework, expansion of higher education, and a reduction of internal and external barriers to trade and finance.

Education policy: higher education is important, but especially for training scientists, engineers and business students. Given the importance of R&D and innovation for TFP growth, it is possible that the social returns from these types of tertiary education are greater than conventionally estimated. The implication for education policies could be that certain types of higher education should be favoured.

Competition policy: if competition policy is “not as important” for countries that are far from the frontier, this means that it is important for the more advanced OECD countries. It is not easy to measure the distance from the frontier because of the difficulty in measuring multifactor productivity levels. This in turn implies both that policy shifts should be cautious --countries should not renounce all policies that permitted catch-up in the past -- and that the policy framework should permit such shifts.

Institutions and policies: the empirical evidence shows that institutions matter a great deal in the sense that countries with poorly-functioning institutions are, and will remain, well below the frontier. But OECD countries have good institutions (one reason why they are so rich), and so good policies matter more. The most important ones are those that encourage physical capital formation, high participation rates and employment rates, high levels of education and that reduce home bias.

Migration: OECD countries favour high-skilled immigrants, which confer benefits from a single-country viewpoint, but less so overall, and it distorts market signals. If migration were left to purely market forces on the other hand, there would be an influx of low-skilled immigrants for whom finding work would be difficult.

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ANNEX

List of main participants, and their presentations

Philippe Aghion (Harvard University)

“Appropriate Growth Policy: a Unifying Framework” (the 2005 Joseph Schumpeter Lecture, EEA, August 2005, with Peter Howitt, Brown University), and “Long-run growth and Technology”
(<http://www.oecd.org/dataoecd/59/5/35935963.ppt>)

Philip Bagnoli (OECD Environment Directorate, Discussant)

“Structural Change and PPP Measures of Income” (with Jean Chateau and Sebnem Sahin)

Claude Bismut (Montpellier-1)

Long-run growth and International saving flows (<http://www.oecd.org/dataoecd/58/37/35936369.ppt>)

Tito Boeri (Bocconi University)

“Growth, Labour markets and Migration” (<http://www.oecd.org/dataoecd/48/47/35933579.ppt>)

Daniel Cohen (École Normale Supérieure and OECD Development Centre)

« Productivité Industrielle et Compétitivité (with Orsetta Causa, OECD Development Centre) »

Jorgen Elmeskov (OECD Economics Department, Discussant)

“Policies, institutions and convergence – a discussion”

Thorvaldur Gylfason (University of Iceland)

“To grow or not to grow: Why institutions must make a difference”
(<http://www.oecd.org/dataoecd/56/57/35953880.ppt>)

Richard Herd (OECD Economics Department)

“China: How rapid a convergence?”

<http://www.oecd.org/dataoecd/58/52/35936550.ppt>

Jorge Braga de Macedo (Universidade Nova de Lisboa)

What policies could sustain convergence of less developed regions?

(<http://www.oecd.org/dataoecd/56/61/35953676.ppt>)

Warwick J McKibbin (Australian National University, Lowy Institute and Brookings Institution)

“Convergence, PPPs and global modelling”

(<http://www.oecd.org/dataoecd/49/5835925163.ppt>)

And “Convergence and per capita Carbon Emissions” (with Alison Stegman) Working Paper no. 4.05 of the Lowy Institute, May 2005.

Luis de Mello (OECD Economics Department)

“Brazil’s growth: What went wrong? What to expect now?”

<http://www.oecd.org/dataoecd/56/45/35940116.ppt>

Bert Mertz (Co-Chairman, IPCC Working Group on Climate Change Mitigation for the 4th Assessment Report)

Giuseppe Nicoletti and Joaquim Oliveira Martins (OECD Economics Department)

“Convergence paths: role of structural and policy factors”

(<http://www.oecd.org/dataoecd/48/25/35933519.ppt>)

Javier Santiso (OECD Development Centre, Discussant)

“Catching up and Falling Down: a Latin American Perspective”

Paul Schreyer (OECD Statistics Directorate, Discussant)

“GDP per capita in convergence scenarios: two comments on PPPs”

Jonathan Temple (University of Bristol)

“Convergence scenarios: an overview” (<http://www.oecd.org/dataoecd/51/6/35921220.ppt>)

Bill Tompson (OECD Economics Department)

“Possible Russian Development Paths” (with Christian Gianella)

(<http://www.oecd.org/dataoecd/56/60/35953685.ppt>)

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(forthcoming in June 2006) Pierre-Olivier Beffy, Patrice Ollivaud, Pete Richardson and Franck Sedillot
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(February 2006) Alexandra Bibbee and Flavio Padrini
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