

ABOUT THE AUTHOR

Jeffrey D. Sachs is Director of the Earth Institute and Quetelet Professor of Sustainable Development at Columbia University, and the global bestselling author of *The End of Poverty*. He is internationally renowned for his work as an economic adviser to governments around the world and is a special adviser to United Nations Secretary-General Ban Ki-moon on the Millennium Development Goals. He was the BBC's Reith Lecturer for 2007 and presented some of the ideas in this book to a worldwide radio audience during those lectures.

Common Wealth

ECONOMICS FOR A CROWDED PLANET

Jeffrey D. Sachs



PENGUIN BOOKS

would soar. Of the 6 children, 4.8 would survive on average (since 20 percent of the 6 children, or 1.2 children, would die). Each mother would be raising 2.4 girls (on average). The population would more than double each generation!

Now consider the implication of a drop of the child mortality rate, from 20 percent to 3 percent (thirty deaths per one thousand births). In this case, the chance of a son surviving is 97 percent. The parents will be satisfied to raise one son or just two children on average. The TFR will be two, and the population will be stable. (Actually, in this example it would decline slightly, since only 97 percent of the daughters would survive, and the NRR would be 0.97).

Now here is the implication: a drop in the child mortality rate must be large enough to induce the risk-averse parents to cut back on the number of children. If the mortality rate is three hundred per one thousand births, they will choose to have six children (for the reasons just argued). If the mortality rate drops from three hundred to two hundred per one thousand, they will *still* choose to have six children. The population growth rate will speed up, without a decline in the fertility rate! If the mortality rate drops further, to thirty per one thousand, the parents will choose to have only two children.

THE COMPELLING CASE FOR FERTILITY DECLINE

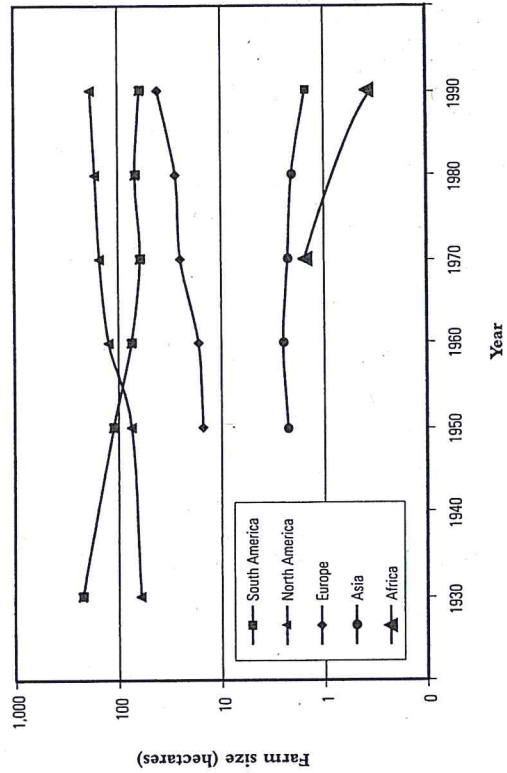
There are four compelling reasons why the poorest countries need to speed the demographic transition, and why we need to help them do it. The first, and most important, is that poor families cannot surmount extreme poverty without a decline in the fertility rate. Parents may think that they are providing security for themselves, but it is coming at the cost of continued extreme poverty for their children. An impoverished subsistence family in a rural village in Africa cannot raise six healthy, educated, well-nourished children. The parents face what economists call a quality-quantity tradeoff. With six children, a poor household must severely ration the investments per child. Perhaps only one of the children (typically the eldest son and none of the daughters) is able to go to secondary school. Often, all of the children will be chronically undernourished. Several may succumb to malaria or other killers because the family cannot afford basic health care and emergency transport to a local hospital. Studies find that large households are impoverished households. While the causation runs in both directions, with poverty conducive

to large households, and large households exacerbating poverty, the pernicious effects of large families on the well-being of the children should not be doubted.

Second, what is true for the family is true for the society as a whole. A poor country cannot afford to equip its communities with schools, clinics, new roads, and other public facilities to accommodate a population that doubles each generation. A country with rapid population growth faces intense fiscal challenges just to keep up with the population, not to mention achieve economic progress.

Third, the ecological and closely related income consequences of such rapid population growth are devastating. The poorest countries are rural and usually in fragile ecologies, especially drylands. Desperately poor subsistence farmers with rapidly growing populations face constantly shrinking farm sizes that are already too small (0.25 hectares or less in parts of Africa) to provide a farm livelihood even with the best of technologies. African farms are already the smallest in the world on average (Figure 7.7). Falling farm sizes mean falling incomes per farm family, unless the shrinking land-family ratio

Figure 7.7: Average Farm Size by Continent from 1930 to 1990



Source: Estimates from Eastwood et al. (2004)
Note: Vertical axis on logarithmic scale

is somehow compensated for by a sharp rise in the value of output per hectare. When farms become as small as they are in many parts of Africa today, it will be extraordinarily difficult to overcome poverty through farm incomes. These communities are also deforesting the local environment in search of fuel wood (Ethiopia, for example, is now 80 percent deforested), overpumping underground aquifers, depleting soil nutrients, overgrazing the pastureslands, and generally mining the environment in a desperate struggle for survival. Land is so scarce that the farmers can no longer afford to leave the land fallow for several years to replenish nutrients. These problems can still be overcome by helping impoverished farmers to adopt improved technologies and diversified income strategies, but such gains will not be sufficient to keep ahead of a doubling of population every generation!

Fourth, and finally, there are the threats to the rest of the world. Rapid population growth raises the pressures for mass migration and local conflict. Today's conflicts in Africa mainly reflect a breakdown of order among hungry and impoverished communities. Violence is not just a matter of poverty but also of the age-population structure. Higher fertility rates, we've seen, lead to age-population pyramids with a wide base and a narrow apex: too few elders per adolescent. The evidence points to added risks of violence and even war, a link that we will explore further in the next chapter.

HIGH FERTILITY RATES AND LOW ECONOMIC GROWTH

We have seen that high fertility rates should impede per capita economic growth for both microeconomic and macroeconomic reasons. At the household level, higher fertility means less investment in each child's human capital (including nutrition, health care, and education). At the national level, higher population growth means that more capital investment must be devoted simply to expanding the number of schools, clinics, paved roads, and other infrastructure just to keep up with population growth, and less can therefore be devoted to improving average services (per person). In economic jargon, we say that saving must be devoted to "capital widening," to keep up with population growth, rather than "capital deepening," to raise the capital stock per person.

One test of this is the cross-country evidence on economic growth. We can

examine whether countries with high fertility rates indeed have lower growth rates of income per person. The standard tests have been carried out by the leaders of empirical growth modeling, Robert Barro and Xavier Sala-i-Martin. Their statistical model accounts for each country's average annual growth rate of income per person according to various characteristics of the country, including the level of income per person, the average educational attainment, the life expectancy, an indicator of the "rule of law," and other variables, including the total fertility rate. The TFR is shown to have a strong, statistically significant negative effect on economic growth. Consider two countries that are identical in all respects except that one has a fertility rate of 6 and the other a fertility rate of 2. According to the statistical result of the Barro and Sala-i-Martin study, the high-fertility country will have per capita income growth that is 1.3 percentage points per year lower than the growth of the low-fertility country. That's a whopping negative effect of high fertility.

POPULATION POLICIES AND THE REDUCTION IN FERTILITY

It might be supposed that fertility choices are among the most private of all decisions and the least amenable to government action (except, perhaps, by coercion). Yes, societies will pass through a demographic transition, but it would seem to be one that can, should, and will be determined by individual choices, not by government policies. Indeed, for today's rich countries of Western Europe and the United States, the demographic transition that took place during the twentieth century occurred largely through such decision making of individual households.

Yet the same has not been the case in the poorer countries. Their demographic transitions, where they have occurred, have typically been accelerated, and even triggered, by proactive government policies. Since governments have played a key role in the rapid decline in mortality rates of young children, for example, through provision of immunizations and safe drinking water, they have also had to step in to promote a rapid decline in fertility to accompany the decline in mortality. Experience has shown that households must be made aware of their legal rights (for example, to contraception) and technological options. Recent decades have brought enormous advances in contraceptive choice, including the pill, intrauterine devices, injectables, implants, and more.

Government programs have been critical in making households aware of the safety, convenience, and efficacy of these options, often providing contraceptive services to the many households in the developing countries that are too poor to afford contraceptive services on their own. Without government support, fertility rates will remain far above desired levels. This is also the case because fertility choices are strongly conditioned by social norms. Government-led advocacy can play an important role in changing ancient customs, which generally favor large families. After all, these customs emerged over centuries or even millennia of high rates of child mortality from infectious diseases.

The case for public leadership in fertility reduction was increasingly accepted throughout the world after 1960, as former colonies gained their independence and the family planning successes of one country spread to the next. The first family planning program was initiated by Prime Minister Jawaharlal Nehru of India in 1951. Pakistan's came soon after. Private foundations and nongovernmental organizations joined the effort, including the formation of the Population Council in 1952 and the start of Ford Foundation financing of India's population programs in 1959. By the 1960s, continued rapid population growth in the poor countries was being viewed as a global threat. The U.S. government came to understand rightly that very high fertility rates threatened political stability by creating a huge bulge of youth, often carrying the burdens of household poverty, hunger, and rural underemployment. Moreover, there were increasing fears that the global population boom would outstrip the world's food supply, making Malthus's original prediction come true one and three-quarter centuries after the prediction was first made.

The adoption of birth control as a U.S. government priority required the fortitude of U.S. political leaders to wade into highly charged and culturally contested waters. As late as 1959, President Dwight Eisenhower rejected the advice of a blue-ribbon committee on U.S. aid that called for U.S. government support for birth control in developing countries. "This government will not . . . as long as I am here, have a positive political doctrine in its program that has to do with birth control. That's not our business." Three years later, however, President John Kennedy agreed with his advisers that U.S. aid efforts should be extended to support family planning services, and as America's first Catholic president, he also made efforts to forestall direct criticisms from leading church officials of such U.S. government actions. U.S. support helped

lead to the establishment of the UN Fund for Population Activities (UNFPA) in 1967, later renamed the UN Population Fund (with the original acronym unchanged). The UN made major efforts to train family planning specialists and demographers, and established regional demography centers to support this global work.

Fertility rates began to drop sharply in much of Asia in the 1960s and then, a decade or so later, in North Africa as well. Countries with higher levels of literacy, women's rights, and per capita incomes achieved the demographic transition earlier, but family planning programs also provoked rapid changes in countries with pervasive rural poverty, rigid gender roles, and widespread illiteracy. The transitions to low fertility were often very rapid. Thailand, for example, reduced its TFR from 6.4 in 1960-65 to 2.9 in 1980-85. Egypt, India, Indonesia, and Nepal achieved a sharp and voluntary drop in fertility rates even at relatively low levels of socioeconomic development through a highly proactive national family planning effort.

Family planning thereby emerged from an effort by a few specialists in a handful of countries into a worldwide effort. From two countries (India and Pakistan) with national family planning programs in the 1950s, more than a dozen countries had established family planning programs as of the 1960s, and several dozen had them by the 1970s. A series of major global conferences on population both spurred and underpinned this phenomenal worldwide shift in public policy. The first two global population conferences, in Rome in 1954 and Belgrade in 1965, were mainly scientific gatherings without direct political input. In 1974, the UN organized the world's first major intergovernmental conference on population in Bucharest. The official delegates, representing thirty-five countries, adopted a twenty-year World Population Plan of Action, which emphasized that countries should launch national population plans of action and that they could expect international support in so doing. The Plan of Action underscored that fertility choices should be left to voluntary decisions of households; that population policies should be seen holistically to include policies related to fertility, mortality, education, and research; and that in the end, such policies are a matter of national sovereignty, not international compulsion. The United States played a major role in Bucharest, urging the widespread adoption of bold population programs backed by U.S. support.

A decade later, the world's governments met again, in Mexico City, to review progress and make midcourse corrections to the Bucharest Plan of Action. Much had been accomplished. The fertility rates in much of the de-

veloping world were falling sharply. Yet the political circumstances had changed a bit. With Ronald Reagan as president, the U.S. delegates argued that fertility reductions were natural results of development and that family planning was much less important. They also suggested that population growth had only "neutral" effects on overall economic development prospects, a change of viewpoint from the earlier (and more accurate) position that high fertility rates are deleterious to long-term development. Most of the other governments, however, continued to maintain that reductions in fertility rates were needed to ensure long-term sustainable development. Nonetheless, despite such contention and a bruising battle over the specific issue of abortion rights, the conference concluded with a continuing global commitment to family planning services, and to the Bucharest Plan of Action in particular.

In 1994, the world assembled in Cairo for the next population conference, with political conditions altered yet again. This time, the major theme, promoted by a global activist community, was that population policies needed to be broadened beyond the narrow gambit of fertility to a much wider integrated approach on sexual and reproductive health, based strongly on the empowerment of women. The International Conference on Population and Development (or ICPD, as it came to be known) certainly did not reject family planning *per se*, but it sought to put family planning in the context of access to a much wider array of sexual and reproductive health (SRH) services, including safe pregnancy and delivery and sexual health more generally (including the control of sexually transmitted disease). In truth, these issues had long been on the table, but the ICPD changed the rhetoric and emphasis. The most important specific commitment regarding family planning to emerge from the ICPD was the commitment to universal access to sexual and reproductive health services, including family planning services, by the year 2015. This commitment was backed up by a call for increased development aid for the poorest countries and for the levels of aid needed specifically to ensure universal SRH coverage by 2015.

In summing up the results of a half century of family planning advocacy, funding, and organization, leading demographers emphasized the crucial role played by all of these global efforts. As John C. Caldwell and coauthors put it:

National family planning programs have been an important instrument in accelerating global fertility decline and in restricting ultimate world population to a level probably below ten billion. . . .

Those of us who have worked with contemporary family planning programs have been convinced of these programs' impact by the certainty of their clients that they could not control their fertility without the support of the program and that their parents' uncontrolled fertility was the inevitable consequence of the absence of such programs in their time.

The spread of changed ideas about family size and the legitimization not only of the use of contraceptives but also of their provision by governments was not a haphazard affair. International organizations played an increasingly important role. . . .

FULFILLING THE MILLENNIUM PROMISE OF REPRODUCTIVE HEALTH

The ICPD Plan of Action (or Cairo Plan of Action) forms one of the most important Millennium Promises. It underscores that population policy is integral to the overall challenge of sustainable development. A UN summary of the ICPD Plan of Action notes that "efforts to slow population growth, reduce poverty, achieve economic progress, improve environmental protection and reduce unsustainable consumption and production patterns are mutually reinforcing." The plan makes clear that one objective is "to facilitate the demographic transition as soon as possible in countries where there is an imbalance between demographic rates and social, economic and environmental goals," thereby contributing "to the stabilization of the world population." To underscore the multidimensional nature of reproductive health, the ICPD Plan of Action puts the goal of universal access in this way:

All countries are called upon to strive to make reproductive health accessible through the primary health-care system to all individuals of appropriate age as soon as possible and no later than 2015. Such care should include, *inter alia*: family planning counseling, information, education, communication and services; education and services for prenatal care, safe delivery and post-natal care, especially breast-feeding and infant and women's health care; prevention and treatment of infertility; abortion as specified in paragraph 8.25; treatment of reproductive tract infections, sexually transmitted diseases (STDs) and other reproductive health con-

reproductive health and counseling on human sexuality, and responsible parenthood.

What is also important, the conference underscored the need for global cooperation, including financial assistance from rich to poor, in order to meet this goal of universal access, and put quite specific financial targets in place:

The international community should strive for the fulfillment of the agreed target of 0.7 per cent of GNP for overall official development assistance (ODA) and endeavour to increase the share of funding for population and development programmes commensurate with the scope and scale of activities required to achieve the objectives and goals of the Programme of Action. . . . Given the magnitude of the financial resource needs for national population and development programmes, and assuming that recipient countries will be able to generate sufficient increases in domestically generated resources, the need for complementary resource flows from donor countries would be (in 1993 US dollars): in the order of \$5.7 billion in 2000; \$6.1 billion in 2005; \$6.8 billion in 2010; and \$7.2 billion in 2015.

The UN Millennium Project's special report on sexual and reproductive health (2006) came up with estimates of the scale of donor effort that would be needed to achieve the goal of comprehensive access to basic sexual and reproductive health in the poor countries, including safe childbirth, emergency obstetrical care, and family planning services. The estimate came to around \$25 billion per year as of 2015, which would be roughly 0.06 percent of the income of the donor countries. This estimate would ensure broad coverage not only of contraception and family planning but also of safe childbirth, the key step in meeting the Millennium Development Goal of cutting maternal mortality by three fourths by 2015. Alas, to date, those financial goals have not yet been met. We now turn to reviving the global cooperation on family planning and fertility reduction.

Chapter 8

Completing the Demographic Transition

SINCE THE BEGINNING OF THIS DECADE, population policy has been hijacked by shortsighted ideology. Leaders of the U.S. religious right have called for ending U.S. support for family planning. While that has not happened entirely, the Bush administration has slashed aid to the UN Population Fund and recommended large cuts in direct U.S. funding of family planning services. It's hard to think of a single more misguided policy; it runs directly against American interests in the reduction of conflict and terror, as well as against the support of economic development and environmental sustainability more generally.

The future trend of the global population will be a matter of choice, not fate. If the rich countries, including the United States in the next administration, honor their commitments at Cairo to help the poor countries invest in family planning and reproductive health more generally, the world's population can be stabilized at around 8 billion. Table 8.1 sketches how this would be achieved. In the current medium-fertility UN forecast, the world's population rises to 9.2 billion by 2050 and is roughly stable thereafter. A plausible policy alternative is to assume a faster demographic transition in the developing countries, as presented in the UN's low-fertility forecast. This low-fertility scenario puts the TFR at 0.5 lower than in the medium forecast. This alternative results in the stabilization of global population at roughly 8 billion, with almost half of the reduction from 9.2 billion to 8 billion resulting from lower populations in India and sub-Saharan Africa. Per capita economic growth in Africa and in other regions of current high fertility would be powerfully promoted. The Earth's environment, first and foremost in the poorest regions, and also globally, would be much better protected. If the United States persists in its war against family planning, or simply continues the cur-

1304-5. See also Diana L. Cox-Foster, et al., "A Metagenomic Survey of Microbes in HoneyBee Colony Collapse Disorder," *Science* 318 (October 12, 2007).

142 Great Apes: Allison Jolly, "The Last Great Apes?" *Science* 309, no. 5740 (September 2, 2005): 1457; and Gretchen Vogel, "Scientists Say Ebola Has Pushed Western Gorillas to the Brink," *Science* 217, (September 14, 2007): 1484.

148 Massive vulnerability: As just one example, New Orleans was exposed to increased damage from Hurricane Katrina in part because of the deterioration of the Mississippi Deltaic Plain (MDP), the area of natural wetlands in the Mississippi Delta. Since the Mississippi River was leveed as it emptied into the Gulf of Mexico, it no longer deposited silt into the MDP, and the MDP itself was eroded. This demonstrates one way that human activity can exacerbate natural hazards. See John W. Day Jr. et al., "Restoration of the Mississippi Delta: Lessons from Hurricanes Katrina and Rita," *Science* 315 (March 3, 2007).

150 benefits of such practices: J. N. Pretty et al., "Resource-Conserving Agriculture Increases Yields in Developing Countries," *Environmental Science and Technology*, 2006.

150 agronomic techniques such as: Anthony Trewavas, "Fertilizer: No-Till Farming Could Reduce Run-Off," *Nature* 427 (January 8, 2004): 99.

150 This dietary transformation: Vaclav Smil, *Feeding the World: A Challenge for the Twenty-First Century* (Boston, Mass.: MIT Press, 2000).

154 Conservation International concluded: E. O. Wilson, *Acting Now to Save the Earth*, School Matters Blog. <http://schoolsmatter.blogspot.com/2007/04/schools-wont-matter-unless.html>.

155 A Web-based Encyclopedia of Life: Wilson estimates that there are somewhere between 1.5 and 1.8 million cataloged species in the world, with perhaps ten to fifty times that number still waiting to be identified and studied. Wilson argues that we must make an organized push to expand our knowledge about those species, lest we allow them to be driven to extinction in our fulsome ignorance. The Encyclopedia of Life could have one expandable Web page per species, documenting all known aspects of the species: genomics, cladistics and evolution, behavior, range, abundance, ecological relations with other species, threats to survival, and so forth.

Chapter 7: Global Population Dynamics

159 "There doesn't seem to be": "How to Deal with a Falling Population" *The Economist* 284, no. 8539 (July 28, 2007): 11.

160 Simon Kuznets and Michael Kremer: Michael Kremer, "Population Growth and Technological Change: One Million B.C. to 1990," *The Quarterly Journal of Economics* 108, no. 3 (August 1993): 683-716; Simon Kuznets, "Population Change and Aggregate Output," *Demographic and Economic Change in Developed Countries* (Princeton, NJ: Princeton University Press, 1960): 324-40.

177 The standard tests have: Robert J. Barro and Xavier Sala-i-Martin, *Economic Growth*, 2nd edition (Cambridge, Mass.: MIT Press, 2004).

177 each country's average annual growth rate: Initial income is expected to have a negative effect: richer countries should grow less rapidly, and poor countries more rapidly, because of the phenomenon of convergence. Educational attainment is expected to have a positive effect on growth, as are the life expectancy and the rule of law.

177 negative effect of high fertility: Specifically, the logarithm of TFR has a linear negative effect on the income growth rate, with a coefficient of -0.012. Here is what this means. The natural logarithm of 6 is 1.79 and of 2 is 0.69. The difference is therefore 1.10, which when multiplied by 0.012 equals 0.013, or 1.3 percentage points (= 0.013 x 100) per year of faster income growth in the low-TFR country.

178 "That's not our business": Arthur M. Schlesinger, *A Thousand Days: John F. Kennedy in the White House* (Boston: Houghton Mifflin, 1965), p. 601.

180 As John C. Caldwell and coauthors: John C. Caldwell, James F. Phillips, and Barkat-e-Khuda, "The Future of Family Planning Programs," *Issues in Family Planning* 33, no. 1 (March 2002): 1-10.

Chapter 8: Completing the Demographic Transition

186 Correlation does not prove: To show lower mortality causes lower fertility see Jeffrey Sachs, Dalton Conley, and Gordon C. McCord, "Africa's Lagging Demographic Transition: Evidence from Exogenous Impacts of Malaria Ecology and Agricultural Technology," NBER Working Paper 12892, February 2007. Whether the effect of reducing the fertility is greater than the effect of the mortality reduction depends not only on reducing child mortality, but also on complementary actions regarding education, family planning, and broader economic development as described in the text.

187 Education of Girls: Of course, the education of boys matters greatly as well. Overall higher rates of education are associated with lower fertility, but the effect of increased female education appears to be much greater.

192 strongly pronatal: John C. Caldwell and Pat Caldwell, "The Cultural Context of High Fertility in Sub-Saharan Africa," *Population and Development Review* 13, no. 3 (September, 1987): 409-37; and John C. Caldwell and Pat Caldwell, "Africa: The New Family Planning Frontier," *Studies in Family Planning* 33, no. 1 (March 2002): 76-86.

192 thereby leading to an indirect: Jeffrey D. Sachs, Dalton Conley, and Gordon C. McCord, "Africa's Lagging Demographic Transition: Evidence from Exogenous Impacts of Malaria and Agricultural Technology," NBER Working Paper Series, no. 12892, February 2007.

194 importance of privacy for: Caldwell and Caldwell, "Africa."

194 seven requirements: *Ibid.*, p. 84.

198 The current Bush administration: BBC News, "China Attacks U.S. Baby Fund Cuts," July 23, 2002. <http://news.bbc.co.uk/1/low/americas/2146160.stm>.

198 In its 2008 budget request: Population Action International, "Bush's Budget Slashes International Family Planning," February 12, 2007. http://www.populationaction.org/press_room/viewpoint_and_statements/2007/02_12_budget.shtml.

198 Population Action International: Richard Cincotta, Robert Engelman, and Daniele Anastasion, *The Security Demographic: Population and Civil Conflict After the Cold War* (Population Action International, August 2003). http://www.populationaction.org/Publications/Reports/The_Security_Demographic/Summary.shtml.

199 "The results of my internal": Henrik Urdal, in Lael Brainard and Derek Chollet, eds., *Too Poor for Peace? Global Poverty, Conflict, and Security in the 21st Century* (Washington, D.C.: Brookings Institution Press, 2007), p. 96.

199 "A recent study": *Ibid.*, p. 92.

199 the youth cohort: United Nations Population Division, *World Population Prospects: 2006 Revision*, 2007.

Chapter 9: The Strategy of Economic Development

206 average income per person: Angus Maddison, *The World Economy: A Millennial Perspective*, (Paris: Development Centre of the Organization for Economic Cooperation and Development, 2001). These data are in constant 1990 PPP-adjusted dollars.

208 it must be a successful exporter: In market terms, the importer buys foreign exchange on the market using domestic currency, while the exporter sells foreign exchange in return for domestic currency. The exchange rate balances the supply and demand for foreign currency vis-à-vis domestic currency.

213 geography shapes economic costs: Let me also mention two frequently noted exceptions that prove the rule. Switzerland is rich despite being landlocked, and Singapore is rich despite being tropical. These cases are much less puzzling than they might seem. Landlockedness is particularly disadvantageous for developing-country regions, where the economy's ability to export to high-income markets is paramount, and trade must generally be carried out by sea. In those circumstances, development will come first to the coastal countries and only later to the interior regions. In the case of Switzerland, however, trade with rich countries can be carried out by land just across the borders with France, Italy, Germany, and Austria. The moral of the story is that