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The Intergenerational Consequences of Economic Distress: In-Utero Exposure to Financial Crises and Birth Outcomes

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ABSTRACT

This paper uses the severe economic crisis in Turkey in 2008 as a quasi-experiment to evaluate the impact of worsening economic conditions during pregnancy on birth outcomes. Exploiting the temporal and spatial variations in economic hardship across provinces, we show that the deep economic downturn led to significantly lower birth weight. Furthermore, these effects are mainly observed in children born to mothers with low socioeconomic status, suggesting that credit constraints may be a significant factor in the impact of economic crises on birth outcomes in Turkey. Our study also demonstrates that mothers residing in provinces significantly hit by the economic recession are more likely to have premature babies and shorter gestational lengths, both of which elevate the prevalence of lower birth weight newborns. Finally, our analysis illustrates that selective fertility, abortion, and neonatal mortality are more common during an economic downturn, and play a significant role in explaining the impact on birth outcomes in our context.

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1 Introduction

Economies around the world have become increasingly susceptible to crises as the financial and trading systems of countries have become more integrated and interconnected over the past several decades. This vulnerability has become more visible lately with the global pandemic, which precipitated a sharp contraction in economic activity and huge job losses, resulting in a global recession in 2020. While most countries work to stimulate their economies and bounce back from the impacts of the pandemic, there are fears that the global economy could enter a recession and that emerging markets and developing countries may face financial crises due to issues such as extreme weather events caused by climate change, ongoing conflicts in regions such as Ukraine, and economic sanctions (Guénette et al., 2022).

The economic challenges brought about by these developments may have far-reaching and long-lasting effects, particularly on vulnerable populations. Infants born in emerging and developing countries may be particularly vulnerable to the consequences of economic turmoil due to limited access to healthcare and weaker welfare safety net systems. Furthermore, stress and anxiety caused by financial insecurity and uncertainty can negatively affect maternal and fetal health. In addition, recessions lead to an increase in poverty, which is associated with a range of negative health outcomes for pregnant women and infants, including malnutrition and an increased risk of infectious diseases. Finally, economic downturns can also lead to an increase in risky behaviors such as substance abuse, which can have negative impacts on the health and well-being of infants.

In this paper, we examine the effect of a major economic crisis in Turkey on birth weight and other birth outcomes, using data from the 2008 and 2013 waves of Demographic Health Surveys (DHS). Like many other countries, both developed and developing, Turkey was severely impacted by the 2008 global economic recession. This crisis resulted in a 4.8% decline in GDP, an unemployment rate of 14%, and a significant reduction in real wages and purchasing power in Turkey. The severe economic crisis significantly worsened the prenatal conditions for children born during these times and was not caused by individual or household behavior, creating a unique opportunity to examine the causal relationship between difficult

conditions during conception and infant birth outcomes. Our identification strategy relies on temporal and spatial variations of the severity of the economic crisis captured by the provincial GDP in a difference-in-differences framework. More specifically, we compare the birth outcomes of children in the more and less severely affected provinces who are exposed to economic downturn during the gestational period to those of children who were not affected by the crisis. We also explore heterogeneity in the estimated relationship with respect to the mother's education, household wealth, and differential prenatal care in an effort to provide insights into the roles of credit constraint, psychological stress, and prenatal care as potential mechanisms. In addition to our main analysis, we conduct an investigation to determine if selective fertility, abortion, and neonatal mortality are influencing the results of our analysis on birth weight.

Birth weight is an outcome of significant social and economic importance due to its impact on a person's health, education, and employment outcomes throughout their life. For example, babies with low birth weight (weighing less than 2500 grams) have a higher one-year mortality risk compared to babies who are heavier at birth (Morris et al., 1998; Almond et al., 2005). Furthermore, the surviving children are more likely to have impaired motor and neurological development and chronic illnesses (Strauss and Thomas, 1998; Adair, 1989; De Boo and Harding, 2006). Low birth weight babies are also more likely to have a lower cognitive ability, achieve lower levels of education, and experience poorer outcomes in the labor market compared to babies who are born at a higher weight (Currie and Hyson, 1998; Case et al., 2005; Behrman and Rosenzweig, 2004; Black, Devereux and Salvanes, 2007), contributing to long-term inequality in socioeconomic indicators. There is also a well-documented positive relationship between birth weight and adult height which further intensifies the effects of early health endowments on future outcomes (Case and Paxson, 2008; Persico, Postlewaite and Silverman, 2004). Therefore, causal evidence aiding our understanding of the determinants of birth weight is of extreme importance for economic and public policy in developing and developed countries alike.

Importantly, we have a unique opportunity to examine whether children exposed to the

economic crisis in utero had shorter gestational periods thanks to special calendar data from DHS that contains detailed information on pregnancy duration and that we were granted access to. In addition to gestational duration, the DHS calendar data also includes information on miscarriages, stillbirths, and abortions, allowing us to differentiate between potential sources of heterogeneity in the estimated effects. In the supplementary analysis, we employ a mother-fixed effects estimation strategy to further account for unobservable determinants in the composition of newborns and unobserved heterogeneity in general. More specifically, we compare the birth outcomes of the siblings who were in-utero during the economic crisis with those whose gestational period falls outside the crisis period. Mother-fixed effects models further allow us to control for possible time-invariant behavioral and physiological characteristics of the mothers and possibly fathers.

Our paper adds fresh insights to the existing literature on the effect of economic shocks on children's birth outcomes. There are several ways in which economic shocks can affect birth weight. If households experience a negative income shock, they may need to cut back on health spending and may not have the means to consistently obtain nutritious food and micronutrients. This can subsequently lead to negative impacts on pregnancy and birth outcomes. Malnutrition, especially during the critical months of the gestational period, leads to poor birth outcomes (Stephenson and Symonds, 2002; Lumey, 1998; Almond and Mazumder, 2011). This may particularly be an important channel in the context of Turkey as food expenditures were the main adjustment mechanism for Turkish households, especially for low-income households, against the income shocks faced during the 2008 financial crisis (Aran, 2013) . In addition to potentially causing negative birth outcomes through reduced access to food, economic shocks may also raise mothers' stress levels, leading to low birth weight (Aizer et al., 2016). Stress during pregnancy has been shown to be associated with low birth weight (e.g., Beydoun and Saftlas, 2008; Paarlberg et al., 1995; Mulder et al., 2002; Wadhwa et al., 1993). Finally, limited access to prenatal care, particularly in the third trimester of pregnancy, has been associated with low birth weight and other complications (e.g., Grossman and Joyce, 1990; Reichman and Teitler, 2003; Rous et al, 2004; Jewell and

Triunfo, 2006; Wehby et al., 2009).

While there is a large literature examining the health effects of recessions, the majority of the studies focus on adult health or use data from the pre-2000 period (Belles-Obrero et al., 2016; Palmer et al., 2016). One notable exception is Bozzoli and Quintana-Domeque (2014), which examines the consequences of the Argentine economic crisis in 2001 on newborns and shows that birth weight is pro-cyclical with respect to the first and third trimesters of pregnancy. Olafsson (2016) examines the collapse of the Icelandic economy in 2008 and finds that first-trimester exposure to the crisis resulted in a significant reduction in birth weight among the affected cohorts of newborns. Wehby et al. (2017) provide similar evidence by examining the effects of business cycles in Argentina and demonstrate that higher unemployment reduces fetal growth rate, particularly among highly educated parents, and increases maternal poverty-related infectious diseases.[1]

Our paper makes several contributions to the literature. First, we build upon previous research by providing evidence of selective fertility, abortion, and neonatal mortality during an economic crisis in the context of a developing country, adding to Dehejia and Lleras-Muney (2004), which already documented such findings in the United States. Additionally, we examine the possible roles of credit constraints, maternal stress, and prenatal care as potential contributing factors. This is important because the ability of governments in developing effective policies to protect vulnerable populations from the harmful effects of economic downturns requires an understanding of the mechanisms behind these negative effects. Finally, to our knowledge, this is the first study to investigate the effects of financial crises on birth outcomes in both Turkey and the Middle East region, which has a history of economic and political instability. As children and youth people are among the most vulnerable members of this region, which has a large young population, birth weight is an important predictor of future socioeconomic success and warrants the attention of researchers and policymakers.

Using data from the Demographic Health Surveys (DHS) in 2008 and 2013, we demonstrate that birth outcomes have significantly deteriorated in crisis-afflicted provinces during the

[1]See also Paxson and Schady (2005), Dehejia and Lleras-Muney (2004), Ferreira and Schady (2009), Baird and Schady (2011) and Mary (2018) for further evidence on the effects of financial and macroeconomic crises on children outcomes.

economic collapse, and these adverse health effects were mainly observed in children born to mothers with low socioeconomic status, suggesting that the main driver of the estimated effects of economic crises in Turkey could be credit constraints. We also find that these detrimental infant health effects arise from the first-trimester exposure to financial hardship, and these estimated effects are also larger in magnitude for children born to mothers with less favorable socioeconomic indicators. Consistent with birth weight results, our analysis also demonstrates that mothers residing in provinces more severely hit by the economic recession are more likely to have premature infants and babies with shorter gestational lengths, both of which elevate the prevalence of lower birth weight newborns. Our analysis suggests that during an economic downturn, more educated and wealthier households may choose to have fewer children, potentially through selective fertility or abortion, and there may be higher rates of neonatal mortality. These factors may be contributing to the birth outcomes we have observed.

Our paper is organized as follows: In Section 2, we offer an overview of the vulnerability of the Turkish economy and the impact of the 2008 financial crisis. Section 3 presents the data and highlights key descriptive statistics. The methodology employed in our analysis is outlined in Section 4. The estimation results are presented in Section 5, followed by a discussion and conclusion in Section 6.

2 Background of the Turkish Economy and the 2008 Economic Crisis

Toward the end of the 1990s, the Turkish government was grappling with high inflation, high real interest rates, and a growing budget deficit, and was therefore required to implement a disinflation program with the guidance and technical assistance of the International Monetary Fund (IMF). This program was designed to reduce inflation through exchange rate adjustments and improve the financial stability of the public sector. In the early 2000s, however, a weak banking sector and large public sector deficits led to a fragile economic structure,

leaving the Turkish economy vulnerable to sudden capital outflows and devaluation of the currency. After implementing the disinflation policies, the government lost its vote of confidence, triggering panic in the markets and resulting in capital outflows. Accordingly, the Turkish economy was severely affected by a liquidity crisis and a deep economic recession. As a result, the government announced a new economic stabilization program in May 2001, in collaboration with the IMF, in order to recover from this deep financial crisis and restore household income and purchasing power, both of which deteriorated dramatically during this economic downturn.

As part of the recovery program, institutional reforms were implemented to improve the regulatory capacity and fiscal stability of the Turkish economy. From 2002 to 2008, the Turkish economy experienced relatively strong and stable conditions, with falling inflation, improved fiscal discipline, and political stability. However, these positive trends were reversed with the 2008 global financial crisis, which had a ripple effect on the Turkish economy. As a result, the value of the Turkish lira plummeted and inflation rose significantly, resulting in a sharp contraction in GDP, a rise in unemployment, and a decline in foreign direct investment. To stabilize the economy, the government implemented several measures such as austerity measures and obtaining loans from international organizations.

Figures 1 and 2 illustrate a severe deterioration in economic indicators and a prolonged impact of the global economic crisis on industrial production and economic growth in Turkey. It is important to note that the data presented in these figures are highly correlated, suggesting that the financial sector crisis was transmitted to the rest of the economy. As shown in Figure 1, economic growth was consistently negative from the final quarter of 2008 until the end of 2009. During this period, GDP fell by 4.8%, the unemployment rate rose to 14%, and real wages significantly declined as a result. The OECD report on the 2008 financial crisis further documents a substantial contraction in the domestic demand in the Turkish economy as well as in the capital inflows into Turkey during these episodes. According to these figures, total domestic demand in 2009 fell by 6.5 percentage points alone. The capital flows also contracted by 6.2 and 19.2 percentage points in 2008 and 2009, respectively. In

our empirical analysis, we, therefore, exploit the cyclical variation in GDP across provinces during these challenging episodes to quantify whether and to what extent exposure to severe downturns in-utero affected children's birth weight and other birth outcomes.

3 Data and Descriptive Statistics

We conduct our empirical analysis using the 2008 and 2013 waves of the Turkish DHS, which contain detailed information on the socio-demographic characteristics of women, men, and children. Essential to the purpose of this paper, the DHS reports women's complete birth histories, including each child's date of birth, gender, birth weight, and prenatal care, allowing us to explore the causal association between economic conditions and birth outcomes. Birth histories further enable us to identify siblings and compare the birth outcomes of children born to the same mother during different episodes of economic conditions. Importantly and in contrast to extant work, we have been granted access to special calendar data from DHS that provides detailed information on the actual length of pregnancy, allowing us to accurately determine the gestational duration for each birth. These detailed data are key to correctly assigning the pregnancy duration and precisely identifying the children who are in-utero during economic downturns; thereby quantifying the causal impacts of the crisis on birth outcomes.

In addition to gestational duration, the DHS calendar data also provide information on miscarriages, stillbirths, and abortions, which help us disentangle the potential sources of heterogeneity in the estimated effects. Since we explore both the spatial and temporal variations in the exposure to economic downturns during pregnancy across 81 Turkish provinces, it is also important to correctly assign children to their birth province. To do this, we use migration histories from DHS and carefully match each child's residence at the time of their birth. We explore provincial differences in output levels by using provincial GDP data provided by Turkish Statistical Institute (TURKSTAT). Since provincial GDP data starts from 2004, we cannot include the 2001 economic crisis, therefore, we only focus on the 2008 crisis in our analysis. Note that a commonly used measure to capture the effects of economic crises

in the literature is the unemployment rate. In the context of Turkey, official data on the unemployment rate is only released at the regional level.[2] Guided by the economic indicators shown in Figures 1 and 2, we define the 2008 crisis as the period between October 2008 and September 2009. We further test the robustness of our results by using alternative definitions of crises taken from Cosar and Sahinoz (2018) and Aruoba and Sarikaya (2013). Our results remain robust with these alternative definitions.

In our analysis, we only consider the birth outcomes of single births that were in utero for more than seven months, since multiple births and premature infants are more likely to have low birth weight regardless of economic condition.[3] We also exclusively focus on children who were born in Turkey. Table 1 reports the summary statistics of the main variables of interest and the provincial GDP per capita. The average weight of children at birth in our sample is 3,244 grams. About 13 percent of these children had low birth weight, which is defined as having a birth weight of 2500 grams or less, while 11 percent of these babies had a high birth weight (4000 grams or higher). On average, mothers have 6.5 years of schooling, while fathers have 8.2 years. The mother's average age at childbirth is approximately 27, while their age at first birth is 22. The number of children ever born to the mothers in our sample is 2.5 children, and more than half of these children were born within the last five years. Finally, the average provincial GDP per capita is 7,252 USD between 2004 and 2013.

Figure 3 illustrates the average raw birth weight over time in provinces that fall within the top and bottom 25 percent of GDP distribution. As demonstrated by the unadjusted trends depicted in the figure, a striking difference in birth weight between these two categories of provinces emerges during the crisis period. These unadjusted disparities also serve as a basis for our causal analysis, which is outlined in the following section.

[2]Although Turkey has 81 provinces, there are only 26 regions. Conducting the analysis at the regional level would have significantly reduced the sample size.

[3]However, we note that our results remain similar when we include these groups in our analysis sample.

4 Empirical Strategy

Our analytical approach is a difference-in-differences strategy, in which we use the temporal and spatial variations of the economic crisis measured by the provincial GDP.[4] More specifically, we compare the birth outcomes of infants who are exposed to the Turkish economic crisis during the gestational period in heavily affected provinces to those of children who were in utero during this period in relatively less affected provinces. Exploring the spatial and time variations in the intensity of the economic crisis across provinces and birth cohorts allows us to credibly isolate the true infant health effect of the crisis from general provincial differences in infant health endowments.

In particular, the proposed estimate of the average treatment effect is given by β in the following equation:

$$BirthWeight_{impt} = \alpha + \beta Crisis_{imt} XGDP_{pt} + \theta GDP_{pt} + \delta_p + \phi_t + \tau_{pt} + \omega X_{imt} + \epsilon_{ipmt}, \quad (1)$$

where $BirthWeight_{impt}$ is the birth weight in grams of child i born to mother m in province p and in year t. $Crisis_{imt}$ is a dummy variable indicating whether a child was in-utero during the economic crisis. GDP_{pt} is the provincial GDP spanning the period 2004-2013. δ_p denotes birth province fixed effects, controlling for permanent differences across provinces. ϕ_t is the child's year of birth fixed effects, controlling for likely secular changes in birth outcomes over time. τ_{pt} controls for unobserved provincial trends in economic and health-related conditions that might be correlated with birth outcomes. X_{imt} includes a vector of controls for a mother's age at birth dummies, mother's and father's educational attainment dummies, gender and birth order of the child, mother's marital status, household wealth index, and urban/rural residence. ϵ_{ipmt} is a random, idiosyncratic error term. The standard errors are clustered at birth province to account for correlations in outcomes between children born in the same province over time.

We perform a series of additional analyses to assess whether our results from the base-

[4]Standard difference–in–differences estimator can produce biased results in the presence of staggered treatment (Goodman–Bacon, 2021; de Chaisemartin and d'Haultfoeuille, 2020). However, this problem does not apply in our analysis since the timing of treatment does not vary over time.

line model are sensitive to different specifications and potential confounding factors. As mentioned earlier, the calendar data in the DHS cover the entire reproductive history of the women in our sample, enabling us to directly measure if the severe economic downturn elevated the incidence of abortion, miscarriages, and stillbirths, thereby contributing to the unobserved heterogeneity in birth outcomes. Furthermore, as proposed by the Trivers-Willard hypothesis and demonstrated by Valente (2015), women might have given birth to more daughters than sons in times of economic hardship, potentially resulting in changes in the level of parental investment in newborns. Therefore, we also investigate whether the gender ratio at birth has changed the economic crises in meaningful ways.

As an additional validity check, we investigate whether there was a fertility response to the crisis by estimating equation (1) using the total number of births by month and by the province as an outcome of interest. Finally, we evaluate whether there was selective fertility during the economic crisis based on the educational attainment and household wealth of mothers and fathers, an aspect that has not been extensively considered in previous studies.

In our supplementary analysis, we estimate a specification with mother-fixed effects in an attempt to more directly account for unobserved heterogeneity. More specifically, we re-estimate equation (1) including mother-fixed effects for the sample of mothers with multiple births during the time period covered. In this empirical setting, we leverage the variation in birth weights of the siblings who were in-utero during the economic crisis to those whose fetal development occurred outside the period of the crisis. The mother fixed effects analysis enables us to account for possible time-invariant behavioral and physiological characteristics of the mothers by exploiting the variation between siblings that have at least one, and generally two, common parents. More formally, this empirical strategy can be specified by the following equation:

$$BirthWeight_{imt} = \alpha + \beta Crisis_{imt} XGDP_{pt} + \delta_m + \phi_t + \theta GDP_{pt} + \lambda_p + \tau_{pt} + \omega X_{imt} + \epsilon_{ipmt}. \quad (2)$$

In this specification, δ_m is the mother fixed effects controlling for the possible time-

invariant behavioral and physiological characteristics of the mothers. Hence, δ_m also absorbs the mother's educational attainment and household wealth. Similar to Equation (1), λ_p denotes birth province fixed effects and ϕ_t is the child's year of birth fixed effects. τ_{pt} controls for unobserved provincial trends in economic and health-related conditions that might be correlated with birth outcomes. X_{imt} now controls for time-variant characteristics such as dummies for the mother's age at birth, and the child's gender.

The validity of the difference-in-differences estimator hinges on the parallel trend assumption, which posits that provinces with varying exposure to the economic crisis would have exhibited parallel trends in child's birth outcomes had the economic crisis not occurred. Similarly, in the mother fixed effects specification, the parallel trend assumption suggests any differences in birth outcomes among siblings are solely due to their differing levels of exposure to the economic crisis and that there are no other systematic differences in trends. We attempt to assess the plausibility of the parallel trend assumption by conducting several validity checks. First, we relax the parallel trend assumption by adding provincial time trends and controlling for unobserved trends in economic and health-related conditions that might be correlated with birth outcomes. Second, we further attempt to verify the validity of our results by conducting a falsification test, in which we repeat our main analysis but only include infants born during non-crisis years. Then we randomly assign the year that the crisis occurred and then evaluate whether these simulated difference-in-differences estimates are statistically and economically significant. Specifically, we test whether birth outcomes of children born 10, 20, 30, and 40 months before and after the actual crisis period differentiate by the provincial GDP. Results from this falsification test are shown in Appendix Table A1. The point estimates from these falsification exercises are statistically and economically insignificant, suggesting that our estimates are unlikely to be driven by pre-existing province-cohort trends. We have performed these control experiments for both of our specifications described above. It is comforting that there is no evidence to suggest differential trends at times outside of crisis years, lending confidence that our findings indeed demonstrate the health costs of the economic crisis rather than the pre-existing trends in

birth outcomes across provinces or siblings.

Next, we further test the validity of our identification by assigning the crisis period through the entire period of our data span. More specifically, our data covers 118 months and in 118 trials we do not obtain a statistically significant effect outside of the crisis period, except for the period between February 2005 and April 2006 in which we see an improvement in birth weight in provinces with lower GDP (as shown in Figure 4). It is important to note that the period between February 2005 and April 2006 coincides with the initial stages of the Turkish Family Medicine Program (FMP), which provided a wide range of free primary healthcare services to all citizens. This program has been shown to generate positive effects on child health (Cesur et al., 2017). These findings suggest that the financial crisis undid the progress gained with health reform in economically less developed provinces and highlight the importance of welfare support during economic collapses. More importantly, this exercise bolsters our confidence that the identified effect on birth weight is in fact due to the 2008 financial crisis and is not affected by unobserved time-varying heterogeneity across provinces.

Finally, we perform an event-study analysis in which we trace the estimates on the treatment indicator in the periods leading to the economic crisis, during the crisis, and following the crisis. In this exercise, we divided the time before and after the crisis period into 11 months brackets similar to the duration of the 2008 economic crisis Turkey experienced. We then estimate the model specified in equation (1) with a set of interaction terms between these time brackets and the measures of provincial GDP. The point estimates along with the confidence intervals and p-values from this analysis are presented in Figure 5. As illustrated in the figure, none of the estimates are statistically distinguishable from zero after accounting for differences across provinces via fixed effects, except for the one coinciding with the crisis period, where higher GDP appears to serve as a protective factor against the harmful effects of the deep economic contraction.

5 Estimation Results

The results from specification (1) in which the outcome of interest is the child's birth weight in grams are presented in Table 2. Column (1) shows the analysis results obtained from the full sample. We allow for heterogeneous effects in columns (2)–(5) by the mother's education and household wealth, respectively. Specifically, column (2) presents the results for the children born to mothers with secondary school education or less, while we focus on children whose mothers have more than secondary school education in column (3). Similarly, in column (4), we show the results for children living in households that fall within the bottom three quintiles of the wealth index generated by the DHS administrators, and column (5) only includes children from households in the top two quintiles.[5] All regressions control for a set of the child, mother, and father characteristics, including the child's gender and birth order, the mother's age at birth dummies, the father's educational attainment dummies, the mother's marital status, household wealth dummies, and urban/rural residence in addition to the yearly provincial GDP per capita, province of birth, birth year fixed effects and province-specific time trends.

Table 2 also presents the estimates for the relationship between our control variables and birth weight as a way to offer perspective for our findings. We find that a child's gender is an important determinant of birth weight, with girls weighing an average of 137 grams less at birth. Similarly, the birth order of a child does seem to matter for the birth weight, as our results show that higher birth order children are heavier on average. This positive effect of birth order on birth weight is significantly stronger for children born to mothers with higher SES. We also see in Table 2 that an infant's birth weight increases, almost monotonically, with maternal education, with mothers with the highest educational attainment having babies 98 grams heavier than mothers with no formal education. Consistent with the economic theory, household income also significantly contributes to birth weight. For instance, babies from households in the top two quintiles of the wealth index are more than 200 grams heavier

[5] DHS calculates the wealth index by using data on households' ownership of selected assets, such as cars, televisions, and bicycles; materials used for housing construction; and types of water access and sanitation facilities. Using principal component analysis separate indexes for urban and rural households are produced and then combined into a national wealth index. Finally, the five (20%) quintiles (poorest, poor, middle, rich, richest) are determined based on the weighted household population.

compared to those in households in the lowest quintile of the wealth distribution. Moreover, Table 2 reveals that the mother's marital status is also important for a child's birth outcomes, especially for high-educated and economically prosperous mothers, as illustrated in columns (3) and (5). On the other hand, we find that the type of residence and the father's educational attainment have limited to no effects on determining an infant's birth weight.

Table 2 further demonstrates that birth weight is pro-cyclical with respect to GDP, but primarily among more educated women and women from economically more advantaged households. For example, one standard deviation increase in GDP per capita ($3,148) is associated with about 72 grams increase in average birth weight among infants born to mothers with more than secondary education. It is also revealed in Table 2 that the 2008 economic crisis itself did not have a dramatic impact on birth weight statistically or economically, as the estimates are small and imprecisely estimated.

We next focus on the infant health effects of the 2008 economic crisis by estimating the model specified in equation (1). The results from this estimation are shown in Table 3. We find that children born during the crisis have significantly lower birth weights if they were born in provinces more heavily hit by the 2008 global financial crisis. The first row of Table 3 shows that children born in the most prosperous provinces during the 2008 crisis are approximately 93 grams heavier on average than the same cohorts of children in the poorest provinces. More specifically, we interpret the difference-in-differences estimate by taking the difference in the 2008 GDP per capita in the richest and the poorest provinces and multiplying it with the estimated coefficient in the first row.[6] Alternatively, our results indicate that crisis-time newborns in the poorest provinces are 30 grams lighter than children of the same age born in a province with average GDP per capita. This effect is economically and statistically significant suggesting that in-utero exposure to the economic downturn is detrimental to birth weight as much as maternal smoking during pregnancy (Lien and Evans, 2005). On average, our estimated coefficient on economic crisis is more than double the magnitude presented by Bozzoli and Quintana-Domeque (2014) for Argentina and larger than

[6]The per capita GDP for the provinces in the richest and poorest quintiles are $18,622 and $3,066, respectively. The difference in these figures multiplied by 0.006 yields 93.3 grams).

the estimates presented for Iceland by Olafsson (2016). This difference is likely explained by the institutional differences across countries in the quality of healthcare provision and welfare structures allowing for consumption smoothing and safety nets in times of hardship.

Table 3 further demonstrates that our results are primarily driven by mothers with low socioeconomic status captured by educational attainment and income. The difference-in-differences estimates for less educated mothers and for mothers in financially more disadvantaged households are 1.5 times larger than the estimates for the entire sample. This finding aligns with the idea that credit constraints and limited resources disproportionately affect less educated and poorer women in Turkey. In contrast, the economic crisis appears to have had little effect on the birth weight of children born to economically and educationally more advantageous mothers, as indicated in columns (3) and (5). The point estimates for these mothers are statistically insignificant and smaller in magnitude. The estimated heterogeneity by the mother's SES could be attributable to several channels. For instance, it is possible that more educated and relatively wealthier parents had means to better cope with the potential financial hardship during the economic crisis; thereby having better access to health care and nutrition during economic hardship. Similarly, parents with higher socioeconomic status may have had greater access to and utilization of family planning services compared to those with lower socioeconomic status. We confirm in our DHS data that family planning services and contraception are indeed more commonly utilized among more educated women in Turkey. We further investigate the idea further by assessing if there were any measurable changes in the utilization of prenatal care among pregnant women during the economic downturn. We do this by examining the probability of receiving prenatal care as an outcome of interest in Appendix Table A2. Our findings provide suggestive evidence that the availability and utilization of prenatal care for infants in-utero during the 2008 global economic crisis might have been reduced in provinces that were more severely impacted by the crisis, although the coefficients are not precisely estimated with the exception of the last column.

In addition to estimating the linear association between provincial economic activity and birth weight as summarized in Table 3, we also look into the potential for nonlinearity in

the estimated effects of the economic crisis on birth weight. Specifically, we hypothesize that areas most heavily affected by the crisis may also experience the sharpest decrease in birth weight. To test this, we constructed dichotomized measures that separated provinces into the top 20 percentile (richest) and bottom 20 percentile (poorest) during the crisis. The results shown in Table 4 support the idea that children born in the poorest provinces during the crisis had lower birth weights compared to those born in the richest provinces. According to the point estimates, there is over a 180-gram difference in the average birth weight of infants born between provinces in the top and bottom 20% of the income distribution.

In addition to examining the overall impact of the economic crisis on infant health, we also estimate the effects of the crisis by trimester of pregnancy in order to more precisely determine when during pregnancy mothers and newborns are most vulnerable to adverse economic shocks. Following the medical literature, we categorize the duration of the pregnancy into three trimesters. In the trimester analysis, we use the unique calendar data from the DHS, as it provides specific details on the actual duration of pregnancy and allows us to accurately determine which trimester(s) the mother was affected by the financial crisis. As previously mentioned in the data section, the duration of the economic crisis was taken into account when determining the mother's exposure to the economic crisis in each trimester. Since the economic crisis lasted for several quarters, none of the mothers were only exposed during the second trimester. As shown in Table 5, mothers experienced the economic downturn during one of the following trimesters: the first or third trimester only, both the first and second trimesters, both the second and third trimesters, or all three trimesters. In our sample, 161 children were exposed in the first trimester, 146 children were exposed in the first and second trimesters, 151 children were exposed in the second and third trimesters, 128 children were exposed in the third trimester, and 449 children were exposed in all three trimesters.

According to estimates shown in Table 5, deep financial crises lead to a greater reduction in birth weight for infants exposed during the first trimester of pregnancy, while the effect on babies exposed only during the third trimester is limited. This pattern aligns with the findings of Bozzoli and Quintana-Domeque (2014) and Olafsson (2016). Additionally, we continue

to observe that mothers with lower socio-economic backgrounds are largely responsible for the patterns observed in the birth weight results as previously discussed in Table 3. The point estimates on the first-trimester exposure indicator also suggest that mothers and their children from lower socio-economic backgrounds disproportionately bear the negative effects of the financial collapse with respect to birth weight.

Our data also enable us to investigate the effects of the economic crisis on various other birth outcomes. In Table 6, we explore the likelihood of having a low birth weight baby (column 1), premature birth of less than seven months gestational age (column 2), gestation length (column 3), and birth spacing (column 4) as additional birth outcomes. We find that mothers in provinces more heavily impacted by the crisis are more likely to give birth to infants with shorter gestation periods and premature births, compared to mothers in less affected provinces. Both of these findings likely contribute to the patterns of results on birth weight discussed in Table 3. More specifically, we find in Table 6 that the gestational length decreases by 0.187 months (2.1%), and the likelihood of premature birth increases by 2% in the least prosperous provinces compared to the richest provinces during the crisis. More specifically, similar to the previous tables, we interpret the difference-in-differences estimate by taking the difference in 2008 GDP per capita in the richest and the poorest provinces and multiplying this difference with the estimated coefficients. However, we find no evidence to suggest a change in birth spacing at times of the crisis.

Overall, our results demonstrate that challenging intra-uterine conditions have detrimental effects on birth outcomes, and these adverse effects are more often borne by mothers and children from disadvantaged backgrounds. These households likely face greater economic insecurity and credit constraints and have limited access to prenatal care and family planning services during the economic collapse, leaving them more vulnerable in the presence of weak institutions and limited welfare support.

5.1 Selective Fertility, Abortions, Miscarriages, and Stillbirths

Previous research on the effect of economic downturns on infant health that uses spatial variation rarely investigates the potential influence of selective fertility and the changes in the composition of babies born, such as through abortion and prenatal mortality. These studies often argue that the unobserved heterogeneity driven by these potential changes in fertility behavior has minimal impact on their findings if any. A notable exception is Dehejia and Lleras-Muney (2004) which demonstrates that fertility responses to temporary shocks in income vary significantly by socioeconomic status and race. It also shows that better birth outcomes during periods of high unemployment are due to selection (changes in the types of mothers who conceive during recessions) and improvements in health behavior (such as decreased smoking and drinking) during recessions. During economic crises, credit constraints and psychological stress may lead people to postpone having children until the economy recovers. On the one hand, the use of contraception among more educated and economically more advantaged parents may amplify this effect, as they are more likely to have access to and utilize it. On the other hand, the makeup of newborns may change during economic hardships through an increase in abortions, miscarriages, particularly during the first trimester, or stillbirths. Indeed, the descriptive statistics presented in the 2013 DHS data clearly demonstrate that family planning practices via the use of contraception and abortion are significantly more prevalent among more educationally and economically affluent Turkish women.

In light of this context, we investigate whether there was a noticeable shift in fertility behavior during the crisis period that altered the number of births and the composition of babies born during an economic downturn. To pursue this line of inquiry, we compute the number of births by month, year, and province and exclusively focus on this indicator as our outcome of interest. As shown in column (1) of Table 7, we find no evidence to indicate that fertility rates were lower in more prosperous provinces during economic crises.[7]

[7]We further investigate whether the gender ratio at birth has changed during or right after the economic crisis in a significant way. To unmask any potential gendered fertility effects of the economic downturn, we created a variable indicating the number of boys born by month, year, and province and use it as our outcome of interest. Results reported in Appendix Table 3 indicate that the difference-in-differences estimates from this analysis are statistically insignificant at the conventional levels suggesting

In the rest of Table 7, we explore the possibility of selective fertility by examining the number of children born by province, year, and month based on the mother's and father's educational attainment and household wealth. More specifically, the outcome of interest in column (2) of Table 7 is the number of children born by month by province by mother's education, where higher maternal education is categorized by a higher value. Similarly, column (3) presents the results for the number of children born by month by province by partner's education, while column (4) shows the results for the number of children born by month by province by household wealth. The evidence presented in Table 7 indicates that more educated parents indeed postpone childbearing during economic hardship. Taken together, our results summarized in Table 7 suggest that selective fertility, and more generally, changes in the composition of the newborns are indeed present during economic crises and should be considered in the estimation of infant health costs during economic recessions as a potential source of unobserved heterogeneity.

Finally, we also investigate whether there was a noticeable change in the incidences of abortions, miscarriages, and stillbirths during economic crises. Abortion, and to a lesser extent, miscarriage, may be alternative birth control methods used to defer conception during times of crisis. As we had access to unique calendar data in the DHS on the complete conception history, we were able to accurately identify incidences of abortions, miscarriages, and stillbirths in our data. Using this information, we generated indicators for abortion (shown in Panel A of Table 8) and miscarriage and stillbirths (shown in Panel B of Table 8). Our results indicate that the likelihood of the pregnancy being terminated through abortion or miscarriage did indeed increase in the most affected provinces during the severe economic downturn in 2008. These findings suggest that there were other behavioral responses in family planning practices in addition to fertility responses contributing to the unobserved heterogeneity.

In light of the evidence presented in Tables 7 and 8 on unobserved heterogeneity and fertility responses at times of economic downturns, we next estimate models with mother-fixed

that there are no discernible systematic changes in the sex ratio during the deep recession experienced in Turkey.

effects. This specification allows us to further guard against bias due to potential unobserved heterogeneity and provide suggestive evidence on the true effect of economic crises on infant health, accounting for possible time-invariant behavioral and physiological characteristics of the mothers and households. As described empirical strategy section, mother fixed effects models compare the birth outcomes of the siblings who were in-utero during a deep recession and those whose gestational period falls in non-recession years.[8] The results obtained from the analysis with mother-fixed effects are presented in Table 9. According to the estimates shown in the table, the infant health effects of the economic crisis no longer appear to be present at the conventional levels of significance, although the point estimates are still negative.

6 Conclusion

In this paper, we use the economic crisis that occurred in Turkey in 2008-2009 as a natural experiment to examine the effect of challenging economic conditions on birth outcomes. Our identification strategy exploits the temporal and spatial variations of the economic crisis measured by provincial GDP. Using data from several waves of the Turkish DHS, we find that the birth outcomes of children born to mothers with low socio-economic status are more sensitive to economic conditions, while those of children born to more affluent mothers are not affected. This suggests that the negative impact of the crisis on birth outcomes may be driven by credit constraints faced by low SES mothers during times of financial hardship. We also examine whether mothers alter their fertility behavior in response to economic difficulties and whether these responses vary by maternal background. We document evidence of selective fertility, including increased rates of abortion and miscarriage in provinces heavily affected by the crisis. These findings indicate that selective fertility and mortality play a significant role, complementing the earlier work of Dehejia and Lleras-Muney (2004) on the United States in a developing country context.

The findings of this paper have important policy implications, as poor infant health can have long-lasting consequences, including developmental delays, increased morbidity, and

[8] We acknowledge that mothers in this subsample could potentially differ from the entire sample.

mortality, and reduced productivity in adulthood. It is therefore of great policy significance to understand the factors that contribute to poor infant health and to develop interventions that can mitigate these risks. In order to promote the well-being of vulnerable populations and mitigate potential future income inequalities, it is crucial for policymakers to consider the impact of economic crises on infant health and develop targeted interventions to support families from low socio-economic backgrounds during times of financial hardship. Our findings also highlight the need to address the underlying socio-economic inequalities that contribute to poor infant health, as addressing these inequalities may be an important way to reduce the impact of economic crises on infant health.

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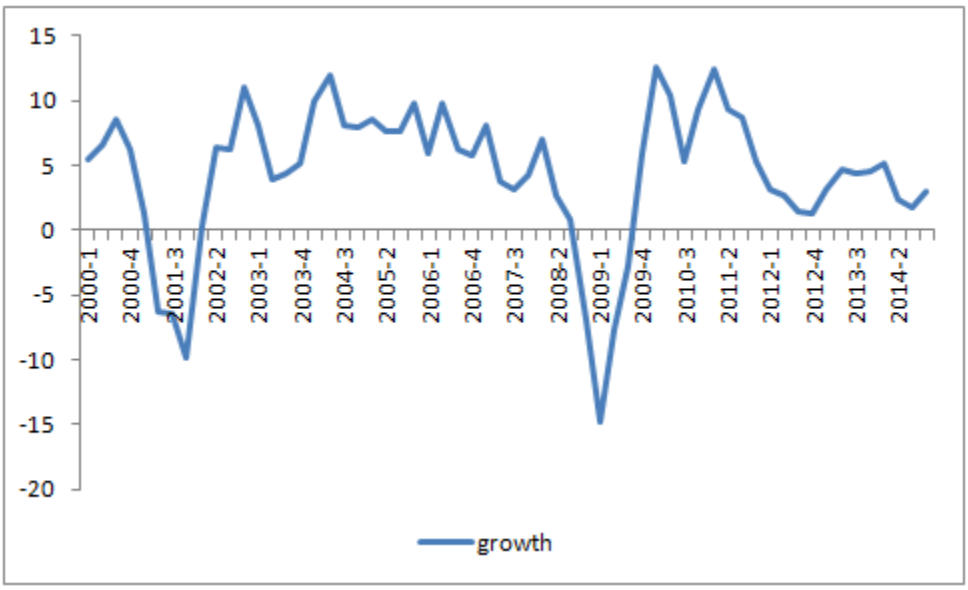
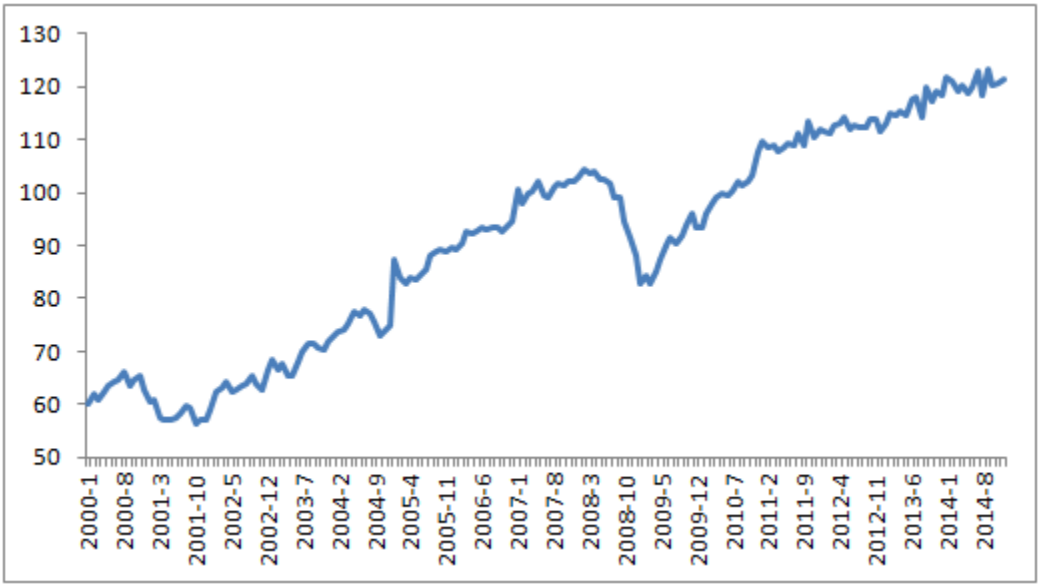
Figure 1: Quarterly Economic Growth Rates of Turkey: 2001-2014



Source: Turkish Statistical Institute.

Figure 2: Industry Production Index (IPI): 2001-2014



Source: Turkish Statistical Institute.

Figure 3: Birth Weight Across Provinces

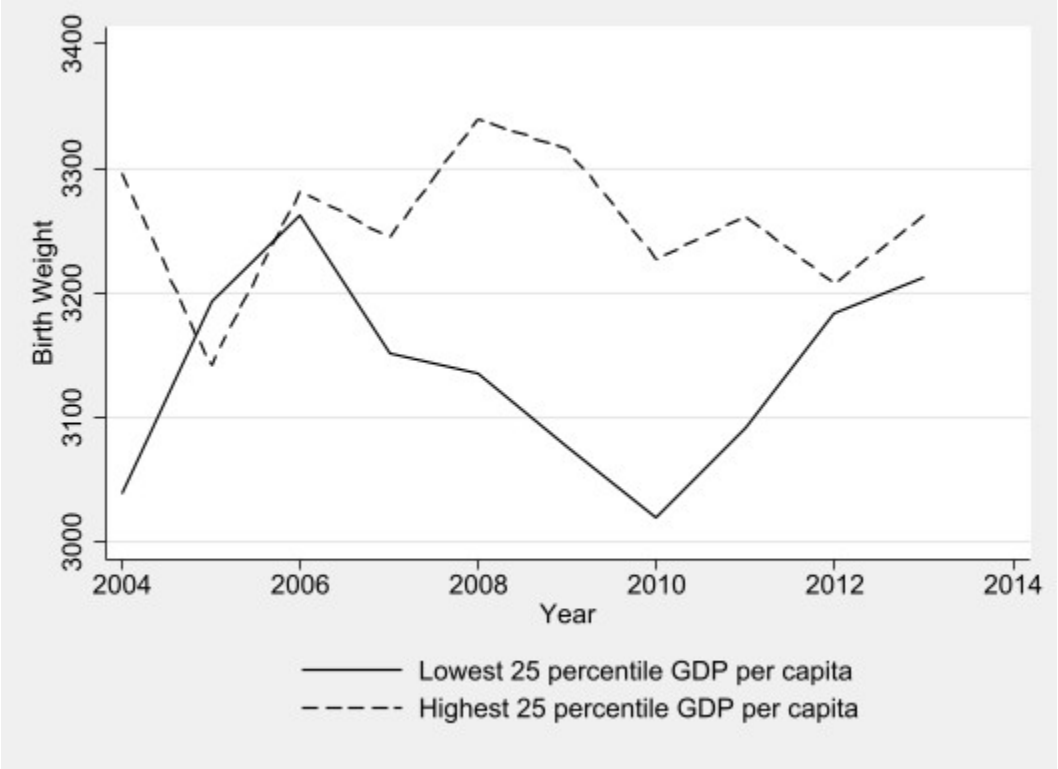
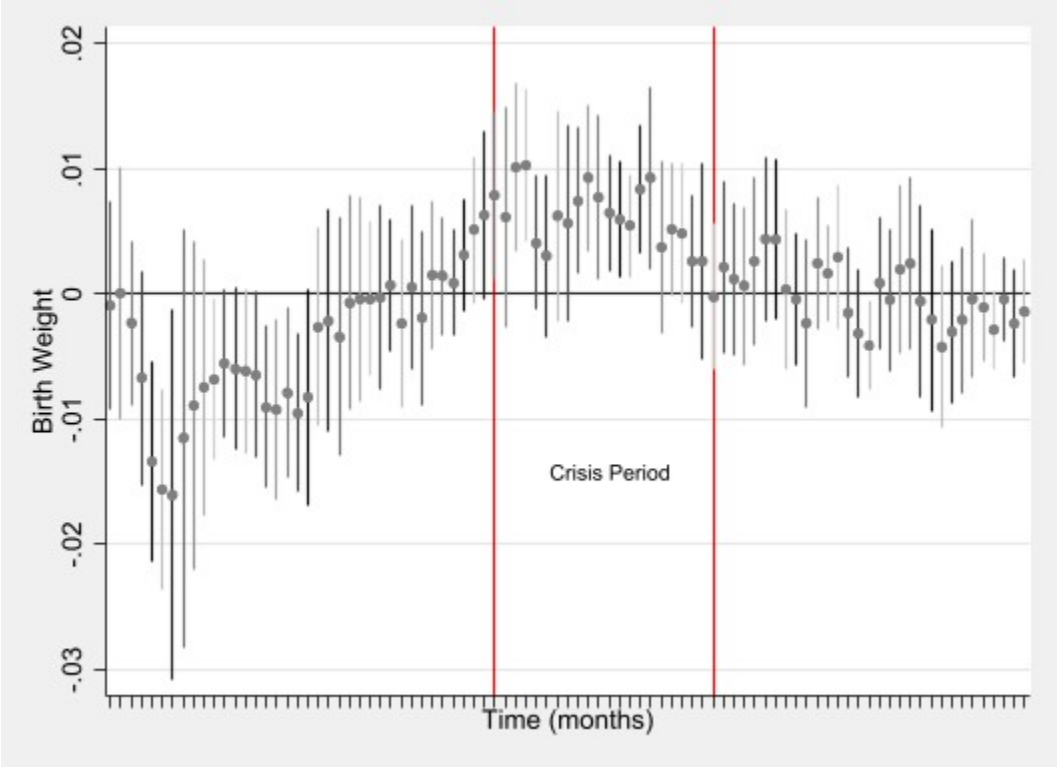
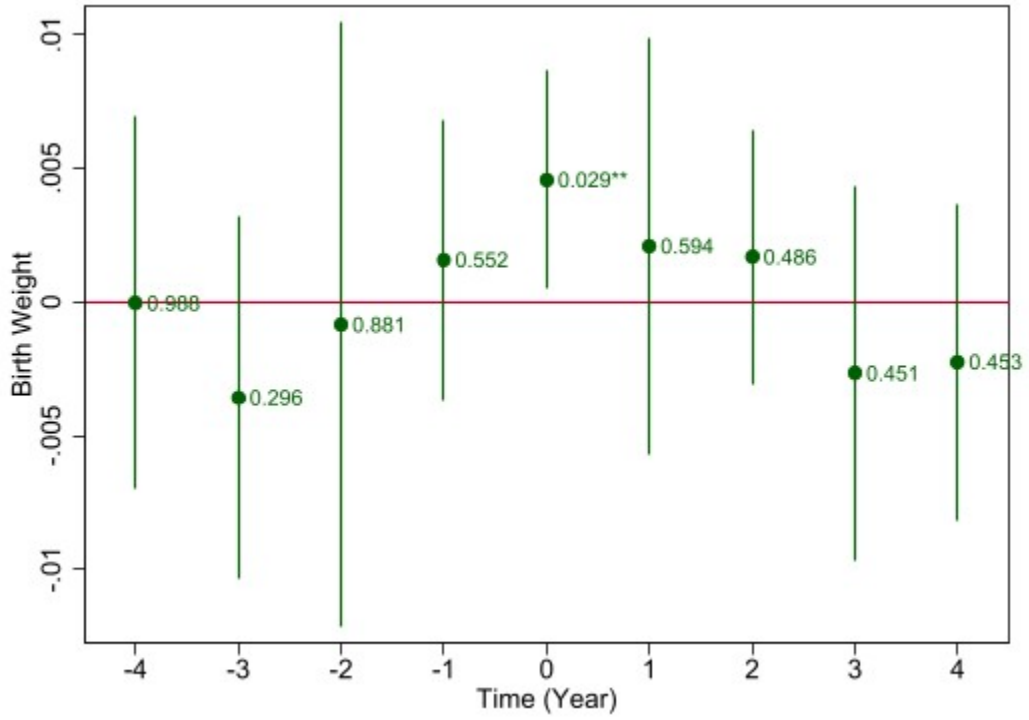


Figure 4: Birth Weight Differential Across Provinces



Note: The figure displays the point estimates and 95% confidence intervals.

Figure 5: Event Study Estimates



Note: The figure shows the confidence intervals along with the associated p-values.

Table 1: Descriptive Statistics

	N	Mean	Standard Deviation	Min	Max
Child Birth weight (grams)	5,915	3244	640	600	6500
Low Birth weight (2,500 gr or less)	5,915	0.131	0.337	0	1
High Birth weight (4000 gr or more)	5,915	0.109	0.312	0	1
Pregnancy Duration	5,915	8.92	0.286	8	10
Mother's Years of Schooling	5,915	6.5	4.1	0	21
Partner's Years of Schooling	5,915	8.2	3.8	0	21
Mother's Age at Child Birth	5,915	27.1	5.565	14	47
Age at First Birth	5,915	22.5	4.2	12	44
Number of Children Ever Born	5,915	2.49	1.594	1	13
Number of Births in Last 5 Years	5,915	1.39	0.585	1	5
Number of Births Last Year	5,915	0.315	0.468	0	2
GDP per capita (USD)	810	7252	3148	1931	20726

Notes: Table reports the summary statistics of the sample (2004-2013) used in our analysis and includes children who are not multiple births and who were in-utero for more than seven months.

Table 2: Effect of Financial Crisis on Birth Weight

	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
	Dependent Variable: Birth weight (grams)				
2008 Crisis	17.666	8.674	57.439	27.049	-18.806
	(36.427)	(45.774)	(57.899)	(45.224)	(65.478)
GDP per capita	0.004	-0.001	0.023**	-0.014	0.028**
	(0.007)	(0.010)	(0.011)	(0.011)	(0.013)
Birth Order	20.079**	16.038	60.309**	12.722	44.146**
	(10.039)	(10.782)	(30.030)	(10.407)	(18.116)
Father Primary Education	12.627	35.788	-47.437	16.002	411.950***
	(59.277)	(61.881)	(169.562)	(61.657)	(103.289)
Father Secondary Education	39.713	72.434	23.084	87.388	352.491***
	(63.758)	(70.971)	(164.152)	(68.581)	(103.951)
Father Higher Education	15.772	10.758	82.369	51.415	357.708***
	(64.398)	(66.516)	(159.274)	(66.540)	(98.463)
Mother Primary Education	26.585			46.915	-55.681
	(42.877)			(49.208)	(162.563)
Mother Secondary Education	40.628			74.070	-26.216
	(46.331)			(60.912)	(162.184)
Mother Higher Education	97.604**			121.518**	35.305
	(41.606)			(51.382)	(151.958)
Poorer	145.103***	143.381***	77.585		
	(30.793)	(36.675)	(96.956)		
Middle	182.990***	191.709***	93.124		
	(46.420)	(45.668)	(107.467)		
Richer	202.238***	206.097***	138.983		
	(30.283)	(36.934)	(104.952)		
Richest	168.640***	160.956***	87.721		
	(35.030)	(45.605)	(107.287)		
Rural	1.717	-11.083	77.596	-74.000***	140.629*
	(28.440)	(32.593)	(55.856)	(27.796)	(75.275)
Girl	-136.979***	-141.129***	-146.936***	-108.286***	-189.108***
	(18.709)	(24.682)	(22.207)	(33.388)	(18.768)
Married	171.305**	62.815	469.103***	53.721	392.514***
	(77.598)	(152.374)	(114.827)	(141.243)	(132.557)
N	5,915	4,534	1,381	4,146	1,769
R^2	0.075	0.078	0.153	0.071	0.153

Notes: In all regressions, the dependent variable is the child's weight in grams at birth. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, Column 2 includes the children of mothers with secondary school education or less, Column 3 includes the children of mothers with more than secondary school education, Column 4 includes the children of households that are classified as poorest, poorer, and middle, Column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect of Financial Crisis on Birth Weight by Provincial Income per capita

	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
	Dependent Variable: Birth Weight (grams)				
2008 Crisis * GDP	0.006**	0.009**	0.002	0.008**	0.002
	(0.002)	(0.004)	(0.003)	(0.004)	(0.003)
GDP per capita	0.005	0.000	0.023**	-0.013	0.028**
	(0.007)	(0.010)	(0.011)	(0.010)	(0.013)
Birth Order	20.283**	16.277	59.429**	12.904	44.677**
	(10.011)	(10.723)	(29.751)	(10.389)	(18.117)
Father- Primary Educ.	11.382	33.947	-44.266	14.272	412.667***
	(59.567)	(62.633)	(166.667)	(62.155)	(105.124)
Father- Secondary Educ.	38.276	70.568	25.749	85.491	353.425***
	(64.029)	(71.659)	(160.456)	(68.519)	(105.360)
Father- Higher Educ.	14.756	8.180	84.644	49.213	358.929***
	(64.726)	(67.809)	(156.438)	(67.647)	(99.931)
Mother- Primary Educ.	26.436			46.885	-54.097
	(42.684)			(48.952)	(163.867)
Mother- Secondary Educ.	37.180			71.539	-26.150
	(46.121)			(60.981)	(163.839)
Mother- Higher Educ.	95.842**			119.869**	35.521
	(41.953)			(50.607)	(153.120)
Poorer	145.872***	144.309***	79.556		
	(30.723)	(36.432)	(96.290)		
Middle	184.348***	193.830***	95.970		
	(46.583)	(45.966)	(107.156)		
Richer	204.382***	209.566***	141.310		
	(30.272)	(36.156)	(104.588)		
Richest	169.544***	160.518***	90.044		
	(34.968)	(45.595)	(107.053)		
Rural	2.371	-10.319	75.826	-73.197***	139.444*
	(28.397)	(32.613)	(55.955)	(27.720)	(75.119)
Girl	-136.649***	-140.734***	-146.688***	-108.173***	-188.641***
	(18.612)	(24.968)	(22.337)	(33.333)	(18.781)
Married	171.989**	63.195	468.425***	54.601	391.652***
	(76.924)	(151.174)	(114.149)	(141.424)	(132.306)
Observations	5,915	4,534	1,381	4,146	1,769
R^2	0.076	0.079	0.153	0.071	0.154

Notes: In all regressions, the dependent variable is the child's weight in grams at birth. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, Column 2 includes the children of mothers with secondary school education or less, Column 3 includes the children of mothers with more than secondary school education, Column 4 includes the children of households that are classified as poorest, poorer, and middle, Column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Effect of Financial Crisis on Birth Weight by Provincial Income per capita - Richest and Poorest Provinces

	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
	Dependent Variable: Birth weight (grams)				
Poorest 20 percentile x 2008 Crisis	-128.684*	-108.157	-25.437	-92.020	-206.795**
	(69.452)	(77.397)	(210.476)	(71.973)	(104.325)
Richest 20 percentile x 2008 Crisis	38.913	79.281	-30.942	82.793	-22.989
	(42.379)	(58.859)	(65.696)	(56.269)	(78.091)
2008 Crisis	24.432	13.305	83.133	29.634	7.173
	(38.436)	(41.551)	(78.125)	(41.534)	(88.557)
N	5,915	4,534	1,381	4,146	1,769
R^2	0.076	0.080	0.152	0.072	0.155

Notes: In all regressions, the dependent variable is the child's weight in grams at birth. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, Column 2 includes the children of mothers with secondary school education or less, Column 3 includes the children of mothers with more than secondary school education, Column 4 includes the children of households that are classified as poorest, poorer, and middle, Column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, birth year fixed effects, and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Effect of Financial Crisis on Birth Weight by Trimester

	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
	Dependent Variable: Birth weight (grams)				
Exposed only in 1st Trimester x GDP	0.034***	0.048***	0.020	0.037***	0.036*
	(0.009)	(0.011)	(0.023)	(0.010)	(0.020)
Exposed only in 3rd Trimester x GDP	-0.002	0.001	0.006	0.004	0.018
	(0.008)	(0.012)	(0.016)	(0.022)	(0.012)
Exposed in 2nd and 3rd Trimesters x GDP	0.022	0.015	0.025	0.009	0.045*
	(0.014)	(0.011)	(0.023)	(0.013)	(0.027)
Exposed in 1st and 2nd Trimesters x GDP	0.028**	0.024*	0.049	0.011	0.042
	(0.012)	(0.013)	(0.039)	(0.011)	(0.028)
Exposed in All 3 Trimesters x GDP	0.028**	0.025**	0.018	0.007	0.044***
	(0.011)	(0.012)	(0.017)	(0.013)	(0.010)
Observations	5,915	4,534	1,381	4,146	1,769
R^2	0.093	0.103	0.196	0.096	0.203

Notes: In all regressions, the dependent variable is the child's birth weight in grams. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, column 2 includes the children of mothers with secondary school education or less, column 3 includes the children of mothers with more than secondary school education, and column 4 includes the children of households that are classified as poorest, poorer and middle, column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Effect of Financial Crisis on Other Birth Outcomes

	Low Birth Weight	Premature Births	Pregnancy Duration	Spacing
2008 Crisis * GDP	-0.016	-0.016**	0.187***	1.027
	(0.012)	(0.007)	(0.016)	(2.466)
Observations	4,619	4,619	4,619	965
R^2	0.107	0.054	0.085	0.399

Notes: Low birth weight babies are born weighing less than 2,500 grams. Spacing is the number of months between subsequent births. Premature birth is one that occurs before the start of the 37th week of the pregnancy. Pregnancy duration is given in months. The sample includes only children born to low-educated mothers. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7: Effect of Financial Crisis on Fertility

	(1)	(2)	(3)	(4)
	Total Births	Births by Mother's Education	Births by Father's Education	Births by Household Wealth
2008 Crisis * GDP	-0.007	-0.006**	-0.007***	-0.001
	(0.006)	(0.002)	(0.003)	(0.002)
Observations	3,594	5,071	5,044	5,108
R^2	0.378	0.122	0.118	0.121

Notes: In column (1) the dependent variable is the number of births by province by year by month, in column (2), the dependent variable is the number of births by province by year by month by education of mothers, in column (3), the dependent variable is the number of births by province by year by month by education of fathers, in column (4), the dependent variable is the number of births by province by year by month by household wealth. Regressions control for birth year and province of birth fixed effects, provincial averages for mother's education, children's gender, father's education, wealth, GDP per capita at child's birthplace, urban/rural residence, and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Effect of Financial Crisis on Abortion and Miscarriages/Stillbirths

	Panel A: Dependent Variable: Dummy Variable for Abortion				
	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
2008 Crisis * GDP	-0.065***	-0.061***	-0.097***	-0.056***	-0.078***
	(0.006)	(0.009)	(0.019)	(0.010)	(0.012)
Observations	6,615	5,068	1,547	4,592	2,023
R^2	0.165	0.169	0.263	0.156	0.230
	Panel B: Dependent Variable: Dummy Variable for Miscarriages and Stillbirths				
2008 Crisis * GDP	-0.082***	-0.058*	-0.108***	-0.105***	-0.059***
	(0.020)	(0.031)	(0.021)	(0.026)	(0.018)
Observations	7,908	6,075	1,833	5,522	2,386
R^2	0.052	0.063	0.166	0.067	0.112

Notes: In Panel A, the dependent variable is a dummy variable indicating whether the pregnancy was terminated or completed to full term. In Panel B, the dependent variable is a dummy variable indicating whether the pregnancy was a miscarriage/stillbirth or completed to full term. Column 1 includes all children, column 2 includes the children of mothers with secondary school education or less, column 3 includes the children of mothers with more than secondary school education, and column 4 includes the children of households that are classified as poorest, poorer and middle, column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 9: Effect of Financial Crisis on Birth Weight: Mother Fixed Effects Models

	Dependent Variable: Birth weight (grams)				
	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
2008 Crisis	-0.005	-0.002	-0.011	-0.009	0.024
	(0.030)	(0.034)	(0.095)	(0.033)	(0.146)
Observations	5,915	4,534	1,381	4,146	1,769
R^2	0.905	0.904	0.962	0.901	0.955

Notes: In all regressions, the dependent variable is the child's birth weight in grams. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, column 2 includes the children of mothers with secondary school education or less, column 3 includes the children of mothers with more than secondary school education, and column 4 includes the children of households that are classified as poorest, poorer and middle, column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies for mother's age at birth, mother fixed effects and child's birth year and birth province fixed effects and provincial GDP per capita at child's birth place, birth year fixed effects, and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table A1: Results from Falsification Analysis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	40 months before	30 months before	20 months before	10 months before	Actual Crisis	10 months after	20 months after	30 months after	40 months after
	Dependent Variable: Birth weight (grams)								
Fake Crisis x GDP	-0.007	-0.007	0.005	0.004	0.005**	0.003	0.001	-0.004	-0.004
	(0.005)	(0.005)	(0.004)	(0.002)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)
Observations	5,915	5,915	5,915	5,915	5,915	5,915	5,915	5,915	5,915
R^2	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.075

Notes: In all regressions, the dependent variable is the child's birth weight in grams. Regressions do not include preterm babies (born before 8 months of pregnancy). All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A2: Effect of Financial Crisis on Prenatal Care

	(1)	(2)	(3)	(4)	(5)
	All Children	Low Educated Mothers	High Educated Mothers	Poorer Households	Richer Households
	Dependent Variable: Had Prenatal Doctor Care				
2008 Crisis * GDP per capita	0.002	0.006	-0.001	-0.003	0.009*
	(0.006)	(0.010)	(0.006)	(0.011)	(0.005)
Observations	4,895	3,676	1,219	3,313	1,582
R^2	0.097	0.112	0.109	0.111	0.103

Notes: In all regressions, the dependent variable is an indicator for the mother's prenatal care utilization during pregnancy. Regressions do not include preterm babies (born before 8 months of pregnancy). Column 1 includes all children, Column 2 includes the children of mothers with secondary school education or less, Column 3 includes the children of mothers with more than secondary school education, Column 4 includes the children of households that are classified as poorest, poorer, and middle, Column 5 includes the children of households that are classified as richer or richest. All regressions include controls for birth order, gender, dummies of mother's age at birth, mother's education, father's education, urban/rural residence, marital status, household wealth and child's province of birth fixed effects, provincial GDP per capita, birth year fixed effects and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. p<0.01, ** p<0.05, * p<0.1.

Table A3: Effect of Financial Crisis on Gender

	(1)	(2)
Dependent Variable: Number of Boys (Year x Month x Province)		
2008 Crisis * GDP	0.002	0.002
	(0.007)	(0.007)
Observations	3,602	3,594
R^2	0.191	0.191

Notes: Dependent variable is the number of boys by year by month by province. The first column controls for year and province of birth fixed effects; column 2 also adds controls for province averages for the mother's education, father's education, wealth, GDP per capita at the child's birthplace and urban/rural residence, and province-specific time trends. Standard errors that are clustered at the province of birth level (81) are in parentheses. *** p<0.01, ** p<0.05, * p<0.1