Infant Mortality, Abortion, and Macroeconomic Conditions: How Women's Health Policy Moderates Unemployment Effects on Infant Mortality

Sandra P. Garcia
Javier M. Rodriguez
Claremont Graduate University

Abstract

Paradoxically, the infant mortality rate (IMR) improves during economic downturns, yet research exploring explanations for this association is scarce. This paper examines a mechanism that explains why the IMR fluctuates procyclically in the United States. We hypothesize that part of this association is explained by abortion. When unemployment increases, women tend to have more abortions. Because a non-trivial fraction of the fetuses that are aborted would not necessarily survive during the first year of age, abortion acts as a selective mechanism through which unhealthy fetuses are eliminated from the pool of live births and, therefore, IMR decreases. Using data from the National Institutes of Health, the Bureau of Labor Statistics, and the Alan Guttmacher Institute, state- and time-fixed effects models are estimated during the period 1973-1982, when states began allowing abortions. We find that the effect of unemployment on IMR is moderated by the difficulty that women face in having an abortion; different degrees of difficulty are given by the access women have to abortion in socially liberal v. conservative states. A higher demand for abortions, due to an increase in unemployment, affects the healthy-unhealthy composition of fetuses that are aborted above and beyond a state's expected abortion rate. Our estimates show that the average difference associated with an annual 1-percentage point increase in unemployment is 14.6 fewer annual infant deaths per 100,000 live births in socially conservative compared to socially liberal states. Findings call for the synchronization of policies affecting the health of women and infants depending on macroeconomic fluctuations.

Key words: Infant mortality, unemployment, abortion, women's health, health policy.

Introduction

Research has shown that once the long-run decline in mortality is removed, residual mortality oscillations are associated with macroeconomic fluctuations. Paradoxically, the patterns of key health indicators like all-cause mortality or infant mortality are found to be procyclical, with mortality improving during contractions of the economy and deteriorating during expansions of the economy (Ruhm, 2000; Tapia Granados, 2008; Tapia Granados & Rodriguez, 2015). This article explores the role that legalized abortion plays in the paradoxical procyclical association between infant mortality and unemployment in the United States.

Given that the infant mortality rate (IMR) has been long considered a key indicator of public health due to its objectivity and sensitivity to contextual stimuli, and that the unemployment rate (UR) has been a central macroeconomic indicator in scholarly research, the examination of possible causal mechanisms that disentangle their procyclical association can have significant public, social, and health policy implications. This is especially true considering that policy makers focus their efforts on prescribing policies and enacting programs that counteract unemployment, while simultaneously improving the health of the population, with a special attention invested in the health of infants and their mothers. Even though the importance of understanding this association is palpable, there is scarcity in the causal mechanisms identified in the current research.

Considering the strong association between infant mortality and legalized abortion in the U.S. and the fact that infant mortality is procyclical, while abortion is countercyclical, our main contribution is the identification of a causal path that explains in part the paradoxical association between infant mortality and unemployment in the U.S. In this context, when the UR increases, more women tend to opt out of their pregnancy via abortion and, given that abortion selectively

eliminates a fraction of unhealthy fetuses from the pool of live births, the IMR decreases. In this article, we examine this premise for the 50 U.S. states using methods well established in the literature, during the periods 1973-1982—the most commonly analyzed period, given that abortion data were more reliably collected during these years—and 1973-1988 using an unevenly spaced data series.

Theoretical Framework

That macroeconomic indicators are associated with population health—including mortality—is a phenomenon discovered over a century ago, and one that has been increasingly corroborated by a growing body of research (Ogburn & Thomas, 1922). However, researchers did not begin to explore this association more systematically until the 1970s. It was Brenner's (1973) groundbreaking work that showed how mortality, infant death, and fatalities increase when the economy declines and decrease when the economy expands. However, contrary to Brenner's findings, several researchers have embarked on a similar analysis using different contexts and methodological approaches, finding a paradoxically strong, inverse relationship between total mortality and unemployment (Adams, 1981; Laporte, 2004; Ruhm, 2000; Tapia Granados, 2004, 2005, 2008).

The bulk of research has confirmed that, at the aggregate level, infant mortality as well as overall mortality—two critical indicators of public health—are inversely associated with the unemployment rate. With some exceptions, this relationship has been found to be robust across time periods and a wide variety of political and economic systems. In the case of the U.S., an increase in unemployment results in a significant decrease in infant mortality (Dehejia & Lleras-Muney, 2004; Ruhm, 2000). Using longitudinal data for the 1972-1991 period, Ruhm (2000) found that a 1% increase in a state unemployment rate predicts a decrease of the IMR by 0.6-

0.8%. Similarly, Dehejia and Lleras-Muney (2004), using data over the period 1975-1999, found that a 1% change in the UR would result in a 0.7% decline in the IMR.

Even though the relationship between all-cause mortality and unemployment has been robustly corroborated across time and countries, there are some exceptions in the cross-national literature that make analyses on infant mortality comparatively less standard (and robust) than those on all-case mortality. For example, one study examined infant mortality time series data from Germany (Neumayer, 2004) while another study analyzed it for the OECD nations showing non-statistically significant results for the relationship between unemployment and infant mortality (Gerdtham & Ruhm, 2006).

This paper focuses on explaining the inverse relationship between infant mortality and unemployment in the U.S. Very few researchers have concentrated their efforts on explaining how these variables are associated. In this respect, Dehejia and Lleras-Muney (2004) investigate the relationship between babies' health outcomes at birth and the unemployment rate. They argue that during periods of high unemployment newborns' health outcomes improve because mothers, now with more time at their disposition, tend to improve their prenatal care. A different causal mechanism is proposed by Chay and Greenstone (2003), who examine the impact of air pollution on infant mortality during the economic recession of 1981-1982. They theorize that as the economy declines—thus producing higher unemployment rates—productivity slows down and subsequently pollution declines. They found that lower exposure to air pollution during pregnancy was associated with fewer infant deaths during the recession.

Previous research finds that legal access to abortion has a significant impact on IMR (Corman, Joyce, & Grossman, 1987; Grossman & Jacobowitz, 1981; Grossman & Joyce, 1990; Joyce, 1987; Joyce & Grossman, 1990). Research also provides evidence showing that a fraction

of fetuses that are aborted would not necessarily survive the first year of life. The elimination of a non-trivial number of weaker fetuses from the pool of live births would decrease the number of infant deaths; therefore, the IMR decreases as access to abortion increases (Joyce, 1987; Gruber, Levine & Staiger, 1999). In other words, abortion acts as a selective mechanism through which unhealthy fetuses are eliminated, thus statistically increasing the overall health of the pool of live births. Even though not all aborted fetuses are unhealthy, the infant mortality rate of aborted fetuses (had they been born) would have been substantially higher than the observed infant mortality rate of the living newborns.

Further, research suggests that women who decide to have an abortion are not a random sample in the population. Using data from 1965 to 1979, Gruber, Levine & Staiger (1999) find that marginal aborted fetuses that would have nevertheless been born would have lived under adverse circumstances compared to the average child in their same cohort. Their results show that, if these fetuses were born, "they would have been 60% more likely to live in a single-parent household, 50% more likely to live in poverty, 45% more likely to be in a household collecting welfare, and 40% more likely to die during the first year of life" (265). Accordingly, as Joyce (1987) contends, preventing unintended, unwanted pregnancies via abortion reduces the fraction of pre-term and low-birth-weight infants (two indicators strongly associated with infant mortality) among the pool of live births. Likewise, a second body of research has found that abortion is strongly and positively correlated with the UR (Blank, George, & London, 1996). Using state-level data, these authors find that an increase of 1% in the UR is associated with a 3% increase in the abortion rate.

Making use of these two independently established relationships—namely that infant mortality decreases when abortions increase and that abortions increase when unemployment

increase—we attempt to shed light on why the IMR fluctuates procyclically in the U.S. Explicitly, we argue that in conditions of rising unemployment women's demand for abortion increases, which subsequently generates a decline of the IMR via the elimination of a non-trivial fraction of weaker fetuses from the pool of live births in the U.S.

Hypotheses

In 1973, the Roe v. Wade court case led the Supreme Court to rule in favor of the right for pregnant women to choose to have an abortion. Abortion suddenly went from being banned in all but a handful of states to being legal in all 50 of them. Although this decision legalized abortion, there have been a variety of socio-political differences among states that, over the years, have either facilitated or hindered women's access to abortions. These differences include, but are not limited to, state restrictions that limit public funding of abortions, the number of abortion providers, and the rules governing parental consent. Other differences include abortion policies influenced by state level public opinion on abortion, influential religious institutions, and the political ideology of the party that controls the state legislature (Blank et al., 1996; Norrander & Wilcox, 1999). Not surprisingly, research has found that state level abortion rates decline when the number of abortion providers, the degree of public funding, and the access to abortion services are restricted (Blank et al., 1996; Matthews, Ribar, & Wilhelm, 1997).

Considering differences between states in the level of difficulty that women face when attempting to get an abortion, it would be expected that the role that legalized abortion plays in the relationship between infant mortality and unemployment would differ between states where it is difficult to obtain a legal abortion and those where it is not—i.e., between states that are socially conservative v. socially liberal. Accordingly, it could be hypothesized that the effect of unemployment on infant mortality would differ between states where it is difficult to get an

abortion compared to states where it is less difficult. Specifically, if this theory is correct, we would expect to see that the effect of the UR on the IMR would be higher in states where abortion is difficult (i.e., socially conservative states) compared to states where abortion is less difficult (i.e., socially liberal states). This is because, presumably, when unemployment increases in states where obtaining an abortion is difficult, a larger fraction of pregnant women would have to take their pregnancies to term, and therefore a higher fraction of weaker fetuses would become part of the pool of live births. And conversely, we would expect that when unemployment increases in states where obtaining an abortion is less difficult, a higher fraction of women would opt out of their pregnancies, meaning that more weaker fetuses would be removed from the pool of live births.

However, this expectation of the relationship of interest may not be entirely accurate. This is because a key aspect about abortion that helps to explain the relationship between unemployment and infant mortality is the healthy-unhealthy composition of fetuses that are aborted above and beyond a state's expected rate of abortion conditional on a given set of states' characteristics—a situation that varies between socially conservative and socially liberal states. Therefore, given an increase in unemployment, there are three compositional hypothetical possibilities that would lead to three different infant mortality outcomes:

(1) If the group of aborted fetuses is mostly comprised of healthy fetuses, then the pool of live births would include a non-trivial portion of unhealthy fetuses, and the IMR increases.

(2) If aborted fetuses are mostly comprised of unhealthy fetuses, then the pool of live births would tend to be a healthier one, and the IMR decreases.

(3) If aborted fetuses are comprised of both unhealthy and healthy fetuses, representing a random sample of the fetus population, then the IMR should not vary.

Data

All data are at the state level and we run our analysis over the periods of 1973-1982 and 1973-1988. The dependent variable is the infant mortality rate, which is defined as the number of infant deaths under age 1 per 1,000 live births. Data on infant mortality come from the National Institutes of Health (NIH). The two variables of interest are the annual unemployment rate and the abortion rate. Unemployment rate is obtained from the Bureau of Labor Statistics (BLS) and defines the unemployed as percentage of the labor force. State-level abortion rate data come from the Alan Guttmacher Institute (AGI) and the rate is defined as the number of abortions (excluding fetal deaths/miscarriages) per 1,000 women aged 15-44 years by state of occurrence.

The AGI data are collected from surveys to abortion providers, which provide a raw count of abortions. The AGI is often considered to provide a more accurate account of abortion statistics than the Centers for Disease Control and Prevention (CDC), whose data are compiled from state health agencies, which are known to non-randomly undercount the number of legal induced abortions (Blank et al., 1996; Levine, 2003). For this reason, the AGI data are also more commonly used in abortion research. Even though state AGI abortion data between 1973 and 1982 are complete for all 50 U.S. states (with the exception of two data points), after 1982 the AGI data are collected less frequently, and even more infrequently after 1988, when data are only collected every 2 or 3 years. For these reasons, we run two analyses, one from 1973 and 1982, and the other from 1973 to 1988 (where data for years 1983 and 1986 are missing). In our analyses, we also controlled for the state average age for all females, collected from the National Cancer Institute.

To evaluate our three hypothetical scenarios, we developed a regression model to classify the 50 states as "Difficult" (i.e., socially conservative) or "Less Difficult" (i.e., socially liberal) depending on the larger or smaller degree of socio-political opposition women may face to perform an abortion. In this model, we regressed state abortion rates on an informative set of covariates that relate to abortion difficulty. Among this vector of covariates, we included such variables as the measure of the state's government ideology, the percent of Protestant evangelicals in the state, the percent of women living in counties without abortion providers, and the citizen's attitudes toward their government's use of public funding for abortion. Difficult states were those under the median of the predicted aborted rate values, whereas states over the median were classified as less difficult. (Refer to the Appendix for a detailed description of the model, data sources, and variables used to classify the states by level of difficulty.)

Methodology

Our various regressions use the following general econometric specification:

$$M_{st} = \mu_s + \nu_t + \beta_1 U_{st} + \varepsilon_{st} \quad (1)$$

where M_{st} is the infant mortality rate in state *s* at year *t*; μ_s are fixed effects for states, which allow us to control for time-invariant state-specific characteristics; ν_t are year-fixed effects, which allow us to control for nationwide time effects; U_{st} is the unemployment rate in state *s* at year *t*; and ε_{st} is the error term. Equation 1 was first estimated for the complete sample comprised by all states, and then for socially conservative and liberal states separately.

Subsequently, to analyze our relationship of interest, we estimated versions of the following general econometric specification:

$$M_{st} = \mu_s + \nu_t + \beta_1 U_{st} + \beta_2 D + \beta_3 D U_{st} + \delta_1 X_{st} + \delta_2 D X_{st} + D\nu_t + \varepsilon_{st} \quad (2)$$

where M_{st} is the infant mortality rate in state *s* at year *t*; μ_s and υ_t are fixed effects for states and years, respectively; U_{st} is the unemployment rate in state *s* at year *t*; D is a dummy variable for difficulty to perform an abortion (coded "1" for socially conservative states, and "0" for socially liberal states); DU_{st} is an interaction term between D and U_{st}; X_{st} is the average female age in state *s* at year *t*; DX_{st} is an interaction term between D and X_{st}; $D\upsilon_t$ represents a series of interaction terms between D and fixed-year effects ν_t; and ε_{st} is the error term.

In essence, Equation 2 allows us to test for the statistical significance of the differential effect of unemployment on infant mortality between socially conservative and liberal states. To carry out this test, we test the joint null hypothesis $(\beta_2, \beta_3) = (0, 0)$. If we reject the null hypothesis that the coefficients β_2 and β_3 are jointly equal to 0, we can conclude that the differential effect of unemployment on infant mortality is statistically significant and, therefore, that the effect of unemployment on infant mortality is moderated by the level of difficulty to get an abortion.

The standard errors were estimated using the Newey-West estimator, which is robust to arbitrary forms of serial correlation. Given that the Newey-West estimator tends to underestimate sampling variability, we used a fixed-bandwidth asymptotics methodology to adjust the *p* values and the 95% confidence intervals, which are, therefore, the statistics reported in Table 1. The distribution of the error term is also assumed to be heteroskedastic and autocorrelated up to a 1-year lag. Our analyses were also run using 2- and 3-year lags, with very similar results. Because the variance of M_{st} is proportional to the square root of the number of live births in any given state, there is heteroskedasticity of M_{st}, and, therefore, all regressions were weighted by the square root of annual live births in each state.

Results

Our analysis concentrates on the results obtained for the period 1973-1982, which is a complete data analysis; the findings for the period 1973-1988 (with incomplete data but with a longer series) are reported as a robustness check. For purposes of illustration, a visual representation of the pooled IMR, UR, and abortion rate (AR) state-level data from 1973 to 1988 shows that the relationships between the variables are in congruence with the theory (Figure 1). The bottom panel in Figure 1 also illustrates that the relationship between infant mortality and unemployment differs between socially conservative and liberal states, with the paradoxical relationship being more evident for socially conservative states.

Table 1 presents the regressions output retrieved from versions of Equations 1 and 2 for the periods 1973-1982 and 1973-1988. The first five columns (Models 1 through 5) show parameter estimates using a state-fixed effects specification; the next five columns (Models 6 through 10) show parameter estimates using a state- and year-fixed effects specification. Results from Model 1 (1973-1982) confirm the negative, strong, and statistically significant association between UR and IMR reported in the literature ($\hat{\beta} = -0.552$, $p = 0.000$). Models 2 and 3 parameter estimates ($\hat{\beta} = -0.739$, $p = 0.000$ and $\hat{\beta} = -0.374$, $p = 0.000$, respectively) indicate that the impact of UR on IMR is twice as big in socially conservative states as in socially liberal states. In addition, note that the effect of UR on IMR in socially conservative states is statistically significant and 34% higher than the overall effect estimated using all states (−0.739 *v.* −0.552). Likewise, the effect of UR on IMR in socially liberal states is statistically significant and 32% smaller than the overall effect estimated using all states (−0.374 *v.* −0.552).

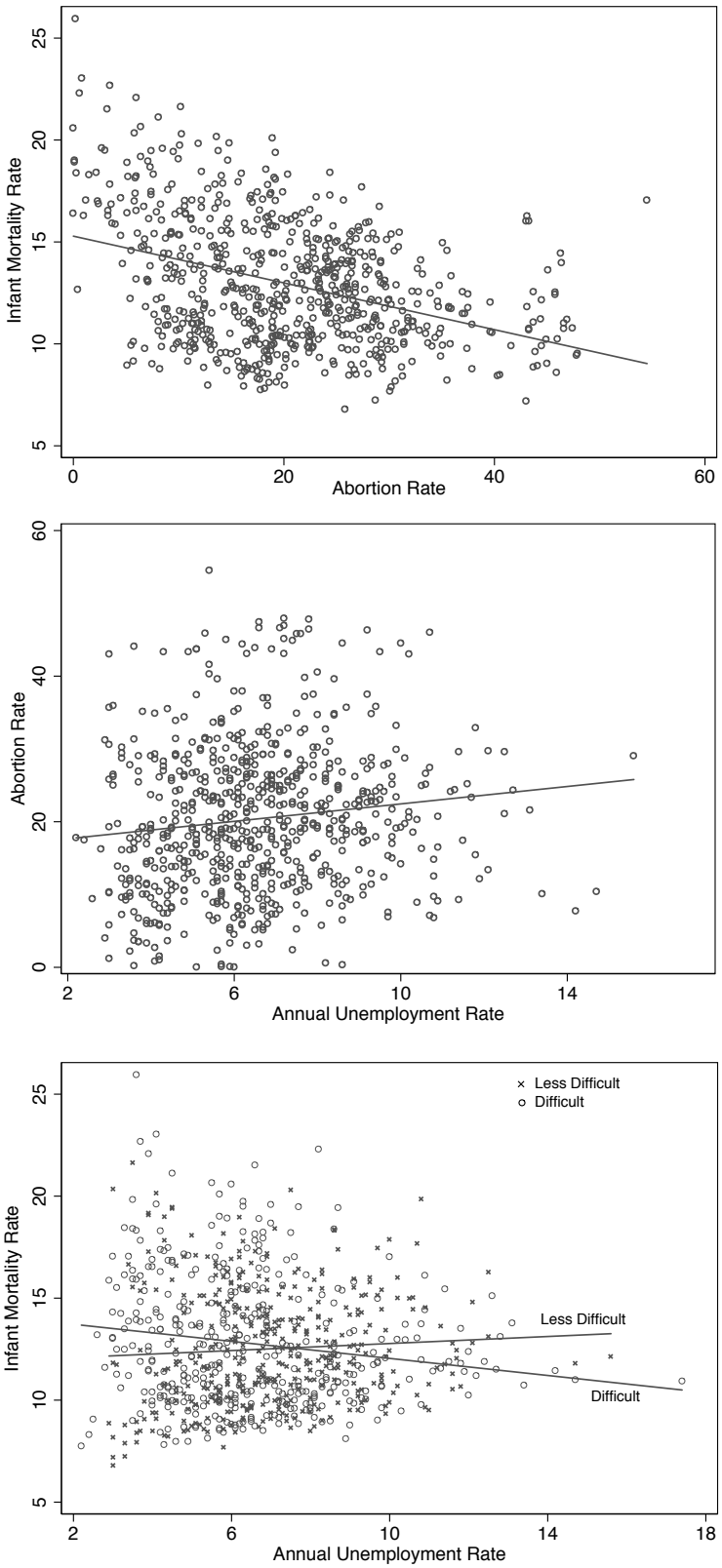

Figure 1. The relationships between three variables used in the study for the period from 1973 to 1988. "Most difficult" and " Least difficult" represent the states where it is most difficult/least difficult for a woman to get an abortion, respectively.

	(1) All states	(2) Difficult states	(3) Less Difficult states	(4) Interactive model	(5) Interactive + control	(6) All states	(7) Difficult states	(8) Less Difficult states	(9) Interactive model	(10) Interactive + control
State Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Fixed Effects	N	N	N	N	N	Y	Y	Y	Y	Y
					Period 1973-1982					
Unemployment Rate (U)	-.552	-.739	-.374	-.374	-.034	-.067	-.171	.025	.025	.028
	±.1245	±.137	±.197	±.197	±.089	±.075	±.134	±.092	±.092	±.091
	(.000)	(.000)	(.000)	(.000)	(.452)	(.080)	(.012)	(.592)	(.592)	(.541)
Abortion-Difficulty (D)				8.493	26.243				5.470	27.079
(Difficult=1; Less=0)				±3.301	±2.135				±1.383	±35.664
				(.000)	(.000)				(.000)	(.136)
Interaction (U X D)				-.365	-.132				-.196	-.200
				±.240	±.140				±.163	±.156
				(.003)	(.064)				(.018)	(.011)
Observations	500	250	250	500	500	500	250	250	500	500
Joint Wald Test *p* value				.000	.000				.000	.019
					Period 1973-1988					
Unemployment Rate (U)	-.396	-.754	-.098	-.098	-.152	-.125	-.164	-.090	-.090	-.081
	±.139	±.151	±.213	±.213	±.087	±.053	±.096	±.075	±.075	±.075
	(.000)	(.000)	(.368)	(.368)	(.001)	(.000)	(.001)	(.019)	(.019)	(.032)
Abortion-Difficulty (D)				7.072	-1.424				2.648	23.325
(Difficult=1; Less D.=0)				±3.423	±1.408				±1.346	±22.503
				(.000)	(.047)				(.000)	(.042)
Interaction (U X D)				-.656	-.107				-.074	-.077
				±.261	±.124				±.122	±.121
				(.000)	(.092)				(.233)	(.207)
Observations	800	400	400	800	800	800	400	400	800	800
Joint Wald Test *p* value				.000	.000				.000	.088

Table 1. Panel regression parameter estimates for periods 1973-1982 and 1973-1998. The dependent variable is the state-year infant mortality rate. First five columns include state fixed effects models; columns 6-10 include state and year fixed effects models. The 95% confidence intervals are provided and *p* values are in parentheses. P values and 95% CI are estimated using the Newey-West estimator and adjusted using fixed-beta asymptotics. The panel error structure is assumed heteroskedastic and autocorrelated up to one-year lag. The terms "Difficult" and "Less Difficult" refer to the level of difficulty to carry out an abortion in a given state. Difficult states refer to the 25 states where is most difficult to get an abortion, and Less Difficult states refer to the 25 states where is less difficult to get an abortion (Appendix). Wald tests for the joint significance shows the results of testing if the differential unemployment effect on infant mortality between difficult and non-difficult states is statistically significant.

Model 4 presents the results of the interactive, state-fixed effects model and reports the *p* value of the joint statistical significance of the differential effects of UR on IMR estimated in Models 2 and 3. The joint Wald test shows that the difference in the effects of UR on IMR between socially conservative and liberal states is statistically significant ($p = 0.000$). Model 5 shows that the differential effect of UR on IMR is robust when also controlling for the female average age in each state.

Results from state and year-fixed effects models (1973-1982) reinforce the general pattern retrieved from using a state-fixed effects specification. Model 6 shows the overall effect of UR on IMR is negative and marginally statistically significant (−0.067, $p = 0.080$). Parameter estimates from Models 7 and 8 (−0.171, $p = 0.012$ and −0.025, $p = 0.592$, respectively) reaffirm our notion that the healthy-unhealthy composition of additionally aborted fetuses is very different between socially conservative and liberal states, with a highly statistically significant effect of UR on IMR in socially conservative states that is two-and-a-half times larger than the overall effect, and a close-to-zero non-statistically significant effect of UR on IMR in socially liberal states.

Model 9 presents the results of the interactive, state- and year-fixed effects models and reports the *p* value of the joint statistical significance of the differential effects of UR on IMR estimated in Models 7 and 8. The joint Wald test shows the effects of UR on IMR are statistically different ($p = 0.000$) between socially conservative and liberal states. Model 10 shows that the estimated differential effect of UR on IMR is robust when adding female age as control ($p = 0.019$).

Results for the period 1973-1988 (bottom panel in Table 1) confirm the general patterns retrieved from analyses for period 1973-1982. We also experimented estimating all of our

models with an abortion-difficulty state classification computed using AGI data for the abortion ratio, defined as number of abortions per 1,000 live births. Results from this exercise were very similar to the ones reported here (Appendix).

Discussion

When unemployment increases, demand for abortions increases in both socially conservative and liberal states. However, the healthy-unhealthy composition of aborted fetuses above and beyond a state's expected abortion rate moderates the effect of UR on IMR depending on the difficulty women face to carry out an abortion. Aside from large differences in infant mortality rates between socially conservative and liberal states, with socially liberal states showing a much lower IMR than socially conservative states ($\hat{\beta} = 5.470, p = 0.000$, Model 9), we find a negative effect of UR on IMR in socially conservative states. This means that once controlling for differences in IMR between difficult and less difficult states, the group of fetuses aborted above and beyond a state's expected abortion rate includes a non-trivial share of unhealthy fetuses, and therefore IMR decreases when unemployment increases. Accordingly, when there is a deterioration of the economy, socially conservative states become effectively "protective" of healthy fetuses that would have been aborted above and beyond their expected abortion rate.

Legalized abortion strongly diminishes infant mortality in both socially conservative and liberal states, reinforcing the idea that a fraction of aborted fetuses would not have survived the first year of age if the pregnancy were taken to term. However, as mentioned above, this effect is more evident in socially conservative states than in socially liberal ones. Aborted fetuses in socially conservative states tend to be, on average, less healthy than those aborted in socially liberal states; or, put differently, if aborted fetuses were born in socially conservative states, the

IMR of that group would be higher compared to the IMR of the same group in socially liberal states. Our results suggest that when unemployment increases in socially liberal states, there is no systematic filter imposed on the healthy-unhealthy composition of fetuses aborted above and beyond their expected abortion rate, and therefore their IMR seems to be insensitive to unemployment fluctuations.

Placing results from Model 9 (1973-1982) into perspective, a 1% increase in the annual UR in socially conservative states is associated with an average 17.1 fewer state-year infant deaths per 100,000 live births. In socially liberal states, a 1% increase in the annual UR is associated with an average 2.5 fewer state-year infant deaths per 100,000 live births. Thus the average difference associated with an annual 1% increase in the UR is 14.6 fewer annual infant deaths per 100,000 live births in socially conservative compared to socially liberal states. Considering that the average IMR between 1973 and 1982 was 14.2 for conservative states, and 13.8 for socially liberal states, we can conclude that an annual 1% increase in the UR is associated with a 1.2% and 0.2% average state-year decrease in the IMR in socially conservative and liberal states, respectively—for a relative difference of a 1% larger decrease in the IMR in socially conservative compared to socially liberal states.

Our results confirm that, on average, overall infant mortality decreases during economic contractions, which is in agreement with previous research (Dehejia & Lleras-Muney, 2004; Ruhm, 2000). The findings also provide evidence in favor of the proposed hypothesis that the difficulty women face when trying to get an abortion moderates this relationship. Our identified causal mechanism, however, brings to light that a non-trivial fraction of the infant mortality effect that has traditionally been attributed to unemployment is actually moderated by abortion.

Estimates from Model 9 corroborate that abortion has a powerful effect on the IMR (Grossman & Jacobowitz, 1981). Our coefficient estimates for "difficulty" show an average of 418 more state-year infant deaths per 100,000 live births in socially conservative compared to liberal states (setting the UR at an average state rate of 6.6%, 1973-1982). Considering that the average IMR for socially conservative states was 14.2 in this period, we can conclude that had socially conservative states relaxed their abortion opposition as much as socially liberal states did between 1973 and 1982, their IMR would have been 29% higher. This finding is similar to the 20% estimate for period 1964-1977 reported by Grossman and Jacobowitz (1981), who concluded that "the increase in the legal abortion rate is the single most important factor in reductions in both white and nonwhite neonatal mortality rates" (p. 695). This is not surprising when considering that by 1982 about 30% of all pregnancies were terminated via abortion in the U.S. (for an approximate 1.6 million abortions annually). Examining the estimated coefficients of unemployment and "difficulty" on the IMR over the period 1973-1988 reaffirms the patterns found for the period 1973-1982, although the estimated impact is about a half.

Conclusion

This paper unpacks a causal mechanism that contributes to the explanation of the paradoxical finding that infant mortality is procyclical. Accordingly, we test the hypothesis that the relationship between the infant mortality rate and the unemployment rate is moderated by abortion. Accounting for state-level socio-political differences that regulate the level of difficulty women face when performing abortions, we classified states into those where it is difficult and those where it is less difficult to have an abortion; namely, into socially conservative and liberal states, respectively. We analyze these relationships for the periods 1973-1982 and 1973-1988, depending on data availability, and during the critical period when states began to allow women

to carry out abortions.

When estimating the overall effect of unemployment on infant mortality, we find that it is strong, negative, and statistically significant as previously described by the literature. Once we account for the difficulty women face when having abortions, we find that the effect is negative, statistically significant, but much stronger in socially conservative states compared to socially liberal states. The effect of unemployment on infant mortality in socially liberal states is substantially lower than in socially conservative states, and non-statistically significant. The difference in the effects between socially conservative and liberal states shows to be substantial and statistically significant. These results provide evidence for the notion that a non-trivial fraction of the infant mortality effect that has traditionally been attributed to unemployment is actually moderated by legalized abortion, which acts as a selective mechanism that countercyclically inflates the health of the pool of living births, thus affecting the IMR.

The relationship between unemployment and infant mortality is particular to the healthy-unhealthy composition of the fetuses that are aborted above and beyond a state's expected rate of abortion. Our findings confirm research that shows legalized abortion has a powerful effect on the infant mortality rate in both socially liberal and conservative states. The effect, however, is particularly powerful in socially conservative states where the infant mortality rate is higher, compared to socially liberal states. The opposition to abortion in socially conservative states shows to be "protective" of healthy fetuses (thus allowing women to abort mostly unhealthy fetuses), whereas the pool of aborted fetuses in socially liberal states seems to be comprised of both healthy and unhealthy fetuses. Had socially conservative states relaxed their abortion opposition, their IMR would have been higher. Yet, if socially conservative states had markedly increased their abortion opposition, their IMR would have increased as well, for the group of

unhealthy fetuses that were selectively aborted would have became part of the pool of living births.

Accordingly, the differential effect of unemployment fluctuations on the infant mortality rate in socially conservative v. socially liberal states shows that the opposition women face to terminate their pregnancy when there is an increased demand for abortions generates a protective effect on healthy fetuses, and the infant mortality rate declines more intensely in socially conservative states compared to socially liberal states during downturns of the economy. Results show a statistically significant effect of unemployment on infant mortality in socially conservative states, two-and-a-half times bigger than the overall effect, and a non-statistically significant, close-to-zero effect estimated in socially liberal states. An annual 1% increase in the unemployment rate is associated with a 1.2% and 0.2% average state-year decrease in the IMR in socially conservative and liberal states, respectively, with a relative difference of a 1% larger decrease in the IMR in socially conservative compared to liberal states.

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Appendix

Model specification to classify "Difficult" and "Less Difficult" states to get an abortion

To classify states in terms of difficulty to obtain an abortion, we used an econometric model specification that includes a set of informative variables about socio-political factors that affect the level of difficulty women may face when decided to have an abortion. The model specification is as follows:

$$A_{st} = \alpha + \beta X_{st} + \delta I_s + \varepsilon_{st} \quad (3)$$

where A_{st} denotes abortion rate in state *s* at year *t*; X_{st} is a vector of relevant factors related to the difficulty to have an abortion in state *s* at year *t* (state citizen ideology, state government ideology, number of abortion providers by state, number of abortion providers per women of ages 15-44 years in each state); I_s is a vector of relevant factors that facilitate, or hinder the ability to have an abortion in a given state. Including, (parental consent, government funding of abortions, affirmative action, percent of counties without an abortion provider, percent of women living in counties without an abortion provider, percent of evangelical Protestants); and ε_{st} is an error term. For a description of the variables and their sources see Table 1A in the Appendix. We can expect the vector I_s to be roughly stable pre-1992, since it was not until after Planned Parenthood v. Casey (1992) that within-state variability became more evident.

The fitted values for the abortion rates in state *s* at year *t* constitute the abortion-difficulty variable, which, once ranked from low to high, represented states from high difficulty to low difficulty. A low predicted abortion rate is associated with higher difficulty to carry out an abortion; a high value is associated with less difficulty to have an abortion (Table 2A). Subsequently, a dummy variable was created to categorize states by level of difficulty, with those states that were above the median classified as "less difficult" or "socially liberal" (n = 25)

and those under the median classified as “difficult” or “socially conservative” (n = 25). This dummy variable was used in Equations 1 and 2. Even though the grading or classification of states by level of difficulty to have an abortion has been carried out by interest groups and organizations (e.g., Americans United for Life, NARAL Pro-Choice America), especially during the last decade, our classification of states for our period of interest was congruent with those reported by such organizations.

Variable	Data source and variable description
State citizen ideology	Source: Berry, Ringquist, Fording, and Hanson (1998). Data from 1973 to 1988.
State government ideology	NOMINATE measure of state government ideology. Source: Berry, Fording, Ringquist, Hanson, and Klarner (2010). Data from 1973 to 1988.
Number of abortion providers by state	Source: Henshaw and Kost (2008). Data from 1973 to 1988.
Number of providers per women of ages 15-44 in each state	Variable created using the number of providers divided by number of women population aged 15-44 in each state multiplied by 10,000. This variable represents the number of abortion providers weighted by the number of female fertile population in each state. Data from 1973 to 1988.
Parental consent	Source: Norrander (2001). Survey from 1988 to 1992 conducted by the American National Election Study. Attitude towards the need of parental consent for abortions. High values on parental consent reflect liberal position (Norrander, 2001). A scale built from three questions: 1. Would you favor or oppose a state law that would require parental consent before a teen-ager under 18 could have an abortion? 2. Do you favor such a law strongly or not strongly? 3. Do you oppose such a law strongly or not strongly? The full wording of each question is available in the American National Election Study: Pooled Senate Election Study, 1988, 1990, 1992 (ICPSR 9580).
Government funding of abortions	Source: Norrander (2001). Survey from 1988 to 1992 conducted by the American National Election Study. Attitude towards the use of government funding for abortions. High values on government funding of abortion represent conservative position (Norrander, 2001). A scale built from three questions: 1.Would you favor or oppose a law in your state that would allow the use of government funds to help pay for the costs of abortion for women who cannot afford them? 2. Do you favor government funding for abortions strongly or not strongly? 3. Do you oppose government funding for abortions strongly or not strongly? The full wording of each question is available in the American National Election Study: Pooled Senate Election Study, 1988, 1990, 1992 (ICPSR 9580).
Affirmative action	Source: Norrander (2001). Survey in 1988, 1990, and 1992 conducted by the American National Election Study. High values on affirmative action represent conservative position (Norrander, 2001).
% of counties without provider	Source: Henshaw and Kost (2008). Data from 1976.
% of women living in counties without provider	Source: Henshaw and Kost (2008). Data from 1988.
% of evangelical Protestants	Source: (ARDA) The Association of Religion Data Archives. Data from 1980.

Table 1A. Data sources of the variables used in Equation 3 to classify difficult and less difficult states to get an abortion.

Difficult States					Less Difficult States				
State	Mean	Std. Dev.	Min	Max	State	Mean	Std. Dev.	Min	Max
South Dakota	7.1	0.35	6.7	7.8	New Mexico	19.1	0.86	18.2	20.7
West Virginia	7.7	0.44	7.1	8.5	Montana	19.3	2.67	15.1	22.6
Mississippi	9.1	0.67	7.9	10.0	Georgia	20.2	1.62	17.9	22.5
North Dakota	9.8	0.53	9.0	10.7	Delaware	20.4	0.35	19.8	20.9
Kentucky	10.2	0.35	9.6	10.8	Pennsylvania	20.7	2.12	16.5	23.0
Arkansas	10.5	0.43	9.5	11.0	Illinois	20.9	1.09	18.8	22.6
South Carolina	11.3	0.42	10.6	11.9	Maine	22.7	3.16	18.0	28.0
Wyoming	11.7	1.02	9.4	13.3	Connecticut	23.6	1.60	20.0	24.8
Louisiana	12.4	0.60	11.2	13.1	Michigan	23.7	0.79	21.8	24.4
Iowa	12.4	0.35	11.7	12.8	Texas	24.1	2.04	19.1	25.7
Wisconsin	12.6	0.45	11.8	13.2	Oregon	24.1	0.66	23.2	25.1
Idaho	13.1	1.16	10.6	14.7	Arizona	24.3	1.34	21.3	26.1
Nebraska	13.5	0.68	12.5	14.4	North Carolina	24.4	0.38	23.9	25.1
Utah	13.8	0.49	13.0	14.5	Maryland	24.7	0.96	23.1	25.8
Oklahoma	14.5	0.72	13.0	15.2	Vermont	24.8	2.74	20.0	27.0
Minnesota	14.5	0.46	13.7	15.3	New Jersey	24.9	1.56	21.7	26.8
Indiana	15.2	0.48	14.7	16.1	Massachusetts	25.5	1.07	23.5	26.6
Alabama	15.3	1.33	13.1	16.9	Alaska	25.9	3.11	22.9	34.0
Missouri	15.8	0.68	14.4	16.6	Florida	27.0	2.41	22.7	29.8
Virginia	16.5	1.95	13.8	19.2	Nevada	27.7	1.40	25.8	29.8
Ohio	17.2	0.57	15.8	18.0	Colorado	27.9	2.17	23.5	30.5
Rhode Island	18.0	0.43	17.3	18.6	Washington	28.3	1.10	27.0	29.8
Kansas	18.1	0.82	16.0	18.9	Hawaii	31.9	2.90	27.3	35.1
New Hampshire	18.7	2.02	15.6	20.8	New York	36.4	1.30	33.2	37.6
Tennessee	18.9	1.54	15.8	20.2	California	49.2	2.78	43.0	52.8

Table 2A. List of states and descriptive statistics for state abortion rate fitted values from Equation 3. The period covered is 1973-1982. The abortion rate is defined as number of abortions per 1,000 women between ages 15 and 44 years. The reported mean represents the annual abortion rate of states as predicted by socio-political factors associated with the difficulty women may face to have an abortion. Lower abortion rates are associated with higher difficulty to have an abortion. The 25 difficult states are those over the median predicted abortion rate; the 25 less difficult states are those under the median.