Newborn health and the business cycle: Is it good to be born in bad times?[*]

Ainhoa Aparicio
(Collegio Carlo Alberto)

Libertad González[♦]
(Universitat Pompeu Fabra and Barcelona GSE)

March 2014

Abstract: We study the effect of the cycle on the health of newborn babies using 30 years of birth-certificate data for Spain. We find that babies are born healthier when the local unemployment rate is high. Although fertility is lower during recessions, the effect on health is not the result of selection, since the main result survives the inclusion of parents' fixed-effects. Analysis of National Health Survey data shows that fertility-age women engage in healthier behaviors during recessions (in terms of exercise, sleep, smoking and drinking) and report better overall health. We conclude that maternal health is a plausible mediating channel.

JEL codes: E32, I10, J13

[*] We thank seminar participants at CREI, Collegio Carlo Alberto, Universität Freiburg, Universitat de Barcelona, and Universitat de Girona, as well as conference attendants at Simposio de Análisis Económico 2013. Libertad acknowledges the financial support of Fundación Ramón Areces.

[♦] Corresponding author. Address: Universitat Pompeu Fabra, Department of Economics and Business, Ramon Trias Fargas 25-27, 08005 Barcelona, Spain. Phone: (+34) 93 542 2610. Fax: (+34) 93 542 1746.
Email: libertad.gonzalez@upf.edu

1. Introduction

A recent literature has documented that adult health improves during recessions, at least in the US (Ruhm 2000, 2003, 2005) and some other OECD countries,[1] plausibly due to healthier behaviors. In their seminal 2004 paper, Dehejia and Lleras-Muney (from now on, D-LM) show that health outcomes at birth (such as birth-weight) are also better on average when the unemployment rate is high. Their results indicate that part of this association can be attributed to selection ("better" parents being more likely to procreate during bad times), but they also provide evidence suggesting that some could be driven by improved maternal health behaviors during pregnancy.

More recent work using data on infant health for other countries, however, has offered a more mixed picture. Several papers have found the opposite association in developing countries. For instance, Bhalotra (2010) found that infant mortality in India increases during recessions, and Bozzoli and Quintana-Domeque (2013) report that birth-weight fell significantly during the 2001-2002 crisis in Argentina.[2] Miller and Urdinola (2000), on the other hand, find that infant mortality increases with positive income shocks in Colombia, and attribute it to mothers having less time to engage in health-promoting behaviors for their children. Finally, recent work by Salvanes (2014) and van den Berg and Modin (2013) for North-European countries (Norway and Sweden, respectively) find no significant association between the local unemployment rate and the health of newborns.

[1] See Gerdtham & Ruhm (2006), Neumayer (2004), Gerdtham & Johannesson (2005), and Tapia Granados & Ionides (2008).

[2] Cutler et al. (2002), Paxson and Schady (2005), and Baird, Friedman & Schady (2011) find that infant mortality falls during good times, using data for Mexico, Peru, and a sample of 59 developing countries, respectively.

We contribute to this literature by using 30 years of high-quality data for Spain, a middle-high income country with large regional heterogeneity as well as large fluctuations in the unemployment rate over time. We exploit very rich birth-certificate data for the universe of registered births from 1981 to 2010, taking advantage of regional variation across the 50 Spanish provinces. We proxy the business cycle by the province unemployment rate (or the employment-to-population ratio). As measures of health at birth, we observe birth-weight and neonatal mortality.

First, in a regression with province and year fixed-effects (like D-LM), we confirm the US finding that babies are born healthier when the local unemployment rate is high. We then proceed to study the extent to which this association is driven by selection. We do this, first, by analyzing the effect of the cycle on fertility. We find that there are fewer births when the unemployment rate is high. Moreover, the observed characteristics of new parents change with the cycle. This suggests that composition might be driving the results. We test for this possibility by matching multiple births to the same parents at different points in the cycle. The effect survives the inclusion of parents' fixed-effects (D-LM could only control for mother fixed-effects in a subset of their data, covering only California and a short time-period). We conclude that at least part of the effect of the unemployment rate on neonatal health is behavioral and not just driven by composition.

Finally, we explore potential behavioral channels. We first focus on mothers' (pre-birth) labor force participation. When controlling for maternal employment or parental occupation in the regressions with parents fixed-effects, the effect of the unemployment rate on newborn health remains. We thus conclude that maternal employment is not the main mediating channel.

We then turn to maternal health-related behaviors. We merge eight waves of National Health Survey data, covering 1987-2011, and find that fertility-age

women report better health during recessions, and appear to engage in healthier behaviors: they smoke and drink less, exercise and sleep more, and weigh less. This is consistent with the US findings of adult health being counter-cyclical (Ruhm 2000, 2003, 2005).

We conclude that maternal health behaviors and outcomes more than compensate for the fall in household income during recessions, on average, leading to healthier babies when the economy is weak. The effect of the cycle on newborn babies' health is actually stronger for low-skill parents and in low-income regions. This pattern is also observed in the maternal health results: fertile-age women's health behaviors are more sensitive to the cycle among the low-skill and in low-income regions, which reinforces the main conclusion.

Our work extends the findings in D-LM in three directions. First, we confirm their main result, that newborn babies' health is countercyclical, with data for a different developed country, with important differences with respect to the US in terms of the health care system (Spain has universal, public healthcare) as well as the labor market. Second, we are able to match multiple babies born to the same parents in the birth-certificate data for the whole 30-year period and the whole country, which allows us to test for selection in the full sample. And third, by using pooled National Health Survey data for the same time period, we can test for the counter-cyclicality of mothers-to-be health-enhancing behaviors as a mediating channel (D-LM only analyze a limited set of health behaviors, and for the selected sample of mothers, so that their results could not separate selection from behavioral effects).

How can we reconcile our findings with the conflicting evidence from other countries? In the cases of Norway and Sweden (and Argentina), it would be useful to know whether women's health behaviors are perhaps less influenced by the cycle than in the US or Spain. With respect to India, Bhalotra (2010) reports that

mothers' health behaviors and outcomes actually worsen during recessions, since women are more likely to work in the fields.

The remainder of the paper is organized as follows. We first present the baseline results (in section 2), showing that regional unemployment is associated with healthier newborns, after controlling for region and year fixed-effects. We then (in section 3) evaluate how fertility changes with the cycle and whether composition effects (in terms of observable characteristics of the parents) may plausibly account for the initial association. Section 4 presents the results with parents' fixed-effects. We also evaluate maternal employment as a potential channel. Then we move on to the analysis of mothers' health-related behaviors (section 5). Section 6 concludes with a discussion of the main results, and evaluates the plausibility of other potential channels.

2. Baseline health results

2.1 Data and descriptive statistics

The national unemployment rate from 1980 to 2012 is shown in figure 1, using data from the Labor Force Survey. The lowest historical level was reached in 2007, at 8%, while there are three peaks of high unemployment in 1985 (21%), 1994 (24%) and 2012 (25%). The national figures hide even larger regional variation. Figure 2 displays the unemployment rate across the 50 Spanish provinces in 2012. The lowest level is 13% (in Guipuzcoa), while the highest is reached in Jaén (37%). Our analysis exploits regional variation in the evolution of the unemployment rate over time. Because of concerns regarding measurement

error, we supplement our analysis with the employment-to-population ratio (also calculated with Labor Force Survey data).[3]

The health information about newborn babies is derived from (micro-level) birth-certificate data, made publicly available by the National Statistical Institute for the population of all registered births in Spain. We construct four measures of neonatal health: birth-weight in grams,[4] an indicator for low birth-weight (under 2,500 grams, from now on LBW), an indicator for very low birth-weight (under 1,500 grams), and an indicator of late fetal death. A fetal death is defined as a baby born after the 20th gestational week who does not survive the first 24 hours (including deaths in utero, and during or after delivery). We also construct two mortality variables from death certificate data: neonatal mortality (including deaths between 1 and 28 days after delivery), and post-neonatal mortality (for deaths between 28 days and 1 year after birth).

Figure 3 shows the time trends in two measures of infant health: infant mortality, and the fraction of LBW babies. Infant mortality includes late fetal deaths as well as neonatal and post-neonatal mortality. During the 30-year period, infant mortality declined from 22 to 6 per 1,000 births, while the fraction of LBW babies increased from less than 4 to more than 6 percent.[5]

[3] In order to maintain the sign of the estimated effects, we in fact use one minus the employment-to-population ratio, which we refer to as the "non-employment rate".

[4] We drop observations with reported birth-weight below 500 or above 6,500 grams (much less than 1% and most likely misreporting errors).

[5] This is common to many countries and is typically attributed to the rising age at motherhood as well as the increase in the incidence of multiple births (although multiple births are not included in figure 3).

Because of the marked long-term trends in the health variables, it is hard to see any correlation with the business cycle. Figure 4 displays, in the same graph, the unemployment rate for the 30 years of analysis (right axis), together with each of our six neonatal health variables, detrended (left axis).[6] The second panel is for the fraction of LBW babies. Except for the initial years, a negative correlation is apparent: the increase in unemployment in the early 1990's coincides with a drop in the fraction of LBW babies, while the sustained fall in unemployment after 1994 coincides with a substantial increase in LBW.

This observation is confirmed by a simple time-series regression analysis, reported in appendix table A1. We regress our six measures of babies' health at the national level on the unemployment rate and a linear or quadratic trend, for the 30 years of data. The sign is negative and strongly significant for several of the outcomes. In particular, when unemployment is high, there are significantly fewer children with LBW, and lower neonatal mortality.[7] These descriptive results are confirmed in the next section, where the data are analyzed at the regional level.

2.2 Econometric specification

In our baseline specification, we regress several measures of health at birth on the regional unemployment rate, controlling for province and year fixed-effects, using data for the 50 Spanish provinces over 30 years (1981-2010). The specification is the following:

$$y_{it} = \alpha + \beta u_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

[6] We just subtract a linear trend (or quadratic, if quadratic term significant), estimated by OLS.

[7] Because the association between the unemployment rate and LBW in the time series seems to be driven by multiple births, in order to be conservative in the rest of the analysis we drop multiples from the sample.

where *y* is a measure of newborn babies' health, for babies born in province i and conceived in year t. We estimate year of conception by combining (individual-level) information on date of birth and number of gestational weeks at birth. Our measures of babies' health are: birth-weight in grams, the fraction of LBW babies, the fraction of babies born under 1,500 grams, the fraction who died within 24 hours of labor (late fetal deaths), the fraction dying between 24 hours and 28 days of labor (neonatal mortality), and the fraction dying between 29 days and 1 year after birth (post-neonatal mortality).

Our main explanatory variable is *u*, the unemployment rate (or the non-employment rate) in province i and year t. We include fixed-effects for province (μ) and year (λ). In additional specifications, we control for a quadratic trend instead of the year fixed-effects, or we additionally include province-specific linear trends. The regressions are weighted by the number of births in each cell. Standard errors are clustered at the province level to allow for serial correlation. The number of observations is 1,500 (50 provinces times 30 years).[8]

2.3 Main results

Descriptive statistics for all the relevant variables are presented in table 1. There are on average 22,000 births in each province-year cell. Almost 6% of babies are LBW, about 0.6% weigh less than 1,500 grams, and 0.56% do not survive the first 24 hours. We supplement these outcomes from birth certificate data with information from death certificates. About 0.4% of newborns die between days 1 and 28 of life, and an additional 0.2% die before their first birthday.

[8] The Labor Force Survey is conducted quarterly, so we can also perform the analysis at the quarterly level. The yearly analysis is more conservative. The quarterly analysis in fact produces very similar point estimates, estimated more precisely.

Regarding our main explanatory variable, the average province unemployment rate is 16.6%, but there is considerable variation, with a standard error of 7, a minimum of 0 and a maximum of 42%.[9] The average non-employment rate is 55.5%. As for family characteristics, most mothers are between 25 and 35 years of age, 83% are married, and 15% have a high-skill occupation. About 48% of babies are female, and 52% are first-born for the mother.

Table 2 presents the results of estimating equation 1 for our six measures of newborns' health. Each of the coefficients comes from a different regression. The first column controls only for province fixed effects and a quadratic time trend. The results suggest that high unemployment is significantly associated with fewer late fetal deaths and lower neonatal mortality. A 10 percentage-point increase in the local unemployment rate is associated with 7% lower death rates. The second column adds year fixed effects. All signs remain unchanged, but now the unemployment rate is significantly associated with the fraction of babies born under 1,500 grams, and with the post-neonatal mortality rate.

The final specification, shown in column 3, includes province-specific linear trends. Unemployment is now shown to be significantly associated with five out of the six outcome variables. A 10-point increase in the unemployment rate is associated with 3% fewer LBW babies and almost 7% fewer babies with very low birth-weight (under 1,500 gr.). Average birth-weight is lower by 3%, and the three mortality rates are lower by between 8 and 11%. When we use the non-employment rate instead of the unemployment rate (columns 4 to 6), the results are even stronger, with significant coefficients for all six outcome variables in the

[9] The sizeable variation in unemployment rates in our data is even more apparent when compared with the variation found in US data. In the sample used by Dehejia and Lleras-Muney (2004) for all US states, they find a 1.97 standard deviation, for a mean of 6.61.

most complete specification (column 6).[10] We conclude that neonatal health is significantly better when local labor market conditions are bad.

In order to analyze whether this effect varies by socio-economic status (SES) or income, we allow the effect of the cycle to vary with the SES of the parents and with the income level of the region. The results are shown in table A2. The first panel stratifies the sample into two groups, as a function of the parents' reported occupation.[11] We find that the results are stronger for the sub-sample of low-skill parents (see columns 3 and 6). The second panel runs the analysis separately for two groups of 25 provinces each, split based on the region's per capita GDP in 1980.[12] By comparing the results in columns 3 and 6 for the two groups of provinces, it appears that the birth-weight effects are driven by the low-income provinces, while the effects on mortality are stronger in high-income regions.

The average health of newborns thus appears to improve during recessions, and we would like to understand why. The first candidate explanation is changes in composition: perhaps the average characteristics of new parents vary with the cycle. If parents with characteristics associated with healthier babies are more likely to give birth when unemployment is high, that could generate the observed association between the cycle and health. In the next section, we evaluate this

[10] As in D-LM, we also address the potential presence of omitted variables by instrumenting unemployment rate at conception with the unemployment rate one year prior to conception. Results from the IV analysis (available upon request) are very similar to the baseline ones and, if anything, they estimate an even stronger negative association between unemployment rates and babies' health.

[11] No results are shown for neonatal and post-neonatal mortality. The reason is that the death registers provide no information on occupation of the parents.

[12] The data on per capita GDP by province in 1980 come from Escudero and Simon (2012).

possibility by analyzing the effect of the business cycle on fertility and family characteristics.

3. Fertility and composition effects

3.1 The cycle and fertility

Previous literature suggests that fertility declines during recessions (Yule, 1906; Galbraith and Thomas, 1941; Becker, 1960; Silver, 1965; Ben-Porath, 1973). If this is the case, then families who give birth when unemployment is high would be "self-selected", and their (observable and/or unobservable) characteristics could explain the association between the business cycle and the health of newborn babies.

Figure 5 shows the annual birth rate (number of births per 1,000 population) in Spain between 1980 and 2011. Fertility declined steadily during the 1980's and early 1990's, reaching its lowest level, about 9 births per 1,000 people, in 1996. The birth rate then increased for the next decade, reaching a peak at 11.4 in 2008, and falling back down since then. Note that the fertility increase from the mid 1990's until 2008 coincides broadly with a long period of falling unemployment (see figure 1), while the beginning of the recent recession is accompanied by falling birth rates.

In order to formally test whether fertility tends to fall when unemployment is high, we run regressions of the form of equation 1, where the dependent variable is a measure of fertility at the province-year level (the total number of births, its log, or the birth rate). Results are presented in table 3 (first panel).

The first three rows use the unemployment rate as the main explanatory variable. All signs are negative, as expected, but precision is low when including year fixed-effects. The last three rows use the employment-to-population ratio,

which arguably contains less measurement error. These results confirm that fertility falls significantly during recessions.[13]

We next explore whether the cycle affects fertility differentially by family characteristics. Table 3 also reports the fertility regression results for the subsamples of families with low- and high-skill parents. If we focus on the results in column 6, it would seem that high unemployment leads to lower fertility among low-skill parents, while the results are not significant for the sub-sample of high-skill occupation families. We also run the analysis separately for low- and high-income provinces (see table A4). A negative effect on fertility is found in both groups of regions.

Our fertility analysis suggests that the characteristics of families having babies may vary with the business cycle, which could be driving our health results. For instance, if low-skill parents tend to have unhealthier babies, their lower fertility rates during recessions might lead to better average health for all newborn babies. We explore this possibility further in the next section.

3.2 The cycle and parental characteristics

Next we test whether parents with characteristics associated with healthier babies are (relatively) more likely to give birth during recessions. In order to do that, first we correlate our observable characteristics (from the birth-certificate data) with the different measures of babies' health.[14] Neonatal health tends to be better for

[13] We also analyze whether the fertility effect is the result of changes in the number of abortions. The results are presented in table A3. We find that abortions do not increase when unemployment is high. Thus, the fertility effect can be traced to fewer conceptions (not more abortions) during recessions.

[14] We run year-by-year regressions where we correlate our newborn health variables with observable characteristics, controlling for province fixed-effects. The results of these regressions are available upon request.

singleton and higher-order births, with mothers aged between 25 and 35, married mothers, and high-skill parents. Girls weigh less than boys at birth but have lower mortality rates.

Thus, if changes in the composition of the families giving birth (along observable characteristics) were to explain our main finding, it would have to be the case that "better" families are more likely to have a baby when unemployment is high. We test this hypothesis directly by estimating regressions of the form of equation 1, where the dependent variable is the fraction of families in each province-year cell with a mother aged between 25 and 35, a married mother, etc. The results are displayed in table 4.

We focus on the specifications with year fixed-effects (columns 2-3 and 5-6). Regarding how average maternal age varies with the cycle, the results are inconclusive. The specifications with the unemployment rate (columns 2 and 3) suggest that maternal age falls during recessions, while column 5 (with the non-employment rate) suggests the opposite. Regarding marital status, the proportion of mothers who are married appears to increase with the unemployment rate, but so do the fraction of babies with no registered father. The results for parental occupation are also mixed.

The stronger results are found for birth order and multiplicity. Although the sex ratio at birth is unrelated to the cycle, high unemployment is strongly associated with fewer first births as well as fewer multiple births. Both first births and twin births are associated with worse health outcomes. However, multiple births were dropped from the sample in the main analysis (table 2). The extent to which birth order is responsible for the observed association between unemployment and babies health is explored further in section 4.

In any case, our analysis in this section suggests that observable family characteristics vary with the cycle. In the next section, we explore the extent to

which both observed and unobserved family characteristics might be driving the documented association between the unemployment rate and neonatal health.

4. Results with parents fixed-effects

The richness of the birth certificate data allows us to test for selection effects by comparing multiple births to the same parents at different points in the cycle. For each newborn, we use information on his or her parents' date of birth, as well as the date of birth of the previous child to the same mother, to link each baby to his or her siblings.[15] By including parents fixed-effects in the regressions, we are "controlling for" family characteristics (both observed and unobserved) that are stable over time.

Table 5 reports the results of estimating the main regressions for the subsample of matched siblings.[16] The first panel uses the unemployment rate as the main explanatory variable, while the second panel shows the regressions using the non-employment rate. Columns 1 to 3 replicate the regressions shown in table 2, for the subsample of siblings. Columns 4 to 8 include the parents' fixed-effects.

Our results are less precise when estimated on the subsample of siblings, although the main conclusions remain unchanged. Focusing on column 3 (with province trends and without family fixed-effects), we find significant effects only for birth-weight in the first panel, and for the two measures of low birth-weight in

[15] We find unique matches for about 67% of the cases. More details on the matching procedure are provided in the appendix. We use the subsample of siblings for all the analysis in this section.

[16]The regressions in table 5 are all estimated at the individual level (instead of aggregating at the province-year level as in table 2), in order to facilitate the inclusion of the family fixed-effects.

the second. The effect on mortality is only negative and significant in column 2 (first panel).

Precision is further reduced, as expected, when including the family fixed-effects (columns 4 to 8), but some significant effects remain. In the regressions with year dummies (columns 5 and 7-8), only one coefficient is significant at the 90% confidence level. The late fetal death rate is found to be lower when the unemployment rate is high (in column 7). The effect on birth-weight and LBW is only significant in the less stringent specifications (with the quadratic time trend, in columns 4 and 6).

In order to judge how much of the original effect is due to selection, we can compare the results in columns 2 and 7 (or 3 and 8). Focusing on the mortality effect in the first panel, note that the magnitude of the coefficient actually increases when including the family fixed effects (from -0.0016 in column 2 to -0.0026 in column 7). Thus, selection does not appear to explain the association between the unemployment rate and the rate of late fetal deaths.

Regarding birth-weight, we can compare the results in columns 1 and 6. The estimated effect of unemployment on average birth-weight is actually higher in the specifications with family fixed-effects (in both panels). The estimated magnitude is also higher for the fraction of low birth-weight babies. However, the association with very low birth-weight essentially vanishes when controlling for family characteristics.

Thus, even within the same family, babies conceived in high-unemployment periods are born healthier than their siblings conceived during a boom. It could still be, however, that this is driven by birth-order effects. Since first births tend to be less healthy and are also less likely to take place during a boom, we would like to control for birth order in our regressions with family fixed effects. The results of doing so are reported in Table A5 (first panel), where we also control for mother's age at birth. The main conclusions remain.

Comparing columns 4 through 8 in tables 5 and A5 (first panel), we can see that controlling for maternal age and birth order reduces the magnitude of the coefficients in the regressions for low birth-weight (first row) by about a half, although they remain statistically significant in two specifications. When focusing on the continuous birth-weight variable, the coefficient in specification 5 actually becomes larger and more significant with the controls. Finally, regarding the mortality results, the significant coefficient in column 7 of table 5 has now turned insignificant, but its magnitude remains basically unchanged.

We also explore the results of the parents' fixed effects specifications in the subsamples by parents' occupation and by income of the region. The results are reported in table A6. The first panel splits the sample into low- and high-SES families, based on the reported occupation of the parents. Results are fairly imprecise, but we still find that, in the low-SES sample, babies are born significantly heavier when the unemployment rate is high (column 3), and the effect survives the inclusion of the family fixed-effects (columns 5 and 8). However, the effects are not present in the high-SES sample, to the extent that some of the coefficients in the birth-weight regressions reverse sign. The fraction of LBW babies *increases* with the unemployment rate for high-skill parents (columns 5 and 7-8). Thus, the main effects appear to be driven by low-skill families.

The second panel of table A6 shows the results for low- and high-income provinces separately. Results are imprecise and we don't find large differences, except perhaps that the mortality effects are stronger in the richer regions (see columns 5 and 7).

To sum up, the results in this section suggest that, although selection plays a role, at least part of the positive association between the local unemployment rate and neonatal health appears to be causal. We next explore some possible drivers of this effect.

Previous literature has highlighted the role of maternal time use and employment as drivers of infant health, although these papers mostly use infant mortality as an outcome and focus on maternal time use and employment after birth (Bhalotra 2010, Miller and Urdinola 2010). In our case, since we measure babies' health at birth, a potential driver could be maternal employment during pregnancy (before birth). Our birth-certificate data provide information on mothers' occupation, from which we can infer their employment status right before birth. We thus re-estimate the regressions with family fixed-effects, controlling for maternal employment. The results are reported in table A5 (second panel), and are essentially unchanged with respect to table 5. The same is true if we control for parents' occupation (third panel of table A5).

We conclude that mothers' employment status or occupation during pregnancy is not the main driver of our effects on newborn health. We next explore the possibility that other maternal behaviors are affected by the cycle.

5. Maternal health behaviors

A recent literature finds that adult health tends to improve during recessions (Ruhm 2000, 2003, 2005; Neumayer 2004; Tapia-Granados 2005), at least in part due to increased health-enhancing behaviors. One possible explanation for our main finding is that (pregnant) women engage in healthier behaviors when unemployment is high.

In order to test this hypothesis, we merge eight waves of the Spanish National Health Survey, covering 1987-2011, and restrict the sample to women of childbearing age (in the main table, 17 to 50).[17] Descriptive statistics are reported in table A7. We define two binary measures of health status. The first one is an

[17] We explore different age ranges and also restrict the sample to married women in alternative specifications. The main conclusions remain.

indicator of good self-reported overall health status. It recodes a variable that asks about health status with five possible answers. Our measure takes value 1 is the woman reports ok, good or very good health, which is the case for almost 96% of the sample. We also create an indicator of mental health, which takes value 1 for women not reporting any mental health problems (only 1% do).

We also construct four variables measuring health-related behaviors. About 37% of women in the sample report smoking, while 47% report having consumed alcohol during the 2 weeks prior to the interview. Almost 48% of women report exercising regularly, and average hours of sleep are about 7.6. Finally, we observe women's weight (almost 62 kilograms on average) and construct their body-mass index (BMI), which adjusts weight based on height. Average BMI is 23.5 (24 and higher is considered overweight).

We run regressions of the form of equation 1, where the dependent variable is a measure of women's health or health-related behavior. The results are presented in table 6. The specifications are parallel to those estimated in table 2 for babies' health, except that we always control for a cubic polynomial in age, and add an initial column with a linear time trend (and no year dummies).

The first row reports the results for overall health status. The most complete specification (with province trends, in column 4) shows that high unemployment is associated with a significantly higher fraction of women reporting good overall health. This does not seem to be driven by mental health, as none of the coefficients are significant when we use mental health as an outcome.[18] This is consistent with the results in Ruhm (2003), who finds that adult physical health is better when macroeconomic conditions are worse, while that is not the case for mental health.

[18] The coefficient in the last column is marginally significant, with a p-value of 0.105.

We next turn to health behaviors. There is some indication that women drink and smoke less when unemployment is high, although the effects turn insignificant in the specifications with year fixed-effects. We also find that hours of sleep and exercise increase with the unemployment rate.[19] While we do not have data on nutritional intake for all years, we do find (column 6) that women weigh less in high-unemployment periods.

We also explore whether the effects of the cycle on women's health vary by SES or by income of the region. The results are reported in table A8. The first panel estimates the health regressions separately by occupation of the main earner in the household. The overall health effects are present both for low- and high-SES women, although they appear stronger in the high-SES group (see column 3). The effect of the cycle on healthy behaviors (smoking, drinking, sleep and exercise), however, appears to be driven by the low-SES group, with the signs even reversing in some cases for the high-SES group (see column 2 for smoking, column 3 for drinking, and column 5 for sleep). High-SES women do appear to weigh less when unemployment is high (columns 4-6).

The second panel of table A8 reports the health results for low- and high-income provinces. The results are quite imprecise once we control for year fixed-effects, but we do find that women in poor regions exercise more and weigh less when unemployment is high.

The results for women's health by SES and income of the region are consistent with our findings for neonatal health, in the sense that the effect of the

[19] Since fertility is lower during recessions, we expect that fewer women in the sample will be pregnant at the time of the interview, which could affect our health results if pregnancy affects, for instance, smoking and drinking behaviors. However, if anything, we would expect that pregnancy might induce healthier behaviors, which would lead us to observe that women are healthier when unemployment is low (instead of high).

cycle on adult women's health-enhancing behaviors appears stronger in lower-income groups. If women's health is a relevant factor behind the countercyclicality of babies' health, one would expect that the segments of the female population that experience the strongest health effects of the cycle also experience the strongest effects on newborn health.

Overall, the results in this section suggest that women's health status improves when unemployment is high, and they seem to engage in more health-enhancing behaviors. This suggests that maternal health is one potential channel driving better health outcomes for newborn babies.

6. Conclusions

Using birth- and death-certificate data and Labor Force Survey data for Spain between 1980 and 2010, we show that the health of newborn babies appears to improve (on average) during recessions. This is not the result of selection in parental characteristics (observed or unobserved). Although mothers-to-be are less likely to be working when unemployment is high, maternal employment does not explain the result. We do, however, find evidence that mothers-to-be engage in healthier behaviors when unemployment is high, which might explain that they have healthier babies.

There could still be additional channels underlying the positive association between the local unemployment rate and babies' health. For instance, since fertility is lower during recessions, it is possible that pregnant women receive better quality medical care as a result, both during pregnancy and labor. Congestion in the health system during booms could thus explain part of the results. However, it is also likely that the (public) health system is more underfunded during recessions, which would lead to the opposite effect.

One could still come up with additional channels that could contribute to our main effect. For example, periods of lower economic activity could result in less

pollution and better air quality, which in turn could affect babies' health positively. A recent literature shows that air quality during pregnancy can have important health effects for newborns (Chay and Greenstone, 2003; Currie and Schmeider, 2009; Currie et al., 2009; Currie and Walker, 2011; Corneus and Spiess, 2012).

Our results contribute to previous literature showing that, at least in rich countries, babies' health is countercyclical. We believe that we can plausibly discard that this is only due to selection effects, and we provide some evidence suggesting that maternal health and health-enhancing behaviors before birth can be a potentially relevant mediating factor, which would compensate the potentially negative effects of recessions on neonatal health via maternal nutrition and/or stress.

Appendix: The matching procedure for siblings

The Spanish National Statistical Institute (NSI) provides data for every registered birth in Spain between 1981 and 2010. The total number of birth records during the 30-year period is 13,009,614. In addition to the publicly available data, we purchased the mother's exact date of birth as an additional variable from the NSI. We used the following variables to link siblings: date of birth of the mother, month and year of birth of the father, month and year of birth of the mother's previous child, and number of previous children of the mother.

Our matching procedure for siblings is the following. We compute the number of "potential matches" by identifying all births in 1980-2010 in which the mother reports having had her previous child in 1981 or later. A pair of births is then considered an actual match if:

a) we find a match for the earlier birth in the data (for instance, births that happen out of Spain may not be recorded),

b) both babies have the same father (or a father with the same month and year of birth),

c) the earlier birth is distinguishable from other earlier births (only babies with unique values for the identifying variables can be matched),

d) the later birth is distinguishable from other later births,

e) the earlier birth is not a potential match with any other later births, and

f) the later birth is not a potential match with other later births.

Thus, if a newborn in our original data is not matched, it can be because: i) he/she has no older siblings; or iii) his/her most recent older sibling was born before 1981; or iii) his/her older sibling is not in the Spanish birth-register data; or iv) there are multiple candidates to be his/her earlier sibling that cannot be distinguished (multiple matches); or v) he/she cannot be distinguished from other babies herself. Of course, any typos or recording errors in the birth register files will also lead to our failure to identify siblings.

The total number of potential matches is 5,028,507 while the actual number of matches is 3,354,722 (66.7%). We fail to match 5% of them (172,119) due to multiple matches (births with identical values for all matching variables). The rest (about 28%) are not matched due to either one sibling not being registered, or measurement error in our matching variables. Overall, our matching procedure allows us to link about two thirds of the siblings in the sample.

References

Baird, Sarah, Jed Friedman, and Norbert Schady (2011) "Aggregate Income Shocks and Infant Mortality in the Developing World." *Review of Economics and Statistics* 93:3.

Becker, Gary, "An Economic Analysis of Fertility," in *Demographic and Economic Change in Developed Countries,* National Bureau of Economic Research Series,
Number 11 (Princeton, NJ: Princeton University Press, 1960), pp. 209–231.

Ben-Porath, Yoram, "Short-Term Fluctuations in Fertility and Economic Activity in Israel," *Demography,* X (1973), 185–204.

Bhalotra, Sonia. "Fatal fluctuations? Cyclicality in infant mortality in India" *Journal of Development Economics* 93 (7-19), 2010.

Bozzoli, Carlos and Climent Quintana-Domeque. "The Weight of the Crisis: Evidence From Newborns in Argentina" *Review of Economics and Statistics,* forthcoming.

Case, Anne and Christina Paxson, "Causes and Consequences of Early Life Health." National Bureau of Economic Research Working Paper No. 15637, 2010.

Chay, Kenneth Y. and Michael Greenstone. August 2003. "The Impact of Air Pollution on Infant Mortality: Evidence from Geographic Variation in Pollution Shocks Induced by a Recession." *Quarterly Journal of Economics,* 118(3): 1121-1167.

Coneus, Katja and C. Katharina Spiess, "Pollution exposure and child health: Evidence for infants and toddlers in Germany**",** *Journal of Health Economics,* 2012, vol. 31, issue 1, pages 180-196

Cunha, Flavio and James J. Heckman. 2008. "Formulating, Identifying and Estimating the Technology of Cognitive and Noncognitive Skill Formation." *Journal of Human Resources,* 43(4): 738-782.

Cunha, Flavio, James J. Heckman, and Susanne M. Schennach. 2010. "Estimating the Technology of Cognitive and Noncognitive Skill Formation." *Econometrica,* 78(3): 883-931.

Currie, Janet. 2009. “Healthy, Wealthy, and Wise: Socioeconomic Status, Poor Health in Childhood, and Human Capital Development.” *Journal of Economic Literature*, 47(1): 87-122.

Currie, Janet, Matthew Neidell, and Johannes F. Schmeider. 2009. “Air Pollution and Infant Health: Lessons from New Jersey.” *Journal of Health Economics*, 28(3): 688-703.

Currie, Janet and Johannes F. Schmeider. 2009. “Fetal Exposures to Toxic Releases and Infant Health.” *American Economic Review:* Papers and Proceedings of the Annual Meeting of the American Economic Association, 99(2): 177-183.

Currie, Janet and Reed Walker. 2011. “Traffic Congestion and Infant Health: Evidence from EZPass.” *American Economic Journals-Applied Economics*.

Cutler, David M., Felicia Knaul, Rafael Lozano, Oscar Mendez, and Beatriz Zurita (2002) "Financial Crisis, Health Outcomes, and Ageing: Mexico in the 1980s and 1990s." *Journal of Public Economics* 84(2): 279-303.

Dehejia, Rajeev and Adriana Lleras-Muney (2004) “Booms, Busts, and Babies’ Health” *Quarterly Journal of Economics*.

Escudero, A. and H. Simon (2012) “Diferencias provinciales de bienestar en la España del siglo XX.” *Revista de Historia Industrial* 49(2): 17-54.

Galbraith, Virginia L., and Dorothy S. Thomas, “Birth Rates and the Interwar Business Cycles,” *Journal of the American Statistical Association,* XXXVI (1941), 465–476.

Gerdtham, U.G. and M. Johannesson (2005) “Business Cycles and Mortality: Results From Swedish Micro Data.” *Social Science and Medicine* 60(1): 205-218.

Gerdtham, U.G. and C. J. Ruhm (2006): “Death Rise In Good Economic Times: Evidence From The OECD.” *Economics and Human Biology* 4: 298-316.

Miller, Grant and Piedad Urdinola (2010) “Cyclicality, Mortality, and the Value of Time: The Case of Coffee Price Fluctuations and Child Survival in Colombia.” *Journal of Political Economy* 118, 2010.

Neumayer, E. (2004) “Recessions Lower (some) Mortality Rates: Evidence From Germany.” *Social Science and Medicine* 58(6): 1037-1047.

Paxson, Christina, and Norbert Schady (2005) “Child Health and Economic Crisis in Peru.” *World Bank Economic Review* 19:2 (2005), 203–223.

Ruhm, Christopher J. (2000) "Are Recessions Good For Your Health? " *Quarterly Journal of Economics*.

Ruhm, Christopher J., (2003). "Good times make you sick," *Journal of Health Economics*, Elsevier, vol. 22(4), pages 637-658, July.

Ruhm, Christopher J. (2005) “Healthy Living in Hard Times.” *Journal of Health Economics* 24 (2): 341–63.

Salvanes, K. V. (2014). "Economic Conditions and Family Policy: Child and Family Outcomes." Ph.D. Thesis. University of Oslo.

Silver, Morris, “Births, Marriages, and the Business Cycles in the United States,” *Journal of Political Economy*, LXXIII (1965), 237–255.

Tapia Granados, J. (2005). “Increasing Mortality during Expansions of the US Economy, 1900–1996.” *International Journal of Epidemiology* 34 (6): 1194–1202.

Tapia Granados, J. A. and E. L. Ionides (2008) “The Reversal of The Relation Between Economic Growth and Health Progress: Sweden in The 19th and 20th Centuries.” *Journal of Health Economics* 27(3): 544–563.

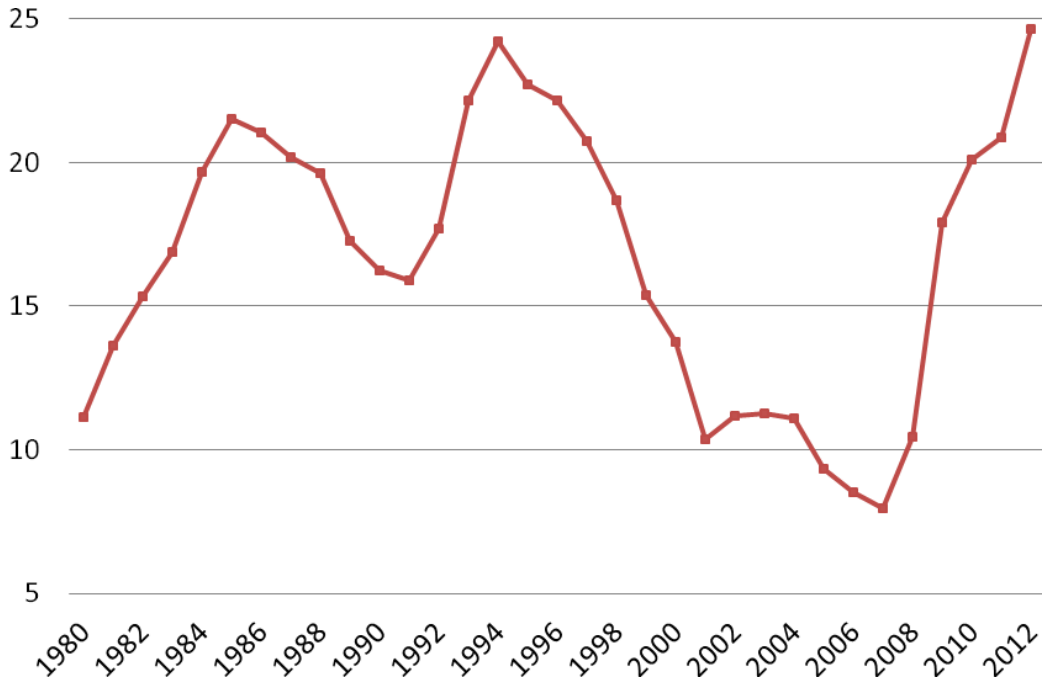
van den Berg, Gerard J. and Modin, Bitte (2013) “Economic Conditions at Birth, Birth Weight, Ability, and the Causal Path to Cardiovascular Mortality.” IZA Discussion Paper No. 7605.

van den Berg, Gerard, Maarten Lindeboom, and France Portrait. “Economic Conditions Early in Life and Individual Mortality” *American Economic Review*, 2006.

Yule, G. Udny, “On the Changes of Marriage and Birth Rates in England and Wales During the Past Half Century: With an Inquiry as to Their Probable Causes,” *Journal of the Royal Statistical Society*, LXIX (1906), 88–147.

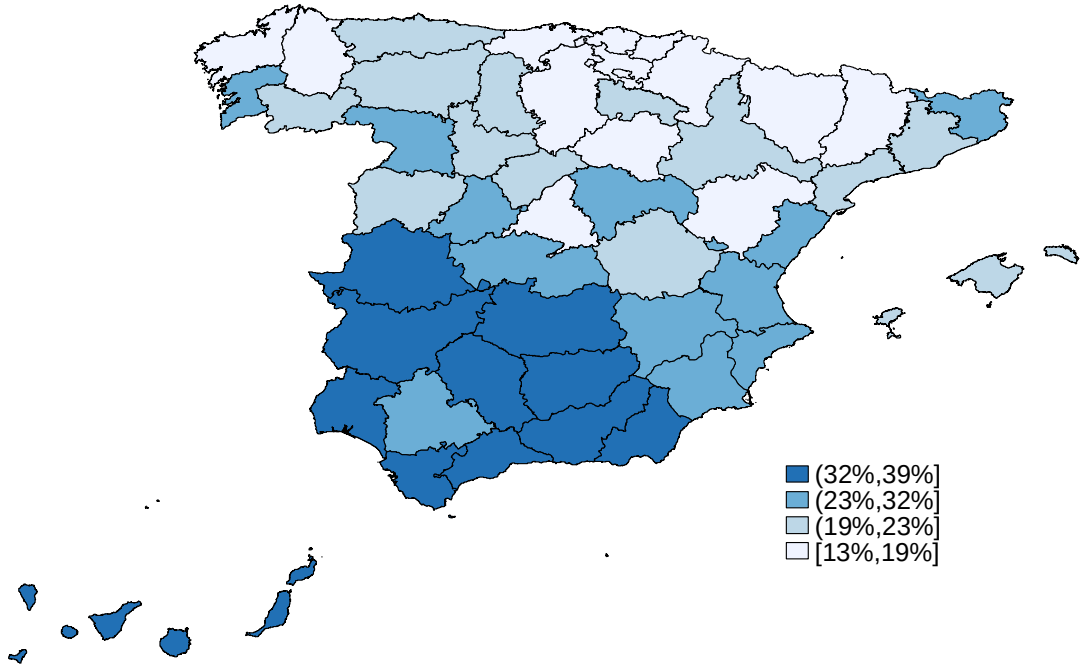
Tables and figures

Figure 1. National unemployment rate, Spain 1980-2012



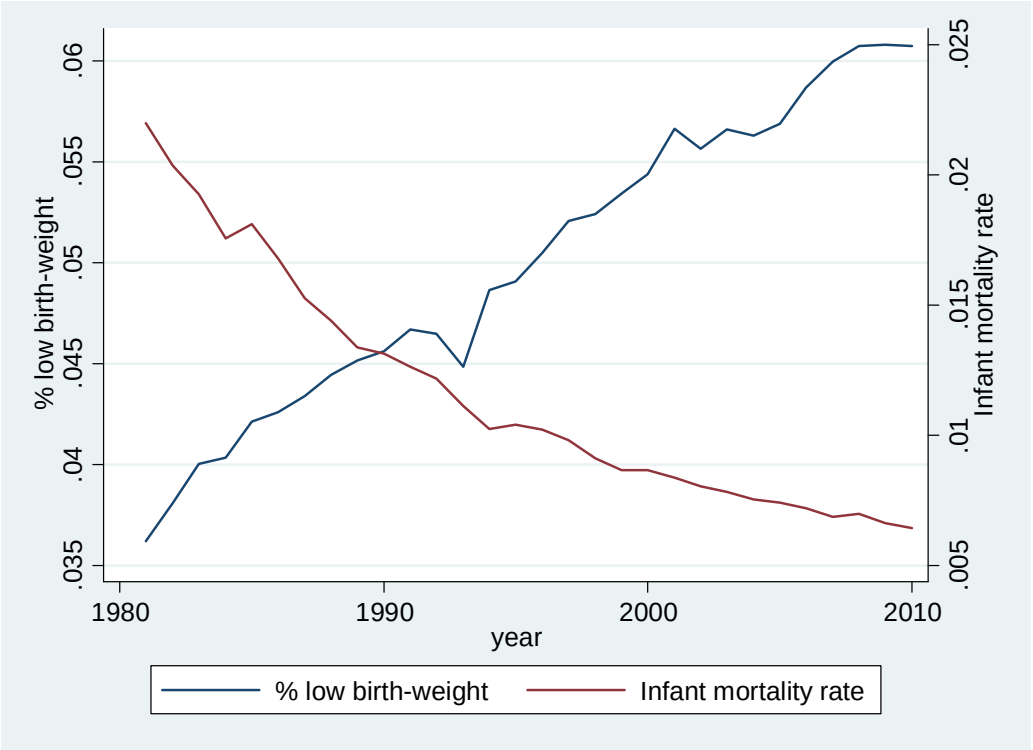
Source: Spanish Labor Force Survey (2nd quarter).

Figure 2. Unemployment rate by province, Spain 2012



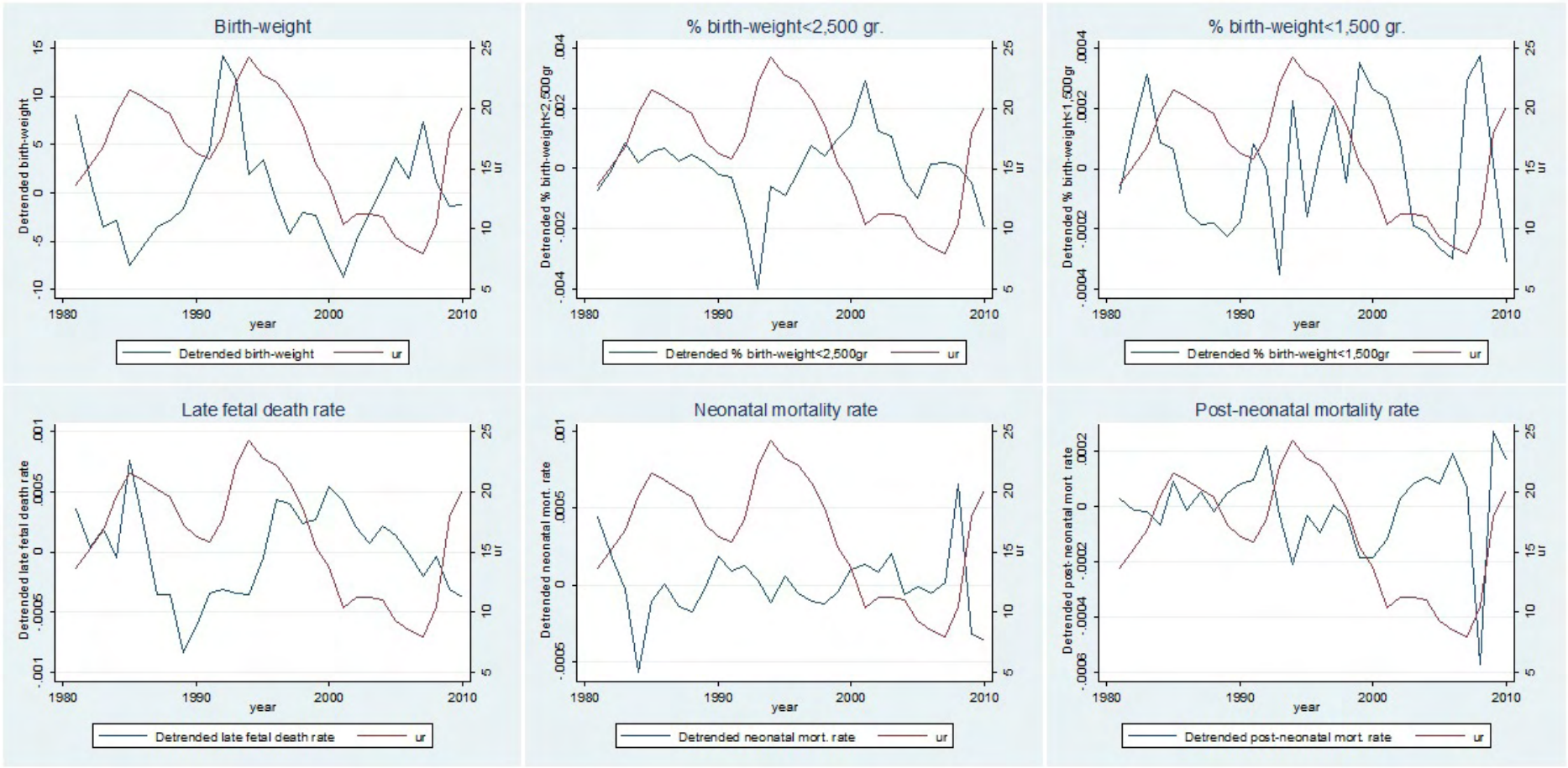
Source: Spanish Labor Force Survey 2012 (2nd quarter).

Figure 3. Neonatal health, Spain 1980-2010



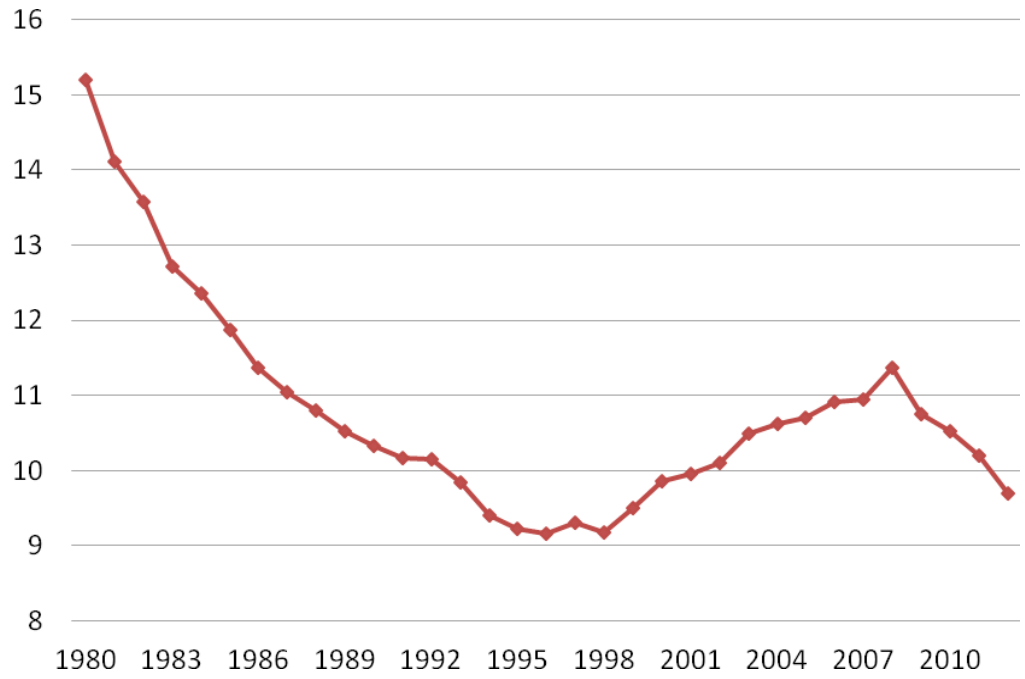
Source: Birth and death register data, National Statistical Institute (www.ine.es). The mortality rate is calculated as number of deaths before age 1 per 1,000 births.

Figure 4. Unemployment rate and neonatal health, 1981-2010



Note: Birth and death register data, National Statistical Institute (www.ine.es). The six health variables are detrended (with a quadratic trend if quadratic term significant, linear otherwise).

Figure 5. Birth rate (annual number of births per 1,000 people), Spain 1980-2012



Source: Birth register data, National Statistical Institute (www.ine.es).

Table 1. Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Birth certificate data				
Year of conception	1.996	9	1981	2010
Number of births	22,018	20,947	612	77,201
Birth rate	0.0491	0.0102	0.0259	0.0930
Unemployment rate	0.1663	0.0744	0.0000	0.4203
Non-employment rate	0.5552	0.0731	0.3701	0.7316
Birth weight in gr.	3,263	54	3,136	3,462
Low birth weight (<2.500 gr.)	0.0567	0.0120	0.0203	0.0997
Very low birth weight (<1.500)	0.0065	0.0019	0	0.0199
Late fetal death	0.0056	0.0029	0	0.0212
% Mothers <25	0.1956	0.0948	0.0414	0.4599
% Mothers 25-35	0.6738	0.0699	0.4499	0.8254
% Mothers >35	0.1306	0.0521	0.0573	0.2972
% Mothers married	0.8271	0.1113	0.3911	0.9819
% No registered father	0.0178	0.0095	0.0001	0.0776
% Mother high-skill	0.1508	0.0644	0.0172	0.3752
% Father high-skill	0.1772	0.0685	0.0497	0.4280
% Both high-skill	0.0832	0.0415	0.0100	0.2319
% Girls	0.4828	0.0065	0.3678	0.5189
% First birth	0.5203	0.0568	0.1374	0.8533
Death certificate data				
Neonatal mortality	0.0041	0.0021	0	0.0144
Post-neonatal mortality	0.0020	0.0010	0	0.0074

Note: Province-year observations are weighted by the number of individuals in each cell.
Source: Spanish National Statistical Institute.

Table 2. Baseline health results: the effect of the cycle on birth weight and infant mortality (1981-2010)

Main exp. var.	**Unemployent rate**						**Non-emp. rate**					
Dep. var.	**1**		**2**		**3**		**4**		**5**		**6**	
Low birth weight	-0.0031		-0.0002		-0.0146	**	-0.0060		-0.0054		-0.0239	**
[0.0567]	[0.004]		[0.008]		[0.007]		[0.006]		[0.007]		[0.010]	
(% effect of 10p. Δ in ur)	0.6%		0.4%		3.0%		1.2%		1.1%		4.8%	
Very low birth weight	-0.0007		-0.0040	**	-0.0037	**	-0.0025		-0.0066	*	-0.0059	**
[0.0065]	[0.001]		[0.002]		[0.002]		[0.002]		[0.003]		[0.003]	
(% effect of 10p. Δ in ur)	1.3%		7.1%		6.6%		4.5%		11.8%		10.5%	
Birth weight	-29.14		-32.34		97.24	***	-61.71	*	-66.14		69.31	**
[3,263]	[27.894]		[63.484]		[26.084]		[36.607]		[63.000]		[32.654]	
(% effect of 10p. Δ in ur)	0.9%		1.0%		3.0%		1.9%		2.0%		2.1%	
Post-neonatal mortality	-0.0003		-0.0014	*	-0.0008		-0.0016	**	-0.0037	***	-0.0028	**
[0.002]	[0.000]		[0.001]		[0.001]		[0.001]		[0.001]		[0.001]	
(% effect of 10p. Δ in ur)	1.5%		7.0%		4.0%		8.0%		18.5%		14.0%	
Neonatal mortality	-0.0029	***	-0.0022		-0.0024	*	-0.0059	***	-0.0024	*	-0.0059	***
[0.0041]	[0.001]		[0.002]		[0.001]		[0.001]		[0.001]		[0.001]	
(% effect of 10p. Δ in ur)	7.1%		5.4%		5.9%		14.4%		5.9%		14.4%	
Late fetal death	-0.0040	**	-0.0092		-0.0060	*	-0.0078	***	-0.0154	***	-0.0106	**
[0.0056]	[0.002]		[0.006]		[0.003]		[0.002]		[0.006]		[0.005]	
(% effect of 10p. Δ in ur)	7.3%		16.7%		10.9%		14.2%		28.0%		19.3%	
Quadratic time trend	Y		N		N		Y		N		N	
Year dummies	N		Y		Y		N		Y		Y	
Province trends	N		N		Y		N		N		Y	

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth and death certificates is aggregated by province and year (30 years, 50 provinces: N=1500). Only singleton births are included in the sample. The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth and death outcomes are matched to the unemployment (or non-employment) rate by estimated year of conception. All regressions include province fixed effects. Regressions are weighted by the number of births in the province and year. Robust standard errors clustered by province are in brackets. The average value for each outcome variable is reported in brackets in the first column.

Table 3. The effect of the business cycle on fertility, 1981-2010

Main exp. var.	Unemployment rate			Non-emp. rate		
	1	2	3	4	5	6
All parents						
N. of births	-7,130 ***	-3,846	-73	-15,634 ***	-15,073 ***	-3,964
	[2,003.5]	[2,687.2]	[3,408.9]	[4,633.3]	[5,412.6]	[3,519.8]
Log n. of births	-0.6310 ***	-0.3327	-0.0083	-1.9197 ***	-2.1139 ***	-0.6546 ***
	[0.132]	[0.319]	[0.160]	[0.177]	[0.253]	[0.142]
Birth rate	-0.0068 ***	-0.0030	-0.0032 **	-0.0108 ***	-0.0079 ***	-0.0071 ***
	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]
Low-skilled parents						
N. of births	-6,047 ***	1,160	-749	-10,438 ***	-6,052 ***	-4,916 *
	[1,428.7]	[2,163.4]	[3,029.6]	[2,608.2]	[2,163.7]	[2,889.2]
Log n. of births	-0.8740 ***	-0.1040	0.1476	-2.2771 ***	-2.1924 ***	-0.6417 ***
	[0.154]	[0.363]	[0.202]	[0.193]	[0.283]	[0.216]
High-skilled parents						
N. of births	-1,083	-5,006 **	676	-5,196 **	-9,021 **	952
	[1,001.1]	[2,369.5]	[639]	[2,573.9]	[4,267.8]	[1,034.2]
Log n. of births	0.0982	-0.5450 *	-0.2009	-0.9311 ***	-1.6836 ***	-0.4558
	[0.135]	[0.324]	[0.224]	[0.235]	[0.339]	[0.278]
Quadratic time trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth certificates is aggregated by province and year (30 years, 50 provinces: N=1500). The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth outcomes are matched to the labor market variables by estimated year of conception. All regressions include province fixed effects. Robust standard errors clustered by province are in brackets. Parents are classified as high- or low-skill based on their reported occupation.

Table 4. The business cycle and the characteristics of families giving birth, 1981-2010

	Unemployment rate			Non-emp. rate		
	1	**2**	**3**	**4**	**5**	**6**
Mother <25	-0.0997 ***	-0.0666	0.0762 **	-0.3334 ***	-0.4296 ***	-0.0094
	[0.0281]	[0.0625]	[0.0290]	[0.0539]	[0.0867]	[0.0496]
Mother 25-35	0.1278 ***	0.1223	-0.059 **	0.3156 ***	0.4184 ***	0.031
	[0.0309]	[0.0736]	[0.0253]	[0.0620]	[0.1139]	[0.0460]
Mother >35	-0.0281 **	-0.0557 *	-0.0172	0.0178	0.0113	-0.0217
	[0.0139]	[0.0321]	[0.0134]	[0.0258]	[0.0627]	[0.0226]
Married mother	0.0582 **	0.024	0.0489 **	0.1139 ***	0.0558	0.1118 *
	[0.0275]	[0.0503]	[0.0366]	[0.0362]	[0.0670]	[0.0646]
No registered father	0.0017	0.0183	0.0277 *	-0.0002	0.0109	0.0004
	[0.0042]	[0.0136]	[0.0115]	[0.0114]	[0.0283]	[0.0120]
Mother high-skill	0.1329 ***	-0.1392 **	-0.119	0.2141 ***	-0.0165	-0.0168
	[0.0194]	[0.0545]	[0.0609]	[0.0250]	[0.0587]	[0.0728]
Father high-skill	0.1269 ***	-0.1037 *	-0.084	0.1901 ***	-0.0202	-0.015
	[0.0286]	[0.0561]	[0.0587]	[0.0389]	[0.0740]	[0.0856]
Both high-skill	0.0611 ***	-0.1097 ***	-0.0577 *	0.0815 ***	-0.0777	0.0161
	[0.0109]	[0.0360]	[0.0343]	[0.0203]	[0.0649]	[0.0309]
First birth	-0.159 ***	-0.108	-0.1334 ***	-0.1987 ***	-0.0424	-0.1292 **
	[0.0283]	[0.0711]	[0.0411]	[0.0469]	[0.0588]	[0.0566]
Girl	0.0024	-0.0013	-0.0017	0.0021	-0.0043	0.0086
	[0.0034]	[0.0047]	[0.0082]	[0.0044]	[0.0055]	[0.0132]
Multiple birth	-0.0101 ***	-0.0083 **	-0.0049 *	-0.00995 ***	-0.0068	-0.0076 **
	[0.0012]	[0.0032]	[0.0029]	[0.0022]	[0.0044]	[0.0036]
Quadratic trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth certificates is aggregated by province and year (30 years, 50 provinces: N=1500). The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth outcomes are matched to the labor market variables by estimated year of conception. All regressions include province fixed effects. Robust standard errors clustered by province are in brackets.

Table 5. The effect of the cycle on babies' health: Results with parents' fixed-effects

Main exp. var.	**Unemployment rate**							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.008 *	0.01	0.001	-0.0188 ***	0.0048	-0.0192 ***	0.0083	0.0044
	[0.004]	[0.008]	[0.0064]	[0.0051]	[0.0087]	[0.0053]	[0.0092]	[0.0086]
Very low birth weight	0.0026 ***	0.0009	-0.0004	0.0005	0.0005	0.0002	-0.0007	-0.0018
	[0.0007]	[0.0014]	[0.0012]	[0.001]	[0.0022]	[0.001]	[0.0023]	[0.0022]
Birth weight	52.487 **	-38.428	59.085 **	82.277 ***	37.787	75.407 ***	0.275	31.128
	[25.246]	[56.655]	[24.201]	[18.783]	[33.194]	[19.768]	[38.159]	]
Late fetal death	0.0015 ***	-0.0016 *	-0.0004	0.0015 **	-0.0016	0.0014 *	-0.0026 *	-0.002
	[0.0005]	[0.001]	[0.0009]	[0.0007]	[0.0013]	[0.0007]	[0.0014]	[0.0015]
Main exp. var.	**Non-employment rate**							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.016 ***	-0.0049	-0.0181 *	-0.0306 ***	-0.0102	-0.0333 ***	-0.0109	-0.0111
	[0.0055]	[0.0082]	[0.0098]	[0.0075]	[0.0115]	0.0083	[0.0139]	[0.0111]
Very low birth weight	0.0036 ***	0.0018	-0.0036 *	0.0012	0.0015	0.0006	-0.0002	-0.0033
	[0.0012]	[0.002]	[0.0019]	[0.0015]	[0.0026]	0.0018	[0.0034]	[0.0033]
Birth weight	39.826	-57.452	38.359	92.929 ***	31.888	88.176 ***	-10.146	-14.897
	[32.882]	[61.05]	[36.587]	[27.794]	[57.288]	28.306	[59.509]	[33.581]
Late fetal death	0.0018 **	-0.0021	-0.0008	0.0024 **	-0.0009	0.0023 *	-0.0026	-0.0014
	[0.0009]	[0.0016]	[0.0016]	[0.001]	[0.0019]	0.0011	[0.0022]	[0.0024]
Quadratic time trend	Y	N	N	Y	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth certificates is aggregated by province and year (30 years, 50 provinces: N=1500). The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth and death outcomes are matched to the unemployment rate by estimated year of conception. Regressions are estimated at the individual level. Robust standard errors clustered by province are in brackets.

Table 6. The effect of the cycle on mothers' health behaviors

Main exp. var.	**Unemployent rate**									**Non-Employment rate**							
Dep. var.	**1**		**2**		**3**		**4**			**5**		**6**			**7**		
Good health	0.068	***	0.071	***	0.045		0.111	**		0.084	**	-0.018			0.105		
[0.957]	[0.022]		[0.023]		[0.041]		[0.053]			[0.038]		[0.053]			[0.065]		
Mental health	-0.012		-0.018		-0.007		0.021			-0.026		-0.019			0.057		
[0.989]	[0.014]		[0.012]		[0.027]		[0.032]			[0.017]		[0.031]			[0.035]		
Drinking	-0.375	***	-0.509	***	0.109		-0.051			-0.6696	***	0.076			-0.021		
[0.469]	[0.099]		[0.101]		[0.205]		[0.238]			[0.143]		[0.283]			[0.312]		
Smoking	-0.128	**	0.028		0.087		0.139			0.094		0.103			-0.088		
[0.371]	[0.050]		[0.045]		[0.102]		[0.147]			[0.069]		[0.124]			[0.157]		
Hours of sleep	0.635	***	0.568	***	0.535	*	0.491			0.492	**	-0.297			0.127		
[7.56]	[0.139]		[0.159]		[0.309]		[0.393]			[0.230]		[0.287]			[0.519]		
Exercise	0.011		0.095		0.238		0.21			0.191		0.556	**		0.323		
[0.476]	[0.091]		[0.109]		[0.181]		[0.224]			[0.162]		[0.230]			[0.325]		
Weight	0.711		1.025		-0.161		0.508			-0.545		-4.496	*		-5.003		
[61.4]	[1.343]		[1.322]		[3.304]		[3.154]			[1.870]		[2.610]			[4.162]		
BMI	0.309		0.544		-0.711		-1.016			0.094		-1.781	*		-2.393		
[23.4]	[0.429]		[0.442]		[1.092]		[1.158]			[0.670]		[0.989]			[1.439]		
Cubic in age	Y		Y		Y		Y			Y		Y			Y		
Linear time trend	Y		Y		N		N			Y		N			N		
Quadratic time trend	N		Y		N		N			Y		N			N		
Year dummies	N		N		Y		Y			N		Y			Y		
Province trends	N		N		N		Y			N		N			Y		

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Micro data from National Health Surveys (1987, 1993, 1995, 1997, 2001, 2003, 2006, 2011) for women aged 17-45. The unemployment and the non-employment rates are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Each coefficient comes from a separate regression. All regressions include province fixed effects. Robust standard errors clustered by province are in parentheses.

Appendix. Additional tables

Table A1. The effect of the cycle on babies' health: Time-series regressions (1981-2010)

Main exp. var.	**Unemployment rate**							
Dep. var.	**1**		**2**		**3**		**4**	
Low birth weight	-0.1142	**	-0.133	**	-0.0374		-0.0595	
	[0.0520]		[0.054]		[0.0431]		[0.0437]	
Very low birth weight	-0.0327	*	-0.0087		-0.0153		0.00952	
	[0.0179]		[0.0107]		[0.0182]		[0.0105]	
Birth weight	-1.2670		-0.0895		-1.3930	*	-0.1928	
	[0.7690]		[0.2622]		[0.7780]		[0.2446]	
Log birth weight	-0.3314		-0.0019		-0.3823	*	-0.0461	
	[0.2184]		[0.0831]		[0.2200]		[0.0758]	
Late fetal death rate	-0.0645	*	-0.0159		-0.0601	*	-0.0104	
	[0.0345]		[0.0180]		[0.0345]		[0.0167]	
Neonatal mortality	-0.0676	**	-0.0301	***	-0.0686	**	-0.0308	***
	[0.0249]		[0.0095]		[0.0251]		[0.0097]	
Post-neonatal mortality	-0.0001		0.0017		-0.0002		0.0016	
	[0.0073]		[0.0077]		[0.0074]		[0.0078]	
Multiples included	Y		Y		N		N	
Weights	N		N		N		N	
Linear trend	Y		Y		Y		Y	
Quadratic trend	N		Y		N		Y	

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Coefficients and standard errors are multiplied by 1,000 for readability reasons. Micro data from birth and death certificates is aggregated by year (N=30). The unemployment rate is calculated from the Labor Force Survey for the second quarter of each year. Birth and death outcomes are matched to the unemployment rate by estimated year of conception.

Table A2. The effect of the cycle on babies' health by occupation of the parents and by income of the region

i) By parents occupation

Main exp. var.	**Unemployment rate**			**Non-emp. rate**		
	1	**2**	**3**	**4**	**5**	**6**
Low-skill parents						
Low birth weight	-0.0053	-0.0118	-0.0206 ***	-0.0089	-0.0155 *	-0.0250 **
	[0.004]	[0.007]	[0.008]	[0.006]	[0.008]	[0.011]
Very low birth weight	-0.0014 *	-0.0061 ***	-0.0046 **	-0.0036 *	-0.0087 **	-0.0054 *
	[0.001]	[0.002]	[0.002]	[0.002]	[0.004]	[0.003]
Birth weight	-18.67	11.55	136.24 ***	-59.76	-44.97	91.27 **
	[27.775]	[61.749]	[30.626]	[37.999]	[61.920]	[41.257]
Late fetal death	-0.0050 ***	-0.0101	-0.0057	-0.0094 ***	-0.0174 ***	-0.0105 **
	[0.002]	[0.006]	[0.003]	[0.003]	[0.006]	[0.005]
High-skill parents						
Low birth weight	0.0053	0.0210 **	-0.0009	0.0074	0.0178 *	-0.0178
	[0.005]	[0.010]	[0.010]	[0.007]	[0.009]	[0.015]
Very low birth weight	0.0018 *	0.0006	-0.0010	0.0017	-0.0014	-0.0073 *
	[0.001]	[0.002]	[0.002]	[0.002]	[0.004]	[0.004]
Birth weight	-39.03	-121.25 *	6.96	-61.15	-125.21 *	-3.46
	[27.727]	[62.444]	[23.760]	[38.605]	[66.911]	[36.634]
Late fetal death	-0.0004	-0.0073	-0.0061 *	-0.0008	-0.0074	-0.0097
	[0.002]	[0.005]	[0.004]	[0.003]	[0.007]	[0.006]
Quadratic time trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

ii) By income of the region

Main exp. var.	Unemployment rate			Non-emp. rate		
	1	2	3	4	5	6
Poor provinces						
Low birth weight	-0.0037	-0.0029	0.0049	-0.0163 **	-0.0197 *	-0.0109
	[0.004]	[0.009]	[0.009]	[0.007]	[0.010]	[0.010]
Very low birth weight	0.0002	-0.0019	0.0007	-0.0048	-0.0085	-0.0008
	[0.001]	[0.002]	[0.002]	[0.003]	[0.005]	[0.003]
Birth weight	24.94	73.00 *	70.78	90.63 ***	166.12 ***	119.17 **
	[15.003]	[37.051]	[49.198]	[28.641]	[40.560]	[56.467]
Late fetal death	-0.0005	-0.0002	-0.0022	-0.0022	-0.0047	-0.0033
	[0.001]	[0.003]	[0.002]	[0.003]	[0.005]	[0.004]
Rich provinces						
Low birth weight	0.0016	0.0177	-0.0122	-0.0006	0.0065	-0.0143
	[0.007]	[0.014]	[0.013]	[0.009]	[0.015]	[0.016]
Very low birth weight	0.0001	-0.0008	-0.0040	0.0019	0.0031	-0.0051
	[0.001]	[0.002]	[0.003]	[0.002]	[0.004]	[0.004]
Birth weight	-75.18 **	-144.15 *	61.91	-116.97 **	-184.34	-9.85
	[27.950]	[77.810]	[38.419]	[46.154]	[132.322]	[48.540]
Late fetal death	-0.0044 ***	-0.0106	-0.0067	-0.0053 ***	-0.0118	-0.0126 *
	[0.001]	[0.007]	[0.006]	[0.001]	[0.008]	[0.007]
Quadratic time trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Micro data from birth and death certificates is aggregated by province and year (30 years, 50 provinces: N=1500). The unemployment and the non-employment rates are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth and death outcomes are matched to the unemployment rate by estimated year of conception. All regressions include province fixed effects. Regressions are weighted by the number of births in the province and year. Robust standard errors clustered by province are in parentheses. The 50 provinces are divided into two groups of 25 based on per capita income in 1980 ("poor" and "rich").

Table A3. The effect of the business cycle on abortions, 1987-2010

Main exp. var.	**Unemployent rate**			**Non-emp. rate**		
	1	**2**	**3**	**4**	**5**	**6**
N. of abortions	-407	-2,710	-89.2	-4,750 *	-10,160 **	370
	[672]	[2,110]	[748.8]	[2,726]	[4,778]	903
Log n. of abortions	-0.095	0.762	0.072	-2.28 ***	-3.78 ***	-0.452
	[0.236]	[0.627]	[0.44]	[0.518]	[0.99]	[0.609]
Abortion rate	6.214 ***	2.675	-0.593	-2	-15.054 ***	-1.363
	[1.796]	[4.444]	[2.475]	[3.568]	[4.860]	[3.513]
Quadratic time trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from number of abortions is aggregated by province and year. The abortion data are taken from Johnston's Archive (http://www.johnstonsarchive.net/). The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. The abortion rate is defined as the number of abortions per 1,000 women aged 15-45. All regressions include province fixed effects. Robust standard errors clustered by province are in parentheses.

Table A4. The effect of the cycle on fertility and abortions by income of the region

Main exp. var.	Unemployent rate			Non-emp. rate		
	1	2	3	4	5	6
Poor provinces						
Log n. of births	-0.4569 ***	-0.3176	0.0137	-1.5212 ***	-1.5910 ***	-0.4109 ***
	[0.148]	[0.351]	[0.128]	[0.213]	[0.280]	[0.112]
Birth rate	-0.0040 ***	0.0010	-0.0027 *	-0.0038 *	0.0001	-0.0048 ***
	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.001]
Log n. of abortions	-0.057	-0.338	0.185	-2.69 ***	-5.09 ***	-0.319
	[0.257]	[0.821]	[0.586]	[0.699]	[1.055]	[0.705]
Abortion rate	3.145	-5.792	0.585	-8.571 *	-24.16 ***	-1.390
	[1.914]	[4.924]	[2.965]	[4.264]	[5.377]	[4.337]
Rich provinces						
Log n. of births	-0.7411 ***	-0.0174	-0.5251 ***	-1.8266 ***	-1.8584 ***	-1.0169 ***
	[0.150]	[0.411]	[0.182]	[0.286]	[0.633]	[0.187]
Birth rate	-0.0095 ***	-0.0048	-0.0063 ***	-0.0157 ***	-0.0131 ***	-0.0094 ***
	[0.001]	[0.003]	[0.001]	[0.002]	[0.004]	[0.002]
Log n. of abortions	-0.112	2.148 *	-0.713	-1.978 **	-2.412	-0.755
	[0.416]	[1.084]	[0.706]	[0.745]	[1.948]	[1.060]
Abortion rate	10.42 ***	14.10 *	-4.02	5.65	-2.11	-2.07
	[2.97]	[7.76]	[4.18]	[6.03]	[13.39]	[5.95]
Quadratic time trend	Y	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	Y
Province trends	N	N	Y	N	N	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Micro data from birth certificates and abortions is aggregated by province and year. The abortion data are taken from Johnston's Archive (http://www.johnstonsarchive.net/). The unemployment rate and the non-employment rate are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth outcomes are matched to the labor market variables by estimated year of conception. "Poor regions" are those in the lowest half of the distribution of per capita income in 1980, "rich provinces" are those in the top half. All regressions include province fixed effects. Robust standard errors clustered by province are in parentheses.

Table A5. The effect of the cycle on babies' health: Results with parents' fixed-effects and controls

i) Controlling for mother age and birth order

Main exp. Var.	**Unemployment rate**							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.0002	0.0109	0.0001	-0.0094 *	0.0018	-0.0093 *	0.0045	0.0032
	[0.0041]	[0.0084]	[0.0065]	[0.0049]	[0.0087]	[0.0051]	[0.0091]	[0.0084]
Very low birth weight	0.0027 ***	0.001	-0.0004	0.0013	0.002	0.0011	-0.001	-0.0019
	[0.0008]	[0.0014]	[0.0012]	[0.001]	[0.0022]	[0.001]	[0.0023]	[0.0023]
Birth weight	-17.425	-39.224	65.784 ***	35.717 **	52.746 *	26.47	18.736	37.011
	[23.964]	[55.745]	[24.162]	[17.58]	[31.204]	[18.345]	[36.591]	[25.198]
Mortality <1 day	-0.0001	-0.0015	-0.0003	0.0008	-0.0014	0.0007	-0.0023	-0.002
	[0.0005]	[0.0009]	[0.0009]	[0.0007]	[0.0013]	[0.0007]	[0.0014]	[0.0016]
Quadratic time trend	Y	N	N	Y	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

ii) Controlling for maternal employment

Main exp. var.	**Unemployment rate**							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.0077 *	0.0097	-0.0004	-0.0189 **	0.0049	-0.0194 ***	0.0082	0.0045
	[0.0041]	[0.0082]	[0.0064]	[0.0051]	[0.0087]	[0.0053]	[0.0092]	[0.0087]
Very low birth weight	0.0026 ***	0.0009	-0.0005	0.0005	0.0005	0.0002	-0.0007	-0.0018
	[0.0007]	[0.0014]	[0.0012]	[0.001]	[0.0022]	[0.001]	[0.0023]	[0.0022]
Birth weight	52.088 **	-37.989	61.141 **	82.94 ***	37.413	76.247 ***	0.484	30.629
	[25.422]	[57.505]	[23.95]	[18.904]	[33.138]	[19.929]	[38.259]	[24.788]
Mortality <1 day	0.0016 ***	-0.0017 *	-0.0006	0.0016 **	-0.0016	0.0015 **	-0.0026 *	-0.0021
	[0.0005]	[0.0009]	[0.0009]	[0.0007]	[0.0013]	[0.0007]	[0.0015]	[0.0016]
Quadratic time trend	Y	N	N	Y	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

iii) Controlling for parents occupation

Main exp. var.	**Unemployment rate**							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.007 *	0.0095	0.0001	-0.0183 ***	0.0049	-0.0187 ***	0.0081	0.0044
	[0.004]	[0.0081]	[0.0064]	[0.0051]	[0.0086]	[0.0053]	[0.0092]	[0.0085]
Very low birth weight	0.0028 ***	0.0008	-0.0004	0.0007	0.0005	0.0004	-0.0008	-0.0018
	[0.0007]	[0.0014]	[0.0012]	[0.001]	[0.0022]	[0.001]	[0.0023]	[0.0022]
Birth weight	48.152 *	-37.333	59.831 **	79.713 ***	37.356	73.079 ***	1.125	31.278
	[24.899]	[56.65]	[24.086]	[18.663]	[33.336]	[19.592]	[38.328]	[24.337]
Mortality <1 day	0.0017 ***	-0.0017 *	-0.0007	0.0018 **	-0.0017	0.0017 **	-0.0027 *	-0.0022
	[0.0005]	[0.0009]	[0.0009]	[0.0007]	[0.0013]	[0.0007]	[0.0015]	[0.0016]
Quadratic time trend	Y	N	N	Y	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth certificates is aggregated by province and year (30 years, 50 provinces: N=1500). The unemployment rate is calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Birth and death outcomes are matched to the unemployment rate by estimated year of conception. Regressions are estimated at the individual level. Robust standard errors clustered by province are in brackets.

Table A6. Results with parents fixed effects by parents' occupation and region

i) By parents occupation

Main exp. var.	**Unemployment rate**							
Low-skill	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.0084 **	0.0011	-0.0047	-0.017 ***	0.0008	-0.0171 ***	0.0039	-0.0001
	[0.0041]	[0.0072]	[0.0065]	[0.0057]	[0.0097]	0.0059	[0.0096]	[0.0088]
Very low birth weight	0.0019 *	-0.0014	-0.0019	-0.0006	-0.002	-0.0007	-0.0024	-0.0032
	[0.0009]	[0.0015]	[0.0015]	[0.0015]	[0.0025]	0.0016	[0.0026]	[0.0024]
Birth weight	53.096 **	0.462	100.633 ***	79.087 ***	64.856 *	71.999 ***	34.623	67.525 **
	[25.577]	[56.668]	[28.179]	[22.592]	[37.296]	24.248	[41.388]	[29.578]
Mortality <1 day	0.0011 **	-0.0019	-0.0003	0.0012	-0.0018	0.0012	-0.0026	-0.0021
	[0.0006]	[0.0012]	[0.0011]	[0.0009]	[0.0019]	0.0009	[0.0022]	[0.002]
High-skill								
Low birth weight	-0.0063	0.0269 **	0.0147	-0.0205 **	0.0288 *	-0.0208 **	0.0376 **	0.0377 **
	[0.0051]	[0.0111]	[0.0096]	[0.0091]	[0.0165]	0.0089	[0.0172]	[0.0175]
Very low birth weight	0.0044 ***	0.0062 ***	0.0043 **	0.0027	0.0077 *	0.0019	0.0048	0.0036
	[0.001]	[0.0015]	[0.0016]	[0.0022]	[0.0045]	0.0022	[0.005]	[0.0054]
Birth weight	60.558 **	-116.832 **	-34.76	98.642 ***	-15.187	92.912 ***	-64.647	-41.093
	[26.974]	[57.618]	[23.788]	[27.629]	[48.206]	26.814	[54.353]	[30.834]
Mortality <1 day	0.0025 ***	-0.0014	-0.0011	0.0025 **	-0.0004	0.0023 **	-0.0017	-0.0009
	[0.008]	[0.0014]	[0.0014]	[0.001]	[0.0022]	0.0011	[0.0028]	[0.0032]
Quadratic time trend	Y	N	N	Y	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

ii) By income of the region

Main exp. var.	Unemployment rate							
Dep. var.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Low birth weight	-0.0098 **	0.0012	0.0101	-0.0156 **	0.0117	-0.0159 *	0.0127	0.0104
	[0.0037]	[0.0058]	[0.0072]	[0.0075]	[0.0096]	[0.0077]	[0.0096]	[0.011]
Very low birth weight	0.0018 ***	-0.0018	-0.0007	-0.0002	-0.0016	-0.0003	-0.0023	-0.0032
	[0.0006]	[0.0018]	[0.0023]	[0.0016]	[0.0033]	[0.0016]	[0.0033]	[0.0033]
Birth weight	96.358 ***	49793	59879	94.982 ***	15.331	93.489 ***	2.134	21.881
	[15.425]	[38.761]	[46.83]	[25.058]	[40.516]	[26.373]	[47.026]	[43.619]
Late fetal death	0.001	-0.003 *	-0.0006	0.001	-0.002	0.0011	-0.002	-0.0001
	[0.0006]	[0.0015]	[0.0011]	[0.001]	[0.0028]	[0.0008]	[0.0029]	[0.0021]
Dep. var.								
Low birth weight	-0.0051	0.0316 *	0.0071	-0.0199 **	0.0121	-0.02 **	0.014	0.0074
	[0.0069]	[0.0155]	[0.0117]	[0.0078]	[0.0178]	[0.0078]	[0.019]	[0.0151]
Very low birth weight	0.0035 **	0.0047 **	0.0016	-0.0007	0.002	0.0005	0.0013	0.0001
	[0.0012]	[0.0018]	[0.0022]	[0.0015]	[0.004]	[0.0015]	[0.0042]	[0.0042]
Birth weight	14.947	-166.38 **	12.74	52.17 *	-39.87	49.23	-63.17	-13.97
	[30.018]	[73.84]	[29.96]	[29.33]	[72.23]	[29.2]	[76.39]	[35.64]
Late fetal death	0.0018 **	-0.0015	-0.0011	0.0015	-0.004 **	0.0016	-0.0041 **	-0.003
	[0.0008]	[0.0016]	[0.0016]	[0.0011]	[0.0017]	[0.0011]	[0.0018]	[0.0019]
Quadratic time trend	Y	N	N	N	N	Y	N	N
Year dummies	N	Y	Y	N	Y	N	Y	Y
Province dummies	Y	Y	Y	N	N	Y	Y	Y
Province trends	N	N	Y	N	N	N	N	Y
Family fixed effects	N	N	N	Y	Y	Y	Y	Y

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Each coefficient comes from a separate regression. Micro data from birth certificates is aggregated by province and year (30 years, 50 provinces). The unemployment rate is calculated at the province-year level from the Labor Force Survey for the 2nd quarter of each year. Birth and death outcomes are matched to the unemployment rate by estimated year of conception. Regressions are estimated at the individual level. Robust standard errors clustered by province are in brackets. “Poor regions” are those in the lowest half of the distribution of per capita income in 1980, “rich provinces” are those in the top half.

Table A7. Descriptive statistics health survey data (1987-2011)

Variable	N. Obs.	Mean	Std. Dev.	Min	Max
Self-reported health status	44432	0.9573	0.2022	0	1
Mental health	43567	0.9888	0.1052	0	1
Currently a smoker	44389	0.3712	0.4831	0	1
Alcohol past 2 weeks	44054	0.4695	0.4991	0	1
Regular exercise	44163	0.4758	0.4994	0	1
Hours of sleep	44231	7.56	1.24	1	24
Weight (in kg.)	42653	61.7	10.9	25.0	170.0
Body Mass Index	40379	23.5	4.0	14.0	49.9
Age	44521	34	10	17	50
High-skilled	44521	0.1506	0.3577	0	1
Unemployment rate	44521	0.1510	0.0766	0.0216	0.4101
Year	44521	1,999	8	1987	2011

Source: Spanish National Health Survey (1987, 1993, 1995, 1997, 2001, 2003, 2006, 2011), sample of women aged 17-45.

Table A8. Health results by occupation and income of the region

i) By main earner's occupation

Low-skilled	**Unemployment rate**						**Non-emp. rate**					
Dep. var.	**1**		**2**		**3**		**4**		**5**		**6**	
Good health	0.068	***	0.072	***	0.004		0.025		-0.049		0.048	
	[0.025]		[0.025]		[0.047]		[0.053]		[0.067]		[0.084]	
Smoking	-0.177	***	-0.030		0.063		0.201		0.065		-0.055	
	[0.057]		[0.051]		[0.109]		[0.171]		[0.126]		[0.186]	
Drinking	-0.381	***	-0.507	***	0.050		-0.069		0.010		-0.035	
	[0.102]		[0.102]		[0.216]		[0.261]		[0.299]		[0.342]	
Exercise	0.021		0.101		0.246		0.330		0.523	**	0.416	
	[0.091]		[0.101]		[0.184]		[0.232]		[0.250]		[0.332]	
Hours of sleep	0.695	***	0.626	***	0.450		0.328		-0.367		0.114	
	[0.153]		[0.163]		[0.321]		[0.440]		[0.336]		[0.593]	
BMI	0.49		0.60		-0.41		-0.60		-1.70		-1.51	
	[0.43]		[0.47]		[1.13]		[1.15]		[1.06]		[1.41]	
High-skilled												
Good health	0.089	**	0.090	**	0.203	***	0.024	***	0.065		0.079	
	[0.035]		[0.042]		[0.071]		[0.090]		[0.102]		[0.161]	
Smoking	0.095		0.299	**	0.171		-0.096		-0.065		-0.228	
	[0.089]		[0.118]		[0.241]		[0.302]		[0.275]		[0.415]	
Drinking	-0.285	*	-0.471	***	0.539	*	0.344		0.819	**	0.700	
	[0.151]		[0.157]		[0.284]		[0.399]		[0.324]		[0.440]	
Exercise	0.136		0.191		0.291		-0.159		0.577		-0.251	
	[0.157]		[0.212]		[0.281]		[0.337]		[0.405]		[0.524]	
Hours of sleep	0.384		0.231		0.141		0.545		-1.324	**	-1.181	
	[0.320]		[0.420]		[0.656]		[0.831]		[0.652]		[0.964]	
BMI	-1.35		-0.51		-2.68		-3.98	*	-4.14	*	-8.07	**
	[1.00]		[1.08]		[1.88]		[2.24]		[2.31]		[3.08]	
Cubic in age	Y		Y		Y		Y		Y		Y	
Province dummies	Y		Y		Y		Y		Y		Y	
Quadratic trend	Y		Y		N		N		N		N	
Year dummies	N		N		Y		Y		Y		Y	
Province trends	N		N		N		Y		N		Y	

ii) By income of the region

Low-skilled	Unemployment rate						Non-emp. rate					
Dep. var.	**1**		**2**		**3**		**4**		**5**		**6**	
Good health	0.089	**	0.097	**	0.045		0.096		0.004		0.013	
	[0.038]		[0.038]		[0.067]		[0.086]		[0.090]		[0.119]	
Smoking	-0.078		0.027		-0.055		0.145		-0.098		0.341	
	[0.082]		[0.081]		[0.148]		[0.210]		[0.150]		[0.224]	
Drinking	-0.430	**	-0.528	***	0.216		0.029		0.132		-0.127	
	[0.168]		[0.166]		[0.316]		[0.355]		[0.365]		[0.436]	
Exercise	0.052		0.072		0.386	*	0.512	*	0.158		0.088	
	[0.115]		[0.112]		[0.227]		[0.255]		[0.343]		[0.402]	
Hours of sleep	0.734	***	0.718	***	0.155		0.123		-0.397		-0.370	
	[0.233]		[0.254]		[0.422]		[0.574]		[0.525]		[0.768]	
BMI	0.02		0.36		-3.54	**	-2.97	*	-4.07	**	-4.81	**
	[0.77]		[0.75]		[1.54]		[1.72]		[1.55]		[2.06]	
High-skilled												
Good health	0.057	**	0.054	**	-0.004		0.004		-0.049		0.103	
	[0.026]		[0.025]		[0.058]		[0.070]		[0.086]		[0.104]	
Smoking	-0.180	***	0.038		0.261		0.180		0.156		-0.384	
	[0.060]		[0.052]		[0.168]		[0.250]		[0.194]		[0.325]	
Drinking	-0.314	**	-0.458	***	0.233		0.185		0.894	*	0.242	
	[0.115]		[0.119]		[0.175]		[0.344]		[0.503]		[0.473]	
Exercise	0.004		0.136		0.218		0.151		0.797	***	0.673	
	[0.140]		[0.180]		[0.276]		[0.393]		[0.260]		[0.425]	
Hours of sleep	0.572	***	0.450	**	0.490		0.232		-0.097		0.328	
	[0.173]		[0.202]		[0.404]		[0.549]		[0.388]		[0.812]	
BMI	0.56		0.64		1.54		-0.10		-1.25		-0.92	
	[0.47]		[0.51]		[1.04]		[1.63]		[1.24]		[2.06]	
Cubic in age	Y		Y		Y		Y		Y		Y	
Province dummies	Y		Y		Y		Y		Y		Y	
Quadratic trend	Y		Y		N		N		N		N	
Year dummies	N		N		Y		Y		Y		Y	
Province trends	N		N		N		Y		N		Y	

(* significant at 90%; ** significant at 95%; *** significant at 99%)

Notes: Micro data from National Health Surveys (1987, 1993, 1995, 1997, 2001, 2003, 2006, 2011) for women aged 17-45. The unemployment and the non-employment rates are calculated at the province-year level from the Labor Force Survey for the second quarter of each year. Each coefficient comes from a separate regression. All regressions include province fixed effects. Robust standard errors clustered by province are in parentheses. “Poor regions” are those in the lowest half of the distribution of per capita income in 1980, “rich provinces” are those in the top half.