



NEWS

The Baby Deficit

As fertility rates decline across the developed world, governments are offering big incentives for childbearing. Experts don't expect them to have much effect

Last month, from the podium of the Kremlin's grandiose Marble Hall, Russian President Vladimir Putin expounded on subjects vital to his nation's future—economic growth, technological modernization, and world trade—then he turned to the “most important” matter. “What I want to talk about,” Putin said in his annual speech before the Federal Assembly, “is love, women, children. I want to talk about the family, about the most acute problem facing our country today—the demographic problem.” Reminding the deputies that Russia's 143-million-strong population was declining by almost 700,000 people each year, Putin proposed a fistful of incentives to boost the country's flagging birthrate. They include raising the childcare benefit of 700 rubles (\$26) per month to 1500 rubles for a first child and 3000 rubles for a second child, and paying 18 months of maternity leave equal to at least 40% of a mother's previous wages.

Putin is not the only politician talking about babies these days. Earlier this year, Poland's Parliament approved a one-time payment of 1000 zlotys (\$328) for each child born, and this month, German Chancellor Angela Merkel proposed a 1-year paid leave for women who have children. When Australia introduced its own generous “baby bonus” in 2004, the coun-

try's treasurer Peter Costello exhorted parents to have “one for Mum, one for Dad, and one for the country.” On 1 July, Australia's bonus will jump from \$2250 to \$3002 per child (in U.S. dollars) and will reach \$3762 by 2008. Meanwhile, pro-family inducements have been in place for many years in France, Sweden, and other European countries.

Political leaders and economists see plenty of justification for spending all this money. In

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the European Union (E.U.), for example, low birthrates have already begun to shrink the population, and demographers project that the E.U. will lose between 24 million and 40 million people during each coming decade unless fertility is markedly raised (*Science*, 28 March 2003, p. 1991). Population losses could bring a

raft of negative economic consequences in the industrialized world, as well as greater stresses on social security and health care systems as the proportion of older citizens increases. “The changes projected for the United States are not as dramatic as those projected for other areas—particularly Europe and Japan—but they nonetheless present substantial challenges,” then-Federal Reserve Board chair Alan Greenspan told a 2004 symposium on population aging in Jackson Hole, Wyoming.

Although these trends are most pronounced in the developed world, fertility declines are now also being detected even in less affluent areas of Latin America and Asia. Roughly half of the world's nations, with more than 40% of the human population, now have birthrates below replacement levels, and fertility rates are falling steadily in most developing countries as well. To be sure, demographers predict that the world's population will continue to increase for decades to come, rising from its current 6.5 billion to somewhere between 8 billion and 11 billion by 2050 (see sidebar, p. 1896). But nearly all of this increase will be in developing countries.

Population researchers nevertheless are currently engaged in a lively debate over just what, if anything, developed countries can do to increase family size. Some believe very low fertility rates are here to stay. “The popularity of baby-bonus schemes among governments is difficult to understand,” says Anne Gauthier, a sociologist at the University of Calgary in Canada. “While the additional financial support is bound to be welcomed by parents, the overall effect on fertility is likely to be small.”

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◀ **Doing her part.** Minister for Families Ursula von der Leyen (with her children) oversees Germany's effort to increase fertility rates.

Others argue that even modest boosts in the birthrate can make a difference. "We can only expect relatively small effects of policy on fertility, but relatively small effects are important when fertility is low," says demographer Peter McDonald of the Australian National University (ANU) in Canberra, whose advocacy of pro-family policies helped bring about Australia's baby bonus. Yet both sides agree that falling fertility rates might be irreversible once they drop below a certain level—what some demographers have begun to call the "low-fertility trap."

The demographic transition

Predicting population trends is a tricky business, fraught with assumptions about what humans are likely to do in the future. Most demographers rely on a complex parameter called the total fertility rate (TFR). For any particular country and year, the TFR is a hypothetical measure of the average number of children that nation's women would bear during their lifetimes if, at each stage of their lives, they behaved exactly like women in each age group did during that year. By comparing TFRs from one year to another, demographers can track fertility trends. Leaving aside the effects of immigration and emigration, if a population is to remain the same size, both parents must replace themselves. For industrialized countries, demographers define a replacement-level TFR as 2.1—slightly more than a flat rate, to account for the small fraction of children who die before reaching reproductive age.

Yet nearly all of the world's industrialized nations have TFRs well below this magic number. Russia's current TFR is only 1.28 (which ties it with Italy and Spain), Poland's is 1.25, Germany's is 1.39, and Australia's is 1.76, which helps explain the alarm expressed by political leaders in those countries. Even the E.U. nations with the highest birthrates, France and Ireland, are falling short of replacement, with TFRs of 1.84 and 1.86, respectively. Nor is the baby shortage restricted to Europe: South Korea's TFR is 1.27 and Japan's is 1.25. Only the United States, exceptional in the developed world, hits the replacement mark, with a TFR of 2.09.

Today's low TFRs are an unexpected consequence of a so-called demographic transition to lower fertility rates that began in Europe in about 1800 and is still taking place in much of the world. As advances in health and



Proud papa. Australian Treasurer Peter Costello fathered a baby-bonus scheme.

hygiene increased the likelihood of a child surviving to reproduce, both death and birthrates started to fall, especially in industrialized countries. Although TFRs remain high in some of the world's poorest countries—Niger has the highest TFR, 7.46—the demographic transition is either under way or completed in most nations. The process has taken place even in relatively poor countries such as Mexico, where TFR dropped from 6.5 to 2.5 between 1975 and 2005, and the Philippines, which saw a decline from 6.0 to 3.2 during the same period. However, demographers had assumed that the decline

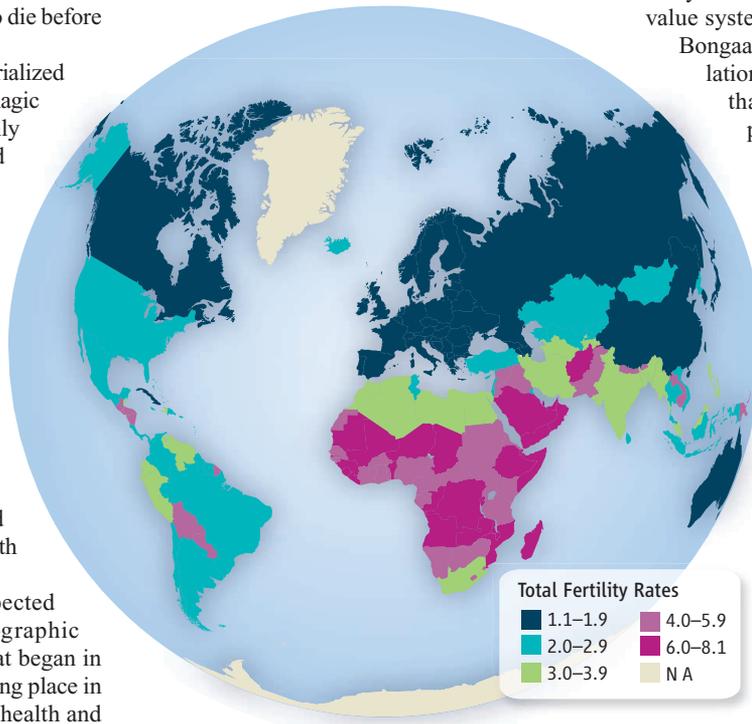
would stop when replacement-level TFRs were reached. "During the early 1970s, everyone talked about the magic floor of replacement," says David Reher, a population historian at the Complutense University of Madrid, Spain. "Nobody thought it would go below 2.1."

Yet by 1975, several European countries, as well as the United States and Canada, had already dipped below this floor. (Although the United States has now come back up to replacement level, Canada's TFR has continued to plummet and now stands at 1.61.) This trend, which many demographers and economists call the "second demographic transition," has its roots in the social changes that swept much of the Western world during the 1960s and 1970s.

As women entered the labor force in increasing numbers and obtained easier access to effective contraception and as conflicts between work and childbearing intensified, parents began to delay the timing of their first child, which inevitably led to a reduction in the total number of offspring. These shifts were accompanied by a constellation of new attitudes toward family, career, and personal autonomy that are not easily quantified, researchers say. "Human reproductive behavior is profoundly social," says Jennifer Johnson-Hanks, a demographer and anthropologist at the University of California, Berkeley. "It is structured by social categories, value systems, and power relations." John

Bongaarts, a demographer at the Population Council in New York City, adds that personal choice has come to play a much bigger role in reproductive decisions. In earlier days, Bongaarts says, "people tended to do what society expected of them. Over time, individual agency has become more important."

Social factors also explain the United States's anomalously high fertility rate, population experts say. Although relatively higher birthrates among some ethnic groups and more recently arrived immigrants, including Hispanics, explain part of the difference, the TFR for non-Hispanic whites is still about 1.85, equivalent to the highest rates seen in Europe. "There are several factors that make the TFR in the U.S. higher than



Life Cycles

in many European countries,” Bongaarts says, including a higher rate of unwanted pregnancies due to restrictions on birth-control information, a lower unemployment rate, and a greater tendency for women to have children earlier in life than in Europe. Gauthier adds that a stronger emphasis on religion and “traditional values” in the United States also tends to favor larger families.

Aged and dependent

The key reason that economists and other experts are worried about low fertility rates is that they accelerate an overall “aging” of a population, in which the proportion of elderly adults relative to the active labor force increases. The consequences of an increase in this so-called dependency ratio are hard to predict, says demographer James Trussell of Princeton University. “The economic burden of the elderly will depend on their health, on employment opportunities, and on the social institutions that support their care,” Trussell says. “But it is clear that it will be a challenge.” One way that many developed countries meet the challenge now is through immigration, which tends to increase the number of younger workers. Yet few demographers see immigration as the answer.

“As a short-term solution, it is necessary, and it is happening,” says Reher. “But there are very serious doubts about whether it is a long-term solution. Migrant fertility starts higher than that of the native population but very quickly descends towards local fertility levels.” Trussell agrees: “To have an appreciable effect on the aging of a population, you would need massive immigration, which is not politically acceptable in either Europe or the U.S.”

That leaves raising birthrates as the only solution, assuming that a solution to low fertility rates is possible—and desired. Some demographers take heart in an apparent gap between how many children parents would ideally like to have if they felt they could manage it and how many they actually do have. In this gap, some see wiggle room for fertility-enhancing policies. Thus, public-opinion surveys carried out by the E.U. as part of its Eurobarometer program have suggested that this gap amounts to an average of about 0.5 children per woman. Indeed, baby bonuses and other pro-family measures are in part designed to make it easier financially for families to fulfill this ideal. But Gauthier questions whether the gap is actually that large. In a study in press at the journal *Population Research and Policy Review*, she concludes that the “window of opportunity” for family policies might actually be as little as 0.1 to 0.2 children per woman.

Gauthier and other researchers agree nevertheless that pro-family policies have had some positive effect on fertility rates in countries such as France, whose TFR of 1.84 is the second high-

The Bomb That Wasn't

When Stanford University entomologist Paul Ehrlich published *The Population Bomb* in 1968, the world's human population was about 3.5 billion. Today, it is approximately 6.5 billion. Yet the worst of Ehrlich's widely publicized predictions, including the starvation of hundreds of millions of people in mass famines, have not come true. Still, the world's population is expected to continue to grow until at least 2050, according to estimates by the United Nations Population Division (esa.un.org/unpp). Just how much it will increase depends on future fertility, which is very difficult to predict. U.N. population experts have examined three hypothetical fertility trends, which they term medium, low, and high. Under the medium scenario, population would reach 9.1 billion by 2050, but the low and high scenarios project as few as 7.6 billion people and as many as 10.6 billion.

Nearly all of this growth will be in developing countries, with major contributions from nations such as India, Pakistan, Nigeria, Bangladesh, and China. (Even the United States, with its relatively youthful population, will add significant numbers.) Fueled by very high fertility rates, between now and 2050, population is expected to at least triple in some nations, such as Afghanistan, Burundi, Chad, Democratic Republic of Congo, Mali, and Uganda—despite high HIV infection rates in many African countries. Yet over the long term, fertility is expected to drop dramatically in even the poorest countries, from an average of five children per woman now to about 2.6 in 2050; and under the U.N.'s medium scenario, average worldwide fertility will decline to 2.05 by 2050, and to just over 1.5 in the low scenario, well below the replacement level.

“Virtually all countries are headed towards replacement-level fertility or below,” says Ronald Lee, a demographer at the University of California, Berkeley. “But there may be pauses and reversals along the way, sometimes lasting decades.” If so, the population bomb may ultimately fizzle out—that is, assuming an already stressed planet can survive the onslaught of 9 billion human beings.

—M.B.

est in the E.U. after Ireland. “There are no fewer than 38 measures in favor of families with children,” says demographer Laurent Toulemon of the National Institute of Demographic Studies in Paris. For example, mothers receive 16 weeks of maternity leave at more than 80% of their normal pay, which is extended to 26 weeks beginning with a third child. Parents also receive numerous direct allowances to help provide for young children, and the number of publicly



Allons les enfants! France guarantees nursery school spots to nearly all children.

funded nursery schools has expanded in recent years to the extent that nearly every child is guaranteed a place. In fact, there are so many pro-family policies, says Toulemon, “that it is almost impossible to evaluate the impact of each one” on fertility.

Despite these generous allotments, however, France's relatively high fertility rate in European terms is still below replacement. The same is true of Sweden, where government officials credit bountiful policies designed to make life easier for working parents with recent gains in TFR from about 1.6 to 1.8. Yet Gigi Santow, formerly of Stockholm University and now an independent demographer in Sydney, Australia, says that this fertility jump was not due to baby bonuses or other direct attempts to create a baby boom. “Swedish fertility rates may well have responded to the government's integrated web of cradle-to-grave social policies,” Santow says. She adds that fertility plummeted during the economic recession that hit Sweden during the 1990s, despite the policies then in place.

Proving that financial incentives can actually raise fertility rates is very difficult—and demographers do not always agree. “We cannot carry out an experiment,” says Gauthier. “We can only look historically at what has happened and rely on cross-national differences in policies.” Earlier this month, for example, Australia's news media were abuzz with reports of the latest birth figures from the Australian Bureau of Statistics, show-

CREDIT: CHARLES JEAN MARC/CORBIS SYGMA

ing that 261,404 babies were born in 2005, 2.4% more than the previous year and the highest number since 1992. Treasurer Costello was quick to credit the baby bonus: The daily newspaper *The Australian* quoted Costello as “delighted that at least some families have been taking up the challenge.”

ANU’s McDonald says that although it is too early to carry out “rigorous research” on the reasons for the increase, most of the additional births are to women in the middle to late part of their childbearing years. This suggests that the message may have been heard: “If you want to have children, it is risky to delay too long,” McDonald says. And although McDonald concedes that “most of the 261,000 women who gave birth in 2005 would have had the baby without” the baby bonus, the extra money “can make a difference” to middle income families who make “close calculations” about the impact of parenting. McDonald estimates that Australia’s TFR for 2005, when published in November, should rise from about 1.76 to 1.82.

But Robert Birrell, director of the Center for Population and Urban Research at Monash University in Clayton, Australia, says that a number of other factors may have weighed much more heavily, especially “the impact of the current economic boom in Australia, which has seen an increase in the rate of employment for men and particularly women in recent years.” Santow agrees: “I would not leap immediately to the conclusion that Peter Costello should be given the credit.”

Low-fertility spiral

The uncertain response to incentives suggests to some demographers that governments need to do even more to make child rearing attractive. “Many things that we’ve tried aren’t big enough,” says Bongaarts. “To move behavior, you need real incentives; you need thousands of dollars. ... You have to pull all the levers you have, and maybe you will get halfway there.” But pulling those levers might end up being too costly, Trussell says. “Policies that would work would be so expensive that they will never be implemented.”

And some researchers have begun to think that it might actually be too late to reverse the trend in countries with the lowest fertility levels. At several recent population meetings, for example, McDonald has warned that once a nation’s TFR falls below 1.5, a downward demographic spiral sets in that makes it much more difficult to recover. “This is the safety zone,” McDonald says. “Countries should try hard to avoid falling below it.”

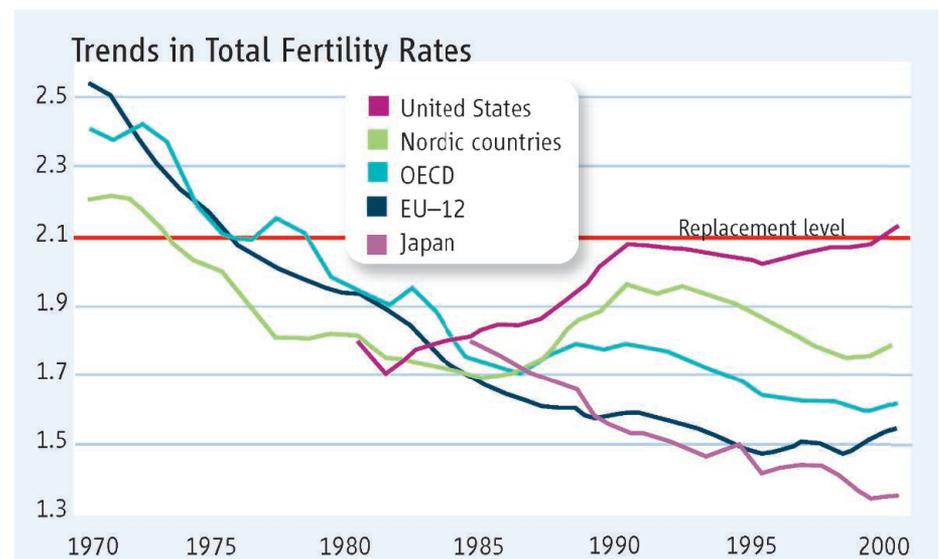
A team led by Wolfgang Lutz, a demographer at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, has taken McDonald’s observation further and

argued that countries with a TFR of 1.5 or lower may have crossed into permanent negative population growth. Lutz calls this hypothesis, which he presented most recently at this spring’s annual meeting of the Population Association of America in Los Angeles, California, the “low-fertility trap.” Lutz and other colleagues at IIASA and the Vienna Institute of Demography argue that the new social norms created by low fertility rates create a self-reinforcing negative feedback loop. It is locked in place by a reduction in ideal family size, aging of the population, and other effects on the labor market that make having fewer and fewer children inevitable. As evidence, Lutz and his colleagues cite data from the Eurobarometer survey showing that in Germany and Austria—nations with TFRs of 1.39 and 1.36, respectively—young adults now consider their ideal family sizes to be as low as 1.7 children on average.

“Germany is the extreme example of this phenomenon, with around 30% of young people not intending to have children,” says McDonald.

Reher argued that low fertility rates were now entrenched in the social structure of developed countries and a growing number of developing countries as well. Although the momentum of past high fertility rates would continue to fuel an increase in the entire world’s population for some decades to come, this would eventually stop. Rather, Reher maintained, much of the world is now on the cusp of a prolonged period of population decline. The resulting population aging would lead to labor shortages even in developing countries. The result could be an economic disaster, Reher warned. “Urban areas in regions like Europe could well be filled with empty buildings and crumbling infrastructures as population and tax revenues decline,” he prognosticated, adding that “it is not difficult to imagine enclaves of rich, fiercely guarded pockets of well-being surrounded by large areas which look more like what we might see in some science-fiction movies.”

Most population researchers agree that there is plenty to worry about in current world-



On the other hand, McDonald does not agree that there is no turning back for countries whose TFRs fall this low: “This does make Germany a tougher nut to crack, but I would never declare the game to be over.”

Yet Reher sees little reason for optimism. “When fertility is drastically below replacement, it doesn’t go up, no matter how many policies and how much money is thrown at it,” he says. “We are in the midst of a cascading fertility decline. Even a TFR of 1.7 is not safe; it is a disaster if you look a couple of generations down the line.”

Indeed, Reher, at the July 2005 annual meeting of the International Union for the Scientific Study of Population in Tours, France, presented a paper suggesting an even more dismal picture.

wide demographic trends. Yet few are ready to accept the direst parts of Reher’s doomsday scenario—at least not yet. “I wouldn’t be surprised” if population shrinkage “happens in a lot of places in the world,” says Gauthier, although she adds that “it is much harder to believe in Africa,” where the population is expected to at least double by 2050. And Santow comments that although Reher’s predictions “may well be sensible,” she sees “nothing terrifying about a drop in the size of Europe’s population. Any decline will take time, and economies will adjust. Governments should not expend energy to maintain the status quo. Governments should plan for the future, not try to reintroduce the past.”

—MICHAEL BALTER