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Booms, Busts, and Divorce

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Abstract

For almost a century, anecdotes have suggested that divorce rates decline during recessions. However, until very recently there has been surprisingly little formal empirical evidence on whether such a link exists, let alone its magnitude if it does. Moreover, the anticipated direction of the effect is ambiguous theoretically. Although previous studies have concluded that individual job loss destabilizes marriages, macroeconomic conditions may affect divorce probabilities even for those not directly experiencing a job shock. We add to the few existing contemporaneous studies of the effects of macroeconomic shocks on divorce by conducting an empirical analysis of the relationship between state-level unemployment rates and state-level divorce rates using vital statistics data on divorces in the United States from 1976–2009. We find a significant and robust negative relationship between the unemployment and divorce rates, whereby a one percentage point rise in the unemployment rate is associated with a decrease of 0.043 divorces per one thousand people, or about a one percent fall in the divorce rate. The result that divorce is procyclical is robust to a host of alternative empirical specifications, to disaggregating by state characteristics and time period, to expanding the unemployment series back to 1970, and to using alternative measures of local economic conditions.

Keywords

divorce; unemployment rate; business cycles

“Marriage counselors and divorce lawyers nationwide say more distressed couples are putting off divorce because the cost of splitting up is prohibitive in a time of stagnant salaries, plummeting home values and rising unemployment.”

Alex Johnson, November 23, 2008, msnbc.com¹

There has long been interest in, and many anecdotal accounts of, the consequences of economic recession on marital stability. Recently, discussions in the popular press have drawn from a variety of sources including surveys of divorce lawyers,² op-ed articles by social scientists,³ and interviews of individuals.⁴ In fact, researchers dating back to at least

¹<http://www.msnbc.msn.com/id/27808110>, viewed on December 22, 2008.

²See, for example, American Academy of Matrimonial Lawyers (2008).

³See, for example, Wolfers (2009) and Cherlin (2009).

the 1920's have speculated that divorce rates might decline in times of economic recession (Ogburn and Thomas, 1922). Given the long history of interest in the subject, it is surprising that it has taken until the recent "Great Recession" for there to be renewed interest in systematically examining the empirical evidence supporting—or refuting—this assertion.

Whether divorce is pro-cyclical or counter-cyclical is ambiguous theoretically. We therefore conduct an empirical examination of the relationship between macroeconomic conditions and divorce over recent decades. In our main analysis, we combine data on state-by-year unemployment rates with state-by-year vital statistics data across the United States over the period 1976 to 2009. We assess the impact of local macroeconomic conditions on state-level divorce rates, controlling for year fixed effects, state-specific time trends, and state-specific time-invariant determinants of divorce rates.

We find strong evidence that the divorce rate is pro-cyclical, a result that is consistent with the two other very recent studies examining the cyclicalities of divorce using vital statistics data (Amato and Beattie, 2011; Schaller, 2010). Our basic finding of pro-cyclical divorce is robust to alternative empirical specifications and is found when we allow the effect of unemployment rates on divorce to vary by the fraction of the population that is Catholic (40% or more Catholic versus less than 40%), the census region, and by time period. We also show that this finding is robust to extending our unemployment series back to 1970 by using the Blanchard and Katz (1992) series on state-by-year unemployment rates for 1970–1975. The early 1970s is an important time period given large and differential increases in divorce rates across states in these years, which occurred as many states were adopting unilateral and no-fault divorce laws. Finally, we replace the unemployment rate at the state-by-year level as our measure of macroeconomic conditions with two alternative measures: state-by-year per capita gross domestic product (GDP) and state-by-year per capita income. These results also demonstrate strong evidence of the pro-cyclicity of divorce, thereby corroborating the results using unemployment rates.

What is perhaps most surprising about this finding of pro-cyclical divorce is the contrast to what is known about the effects on families of an individual job loss. Prior work has shown that household level income shocks (whether positive or negative) can be destabilizing to a marriage (see, e.g., Charles and Stephens, 2004). In particular, we are not aware of any empirical evidence that losing one's job leads to a *lower* risk of divorce. If the unemployment rate is a proxy for the aggregation of many individual household adverse shocks, then we would expect the divorce rate to be either counter-cyclical or perhaps acyclical. Indeed, if families experience a greater degree of stress and marital conflict during a bust we should expect a rise in the divorce rate, not a fall. Therefore, it must be the case that the mechanisms through which high unemployment rates affect families are quite different than from individual employment shocks. Although in this paper we simply document this robust and perhaps surprising incongruence, disentangling and understanding these mechanisms is an important topic for future research. In the next section we discuss potential mechanisms through which the business cycle might affect marital stability in ways other than directly through individual job loss.

⁴For example, see Johnson (2008).

We note at the outset that the huge secular changes in divorce over the last 50 years (see, e.g., Stevenson and Wolfers, 2007, and Cherlin, 1981) dwarf the effects of the business cycle on divorce. Nonetheless, determining how local macroeconomic conditions affect divorce rates is an important component in understanding the stability of marriages. Documenting how business cycles affect marital dissolution rates contributes to a large body of research examining the impact of the economy on demographic outcomes. For example, in an early paper, Ben-Porath (1973) demonstrates that both marriage and fertility are pro-cyclical. Individual health outcomes have been shown to vary across the business cycle as well. Several studies have found that mortality rates drop (for all causes except suicide) and that people are generally healthier during periods of macroeconomic turmoil.⁵

A second motivation is that knowing divorce rates are pro-cyclical in the aggregate suggests important avenues for future research on the determinants of divorce at the individual level. For example, researchers and policymakers have long sought to identify factors that contribute to marital instability, particularly in at-risk populations.⁶ Identifying how macroeconomic conditions, particularly unemployment rates, affect families will contribute to our understanding of how families may or may not react to business cycles.

And finally, in our view, the magnitude of the effect we report is qualitatively significant. We estimate that a one percentage point fall in the unemployment rate during the years 1976 to 2009 was associated with an increase in the divorce rate of 0.043 divorces per one thousand people. This is roughly equivalent to a one percentage point drop in the unemployment rate yielding a one percent rise in the divorce rate.

II. Background

There is a long history of research speculating that divorce rates fall in times of macroeconomic decline (e.g., Ogburn and Thomas, 1922). However, until very recently, there has been surprisingly little empirical evidence on whether such a link exists, let alone its magnitude if it does.⁷ South (1985) and Fischer and Liefbroer (2006) are notable exceptions. South finds that divorce rates covary positively with the unemployment rate (that is, that divorce is counter-cyclical), arguing against what he describes as the conventional wisdom suggested in prior research. Fischer and Liefbroer use data from the Netherlands and also find a slight negative relationship between consumer confidence and marital dissolution rates, implying again that dissolution is counter-cyclical. Both of these studies use time-series data at the national level, and so neither is able to control for secular changes in the divorce rate and the economy that may be spuriously correlated.

We are aware of three other very recent papers that take up the question of the cyclicity of divorce. The existing published paper, Amato and Beattie (2011), conducts a state-level analysis of divorce rates on unemployment rates using vital statistics data from 1960–2005 at five-year intervals, controlling for state and year fixed effects. The authors conclude that

⁵For example, see Ruhm (2000), Tapia Granados (2005), and Miller et al. (2009). Xu and Kaestner (2010) provide an excellent review of this literature and explore potential mechanisms through which business cycles might impact health.

⁶Stevenson and Wolfers (2007), White (1990), and Amato and Rogers (1997) describe demographic and socioeconomic factors that have been found to be associated with higher risks of marital stress and marital dissolution.

⁷For a detailed discussion, see South (1985). In related work, Elder (1999) analyzes the impact of the Great Depression on families.

there is evidence of pro-cyclical divorce in the period starting after 1980. The magnitude of their estimated effect for this later period is very large (and statistically significant), but because they have very few years of data in their analysis, the standard errors are very large as well.

Schaller (2010) examines the pro-cyclicality of both marriage and divorce in vital statistics data over the same period as our analysis. Her basic estimation strategy for examining the cyclicalities of divorce is very similar to ours, and she also finds pro-cyclical divorce patterns in the aggregate. The main difference is that she estimates results using a somewhat different definition of the divorce rate and including state-level population characteristics as control variables (although with state and year fixed effects and state-specific time trends, it is not surprising that results are insensitive to the inclusion of these variables). It is reassuring that the results from our independent analyses are so similar.

Finally, another recent working paper, Arkes and Shen (2010), uses data from the National Longitudinal Survey of Youth (NLSY) 1979 to examine whether divorce is pro-cyclical for this cohort. The results are somewhat mixed, and the authors do not find evidence of pro-cyclicality. But, because the NLSY data track the dissolution of marriages for only one (small) cohort as it ages, their results may not generalize.

A related literature suggests that individual family economic shocks (such as job loss) may increase the probability of marital dissolution. In a Becker-style model of divorce, individuals compare their relative wellbeing from staying married versus accepting an outside-of-marriage alternative and incurring a cost to dissolve the marriage.⁸ When the outside-of-marriage alternative becomes relatively more attractive (or the inside-of-marriage expected future utility becomes relatively lower) the risk of separation should increase. Similarly, when the costs associated with dissolving the marriage increase (or increase relative to family resources) divorce rates should decline.

Building on this idea, Weiss and Willis (1997) argue that unexpected changes in income should influence divorce probabilities. They use data from the National Longitudinal Study of the High School Class of 1972 to show that a rise in the husband's earnings is stabilizing to marriage while a rise in the wife's earnings is destabilizing. Charles and Stephens (2004) use a similar framework and, using the Panel Study of Income Dynamics, report that divorce probabilities rise in response to a husband being laid off from a job, but not as a result of job loss due to disability or plant closing. They interpret their results to imply that while a lay-off provides information to the wife about her husband's future earnings potential, job loss due to a plant closing does not change the wife's information set. Further, they argue that there is a stigma to leaving a disabled spouse, so the (social) cost of divorce in this case is prohibitively high.⁹

⁸Becker's original models of the economics of the family are described in Becker (1981). See also descriptions in Weiss and Willis (1997) and Charles and Stephens (2004).

⁹In contrast, Singleton (2009) finds, using the Survey of Income Program and Participation, that disability of a husband increases the probability of divorce, particularly in the case of young men.

Researchers have also examined how some specific kinds of income and wage shocks affect divorce, with less clear results. The original analysis of the Seattle-Denver Income Maintenance Experiment suggested that the treatment group eligible for a negative income tax experienced more divorce than the untreated group. Later analyses, however, questioned that initial result (see, e.g., Cain and Wissoker, 1990, and the references therein). And very recently, Hankins and Hoekstra (2011) compare lottery winners and losers from Florida and find no differential divorce rates between them.

It is theoretically ambiguous whether and how marital dissolution rates vary with the business cycle (either pro-cyclically or counter-cyclically). Obtaining a divorce can be a costly endeavor, and maintaining separate households after divorce is usually much more costly than maintaining a single residence. If couples are liquidity constrained, they may be less likely to divorce during economic downturns because they simply cannot afford to do so. Similarly, if couples have large illiquid assets, such as a home with a large debt to value ratio, against which they cannot borrow, it may be difficult to finance the cost of divorce and subsequent expenses. This could explain recent anecdotal evidence of the “Great Recession” suggesting that a weak housing market forces some couples to postpone or forgo divorcing, as highlighted in some press accounts.¹⁰ On the other hand, to the extent that individual job loss increases the risk of divorce, liquidity constraints alone cannot be at work in determining the timing or frequency of divorce since job loss should lead to a tightening of these constraints.

While liquidity constraints may be a powerful and intuitive explanation for the (counter-) cyclicalities of divorce, even in a fully rational world without liquidity constraints, marital dissolution rates may covary with business cycles. The basic structure of macroeconomic models detailing how and why the value of job matches changes over the business cycle and why this can lead to cyclicalities in job destruction (e.g., Mortensen and Pissarides, 1994) can be extended to explain how and why the “value” of matches between a husband and wife change over the business cycle, potentially leading to marital dissolution.¹¹

First, an economic shock can simultaneously lower (or raise) the present discounted value of a marriage—relative to the value of the option outside of marriage—to all couples by the same amount. For example, if economic booms (or busts) lead to increased marital conflict and stress, the relative value of marriage will fall for all couples, and it will fall by enough that some couples will dissolve the marriage.¹² Alternatively, an economic boom may temporarily increase labor market opportunities for women, potentially leading to increases in women’s valuations of alternatives outside of marriage, and hence to higher divorce rates. As long as there is heterogeneity in the pre-existing value of the marriage, then even if the shock changes the quality of the match for all couples in the same direction and by the same amount, then there will be some couples who find that an economic shock causes the value

¹⁰See Leland (2008).

¹¹We recognize that a full Mortensen and Pissarides-style model of the marriage market would require a simultaneous treatment both of marriages and dissolutions, but in this work we explore only dissolution and leave a more complete treatment to future work.

¹²For a discussion of how marital stress may increase after an individual’s job loss, one example of a potential mechanism through which individual job loss might affect relationship stability, see Vinokur et al. (1996).

of marriage to become so low (or so high) that these couples choose to dissolve (or not to dissolve) the marriage.

A second way in which business cycles may change the value of marital matches is through a shock not to the mean value of marital matches, but to the dispersion of match quality across couples in the population. If, for example, economic booms lead to increased wage inequality among men, this will cause the value (particularly for women) of staying in the marriage to become higher when the men have wages in the top of the wage distribution (especially if their wives are not in the labor force), but it will lower the value of the marriage when the men have wages in the bottom of the wage distribution.¹³ Alternatively, if economic booms lead to increased labor market participation of women and increased contact in the workforce between men and women, there may be cases where a spouse revises upward his or her valuation of options outside of marriage by meeting a potential new spouse on the job (as in McKinnish, 2004).¹⁴

Similarly, although admittedly more complicated to model theoretically, in a world of imperfect information where underlying match quality is unobserved, if economic booms increase the dispersion of the observed signal of match quality (say, for example, because more information is provided by potential job loss during periods of economic growth) then idiosyncratic labor market shocks may lead to increased learning by spouses of true match quality during these times. If this is true, then divorce rates should increase when dispersion increases, i.e., during economic booms.¹⁵

In sum, although prior work has found that family-level economic shocks can be destabilizing to marriages, we need not view the relationship between high unemployment and the divorce rate as operating through individuals that actually experience a job loss. As is suggested by traditional theoretical models of the economics of divorce, the value of staying in the marriage during various points in the business cycle relative to the value of the outside option of dissolution will be the defining factor in determining divorce rates over the business cycle. Theoretically, there is no clear prediction as to whether the divorce rate should be pro- or counter-cyclical, or whether the divorce rate actually varies systematically over the business cycle at all. Whether and how business cycles matter to marital stability is ultimately an empirical question.

III. Data and Empirical Results

We examine the impact of macroeconomic conditions on marital stability by approximating macroeconomic conditions with the state unemployment rates. We also conduct robustness checks using state-by-year data on GDP per capita and income per capita as alternative proxies for the business cycle. The unemployment rate series, which began in 1976, is

¹³For example, Jalovaara (2003) describes how the effects of unemployment on marital instability vary by the socioeconomic status of the couple.

¹⁴South and Lloyd (1995) document that more appealing spousal alternatives in a local marriage market are associated with higher divorce rates.

¹⁵This argument is similar in spirit to Jovanovic (1979), which looks at job turnover and employer-worker learning. To our knowledge, this idea was first applied to studies of divorce by Brien, Lillard, and Stern (2006), who model learning in marriage to explain observed patterns of marriage durations (duration dependence).

produced by the Bureau of Labor Statistics.¹⁶ We choose to focus primarily on this measure for three reasons. First, the unemployment rate represents a good approximation of the aggregation of individuals who have lost their jobs.¹⁷ Because previous literature on individual households suggests that job loss at the household level raises divorce risk, it is especially salient to consider an aggregate measure that approximates these household job losses. Second, the state-level unemployment rate series uses a consistent and well-documented methodology, something that is not true of state-level unemployment data from years prior to 1976.¹⁸ Third, the unemployment rate, unlike measures such as per capita income, is an average of what are essentially binary outcomes for individuals (where the binary outcome is, more or less, are you searching for work or not), and therefore is not affected over time by dispersion in the underlying individual data. For example, while the unemployment rate rose from 5.8 percent to 9.3 percent from 2008 to 2009, per capita income fell by 2.6 percent.¹⁹ Due to high levels of income inequality, the latter drop likely masks much larger losses in income for lower-earning families.

The state-level annual divorce rates data we use are from the vital statistics data series produced by the National Center for Health Statistics.²⁰ The divorce rate is calculated as the number of divorces per 1000 people, with a mean of 4.43 over this time period.²¹ Combining these two series, therefore, restricts the period of our analysis to the years 1976 through 2009.²²

While our analysis is restricted to the period from 1976 through 2009, in our view this focus on more recent decades is not an inherent weakness. During the decades we study, vast changes occurred in the divorce rate. Therefore, the relationship between macroeconomic conditions and divorce rates during this more recent time period may well provide more information about current trends than would earlier time periods. As divorces became more common in the late 1970's and early 1980's, cultural attitudes toward divorce shifted, so that divorce carried less of a social stigma.²³ In addition, with the adoption of unilateral and no-

¹⁶This data series is available at: <http://www.bls.gov/lau/rdsn16.htm> [accessed November 8, 2009].

¹⁷The unemployment rate is only an approximation of job loss because the numerator is composed of those who report actively searching for work, which will not include workers who are discouraged after losing a job and are no longer actively searching (i.e., "discouraged workers") but does include workers that have newly entered the labor force and are searching (i.e., "added workers").

¹⁸For example, prior to 1970, state-level unemployment rates were constructed by each state individually without a standardized methodology across states. They were simply compiled by the Federal Government in various reports (personal communication with BLS employee Brian Hannon, February, 2009).

¹⁹See http://www.bea.gov/newsreleases/regional/spi/spi_newsrelease.htm [viewed July 9, 2010].

²⁰For the years 1976–1988 we use the data first compiled by Leora Friedberg (see Friedberg, 1998) and provided by Justin Wolfers on his website: <http://bpp.wharton.upenn.edu/jwolfers/data/DivorceDataAppendix.pdf> [accessed May 21, 2009]. For the years 1989 to 2009, we compile divorce rates by dividing the number of divorces by state population estimates. The number of divorces is collected from the CDC National Vital Statistics Reports (also called the Monthly Vital Statistics Reports (MVSr)) from the CDC website: <http://www.cdc.gov/nchs/products/nvsr.htm>, [accessed May 5, 2011]. The 1989 population estimates are from the Census Bureau Intercensal Estimates: <http://www.census.gov/popest/archives/1980s/st8090ts.txt>, [accessed May 5, 2011]. The 1990–1999 population estimates are from the Census Bureau Intercensal Estimates: http://www.census.gov/popest/archives/2000s/vintage_2001/CO-EST2001-12/, [accessed May 5, 2011]. Note that these were updated from those used by Wolfers (2006) to be consistent with the 2000 Census. The population estimates for 2000–2009 are from the Census Bureau Annual Population Estimates: <http://www.census.gov/popest/states/tables/NST-EST2009-01.csv>, [accessed May 5, 2011].

²¹Although the Vital Statistics series also produces a measure of the number of divorces per 1,000 married women, this series is only available at the national level and therefore cannot be used in our empirical analysis. That said, over our sample period, movements over time in this alternative series closely track movements over time in the standard divorce rate at the national level (results available upon request). In addition, Amato and Beattie (2011) and Schaller (2010) construct state-level measures of the at-risk population of married women using the Current Population Survey and report that the results are insensitive to the choice of denominator.

²²Note that the Vital Statistics data are not available for all states in all years. We discuss this further below.

fault divorce legislation in many states over this time period, it became possible for one partner alone to initiate a divorce, and that partner would not have the same burden of establishing fault for grounds for divorce.²⁴ To the extent that one of the possible mechanisms by which macroeconomic conditions affect divorce is via a change in one partner's valuation of the quality of the marital match, this mechanism will be much more relevant in a world where one partner can initiate divorce without establishing fault. At the same time, women were entering the labor market in increasing numbers, and moving into more stable and higher paid jobs, lessening a woman's financial risk in divorcing. Increased and improved labor market opportunities should lower the cost of divorce for women by raising the overall value of opportunities outside of marriage. This would again potentially lead women increasingly to initiate divorce as they perceive that the value of staying in the marriage is below that of dissolving it. Additionally, more divorce can lead to a larger pool of potential partners for new unions. In total, examining the impact of macroeconomic conditions on divorce over recent decades has more to teach us about the current state of the world than an analysis using older data.

We first plot the data in aggregate form in Figure 1. State-by-year divorce rates and state-by-year unemployment rates are each collapsed into population-weighted annual averages across states so that the figure reflects national trends.²⁵ The unemployment rate and divorce rate appear to track somewhat positively over the decades of the 1980s and 1990s, perhaps suggesting a counter-cyclical pattern of divorce, although the relationships at the beginning of our series and at the end are not suggestive of counter-cyclical divorce. Note that the steep rise in divorce rates early in the period we study often has been attributed at least partially to the significant legislative changes in divorce laws.²⁶

Because national trends can mask significant heterogeneity across states and are driven by large secular changes in cultural attitudes toward divorce and the legislative environment, we turn to regression analysis. We examine the relationship between state-level divorce rates and state-level variation in macroeconomic conditions controlling for changes in divorce rates over time, time-invariant differences in divorce rates across states, and differential trends in divorce rates across states. Controlling for aggregate trends is particularly important given the large secular changes in divorce rates over time at the national level, as discussed above. Similarly, states have their own policies and cultures that dictate the terms (and costs) of obtaining a divorce, so that there may be time-invariant differences in divorce rates across states as well as differences across states in secular trends. In effect, then, our estimates are identified off of shocks to the individual states' economies that are larger or smaller than shocks at the national level and that represent deviations from long-run differences across states. In Table 1 we show estimates of the coefficient β_1 from least squares regressions that are all variants of a regression specification of the form:

²³Thornton and Young-DeMarco (2001) provide a detailed description of the changing attitudes towards marriage and divorce in the United States over this time period.

²⁴For a discussion of divorce legislation reform over this time period, see Friedberg (1998).

²⁵For a detailed discussion of trends in marriage and divorce rates over the early part of this time period, see Glick and Lin (1986). Ruggles (1997) discusses divorce and separation trends over a longer time period, from 1880 – 1990.

²⁶For a discussion of the effects of unilateral divorce laws see Friedberg (1998), Wolfers (2006), and references therein. The debate about the importance and impact of unilateral divorce laws on divorce rates is still very much open. For example, Lee and Solon (2011) demonstrate the fragility of the estimated results in Wolfers (2006).

$$DivRate_{st} = \beta_1 * urate_{st} + \beta_2 * STATE_s + \beta_3 * YEAR_t + \gamma * STATE_s * t + \varepsilon_{st} \quad (1)$$

Here *DivRate_{st}* is the divorce rate in state *s* in year *t*, *urate_{st}* is the unemployment rate in state *s* in year *t*, *STATE* is a vector of state fixed effects, *YEAR* is a vector of year fixed effects, and *STATE***t* are state-specific linear time trends. For the weighted regressions whose results are reported in the first four columns of the table, we use as weights state-by-year population estimates from the U.S. Census Bureau.²⁷ The standard errors of all coefficient estimates are clustered by state.

The first column of Table 1 reports the results from weighted least squares estimation that include only the unemployment rate in the regression without accounting for state or year trends (that is, it constrains β_2 , and the vectors β_3 and γ all to be equal to zero). Because both the unemployment and divorce rate are falling over much of this time period, it is not surprising that the estimated coefficient on unemployment is positive. Since the secular decline in both rates confounds the measurement of the response of the divorce rate to cyclical fluctuations in the unemployment rate, in column 2 we include both state and year fixed effects (that is, we estimate Equation 1 constraining only the vector γ to be equal to zero). Including state and year fixed effects in the regression causes the estimated impact of the unemployment rate on divorce to flip signs. The large and statistically significant negative coefficient in column 2 implies that a one percentage point rise in a state's unemployment rate is associated with a decline of 0.057 points in the divorce rate. In the third column of Table 1, we report results that are derived from estimating Equation 1 without constraining any coefficients. Including the state-specific linear year trends controls for differences across states in *trends* in divorce rates, not just levels. Among other factors, this will also control for smooth secular changes that vary across states in characteristics of state populations, such as the age structure or racial/ethnic composition.²⁸ Including these state-specific time trends reduces the estimated coefficient to -0.043 and reduces the standard error by a factor of two.²⁹ We consider this specification to be our baseline from which the rest of the analysis follows.

The estimated effect of unemployment on divorce in column 3 translates into a one percent decrease in the divorce rate over this time period for every one percentage point increase in the unemployment rate, given that the mean divorce rate over the time period of this sample is 4.43 divorces per 1000 people. In our view, this is a substantial qualitative effect. Given inherent issues with sampling and survey error in state-level measures of the unemployment rate, this estimate is likely a lower bound.

In Table 1, columns 4 and 5, we conduct two additional robustness checks based on suggested specifications in Lee and Solon (2011). In column 4, we replace the dependent

²⁷See footnote 20 for a detailed description of the Census population estimates used.

²⁸These state-specific trends also control for smooth changes in population due to migration. Schaller (2010) presents results including detailed controls for these types of population characteristics and confirms that the relationship of interest is not sensitive to their inclusion.

²⁹Including a quadratic state-by-year trend leads to a slightly larger (in absolute value) estimated effect of unemployment on divorce rates; the coefficient is -0.059 (with a standard error of 0.012).

variable with the log of the divorce rate. The estimated coefficient on the unemployment rate is -0.011 and is statistically significant. This suggests that a one percentage point rise in the unemployment rate is associated with a decrease of 1.1 percent in the divorce rate, which is an effect of the same magnitude as our baseline result. In column 5 we include results using (unweighted) ordinary least squares. This specification provides a check on the robustness of the results across state sizes and better handles potential heteroskedasticity. The estimated coefficient on the unemployment rate is somewhat smaller than in column 3 at -0.036 , but still statistically significant and still strongly suggests pro-cyclical divorce patterns.

In Table 2 we examine the sensitivity of our results to other forms of specification error. The first column of the table replicates the baseline fixed-effect results reported in Table 1, column 3 for comparison. In columns 2, 3, and 4 we present estimates from time-differenced model versions of Equation 1, where we difference the data over two years, three years, and five years respectively across columns. If Equation 1 is correctly specified both in terms of functional form and in terms of properly measured data, then the results should not vary across the first four columns of the table. It may then seem worrisome that the coefficient on the unemployment rate in column 2 is smaller than in column 1 (-0.016 vs. -0.043) and is not statistically significant. But, differences taken over a period of one year may well lead us to be differencing out much of the meaningful variation in both the divorce rate and the unemployment rate.³⁰ It is reassuring, then, that the estimated coefficients on the 3-year difference and the 5-year difference (-0.040 and -0.054) reported in columns 3 and 4 are both similar in magnitude as that in column 1, as well as statistically significant.

In column 5 of Table 2 we include three lags of the unemployment rate in the regression. This can be thought of as a specification check to ask whether the divorce rate is truly varying with the contemporaneous unemployment rate or whether the timing of the relationship between the divorce rate and the unemployment rate is more complex, especially given that the time from a couple's initial separation to final divorce can be lengthy.³¹ As column 5 of Table 2 demonstrates, the results are imprecise, which is not surprising given that serial correlation in the unemployment rate makes it difficult to identify separate effects, especially given that the specification includes state-specific time trends. Moreover, evaluating how the possibility of serially correlated measurement errors in the unemployment rates affects the results is complicated. Nonetheless, the point estimate of the coefficient on the contemporaneous unemployment rate is still negative and, at -0.034 , not much smaller than the baseline result in column 1.³²

Finally, in column 6 we estimate a specification where we include in the covariates a one-year lag in the divorce rate in the state. This specification, like that in column 5, is hard to interpret in a causal sense because of likely correlation between the lagged divorce rate and

³⁰Indeed, given that the unemployment rate is subject to sampling error, and since it is only a proxy for macroeconomic conditions, measurement error may be especially problematic in the first-differenced models.

³¹According to a Census Bureau Report, Kreider and Fields (2001), in 1996 the average duration between first separation and first divorce for couples who eventually divorced was 0.8 years, [accessed at <http://www.census.gov/prod/2002pubs/p70-80.pdf>, October 2010].

³²We also estimated a model (not reported) with no lags where we included as the measure of macroeconomic conditions in year t the average unemployment rate in year t , $t-1$, and $t+1$. The estimated coefficient on this average unemployment rate measure is -0.061 (0.014), which is actually larger than the baseline result in column 1, perhaps indicating as we suggest above that measurement error in our baseline specification does cause downward bias in the estimate.

the contemporaneous error term. But to the extent that this correlation will bias upward the estimated coefficient on the lagged divorce rate, it should bias downward the estimated coefficient on the contemporaneous unemployment effect. The estimated coefficient on the unemployment rate in this specification is again negative and statistically significant (-0.022 with a standard error of 0.005).

All in all, the results in Table 2 suggest a robust negative relationship between the current unemployment rate and the divorce rate. In Table 3 we present further results that are generated by expanding the set of covariates included in the model, as well as by expanding the data series that we use. Once again, the first column of Table 3 replicates the baseline results reported in Table 1, column 3 for purposes of comparison. Because there is no a-priori reason to assume that increases in the unemployment rate would have the same incremental effect on divorce rates regardless of the level of unemployment, in column 2 we report results from a regression where we include a quadratic in the unemployment rate rather than just a linear term. The estimated coefficient on the quadratic term is small and insignificant, and the main effect remains negative (and larger in absolute value than in column 1).

In column 3 of Table 3, we restrict the sample to the years 1976 to 1990 because in these years the divorce rate is more consistently reported each year by all states—for example, California stopped reporting data after 1990.³³ The results are quite robust to dropping the data from 1991 onwards. We see that the main effect is very similar (-0.046) to the full sample effect and still highly statistically significant. In column 4 we use the same data and time period as in Wolfers (2006) and include his indicators for whether unilateral divorce had been passed in the state in each given year.³⁴ In column 5 we again use this sample and specification and also include an interaction term of an indicator for whether the state had enacted unilateral divorce reform by that year with the unemployment rate. The coefficient on the unemployment rate in column 4 is -0.055 , and the coefficient on the non-interacted unemployment rate in column 5 is only slightly smaller at -0.053 .³⁵ In both columns, the unilateral divorce indicator is positive but not statistically significant, and the interaction term between the unemployment rate and the unilateral divorce indicator in column 5 is small and also not statistically significant.

Finally, in the last column of Table 3 we expand the years of data that we consider. In particular, we augment the BLS official state-level unemployment series by incorporating the annual state-level unemployment rates from 1970–1975 that were used in Blanchard and Katz (1992).³⁶ This is potentially important given large increases in divorce rates over this period (and given that it was coincident with the beginning of unilateral divorce legislation).

³³The Vital Statistics are missing for the following state by years: California (1991–2009), Colorado (1992, 1995–2001), Georgia (2004–2009), Hawaii (2003–2009), Indiana (1988–2009), Louisiana (1977, 1981, 1984–2001–2004–2009), Minnesota (2005–2009), New Mexico (1981–1982–1986–1987), Nevada (1991–1993), Oklahoma (2002–2003), Texas (1998 Texas (2001), and Washington State (1992). So while the data are nearly complete from 1976–1990, data for California are missing from 1991 onwards and several states are missing for the last few years of our sample.

³⁴These data are provided by Justin Wolfers at: <http://bpp.wharton.upenn.edu/jwolfers/data/DivorceDataAppendix.pdf> [accessed May 21, 2009].

³⁵Using the Wolfers' data for the years 1976–1998, the estimated coefficient from the regression using the specification in Table 3, column 1 is 0.055 (standard error 0.014).

³⁶We thank Larry Katz for providing us with these data.

Adding these years reduces the point estimate on the unemployment rate slightly relative to column 1 from -0.043 to -0.037 , but it is still clearly negative and statistically significant.³⁷

Next, we explore the heterogeneity within the sample by disaggregating the effect of the unemployment rate on divorce across states that vary along potentially important observable dimensions. We do this in a series of three separate regressions where we interact with the unemployment rate with indicators for: whether or not the state has a highly Catholic population; Census region; and time period.³⁸ The results are reported in Table 4. As in Table 2, the first column of Table 4 reports the baseline result from Table 1, column 3.

We first consider whether in states where a large portion of the population is Catholic, the relationship between the unemployment rate and divorce rate differs from the rest of the country. We define states as having a high percent Catholic if in 1990 more than 40 percent of the population reported being a Catholic adherent.³⁹ As is not surprising, we show in Appendix Table A1 that the states where more than 40 percent of the population reports being Catholic have lower divorce rates (but nearly identical unemployment rates) over our time period. Given attitudes toward divorce and remarriage in the Catholic Church, it may be that in addition to divorce rates being lower on average in more Catholic states, divorce in these heavily Catholic states is less prone to being affected by macroeconomic fluctuations. Interestingly, however, as reported in the second column of Table 4, we find that in states with a high percentage of Catholics, the unemployment rate has a much stronger effect on divorce rates than in other states. As column 2 indicates, the estimated coefficient on the unemployment rates in states other than the five most Catholic states is -0.039 . But, the coefficient on the interaction term implies that the effect of the unemployment rate on divorce rates in these states is a full two thirds larger. Note again that the mean divorce rate in these high percent Catholic states is 3.15 divorces per 1000 people, which is substantially lower than in the other states. This indicates an even larger percentage change effect. Of course, we have no evidence that this effect is being driven by Catholics per se; in fact, given the close geographic proximity of these states (all in the Northeast), it may well be that other factors are driving the result.

We explore this possibility further by explicitly considering heterogeneity in the relationship between the unemployment rate and the divorce rate by the four large census regions: Northeast, South, Midwest, and West. There is vast heterogeneity across regions of the country in population density, population characteristics, and economic performance. It is entirely possible that the effect of the unemployment rate on divorce rates is not constant across regions. In Appendix Table A1 we show that the divorce rates do vary quite a bit by region. In the Northeast, where the high percentage Catholic states are located, the divorce

³⁷We note that the results when we add the data from 1970–1975 are not robust to the exclusion of the state-specific linear time trends. If the trends are omitted, the estimated coefficient drops to -0.020 . This is due to large differences in this early period in state-specific increases in divorce. Adding a quadratic to the state-specific trends nearly doubles the coefficient relative to what is reported in column 6 (-0.062 , standard error 0.011).

³⁸Sample means of the state-by-year unemployment rates and divorce rates across each of these subsamples is reported in Appendix Table A1.

³⁹States classified as having a high percent Catholic had above 40 percent Catholic population in 1990, roughly the 90th percentile. These states are Connecticut, Massachusetts, New Jersey, New York, and Rhode Island. Note that no religiosity data were available for the District of Columbia. The religiosity data were downloaded from the Association of Religion Data Archives, www.TheARDA.com, [accessed August 8, 2009].

rate is lower than in the other three regions; meanwhile the highest divorce rate is in the western states. On the other hand, the unemployment rate does not follow a similar pattern. The lowest unemployment over this time period is in the South while the highest is in the West.

The regression results from including interaction terms between the unemployment rate and census region are reported in Table 4 column 3, where the Northeast is the omitted region. First, note that the estimated coefficient on the unemployment rates in the northeastern states is -0.060 , which is larger in absolute value than the baseline estimate reported in column 1. Second, the coefficient estimates for the interaction terms are all positive, although the estimates for the South and Midwest are small and only the interaction for the West is statistically significant. Third, the sum of the coefficients of the unemployment rate and the interaction between the unemployment rate and census region is negative and statistically significant in all cases except for the West. Given that data are missing for California from 1991 onwards, we do not think there is sufficient evidence to conclude that divorce is a-cyclical in the West.

The final source of heterogeneity we explore is between the early, middle, and late years of our sample. The last column of Table 4 reports estimates that are allowed to vary by the periods 1976–1985, 1986–1998, and 1999–2009. The estimated coefficient on the (non-interacted) unemployment rate variable that represents the impact over the early years is -0.028 (0.014), which is somewhat smaller than the full sample result. The estimated coefficient on the interaction term for the middle years is -0.053 (0.017), so that the overall effect in this period is quite large, while the estimate for the interaction term for last period is small and very imprecise. Overall, then, the finding of pro-cyclical divorce is robust across the time periods, but the relationship between unemployment rates and divorce rates is strongest during the middle years.

The state-level unemployment rate of course is just one proxy for the health of the local economy at any point in time. As we argue above, we think that variation in the unemployment rate may best capture the kind of macroeconomic fluctuations that would affect the divorce rate, but it is still important to ensure that our results are not somehow anomalously unique to using the unemployment rate as a measure of local macroeconomic conditions. Therefore, in Table 5 we report results based on two alternative indicators for the strength of the economy: state-by-year (log of) per capita income and state-by-year (log of) GDP. For the analysis using GDP, we break the data into two series at 1997 due to a break in the GDP data in that year.⁴⁰ In the first column of Table 5, we replicate the baseline result from Table 1, column 3. In the second column, we again use the same baseline regression specification except that we replace the unemployment rate in each state and year with log per capita income.⁴¹ In column 3, we instead replace the unemployment rate with state per capita GDP, estimating separate coefficients for the years before and after 1997. In both columns 2 and 3, the estimated coefficients on the macro indicators are positive and

⁴⁰The Bureau of Economic Analysis (BEA) cautions against appending the data series before and 1997: <http://www.bea.gov/regional/gsp/default.cfm?series=SIC#step2> [accessed May 20, 2011].

⁴¹The Bureau of Economic Analysis (BEA)'s series on state annual personal income per capita can be downloaded from <http://www.bea.gov/regional/spi/>, [accessed May 20, 2011].

statistically significant, implying in both cases that divorce is pro-cyclical. That is, the basic result that divorce is pro-cyclical is robust to different proxies for macroeconomic fluctuations.

IV. Discussion and Conclusion

We provide empirical evidence that supports the conjectures and anecdotal stories that in recent decades the divorce rate is pro-cyclical. Our main results using data from 1976–2009 imply that a one percentage point increase in the unemployment rate over our sample period is associated with approximately a one percent decline in the contemporaneous divorce rate. The result that divorce is pro-cyclical over the period we examine is robust to various alternative specifications, including considerations of the timing of divorce as it relates to unemployment, the implementation of unilateral divorce, whether we consider data early or late in our sample, and heterogeneity across states in population size, Catholic religiosity, and census region. The finding of pro-cyclicality is also robust to using two alternative measures of macroeconomic conditions.

Perhaps the most interesting aspect of this basic finding is its contrast with published results from individual households. Charles and Stephens (2004) find that when a family suffers a job loss, it either increases the probability of divorce (if the job loss is a lay-off) or does not affect the probability (in the case of disability or plant closing). This suggests that if we were to aggregate all of the individual household shocks into the full set of job losses that accompany a recession, we would find that divorce is either counter-cyclical or a-cyclical. Clearly then, the reconciliation of our results with those of Charles and Stephens suggests that the mechanisms by which macroeconomic downturns affect marital stability are different than those of shocks to individual households. Disentangling and understanding these mechanisms is an important topic for future research.

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Figure 1.
Aggregate Divorce Rates and Unemployment Rates, 1976–2009

Table 1

Macroeconomic Conditions and State-Level Divorce Rates

Dependent Variable: State-Level Divorce Rate 1976 – 2009, Mean 4.43.

	No Fixed Effects	State and Year FE	State-Specific Trend	Log Divorce Rate	Not Weighted by State Population
	(1)	(2)	(3)	(4)	(5)
Unemployment Rate	0.1117 (0.034)	–0.057 (0.024)	–0.043 (0.011)	–0.011 (0.004)	–0.036 (0.016)
State and Year Fixed Effects		X	X	X	X
State-Specific Linear Year Trend			X	X	X
R ²	0.030	0.855	0.953	0.948	0.949
N	1,629	1,629	1,629	1,629	1,629

Notes: Standard errors are in parentheses and are clustered by state. Specifications in columns (1) – (5) are weighted by state population.

Table 2

Robustness Checks of Empirical Specification

Dependent Variable: State-Level Divorce Rate 1976 – 2009.

Fixed Effects Model	First Difference	Long Difference (3 Years)	Long Difference (5 Years)	Lagged Unemp. Rate	Lagged Divorce Rate
(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	–0.043 (0.011)	–0.016 (0.014)	–0.040 (0.012)	–0.054 (0.012)	–0.022 (0.005)
Divorce Rate _{t(t-1)}					0.459 (0.063)
Unemployment Rate _{t(t-1)}				–0.021 (0.023)	
Unemployment Rate _{t(t-2)}				–0.029 (0.014)	
Unemployment Rate _{t(t-3)}				0.028 (0.018)	
R ²	0.954	0.121	0.280	0.337	0.964
N	1,629	1,566	1,460	1,357	1,477
					1,566

Notes: Standard errors are in parentheses. All specifications are weighted by state population and standard errors are clustered by state. All models include the appropriate equivalent of state and year fixed effects and a state-specific linear time trend.

Table 3

Robustness Checks—Further Covariates

Dependent Variable: State-Level Divorce Rate.

	Baseline	Non-linearity	Years 1976–1990	Unilateral Divorce Indicator (Wolfers)	Unilateral Interaction Term (Wolfers)	Add Years 1970–1975
	(1)	(2)	(3)	(4)	(5)	(6)
Unemployment Rate	–0.043 (0.011)	–0.058 (0.033)	–0.046 (0.015)	–0.055 (0.014)	–0.053 (0.018)	–0.037 (0.010)
Unemployment Rate ²		0.001 (0.002)				
Unemployment Rate						
Unilateral Divorce Indicator				0.143 (0.190)	0.165 (0.203)	
Unilateral Divorce x Unemployment Rate					–0.005 (0.217)	
R ²	0.954	0.954	0.979	0.972	0.972	0.953
N	1,629	1,629	751	1122	1122	1,921
Sample Mean Divorce Rate	4.43	4.43	4.97	4.82	4.82	4.39
Years of Data	1976–2009	1976–2009	1976–1990	1976–1998	1976–1998	1970–2009

Notes: Standard errors are in parentheses. All specifications are weighted by state population and standard errors are clustered by state. All specifications include state and year fixed effects and a state-specific linear time trend.

Table 4

Heterogeneity in the Relationship between Unemployment Rate and Divorce Rate

Dependent Variable: State-Level Divorce Rate

	Baseline	Percent Catholic	Census Regions	Time Period
	(1)	(2)	(3)	(4)
Unemployment Rate	−0.043 (0.011)	−0.039 (0.011)	−0.060 (0.020)	−0.028 (0.014)
Unemployment Rate x High Percent Catholic ¹		−0.026 (0.025)		
Unemployment Rate x Midwest			0.015 (0.018)	
Unemployment Rate x South			0.015 (0.025)	
Unemployment Rate x West			0.073 (0.026)	
Unemployment Rate x Years 1986–1998				−0.053 (0.017)
Unemployment Rate x Years 1999–2009				0.010 (0.046)
R ²	0.954	0.954	0.956	0.954
N	1,629	1,595	1,629	1,629

Notes: Standard errors are in parentheses. All specifications are weighted by state population and standard errors are clustered by state. All specifications include state and year fixed effects and a state-specific linear time trend.

¹ States classified as having a high percent Catholic had above 40 percent Catholic population in 1990, roughly the 90th percentile. These states are Connecticut, Massachusetts, New Jersey, New York, and Rhode Island. The religiosity data were downloaded from the Association of Religion Data Archives, www.TheARDA.com. Note that no religiosity data were available for the District of Columbia.

Table 5

Alternative Definitions of Macroeconomic Conditions and State-Level Divorce Rates

Dependent Variable: State-Level Divorce Rates, Mean Divorce Rate is 4.43

	Unemployment Rate	Per Capita Income	Per Capita GDP
	(1)	(2)	(3)
Unemployment Rate	−0.043 (0.011)		
Log Per Capita Income		1.450 (0.600)	
Log Per Capita GDP, SIC (1976–1996)			0.878 (0.279)
Log Per Capita GDP, NAICS (1997–2009)			2.000 (0.427)
R ²	0.954	0.954	0.955
N	1,629	1,629	1,629

Notes: Standard errors are in parentheses. All specifications are weighted by state population and standard errors are clustered by state. All specifications include state and year fixed effects and a state-specific linear time trend.

Appendix Table A1

Summary Statistics of State-by-Year Unemployment Rates and Divorce Rates for Various Subsamples

Sample		Observations	Mean Unemployment Rate	Mean Divorce Rate
Percent Catholic ^I	Full Sample	1,629	6.162 (0.065)	4.430 (0.042)
	Above 40%	170	6.122 (0.160)	3.145 (0.040)
	Below 40%	1,425	6.166 (0.071)	4.680 (0.043)
Region	Northeast	306	6.133 (0.136)	3.219 (0.033)
	Midwest	381	6.287 (0.150)	4.041 (0.054)
	South	542	5.973 (0.091)	5.026 (0.067)
	West	400	6.457 (0.156)	5.419 (0.077)
Years	1976–1985	504	7.555 (0.122)	5.071 (0.080)
	1986–1998	619	5.808 (0.073)	4.554 (0.063)
	1999–2009	506	5.348 (0.098)	3.733 (0.051)

Notes: Standard errors are in parentheses. Means are weighted by state population.

^I States classified as having a high percent Catholic had above 40 percent Catholic population in 1990, roughly the 90th percentile. These states are Connecticut, Massachusetts, New Jersey, New York, and Rhode Island. Note that no religiosity data were available for the District of Columbia. The religiosity data were downloaded from the Association of Religion Data Archives, www.TheARDA.com, [accessed August 8, 2009].