University of Connecticut

Department of Economics Working Paper Series

Parental Economic Shocks and Infant Health: The Effect of Import Competition in the U.S.

by

Patralekha Ukil
University of Connecticut

Working Paper 2019-18
September 2019

365 Fairfield Way, Unit 1063
Storrs, CT 06269-1063
Phone: (860) 486-3022
Fax: (860) 486-4463
http://www.econ.uconn.edu/

This working paper is indexed in RePEc, http://repec.org

Parental Economic Shocks and Infant Health: The Effect of Import Competition in the U.S.

Patralekha Ukil*

Much of the literature providing causal evidence of parental economic conditions on infant health has focused on the impact of positive economic or income shocks, as opposed to negative ones. The concept of loss aversion makes it clear that individuals react differently when facing potential losses compared to potential gains, and that losses tend to be twice as psychologically powerful as gains. Moreover, long-term and persistent negative shocks such as those arising through increasing import competition could have different effects on health compared to reasonably temporary shocks such as lay-offs, recessions or business cycle fluctuations. This paper examines the effect of parental or household economic shocks on infant health by exploiting the increasing import competition from China between 1990 and 2000 on U.S. local labor markets as a plausibly exogenous source of variation in economic conditions. It also utilizes additional variation stemming from parental age within the local labor markets, thereby controlling for local labor market trends and allowing the analysis of heterogeneous impacts. Results indicate that commuting zones in the U.S. which experienced increased import penetration over time also experienced an increased incidence of low birthweight and a decrease in average birthweight. Further analyses show that the above results are driven by relatively younger parents as opposed to older parents.

Keywords: Infant health; Birthweight; Parental Income; International Trade; Income Inequality; Import Competition; Manufacturing Decline

JEL Codes: F14, F16, F61, I14, J13

---

* Dept. of Economics, University of Connecticut, 365 Fairfield Way Unit 1063, Storrs CT 06269-1063 (email: patralekha.ukil@uconn.edu). I am grateful to Stephen L. Ross, Delia Furtado, Nishith Prakash, David Simon, Jorge Aguero, Kenneth Couch, Deepak Saraswat and seminar participants at the University of Connecticut and the Eastern Economic Association 2019 meeting for valuable comments. All errors and omissions are my own.

Introduction

The "fetal origins hypothesis"[1] (Barker, 1998) has been a particularly active area of research in epidemiology and economics alike. Even though it was initially developed as a theory on the effect of prenatal nutrition deprivation on adult health outcomes, subsequent research has documented that early life experiences matter not only for long-run health outcomes, but also for a whole range of other, non-health outcomes. In fact, every individual's initial endowment of health is a significant determinant of their future stock of health and labor market outcomes. Low birthweight has been shown to reduce educational attainment (Currie & Hyson, 1999; Case et al., 2005), negatively impact health outcomes as an adult (Behrman & Rosenzweig, 2004) and also labor market outcomes (Black et a., 2007; Currie & Hyson, 1999). In this context, parental economic conditions can have serious long-term consequences on children through the impact on birthweight and thus on infant health, but much of the literature providing causal evidence has focused on the impact of positive economic or income shocks, as opposed to negative ones.

Prospect theory (Kahneman & Tversky, 1979) suggests that individuals have a tendency to evaluate choice problems in terms of gains and losses. In fact, the concept of loss aversion makes it clear that people react differently when facing potential losses compared to potential gains, and studies suggest the losses tend to be twice as psychologically powerful as gains (Kahneman & Tversky, 1992). Thus, it is reasonable to expect that negative economic shocks could operate very differently from positive income shocks, through channels such as the anxiety and stress from navigating and managing such losses, etc. Also, negative shocks from reasonably temporary shocks such as lay-offs, recessions or business cycle fluctuations could have differential impacts compared to relatively more persistent and long-term negative shocks, such as those arising more increasing import competition. U.S local labor markets with import-competing industries have gone on to experience reduced wages and employment rates even 15 years after China's entry into the World Trade Organization (Autor et al., 2016).

This paper examines the impact of economic shocks faced by parents on infant health by exploiting the increasing import competition from China between 1990 and 2000 on U.S. local labor markets as a plausibly exogenous source of variation in economic conditions. In addition, as an

[1] Currie (2009) and Almond and Currie (2011) provide composite literature reviews on this hypothesis.

important contribution to the literature, this paper also exploits additional variation from parental age within local labor markets - thus allowing us to detect effects based on variation within the local labor markets, rather than across labor markets and also allowing to control for labor market trends. In fact, there is relatively scarce direct causal evidence of the effect of persistent shocks to employment which might have effects that go beyond income, such as increased household stress, and the resultant impact on infant health could be ambiguous.

Moreover, this paper also provides empirical evidence on the unexplored research question of the impact of long-term and persistent import competition from China on infant health in U.S local labor markets. Much of the related literature has been limited to labor market outcomes such as workers' wages, earnings and employment and even the research on the health effects of trade has focused on the affected workers' general and mental health outcomes (Lang et al., 2019; Adda & Fawaz, 2019). The impact of rising import competition on the infant health outcomes in these local labor markets is an indirect but an important impact because it relates to the effects on the next generation of U.S. workers.

Results indicate that a one-standard deviation increase in import penetration from China over 10 years in commuting zones within the United States led to almost a 0.20 percentage point increase in the incidence of low birthweight, and a reduction in the average birthweight by approximately 6 grams. Furthermore, when additional sources of variation stemming from the age of the father is exploited, the negative effect is larger for certain age-groups: for relatively younger parents, a one-standard deviation increase in Chinese import penetration led to approximately 0.3 percentage point increase in the incidence of low birthweight, and a reduction in average birthweight by almost 10 grams. This paper also analyzes several mechanisms which could be at play, and also checks to see if there are changes in the composition of births due to the increased import competition within the local labor markets. Scope of further research includes investigating the mechanism of increased maternal anxiety due to the worsening economic conditions from increased exposure to trade shocks, by exploiting data from the Behavioral Risk Factor Surveillance System of the CDC, which may allow us to examine whether residents in local labor markets facing increased import competition faced chronic health conditions, used different preventive services or in general show health-related risk behaviors – all in an effort to better understand the issue of economic anxiety stemming from increasing globalization and trade and the consequent manufacturing decline.

Existing Literature:

The analysis in this paper contributes to two branches of existing literature: the first one being on the impact of parental conditions (economic or otherwise) on health outcomes, and the second one on the impact of import competition from China on outcomes within the United States.

Several papers have examined the impact of cash transfers on different child outcomes. Cash transfers could be considered to increase parental income exogenously which could theoretically increase both investment on children as well as consumption within the family. Aizer et al. (2016) collect historical administrative data on the U.S. Mother's Pension Program (often considered an ancestor to modern welfare programs in the United states), and ask if the acceptance into the program impacted health outcomes which were observable on the WWII enlistment records or on the mortality risk (which was measured using age of death on death certificates). The authors find that being accepted increased longevity by 1.5 years on an average, and the impact was larger for the poorest families.

In a similar context, Hoynes, Miller, and Simon (2015) and Dahl and Lochner (2012) examine the impact of the U.S. Earned Income Tax Credit Program (EITC). Both papers exploit variation coming from a substantial increase in the generosity of the program in the mid-1990s. The first study finds a reduction in the incidence of low birth weight among mothers who benefited from the expansion while pregnant, while the second finds an increase in a range of cognitive test scores, which are larger for children from the most disadvantaged families. A possible mechanism contributing to these effects is the positive link between EITC and mother's health (Evans and Garthwaite, 2014).

Another group of papers investigate "near cash" programs which supply food and nutritional aid to families. Theoretically it could be argued that if the amount of an in-kind transfer is small compared to the household's budget for that particular item, then an in-kind transfer will have the same impact as cash. The studies of the U.S. Food Stamp program (or SNAP, the Supplemental Nutrition Assistance Program) by Almond, Hoynes, and Schazenbach (2011) and Hoynes, Schazenbach, and Almond (2016) respectively find that the rollout of SNAP led to an increase in birth weight, especially among the African American population, and that long-term rollout of the SNAP reduced the incidence of metabolic syndrome (obesity, high blood pressure, diabetes, etc.). Hoynes et al. (2011) examine the implementation of the WIC program (Supplemental Nutrition for Women, Infants, and Children). They exploit the rollout of the program across counties in the U.S., and find that it led to an increase in average birth weight and a decrease in the incidence of low birth weight.

In a related context, Rossin-Slater (2013) examines an opposite kind of a policy: the closures of clinics which provide WIC in the late 2000s in Texas. WIC closures led to reduced WIC participation, which in turn reduced the probability that a mother gained an acceptable amount of weight during pregnancy, and thereby reduced birth weight. Similarly, Meckel (2015) finds that increased crackdowns on WIC fraud led to small retailers exiting the program and reduced the mother's prenatal participation in the WIC program, leading to negative effects on birth outcomes.

A number of studies look into the broader impacts of economic circumstances on infant and child outcomes, concentrating on aggregate units. Favorable economic conditions may impact health not only through an increase in family and parental resources but also through an increase in employment and social resources. For example, an increase in employment could have either positive or negative impacts on children depending on the childcare options available to parents. A portion of the existing literature has looked at the rate of low birthweight infants at the state level to analyze how this aggregate is impacted by the state unemployment rates: Dehejia & Lleras-Muney (2004) find that higher unemployment rates are associated with improved health outcomes of infants. On the other hand, Page, Schaller & Simon (2019) look into the relationship between cyclical changes in aggregate local labor market opportunities and child health outcomes. In addition to using state unemployment rates, they also use the demand-induced changes in employment opportunities for mothers and fathers. They find very little empirical evidence that aggregate economic conditions correlate with child health, but they do find important patterns by gender: an improvement in women's employment opportunities are associated with worse child health while positive labor market conditions for males lead to positive effects. These results suggest that in addition to family income, maternal time is an important input to child health. Eisenberg et al. (2016) go beyond looking at the effects on health at birth and also examine an impact on children's mental health (using the Child Strength and Difficulties Questionnaire). The authors find that a one standard deviation increase in the state unemployment rate stemming from the Great Recession, has a negative impact on child's mental health and is associated with a 5.7% increase in the use of special education services for mental and emotional problems. In a non-US context, the studies by Loken, Mogstad, and Wiswall (2012) and Adhvaryu et al. (2016) study the oil boom in Norway and a cocoa price boom in Ghana, respectively. The authors find positive effects of good economic circumstances times on health outcomes, and the impacts were disproportionately larger for low-income households.

Several other researchers have exploited other arguably exogenous variations in income, which are not necessarily government programs. Lindo (2011) used the job loss of a husband in the past as a

temporary shock to household income, using data from the Panel Study of Income Dynamics, and finds that a husband's job loss in the past has a strong negative effect on infant health, reducing birth weight by about 4.5%. Carlson (2015) uses data from notices which were filed under the Worker Adjustment and Retraining Notification Act, aggregated at the county-month level, and finds a strong negative impact of anticipated job losses on birth weight. Schaller & Zerpa (2017) find that paternal job loss is harmful to children's physical and mental health, particularly for low-socioeconomic status (SES) families. They also find that maternal job loss does not have negative effects on child health. Mocan et. al. (2015) use skill-biased technology shocks as an instrument for mothers' earnings and find that an increase in weekly earnings has a small positive impact on birth weight, but not on those born to high-skill mothers.

With regard to the burgeoning literature on the impact of increase in the import competition from China on local labor markets within the United States, this paper also makes a significant contribution. In their seminal work, Autor et al. (2013) analyze the impact of increasing import competition from China and find that rising imports lead to higher unemployment, reduced labor force participation and reduced wages in local labor markets that have import-competing manufacturing industries. They also find an increase in transfer benefits payments for disability, unemployment, retirement and healthcare in labor markets more exposed to trade. In Autor et al. (2016), the results indicate that workers exposed to higher import competition experience increased job churning and lower lifetime earnings. The authors also find that at the national level, employment reduced in those industries more exposed to import competition, but the country did not experience offsetting employment gains in other industries. In a related context, Autor, Dorn & Hanson (2018) find that increased trade shocks reduce employment and earnings, increase the prevalence of idleness and also increase premature mortality among young males. They articulate that such shocks to male relative stature reduce marriage and fertility. They find that these shocks increase the share of unwed mothers and also the share of children residing in below-poverty, single parent households.

Thus, this paper is a significant contribution to the existing literature since it looks into the impact of such increasing trade shocks on infant health. It is interesting to investigate whether increasing import competition and the resultant manufacturing decline in a local labor market area has far-reaching impact on infant health, through channels such as changes in behavior, reduced income, increased stress and anxiety, etc., all stemming from the differential import exposure to the manufacturing industries that are based in the region. Globalization could potentially increase standards of living through channels such as lower product prices, and any short-term losses on workers through increasing import penetration could potentially dissipate over the longer term through

reallocation, but it is worth investigating whether the children of those workers are impacted through these shocks, through the impact on their weight at birth.

Empirical Methodology

This paper uses the increasing import competition from China on U.S. local labor markets, as an exogenous source of variation in parental or household income. The analysis follows the Autor, Dorn & Hanson (ADH) (2013) identification strategy where local labor markets (commuting zones) are treated as sub-economies which receive differential foreign trade shocks, based on local industry specialization.

The estimating equation for the initial group of results is as follows:

$$\Delta Y_{it} = \beta_0 + \beta_1 \Delta IPW_{it} + \beta_2 X_{it} + \Delta \varepsilon_{it}$$

Here, ΔY_{it} is the change in the outcome of interest (the main outcomes are birthweight in grams and the incidence of low birthweight along with several thresholds of birthweight used in the existing literature on infant health), in commuting zone i over the decade 1990 to 2000. The covariate of interest ΔIPW_{it} signifies the measure of Chinese import penetration in commuting zone i over the corresponding decade. X_{it} is a vector that includes a large number of demographic and labor market controls; and the common changes in any health outcomes across all local labor markets in captured by the constant in the equation. β_1 is the coefficient of interest.

The main regressor is a per-capita measure of the change in import exposure in the commuting zone i:

$$\Delta IPW_{it}{}^{USA} = \sum_j \frac{L_{ij}{}^{base}}{L_i{}^{base}} \cdot \frac{\Delta M_{jt}{}^{USA}}{L_j{}^{base}}$$

where $\frac{L_{ij}{}^{base}}{L_i{}^{base}}$ stands for the share of commuting zone i's labor force that is employed in industry j in the base year, and $\frac{\Delta M_{jt}{}^{USA}}{L_j{}^{base}}$ stands for the per-capita growth in Chinese imports to the United States in the corresponding industry j. The above variable thus provides a sense of the employment in different industries exposed to import competition from China, relative to the total employment in the geographic area. It also provides a sense of the magnitude of the trade shock, relative to the employment in the region.

It is a reasonable concern that U.S imports from China could be correlated with industry import demand shocks from within the U.S. If so, the OLS estimate could be biased and understate the true impact of increased imports from China, since both the employment within the U.S and Chinese imports might be correlated with some unobservable shocks to product demand in the U.S. In order to identify the causal impact of increasing Chinese import exposure on manufacturing employment in the U.S. it is important to account for this potential endogeneity of U.S trade exposure.

Thus, following the methodology provided in Autor et al. (2013), I instrument for the growth in Chinese imports to the U.S by using the contemporaneous growth of Chinese imports in other high-income, developed countries. In essence, I capture a supply shock from China and not a demand shock from the U.S.[2]

The instrument is as follows:

$$\Delta IPW_{it}{}^{HIC} = \sum_j \frac{L_{ij}{}^{lagged}}{L_i{}^{lagged}} \cdot \frac{\Delta M_{jt}{}^{HIC}}{L_j{}^{lagged}}$$

Here, I use lagged (or pre-1990) employment data in order to create the instrument, so as to control for the confounding issues stemming from anticipated trade with China.

For the second group of results, I go beyond the standard Autor et. al (2013) methodology and also exploit an additional source of variation: I exploit the parental age-group, more specifically the age-group of fathers, because it is quite reasonable to expect that trade shocks from China could differ within and across commuting zones by the age distribution of workers, which by itself would be based on the age distribution of workers employed in the different industries which face differential trade shocks. Conducting this analysis using the age variation allows us to capture local labor market trends which the standard ADH model does not allow for.

The estimating equation now becomes:

$$Y_{iat} = \beta_0 + \beta_1 IPW_{iat} + \beta_2 X_{iat} + \theta_a + \delta_i + \gamma_t + \varepsilon_{iat}$$

Here, Y_{iat} is the outcome of interest in commuting zone i, parental age-group a and year t.

[2] Demand shocks in these high-income countries could be partially correlated with demand shocks in the U.S., and thus it is important to state that this instrument reduces the endogeneity bias, but does not eliminate it completely. However, the results from the instrumental variable analysis will provide a lower bound for effects.

The covariate of interest IPW_{iat} once again signifies the magnitude of import penetration accruing to commuting zone i, parental age-group a and year t. X_{iat} include a large number of demographic and labor market controls; θ_a stands for parental age-group fixed effect, and δ_i stands for commuting zone fixed effects, and γ_t stands for year fixed effects.
Similarly, the covariate of interest now is as follows:

$$IPW_{iat}{}^{USA} = \sum_j \frac{L_{iaj}{}^{base}}{L_{ai}{}^{base}} \cdot \frac{M_{jt}{}^{USA}}{L_{aj}{}^{base}}$$

where M_{jt} stands for the trade shock accruing to industry j in year t in the United States; and i stands for commuting zone and a for the parental age-group.

The instrument correspondingly is:

$$IPW_{iat}{}^{HIC} = \sum_j \frac{L_{iaj}{}^{lagged}}{L_{ai}{}^{lagged}} \cdot \frac{M_{jt}{}^{HIC}}{L_{aj}{}^{lagged}}$$

Data

The main birth weight data come from the U.S Vital Statistics Natality Data, from the National Center for Health Statistics. This dataset contains demographic and health data for births occurring during a calendar year. The microdata is based on the information abstracted from all birth certificates filed in the Vital Statistics offices in the United States. The dataset provides me with health data on a range of infant health outcomes such as birthweight, gestation, prenatal care, the Apgar score, etc. I also get access to several demographic variables such as the age, race, marital status and the educational attainment of the mothers, in addition to information on the geographic area. This dataset also provides information about the mother's use of prenatal care and her smoking and drinking behavior.

I use birth certificate data for births that occurred between 1990 and 2000. The Vital Statistics data is available on a yearly basis and for the purpose of the analysis conducted in this paper, I collapse the

data at the geographic level of analysis which is the commuting zone. The birth certificate data report the mother's state and county of residence which are then linked to 1990-level commuting zones following the mapping methodology provided in Dorn (2009). For the main results in my analysis I look at average outcomes at the commuting zone level for 1990 and 2000 respectively[3].

In my analysis, I first show results for the full sample consisting of both married and unmarried mothers, and then the sample is restricted to only married women to see if the results differ for them. In all of my analyses, I remove any births to parents aged below 16. The birthweight of infants (provided in grams) is used as a measure of infant health following the health economics literature. Further measures of infant health are indicator variables which take the value of one if the infant is born with a weight below 2500 grams, 2000 grams and 1500 grams. I also construct dummy variables for smoking and drinking behavior which take the value of one if the mother reported smoking or consuming alcohol during the duration of the pregnancy.

The trade data come from the United Nations Comtrade Database. Data on US imports are available at the six-digit Harmonized System (HS) product level which are mapped to comparable industry codes following the mapping methodology provided in Dorn (2009). The initial analysis without any additional variation from parental age follow the Autor, Dorn & Hanson (2013) data, where the employment data come from the Census County Business Patterns, an establishment survey. For the analysis utilizing additional parental age variation, I construct both the explanatory variable and the instrumental variable at the commuting zone levels, using employment data from the Census IPUMS which provides detailed data on the U.S population with the key demographic variables that are required.

[3] I have also conducted additional analysis where I aggregate outcomes at the CZ-level for each calendar year, and at a five-year variation as well.

Summary Statistics:

Table 1 below shows that summary statistics:

Variable	Mean (Std. Dev)
Average birthweight (in grams)	3329.75
	(64.28)
Incidence of low birthweight (below 2500gm)	0.074
	(0.015)
Incidence of very-low birthweight (at or below	0.014
1500gm)	(0.004)
Gestation of infants (in weeks)	39.37
	(1.189)
Preterm birth	0.11
	(0.021)
Diabetes in infant	0.026
	(0.011)
Anemia in infant	0.0013
	(0.003)
Hospital birth	0.989
	(0.014)
Plural birth	0.027
	(0.006)
Infant is male	0.511
	(0.007)
Total prenatal visits made	11.378
	(0.906)
Mother used tobacco during pregnancy	0.163
	(0.068)
Mother drank alcohol during pregnancy	0.031
	(0.098)
Mother is married	0.695
	(0.079)
Mother's schooling (in years)	12.834
	(0.602)

Mother made at least one prenatal visit	0.986
	(0.0127)
Mother is black	0.162
	(0.144)
Mother is Hispanic in origin	0.124
	(0.172)
Mother's age (in years)	26.58
	(1.032)
Father's age (in years)	29.68
	(1.031)

Results

Main results: 10-year change in import penetration (full sample of married & unmarried mothers)

Table 2 below shows the results of the first differenced regression for the change in import penetration in the commuting zone over 10 years for the full sample of both married and unmarried mothers, and Table 3 shows the corresponding results from the IV regression.

Table 2: 10-year change in import penetration (full sample)

(OLS regression)

PANEL A			**PANEL B**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Impact on:	Average birthweight (in grams)	Incidence of low birthweight (below 2500 grams)	Incidence of very low birthweight (at or below 1500 grams)	Incidence of low birthweight (at or below 2000 grams)	Incidence of low birthweight (below 3000 grams)
Increase in import penetration	-3.752	0.00108*	0.000938***	0.00120***	0.00218
	(2.405)	(0.000640)	(0.000307)	(0.000427)	(0.00152)
Constant	-121.8	-0.00126	-0.0134	-0.00886	0.0541
	(76.82)	(0.0220)	(0.00824)	(0.0129)	(0.0402)
Observations	203	203	203	203	203
CZ-level controls	Y	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

Table 3: 10-year change in import penetration (full sample)

(IV regression)

PANEL A			**PANEL B**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Impact on:	birthweight (in grams)	Incidence of low birthweight (below 2500 grams)	Incidence of very low birthweight (at or below 1500 grams)	Incidence of low birthweight (at or below 2000 grams)	Incidence of low birthweight (below 3000 grams)
Increase in import penetration	-6.024*	0.00191**	0.000807*	0.00152***	0.00301
	(3.630)	(0.000868)	(0.000418)	(0.000565)	(0.00204)
Constant	-114.3	-0.00399	-0.0129*	-0.00991	0.0514
	(74.61)	(0.0213)	(0.00772)	(0.0123)	(0.0384)
Observations	203	203	203	203	203
CZ-level controls	Y	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

From the IV regression results, we find that over 10 years, a one-standard deviation increase in import penetration in commuting zone i leads to a decrease in the average birthweight by almost 6 grams, and approximately 0.20 percentage point increase in the incidence of low birthweight (below 2500 grams).

The first-stage regressions and the exclusion restriction results are shown in the appendix to this paper. The first-stage results show an F-stat of almost 90, and the exclusion restriction results do not show any significant relationship between the main outcome of interest and the instrumental variable used in this analysis.

Now, Table 4 below shows the corresponding results for the IV regression for restricted sample of married mothers only.

Table 4: 10-year change in import penetration (married sample)

(IV regression)

PANEL A			**PANEL B**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
Impact on:	birthweight (in grams)	Incidence of low birthweight (below 2500 grams)	Incidence of very low birthweight (at or below 1500 grams)	Incidence of low birthweight (at or below 2000 grams)	Incidence of low birthweight (below 3000 grams)
Increase in import penetration	-5.629	0.00172**	0.000872*	0.00108*	0.00308
	(4.288)	(0.000863)	(0.000470)	(0.000578)	(0.00211)
Constant	-84.95	0.00992	-0.0141*	-0.00433	0.0507
	(77.87)	(0.0194)	(0.00732)	(0.0114)	(0.0400)
Observations	203	203	203	203	203
CZ-level controls	Y	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

We find overall that the negative impact is slightly lower for the sample of married women, than that for the full sample: a one-standard deviation increase in import penetration over 10 years leads to a decrease in average birthweight by approximately 6 grams but it is not statistically significant, and a 0.17 percentage point increase in the incidence of low birthweight on average. This suggests that being married may provide with a slight cushion when it comes to negative economic shocks from Chinese import competition and manufacturing decline.

Additional results: 10-year change in import penetration (exploiting age variation of fathers)

Now I change my model to include additional variation stemming from parental age. In effect, I add the age of the father in my model, since negative economic shocks from import competition

are quite likely to affect different age-groups of workers in different ways, depending on the age composition of workers in the affected industries.[4]

Table 5: 10-year change in import penetration (full sample)

(IV regression with additional age variation)

Impact on average birthweight (in grams)	**(1) Age below 26**	**(2) Ages 27 to 30**	**(3) Ages 31 to 35**	**(4) Age above 36**
Increase in import penetration	-10.48***	-7.277**	-4.786	-21.96*
	(2.915)	(3.501)	(3.445)	(12.63)
Observations	406	406	406	406
R-squared	0.959	0.939	0.940	0.934
CZ FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
CZ-level controls	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

We find from Table 5 that the negative impacts are strongly negative for the two age-groups consisting of the youngest groups of parents: for the age-group with age below 26, a one-standard deviation increase in import penetration in the commuting zone leads to a decrease in average birthweight by approximately 10 grams. For the age-group of age between 27 and 30, we also find a decrease in average birthweight by around 7 grams.

Table 6 below shows the corresponding results for the incidence of low birthweight (below 2500 grams).

[4] It is worthwhile to check if there are any spillover effects on age groups and the corresponding results are shown in the appendix Table A.3. In order to inspect these effects, I use as the explanatory variable the overall increase in import penetration in the commuting zone instead of the age-specific penetration as used in Table 5. The results do not differ considerably.

Table 6: 10-year change in import penetration (full sample)

(IV regression with additional age variation)

Impact on the incidence of low birthweight (weight below 2500gm)	(1) Age below 26	(2) Ages 27 to 30	(3) Ages 31 to 35	(4) Age above 36
Increase in import penetration	0.000656	0.00287***	0.000718	0.00751
	(0.00120)	(0.000593)	(0.00161)	(0.0102)
Observations	406	406	406	406
R-squared	0.911	0.856	0.888	0.872
CZ FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
CZ-level controls	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

For the age-group of ages between 27 and 30, a one-standard deviation increase in import penetration in the commuting zone leads to almost 0.3 percentage point increase in the incidence of low birthweight.

Analyses of Possible Mechanisms

I now check to see if the increased import penetration from 1990 to 2000 led to any significant changes in maternal behavior which could explain the negative impact on average birthweight and the increased incidence of low birthweight. Using data available on maternal behavior from The Vital Statistics database, I try to see if there has occurred any significant reduction in prenatal visits made, or any increased use of tobacco or alcohol during pregnancy – all of which would theoretically lead to negative effects on infant health.

Table 7 below shows the results on variables that indicate changes in maternal behavior:

Table 7: Changes in maternal behavior (full sample)

VARIABLES	(1) prenatal visits during pregnancy	(2) tobacco use during pregnancy	(3) alcohol use during pregnancy
Increase in import penetration	-0.000726	-0.428**	0.00365
	(0.00188)	(0.187)	(0.0131)
Observations	203	203	203
CZ-level controls	Y	Y	Y
Maternal controls	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

From Table 7 we find that there is no conclusive evidence of any kind of changes in maternal behavior that could be leading to the negative impact on the birthweight of the infants. The decrease in the number of prenatal visits is not statistically significant, but I do find significant reduction in the usage of tobacco.

I now check to see if there have occurred any changes in the composition of births in the affected areas:

Table 8: Changes in composition of births in CZs (full sample)

VARIABLES	(1) (log) number of births in commuting zone	(2) Incidence of births to married mothers in commuting zone	(3) male/female live birth ratio commuting zone
Increase in import penetration	-0.0294	-0.00882*	0.00184
	(0.0221)	(0.00501)	(0.00149)
Observations	203	203	203
CZ-level controls	Y	Y	Y
Maternal controls	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

I find no significant changes in fertility or any significant decrease in the male to female live birth ratio in the commuting zones which is a proxy for infant mortality since male infants are more vulnerable in infancy. However, I do find a significant reduction in share of births to married mothers in the commuting zones.

I now investigate whether increasing labor supply by mothers could be driving my main results. Using census data from 1990 and 2000, I check to see if mothers likely to be married to men in my four age categories increase their labor supply due to the increase in the import penetration in the commuting zone. Once again, I find no significant changes in maternal labor supply, for any of the four different paternal age groups.

Table 9: Changes in female labor supply in CZs (by age group)

Impact on the incidence of female employment	**(1)** **Age below 26**	**(2)** **Ages 27 to 30**	**(3)** **Ages 31 to 35**	**(4)** **Age above 36**
Increase in import penetration	-0.00422	0.00337	-0.00705*	0.000820
	(0.00948)	(0.00306)	(0.00400)	(0.0117)
Observations	660	636	654	716
R-squared	0.656	0.770	0.628	0.534
CZ FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
CZ-level controls	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

Conclusion

Infant health is an important predictor of several adult outcomes such as health, education, income, wealth, etc., and parental economic conditions may have serious long-term consequences on children through the impact on birthweight, and thus on infant health. This paper examines the impact of economic shocks faced by parents on infant health by exploiting the increasing import competition from China between 1990 and 2000 on U.S. local labor markets as a plausibly exogenous source of variation in economic conditions. Results indicate that a one-standard deviation increase in import penetration from China over 10 years in commuting zones within the United States led to almost a 0.20 percentage point increase in the incidence of low birthweight, and a reduction in the average birthweight by approximately 6 grams. When restricting the sample to only married women, the magnitude of the negative effect reduces indicating that marriage could act as a cushion against negative shocks from import competition, but results for low birthweight still remain statistically significant. Furthermore, when additional sources of variation stemming from the age of the father is exploited, the negative effect is larger for certain age-groups: for relatively younger parents, a one-standard deviation increase in Chinese import penetration led to approximately 0.3 percentage point increase in the incidence of low birthweight, and a reduction in average birthweight by almost 10 grams.

Using the data available, this paper also analyzes several mechanisms which could be at play, and also checks to see if there are changes in the composition of births due to the increased import competition within the local labor markets. Results find no evidence of any compositional changes within the commuting zones except a reduction in the share of married mothers giving birth, nor of any negative changes in maternal behavior which could adversely affect infant health. These results are suggestive that trade shocks in local labor markets within the United States have

created conditions which may have led to negative effects on birthweight through increased economic anxiety, maternal stress, etc.

Scope of further research includes testing the mechanism of increased maternal anxiety following worsening economic conditions due to increased exposure to trade shocks, by exploiting data from the Behavioral Risk Factor Surveillance System of the CDC, which may allow us to examine in further detail whether residents in local labor markets facing increased import competition faced chronic health conditions, used different preventive services or in general showed health-related risk behaviors – all in an effort to better understand the issue of economic anxiety stemming from increasing globalization and trade and the consequent manufacturing decline.

Appendix

Table A.1: First-stage regression

Increase in import penetration (in USA)	(1)
Increase in import penetration (in HICs)	1.020***
	(0.113)
	-2.179
	(1.349)
Observations	203
T stat	9.05
F stat	81.9025
Observations	203
R-squared	0.703
CZ-level controls	Yes

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: CZ-level controls are for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

Table A.2: Exclusion restriction (impact on birthweight)

Impact on:	(1) birthweight (in grams)
Increase in import penetration (in HICs)	-2.665
	(3.129)
Constant	3,840***
	(1,029)
Observations	203
R-squared	0.292
CZ controls	Y
maternal controls	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: CZ-level controls are for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

Table A.3: Analyzing spillover effects

Impact on average birthweight (in grams)	(1) Age below 26	(2) Ages 27 to 30	(3) Ages 31 to 35	(4) Age above 36
Increase in import penetration	-6.252***	-10.48***	-4.559	-5.599
(overall sample)	(1.797)	(3.622)	(3.224)	(3.885)
Observations	406	406	406	406
R-squared	0.960	0.941	0.940	0.935
CZ FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
CZ-level controls	Y	Y	Y	Y
Maternal controls	Y	Y	Y	Y

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: All columns have CZ-level controls for unemployment, racial composition, fertility, government benefits, and income levels. Standard errors are clustered at the commuting zone level.

References

Adda, J., & Fawaz, Y. (2017). *The health toll of import competition*. mimeo, Bocconi University.

Adhvaryu, A., Bharadwaj, P., Fenske, J., Nyshadham, A., & Stanley, R. (2016). Dust and death: evidence from the West African Harmattan. *Centre for the Study of African Economies, University of Oxford working paper*.

Aizer, A., Eli, S., Ferrie, J., & Lleras-Muney, A. (2016). The long-run impact of cash transfers to poor families. *American Economic Review*, *106*(4), 935-71.

Almond, D., & Currie, J. (2011). Killing me softly: The fetal origins hypothesis. *Journal of economic perspectives*, *25*(3), 153-72.

Almond, D., Hoynes, H. W., & Schanzenbach, D. W. (2011). Inside the war on poverty: The impact of food stamps on birth outcomes. *The review of economics and statistics*, *93*(2), 387-403.

Autor, D., Dorn, D., & Hanson, G. (2018). When work disappears: Manufacturing decline and the falling marriage-market value of young men. *American Economic Review: Insights*.

Autor, D. H., Dorn, D., & Hanson, G. H. (2016). The china shock: Learning from labor-market adjustment to large changes in trade. *Annual Review of Economics*, *8*, 205-240.

Autor, D. H., Dorn, D., & Hanson, G. H. (2015). Untangling trade and technology: Evidence from local labour markets. *The Economic Journal*, *125*(584), 621-646.

Autor, D., Dorn, D., & Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, *103*(6), 2121-68.

Barker, D.J.P. (1998) In Utero Programming of Chronic Disease. *Clinical Science*, 95(2): 115 – 28.
Behrman, J. R., & Rosenzweig, M. R. (2004). Returns to birthweight. *Review of Economics and statistics*, *86*(2), 586-601.

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2007). From the cradle to the labor market? The effect of birth weight on adult outcomes. *The Quarterly Journal of Economics*, *122*(1), 409-439.

Carlson, K. (2015). Fear itself: The effects of distressing economic news on birth outcomes. *Journal of health economics*, *41*, 117-132.

Currie, J. (2011). Inequality at birth: Some causes and consequences. *American Economic Review*, *101*(3), 1-22.

Currie, J. (2009). Healthy, wealthy, and wise: Is there a causal relationship between child health and human capital development?. *Journal of Economic Literature*, *47*(1), 87-122.

Currie, J., & Hyson, R. (1999). Is the impact of health shocks cushioned by socioeconomic status? The case of low birthweight. *American Economic Review*, *89*(2), 245-250.

Dahl, G. B., & Lochner, L. (2012). The impact of family income on child achievement: Evidence from the earned income tax credit. *American Economic Review*, *102*(5), 1927-56.

Dehejia, R., & Lleras-Muney, A. (2004). Booms, busts, and babies' health. *The Quarterly Journal of Economics*, *119*(3), 1091-1130.

Eisenberg, D., Golberstein, E., & Hunt, J. B. (2009). Mental health and academic success in college. *The BE Journal of Economic Analysis & Policy*, *9*(1).

Evans, W. N., & Garthwaite, C. L. (2014). Giving mom a break: The impact of higher EITC payments on maternal health. *American Economic Journal: Economic Policy*, *6*(2), 258-90.

Hoynes, H., Page, M., & Stevens, A. H. (2011). Can targeted transfers improve birth outcomes?: Evidence from the introduction of the WIC program. *Journal of Public Economics*, *95*(7-8), 813-827.

Hoynes, H., Miller, D., & Simon, D. (2015). Income, the earned income tax credit, and infant health. *American Economic Journal: Economic Policy*, *7*(1), 172-211.

Hoynes, H., Schanzenbach, D. W., & Almond, D. (2016). Long-run impacts of childhood access to the safety net. *American Economic Review*, *106*(4), 903-34.

Kahneman, D. & Tversky, A. (1979). "Prospect Theory: An Analysis of Decision under Risk". *Econometrica*. **47** (4): 263–291.

Kahneman, D. & Tversky, A. (1992). "Advances in prospect theory: Cumulative representation of uncertainty". *Journal of Risk and Uncertainty*. **5** (4): 297–323.

Lang, Matthew, T. Clay McManus, and Georg Schaur. "The effects of import competition on health in the local economy." *Health economics* 28.1 (2019): 44-56.

Lindo, J. M. (2011). Parental job loss and infant health. *Journal of Health Economics*, *30*(5), 869-879.

Løken, K. V., Mogstad, M., & Wiswall, M. (2012). What linear estimators miss: The effects of family income on child outcomes. *American Economic Journal: Applied Economics*, *4*(2), 1-35.

Meckel, K. (2015). Is the cure worse than the disease? Unintended consequences of fraud reduction in transfer programs.

Mocan, N., Raschke, C., & Unel, B. (2015). The impact of mothers' earnings on health inputs and infant health. *Economics & Human Biology*, *19*, 204-223.

Page, M., Schaller, J., & Simon, D. (2019). The effects of aggregate and gender-specific labor demand shocks on child health. *Journal of Human Resources*, *54*(1), 37-78.

Rossin-Slater, M. (2013). WIC in your neighborhood: New evidence on the impacts of geographic access to clinics. *Journal of Public Economics*, *102*, 51-69.

Schaller, J., & Zerpa, M. (2015). Short-run effects of parental job loss on child health. *American Journal of Health Economics*, (Just Accepted), 1-56.

Steven Ruggles, Sarah Flood, Ronald Goeken, Josiah Grover, Erin Meyer, Jose Pacas and Matthew Sobek. *IPUMS USA: Version 9.0* [dataset]. Minneapolis, MN: IPUMS, 2019.