to improve on existing device performance while maintaining acceptable economic value. This information could then inform postmarketing surveillance efforts, triggering reviews at prespecified efficacy or complication thresholds and facilitating rapid application of new data as they become available. Manufacturers could use such data to improve device development; researchers could identify target populations for evaluating novel technologies; insurers could identify opportunities for value-based reimbursement; and consumers could be educated about what clinical benefits they are getting for their money. The complex trade-offs between short- and long-term health and economic consequences of technological innovation may not be captured by even the most sophisticated randomized trials. Model-based approaches may provide invaluable insights for evaluating medical device innovation and merit consideration as a standard component of the evaluation process.

Disclosure forms provided by the authors are available with the full text of this article at NEJM.org.

From Yale School of Medicine (L.G.S.) and Yale School of Public Health (A.D.P.) — both in New Haven, CT; the Veterans Affairs Connecticut Healthcare System, West Haven, CT (L.G.S.); and Brigham and Women's Hospital (B.N.R., D.H.S., I.G., H.G., J.N.K., E.L.), Harvard Medical School (D.H.S., E.L.), Harvard School of Public Health (J.N.K.), and Boston University School of Public Health (E.L.) — all in Boston.

1. O'Keeffe K. The rise of Medtech. Medical Device and Diagnostic Industry, June 10, 2011. (http://www.mddionline.com/article/rise-medtech.)
2. Lawrence RC, Felson DT, Helmick CG, et al. Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: part II. Arthritis Rheum 2008; 58:26-35.
3. Paxton EW, Namba RS, Maletis GB, et al. A prospective study of 80,000 total joint and 5000 anterior cruciate ligament reconstruction procedures in a community-based registry in the United States. J Bone Joint Surg Am 2010;92:Suppl 2:117-32.
4. Institute of Medicine. Medical devices and the public's health: the FDA 510(k) clearance process at 35 years. Washington, DC: National Academies Press, 2011. (http://www.iom.edu/Reports/2011/Medical-Devices-and-the-Publics-Health-The-FDA-510k-Clearance-Process-at-35-Years.aspx.)
5. Losina E, Walensky RP, Reichmann WM, et al. Impact of obesity and knee osteoarthritis on morbidity and mortality in older Americans. Ann Intern Med 2011;154:217-26.

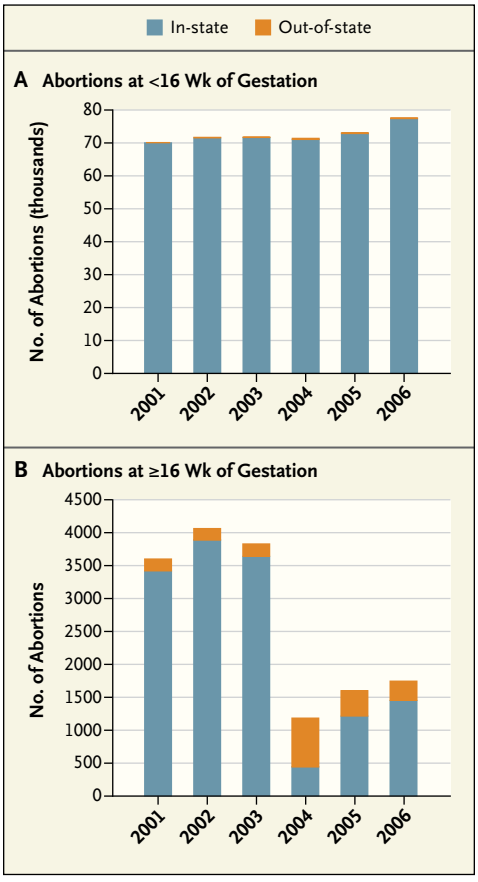
The Supply-Side Economics of Abortion

Theodore Joyce, Ph.D.

Under legislation recently signed by Kansas's governor, the Kansas Department of Health and Environment has issued new licensing standards for abortion clinics. The regulations stipulate, among other requirements, that facilities must have procedure rooms of at least 150 ft^2; each procedure room must have janitorial space of at least 50 ft^2; facilities must have designated dressing rooms for patients and separate ones for staff; and each dressing room must have a toilet, a washing station, and storage for clothing.[1] Two physicians who provide abortions in their office-based practice filed suit, stating that the requirements were unnecessary to ensure patient safety and would force them to stop providing abortion services. On July 1, 2011, a federal judge issued a temporary injunction allowing all three providers in Kansas to continue operating for the time being.

Such licensing requirements reflect an aggressive new thrust on the part of abortion opponents. Early approaches to restricting abortion access were directed largely at patients — the demand side of the market. For instance, laws requiring parental involvement in a minor's decision to abort, limiting Medicaid funding of abortion, mandating the provision of information including unfounded claims about risks, and requiring a 24-hour waiting period between receipt of mandated information and an abortion are all efforts to discourage women from terminating their pregnancies. Although these demand-side policies have had relatively little impact on national abortion rates, they have prevented some women from terminating an unwanted pregnancy. Not surprisingly, the women most affected are those without the support and resources to circumvent or comply with these requirements.[2]

Perhaps frustrated by many women's determination to overcome demand-side hurdles, abortion opponents have turned to supply-side restrictions, focusing on providers of abortion services. This strategy is likely to be more effective. In 2004, 12 states had fewer than five non-hospital-based abortion providers and 7 states had one or no provider that performed at least 400 abortions per year. Larger clinics are the mainstay of the service: 94% of all U.S. abortions are performed in



Number of Abortions Performed in Residents of Texas, before and after 16 Weeks of Gestation, in and outside Texas, 2001–2006.

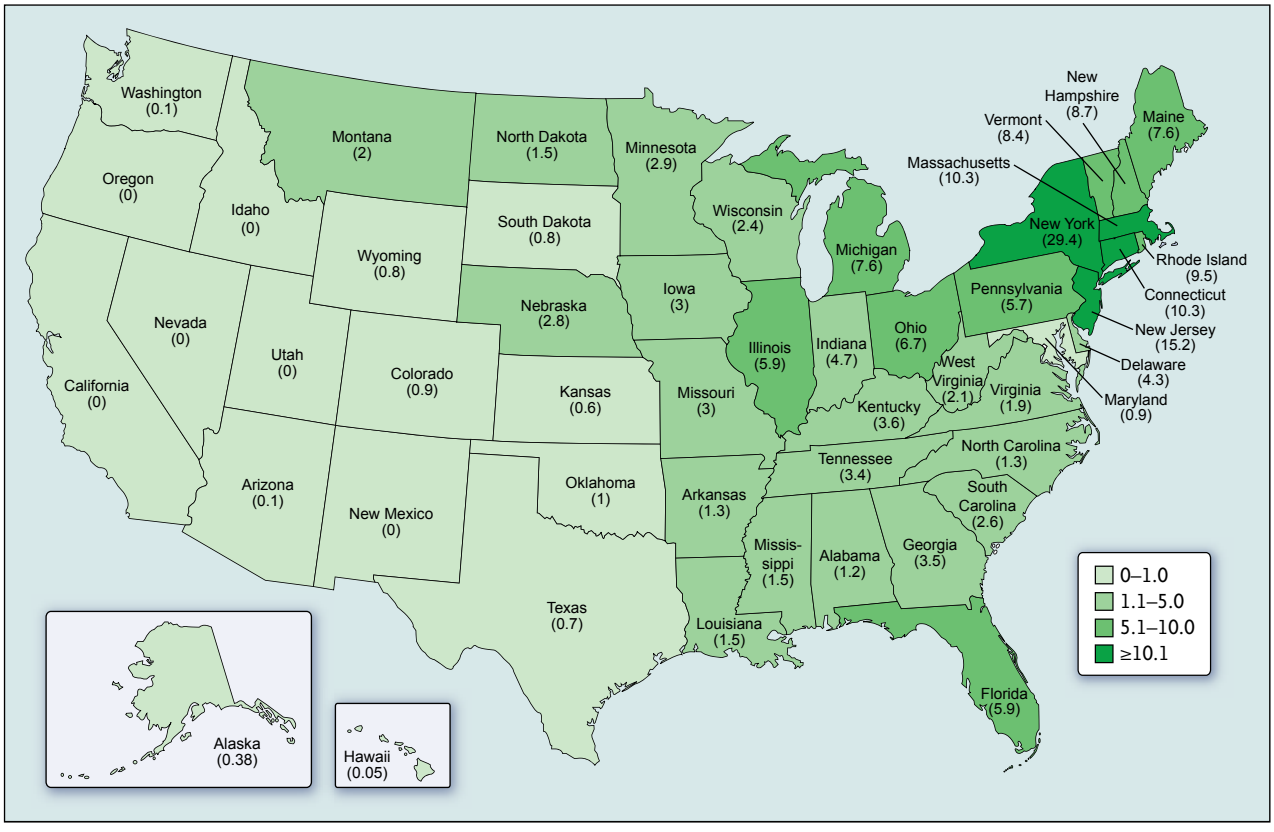
Data are from Colman and Joyce.[4]

clinics that do 400 or more abortions per year.[3] In Kansas, where more than 10,000 abortions were performed in 2008, the law may reduce the number of providers from three to one.[3] Many Kansas residents would seek abortion services in other states. But the cost of traveling elsewhere for an abortion can be substantial, and travel distance can make compliance with another state's mandatory counseling and waiting periods, or its judicial bypass procedure, more difficult.

Texas's Woman's Right to Know Act provides a natural experiment that permits comparison of the effects of demand-side and supply-side policies. The law, which went into effect in January 2004, has two components. The demand-side element requires that the patient receive information similar to that mandated in other states at least 24 hours before an abortion is performed. The supply-side component requires that all abortions at or after 16 weeks of gestation be performed in a hospital or an ambulatory surgical center. Ambulatory surgical centers must adhere to more demanding staffing, reporting, and facility-structure requirements than free-standing abortion clinics must meet. When the law went into effect, none of Texas's non–hospital-based abortion providers qualified as ambulatory surgical centers, so the average distance to the nearest non–hospital-based abortion provider offering terminations at or after 16 weeks of gestation rose from 33 miles in 2003 to 252 miles in 2004. Hospitals were not a viable alternative, since Texas hospitals perform relatively few abortions.[4]

If Texas's demand-side policies had an impact, there would have been a decrease in abortions at all gestational stages. If only the supply-side policy restricted access, the decrease would be limited to abortions performed at or after 16 weeks. I found that the supply-side policy had dramatic effects, whereas the demand-side policy had none. The number of abortions performed in Texas at or after 16 weeks of gestation dropped by 88%, from 3642 in 2003 to 446 in 2004, while the number of residents who left the state for a late abortion almost quadrupled, from 187 in 2003 to 736 in 2004. Despite this large outflow, there were 2460 fewer abortions at 16 weeks or later in Texas residents 1 year after the law took effect, a 68% decline. By 2006, Austin, Dallas, Houston, and San Antonio had ambulatory surgical centers in which abortions were performed at or after 16 weeks of gestation, but the number of such abortions remained well below the 2003 level.[4] Over the same period there was no meaningful change in the number of abortions before 16 weeks of gestation (see graph). The demand-side policies had no measurable impact.

Even more restrictive supply-side requirements have been enacted in other states. A 2007 Missouri statute mandates that any abortion facility in which five or more first-trimester abortions per month or at least one abortion after 12 weeks of gestation are performed must meet the requirements of an ambulatory surgical center. A state judge issued a temporary restraining order against implementing the statute, largely because of its economic impact.[5] Virginia enacted a similar statute in March 2011. Any abortion facility in which five or more first-trimester abortions per month are performed will be considered a hospital for purposes of the legislation. New regulations from the Virginia Department of Health are scheduled to go into effect on January 1, 2012, after the expected approval of the governor. A new Arizona law requires that only physicians perform medical (as well as surgical) abortions. As a result, Planned Parenthood of Arizona stopped providing abortion services in three clinics, since only nurse practitioners had been available to dispense medication for nonsurgical abortions.



Rate of Abortions (per 1000 Women 15 to 44 Years of Age) Performed in New York in Residents of Each State, 1971–1972.
Rates were calculated by the author on the basis of data from the New York State Department of Health.

If policies rendering freestanding abortion clinics economically unviable are allowed to stand, a map of U.S. abortion services will probably resemble the blue-state–red-state configuration after the 2004 presidential election. Services will be readily available in coastal blue states, whereas women in the country's vast middle will have to travel large distances for access. To illustrate the importance of travel distance as a determinant of whether a woman obtains an abortion, consider abortion rates just before *Roe v. Wade.* In 1971–1972, abortion was effectively legal in five states: Alaska, California, Hawaii, New York, and Washington. In 1971–1972, there were 27,793 abortions performed in New York in residents of Illinois, an annual rate of 5.8 abortions per 1000 female Illinois residents 15 to 44 years of age (see map) — but the rate of abortions performed in New York in Connecticut residents was almost twice as high, 10.3 per 1000, and the rate among New Jersey residents was more than 2.5 times as high, 15.2 per 1000.

There were also important differences according to race. The rate of abortions performed in New York in non-white Illinois residents was lower than that among whites (4.5 vs. 6.0 per 1000). The opposite was true for Connecticut and New Jersey. The abortion rate among nonwhite women was 15.8 per 1000 for Connecticut and 23.0 per 1000 for New Jersey, as compared with 9.6 and 13.6 per 1000, respectively, among white residents of those states.

The pre-*Roe* data illustrate that the farther women must travel for an abortion, the lower the abortion rate will be, and that travel distance is a greater obstacle for less-advantaged women. Thus, if a "blue state–red state" distribution of abortion services evolves, the pre-*Roe* racial and socioeconomic patterns will probably reemerge. Women with resources will travel substantial distances for an abortion, whereas less-advantaged women will travel less.

History suggests that there will always be abortions. The goal should be to reduce the abortion rate by reducing unintended pregnancies, while providing safe, legal services for women who need

them. Making access to abortion unnecessarily costly will probably result in clandestine abortions and unintended childbearing among families with the least resources and the fewest options.

Disclosure forms provided by the author are available with the full text of this article at NEJM.org.

From Baruch College and Graduate Center, City University of New York, and the National Bureau of Economic Research — both in New York.

1. Hodes & Nauser, MDs, P.a. v. Moser, No. 11-CV-2365 (D. Kan. filed June 28, 2011).
2. Joyce T, Kaestner R, Colman S. Change in abortions and births and the Texas parental notification law. N Engl J Med 2006;354:1031-8.
3. Jones RK, Kooistra K. Abortion iIncidence and access to services in the United States, 2008. Perspect Sex Reprod Health 2011;43:41-50.
4. Colman S, Joyce T. Regulating abortion: impact on patients and providers in Texas. J Policy Anal Manage 2011;30:775-97.
5. Planned Parenthood of Kansas and Mid-Missouri, Inc. v. Drummond, Case No. 07-4164-CV-CODS (W.D. MI. August 27, 2007).