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What effects do macroeconomic conditions have on the time couples with children spend together?

Melinda Sandler Morrill · Sabrina Wulff Pabilonia

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Abstract Using data from the 2003–2010 American Time Use Survey combined with U.S. Bureau of Labor Statistics data on state-level unemployment rates, we examine how couple time together is affected by macroeconomic conditions. We find a U-shaped relationship between the unemployment rate and the time that couples who have children spend together, with the lowest amount of time together occurring when unemployment rates are around 9 %. We explore how these patterns are related to the timing of work. Our evidence suggests mothers' work hours are shifted from standard daytime hours to weekend hours, consistent with difficulty in aligning work schedules at moderately high unemployment rates.

Keywords Unemployment · Time use · Time together · Great recession · Non-standard work hours

JEL Classification J22 · J11

1 Introduction

In this paper, we explore whether the amount of time that married or cohabiting couples who have children spend together varies over the business cycle. We expect that time spent together may vary due to several factors even for couples who

M. S. Morrill
Department of Economics, North Carolina State University, Box 8110, Raleigh, NC 27695-8110, USA
e-mail: melinda_morrill@ncsu.edu

S. W. Pabilonia (✉)
U.S. Bureau of Labor Statistics, 2 Massachusetts Ave. NE Rm. 2180, Washington, DC 20212, USA
e-mail: Pabilonia.Sabrina@bls.gov

experience no change in employment status. In addition, the hypothesized relationship is not necessarily linear in nature. For example, during periods of macroeconomic decline, couples may spend more time together as they experience time windfalls from lower labor market activity. However, if time with a spouse is a normal good, then couple time together may also rise during periods of economic boom as households experience greater levels of disposable income and substitute market expenditures for home production. Specifically, we examine the reduced-form impact of state unemployment rates on the time couples who have children spend together.

We focus on couples who have children to gain insight into how the dynamics in American families are affected by business cycles. Previous research suggests that the time couples spend together has important implications for the well-being of the members of the couple, as well as their children. For example, couple time together may promote marital stability. Recent research suggests that, on average, U.S. divorce rates decline during recessions (Amato and Beattie 2011; Hellerstein and Morrill 2011; Schaller 2012), while Kingston and Nock (1987) and Johnson et al. (2006) find that when a couple spends more leisure time together, they report higher marital satisfaction. However, not only leisure time but all time together may be important, as Hallberg (2003) finds that couples who have children enjoy less shared leisure time but more shared domestic work, but total couple time together is the same regardless of whether there are children in the household. Thus, for example, if couple time together rises during recessions, this may at least partially explain the drop in divorce.[1] Furthermore, we are interested in what promotes or hinders time together generally, as previous studies have documented that people report greater satisfaction from doing activities in the presence of their significant other, regardless of the type of activity (e.g., Sullivan 1996).[2] In addition, Glorieux et al. (2011) argue that the time partners spend together could be used as an indicator of social quality time.

Previous time use literature explains how the business cycle affects the total leisure and home production activities of individuals. In a study examining the effects of local business cycles on individuals' time allocation decisions, using time diary data that preceded the Great Recession, Burda and Hamermesh (2010) find that individuals who lose their jobs reallocate the majority of their time toward leisure activities rather than household production activities. However, when instead they consider all individuals who experience an increase in local unemployment rates, they find that the reduction in market work from the economic contraction is completely offset by an increase in household production. This suggests that local economic conditions affect the time use both of individuals who directly experience job loss and of those who remain employed. Using Spanish time diary data, Gimenez-Nadal and Molina (2014) examine the effect of others' unemployment on the time use of unemployed individuals. They find that higher regional

[1] Ariizumi et al. (2013) provide a theoretical framework that suggests that the effects of a recession on divorce is ambiguous and depend on whether the recessions' negative effects on the gains from staying in an existing marriage are larger than its' effects on the quality of the pool of individuals available in the remarriage market.

[2] The one exception is that men's satisfaction with doing domestic tasks alone or together differs little.

unemployment rates are associated with increased home production and decreased leisure for unemployed women. They attribute these changes in time allocation to the reduction in the probability of finding a new job and the desire to smooth consumption. Aguiar et al. (2013) explore how individuals spend surplus time resulting from reductions in market work during the Great Recession. They find that about 30–40 % of the forgone work hours are allocated to home production activities, while about 50 % are allocated to some type of leisure activity.

We seek to understand how the time that couples who have children spend together varies over the business cycle. The total effects on simultaneous leisure could differ from previous researchers' findings on total leisure, as Barnet-Verzat et al. (2011) find the presence of children affects joint leisure and not alone leisure. Our sample includes non-married couples with children, but we refer to them as "couples" or "spouses" throughout for simplicity. Some examples of potential mechanisms through which business cycles could affect couple time together include reduced time spent in labor market activities, pressure on families due to tightened financial constraints, teenager labor market activities, changes in childcare arrangements for younger children, and/or shifts in the timing of work hours.

We use data from the 2003–2010 American Time Use Survey (ATUS), combined with U.S. Bureau of Labor Statistics data on state-level unemployment rates, to capture economic conditions, including the large negative employment effects occurring during and in the aftermath of the Great Recession. The first outcome that we consider is the number of minutes a couple spends together. Our model includes both state and year fixed effects in order to exploit the variation in unemployment rates between states over time in order to identify the relationship between state unemployment rates and couple time together while controlling for national trends and time invariant differences across states. Allowing for a somewhat flexible functional form, we present specifications including linear, quadratic, and cubic polynomials in state-level unemployment rates. We find a significant and robust U-shaped relationship (i.e., quadratic) between couples' time together and the state unemployment rate. If we compare couple time together when the state unemployment rate is 5 % with the time couples spend together when the state unemployment rate is 10 % (the national unemployment rate increased from 5 to 10 % during the Great Recession), we find that couples are spending less time together at the higher unemployment rate. However, as the unemployment rate rises above about 9 %, we see couple time together increase. We find that changes in shared leisure time explain most of the variability in couple time together. Thus, we find an interesting and previously undocumented non-linearity in the effect of business cycles on couples.

We do not explicitly consider the effects of an individual's or spouse's job loss, because job loss may not be exogenous to intrahousehold time allocation and we seek to understand how macroeconomic conditions affect couple time on average. We do, however, explore whether our results differ for couples where both spouses are employed at the time of the survey (dual-earner couples). We find nearly identical patterns when we consider only dual-earner couples, which suggests that the results are not driven entirely by those experiencing a job loss. This is not entirely surprising, because Glorieux et al. (2011) found that the difference in the

time that single-earner couples and dual-earner couples spend together is relative small (3 percentage points) and attribute this to the fact that it is difficult to do things together when one partner is at work.

We hypothesize that our results may be due at least partly to the time and timing of work and conclude the paper by exploring these possible mechanisms for the observed variation in time spent together. A reduction in jobs with desirable work schedules during periods of economic contraction may hinder the ability of couples to synchronize their time at work, thereby limiting their time spent together (Barnet-Verzat et al. 2011; Hallberg 2003; Hamermesh 2002; Glorieux et al. 2011; Kingston and Nock 1987). Consistent with the time couples spend together, the results suggest that mothers work more weekend hours during moderate economic downturns, resulting in less time available to spend with their spouses.

2 Background on macroeconomic conditions and couple time

There are many potential channels through which fluctuations in labor market conditions may affect the amount of time that a couple spends together for both those couples that directly experience job loss and those whose formal job status does not change. Furthermore, the relationship between a couple's time together and state labor market conditions need not be linear, that is where economic decline always leads to an increase or decrease in time together regardless of levels.

For a couple to share time together, each individual must have some time available to spend in leisure (or joint home production). In addition, both members must be willing and able to coordinate their schedules to enjoy that time together. If one member experiences a job loss, that individual may choose to spend the time windfall on household production, on leisure, or on job search activities. Burda and Hamermesh (2010) find that, in general, the time windfall following job loss is spent on leisure activities rather than on household production. However, for individual job loss to be associated with more couple time together, the other member must be available to share in this newfound time. If the spouse must enter the labor market to compensate for lost income (i.e., an "added worker" effect) or even take on a second job, then we may, in fact, see a decline or no change in shared time if the spouse chooses to work non-standard hours in order to help minimize paid childcare time (Jenkins and Osberg 2005). Şahin et al. (2010) find evidence that "added workers," generally women who have childcare responsibilities during the day, work during non-standard hours to supplement household income, particularly during the recent Great Recession. Barnet-Verzat et al. (2011) show that if one member of a couple works at night, then shared leisure time decreases.

Research has demonstrated that work hours fluctuate over the business cycle, even for those who remain continuously employed. However, the direction and magnitude of the relationship seem to vary between different periods of a recession. Kroll (2011) reports that in the Great Recession, average weekly hours paid by employers did not begin to fall dramatically until about 6 months into the recession, as dated by the National Bureau of Economic Research (NBER). Twelve months into the Great Recession, the United States (U.S.) witnessed a drop in aggregate

weekly hours paid that was larger than during the two previous recessions (U.S. Department of Labor 2011a). However, salaried workers, who are often reported as being paid for 40 h per week, may work increased unpaid overtime either to secure their jobs or because they are asked to pick up the work done by those let go.

Besides fluctuations in total hours of work, there may also be changes in the timing of hours worked over the business cycle. Prior research on time use has found that spouses attempt to synchronize their work schedules and leisure time (Connelly and Kimmel 2009; Hallberg 2003; Hamermesh 2002; Jenkins and Osberg 2005), but this may be less of an option when the labor market is tight and they are working longer hours. In addition, workers who lose their jobs during a recession may be more willing to accept new jobs that require workers to work at hours that do not allow spouses to synchronize their work schedules.

In addition to having time available to spend together, individuals also must choose whether to share that leisure time. If periods of high unemployment lead to higher stress levels for both the unemployed (Krueger and Mueller 2010, 2012) and the employed who perceive greater job insecurity (Luechinger et al. 2010), then couples may avoid spending time together due to increased conflict or they may spend more time on sole home production activities to compensate for any losses or potential losses due to the economic downturn. On the other hand, couples who are liquidity constrained by the recession may stay home and engage in lower cost activities with their families (Evans and Moore 2012).

How we might anticipate business cycles affecting couples' time together on average is theoretically ambiguous. During periods of high unemployment, we expect to see more total hours of leisure for those who have lost a job or those who are continuously employed but working fewer hours, but this additional time is not necessarily spent with their spouse. If a spouse has to take on additional work responsibilities during non-standard hours, this may lead to a reduction in time that couples spend together. Although couples that become more income constrained during periods of macroeconomic decline may spend more time at home and thus enjoy more shared leisure or home production hours, they also may cease to engage in formerly shared leisure outside the home, such as dining out or attending recreational activities together, resulting in no change or even a net loss in time shared. Those who remain employed with a change in their hours may also substitute market expenditures for home production in order to increase their rainy day savings, and thus actually reduce their leisure activities due to concerns about their job security.

3 Data

3.1 Time use data and sample

The ATUS is the only ongoing survey of how people living in the U.S. spend their time. Therefore, it is the only time use survey that currently allows for the examination of the effects of business cycles on the time use behavior of individuals beyond their working time behavior. In 2003, the ATUS began surveying one

individual aged 15 and older per household drawn from a subsample of households completing their final month of interviews in the Current Population Survey (CPS). Phone interviews for the ATUS were conducted 2–5 months following the final CPS interview. The ATUS updates employment information from the CPS for the respondent and their spouse/unmarried partner, but not for all household members. For the spouse's employment status, no distinction is made between being unemployed and being out of the labor force. In addition, a 24-h time diary is collected beginning at 4 a.m. on the day prior to the interview. Respondents are asked to report their activities sequentially, the start and stop time of each activity, where the activity took place, and, for most activities, who was with them in the room or who accompanied them on an activity if they were not at home (with whom information was not collected for the following activities: sleeping, grooming, private activities, working, refused to classify type, or can't remember).[3] Activities are coded by interviewers into one of 17 major time categories, with various second-tier and third-tier subcategories.

Time diary data have the advantage over other survey questions asked about time during the last week (or usual activity) of being less subject to recall bias because of the shorter time horizon. The data are also less subject to aggregation bias (because respondents are asked to account for 1440 min of activities in the diary day) and are less subject to social desirability bias (Bianchi et al. 2006). One of the disadvantages of time diary data is that the data are highly variable due to capturing information on a single day, thus leading to reduced statistical power in regression analyses, especially for activities that occur infrequently. We use pooled diaries from 2003 to 2010 and thus cover both an economic expansion and contraction and the beginning of another expansion. About half of the diaries were collected on weekdays and the other half on weekend days. Throughout the paper, we use ATUS final weights, which correct for this oversampling and differential response rates among major demographic groups. We have reweighted these weights to ensure equal day-of-week representation for each of our subsamples. In all regressions, we cluster standard errors by state of residence.

For our analysis, we are interested in the time couples who have children spend together and how that time changes over the business cycle. The ATUS collects time diary data from only one member of the couple, but we can construct a couple's time together using the "with whom" variable. Our main estimates use a broad measure of couple time together, excluding working, sleeping and grooming time. However, we also explore changes in the composition of couple time over the business cycle to see whether the presence of children or location matters and whether results differ by whether the shared time is spent on leisure activities excluding time spent watching TV and movies, TV and movies, housework, or primary childcare. We caution the reader that it is not straightforward to categorize activities into leisure time versus time spent in household production and that couples may enjoy time together in household production if it means they can spend time together (Barnet-Verzat et al. 2011). In addition, it is possible that a mother reports doing housework while her spouse is present but he is not actually participating in the activity but doing another

[3] In 2010, respondents were asked whom they were with while working so we deleted these times together to maintain consistency in time together across all categories.

Table 1 Sample creation

	Number of observations
Married and cohabiting individuals	60,923
Married and cohabiting individuals in heterosexual couples	60,636
Married and cohabiting individuals aged 25–64 in heterosexual couples	48,749
Only couples who have children in household under age 19	34,153
Drop those who slept more than 20 h on diary day	34,137
Drop those sick more than 4 h on diary day	34,001
Total sample size	
Couples	34,001
Mothers	18,066
Fathers	15,935

activity in the same location, or vice versa. However, Glorieux et al. (2011) found that eating meals together, watching TV, and going out are popular activities couples choose to do together. Furthermore, Kingston and Nock (1987) found that eating meals together and talking were highly correlated with marital quality and especially affected by work schedules. In Appendix Table 5, we do see a difference in the incidence of reported shared leisure time by whether a mother or father reports. We separate TV and movies from other leisure time as it is a major component of leisure time and couples may increase their time spent at home watching TV when the labor market is bleak. We also separate primary childcare from housework as childcare has been shown to be distinct from leisure and housework (Kimmel and Connelly 2007; Guryan et al. 2008). We define shared leisure time similar to the main definition used by Aguiar and Hurst (2007), with a few exceptions such as the addition of religious activities and the exclusion of TV and movies. Shared leisure time includes the following activities: caring for lawn, garden and houseplants, animals and pets; eating and drinking; socializing; religious activities; relaxing and leisure; sports, exercise and recreation; telephone calls to family members and friends; and travel related to socializing, sports, or religious activities. Housework time includes the following activities: cooking, adult caregiving, cleaning, vehicle repair, household management, civic duties and related travel. Primary childcare time includes time spent helping household and non-household children.

Our sample construction is illustrated in Table 1. We include a respondent if he or she was a member of a heterosexual couple with co-resident children under the age of 19 and both members of the couple were aged 25–64. We exclude diaries that captured atypical days (those where the respondent reported either sleeping more than 20 h or being ill for more than 4 h) (Juster 1985).[4] The parents could be married or cohabiting (only 4 % of the sample are cohabiting). Because we have

[4] While not all respondents record activities for the full 1440 min in the diary day, respondents are automatically discarded by ATUS staff if their diaries contain fewer than five activities and are missing 180 or more minutes of recorded activities (low quality diaries). However, many researchers exclude those missing more than 60 min of time. Failure to include all respondents in analyses may bias results. Only 5 % of our sample is missing more than 60 min of activities. Results excluding these individuals are similar.

data on only one member of a couple, our full sample consists of 34,001 couples, which includes responses from 18,066 mothers and 15,935 fathers.[5]

3.2 Macroeconomic conditions

From the U.S. Bureau of Labor Statistics' Local Area Unemployment Statistics, we obtain unemployment rates for 50 U.S. states plus the District of Columbia that are linked to the ATUS respondents by the state in which they reside. These unemployment rates are available both monthly and yearly. We use an average of the 12 months ending in the interview month as our proxy for macroeconomic conditions. The unemployment rate is measured over 12 months instead of a shorter period in order to allow behavioral patterns to become more consistent and to minimize any potential effects of short-term fluctuations in the unemployment rate resulting from sampling error (Arkes and Klerman 2009).[6] The mean state yearly unemployment rate over the period of study is about 6.1 %, with a minimum rate of 2.5 % and a maximum rate of 13.8 %.[7]

Figure 1 graphs the average state unemployment rate and the average of couples' time together per day by quarter from 2003 to 2010. The unemployment rate initially falls until approximately the third quarter of 2008, at which point it rises sharply and then flattens out. The average amount of time couples' spend together does not experience the same low point in 2007 and early 2008, but does spike upward in the second quarter of 2009, which corresponds to the quarter when GDP growth reached its lowest point. In our regression analysis, we control for these larger trends in both time use and average unemployment rates and instead rely on variation within states over time to identify the relationship between state economic conditions and couple time together.

4 Econometric model and results

4.1 Econometric framework

Our basic econometric model is as follows:[8]

[5] In general, men in the ATUS have lower response rates than women. To account for differential survey nonresponse, ATUS weights are adjusted to be higher for men than women (U.S. Department of Labor 2011b). Although these are not the same couples, their observable characteristics, such as age and education, are similar (see Appendix Table 5).

[6] We considered several other proxies for macroeconomic conditions (including a shorter lag and MSA unemployment rates) with similar results for our preferred specification.

[7] Appendix Fig. 4 illustrates the substantial variation in state unemployment rates for our sample over the period.

[8] This specification is similar to those commonly used when exploring the relationship between demographic outcomes and the business cycle (e.g., Ruhm 2000), except that here we model the state unemployment rate as a quadratic. With state and year fixed effects, one is implicitly calculating deviations from the sample means.

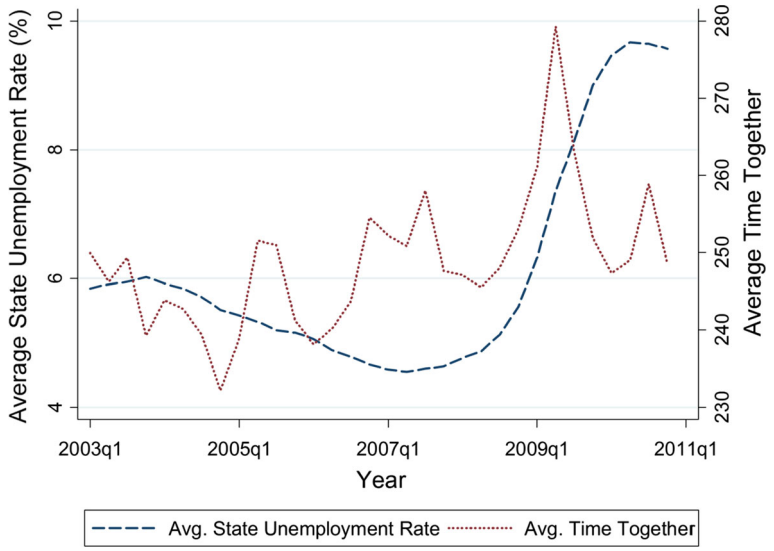

Fig. 1 National patterns of state unemployment rates and couple time together (in minutes). *Sources*: data are from the American Time Use Survey and U.S. Bureau of Labor Statistics (2003–2010). *Notes* quarterly average time together is measured in minutes per day. The state unemployment rate is averaged over the 12 months ending in the interview month. See text for details on sample construction and variable definitions

$$\text{Couple Time}_{ist} = \alpha + \beta_1 \ * \ \text{Urate}_{s,t-1} + \beta_2 * \text{Urate}^2_{s,t-1} + \gamma X_{ist} + \delta_s + \theta_t + \varepsilon_{ist} \quad (1)$$

where Couple Time_{ist} is the minutes spent together by couple *i* living in state *s* at time *t*; $\text{Urate}_{s,t-1}$ is the monthly state-level unemployment rate averaged over the prior 12 months (t − 1), X_{ist} is a vector of observable individual and family-level variables, α is a constant, δ's are state fixed effects, and θ's are year fixed effects.[9] ε_{ist} is a stochastic disturbance term assumed to follow a normal distribution. The key coefficients of interest are β_1 and β_2, the effect of the unemployment rate on a couple's time together, which capture the effect of within-state variation in macroeconomic conditions relative to other states. All models of time spent together are estimated using ordinary least squares.

In our regression model (1), X_i includes own and spouse's age and age squared and indicators for the following: husband and wife education (high school dropout, some college, college, missing, with high school degree being the omitted category), race and ethnicity (non-Hispanic black, other, Hispanic, with non-Hispanic white being the omitted category), gender, age of youngest household child (infant,

[9] Year fixed effects are included to capture any long-run trends in time use, such as the documented increases in total leisure time pre-Great Recession (Aguiar et al. 2013). We explored the sensitivity of the results to omitting the year fixed effects. Time use changes slowly over time, but excluding the year fixed effects allows identification to come from the additional variation over the time period studied. The effects were smaller in magnitude, but the patterns were similar. Results are available from the authors upon request.

Table 2 All time with spouse (in minutes)

	Sample		N	Mean dep. var.	Urate	Urate^2	Urate^3	R^2
(A)	Full sample	Linear urate	34,001	248.89	−0.886 (2.207)			0.017
		Quadratic urate	34,001		−19.045*** (5.942)	1.091*** (0.365)		0.017
		State-specific time trends	34,001		−17.568** (6.673)	1.004** (0.428)		0.019
		Cubic urate	34,001		−21.955 (20.042)	1.443 (2.572)	−0.015 (0.103)	0.017
Estimates using quadratic specification and various subsamples								
(B)	Race/ethnicity	Non-Hispanic whites	25,252	250.59	−17.665*** (5.907)	0.929** (0.367)		0.016
		Non-Hispanic blacks	1918	204.77	−19.012 (22.841)	1.073 (1.242)		0.051
		Hispanic	4748	261.17	−38.266* (20.548)	2.582** (1.050)		0.032
(C)	Earner status	Dual-earner couples	21,114	229.30	−14.44* (7.357)	0.899** (0.400)		0.022
(D)	Father's degree	College	13,628	251.62	−5.440 (9.400)	0.359 (0.564)		0.025
		No college	20,373	247.40	−25.756*** (7.261)	1.468*** (0.403)		0.019
(E)	Summer months	No summer	25,643	246.28	−14.416** (6.640)	0.825** (0.394)		0.019
		Summer	8358	256.45	−37.966*** (12.755)	2.095*** (0.767)		0.022
(F)	Day of week	Weekdays	16,465	185.62	−16.742*** (5.606)	1.007*** (0.338)		0.022
		Weekend days	17,536	398.10	−27.236*** (9.025)	1.353*** (0.471)		0.036
(G)	Families with children under age 13		27,907	251.69	−25.712*** (6.211)	1.489*** (0.348)		0.019

The sample includes married or cohabiting couples with co-resident children under age 19. The dependent variable is any time with spouse. Unemployment rates are measured at the state-level and all specifications include state and year fixed effects. Control variables include own and spouse's age and age squared, and indicators for the following: husband and wife education (high school dropout, some college, college, missing), race and ethnicity (non-Hispanic black, other, Hispanic), gender, age of youngest household child (infant, preschooler, elementary), household child older than age 18, number of children (two, three or more), lives with other adults, cohabiting couple, gender composition of the children (all boy, mixed gender), season, and respondent lives in SMSA. ATUS final weights are used. Standard errors adjusted for clustering by state are reported in parentheses

*** Significant at 1 %; ** significant at 5 %; * significant at 10 %

preschooler, elementary school aged, with high school aged being the omitted category), presence of household child older than age 18, number of children in the household (two children, three or more children, with one child being the omitted category), lives with other adults (e.g. parent or sibling), cohabiting couple, gender composition of the children (all boy children, mixed gender children, with all girls being the omitted category), respondent lives in SMSA, and season. Appendix Table 5 includes means for most of the variables used in these analyses.

4.2 Estimates for couples' time together

Table 2 presents estimates from pooled cross-sections of the effect of the state-level unemployment rate on a broad measure of couples' time together. The baseline regression is estimated modeling the unemployment rate as a quadratic for the full sample, as specified in Eq. (1), including both state and year fixed effects. In Table 2, Panel A, we consider all couples and find a U-shaped relationship.[10] This is illustrated in Fig. 2, which shows the predicted mean minutes of couples' time together by state unemployment rates using the estimates presented in Table 2. The unemployment rate is associated with a decline in couples' time together until the unemployment rate reaches around 8.7 %, at which point couples' time together begins to increase. To put these results into perspective, the BLS estimates that over the period after the Great Recession began in December 2007, the national unemployment rate rose from 5 % to a peak of 10 % in October 2009.[11] Using the regression estimates here, we estimate that couples spend about 252 min together when the state unemployment rate is 5 %. This drops to about 239 min together when the state unemployment rate reaches 10 %. This difference of about 13 min is approximately 6 % of the sample mean of 248 min of time together.[12] However, as the unemployment rates rise to 12 %, couples spend 249 min together on average.

The remaining rows of Table 2, Panel A, present results using two other functional forms—linear and cubic polynomial. We find no significant higher-order effects. We also find that results from the quadratic specification are similar if we include state-specific linear time trends. Because of concerns over power in the smaller samples, all remaining analyses do not include state-specific time trends.

Next, we estimate the quadratic model for various subsamples. In Table 2, Panel B we explore whether the effect of the business cycle on time together

[10] All results presented in the paper are weighted; however, unweighted results are similar (results available upon request).

[11] See U.S. Department of Labor (2012).

[12] Appendix Table 6 includes the full set of estimated coefficients corresponding to the quadratic specification in Table 2, Row A. The estimates on the covariates are in line with expectations. Non-Hispanic black couples spend 45 min less together on average relative to non-Hispanic white couples. When the youngest child in the household is an infant, couples spend about 19 min more together, and couples spend more time together in the winter and summer than in the fall. Consistent with the estimated coefficient on state unemployment rates, holding all else equal, couples are spending more time together in 2009 and 2010 relative to the year 2005.

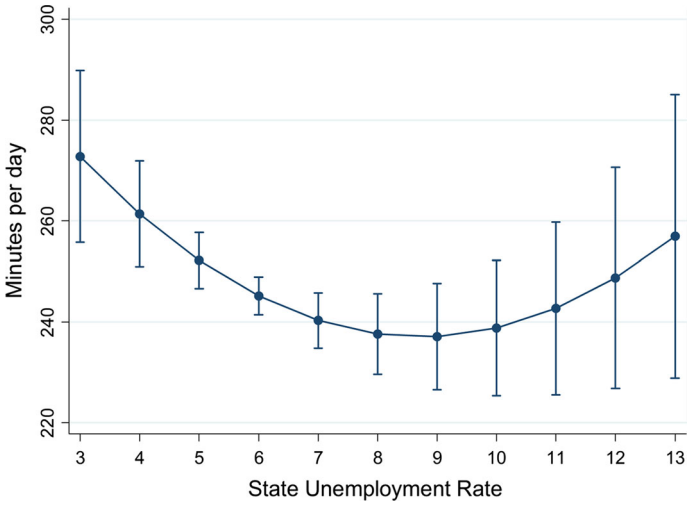

Fig. 2 Predicted mean minutes per day couples spend together by state unemployment rate with 95 % confidence intervals. *Sources*: American Time Use Survey and U.S. Bureau of Labor Statistics (2003–2010). *Notes*: this specification matches Table 2, Row (A), quadratic unemployment rate

varies by race/ethnicity.[13] We see that the relationship is statistically significant for non-Hispanic whites. Although the coefficient estimates for non-Hispanic blacks are similar to those of non-Hispanic whites, they are imprecise, perhaps due to the smaller sample size. The point estimates are largest for those of Hispanic origin, although the confidence intervals are large and the mean is slightly higher.

In Table 2, Panel C, we examine the effects for dual-earner couples. Throughout the paper, we define "employed" as a binary variable equaling one if the parent had a job for pay or profit in the last 7 days at the time of the ATUS interview, and equaling zero otherwise. We define dual-earner status here as whether both members of the couple reported that they were employed.[14] Although the standard errors increase when the sample is divided, we find that the estimated coefficients for the dual-earner couples sample are quite similar to those for the entire couple sample. This suggests that our results are not being driven entirely by individual or spousal job losses. However, we caution the reader that results should be considered

[13] Elsby et al. (2010) and Hoynes et al. (2012) document that males were more affected than females, those who do not hold a college degree were more affected than those with a college degree, youths were more affected than prime-age workers and the elderly, and non-Hispanic blacks and Hispanics were more affected than non-Hispanic whites and Asians by the Great Recession. Most of these differences resulted from job losses in industries, such as construction and manufacturing, where certain demographic groups of workers were concentrated.

[14] 110 women and 42 men do not report being employed but reported minutes of work on their diary day. We use the employed definition for official BLS labor force statistics (TELFS = 1 or 2). Some respondents may have done unpaid work in a family business.

descriptive rather than causal here, because employment status itself is potentially endogenous.[15]

Table 2, Panel D presents results disaggregated by the education level of the husband. Here, we see that the association between the state-level unemployment rate and couples' time together is concentrated among families where the husband has less than a college degree. This is not surprising, given that these couples would be most affected by a downturn in the business cycle by directly experiencing job losses, or because of more binding income constraints. Next, Table 2, Panel E considers time diaries from the summer months (June through August) separately from school-year diaries (September through May). Because our sample includes only couples who have children under age 19, it may be that childcare concerns are greatest during the summer months when school is not in session. Interestingly, we find that couples who have children are spending 10 min more together per day on average during the summer months than school-year months. Both the summer and school-year diaries show the same U-shaped pattern between couples' time together and the unemployment rate. During the summer months, we see a much sharper decline in time spent together as the unemployment rate rises, but for both groups, the lowest point of time together is when the unemployment rate is approximately 9.1 %.

We next examine time together on weekdays separately from time together on weekend days. Estimated coefficients are reported in Table 2, Panel F. Note that, on average, couples spend more than twice as much time together on a weekend day than on a weekday (398 min vs. 186 min). We find that the U-shaped relationship occurs for both weekdays and weekend days, but there is a larger decline in time spent together on weekend days as the unemployment rate rises. This may be because the majority of work is done on weekdays and children's school/daycare schedules provide an additional constraint on the ability to synchronize schedules.

Finally, Table 2, Panel G estimates the same model on a sample of couples with at least one child under age 13, given that these children have greater childcare needs. As anticipated, these couples spend slightly more time together on average, but the coefficient estimates are very similar to the full sample. On the whole, the results presented in both Table 2 and Fig. 2 indicate that couples' time together does indeed vary over the business cycle with a U-shaped pattern.

In Table 3, we consider alternative measures of couple time together. We first present results that consider separately parents' time spent together in the presence of their children, i.e. "family time", and alone as a couple. Coefficient estimates are almost identical.[16] We next consider which types of shared activities account for

[15] One may be concerned that the sample composition is itself changing over time if, for example, couples with a higher preference for time spent together are disproportionately more likely to be both working during a period of low state-level unemployment. Then, the pattern would be driven by the unobserved preferences of the sample of dual earners, rather than a fixed sample of dual earners having different work patterns over time. However, since estimates using the full sample are very similar (and the single- and sole-earner couple estimates are not significant), it seems unlikely that sample composition changes are driving the dual-earner couple results.

[16] We also examine cohabiting couples separately and find that their time alone as a couple is strongly affected by the recession, but not their family time (results available upon request).

Table 3 Estimates using alternative measures of time with spouse (in minutes) (N = 34,001)

	Dependent variable	Mean dep. var.	Urate	Urate^2	R^2
Estimates by presence of children					
(A)	Family time	150.79	−10.024** (4.594)	0.562** (0.242)	0.055
(B)	Couple alone time	98.10	−9.020*** (3.351)	0.529** (0.235)	0.045
Estimates by type of activity					
(C)	Time with spouse in leisure activities excluding TV	97.89	−7.627** (3.114)	0.429** (0.172)	0.013
(D)	Time with spouse watching TV and movies	85.08	−6.761* (3.789)	0.332* (0.187)	0.032
(E)	Housework with spouse present	43.17	−2.504 (2.104)	0.199* (0.108)	0.009
(F)	Primary childcare with spouse present	22.75	−2.153 (1.840)	0.131 (0.098)	0.076
Estimates by location of activity					
(G)	Time with spouse in the home	171.25	−10.874*** (3.931)	0.691** (0.244)	0.022

Time together excludes time sleeping, working, or grooming. See notes for Table 2 for covariates. Standard errors adjusted for clustering by state are reported in parentheses

*** Significant at 1 %; ** significant at 5 %; * significant at 10 %

most of the change over the business cycle. We find that leisure activities account for most of the variability in couples' time together, which is consistent with findings by Kingston and Nock (1987). Changes in TV and movie time are almost equivalent to changes in all other leisure time over the business cycle.[17] We also find a U-shaped relationship between housework time and the unemployment rate, although the effects are small and imprecise. Finally, we examine time together in the couple's home and find similar results, which could be consistent with difficulties synchronizing work schedules to allow for family time.[18]

5 Time and timing of work

In order to better interpret our results on couple time together over the business cycle as presented in Sect. 4, we next consider how the timing of work activities

[17] In estimates not shown, we found that leisure time alone as a couple and with children contributed almost equally to the U-shaped relationship between leisure time and the unemployment rate.

[18] Couples without co-resident children spend significantly more time together as the unemployment rate rises. A 1 percentage point increase in the unemployment rate is associated with a 4.9 min increase in couples' time together (results available upon request). The majority of the increase over the recession comes from changes in shared leisure time rather than changes in shared housework. This increase in shared couple time, especially leisure time, which is consistently reported as preferable to other activities, could potentially contribute to the drop in divorce rates during the Great Recession. Given that we find only a positive linear effect of unemployment rates on time together for couples without children, it further suggests that our results are consistent with the Barnet-Verzat et al. (2011) finding that children complicate work schedule synchronization.

varies over the business cycle for couples with household children. These results shed light on how the patterns of couple time together may be related to parents' work schedules, not just the overall amount of time working (Connelly and Kimmel 2011).

Our findings in Sect. 4 show that couples with children spend more time together when state unemployment rates are at their highest and lowest levels. As unemployment rates increase and households lose incomes, mothers may take jobs that require them to work at non-standard hours, which may make synchronizing work schedules more difficult.[19] At the highest unemployment rates, when even these jobs with non-standard work hours are not necessarily available, couples may then spend more time together. For our results reported in Sect. 4 to be consistent with non-standard work hours, we would see at least one member of the couple working more non-standard hours when the unemployment rate is approximately 8–9 %; because at those rates, couples' time together is at its minimum.

Previous research using cross-sectional data finds that among dual-earner parents, when one partner is observed working non-standard hours, it is common that the parents have staggered work hours so that each is working a different shift (Fox et al. 2013). This could result in parents spending less time with their spouse (Barnet-Verzat et al. 2011). While we do not observe the work hours of both partners within a couple, we can separately analyze our samples of mothers and fathers to look for evidence of a change in the amount of work occurring outside standard weekday hours over the business cycle. We expect that an individual working during non-standard hours decreases the time he/she spends with his/her spouse, as seen in our sample when the unemployment rate rises from 5 to 9 %.

We consider the number of minutes a parent works by day of the week and time of day. Minutes of work includes time working at a main job and other jobs, work-related activities, and other income-generating activities, but excludes job search activities. We include work activity regardless of the location. Given that there is only one diary day per individual, we cannot assess whether work in these intervals is typical (i.e., working in a job with non-standard hours) or is an anomaly (i.e., having to work overtime). Still, these results allow us to measure whether, on average, the timing of work hours varies by the state unemployment rate.

In Table 4, we consider the timing of work patterns for mothers and fathers over the business cycle. As before, we model the unemployment rate as a linear, quadratic, and cubic polynomial. Panels A and B of Table 4 present our results for the timing of work for mothers and fathers, respectively. Each column of each panel of Table 4 presents estimates from a separate Tobit model where the dependent variable is minutes worked during the specified time period. The categories are: Columns (1)–(3) time worked on all days (weekend day or weekday); Columns (4)–(6) time worked on weekdays between 8 a.m. and 6 p.m.; Columns (7)–(9) time

[19] Mattingly and Smith (2010) found that women were more likely to start work or increase their hours if their spouse lost his job in the Great Recession than if their spouse lost a job during periods of economic prosperity; however, there were many who could not find a job. Thus, it is likely that they may have had to take positions that they would not have chosen in times of prosperity, perhaps positions with undesirable working hours.

Table 4 Time and timing of work (in minutes)

	All days Total minutes (N = 18,066, mean = 184.21)			Weekdays Minutes 8 a.m. to 6 p.m. (N = 8809, mean 202.15)			Weekdays Minutes 6 p.m. to 8 a.m. (N = 8809, mean 36.01)			Weekend days Total minutes (N = 9257, mean 55.83)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Mothers												
Urate	−5.149**	−6.074	1.910	−6.064**	−7.968	48.336	−0.613	1.150	−0.426	0.290	−2.836	−61.642**
	(2.598)	(8.590)	(35.800)	(3.076)	(9.886)	(36.395)	(0.818)	(3.447)	(9.785)	(1.836)	(8.038)	(28.001)
Urate^2		0.056	−1.051		0.116	−7.723		−0.108	0.112		0.186	8.219**
		(0.525)	(4.714)		(0.609)	(4.772)		(0.211)	(1.254)		(0.469)	(3.481)
Urate^3			0.047			0.337*			−0.009			−0.339**
			(0.193)			(0.197)			(0.051)			(0.137)
Pseudo R^2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Table 4 continued

	All days Total minutes (N = 15,935, mean = 329.10)			Weekdays Minutes 8 a.m. to 6 p.m. (N = 7656, mean 336.46)			Weekdays Minutes 6 p.m. to 8 a.m. (N = 7656, mean 86.17)			Weekend days Total minutes (N = 8279, mean 110.64)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel B: Fathers												
Urate	−3.725	−4.824	−22.855	−5.395	5.158	−31.212	−1.573	−4.829	1.713	4.373	0.526	22.320
	(3.560)	(9.045)	(34.057)	(4.545)	(11.780)	(37.345)	(1.938)	(4.979)	(12.867)	(4.432)	(11.061)	(28.607)
Urate^2		0.066	2.551		−0.629	4.393		0.194	−0.709		0.230	−2.754
		(0.588)	(4.602)		(0.716)	(5.011)		(0.255)	(1.670)		(0.632)	(4.029)
Urate^3			−0.105			−0.213			0.038			0.126
			(0.190)			(0.210)			(0.069)			(0.173)
Pseudo R^2	0.002	0.002	0.002	0.01	0.01	0.01	0.003	0.003	0.003	0.003	0.003	0.003

The sample includes married or cohabiting mothers and fathers, respectively, who have co-resident household children under age 19, regardless of employment status. Marginal effects are estimated using Tobit models. Unemployment rates are measured at the state-level and all specifications include state and year fixed effects. Control variables include own and spouse's age and age squared, and indicators for the following: husband and wife education (high school dropout, some college, college, missing), race and ethnicity (non-Hispanic black, other, Hispanic), age of youngest HH child (infant, preschooler, elementary), HH child older than age 18, number of children (two, three or more), live with other adult, gender composition of the children (all boy, mixed gender), season, and lives in an SMSA. Minutes of work exclude job search time but include any time spent working regardless of location. ATUS final weights are used. Standard errors adjusted for clustering by state are reported in parentheses

*** Significant at 1 %; ** Significant at 5 %; * Significant at 10 %

worked on weekdays between 6 p.m. and 8 a.m.; and Columns (10)–(12) time worked on weekend days at any time.[20]

For mothers, we find that total time worked decreases linearly with an increase in the unemployment rate, and that this decrease in time is during the "standard" time period of 8 a.m. to 6 p.m. The estimated coefficient reported in Table 4, Panel A, Column (4) indicates that a 1 percentage point increase in the unemployment rate is associated with mothers working, on average, 6 fewer minutes on weekdays between 8 a.m. and 6 p.m. However, when considering the total number of minutes worked on weekend days in Column (12), we find a non-linear effect with the total time working on weekend days at its highest at the lowest levels of unemployment and at its lowest at the highest levels of unemployment, with a slight bump up around unemployment rates of 9 or 10 %.[21] Figure 3 illustrates this specification by plotting the predicted mean minutes by state unemployment rate.

We see no statistically significant results for fathers in Table 4 for any specification for any dependent variable. Although clearly, on average, time spent working varies over the business cycle, for our sample of married/cohabiting fathers, we do not detect any changes in time spent working. Because we do not observe both a mother and father within a household, it is not possible to test directly whether work schedules are staggered within families. It may be that individual families are trading off childcare responsibilities but that, on average, there is no change in the timing of work. In sensitivity analyses not shown, we did not find that total time with children varied with the state unemployment rate (results available upon request of the authors).[22] Taking together the results presented in Table 4, we conclude that timing of work hours over the business cycle is consistent with couples having more difficulty synchronizing work schedules during periods where the state-level unemployment rate is between 8 and 10 %.

[20] In results not shown, we explored using the time periods 8 a.m. to 4 p.m. and 6 a.m. to 6 p.m. as the "standard work hours." Results were similar in each of these cases. We chose to present the results for 8 a.m. to 6 p.m. because these are standard hours for school and/or daycare. In results not shown, we included a specification for weekday time diaries where the dependent variable was whether or not the parent worked the majority of hours during the 6 p.m. to 8 a.m. time. In this specification, parents who reported 0 h of work on the time diary day were coded as *not* working the majority of time in non-standard hours. The results from this specification were never significant for mothers or fathers. This specification is similar in spirit to Connelly and Kimmel (2011), who model the effects of non-standard work hours on time spent engaging in childcare. Connelly and Kimmel show that mothers and fathers who work the majority of their hours outside of 8 a.m. to 4 p.m. engage in childcare throughout the day, while mothers and fathers who work the majority of their hours during the "standard" 8 a.m. to 4 p.m. time slot spend more time in childcare in the mornings and early evenings. However, they do not consider whether total childcare time varies between parents working standard versus non-standard hours.

[21] This weekend pattern is even stronger if the sample is restricted to mothers married to men without a college degree (results available upon request).

[22] Total time with children, here, differs in definition from primary childcare time examined in many other papers using the ATUS (e.g., Aguiar et al. 2013; Colman and Dave 2013), which only considers time where the parent is focused on the child's basic needs or playing with children as defined by ATUS and likely misses important developmental time interacting with older children.

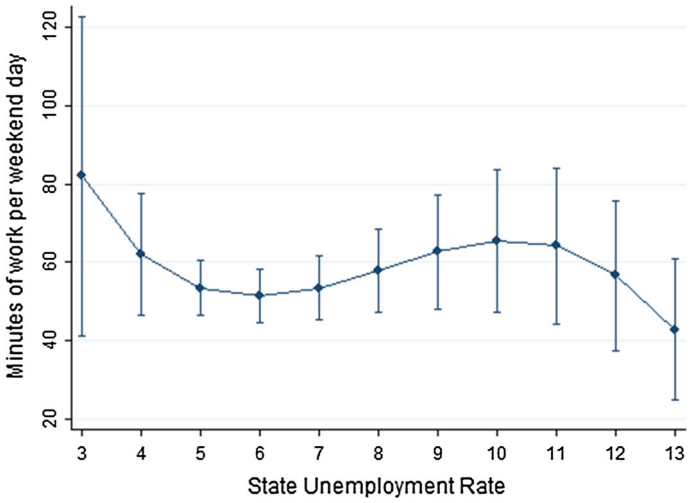

Fig. 3 Predicted mean minutes mothers spend working on weekend days by state unemployment rate with 95 % confidence intervals. *Sources*: American Time Use Survey and U.S. Bureau of Labor Statistics (2003–2010). *Notes*: this specification matches Table 3, Row (A), Column 12

6 Discussion and conclusion

In this paper we examine how the time couples with children spend together during the period 2003–2010 is associated with changes in macroeconomic conditions, as approximated by state-level unemployment rates. We find that the time that couples spend together exhibits a U-shaped pattern with respect to the unemployment rate, with the highest amounts of couple time together at very low and very high levels of unemployment. These results suggest that at times such as during the Great Recession, when the national unemployment rate grew from 5 to 10 %, couples are spending approximately 13 fewer minutes together per day. However, the quadratic shape also indicates that at extremely high unemployment rates exceeding 10 %, couples spend more time together on average. The majority of the variability in couple time together over the recession comes from changes in shared leisure time rather than changes in shared housework or primary childcare time. In addition, the observed pattern holds even for dual-earner couples, suggesting that the findings are not being driven by individual job losses.

We also explore how the timing of work for parents varies over the business cycle, because this variation may explain the cyclical changes in couple time together. The increase in the number of minutes mothers work on weekend days as unemployment rates increase to 9 % could explain the decrease in the time that couples spend together, which has its lowest point at unemployment rates between 8 and 9 %. Thus, another cost of a moderate recession for couples who have children is a reduction in the gains from complementarities associated with living together, such as spending leisure time together.

Couples who have children do spend differing amounts of time together over the business cycle, with moderate recessions being associated with a drop in couple

time together. We find effects not just for those who lose their jobs, but also for couples where both partners are currently working for pay. The finding that the state unemployment rate affects individuals who do not lose their jobs implies that the unemployment rate is an invalid instrument for an individual's employment status, as it so frequently is used in the economics literature.

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Appendix

See Tables 5, 6 and Fig. 4.

Table 5 Mean characteristics

	Couple sample	Mother sample	Father sample
Economic conditions			
State yearly unemployment rate (overall min 2.45, max 13.84)	6.09	6.07	6.11
Time together (in minutes)			
Time with spouse	248.89	239.17	258.55
Leisure time with spouse excluding TV	97.89	94.76	101.01
TV time with spouse	85.08	74.37	95.72
Housework with spouse	43.17	46.75	39.61
Primary childcare with spouse	22.75	23.29	22.21
Proportion not spending time together on diary day			
Time with spouse	0.12	0.12	0.11
Leisure time with spouse excluding TV	0.20	0.21	0.19
TV time with spouse	0.40	0.42	0.38
Housework with spouse	0.52	0.46	0.57
Primary childcare with spouse	0.71	0.69	0.73
Individual characteristics			
Hispanic	0.18	0.18	0.18
Non-Hispanic black	0.08	0.07	0.09
Non-Hispanic other	0.06	0.06	0.06
Age	40.03	38.96	41.09
Spouse's age	40.19	41.33	39.06
Wife HS dropout	0.11	0.11	0.11
Wife some college	0.27	0.27	0.27
Wife college	0.36	0.36	0.37

Table 5 continued

	Couple sample	Mother sample	Father sample
Husband HS dropout	0.12	0.12	0.12
Husband some college	0.24	0.25	0.23
Husband college	0.35	0.35	0.35
Wife missing education	0.00	0.00	0.005
Husband missing education	0.004	0.01	0.00
Youngest child infant	0.26	0.27	0.26
Youngest child preschooler	0.19	0.18	0.19
Youngest child elementary student	0.33	0.33	0.33
Two children in household	0.40	0.40	0.40
Three or more children in household	0.24	0.24	0.24
Cohabiting	0.04	0.04	0.04
Child older than 18 in HH	0.13	0.14	0.13
Live with other adults	0.06	0.06	0.06
All boy HH children	0.31	0.32	0.31
Mixed gender HH children	0.40	0.39	0.40
Resides in SMSA	0.83	0.83	0.83
N	34,001	18,066	15,935

Survey weights used

Table 6 All time with spouse

Dependent variable: all time with spouse (in minutes), (OLS) (N = 34,001)	
Urate	−19.045*** (5.924)
Urate^2	1.091*** (0.365)
Hispanic	−0.417 (5.388)
Black	−45.439*** (6.431)
Other race	−4.262 (4.794)
Age	−2.338 (2.497)
Age squared	20.065 (28.132)
Spouse's age	−3.932** (1.944)
Spouse's age squared	4.007* (2.134)
Wife HS dropout	19.621*** (5.875)
Wife some college	−4.503 (5.121)
Wife college	−8.889 (5.507)
Husband HS dropout	−2.343 (5.618)
Husband some college	0.492 (4.339)
Husband college	11.295** (5.030)
Wife college missing	−43.299* (23.845)
Husband college missing	−37.648 (26.650)
Youngest child is infant	19.334*** (5.500)
Youngest child is preschooler	−2.544 (6.293)
Youngest child elementary—school aged	−4.798 (5.073)

Table 6 continued

Two children in household	−2.782 (3.492)
Three or more children in household	−2.272 (4.840)
Winter	12.590*** (4.251)
Spring	−0.694 (4.287)
Summer	14.653*** (5.086)
SMSA	−3.538 (4.361)
Cohabiting couple	−5.160 (8.289)
Child aged 19+ in household	−5.347 (4.308)
All boys in household	3.547 (3.348)
Mixed-gender children in household	−2.328 (3.990)
Other adults in household	−8.824 (8.266)
Female	−20.855*** (2.651)
Year = 2003	4.374 (4.530)
Year = 2004	−3.101 (4.405)
Year = 2006	−5.566 (6.826)
Year = 2007	0.747 (5.891)
Year = 2008	0.563 (5.074)
Year = 2009	27.271*** (6.281)
Year = 2010	15.438** (7.058)
Constant	468.065*** (54.045)

This is the full set of covariates from the quadratic specification in Table 2, full sample. Regressions also include state FEs. Standard errors adjusted for clustering by state are reported in parentheses

*** Significant at 1 %; ** Significant at 5 %; * Significant at 10 %

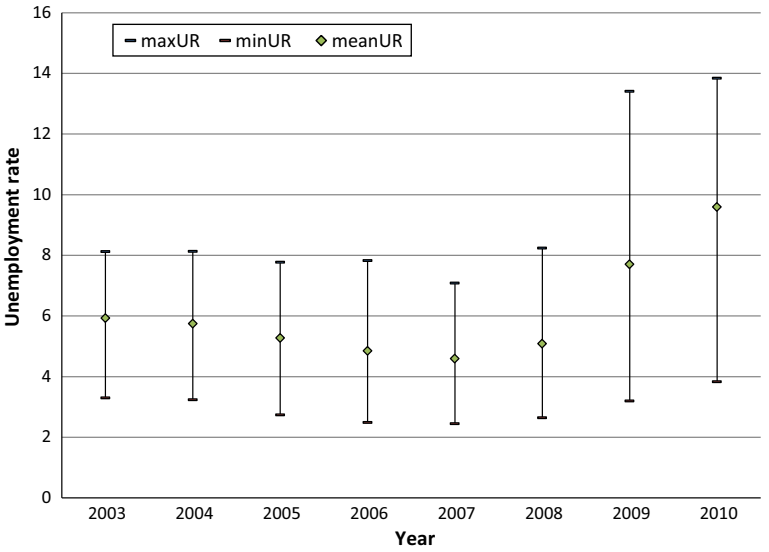

Fig. 4 Mean, minimum, and maximum state unemployment rates, 2003–2010

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