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Effects of State Cervical Cancer Insurance Mandates on Pap Test Rates

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ABSTRACT

Cervical cancer is one of the most preventable, treatable, and survivable cancers, and nearly all adult women are recommended to have had a Pap test (the standard screening for cervical cancer). We provide the first evidence on the effects of 24 state mandates adopted from 1988 to 2000 that require insurance plans to cover Pap tests. In standard difference-in-differences models using data on 600,000 women age 19-64 from the CDC's Behavioral Risk Factor Surveillance System, we find that these mandates significantly reduced the share of never-screened women by 16 percent. These effects are plausibly concentrated among insured women and are not observed for other women's health outcomes (e.g., mammograms). Effects are particularly large, positive, and robust for Hispanic women. Our results suggest that mandating more generous insurance coverage for even cheap, routine services with already high utilization rates can significantly further increase utilization.

JEL classification: I1, J8, K32

Keywords: insurance mandates, cervical cancer screenings, Pap tests, quasi-experiment

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1. Introduction

Cervical cancer is the fifth most deadly cancer worldwide. Early detection through regular Papanicolaou ('Pap') tests is commonly understood in the medical community to be the most important determinant of survival. The Papanicolaou test (henceforth "Pap test", sometimes also called "Pap smear", "cervical smear", or "cervical test") is the standard method for detecting early cancer of the cervix. In a Pap test, a tool is used to gather cells from the outer opening of the cervix. These cells are examined under a microscope for abnormalities, particularly for pre-cancerous changes usually caused by the human papillomaviruses which are sexually transmitted. If the test is abnormal, colposcopy (a cervical examination using a microscope) or a biopsy can follow. Pap tests are generally given as part of a comprehensive pelvic examination performed by a woman's obstetrician/gynecologist (OB/GYN). They are also commonly performed at women's health clinics when a woman seeks contraception or is treated for a sexually transmitted infection (STI).

Unlike screenings for other major cancers such as breast, prostate, and colon cancer, cervical cancer screening tests have had very high utilization rates. Our public health data, which we describe in detail below, show that well over 80 percent of women age 19-64 report that they had a Pap test in the past two years as early as 1988 – the first year of our sample. Although the goal of major medical organizations and HealthyPeople 2020 is to reach 90% cervical cancer screening rates for adult women, Pap test rates are (and for a long time have been) considerably higher than mammography, proctoscopy, and colonoscopy rates. Differential utilization rates may be explained in part by differences in cost and in convenience. For example, the average cost of a Pap test is

\$25-\$40. This is much cheaper than the average cost for a screening mammogram (\$80-\$210) or for a colonoscopy (\$3000).[1] Pap tests are also frequently performed in-office as part of a standard well-woman exam; in contrast, mammograms and colonoscopies require special equipment and often are performed during another visit to a separate facility upon referral.

Given that cervical cancer is one of the most preventable, treatable, and survivable cancers, there is substantial interest in public policies that can further increase Pap test utilization rates.[2] In this paper we provide the first evidence on the effects of state mandates that require insurance plans to cover Pap tests. 20 states adopted such laws during the 1990s.[3] Previous research has studied policies such as the provision of free Pap tests to low-income women through state participation in the National Breast and Cervical Cancer Early Detection Program and state laws requiring insurance plans to allow a woman to directly access an OB/GYN, finding mixed evidence on the effectiveness of these public policies on Pap test rates (Adams et al. 2006, Baker and Chan 2000). Those studies did not control for the presence of state cervical cancer insurance mandates.

We draw on data with outcomes on Pap test use for slightly more than 600,000 women from the 1988-2000 Behavioral Risk Factor Surveillance System (BRFSS), a

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[1] See, for example: http://www.costhelper.com/cost/health/colonoscopy.html and http://www.costhelper.com/cost/health/mammogram.html.

[2] More recently, policy activity regarding cervical cancer prevention has addressed HPV vaccination and HPV testing. We do not address these state laws in this paper because there is no HPV mandate variation over our time period. Also, public health surveys did not begin asking about HPV vaccination until quite recently, well after our sample period. Lastly, HPV vaccines are only approved for women up to age 26. The effect of these policies is an important area for future research, however.

[3] Similar mandates exist for a variety of benefits and have been studied at length in the economics and public health literature. For examples, see Gruber (1994a) on mandated pregnancy benefits; Bitler and Carpenter (2010) on mandates requiring coverage for screening mammography; Liu, Dow, and Norton (2004) for mandates requiring minimum hospital stays after pregnancy; Pacula and Sturm (2000) for

publicly available dataset that is designed to be representative at the state level in each year. These data have included questions for women about cervical cancer screenings since 1988, and they also include standard demographic characteristics and a summary measure of health insurance coverage (since 1991). The main empirical approach takes advantage of the staggered timing of adoption of each of the types of policies across states in a difference-in-differences (DD) framework with state and year fixed effects. We also control for individual-level characteristics (e.g., age, race, education, and marital status) and annual state economic and demographic characteristics.

To preview, we provide the literature's first evidence that state cervical cancer screening mandates significantly increased Pap test utilization: DD estimates indicate that a mandate for annual screening significantly increased the probability a woman reports having had a Pap test in the past 2 years by 1.4 percentage points and significantly increased the probability a woman reports having ever had a Pap test by 0.8 percentage points. Measured differently, we find that cervical cancer insurance mandates reduced the share of never-screened women by approximately 16 percent; since all women in the age range we study were recommended to have had a Pap test at least once in their lives, this is a nontrivial effect. These effects are highly robust to inclusion of controls for other aspects of the cervical cancer screening environment, are not observed for other women's health outcomes such as mammography rates that were not targeted by mandates, and are plausibly concentrated among insured individuals. Further examination reveals that the results are particularly large and robust for Hispanic women and that there is also a smaller effect for older white women. Our results confirm that

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mandates requiring mental health parity; Bitler and Schmidt (2012) and Schmidt (2007) for mandates requiring coverage of infertility treatment; and others.

more generous insurance coverage for even cheap, routine in-office services with already high utilization rates can significantly further increase utilization. Recently adopted federal health reform, which requires insurance plans to cover preventive services such as Pap tests without copays or deductibles,[4] may be expected to further increase cervical cancer screening rates toward the recommended 90% level.

The paper proceeds as follows: Section 2 describes the data and empirical approach. Section 3 presents the main results, and Section 4 offers a discussion and concludes.[5]

2. Data Description and Empirical Approach

2.1 Data Description

Our main outcome data come from the Center for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS). Fielded annually since 1984, the BRFSS has included questions about Pap tests in every year since 1988 and is designed to be representative at the state level. Surveys are fielded by the individual states and then sent to CDC to be compiled into a public-use dataset. Our analysis focuses on 1988 to 2000, which spans the period when 24 states adopted these laws.[6]

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[4] The actual provision in the Patient Protection and Affordable Care Act (PPACA) requires coverage (without copays or deductibles) of services that, according to the United States Preventive Services Task Force, have a rating of "B" or better. Screening for cervical cancer through Pap tests has an "A" level recommendation.

[5] We do not provide a literature review here because we are not aware of any published studies that evaluate the effects of Pap test mandates. We found one public health abstract that used cross-sectional methods and the 1996 MEPS to relate presence of a state cervical cancer screening mandate and past 2-year Pap test rates; that study found no significant relationship (Pettibone 2003). We improve on this approach by exploiting policy variation within states over time, described in detail below. We similarly do not review a sizable public health literature that documents descriptive associations between demographic characteristics and Pap test use rates but does not focus on the role of insurance mandates or other public policies.

[6] State participation in the BRFSS increased over the late 1980s, and the last state joined the BRFSS in the mid 1990s. In practice, this means that we have an unbalanced panel; because many states adopted laws

The BRFSS Pap test questions allow us to create consistent measures of utilization along several dimensions for women age 18 and older. Specifically, in 1988, women were asked: "Have you ever had a Pap smear?"[7] Women who report ever having had a Pap test then asked about the timing of their most recent Pap test, as well as the reason for their most recent Pap test.[8] We create three key outcome variables: first, we identify Ever had Pap test as equal to one if the woman reports ever having had a Pap test and zero otherwise. Second, we create Pap test in the past year as equal to one if the woman reports that she had a Pap test within the past year and zero otherwise.[9] Third, we create Pap test in the past two years as equal to one if the woman reports that she had a Pap test within the past two years. Note that these latter two variables are not mutually exclusive: All observations where Pap test in the past year is 1 also have Pap test in the past two years equal to 1.[10]

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prior to 1990 we use all available data (i.e., any state/year combination with BRFSS data). Findings are robust to using a balanced panel. Texas and Maryland adopted laws after 2000.

[7] In subsequent years the survey included various lead-in phrasing that included a definition of a Pap smear as a test for cancer of the cervix. Also, beginning in 1988 the survey had an introductory screener question about whether the respondent had ever *heard* of a Pap smear test. We code women in the early waves who report that they had not ever heard of a Pap smear test as not ever having had a Pap test.

[8] Actual question wording changed very slightly from 1991 to 1992 and from 1992 to 1993. From 1988 until 1990 women were first asked if they have ever heard of a Pap smear. In 1991 women were first told that a Pap smear tests for cancer of the cervix or uterus before they were asked about whether they had heard of a Pap smear. In both cases, we code individuals who report never having heard of a Pap smear as never having had a Pap test. Starting in 1992 women were no longer asked whether they had heard of a Pap smear; instead, women were asked about lifetime cervical cancer screening after the interviewer first defined the procedure.

[9] Item non-response is low for these questions. We omit observations with a DK/RF response to the Pap test questions.

[10] A problem is that we lack exact timing of the most recent Pap test (beyond first year, second year, or later). Moreover, any of the Pap test outcomes that measure recency of screening raise questions about recall bias, as well as whether the woman is reporting behavior within the previous calendar year or within the previous 365 days. Thus we use all of the measures to ensure our findings are robust, and we measure exposure to our key dependent variable – insurance mandate – using the same window over which the Pap test variables are measured.

We also observe standard demographic characteristics in the BRFSS, including age, race, education, marital status, family income (in ranges), and employment status.[11] The BRFSS also includes a very basic measure of health insurance coverage (beginning in 1991): we are able to identify whether the woman is covered by "any health plan", though for our main sample period we cannot distinguish who pays for the plan, what the plan covers, whether the plan is in her own name, whether it is a public plan such as Medicaid, and other important related questions.[12] Since the state mandates we study should work primarily through the mechanism of increasing generosity of insurance coverage for Pap tests, the insurance variable - though imperfect - constitutes an important plausibility check on our results (i.e., any effects of mandates should be observed mainly in the sample of women with a health plan).

2.2 Empirical Approach

We are interested in identifying the casual effects of state mandates requiring insurance plans to cover Pap tests on Pap test use rates. A concern with the raw association between the presence of a state Pap test mandate and cervical cancer screening outcomes is that unobserved characteristics about women living in states with mandates may contribute both to screening behaviors and to the adoption of a mandate. Alternatively, there were other changes to the health care delivery system over our time period that could introduce bias: HMO penetration increased over this time period in a

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[11] We choose not to control directly for employment or household income in the regression models below due to their likely endogeneity with our outcomes and key variables of interest.

[12] Specifically, one might be concerned that this "any health plan" measure is picking up some women who have Medicaid for example, and are not affected by the mandates. We have examined data from the March Current Population Surveys (CPS) over this same period to see what share of health care coverage is from private insurance. For women 25-64, approximately 90% of those with any health coverage in the CPS had private coverage. The share for most subgroups of interest is also at least 90% (e.g., high school graduates 25-64, women with some college 25-64, college graduates 25-64, and non-Hispanic white women 25-64).

way that was plausibly correlated with policy adoption, for example, and it is generally believed that HMOs are particularly good at increasing use of preventive services. In these cases, the association between Pap test mandates and screening outcomes is likely to be overstated.

We adopt multiple approaches to deal with these potential omitted variables. First, we rely on variation in the timing of adoption of the policies by estimating state- and year-level fixed effects models of outcomes. Since many unobserved factors contributing both to outcomes and to policy adoption are likely to be time invariant within a state (e.g., voters in some states have stronger unobserved preferences for women's health than other states), the two-way fixed effects models removes these sources of bias. Second, we observe state/year measures of some of the key variables which could be alternative explanations for increased cervical screenings such as managed care and HMO penetration, and we include these directly in the regression models (described below). We also account for other co-occurring aspects of the policy environment toward cervical cancer. In these augmented difference-in-differences models with controls for demographics, other policies, and fixed characteristics of states, the key identifying assumption is that there were no other unobserved shocks to outcomes coincident with policy adoption that affected cervical cancer screening outcomes.

We implement the DD model using a standard OLS model of the following form:

(1) $Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2(\text{Share of Relevant Reference Window Treated by a Cervical Cancer Mandate})_{st} + \beta_3 Z_{st} + \beta_4 S + \beta_5 T + \varepsilon_{ist}$

For non-Hispanic blacks and Hispanics 25-64, the relevant figure is above 75%. Even for high school dropouts 25-64, 65% of those with any health coverage had private coverage.

where Y_{ist} are the various dichotomous screening outcomes for woman i in state s at time t. X_{ist} is a vector of individual level demographic characteristics that includes: age group dummies (19-24, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 25-29 omitted), race/ethnicity (non-Hispanic black, non-Hispanic other race, Hispanic ethnicity, white non-Hispanic omitted) education (less than high school, high school degree, some college, DK/RF, college degree or more omitted), and marital status (never married, widowed/divorced/separated, cohabiting, DK/RF, married omitted). The key policy variable reflects the cervical cancer mandates, and β_2 is the coefficient of interest.[13] Note that our key policy variable for the one-year and two-year Pap variables is the share of that one- or two-year window that the policy was in effect to match the period over which women could have obtained the test; the ever Pap specifications use contemporaneous laws.

As noted above, we also include covariates that vary at the state and year level and that are standard in two-way fixed effects models such as ours. These variables are

[13] There is a great deal of variation across states in the language regarding when the laws are supposed to take effect. Some states set a date after which "all policies sold or renewed after that date" must comply with the mandate, while others state that benefits must be changed effective immediately. We have coded plans as taking effect the year after the year in which they are passed, with the logic that most policies are renewed with insurers in January. Note also that the BRFSS questions introduce a "reference window" problem due to the fact that the questions typically ask about screening behavior over some recent period. Given this, it is important to account for the systematic BRFSS interview structure when defining someone as treated by the policy in question. Specifically, we make use of the fact that BRFSS interviews are distributed almost uniformly across the calendar year and we know which month the interview occurred in. This information, coupled with our decision rule regarding when individuals are first treated, means that we can create a more precise treatment variable that captures the share of the recent period that the individual was treated by the Pap test mandate. The intuition here is straightforward: since we define a policy to turn "on" in January 1 of the year following adoption, it remains the case that people interviewed in, say, February of what we define as the first treatment year will have only been exposed to two months of treatment while people interviewed in, say, November of that same year in that same state will have been exposed to 11 months of treatment. Similarly, for the past two year outcomes we code individuals interviewed in January after the adoption year as being treated 1/24, February of the adoption year as being treated 2/24, and so forth, until December of the following year (i.e., December in the second year after adoption) as being fully treated (i.e., 24/24). Note that even if our assumptions about when insurance policies reset are incorrect, it remains the case that people interviewed toward the beginning of the calendar

captured in Z_{st}, a vector of state economic and demographic characteristics, including: the unemployment rate, the HMO penetration rate, the number of obstetric beds in the state per 1000 women age 15-44, the share of women age 15-44 with private health insurance, the share of women age 15-44 who work (or whose spouses work) at private firms of various sizes (<24, 25-99, 100+), real median income for a family of 4, fraction black, fraction Hispanic, and fraction urban. The Z_{st} vector also includes controls for other relevant public policies that may be expected to affect insurance such as Medicaid expansions for pregnant women and welfare reform. This vector also controls for the presence of a state direct access law (Baker and Chan 2007)[14] and state by year variation in the implementation of the federal cervical screening program for low-income uninsured women (we separately control for pilot and full implementation of NBECCDP).[15] Dummy variables for each state are captured by S_s, and in the DD models, control for time-invariant state-specific factors. Dummy variables for each survey year are captured by T_t, and in the DD specifications, control for period-specific shocks common to all states in any given year. We also control for month of interview to account for idiosyncratic month differences. Throughout, we cluster the standard errors

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year will, by construction, have less potential treatment than individuals interviewed toward the end of the calendar year in any period where there is variation in exposure.

[14] Direct access laws require managed care organizations to allow women direct access to OB/GYNs without first obtaining a referral from her primary care provider (PCP). It has been hypothesized that requiring direct access may increase women's preventive health behaviors such as Pap tests. Baker and Chan (2007) also use BRFSS data from 1996 to 2000 to evaluate the effects of direct access laws and find no evidence that these laws increase Pap test rates. They do not, however, control for the presence of Pap test mandates.

[15] The Breast and Cervical Cancer Mortality Prevention Act of 1990 established federal funding for the National Breast and Cervical Cancer Early Detection Program (NBCCEDP). The mission of the NBCCEDP is to provide cancer screenings for low-income women within the state. NBCCEDP is a federal program, and states are required to submit plans to the federal government to receive federal funds. Adams et al. (2003) and Adams, Breen, and Joski (2006) use BRFSS data from 1996 to 2000 and find that the longevity of a state's participation in the NBCCEDP program is significantly associated with increases in rates of mammography screening and Pap tests for women under age 64 in models with state and year fixed effects. These studies do not, however, control for the presence of Pap test mandates.

at the state level (Bertrand, Duflo, and Mullainathan 2004).[16] Regressions are weighted to be population representative, and the main sample is all women aged 19-64 interviewed by the BRFSS in survey years 1988-2000 with responses to the relevant Pap test questions.

3. Results

In Figure 1 we show the trend from 1988 to 2000 for our main outcomes: Ever had Pap test, Pap test in the past two years, and Pap test in the past year. Several features are notable. First, Pap test rates are very high: about 95 percent of women age 19-64 report ever having had a Pap test, while over 80 percent report having had one in the past two years and about 70 percent have had one in the past year. Second, Pap test rates were very stable over the sample period, in contrast to what has been established for mammography - the other major women's preventive health cancer screening behavior that has been studied over the 1990s (Bitler and Carpenter 2010).[17]

Table 1 presents descriptive statistics of the key demographic variables used in this analysis for adult women in the BRFSS. We present demographic characteristics

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[16] Our policy data come from the National Cancer Institute's State Cancer Legislative Database (SCLD). SCLD tracks every piece of legislation pertaining to different types of cancers, including cervical cancer. Our information on state participation in the NBCCEDP program comes from personal correspondence with Janet Royalty at the CDC. Our information on direct access laws comes from Baker and Chan (2007).

[17] Over this time period national recommended guidelines were unchanged. A 1987 consensus panel convened by the American Cancer Society and supported by the American College of Obstetricians and Gynecologists (ACOG) and other major medical organizations recommended that starting at age 18 or with the onset of sexual activity all women should have an annual pelvic examination including a Pap test. After at least 3 annual consecutive normal Pap tests, the interval between Pap tests could be extended at the physician's discretion (Waxman 2005). These guidelines remained in place until the ACS issued revised guidelines in November 2002, the United States Preventive Services Task Force issued guidelines in January 2003, and the ACOG issued revised guidelines in August 2003. These guidelines differed somewhat in terms of the recommended age to begin screening and the recommended frequency of screening. For example, the current ACS guideline recommends that women not begin cervical cancer screenings until age 21. Again, over our sample period there were no substantive changes in these recommended guidelines.

(e.g., age, race, education, marital status), as well as the key cervical cancer screening outcomes and means of policy variables. Most of the sample is white non-Hispanic, while about 11% of the sample is black non-Hispanic, and 10 percent of the sample is Hispanic. About 45 percent of the sample has a high school degree or less. Over 60 percent of the sample is married and 60 percent is employed. Nearly 85 percent of women report that they have a health plan (our proxy for health insurance). Regarding health outcomes and the policy variables, 70 percent of women report that they had a Pap test in the past year, with higher rates for past two-year and lifetime Pap test rates. Finally, Table 1 shows that about 37.4 percent of the sample was treated by a mandate for an annual Pap test, nearly 70 percent of the sample was covered by a fully implemented NBCCEDP program, and 22.7 percent of the sample was covered by a law requiring insurance plans to allow women to directly access an OB/GYN.

We present the baseline difference-in-differences results in Table 2 for the main Pap test screening outcomes. Each entry in the table is from a separate model. We present coefficient estimates on the key mandate variable of interest, though the models control for all the covariates described above including state and year fixed effects. Thus, the printed estimate is the difference-in-differences estimate of β_2 in equation (1) above. The format of Table 2 is as follows: In the top row we present estimates from the full 1988-2000 sample. The middle panel restricts attention to individuals with a health plan (our proxy for health insurance, reported for 1991-2000), while the bottom panel shows results for women without a health plan. Since our hypotheses about the effects of the cancer screening insurance mandates rely mainly on an insurance mechanism, the health plan/no health plan distinction is key for interpretation.[18] We present results for Ever had a Pap test in column 1, Pap test in past two years in column 2, Pap test in the past year in column 3, and Mammogram in the past two years in column 4. The last outcome is a key placebo test: If Pap test mandates were correlated with other women's health initiatives or programs more generally, we might expect to observe spurious increases in mammography (which was not covered by the mandates we study) coincident with cervical cancer mandate adoption; the estimate is one-third as large as our effect of interest.[19]

The first column in the top panel of Table 2 shows that Pap test mandates are estimated to have significantly increased the likelihood a woman reports having ever had a Pap test by about 0.8 percentage points. Relative to the average rate of lifetime Pap test use, this represents about a one percent effect.[20] In the second column we also see that the presence of a Pap test mandate is associated with a statistically significant increase of 1.4 percentage points in the likelihood a woman reports she received a Pap test within the past two years, or about a two percent effect. We also estimate that Pap test mandates increase past year Pap test use in column 3, though this estimate is not statistically

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[18] Since the health plan variable is only available from 1991 onward, our sample sizes in the middle and bottom panel are slightly smaller than in the top panel (though recall that only 14 and 25 states asked the cervical cancer screening questions in 1988 and 1989, respectively).

[19] In results not reported but available upon request we also estimated models that included controls for the presence of any state mandate for breast cancer screening, which we study in companion work (Bitler and Carpenter 2010). These mandates were also adopted by states over this period, though they were generally adopted in different years, were adopted by more states, and importantly only applied to the older women in the sample. Controlling for these mandates did not substantively affect the estimates on the cervical cancer screening mandates.

[20] We present coefficient estimates on the demographic control variables in Appendix Table 1. Older women are significantly less likely to have had recent Pap tests compared to young women and less educated women are significantly less likely to have had Pap tests compared with more educated women. Black women and married women are significantly more likely to have had a Pap test than other women. In results not reported, we do not find consistent evidence that laws requiring women direct access to an OB/GYN were significantly related to Pap test rates, similar to findings by Baker and Chan (2007). We

significant at conventional levels. Finally, we find no substantive or statistically significant relationship between the presence of a cervical cancer screening mandate and the likelihood a woman reports she received a mammogram in the past 2 years.[21]

In the middle and bottom panels of Table 2 we directly assess the importance of the insurance channel. The intuition here is straightforward: If the mechanism through which cervical cancer screening mandates increase Pap test use is through more generous insurance coverage (as we hypothesize), then the effects should be observed primarily in the sample of women with a health plan (our proxy for health insurance). If, in contrast, we observed that the effect was mainly driven by women without a health plan, this would cast doubt on the insurance mechanism described above. The results from this exercise in the middle and bottom panels of Table 2 are somewhat mixed: On one hand, we do find evidence of statistically significant increases in Pap test utilization in columns 1-3 for the main Pap test outcomes. Moreover, the associated estimates for the recent Pap test outcomes (in the past two years and in the past year, columns 2 and 3) in the sample without a health plan are statistically insignificant. However, Table 2 also exhibits some patterns that are less consistent with a causal role for Pap test mandates. For example, the magnitude of the mandate coefficients in the sample without a health plan are about as large or larger than those for the sample with a health plan. And the estimated mandate effect on the probability a woman reports having ever had a Pap test among women without a health plan is positive and statistically significant. This could indicate that there were other outreach campaigns or public programs that independently

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also found no evidence that for all women 19-64, a pilot or full NBECCDP program is associated with screenings.

[21] Examining the probability a woman obtained a mammogram in the past year or in her lifetime similarly returned no evidence for an effect of Pap test mandates on those outcomes.

increased Pap test rates that may be correlated with Pap test mandates and that are not picked up by our direct controls for policies such as direct access laws or implementation of the NBCCEDP program for low-income women. Overall, Table 2 provides some suggestive evidence of causal effects of Pap test mandates on cervical cancer screening utilization.

We next estimated models by exogenous demographic characteristics crossed with whether the individual reported having a health plan. The results of this exercise for race/ethnicity-by-health plan are reported in Table 3. As with Table 2, each entry in Table 3 is from a separate DD model. The top panel reports results for Hispanic women, the second panel reports results for non-Hispanic white women, the third panel reports results for non-Hispanic black women, and the bottom panel reports results for non-Hispanic women who reported an "other" race. Columns 1-3 (for Ever had a Pap test, Pap test in the past two years, and Pap test in the past year, respectively) report results for the sample of women with a health plan, while columns 4-6 restrict attention to women without a health plan.

Several patterns from Table 3 are notable. First, the patterns of mandate coefficients for Hispanic women and non-Hispanic white women are very consistent with a causal interpretation of the effect of cervical cancer screening mandates on Pap test rates. For these two groups of women, the mandate coefficients are positive and statistically significant in the sample of women with a health plan and are generally smaller and statistically insignificant in the sample of women without a health plan. For Hispanic women, the effects are also on the order of 7 percent increases (versus the 1-2 percent increases estimated for non-Hispanic white women). The other key pattern that is clear from Table 3 is that the puzzling patterns in Table 2 are driven by perverse relationships between the presence of mandates and Pap test rates for black women. For this sample, there are very large, positive, and statistically significant associations between Pap test mandates and Pap test rates for women without a health plan but much smaller and statistically insignificant associations for women with a health plan—exactly the opposite of what one would expect in the presence of a mandate-related insurance channel. For "other" race women, we do not observe systematic, substantive, or statistically significant relationships between cervical cancer screening mandates and Pap test outcomes.

In Table 4 we report the results of several robustness checks performed on the sample of Hispanic and non-Hispanic white women – the two groups whose patterns of mandate coefficients were most consistent with our hypothesis that Pap test mandates increased utilization through an insurance coverage channel. The format of Table 4 is as follows: in the top row we report results from models where we control for the Pap test mandates but exclude controls for the other aspects of the cervical cancer screening policy environment (direct access laws and NBCCEDP implementation). If the Pap test mandate coefficients are highly sensitive to inclusion of controls for the other aspects of the policy environment, this could suggest some substantial misspecification. In the middle row we report results from models that include linear state trends; in these models, mandate effects are identified from sharp deviations in Pap test rates relative to smooth state-specific trends in outcomes coincident with mandate adoption. In the bottom row we report results from models that restrict attention to states comprising a balanced BRFSS sample from 1990-2000 (recall that only a handful of states asked the

Pap test questions in 1988 and 1989). The first three columns report results for Hispanic women with a health plan, while the last three columns report results for non-Hispanic white women with a health plan. Columns 1 and 4 report results for Ever had a Pap test, columns 2 and 5 report results for Had a Pap test in the Past 2 Years, and columns 3 and 6 report results for Had a Pap test in the Past Year.

The results in Table 4 suggest that the mandate effects observed in Table 3 for Hispanic and non-Hispanic white women are quite robust. For Hispanic women, we find very similar estimated coefficients for all outcome variables: all nine estimates are sizable and positive, and 6 of 9 are statistically significant. Note that the models in the bottom row that restrict attention to states in the 1990-2000 balanced panel lose more than half the sample, so standard errors increase. For non-Hispanic white women in columns 4-6 we find broadly similar patterns: eight of the nine estimates are positive, and five of nine retain statistical significance at standard confidence levels. The exception is that the estimates in the middle panel for the models that include linear state time trends all lose statistical significance, though we cannot rule out that these estimates are significantly different from the basic difference-in-differences estimates without trends for non-Hispanic white women with a health plan in Table 3. Overall, the results in Table 4 continue to suggest that state cervical cancer screening mandates had robust and significant effects at increasing Pap test rates for Hispanic and non-Hispanic white women.[22]

Finally, in Table 5 we show estimated mandate effects by age and education for Hispanic and non-Hispanic white women with a health plan. The top panel of Table 5 reports results for the sample of 19-34 year olds, while the second panel reports results for 35-64 year olds. The third panel reports results for women with a high school degree or less, while the bottom panel reports results for women with at least some college education. The first three columns report results for Hispanic women with a health plan (for Ever had a Pap test, Pap test in the past two years, and Pap test in the past year, respectively), while columns 4-6 report results for non-Hispanic white women with a health plan (similarly for the three Pap test outcomes). The results by demographic group in Table 5 for Hispanic women show that the mandate effects are much larger in magnitude for younger Hispanic women; for older Hispanic women we do not find statistically significant effects of cervical cancer screening mandates on Pap test utilization. When we separately examine low-educated and high-educated Hispanic women, we find evidence of sizable mandate effects in both groups. For non-Hispanic white women, in contrast, we find that the mandate effects are concentrated in the 35-64 year old sample, with much smaller estimated effects for 19-34 year olds that are not statistically significant. We do not find clear patterns of differential effects of mandates by education for non-Hispanic white women. Notably, all of the estimates in Table 5 are positive in sign, suggesting that mandates uniformly increased Pap test rates for Hispanic and non-Hispanic white women.

4. Discussion and Conclusion

The results above suggest that insurance mandates requiring coverage of Pap tests significantly increased Pap test use rates, even though these screenings are cheap and

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[22] In results not reported, as in Table 2 we found no evidence of a significant relationship between Pap test mandates and mammography rates for Hispanic and non-Hispanic white women with a health plan, further

were already quite widespread by the late 1980s. We estimate that adoption of a cervical cancer screening mandate reduced the share of never-screened women by 16 percent. These effects are plausibly observed for women with a health plan, are not observed for other women's health outcomes (e.g., mammograms), and are especially large for Hispanic women.

We did observe one interesting puzzle: namely, that among black women *without a health plan*, cervical cancer screening mandates were also associated with significant increases in Pap test rates. What explains this pattern for black women? It is important to note that while the presence of a health plan is related to socioeconomic status, it is also the case that the poorest women in a state are more likely than other women to be eligible for Medicaid (conditional on being otherwise eligible), which would also be included in our "health plan" variable to the extent that they took up coverage.[23] Thus, any omitted variable explanation for the patterns for black women in Table 3 require a race/ethnicity-by-health-plan-specific story. This would be possible, for example, if states started outreach campaigns about the importance of cervical cancer screening tests that they targeted to black women without health plans (but not black women with public or private health plans and not women of other race/ethnicities without health plans).[24] We have no evidence that they did so and think the exclusion of other minority women from such campaigns particularly unlikely. Another possibility is that our control for the

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suggesting that the mandate effects observed in Tables 3 and 4 for these women are real.

[23] We do not have information on when state Medicaid programs began covering Pap tests. Different sources in the literature provide sometimes conflicting reports of state Medicaid benefits for cervical cancer screenings. We fielded our own survey of state Medicaid offices to try to obtain this information in summer 2010 but were unsuccessful in obtaining high quality data for a substantial number of states on the timing of when specific cancer screening benefits were covered.

[24] An additional piece of evidence consistent with this race-by-health-plan-status omitted variables bias story is that cervical cancer screening mandates were also significantly related to the probably that non-

state implementation of the federal cervical cancer screening program for low-income, uninsured women (NBCCEDP) is crudely measured and not adequately picking up relevant aspects of public program generosity toward black women. The difficulty with this explanation, however, is that it should be expected to produce the same patterns for the other minority groups as well (to the extent that they are all less advantaged than white non-Hispanic women).

Absent an obvious omitted variables bias explanation, we explored three other possible alternative explanations for the findings for black women. First, we investigated whether differences in marital status for non-Hispanic black women compared to Hispanic and non-Hispanic white women could explain the differences in Table 3, since we expect married women to be more likely to be insured through a spouse, and it is well known that Hispanic women are more likely to be married than women of other races. Second, we examined whether differences in the geographic distribution of women by race/ethnicity could explain the differences in Table 3, with the idea that the geographic distribution of black non-Hispanic women compared to Hispanic women is not very highly correlated.[25] Different mandate effects across different states might therefore explain the race variation. We found little evidence that either of these factors accounts for the divergence in Table 3 by race/ethnicity and health plan status. Finally, we examined whether including a crude control for Planned Parenthood availability in a state/year as a proxy for access by uninsured women to free or sliding scale OB/GYN

Hispanic black women without a health plan obtained a mammogram in the past year. This was not true for non-Hispanic black women with a health plan, however.

[25] For example, the ten states with the largest shares of African Americans are Mississippi, Louisiana, Georgia, Maryland, South Carolina, Alabama, North Carolina, Delaware, Virginia, and Tennessee. The states with the largest share of Hispanics are California, Texas, Florida, New York, Illinois, Arizona, New Jersey, Colorado, New Mexico, and Georgia.

care explained the results for black women since a not-uncommon route for getting a Pap test is during a visit to obtain contraception or to be tested for a sexually-transmitted infection, both of which are differentially prevalent among black women compared to Hispanic women (Centers for Disease Control 2012). We obtained information on the number of abortion providers in a state (a partial proxy for Planned Parenthood or other clinics likely to offer free or sliding scale care) from various years of publications from the Guttmacher Institute. We found that including this control did not change the finding that non-Hispanic black women without a health plan had significant increases in Pap test rates associated with cervical cancer screening mandates. We leave this puzzling pattern for future work but note that these results do not invalidate the interpretation that the estimates for Hispanic and non-Hispanic white women in Table 3 reflect true causal effects of cervical cancer screening mandates on Pap test utilization rates for these women. Indeed, if we observed the "perverse" pattern of results for all the non-white samples, this would be especially troubling. That it is only observed for non-Hispanic black women is notable, not easily explained, and deserving of future work.

There are several limitations to our study that are important to note. First, we do not have information on what actually happened to insurance plans following mandate adoption. We do not know how many firms were covering Pap tests prior to mandate adoption,[26] and we also do not know which women have insurance that would be

[26] Available evidence indicates that benefits coverage for Pap tests was far from complete over our sample period. Sullivan and Rice (1991), for example, report that the Health Insurance Association of America (HIAA) employer benefits survey fielded in 1990 showed that about 67 percent of private plans were covering Pap tests in 1990, suggesting substantial latitude for cervical cancer mandates to affect benefits coverage and, subsequently, utilization. It is, of course, natural to ask, given the fairly low cost of Pap tests, why weren't all employers and health plans covering these screenings even in the absence of a mandate? Note that although the cost of an individual screening is relatively cheap, the population at risk of using a mandate is very large: all women over age 18 were recommended to get annual Pap tests over the bulk of our sample period. In contrast, most benefits mandates that have been studied previously (e.g.,

exempted from compliance with these mandates (for example due to the well-known ERISA exemption for self-insured firms).[27] Second, we do not observe information on insurance type for the insured women. Questions in the BRFSS that would allow us to distinguish between private employer-provided insurance and public insurance, for example, were only asked from 1996-2000, and most of the mandates we study were adopted before this period.

Despite these limitations, our results significantly advance our understanding of how state insurance mandates can increase utilization of even very cheap services with already high use rates. As recently adopted federal health reform requires insurance plans to cover Pap tests with no deductibles or copays, our results suggest that Pap test rates are likely to further increase toward recommended levels.

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in-vitro fertilization, substance use/alcoholism treatment) have the potential to affect a much smaller portion of the population. Those other benefits are also typically for services that are far less frequent and regular than Pap tests. Finally, even though the costs of the actual screening are low, the subsequent costs associated with biopsy and other cancer treatments are much larger.

[27] It is also possible that costly mandates cause some firms to reduce their offers of insurance to employees, though the evidence on this is mixed (see, for example, Gruber 1994b, Jensen and Gabel 1989, Jensen and Morrisey 1999, and others). We tested this hypothesis (i.e., that Pap mandates might have led to less insurance coverage) using the March CPS and did not find that Pap test mandates were significantly associated with the likelihood a woman reported having private or any insurance.

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Figure 1
Pap Test Rates Among 19-64 Year-Old Women
BRFSS 1988-2000

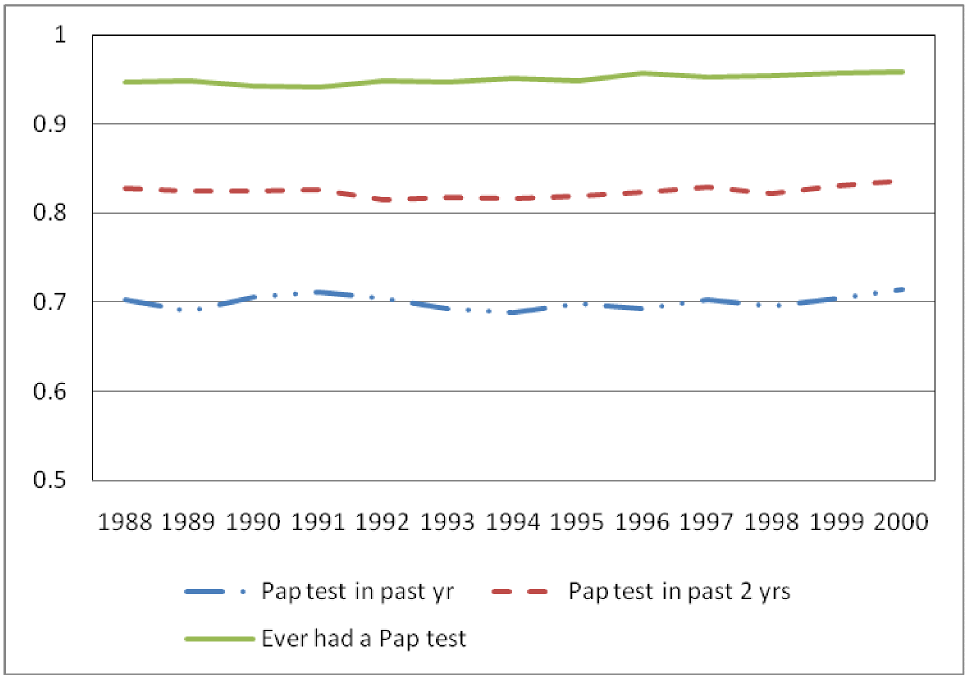

Table 1
Descriptive Statistics, 19-64 year old BRFSS Females

Variable	Mean
White non-Hispanic	.748
Black non-Hispanic	.108
Other race non-Hispanic	.037
Hispanic	.102
Less than high school degree	.112
HS degree	.333
Some college	.295
Bachelors degree or more	.259
Married	.621
Widowed/Divorced/Separated	.175
Never married	.175
Living with a partner	.027
Employed	.600
Self-employed	.064
Unemployed	.055
Not in labor force	.279
Has a health plan (1991-00)	.843
Ever had a Pap test	.951
Had a Pap test within the past 2 years	.824
Had a Pap test within the past year	.700
Treated by mandate for annual Pap test	.374
State has implemented pilot NBCCEDP program	.090
State has implemented full NBCCEDP program	.693
State has direct access law for OB/GYNs	.227
N	602814

Author calculations from 1988-2000 BRFSS for adult females 19-64. Some of the variables are not defined in some of the years (e.g., presence of health insurance was not asked until 1991).

Table 2:
Cervical Cancer Screening Mandates and Multiple Outcomes
DD Models with State and Year Fixed Effects
Overall and By Whether Has a Health Plan
BRFSS women 19-64, 1988-2000

Outcome is →	(1) Ever had a Pap test	(2) Pap test in past 2 years	(3) Pap test in past year	(4) Mammogram in past 2 years (placebo test)
All (88-2000)				
Treated by mandate for annual Pap test	.008**	.014*	.011	.005
	(.003)	(.006)	(.007)	(.008)
Adjusted R-squared	.09	.04	.04	.18
N	602408	599164	599164	657847
Has a Health Plan (91-2000)				
Treated by mandate for annual Pap test	.007**	.018**	.017*	.008
	(.003)	(.006)	(.008)	(.010)
Adjusted R-squared	.07	.03	.03	.19
N	478192	475705	475705	477898
Does Not Have a Health Plan (91-2000)				
Treated by mandate for annual Pap test	.025**	.016	.016	.016
	(.007)	(.014)	(.014)	(.017)
Adjusted R-squared	.10	.04	.04	.07
N	80888	80332	80332	80816

Notes: Each column shows the results from a separate DD model. All models include state, month, and year fixed effects, as well as controls for: 5-year age groups (19-24, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64; 25-29 is the excluded category), race (black, other race; white is the excluded category), Hispanic ethnicity, education (less than high school, high school degree, some college, and DK/RF; college degree or more is the excluded category), and marital status (never married, widowed/divorced/separated, cohabiting, DK/RF; married is the excluded category). All models also control for the following variables for each state and year: presence of a direct access law for OB/GYNs; presence of a pilot-stage National Breast and Cervical Cancer Early Detection Program (NBCCEDP); presence of a fully implemented NBCCEDP program; share of women 15–44 with private health insurance; share of women who work or who have a husband who works at a firm with 24 or fewer employees, 25–99 employees or 100 or more employees; the unemployment rate; welfare reform; the level of HMO penetration (as a share of the population); the number of obstetric beds per 100 women 15–44, the eligibility threshold for Medicaid eligibility for a pregnant woman in the state as a share of the FPL; and the share urban, share black, and share Hispanic in the state. * significant at 5%; ** significant at 1%. Standard errors throughout are clustered at the state level and estimates are weighted.

Table 3:
Mandate Effects By Race/Ethnicity and Health Plan Status
DD Models with State and Year Fixed Effects
BRFSS women 19-64, 1991-2000

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome is →	Ever had a Pap test	Pap test in past 2 years	Pap test in past year	Ever had a Pap test	Pap test in past 2 years	Pap test in past year
Sample is →	Has a health plan	Has a health plan	Has a health plan	Does not have a health plan	Does not have a health plan	Does not have a health plan
Hispanic						
Treated by mandate for annual Pap test	.042** (.013)	.043** (.014)	.055** (.016)	.034 (.030)	.002 (.037)	.032 (.028)
Adjusted R-squared	.07	.03	.02	.13	.06	.04
N	26463	26368	26368	9828	9784	9784
White, non-Hispanic						
Treated by mandate for annual Pap test	.006** (.002)	.017* (.007)	.015 (.008)	.015 (.009)	.002 (.020)	-.00002 (.021)
Adjusted R-squared	.07	.04	.03	.06	.06	.06
N	386200	384299	384299	55876	55521	55521
Black, non-Hispanic						
Treated by mandate for annual Pap test	.008 (.009)	.016 (.010)	.016 (.016)	.067* (.029)	.079** (.026)	.084** (.031)
Adjusted R-squared	.03	.03	.03	.06	.05	.05
N	45286	44938	44938	11057	10926	10926
Other race, non-Hispanic						
Treated by mandate for annual Pap test	-.010 (.018)	-.003 (.017)	-.003 (.020)	.065 (.059)	-.013 (.059)	-.049 (.046)
Adjusted R-squared	.12	.05	.03	.20	.14	.12
N	17708	17613	17613	3638	3621	3621

Each entry is from a separate model. All models include state, month, and year fixed effects, as well as controls for: 5-year age groups (19-24, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64; 25-29 is the excluded category), race (black, other race; white is the excluded category), Hispanic ethnicity, education (less than high school, high school degree, some college, and DK/RF; college degree or more is the excluded category), and marital status (never married, widowed/divorced/separated, cohabiting, DK/RF; married is the excluded category). All models also control for the following variables for each state and year: presence of a direct access law for OB/GYNs; presence of a pilot-stage National Breast and Cervical Cancer Early Detection Program (NBCCEDP); presence of a fully implemented NBCCEDP program; share of women 15–44 with private health insurance; share of women who work or who have a husband who works at a firm with 24 or fewer employees, 25–99 employees or 100 or more employees; the unemployment rate; welfare reform; the level of HMO penetration (as a share of the population); the number of obstetric beds per 100 women 15–44, the eligibility threshold for Medicaid eligibility for a pregnant woman in the state as a share of the FPL; and the share urban, share black, and share Hispanic in the state. * significant at 5%; ** significant at 1%. Standard errors throughout are clustered at the state level and estimates are weighted.

Table 4:
Mandate Effects: Robustness
DD Models with State and Year Fixed Effects
Sample is White and Hispanic Women With a Health Plan
BRFSS women 19-64, 1991-2000

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome is →	Ever had a Pap test	Pap test in past 2 years	Pap test in past year	Ever had a Pap test	Pap test in past 2 years	Pap test in past year
Sample is →	Hispanic women with a health plan	Hispanic women with a health plan	Hispanic women with a health plan	White, non-Hispanic women with a health plan	White, non-Hispanic women with a health plan	White, non-Hispanic women with a health plan
Excluding direct access & NBCCEDP controls						
Treated by mandate for annual Pap test	.025	.034*	.052**	.007**	.017*	.015
	(.013)	(.014)	(.014)	(.002)	(.008)	(.008)
Adjusted R-squared	.07	.03	.02	.07	.04	.03
N	26463	26368	26368	386200	384299	384299
With linear state trends						
Treated by mandate for annual Pap test	.049**	.054**	.059*	-.001	.007	.006
	(.017)	(.017)	(.023)	(.003)	(.007)	(.007)
Adjusted R-squared	.07	.02	.02	.07	.04	.03
N	26463	26368	26368	386200	384299	384299
States in balanced panel 90-2000						
Treated by mandate for annual Pap test	.045**	.039	.048	.006**	.027**	.018*
	(.009)	(.022)	(.024)	(.002)	(.009)	(.008)
Adjusted R-squared	.08	.03	.02	.06	.04	.03
N	10586	10560	10560	148981	148391	148391

Each entry is from a separate model. All models include state, month, and year fixed effects, as well as controls for: 5-year age groups (19-24, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64; 25-29 is the excluded category), race (black, other race; white is the excluded category), Hispanic ethnicity, education (less than high school, high school degree, some college, and DK/RF; college degree or more is the excluded category), and marital status (never married, widowed/divorced/separated, cohabiting, DK/RF; married is the excluded category). All models also control for the following variables for each state and year: presence of a direct access law for OB/GYNs; presence of a pilot-stage National Breast and Cervical Cancer Early Detection Program (NBCCEDP); presence of a fully implemented NBCCEDP program; share of women 15–44 with private health insurance; share of women who work or who have a husband who works at a firm with 24 or fewer employees, 25–99 employees or 100 or more employees; the unemployment rate; welfare reform; the level of HMO penetration (as a share of the population); the number of obstetric beds per 100 women 15–44, the eligibility threshold for Medicaid eligibility for a pregnant woman in the state as a share of the FPL; and the share urban, share black, and share Hispanic in the state. * significant at 5%; ** significant at 1%. Standard errors throughout are clustered at the state level and estimates are weighted.

Table 5:
Mandate Effects by Age and Education
Sample is Insured White and Hispanic Women
DD Models with State and Year Fixed Effects
BRFSS women 19-64, 1991-2000

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome is →	Ever had a Pap test	Pap test in past 2 years	Pap test in past year	Ever had a Pap test	Pap test in past 2 years	Pap test in past year
Sample is →	Hispanic women with a health plan	Hispanic women with a health plan	Hispanic women with a health plan	White, non-Hispanic women with a health plan	White, non-Hispanic women with a health plan	White, non-Hispanic women with a health plan
19-34 year olds						
Treated by mandate for annual Pap test	.065**	.076**	.109**	.008	.008	.003
	(.017)	(.026)	(.028)	(.004)	(.008)	(.008)
Adjusted R-squared	.09	.05	.03	.10	.04	.03
N	11881	11858	11858	121152	120846	120846
35-64 year olds						
Treated by mandate for annual Pap test	.018	.012	.009	.005	.022*	.021*
	(.015)	(.031)	(.029)	(.003)	(.011)	(.010)
Adjusted R-squared	.03	.03	.02	.02	.03	.02
N	14582	14510	14510	265048	263453	263453
HS degree or less						
Treated by mandate for annual Pap test	.042*	.036*	.052*	.003	.024*	.013
	(.020)	(.016)	(.022)	(.003)	(.009)	(.009)
Adjusted R-squared	.05	.02	.02	.04	.03	.03
N	13743	13678	13678	145666	144655	144655
Some college or more						
Treated by mandate for annual Pap test	.045**	.051*	.062*	.008**	.013	.017
	(.015)	(.024)	(.026)	(.002)	(.007)	(.009)
Adjusted R-squared	.13	.05	.03	.09	.03	.02
N	12691	12661	12661	240238	239358	239358

Each entry is from a separate model. All models include state, month, and year fixed effects, as well as controls for: 5-year age groups (19-24, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, and 60-64; 25-29 is the excluded category), race (black, other race; white is the excluded category), Hispanic ethnicity, education (less than high school, high school degree, some college, and DK/RF; college degree or more is the excluded category), and marital status (never married, widowed/divorced/separated, cohabiting, DK/RF; married is the excluded category). All models also control for the following variables for each state and year: presence of a direct access law for OB/GYNs; presence of a pilot-stage National Breast and Cervical Cancer Early Detection Program (NBCCEDP); presence of a fully implemented NBCCEDP program; share of women 15–44 with private health insurance; share of women who work or who have a husband who works at a firm with 24 or fewer employees, 25–99 employees or 100 or more employees; the unemployment rate; welfare reform; the level of HMO penetration (as a share of the population); the number of obstetric beds per 100 women 15–44, the eligibility threshold for Medicaid eligibility for a pregnant woman in the state as a share of the FPL; and the share urban, share black, and share Hispanic in the state. * significant at 5%; ** significant at 1%. Standard errors throughout are clustered at the state level and estimates are weighted.

Appendix Table 1:
Expanded Set of Coefficient Estimates
DD Models with State and Year Fixed Effects
BRFSS women 19-64, 1988-2000

	(1) Ever had a Pap test	(2) Pap test in past 2 years	(3) Pap test in past year
Treated by mandate for annual Pap test	.008**	.014*	.011
	(.002)	(.006)	(.007)
19-24	-.074**	.006	.036**
	(.005)	(.008)	(.009)
30-34	.009**	-.011*	-.029**
	(.002)	(.004)	(.006)
35-39	.006	-.044**	-.085**
	(.004)	(.005)	(.006)
40-44	.007	-.070**	-.120**
	(.003)	(.006)	(.008)
45-49	.002	-.078**	-.109**
	(.003)	(.006)	(.005)
50-54	-.001	-.103**	-.126**
	(.004)	(.006)	(.005)
55-59	-.011*	-.145**	-.164**
	(.004)	(.009)	(.006)
60-64	-.025**	-.184**	-.210**
	(.004)	(.009)	(.007)
Black	.015**	.072**	.089**
	9.004)	(.005)	(.005)
Other race	-.125**	-.111**	-.104**
	(.009)	(.011)	(.012)
Hispanic ethnicity	-.064**	-.019**	-.004
	(.005)	(.006)	(.006)
Less than HS degree	-.040**	-.147**	-.165**
	(.005)	(.006)	(.006)
HS degree	-.012**	-.077**	-.089**
	(.001)	(.003)	(.005)
Some college	-.010**	-.049**	-.059**
	(.001)	(.002)	(.003)
Education missing	-.098**	-.129**	-.133**
	(.024)	(.035)	(.029)
Never married	-.089**	-.108**	-.104**
	(.006)	(.006)	(.005)
Widowed/divorced/separated	-.005**	-.049**	-.054**
	(.002)	(.002)	(.003)
Cohabiting	-.004	-.012*	.001
	(.003)	(.005)	(.006)
Marital status missing	-.008	-.032**	-.017
	(.009)	(.010)	(.020)
Adjusted R-squared	.09	.04	.04
N	602408	599164	599164

Each entry is from a separate model. See notes to Table 2. * significant at 5%; ** significant at 1%.
Standard errors throughout are clustered at the state level.