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The Effect of New Drugs on Longevity

Life expectancy around the world has increased dramatically over the past fifty years, from an average of 46.5 years for a child born in 1950-1955 to an average of 65.0 years for a child born in 1995-2000. The gap in life expectancy between rich and poor countries has been halved, from 25 to 12 years. Over the same period, health care spending has risen substantially. However, it has historically been difficult to quantify the relationship between health care spending and longevity improvements. In fact, many health researchers have hypothesized that these longevity increases are primarily due to other factors such as changes in income, education, lifestyle, and the environment.

In **The Impact of New Drug Launches on Longevity: Evidence from Longitudinal, Disease-Level Data from 52 Countries, 1982-2001** (NBER Working Paper 9754), **Frank Lichtenberg** assesses the contribution of one indicator of changes in health care — the introduction of new drugs — to longevity improvements around the world over the past twenty years. New drug launches are of particular interest because they account for a substantial fraction of medical innovations.

Using data from the IMS Health Drug Launches database and the World Health Organization Mortality database, the author constructs a data set with the number of new drugs launched since 1982 and the fraction of deaths occurring after age 65 for each major disease category, country, and year. By having data at the disease-country-year level, the author is able to account for the effect of unobservable factors such as environmental quality on longevity (as long as these factors have the same effect on all diseases in a given country and year, or in all countries for a given disease and year, or in all years for a given disease and country).

The author first explores the effect of launches of new chemical entities (NCEs) — drugs whose key ingredient has not previously been available in the country. He finds that increases in the stock of NCEs available to treat illnesses in a particular disease category are associated with increases in the fraction of deaths in that disease category that occur after age 65. When the stock of drugs is measured with a lag of 3-6 years, the effect is more than twice as large, suggesting that it may take several years for a new drug to have its full impact on survival rates, due to the gradual diffusion of new drugs to consumers.

The author then incorporates the number of non-NCE launches since 1982 into his model. He finds that, conditional on the number of NCE launches, an increase in the number of non-NCE launches has no effect on the fraction of deaths occurring after age 65.

The author uses these results to draw several important conclusions about new drug launches. First, he finds that differences in the prevalence of NCE launches can explain only a small fraction of the differences in life expectancy across countries in his sample. For example, only 0.5 years of the 5.7-year gap in life expectancy between Italy and Malaysia, the countries with the highest and lowest number of launches, can be attributed to differences in NCE launches over the period. However, his sample does not include African countries, where the number of NCE launches may be much lower than it is in Malaysia.

By contrast, he estimates that NCE launches can explain a signifi-

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A program report of the Aging Program will be available in the forthcoming issue of the NBER Summer *Reporter* which can be accessed on the NBER website at: http://www.nber.org/reporter/

cant fraction of the increase in longevity over time. He credits NCE launches with increasing life expectancy by 0.8 years over the 1986-2000 period — almost three weeks per year — for the 52 sample countries as a whole, or 40 percent of the total increase in life expectancy over the period. This suggests that launch delays can reduce longevity.

Finally, the author uses his results to calculate an upper-bound estimate of the cost per life-year gained from the launch of NCEs — $4500 — which is far lower than most estimates of the value of a life-year. Taken together, these findings suggest that new drug launches can yield substantial longevity gains and that spending on new drugs may be a cost-effective way to achieve such gains.

This research was supported by the following companies: Aventis, Johnson & Johnson, Novartis, Pfizer, and Pharmacia. It was summarized by Courtney Coile.

Health Insurance Subsidies, Coverage, and Costs

One of the most serious challenges facing the U.S. health care system is the problem of the uninsured. Forty-one million Americans, or nearly 15 percent of the non-elderly population, currently lack health insurance coverage. This lack of coverage has real consequences in terms of both access to care and health outcomes. A recent report by the Kaiser Family Foundation found that "the uninsured receive less preventative care, are diagnosed at more advanced disease stages, and once diagnosed, tend to receive less therapeutic care and have higher mortality rates."

One frequently proposed remedy is to subsidize the premiums that employees are charged for employer-provided health insurance. Roughly one-quarter of the uninsured have access to insurance through their own job or that of a family member but decline to take it up; in fact, most of the decline in insurance coverage over the past two decades results from decreases in the rate of take-up by employees. If these individuals are price-sensitive in their take-up decisions, offering premium subsidies may encourage them to enroll in employer-provided plans, decreasing the number of uninsured.

However, premium subsidies may be costly. As a practical matter, it is difficult to offer subsidies solely to uninsured workers. But, among those who are offered insurance, only about 7 percent are uninsured. So it is very costly to provide subsidies to all workers in an effort to increase coverage among that small share that is uninsured. Moreover, subsidies may encourage insured employees to choose more expensive plans by shielding them from the full cost of upgrading.

In **Subsidies to Employee Health Insurance Premiums and the Health Insurance Market** (NBER Working Paper 9567), **Jonathan Gruber** and **Ebonya Washington** estimate the effect of premium subsidies on the take-up and costs of employer-provided health insurance. The appeal of premium subsidies as a partial solution to the problem of the uninsured will depend on the magnitude of these behavioral responses.

Previous research on the topic has used differences in premiums across firms to examine the link between premiums and take-up. But estimates based on such differences are suspect. If, for example, workers who like insurance lobby their firms for a low employee premium share, then the observed relationship between premiums and take-up will overstate the true effect of premiums on take-up.

The authors exploit a major rule change for the Federal Employees Health Benefit Plan, which allowed postal employees to pay premiums on a pre-tax basis starting in 1994 and all other federal employees to do so starting in 2000. This rule change lowered employees' premiums substantially — for example, a middle income family could see their employee premiums fall by 45 percent. Moreover, the sequential timing of the change created large differences in premiums paid by federal workers depending on the year and whether they were postal employees. As these differences are likely to be unrelated to worker preferences for insurance, they provide a compelling means to estimate the true effect of premium changes.

The authors construct a unique data set of personnel records for federal employees for the years 1991-2002 using information obtained from the Postal Service and the Federal Office of Personnel Management through a Freedom of Information Act request. They also calculate the employee share of insurance premiums, accounting for whether premiums are paid on a pre-tax or post-tax basis.

The authors find that a decrease in the employee share of premiums is associated with a increase in take-up of family coverage, though the effect is modest — a 10 percent decrease in the employee share increases take-up by only about 0.2 percent. A decrease in the employee share of premiums is associated with a decrease in the take-up of individual coverage, which the authors suggest may occur because people switch from individual to family coverage as the subsidy rises.

Next, the authors explore the relationship between premiums and the cost of plans chosen by employees, and find that a decrease in employee premiums is associated with a increase in costs. On average, the selection of more expensive plans represents only 2.5 percent of

the premium decrease, though the employer's additional costs are two to three times as large.

Finally, the authors use their results to simulate the cost of the 2000 rule change for non-postal employees, which they estimate to be between $31,000 and $83,000 per newly insured worker. Although a more targeted subsidy program would be somewhat less expensive, the authors conclude that offering premium subsidies is unlikely to be a cost-effective approach to address the problem of the uninsured.

This research was supported by the Economic Research Initiative on the Uninsured at the University of Michigan and by the Commonwealth Fund. It was summarized by Courtney Coile.

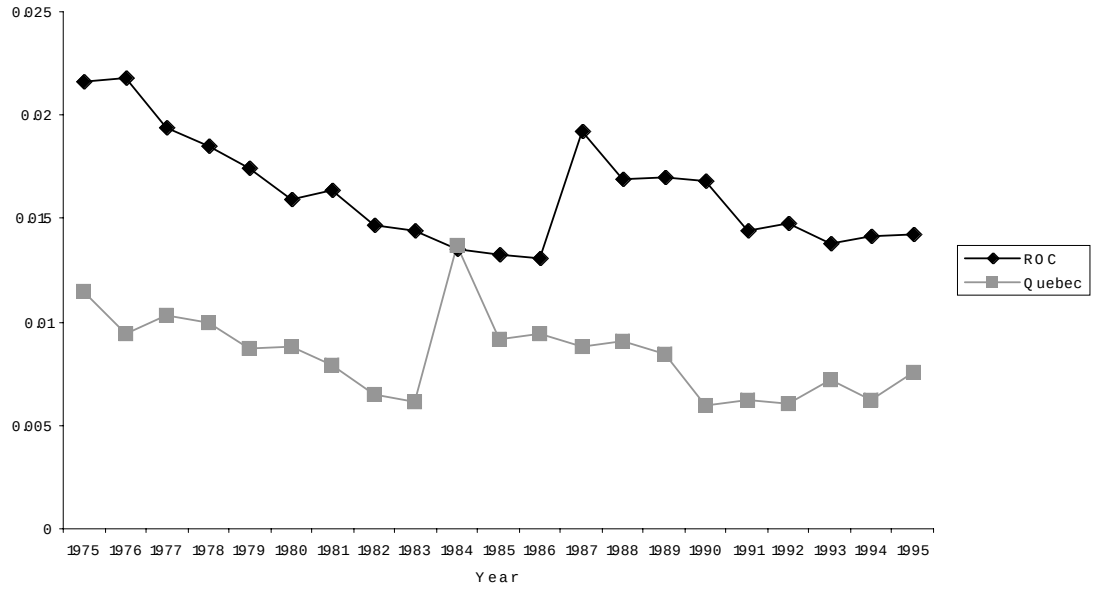
Marriage Penalties in Social Security Programs

Marriage penalties in tax and social insurance systems have been the source of much controversy in the United States; in fact, recent reforms to these systems have been designed in part to reduce them. A marriage penalty exists if two individuals pay higher taxes or receive lower benefits as a married couple than they would if unmarried. Economic theory suggests that by raising the cost of being married, marriage penalties may lead to lower marriage rates. Critics allege that by discouraging marriage, the penalties violate basic principles of equity and efficiency, undermine family values, and negatively affect child outcomes.

Past research has found that marriage penalties have only a very modest effect on marriage rates. However, this relationship is inherently difficult to study because the size of the marriage penalty is usually determined by factors such as family income that may have their own effect on marriage rates. For example, if high-income couples have both larger penalties and higher marriage rates, this may reflect that these couples have a higher underlying propensity to marry, rather than that marriage penalties encourage marriage.

In **The Married Widow: Marriage Penalties Matter!** (NBER Working Paper 9782), **Michael Baker**, **Emily Hanna**, and **Jasmin Kantarevic** exploit a change in the Canadian social security system to revisit the effect of marriage penalties on marriage decisions. The reform allowed surviving spouses of deceased workers to keep their survivor benefits upon remarriage starting in 1984 in Quebec and in 1987 in the rest of Canada. The marriage penalties eliminated by this reform were substantial — prior to the reform, a typical widow aged 45-59 in Quebec would lose $500 (2001 Canadian dollars) a month by remarrying.

Figure 1: Remarriage Rates of Widows in Quebec and the Rest of Canada, 1975-95: Females Aged 45-59.



The data for the analysis comes from a vital statistics marriage file maintained by Statistics Canada and covers the years 1975-1995. The authors' empirical strategy is to look at the change in the remarriage rates of widowed males and females in the affected provinces in the post-reform vs. pre-reform period, using the change in remarriage rates in unaffected provinces over the same period to account for any general time trends.

Figure 1 illustrates this approach for widows aged 45-59. There is a downward trend in remarriage rates in all provinces over the period. In 1984, the remarriage rate jumps up sharply in Quebec while continuing its slow decline in the other provinces; in 1987, this is reversed, with a sharp increase in the remar-

riage rate for the rest of Canada but no change in Quebec. In both cases, there is a large spike in the year of reform and a permanently higher level, suggesting that there was a stock of widows waiting to remarry but also that the reform had long-term effects on marriage activity. Results are similar for men of this age and for younger women, though less conclusive for younger men and older people. The authors estimate that for women under 65, removing the marriage penalty caused remarriage rates to increase by 24 percent to 100 percent.

Finally, the authors find some evidence that wealthier and more educated persons responded more to these reforms. They suggest that this is consistent with the theory that high-income people receive greater benefits from marriage because the laws covering the treatment of income and assets are most applicable to them. The authors conclude that marriage penalties do have a significant effect on marriage decisions.

This research was funded by Social Sciences and Humanities Research Council and was summarized by Courtney Coile.

NBER Profile: *Anne Case*

Anne C. Case is a Research Associate in the NBER's Programs on Public Economics, Children, Aging, and Education. She has been affiliated with the NBER since 1989.

Case is also a Professor of Economics and Public Affairs at the Woodrow Wilson School and the Economics Department, Princeton University. She directs Princeton's Research Program in Development Studies and is a Faculty Associate of their Office of Population Research and their Center for Health and Well-being.

Case received her Masters in Public Affairs from the Woodrow Wilson School and her Ph.D. from Princeton. She taught in the Economics Department at Harvard University before joining the Princeton faculty.

Case's research interests are in development, health, public finance, and intra-household resource allocation. She is currently researching the two-way links between income and health, both in the US and in South Africa, where she is collecting panel data with which to study these issues at several sites.

Case is married to another NBER Research Associate and Professor of Economics, Angus Deaton. When they are not working, they enjoy going to the opera, traveling and watching the Yankees win.

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