Did Industrialization Promote Children's Health and Education?

Evidence from China

David I. Levine, Lingyun Nie, Bernard Yeung, W. Jean Yeung, and Yaohui Zhao[1]

Revised January, 2009

[1] David Levine: University of California, Berkeley; Levine@haas.berkeley.edu; Lingyun Nie: University of California, Berkeley; lingyun@berkeley.edu, Bernard Yeung: National University of Singapore and Stern, New York University; byeung@nus.edu.sg; W. Jean Yeung: National University of Singapore and New York University; jean.yeung@nyu.edu; Yaohui Zhao: CCER, Peking University; yhzhao@ccer.pku.edu.cn. We thank Yuhao Ge for his excellent research assistance. We acknowledge receiving partial research support from the William Davidson Institute of the University of Michigan.

Abstract

Did Industrialization Promote Children's Health and Education? Evidence from China

Industrialization is often equated with income and job growth, improved living conditions, and overall social development. Recent research casts doubt on a straightforward positive relationship between industrialization and development. Since economic reforms began in 1978, China has experienced unprecedented industrialization and income growth. It remains unclear, however, whether this rapid industrialization has improved social and environmental outcomes that are important for sustaining long-run economic development. We investigate this issue by examining the impact of industrialization on the health and education of children in China. Our approach is to analyze micro-level demographic and socioeconomic data from roughly 2,000 counties. The demographic data was collected during the 1990 and 2000 censuses while the socioeconomic indicators are from industrial surveys. We predict individual-level child outcomes using family characteristics, time-varying district characteristics (such as the proportion of economic activity that is based on manufacturing), year effects, and county fixed effects. Regional and time variations allow us to conduct instrumental variable estimations to examine the effects of the increase in the manufacturing sector on investments in children's health and education, while controlling for the presence of foreign ownership. We investigate how the results differ between urban and rural residences, and between the inland and coastal areas. Finally, we examine potential mediating channels such as fiscal revenue, GDP per capita, and health care investment.

Industrialization is often equated with income and job growth, improved living conditions, and possibly civil development. While the positive relationship between industrialization and national income growth is clear, the relationship between industrialization and the social, legal, and political aspects of development has been an area of controversy at least since Marx and Engels wrote about the issue over 150 years ago (Engels, 1845). These debates continue today with much research casting doubt on a straightforward positive relationship between industrialization and development. Examples include:

- In the first two generations of both British and American industrialization, adults lost almost an inch (over 2 centimeters) in height (Fogel, 1994, Steckel and Floud 1997). However, several other nations such as Sweden, Germany and Australia have industrialized without a dip in health measures (Steckel and Floud, 1997: 425).
- Easterly (1999) documents that different aspects of development do not always go hand in hand; nations with above average increases in per capita GDP from 1960 to 1990 enjoyed above-average reduction in infant mortality, but not above average increases in school enrollment.
- Persistent concerns remain about the potentially devastating impact of economic growth on the environment (Grossman and Krueger1995).

These results challenge any simplistic relationship between industrialization and the fundamental ingredients of development such as education and health. Even if industrialization, and thus high GDP, is indeed associated with better health and education in cross-sectional data, the causal direction is uncertain. Moreover, even if industrialization is positively related to education and health at a later stage of development, the relationship may be uncertain at an earlier stage where labor standards are low and environmental protection laws are lax. Since significant improvements in education and health are basic ingredients for sustainable economic and human capital growth, it is vital to understand the relationship between industrialization and these measures, especially at the initial stages of industrialization.

An important country to study these relationships is China. With its rapid growth and large population, China is today the world's second largest economy, and was the third largest exporting nation in 2005 (CIA World Fact February 2006). Its 2007 GDP, adjusted for purchasing power, is $7 trillion and the PPP-adjusted per capita GDP has grown from $300 in 1978 to $7,660 in 2007 (est.) (World Bank, Sept 2007). The industrialization process in China is driven largely by significant increases in the value of the output from manufacturing industries, which are concentrated in the coastal areas, particularly near Hong Kong and Taiwan.

However, China's impressive economic modernization and growth has been accompanied by certain trends that may have harmed children's health and education. These trends include the massive degradation of the environment (World Bank 2004), the rapid increase in income inequality driven by rapid growth in coastal regions and stagnation in many inland, rural and agricultural areas where most of the Chinese population still resides (Kanbur and Zhang 1999, Benjamin et al 2005; World Bank, 2007), and the scaling back of many social programs and the resulting increase in school and medical care fees after the initiation of economic reforms in the early 1980s (Blumenthal and Hsiao 2005). Recent news reports on product safety failures, environmental degradation, and break-downs in the provision of education and health care in poor areas are suggestive of some of the potential negative consequences of the rapid industrialization[2] although the Chinese government appears to have begun to take actions to address these issues. For example, increased attention is now being paid to environmental and product safety issues. School fees are being waived for rural areas and a subsidized medical insurance program is being implemented in both rural and urban areas. An important question is whether China will sacrifice its future in the pursuit of economic growth. Given China's integral role in the world economy today, the sustainability of its growth is of global significance.

China's size and the variation in the level of industrialization across its regions offer researchers an opportunity to conduct systematic large-scale empirical investigations based on micro-level regional data. To our knowledge, no systematic research has been conducted using Chinese data to date. In this paper, we examine the relationship between industrialization and children's well-being, as measured by education and child mortality. Combined with studies from other countries, these results will add to our knowledge on the relationship between industrialization and social development.

In the next section, we describe our theoretical thoughts and methods. We consider the various mechanisms through which industrialization affects children's education and health. We believe that it is useful to decompose the impact of industrialization into

[2] For example, on September 14, 2007, Reuters reported that "about 1 million Chinese children were born each year with congenital heart problems, cleft palates, nerve defects, limb abnormalities and other physical defects, director of China's National Centre for Maternity and Infant Health, Li Zhu, told the China Daily;"... " about a third of the babies born with such problems died shortly after birth, the paper said, citing experts;"… a "(World) Bank study said about 460,000 Chinese died prematurely each year from water and air pollution and about 300,000 more died from indoor toxins."

an aggregate community effect, captured by the proportion of a community's workforce employed in the manufacturing sector, and a household-specific effect, manifested in whether a member of a household worked in manufacturing. To this end, we use data from multiple sources, including aggregated community-level data, household-level census data, and industrial survey data in our empirical analyses. In the third section, we describe our data and measures. We then report our estimates of these relations in the fourth section based on county-level and household-level data. We find that industrialization is positively associated with the level of children's education at the level of the community. Specifically, high school enrolment increases as more individuals in a community work in manufacturing jobs. Interestingly, the household-specific effect of industrialization – captured by the probability that a household's adult male holds a manufacturing job in areas where high school enrolment has risen – is negative and statistically significant in coastal provinces' rural areas. In the inland provinces, the effect is positive and statistically significant in the cities. We speculate that these patterns suggest a positive income effect on school enrolment, as well as a negative substitution effect that influences children to forego high school education for gainful employment. This substitution effect is strongest in coastal provinces' rural areas while the income effect manifests itself in cities in inland provinces.

We also find that industrialization reduces child mortality, although this cannot be attributed to higher local government revenues. Households whose male heads work in manufacturing have lower child mortality in the inland provinces' rural areas; this effect however is insignificant in other regions. It is worth noting that this relationship is found in 1990 and 2000. These results suggest a possible positive household–specific income effect on health in poorer locations. The data also hint at the co-existence of an income effect that reduces child mortality with a pollution effect that raises child mortality, especially in cities where the population density is higher and people live nearer factories. We conclude in Section V with suggestions for future research.

Methodological Consideration

Conceptually, industrialization can be argued to either improve or deprove child mortality and educational attainment, and it is possible that these relationships are affected by various moderators. Industrialization generates jobs in the manufacturing sector, which, at the initial stages of development, typically pay better than jobs in the agricultural sector. Industrialization also generates more income for the community, including increasing tax revenues, which local governments may or may not choose to use to promote children's educational enrollment and health. To the extent that industrialization may raise income inequality (Yao 1997), it may also have non-uniform effects on the education and health of children across income classes, with an uncertain average effect.

The Community-Level Effects of Industrialization on Children

Manufacturing growth can contribute to community-wide income growth and government tax revenues. Higher tax revenues allow a community to invest more in education and public infrastructure, which can lead to cleaner water and better and more health care facilities and schools. Industrialization may also indirectly affect school enrolment by increasing school accessibility through, among other means, lower travel costs and higher clinic density (Duflo 2001).

In addition, children's health and schooling can also improve due to higher expected returns on human capital development: to the extent that industrialization raises the expected returns on investing in education and health, investments in these two domains will increase.

It is also possible that industrialization is associated with a shift to a more "modern" outlook and that families who live in "modern" communities are more likely to perceive education as valuable (Inkeles and Smith, 1974). (See, for example, Akerlof and Kranton (2002) for an economic approach to the social construction of identity.) Likewise, families with a "modern" identity may be more likely to seek more "modern" sanitary conditions, like clean running tap water.

However, industrialization can also have the opposite impact. At the beginning of industrialization, communities may be enticed to divert public funds from education and health purposes to invest in infrastructure that facilitates manufacturing growth more immediately. The recent closure of some state-owned enterprises in China, which coincided with its industrialization, led to a reduction in accessible health services and the number of schools. In addition, able individuals may choose to pursue better-paying manufacturing jobs rather than continue their education, or take up teaching or nursing jobs (xx). These changes may result in lower-quality schools and health services, with harmful consequences for children's education and health.

Another way that manufacturing can negatively affect children's well-being is by degrading the environment, e.g., increased emissions of harmful pollutants, which are particularly damaging to the health of the young (Romieu and others, 2002). Crowded dwellings around factories imply that person-to-person and water-borne pathogens are more easily transmitted. Given industrialization's close association with urbanization, the former may lead to more children being exposed to pollution from automobiles and factories, which again has negative effects on their health. According to a World Bank report (2004), 20 of the world's 30 most polluted cities are in China, largely due to the high use of coal and increased motorization.

More generally, the World Bank stated in a news release on July 11, 2007 that the combined health and non-health cost of outdoor air and water pollution for China's economy came to around $US100 billion a year (or about 5.8% of the country's GDP). Air pollution, especially in large cities, has been found to lead to a higher incidence of lung diseases, including cancer and respiratory system problems, and therefore higher levels of work and school absenteeism. Water pollution is also associated with growing levels of cancer and diarrhea, particularly in children under 5.

The Effects of Household-level Manufacturing Employment on Children

At the household level, although holding a manufacturing job may increase household income, the effect on child'school enrollment and mortality is uncertain. Higher incomes can improve housing and sanitation conditions as well as improve access to health care and nutrition for both mothers and children (Fogel 1994) which may results in better general public health and a reduced child mortality rate. Higher income can enable families to better feed, cloth, and educate children as well. It can also allow families to purchase household appliances or to outsource household chores, thus freeing up children to attend schools. Given that manufacturing jobs pay better than farming jobs, parents may have an incentive to keep children in school and away from farm work or household chores, because they see education as a better long-term investment. Simply put, holding a manufacturing job, and thus having exposure to higher income classes, raises the perceived value of education for parents' (Inkeles and Smith, 1974). This results in greater investment in children's education and a more urban life style, in the form of improved housing conditions such as running water and flush-toilets.

However, the opposite can also happen. When adults are drawn to manufacturing jobs, children, especially older girls, may be left at home to care for the very young or the elderly, or to attend to family farms. Youths may also leave school to obtain manufacturing jobs, which provides an immediate income gain for their families. In terms of children's health, workers who are directly exposed to pollution may give birth to children with health problems who may not survive or suffer from long term illnesses. In addition, children may suffer poor health because of overcrowding or pollution.

Uncovering the relationship between industrialization and children education and mortality

All of these conflicting effects seem to apply in China. While the mass media contains many anecdotes that illustrate the various issues discussed above, systematic evidence has been absent. Disentangling the complex relationships between industrialization and key child outcomes is a daunting task because of several methodological difficulties that are discussed below. To address these challenges, we attempt to use county-level and household-specific manufacturing employment data to examine the community-wide and household-specific effects of industrialization on children's education and mortality.

Endogeneity

The first challenge is endogeneity: manufacturing companies may be attracted to locations with better educated or healthier populations. This endogeneity would reverse the causal relationship posited above. A second challenge is unobserved heterogeneity: That is, other unobserved factors, such as the transport infrastructure or the quality of government, can affect both manufacturing employment and children's education and health, leading to a spurious relationship between industrialization and child outcomes.

Moderating Factors

The relationship between industrialization and children's education and child mortality may be moderated by various variables such as a community's past level of education and health, its culture, its proximity to external opportunities and information, and its tax status (e.g., special economic zones). While some of these factors can be controlled for in the analysis (e.g., the past level of education and health), it is difficult to do so for others because of various data limitations. We discuss these factors below and explain how we address them in the Results section.

Migrants

Migration should be taken into account because of its selective nature. Research has shown that migrants have distinct demographic and sociopsychological characteristics compared to non-migrants. Migrants may be more able individuals who leave their poorer communities to seek opportunities elsewhere, many of which are in manufacturing. They may also have a greater inclination to invest in their offspring, who may or may not be living with them. The discriminatory policies of some county/city governments also make it likely that, compared to non-migrants, migrants would have to pay more for their children's education and health care. In certain cases, migrants may not even be able to access these services.

Inland vs. Coastal areas

We expect the impact of industrialization to differ between the inland and coastal areas. China's coastal areas have undergone economic reforms and liberalization for a longer time, and thus possess greater economic opportunities and more exposure to foreign technology and managerial practices. Business operations might be more advanced in the coastal areas, and the type of manufacturing being carried on could differ from the inland areas. Combined with the fact that businesses in the coastal areas face greater competition, these factors explain why manufacturing jobs pay better in the coastal areas. At the same time, the greater intensity of competition and the sheer density in manufacturing could lead to greater environmental degradation in these areas.

At the community level, the exposure to modern ideas and the intensive competition may lead governments in the coastal areas to increase their investments in education, health, and environmental protection. However, the high level of competition among businesses may restrain the governments' ability to raise taxes to support such public investment or to enforce environmental regulations. At the household level, families in the coastal areas may be more inclined to invest in their offspring because of the greater availability of advanced economic opportunities. On the other hand, they may also be tempted by the short-term financial incentive of increased household income to stop their children's schooling so that they can work in manufacturing.

Another consideration is that there are public policy differences between the inland and coastal areas. In the past, manufacturing in China was moved inland for reasons of national security, or as part of the hubris of central planning. Moreover, direct governmental involvement in economic activity tends to be more prevalent in the inland than the coastal areas. These considerations also suggest that the inland and coastal areas may have different relationships between manufacturing and children's education and health. For example, a decrease in manufacturing in the inland provinces may reflect a correction of past policy errors, while an increase in manufacturing in the coastal provinces may reflect successful government policies in attracting new investment.

Urban vs. Rural Areas

Along the same lines, we need to examine whether the impact of industrialization differs between urban and rural areas. Besides the issues mentioned above (i.e. the level of development, the intensity of competition, the exposure to economic opportunities and modern ideas, and the level of direct governmental involvement in resource allocation), there are additional reasons to expect that the impact of industrialization on education and health attainment varies between urban and rural areas. First, the marginal value of manufacturing jobs may be greater in the poor rural areas than in the cities. Second, the polluting effects of manufacturing ought to be greater in cities where dwellings are more crowded. Third, rural homes are often linked by extended family ties and are still connected to farming. Children in these areas may therefore face greater demands on their time and energy outside school, if their parents are occupied with jobs with rigid work hours like the manufacturing jobs. They may, for example, need to attend to the family farm, or care for the aged and the young in the extended family network. These considerations suggest that the impact of manufacturing on school enrolment and health attainment may differ between urban and rural areas.

It is not possible to analyze how several other factors affect the phenomenon being studied here due to data limitation. These include the type of manufacturing, type of firm, and the quality of local government. Some industries have more deleterious environmental effects than others; for example, the paper and pulp industry is more polluting than the apparel industry[3]. In China, the composition of industry ownership can also affect the impact of industrialization. These factors form the basis of extensions to the model developed here.

Data and Methods

The above discussion indicates that it is imperative to control for endogeneity and to identify pertinent moderators and mediators when seeking to understand the relationship between industrialization and children's education and health. In this paper, we use data from more than 2,500 counties/cities in China and regress high school enrolment and child mortality on the presence of manufacturing employment at both community and household level. The data is from the micro censuses conducted in 1990 and 2000, and other sources, which are described below.

Our empirical steps are as follows. We first examine the extent to which a county's education and child mortality levels predict the arrival of new manufacturing employment. The purpose of this analysis is to examine the extent to which endogeneity is a

---

[3] Note that the type of industry attracted to a particular location can be endogenously affected by that region's level of education, productivity (which is related to health), and labor availability. At the same time, some industries make their location decisions purely on the availability of raw materials and the ease of their transportation, or the presence of complementary industries.

problem. Intuitively, if factories shift to areas with high education or low child mortality, we would be concerned that manufacturing growth is correlated with unobserved shocks to the levels of education or child mortality. On the other hand, if the relationship is weak, we may rule out endogeneity as a severe problem. Next, we check whether migrants are attracted to manufacturing industries. As described above, migrants often have different experiences compared to non-migrants in accessing education and health services. Not paying attention to this problem can lead to inaccurate interpretations.

After deciding on the best strategy to address the endogeneity and sample composition problem, we conduct regression analyses to estimate the relationship between the level of manufacturing employment and school enrolment and child mortality using child-level census data. To examine the community-level effects of industrialization, the share of employment in each county that is in manufacturing is used as an explanatory variable. We also examine three potential mediating channels through which industrialization has a community-wide effect. These are: a) the aggregate income effect, as measured by the county-level per capita GDP (in real dollar terms), b) the aggregate income effect, as measured by county government fiscal revenues, and c) the effect of public investment in infrastructure, as measured by the number of hospital beds per 1,000 persons per county.

To capture the household-specific effect of industrialization, we rely on census data that describes household members' employment and demographic characteristics. To address any possibly unobserved heterogeneity, we include many household-level as well as community-level characteristics in our analysis. We devise a specification (described below) that allows us to examine the impact of changes in manufacturing employment on changes in school enrolment and child mortality between the two censuses (1990 and 2000). We conduct separate analysis for inland and coastal counties and between rural and urban areas, as we expect different relationships in these areas, as discussed above.

Specification

The simplest linear model assumes an outcome for a child *i* in household *h* in county *c* in year *t* (Y_{ihct}) depends on child characteristics (x_{ihct}), household characteristics (X_{hct}), time-varying (Z_{ct}) and on unobserved fixed factors in the county (a_c). With a linear model, one can include fixed effects for each county to absorb any unobserved factors that affect child outcomes in all time periods.

1. $Y_{ihct} = B_1 x_{ihct} + B_2 X_{hct} + B_3 Z_{ct} + \mathbf{B_4\ a_c} + e_{ihct}$

This specification has several problems: a linear model is not appropriate for discrete outcomes such as enrolment and child mortality; unobserved factors may influence *trends* in a region, as well as average levels, and there is measurement error on county characteristics, such as our main variable $\%manufacturing_{ct,}$ the proportion of adults in county c at year t that is employed in the manufacturing sector. We use a specification that addresses all three of these problems.

If we were willing to forego household-level controls we could also estimate this equation at the county level (using dots to represent averages within counties and years):

2. $Y_{..ct} = B_1 x_{..ct} + B_2 X_{.ct} + B_3 Z_{ct} + B_4 a_c + e_{..ct}$

In a two-period panel an alternative way to eliminate the unobserved fixed effects would be to estimate this county-level equation in a first differences form:

3. $\Delta Y_{..ct} = B_1\ \Delta x_{ct} + B_2\ \Delta X_{.ct} + B_3\ \Delta Z_{ct} + \Delta e_{..ct}$

It is common in the first differences form to include baseline county characteristics and outcomes:

3'. $\Delta Y_{..ct} = B'_1\ \Delta x_{ct} + B'_2\ \Delta X_{.ct} + B'_3\ \Delta Z_{ct} + B'_5\ Z_{c0} + B'_6\ Y_{c0} + \Delta e'_{..ct}$

These additional controls are appropriate if there are omitted time-varying factors that affect trends in a county that are correlated with these baseline characteristics. In the fixed effects (levels) specification (1), baseline characteristics in the first differences equation 3' correspond to including baseline characteristics interacted with attributes from a later time period:

1'. $Y_{ihct} = B'_1\ x_{ihct} + B'_2\ X_{hct} + B'_3\ Z_{ct} + B'_4\ a_c + B'_5\ t_1 * Z_{c0} + B'_6\ t_1 * Y_{c0} + e_{ihct}$

That is, first differencing equation 1' would give us the more familiar equation 3', above.

Our outcomes are discrete (mortality and enrollment), so a logit specification is appropriate, instead of a linear model. Unfortunately, we cannot include a vector of fixed effects $\boldsymbol{a_c}$ in logit models. Chamberlin (1980) showed that the effects of unobserved county-level factors can be removed if the average value for the county-level variables of interest (for example, %manufacturing, $Z_{c\cdot}$) is included in the model. These controls absorb unobserved factors that affect counties in all time periods and which would otherwise bias our estimates. This additional modification leads to the following equation, which we estimate:

1''. $Y_{ihct} = F(B''_1\ x_{ihct} + B''_2\ X_{hct} + B''_3\ Z_{ct} + B''_5\ t_1 * Z_{c0} + B''_6\ t_1 * Y_{c0} + B_6''\ Z_{c\cdot} + e_{ihct})$,

where F(.) is the logit specification.

Sampling error on %manufacturing

The %manufacturing variable for each county is modified to account for sampling error, which typically biases coefficients towards zero. Fortunately, because we know the sample size in each county each year, we can compute the error variance for each observation. As shown by Sullivan (2001), a simple solution to sampling error that varies by observation is to multiply each observation by its reliability (that is, the variance of the signal / (variance of the signal + observation-specific noise)). This correction shrinks extreme observations that are measured with low precision towards the mean. We make this correction for the cross-sectional regressions below.

Our situation is slightly more complicated than that analyzed in Sullivan (2001) because in most analyses, we estimate within-county equations; that we, we ask whether counties with higher levels of manufacturing employment had better or worse child-related outcomes. In this context, it is appropriate not to shrink the outlying *levels* of observations, but the outlying *changes in these levels over time*. Thus, changes in $\%manufacturing_{ct}$ are compressed towards the national average value by multiplying the levels by the estimated reliability of the change in manufacturing intensity. The estimated reliability is [V(county changes in %mfg) - V(sampling error of $\%manufacturing_{ct}$)] / V(county changes in %mfg), where V(sampling error of $\%manufacturing_{ct}$) is the squared standard error of $\%manufacturing_{ct}$.[4] The standard error of $\%manufacturing_{ct}$, is, in turn, derived from the mean level of manufacturing employment and the sample size in each county for each year.

Data

We examine the effect of increased employment in the manufacturing sector on child mortality and school enrolment across about 2,500 Chinese regions (cities and counties) from 1990 to 2000[5]. Our main dataset is the 1% public use sample of the 1990 Census and the .1% sample of the 2000 Census. The data are at the individual level and can be aggregated to the household and county levels. In the census data, there are three types of households - Domestic, Collective, and Individual households. For the individual-level regression analyses, we exclude the Collective Households.[6]

We supplement these data with information from firm-level industrial surveys in the 1990s conducted by the Chinese National Bureau of Statistics. We also add data on county- and province-level characteristics from the China Data Center at the University of Michigan and the Chinese University of Hong Kong. Our strategy is to explain individual-level outcomes (child mortality and high school enrolment) by using family characteristics, time-varying district characteristics (such as %manufacturing, % urban, industry mix, and health clinic density), year effects, and county fixed effects. The key variables are: (i) child mortality, (ii) school enrolment for 16-17 year olds, and (iii) manufacturing presence.

---

[4] We appreciate assistance from Benn Eifert in deriving this extension of Sullivan, 2001.
[5] Our sample dropped ccounties with change in boundaries between 1990 and 200.
[6] We deleted the counties in which the number of working-age adults is less than 10 in the 2000 census data (19 counties) in our analysis. Results are similar after the deletion.

Child Mortality

The Chinese Census does not have a direct measure of infant or child mortality. To measure recent child mortality, we use household-level data on the total number of births and the total number of surviving children for women between the ages of 15 and 25. Our decision to include children born to women in this age range in our analyses is based on the following reasons. The non-survival of children by mothers below 15 years of age is likely to be due to factors such as severe physiological problems and immature parental care, which are not the main concern here (e.g., lack of adequate child care or pollution). Children born to women older than 25 are likely to be beyond their childhood at the time the census was conducted.

Our measure of child mortality per thousand births was 63 in 1982; it fell to 35 in 1990 and 16 in 2000. This decline in less than two decades represents a rapid improvement in public health. These rates are similar to the 1982 rates reported by UNICEF (61) and the 1990 rate reported by Bannister (2004; 37.7), who also uses the 1990 Census. We find a steeper decline than reported by UNICEF, who report 44.5 in 1990 and 39 in 2000.

School Enrollment

We focus on the enrolment of children at the high school age (16-17), since that is most relevant to the theoretical discussions above on the links between education and industrialization.

Manufacturing

Our measure of manufacturing presence come from the Censuses, and is represented by the percent of adults aged 18 to 60 in each county who worked in a manufacturing plant (following the industrial classification used in the 1990 Census). This variable had a mean value of 11.1% in 1982, rose slowly to 11.2% in 1990, and then declined to 9.9% in 2000. Note that these are simple averages. The country-wide weighted (by county population) averages are 15.41% and 13.03% in 1990 and 2000 respectively.

Our second measure of manufacturing employment is obtained from the Industrial Survey. This dataset is compiled from firm-level survey data collected by the Chinese National Bureau of Statistics. The Industrial Survey only measures about half as many manufacturing workers as the Census. Much of this gap was presumably due to its focus on measuring medium and large manufacturing establishments with sales greater than 5 million Yuan. At the county level, these two measures were correlated at 0.77 in 2000.

Household employment

From the Census data, we obtained information on the number of household members (mothers excluded) who were employed in the manufacturing industry, and whether any females in the household were manufacturing workers. As the latter variable is not significantly correlated with children's high school enrolment and child mortality (when household members' manufacturing employment is included), it is not include in our final models.

In summary, the key variables are measured in the following way:

- Industrialization:
  - Community level - Manufacturing share in a county is defined as the ratio of total workers aged 18-60 working in manufacturing to the total population aged 18-60.

    - Household level - If anyone in a household is employed in manufacturing, the household is coded as ‘1’. (Mothers are excluded.)
- Child mortality rate is calculated using the following formula: 1- (current number of surviving children / total number of births). As noted earlier, our sample includes children whose mothers are between the age of 15 and 25[7].
- Children’s school enrolment: this is coded as ‘1’ if a child is enrolled in a school. We focus on the enrolment of a child at the age of 16 and 17 (ages for grade 11 and 12 enrollment) for these analyses.

Mediating variables:

- Per capita real GDP (in yuan). We use real GDP per capita as an indicator of the income level in the community. The 1991 county level GDP per capita is obtained from the Chinese University of Hong Kong and the 2000 county level GDP per capita is from county and city level data from the University of Michigan’s China Data Center. The major problem with using this variable is there are many missing values at the county level.[8]
- Local fiscal revenue. This is measured as the natural log of the government taxes in constant yuan (the unit for local government revenue is 10,000 yuan).

---

[7] We are interested in measuring child mortality (survival past age 5) in the last decade. Although we possess Census data on children who were born and survived to the date on which the Census was conducted, we could not use that directly. For example, a mother aged 30 in 2000 might have had a child who died 12 years before the Census. Since this study examines the impact of industrialization from 1990-2000, we do not want to count children who died in 1988 as having died during the 1990s because of pollution and other related reasons. Thus, we chose the early age cutoff.

[8] In the original 1990 and 2000 county-level dataset, there is a substantial amount of missing data. Although we have supplemented these data with city-level county data for the 2000 variables, about 30% of the counties have data missing either in 1990 or 2000.

- Access to medical care. This is measured as the natural log of the number of hospital beds per 10,000 persons in the county

We include the following household-level control variables:

- Characteristics of the mother,[9] including her education, age and its square as well as dummy variables for whether the mother is younger than age 16 or older than 35;
- Characteristics of the child, including gender, age and an interaction term of the two;
- Characteristics of the male head of the household, including his age and its square, education, and a dummy variable indicating whether he was absent;
- Characteristics of the household, including family size, age composition, and the proportion of adults that are male.

Results

Summary statistics (county level data)

[Table 1 about here]

[9] In regressions related to education, we inferred the parent characteristics by the variables "relationship to head" and "gender of the individual". If a person is a son or daughter of a household head, we could identify his/her parent directly. If the child is a grandson or granddaughter of a household head, we identify their parents by averaging the characteristics of the son and daughter of the household head. We also impose a restriction on the age difference between the parent and the child, limiting it to a minimum of 15 years. This approach may lead to some inaccurate assignments; for example, some relatives or non-relatives may be treated as the child's parent. Hence, although we use the terms "father" and "mother" in the text, they actually refer to adults in the right age range in the household, which may possibly includes grandparents, uncles, aunts, etc.

The simple county averages in Table 1 show that the child mortality rate has declined from 0.035 in 1990 to 0.016 in 2000, while the school enrolment of 16-17 year-olds has increased from 35% to 46% over the same time period. The average share of employment taken up by manufacturing has decreased from 11.2% to 9.6%.

Where manufacturing goes and mediating channels

To examine the potential reverse causal relationship between industrialization and the focal dependent variables, we regress the change in manufacturing between 1990 and 2000 on the school enrolment of 16 to 17 year olds in 1990 and the child mortality rate in 1990. To control for initial conditions, we include adult education[10], child mortality, % urban[11], and also the share of manufacturing jobs in the county in the base year (1990). Furthermore, to capture policy-induced changes in the manufacturing sector, we include indicators of whether a county is located on the coast or in a special economic zone[12]. The regression analyses include provincial fixed effects and standard errors are clustered at the province level. The provincial fixed effects expunge the effects of time-invariant latent factors that attract manufacturing. The results are reported in Table II.

[Table II about here]

---

[10] This is measured by using the mean education level of adults aged 18-50 in a county. The education level is converted from the original categorical variables in the census.

[11] The "percent urban' variable is defined as the percentage of population in a county that has non-agricultural *hukou.*

[12] We follow Demerrer & Sachs' (2002) to construct the privileges policy index. Their original index is from 0 to 3 and is allocated at the provincial level. We read the law to identify the county level SEZ index. In the previous county-level regression, we use an un-weighted SEZ index. Here, we change the definition of the weighted SEZ index in this way:
SEZ index = weighted average of privileges = (#years for each privilege score in that county) / #years total, lagged 4 years.

We find that the change in the share of manufacturing is not associated with either baseline child mortality or the level of school enrolment of high-school age children. The effect of the level of adult education in 1990 on the change in the share of manufacturing, though statistically significant, is weak (with a coefficient of 0.01). These results suggest that the endogeneity issue is not severe. Note that the special economic zone dummy is not significant; thus, SEZ status is not likely to be a good instrument for the change in the share of manufacturing. However, the "coastal" dummy variable is significant, suggesting that coastal provinces experienced more growth in the percentage of their workers who worked in the manufacturing sector.

We next examine the relationship between the change in the share of manufacturing and three mediating channels: fiscal revenue, per capita GDP, and hospital beds per 1,000 (as a proxy for public investment in health service). We conduct a regression analysis by incorporating county fixed effects and adjust the standard errors for clustering at the county level. The results are reported in Table III. We find that the change in the share of manufacturing contributes significantly and positively to all three variables. It thus will be worthwhile to include these mediating channel variables in our target regressions in which we examine the relationship between manufacturing and children's education and mortality rate.

[Table III about here]

Finally, we investigate whether migration is related to manufacturing by examining correlations and conducting a regression analysis. Migrants cannot be directly identified from the 1990 and 2000 census data. This can only be done by examining whether

Census respondents reported having a local registration (*hukou*) in their current county.[13] We find that individuals who move to live near factories are not that different from their neighbors in the source location or at the destination (results not presented). That is, they are in their 20s, but not exceptionally highly or poorly educated, and the proportion of females is not particularly high either. The lack of statistically significant results, however, should not be used to refute the contention that manufacturing attracts migrants. A key problem is that migrants may not have been accurately identified in the census. The small proportion (2.3% in 1990) of migrants (as identified by these censuses) persuaded us to exclude migrants from our sample, as the data do not allow us to address this issue adequately. In addition, our results do not change when the migrants are dropped from our sample.

The possible presence of unidentified migrant workers in our sample will dampen the positive effect of manufacturing employment in raising school enrolment and reducing child mortality, as hidden migrant workers usually have poorer living environments and their children often do not obtain as much education as non-migrants' children.

School enrolment and manufacturing

We now turn to our target regression analysis. Table IV reports results from probit models predicting whether a child at the age of 16 to 17 is enrolled in school using the pooled county-level survey data for 1990 and 2000. The specification is reported and explained in Section II ("Specification") and in Equation 1. The independent variables that are designed to capture the general impact

[13] This is likely an under-estimate of total migration, as some people with local *hukou* have moved their local registration to the current county after migrating there. In 1990, 2.3% of the population reported *hukou* in other counties.

of manufacturing include the average share of employment held by the manufacturing sector at the county level in 1990 and 2000[14], the deviation of manufacturing's employment share from the 1990 and 2000 averages (coded as %manufacturing), the interaction of manufacturing's employment share in 1990 with a dummy variable indicating whether it is year 2000. We also include the interaction term between the 2000 year dummy and a county's school enrolment rate of children at 16 and 17 in 1990.

To capture differences between urban and rural regions, we include an urban dummy variable, indicating whether a county has more than 75% of the population with a non-agricultural *hukou*. We also include an interaction term of the urban dummy with the deviation of manufacturing's employment share from the average for 1990 and 2000. The interaction term allows the impact of the change in manufacturing's employment share on the change in the dependent variable to vary between urban and rural areas.

The other independent variables include the child's characteristics - gender, age (baseline category is age 17), an interaction term between the child's gender and age, and whether the year is 2000 (to capture the fixed effect of time). We also control for the education level and age of the father and the mother.

In model II, we add other independent variables. We first include a variable that indicates whether an adult male in the household holds a manufacturing job[15]. Next, we interact this variable with the year 2000 dummy variable and with the urban dwelling dummy. These two interaction terms cater for differences in the household-specific impact of manufacturing jobs between 1990 and 2000, and between urban and rural areas. Finally, in the third column of Table IV, we include the three mediating channel

[14] We correct %manufacturing as described in the earlier "*Sample Error*" section.

[15] We omit the dummy indicating whether the household's mother holds a manufacturing job because the variable is not statistically significant.

variables: the natural log of fiscal revenue, per capita GDP, and the number of hospital beds per 1,000 persons[16]. These regression models include county fixed effects and standard errors are clustered at the county level.

[Table IV about here]

The results indicate that an increase in the share of a county's employment taken up by manufacturing significantly raises the probability of children being enrolled in school at the ages of 16 and 17. Consider a county that doubles its manufacturing share of employment from the 1990 mean of nearly 10 percent to 20 percent. Such an increase is close to a 1 standard deviation increase over the decade. That change predicts an increase in enrolment of about 6.6 percentage points (that is, a 14% increase relative to the 2000 mean of 46%). Note that the effect is slightly less pronounced in cities, although the difference is not statistically significant.

Interestingly, the effect remains after we include the mediators (in the third column) – per capita GDP, per capita fiscal revenue, and number of hospital beds per 1000. Among them, only the rise in fiscal revenues is marginally significant. These results are noteworthy. First, they indicate that the positive impact of industrialization on education enrolment at the county level may be possibly related to the higher fiscal revenues brought about by industrialization, which could in turn raise education spending. Second, they suggest that the positive general impact of manufacturing on school enrolment may be due to a positive "return" effect; in other words, a higher expected return to investment in education due to industrialization entices more household-level investment in education.

---

[16] Note that when we merge data with the mediating channel data, the number of counties in the data set reduces from around 2,000 to 1,450 (need exact numbers here), causing the sample size to drop substantially. This is because the data for the channel variables in 2000 (from Michigan data center) have substantial missing values at the county level.

We now turn to the household-specific effect of manufacturing. The results in both columns II and III indicate that the employment of a household's male adult in manufacturing possibly lower the probability that a high-school age child will remain in school in rural areas; however, the effect is reversed in urban areas. This pattern of substitution and complementary effects appears to support the hypothesis that manufacturing in poorer areas takes high school age children out of school, but does the opposite in richer areas. The control variables behave as expected, so we omit the description here due to space constraints.

Our next investigation focuses on the differences between urban and rural settings. As indicated in Section II, we suspect that the relationship between industrialization and education and health may vary from coastal to inland areas. The negative household-specific effect in rural areas which turned positive in cities (albeit insignificant) also raises our curiosity. We therefore repeat the regressions in Table IV but partition the sample into those in inland and coastal areas[17]. The results are reported in Table V.

[Table V about here]

Interestingly, there is a positive community effect of manufacturing employment share on education enrolment (of children at the age of 16 and 17) in both locations seen in Table IV. However, the impact is stronger in coastal than in inland Provinces. As in Table IV, the positive effect is smaller in cities than rural areas; however, the difference is not statistically significant.

In terms of household-specific effects, columns 2 and 3 reveal that, in both 1990 and 2000, households with a male adult working in manufacturing are less likely to have high school age children in schools in rural areas in the coastal provinces. This effect

[17] We identify a county with a coastal border as a coastal county. This is done by eye-balling the GIS map of China.

disappears in cities, however. Columns 5 and 6 reveal that the effect is positive in inland cities in 1990 and weakened in 2000. In rural inland areas, the household specific effects of manufacturing do not significantly affect high school enrolment.

A male adult's job in manufacturing provides an income effect to keep children in school. Yet, the attraction of a job could divert children's time in school from other activities, ranging from helping out with household chores when parents are at work to actually taking up a job. The results suggest that the substitution effect dominates the income effect in rural areas in the coastal provinces, while the opposite is true in inland cities. In the former, wages are likely to be more attractive given the generally low family income in rural areas. This incentive, together with the demand for household chores to be performed, very likely keeps children of high school age away from school. In inland cities, while wages are also attractive, the demand of household chores is likely to be less, so that the income effect dominates.

The other interesting observation is that fiscal revenue's impact on education enrolment is positive and significant in the inland provinces. The impact is weaker and not significant in the coastal provinces. Hence, the gains in fiscal revenue are channeled towards education more in the inland provinces than in the coastal provinces. But the coefficient of manufacturing is not reduced as a result of adding this mediator; so, while higher fiscal revenue has a main effect, it does not mediate the effect of manufacturing.

Child mortality and manufacturing

In Table VI, we report results from logistic regressions predicting child mortality using pooled data for 1990 and 2000. The specifications follow those that we used for school enrollment (Tables IV and V). The controls include a dummy for gender, the mother's age and education level, household size, the proportion of adults in the household, and whether there is a male spouse in the family. The regressions' standard errors are clustered at the county level.

[Table VI about here]

We find that growth in a county's manufacturing employment share has no significant impact on child mortality (Table VI, col. 1).

In rural areas, if a household male member holds a manufacturing job, the household's child mortality rate is lower in both 1990 and 2000. The presence of a family member (defined to exclude the mother) employed in manufacturing industry decreases the predicted child mortality rate by about 0.4 percentage points. This decline of 4 deaths per thousand births is large relative to a 2000 mean of 16 deaths per thousand. This household specific effect suggests that an income effect exists: higher family income reduces child mortality. Unfortunately, we do not have household income data to allow us to test the hypothesis directly.

One may suspect that parents holding manufacturing jobs have better education and capabilities, and that these characteristics may lower the child mortality rate. We believe that is not the case because we have controlled for parents' education and age, and because we do not find strong selection into manufacturing jobs based on observable factors (the results are available on request).

We suspect that the lack of an impact of manufacturing employment share at the county level on child mortality may be because the community-level income effect (which reduces child mortality) offsets the pollution effect (which may increase child mortality). In column 3, we control for county-level per capita income and investment in health services (number of hospital beds).

Per capita GDP has a marginally significant negative impact on child mortality and the log of number of hospital beds per 10,000 is associated positively (surprisingly) with child mortality.

The lack of any statistically significant effect from the average level of employment taken up by manufacturing in a county, after conditioning on county output per capita, may be a result of our inability to incorporate adequate information about mediating factors such as industry type, location, quality of government, etc. Unfortunately, such data are not available for our analysis.

In analyses that are not shown, we used the World Bank's (2005) procedure to estimate emissions based on the shares of employees in each industry and the pollution per employee that the U.S. manufacturing sector emitted in the early 1990s. This highly imperfect proxy for pollution did not show that counties with rising emissions also had higher rates of child mortality (holding constant manufacturing employment; results available on request). We suspect that the failure to find such an effect has more to do with the challenges of estimating emissions than with the lack of importance of pollution.

Comparing Inland and Coastal areas

We repeat the regressions in Table VI but partition the sample into inland and coastal areas. The results are reported in Table VII. We find that the negative impact of growth in manufacturing on child mortality can be found in the coastal provinces only, while in the inland provinces, the level of manufacturing has a negative impact. Furthermore, the separate analyses reveal that the negative impact of having a male household member working in the manufacturing sector on children mortality is found only in rural areas in the inland provinces. This makes sense because any household-specific income effect that reduces child mortality will likely take place in areas where the income impact is the greatest – that is, in the poorest areas, which are in the rural inland areas.

Conclusions

Our results suggest that manufacturing has a generally positive effect on educational enrolment. The positive effect, however, does not stem from manufacturing's impact on increasing community-level investment on education. Indeed, fiscal revenues and per capita GDP do not raise education enrolment. The effect may be channeled through a higher expected return on investment in children's education.

Manufacturing also has a household-specific effect on education enrolment, in that households with members holding manufacturing jobs are *less* likely to keep their youth in high school in the rural areas in coastal provinces but *more* likely in cities in inland provinces. We suspect that the pattern represents a positive income effect on school enrolment; however, as a manufacturing job pays more, a negative substitution effect takes over. The negative household-specific effect can stem from unmet demand for family labor while adult family members are working in the factories. It can also stem from the judgment that short-term income gains from employment are more attractive than long-term investments in children's education.

We also examine the relationship between manufacturing and child mortality and partition the effects into an income effect (positive) and a pollution effect (negative). We find that the share of manufacturing employment in the community has a significant negative effect on the child mortality rate, as does higher per capita income. The household-specific effect seems to significantly dampen child mortality only in rural areas in inland provinces.

These results suggest that while manufacturing in China does raise education and reduce child mortality, there appear to be a cause for some concerns. First, the lack of a community-wide income effect on raising children's education enrolment via higher fiscal revenue is worrisome. The observation suggests that many counties may not have channeled their economic gains from manufacturing towards schooling and health services.

These results, together with the finding that manufacturing jobs keep some high school age children out of schools in coastal areas, suggest that while manufacturing has a positive impact on educational enrolment and child mortality, there are pockets of concerns that validate the suspicion that China is borrowing from the future in driving its current industrialization.

References

Acemoglu, Daron, Simon Johnson, James Robinson, (2004) “Institutions as the fundamental cause of long-run growth,” NBER wp 10481, forthcoming, the Handbook of Economic Growth

Aitken, Brian, Ann Harrison, and Robert E. Lipsey. 1996. "Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States," *Journal of International Economics*, Vol. 40, pp. 345-371.

Benjamin, Dwayne, Loren Brandt, John Giles, and Sangui Wang, 2005, “Income Inequality During China’s Economic Transition,” paper prepared for the forthcoming volume, *China’s Economic Transition: Origins, Mechanisms, and Consequences*, edited by Loren Brandt and Thomas Rawski.

Behrman, Jere, Piyali Sengupta, and Petra Todd, “Progressing through PROGRESA: An Impact Assessment of a School Subsidy Experiment in Mexico,” manuscript under submission.

Blanchard, Olivier Jean, and Lawrence F. Katz. 1992. *Regional Evolutions*, Brookings Papers on Economic Activity, no. 1: 1–75.

Blumenthal D, Hsiao W. “Privatization and its discontents—the evolving Chinese health care system”. *N Engl J Med*. 2005;353 (11):1165–1170.

Cannon, Terry (ed.). 2000. China's Economic Growth : The Impact on Regions, Migration and the Environment, Palgrave Macmillan.

Cai, Hongbin, Hanming Fang, Lixin Colin Xu. 2005. "Eat, Drink, Firm, Government: An Investigation of Corruption from Entertainment and Travel Costs of Chinese Firms," NBER working paper 11592.

Caves, Richard E. 1996. "Multinational Enterprise and Economic Analysis," (2nd edition, 1982 1st edition), Cambridge University Press, New York, US

Chay, Kenneth Y. and Michael Greenstone. 2003. “The Impact of Air Pollution on Infant Mortality: Evidence From Geographic Variation In Pollution Shocks Induced By A Recession,” *Quarterly Journal of Economics,* August.

Connor, Tim. 2001. *Nike’s Labor Practices in the Three Years since CEO Phil Knight’s Speech to the National Press Club*. Global Exchange, San Francisco, May. [http://www.globalexchange.org/economy/corporations/nike/NikeReport.pdf].

Deaton, Angus. 2004. “Health in an Age of Globalization,” Cambridge MA, NBER Working Paper 10669. [http://papers.nber.org/papers/W10669]

Demurger, Sylvie, Jeffrey D. Sachs, Wing Thye Woo, Shu Ming Bao, Gene Hsin, Chang, Andrew D. Mellinger. 2002. "Geography, Economic Policy and Regional Development in China," Harvard Institute of Economic Research Paper No. 1950, March.

Duflo, Esther. 2001. “Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment,” *American Economic Review*, 91(4), September, 795–813.

Easterly, William. 1999. “Life during Growth: International Evidence on Quality of Life and Per Capita Income,” World Bank WPS 2110, May.

Economy, Elizabeth C.. 2004. *The River Runs Black: The Environmental Challenge to China's Future*, Cornell University Press.

Engels, Friedrich. (First published in 1845). The Condition of the Working Class in England (Penguin Classics reprints, 1987)

Fan, Joseph, Randall Morck, Lixin Colin Xu, and Bernard Yeung, 2006, "Does the quality of the government matter in attracting FDI: the China case in a Global Context," Worldbank Report 2006.

Feenstra, Robert C., and Gordon H. Hanson. 1997. "Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras," *Journal of International Economics*, 42, 371-393.

Frankel, Jeffrey and David Romer. 1999. "Does Trade Cause Growth?" *American Economic Review*, 89 (3), June, 379-399.

Gertler, Paul and Jaime Sepulveda. Forthcoming. "Mexico's PROGRESA: Using a Poverty Alleviation Program as a Financial Incentive for Parents to Invest in Children's Health," *Lancet*.

Gertler, Paul J., and John W. Molyneaux. 1994. "How Economic Development and Family Planning Programs Combined to Reduce Indonesian Fertility," *Demography*, 31(1), February, 33–63.

Gertler, Paul, David I. Levine, and Minnie Ames "Schooling and Parental Death". *Review of Economics and Statistics*, **86**, 1, Feb. 2004: 211-225.

Grossman, Gene M & Krueger, Alan B, 1995. "Economic Growth and the Environment" *The Quarterly Journal of Economics*, MIT Press, vol. 110(2), pages 353-78.

Kanbura, Ravi and Xiaobo Zhang. 1999. "Which Regional Inequality? The Evolution of Rural-Urban and Inland-Coastal Inequality in China from 1983 to 1995," *Journal of Comparative Economics*, 27(4), December, 686-701.

Kevane, Michael and David I. Levine, "Are Investments in Daughters Lower When Daughters Move Away? Evidence from Indonesia". *World Development*, **31**, 6, June 2003.

Krueger, Alan B., and Mikael Lindahl. 2001. "Education for Growth: Why and for Whom?" *Journal of Economic Literature*, 39(4) (Dec.): 1101–1136.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shelifer, and Robert Vishny 1999, "The Quality of Government" *Journal of Law, Economics and Organization,* Vol. 11 Iss 1, 222 -279.

Levine, David I. and Maya Federman. 2004. "The Effect of Industrialization on School Enrollment: Evidence from Indonesia," with Maya Federman, accepted subject to revision, *Contributions to Macroeconomics*, B.E. Journals in Macroeconomics.

Miguel, Ted, Paul Gertler and David I. Levine. 2002. "Does Industrialization Build or Destroy Social Capital in Indonesia?" University of California, Berkeley Center for International and Development Economics Research (CIDER) working paper C03-131.

Morck, Randall, Daniel Wolfenzon, and Bernard Yeung (2004) "Corporate Governance, Economic Entrenchment and Growth," *Journal of Economics Literature*, forthcoming.

Murphy Kevin M., Andrei Shleifer, and Robert Vishny, 1989, "Industrialization and the Big Push," *Journal of Political Economy*, Vol. 97, (Oct), pp. 1003-26).

Narayan, Navin. 1997. “Stolen Childhoods: Tackling the Health Burdens of Child Labor,” *Harvard International Review*, 19(4) (Fall): 50–51+.

Pandey MR, Boleji J. Smith K R., Wafula E. 1989. “Indoor air pollution in developing countries and acute respiratory infection in Children,” *Lancet* 25: 427-429.

Riskin, Carl. 2000. “Decentralization In China’s Transition,” Bratislava Policy Papers #4. http://www1.miser.umass.edu/ldit/docs/bpp4_riskin.pdf

Sen, Amartya. 1999. *Development as Freedom*, New York: Anchor Books.

Smith, Adam. [1776] 1982. *The Wealth of Nations*. New York: Penguin Books.

Wood, Adrian. 1997. “Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asian Conventional Wisdom,” World Bank Economic Review 11: 3-57.

World Bank. 1997. *Clear Water, Blue Skies: China: Environment in the New Century*. Washington, DC.

World Bank. 1999. “Indonesia and Poverty” in *Social Policy and Governance in the East Asia and Pacific Region*, [http://www.worldbank.org/poverty/eacrisis/countries/indon/pov1.htm]

World Bank. 2001. *China Air, Land and Water: Environmental Priorities for a New Millennium*, Washington, DC.

World Bank. 2005. “The Industrial Pollution Projection System” Policy Research Working Paper, number 1431. [http://go.worldbank.org/VU638LHB20] accessed August 1, 2007.

Yao, Shujie,1997. **“**Industrialization and spatial income inequality in rural China, 1986-92” *Economics of Transition* Volume 5, Issue 1 Pages 97 – 112

Zhang, Xiaobo and Ravi Kanbur, “Spatial Inequality in Education and Health Care in China,” mimeo, Cornell, 2003. [http://www.arts.cornell.edu/poverty/kanbur/ChinaSocialInequality.pdf]

Table I: Summary statistics 1990 and 2000 (county level data)
(1) Summary for dependent variable

Variable	Obs	Mean	Std. Dev.	Min	Max
% manufacturing in 1990	2424	0.112467	0.166186	0	0.883657
% manufacturing in 2000	2424	0.096022	0.096742	0	0.641509
Change in % manufacturing	2424	-0.01645	0.119673	-0.81966	0.345213
Note: %manufacturing is a share of adults ages x to xx					
Child mortality 1990	2202	0.03558	0.041851	0	0.5
Child mortality 2000	2202	0.015602	0.060614	0	1
Change in child mortality	2202	-0.01998	0.068563	-0.5	1
% school enrolment, children between 16-17 in 1990	2377	0.351732	0.19855	0	1
% school enrolment, children between 16-17 in 2000	2377	0.460258	0.273248	0	1
Change in % school enrolment, children between 16-17	2377	0.108525	0.25286	-1	1

Summary statistics with between-county measurement correction for sampling error

Note: These data compress %manufacturing$_{c,\,t}$ towards each year's average value, using the estimated reliability (signal / signal+noise) of [V(%mfg$_c$)- V(sampling error of %mfg$_c$)] / V(%mfg$_c$), where V(sampling error of %mfg$_{ct}$) is the squared standard error of % manufacturing$_{ct}$.

Variable	Obs	Mean	Std. Dev.	Min	Max
% manufacturing in 1990 with - correction	2424	.1119145	.1647906	0	.8793874
% manufacturing in 2000 with correction	2424	.0993416	.1039621	0	.6335407
Change in % manufacturing with correction	2424	-.012573	.0973777	-.7033979	.2629367

Variable	Obs	Mean	Std. Dev.	Min	Max
% manufacturing in 1990 demean with correction	2424	.00767	.0581419	-.1711696	.4005709
% manufacturing in 2000 demean with correction	2424	-.0049029	.0402536	-.379227	.1164247
Change in % manufacturing demean with correction	2424	-.012573	.0973777	-.7033979	.2629367

Summary statistics with between-county correction for sampling error

Variable	Obs	Mean	Std. Dev.	Min	Max
% manufacturing in 1990 with correction	2424	.1120647	.1652135	0	.881873
% manufacturing in 2000 with correction	2424	.0916751	.0859323	0	.5215006
Change in % manufacturing with correction	2424	-.02039	.1218903	-.7987037	.2807474

Note: These data compress changes in $\%manufacturing_{ct}$ towards each county's average value, using the estimated reliability (signal / signal+noise) of [V(county changes in %mfg) - V(sampling error of $\%mfg_{ct}$)] / V(county changes in %mfg), where V(sampling error of $\%mfg_{ct}$) is the squared standard error of $\%mfg_{ct}$.

(2) Summary statistics for control variables included in the education enrollment models

1990

Variable	Obs	Mean	Std. Dev.	Min	Max
mother's education	390229	3.842762	3.692676	0	16
mother's age	390229	44.4496	6.143325	31	89
father's education	410155	6.161806	3.404255	0	16
father's age|	410155	47.08668	6.553551	31	95
kid age	410155	16.50301	0.499992	16	17
female kid	410155	0.483442	0.499726	0	1
manufacturing in household	410155	0.167444	0.373372	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
mother's education	24517	6.716258	3.439732	0	19
mother's age	24517	42.53828	4.730997	31	96
father's education	26437	8.10772	2.856039	0	19
father's age	26437	44.64184	4.889073	31	98
Child age	26437	16.46371	0.49869	16	17
Female child	26437	0.465257	0.498801	0	1
manufacturing in household	26437	0.154934	0.361849	0	1

In the child mortality models

1990

Variable	Obs	Mean	Std. Dev.	Min	Max
mom age	417568	23.32059	1.643954	15	25
household size	417568	4.732365	2.008171	1	20
no male spouse	417568	0.006837	0.082404	0	1
Total births	417568	1.631107	0.809765	1	16
mom age less than 16	417568	0.001128	0.033566	0	1
mom education	417568	6.458632	3.196174	0	16
household adult share	417568	0.620707	0.129548	0	1
household male adult share	417568	0.475127	0.118235	0	1
manufacturing in household	417568	0.094785	0.292918	0	1

2000

Variable	Obs	Mean	Std. Dev.	Min	Max
mom age	14706	23.62498	1.432626	17	25
household size	14706	4.615599	1.672873	1	22
no male spouse	14706	0.008024	0.089219	0	1
Total births	14706	1.25527	0.586469	1	10
mom age less than 16	14706	0	0	0	0
mom education level	14706	7.679791	2.757983	0	19
household adult share	14706	0.687148	0.12972	0.111111	1
household male adult share	14706	0.459431	0.13363	0	1
manufacturing in household	14706	0.105127	0.306728	0	1

(3) t-test

	Child mortality			Enrollment for age 16-17		
	1990	2000	Difference	1990	2000	Difference
Nationwide	0.36	0.022	0.014**	0.328	0.459	0.130**
By Residence/year						
Urban	0.025	0.018	-0.008	0.613	0.707	0.094**
Rural	0.037	0.022	-0.015**	0.294	0.429	0.135**
Difference	-0.011**	-0.004	0.007	0.318**	0.277**	-0.041

** significant at 1% level

Table II: OLS Regression of changes in manufacturing share from 1990 to 2000 on baseline county education and child mortality

Dependent variable: Change in manufacturing share of employment from 1990 to 2000

Child mortality 1990	-0.047		-0.046
	(0.91)		(0.89)
% Urban 1990	-0.067	-0.069	-0.068
	(2.41)*	(2.48)*	(2.45)*
Average adult year of education 1990	0.013	0.013	0.012
	(6.23)**	(5.79)**	(5.45)**
Adult education (demeaned) squared, 1990	0.001	0.001	0.001
	(2.76)**	(3.01)**	(3.09)**
Coastal area	0.047	0.048	0.047
	(2.47)*	(2.42)*	(2.40)*
Special economic zone (SEZ) 1990	-0.004	-0.005	-0.005
	(0.34)	(0.40)	(0.40)
% Manufacturing 1990	-0.598	-0.597	-0.598
	(8.62)**	(8.50)**	(8.55)**
% School enrollment 16-17,1990		0.005	0.004
		(0.10)	(0.09)
Constant	-0.031	-0.036	-0.031
	(1.93)	(2.81)**	(2.09)*
Observations	2334	2334	2334
R-squared	0.7	0.7	0.7

Robust t statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level

* significant at 5%; ** significant at 1%

Table III: Fixed-effect OLS Regression of manufacturing share on the mediating channels: fiscal revenue, per capita GDP in real term, hospital beds

	log of real local fiscal revenue	log of real GDP per capita	log of numbers of beds in hospital per 10000
% manufacturing employment of adults	0.669	0.939	1.038
	(2.70)**	(4.49)**	(2.70)**
Year 2000	0.406	0.855	-0.312
	(28.81)**	(82.80)**	(10.45)**
Constant	3.497	6.251	3.045
	(252.75)**	(562.06)**	(139.62)**
Observations	3208	3208	3208
Number of county fixed effects	1604	1604	1604
R-squared	0.36	0.83	0.07

Robust t statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level
* significant at 5%; ** significant at 1%

Note: This regression uses the within-county correction for sampling error on %manufacturing.

Table IV: The Effect of Percent Manufacturing on School Enrollment (Unit: Percentage point)

Probit regression using data for 1990 and 2000 and adjustment for county fixed effects

Dependent: Enrollment among those ages 16 and 17	(1)	(2)	
% Manufacturing employment of adults	0.66	0.69	0.948
	(7.10)**	(7.27)**	(7.88)**
%Manufacturing*Urban	-0.056	-0.133	-0.129
	(0.92)	(2.04)*	(1.09)
Average 1990 & 2000 county %mfg	-0.364	-0.36	-0.835
(captures county fixed effect)	(3.17)**	(3.13)**	(5.32)**
% manufacturing 1990 * year 2000	0.096	0.102	0.145
	(1.45)	(1.51)	(1.45)
County enrollment rate in 1990*year2000	0.273	0.27	0.21
	(7.64)**	(7.56)**	(4.80)**
Urban	0.088	0.085	0.037
	(4.55)**	(4.40)**	(1.39)
Year 2000	-0.061	-0.06	-0.056
	(5.34)**	(5.20)**	(3.15)**
age16	0.168	0.168	0.163
	(43.46)**	(43.42)**	(38.93)**
Female	-0.079	-0.079	-0.091
	(18.34)**	(18.31)**	(19.05)**
Age16&female	-0.013	-0.013	-0.011
	(2.32)*	(2.30)*	(1.76)
Father's education in years	0.123	0.123	0.116
	(16.10)**	(16.14)**	(12.57)**
Father's age	-0.001	-0.001	-0.002
	(3.18)**	(3.15)**	(3.00)**
Mother's education in years	0.014	0.014	0.012
	(26.31)**	(26.31)**	(21.80)**

Mother's age	0.002	0.002	0.002
	(4.98)**	(4.99)**	(3.57)**
Father's age (demeaned) squared	-0.00015	-0.00015	-0.00015
	(4.63)**	(4.63)**	(4.25)**
Father's education (demeaned) squared	0.001	0.001	0.001
	(13.54)**	(13.56)**	(10.65)**
Mother's age (demeaned) squared	-0.00013	-0.00013	-0.0001
	(2.82)**	(2.86)**	(1.79)
Mother's education (demeaned) squared	0.002	0.002	0.002
	(17.78)**	(17.86)**	(13.35)**
Manufacturing in household		-0.017	-0.008
		(2.61)**	(1.09)
Manufacturing in household*year2000		-0.006	-0.025
		(0.53)	(1.93)
Manufacturing in household*Urban		0.05	0.07
		(3.36)**	(2.51)*
County level controls			
Log of real GDP per capita			0.006
			(0.38)
Average 1990 & 2000 Log of real GDP per capita			0.019
(captures county fixed effect)			(0.94)
Log of real local fiscal revenue			0.024
			(1.81)
Average 1990 & 2000 Log of real local fiscal revenue			-0.023
(captures county fixed effect)			(1.42)
Log of numbers of beds in hospital per 10000			0.011
			(1.68)
Average 1990 & 2000 Log of numbers of beds in hospital per 10000			-0.009
(captures county fixed effect)			(1.61)
Observations	414360	414360	315909

Robust z statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level

* significant at 5%; ** significant at 1%

Note: This regression uses the within-county correction for sampling error on %manufacturing.

Table V: The Effect of %Manufacturing on Enrollment in Coastal vs. Inland Areas. (Unit: Percentage point)

	COASTAL			INLAND		
	Enrollment	Enrollment	Enrollment	Enrollment	Enrollment	Enrollment
% Manufacturing employment of adults	1.491	1.629	1.824	0.423	0.431	0.678
	(6.80)**	(7.25)**	(5.29)**	(4.33)**	(4.36)**	(5.22)**
%Manufacturing*Urban	-0.0003	-0.129	-0.288	-0.041	-0.099	-0.022
	0.00	(0.63)	(0.59)	(0.61)	(1.40)	(0.18)
Average 1990 & 2000 county %mfg	-1.609	-1.57	-1.841	-0.052	-0.058	-0.492
(captures county fixed effect)	(5.92)**	(5.62)**	(5.10)**	(0.44)	(0.49)	(2.84)**
%Manufacturing 1990*year 2000	0.741	0.756	0.707	-0.061	-0.053	-0.013
	(4.97)**	(4.96)**	(3.51)**	(0.86)	(0.74)	(0.11)
County enrollment rate in 1990*year2000	0.263	0.233	0.041	0.269	0.268	0.206
	(2.93)**	(2.68)**	(0.29)	(6.74)**	(6.74)**	(4.37)**
Urban	0.108	0.108	-0.086	0.086	0.083	0.032
	(1.66)	(1.64)	(0.51)	(4.23)**	(4.07)**	(1.21)

Year 2000	**-0.112**	**-0.097**	**-0.031**	**-0.056**	**-0.056**	**-0.04**
	(2.87)**	**(2.55)***	**(0.39)**	**(4.58)****	**(4.53)****	**(2.26)***
age16	**0.185**	**0.183**	**0.182**	**0.166**	**0.165**	**0.161**
	(15.19)**	**(15.01)****	**(12.69)****	**(40.08)****	**(40.09)****	**(36.33)****
Female	**-0.094**	**-0.09**	**-0.13**	**-0.074**	**-0.074**	**-0.085**
	(6.74)**	**(6.54)****	**(7.23)****	**(15.81)****	**(15.83)****	**(16.63)****
Age16&female	**-0.013**	**-0.013**	**-0.012**	**-0.013**	**-0.012**	**-0.011**
	(0.78)	**(0.79)**	**(0.54)**	**(2.12)***	**(2.11)***	**(1.65)**
Father's education in years	**0.104**	**0.105**	**0.099**	**0.123**	**0.123**	**0.116**
	(4.17)**	**(4.18)****	**(2.75)****	**(15.07)****	**(15.08)****	**(11.89)****
Father's age	**-0.002**	**-0.002**	**-0.004**	**-0.001**	**-0.001**	**-0.001**
	(1.39)	**(1.23)**	**(2.00)***	**(2.25)***	**(2.26)***	**(2.12)***
Mother's education in years	**0.018**	**0.018**	**0.015**	**0.013**	**0.013**	**0.012**
	(9.72)**	**(9.77)****	**(7.35)****	**(23.69)****	**(23.61)****	**(20.43)****
Mother's age	**0.006**	**0.006**	**0.005**	**0.002**	**0.002**	**0.001**
	(3.71)**	**(3.74)****	**(2.62)****	**(3.12)****	**(3.10)****	**(2.30)***

Father's age (demeaned) squared	**-0.0001**	**-0.0001**	**-9.59e-06**	**-0.0002**	**-0.0002**	**-0.0002**
	(0.87)	**(0.91)**	**(0.06)**	**(4.86)****	**(4.85)****	**(4.66)****
Father's education (demeaned) squared	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
	(3.39)**	**(3.38)****	**(2.28)***	**(12.67)****	**(12.68)****	**(10.04)****
Mother's age (demeaned) squared	**-0.0003**	**-0.0003**	**-0.0003**	**-0.0001**	**-0.0001**	**-0.00006**
	(2.34)*	**(2.58)****	**(1.68)**	**(2.03)***	**(2.02)***	**(1.16)**
Mother's education (demeaned) squared	**0.002**	**0.002**	**0.002**	**0.002**	**0.002**	**0.002**
	(5.38)**	**(5.16)****	**(3.10)****	**(17.23)****	**(17.31)****	**(12.99)****
Manufacturing in household		**-0.083**	**-0.078**		**-0.001**	**0.005**
		(6.63)**	**(5.14)****		**(0.20)**	**(0.55)**
Manufacturing in household*year2000		**-0.026**	**-0.042**		**-0.004**	**-0.021**
		(0.94)	**(1.26)**		**(0.34)**	**(1.46)**
Manufacturing in household*Urban		**0.057**	**0.066**		**0.042**	**0.06**
		(1.44)	**(2.51)***		**(2.59)****	**(2.00)***

County-level controls		
Log of real GDP per capita	**0.001**	**-0.009**
	(0.02)	**(0.54)**
Average 1990 & 2000 Log of real GDP per capita	**0.225**	**0.016**
(captures county fixed effect)	**(3.49)****	**(0.83)**
Log of real local fiscal revenue	**0.011**	**0.028**
	(0.20)	**(2.04)***
Average 1990 & 2000 Log of real local fiscal revenue	**-0.093**	**-0.013**
(captures county fixed effect)	**(1.43)**	**(0.87)**
Log of numbers of beds in hospital per 10000	**-0.03**	**0.013**
	(0.72)	**(1.94)**
Average 1990 & 2000 Log of numbers of beds in hospital per 10000	**-0.017**	**-0.01**
(captures county fixed effect)	**(0.49)**	**(1.73)**

Observations	**44392**	**44392**	**25193**	**349919**	**349919**	**273985**

Robust z statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level

*** significant at 5%; ** significant at 1%**

Note: This regression uses the within-county correction for sampling error on %manufacturing.

Table VI: The Effect of %Manufacturing on child mortality (Unit: Percentage point)

Probit regression using data for 1990 and 2000 and adjustment for county fixed effects

Dependent Variable: Child mortality dummy =1 if a child is dead	(1)	(2)	(3)
% Manufacturing employment of adults	0.01	0.015	0.002
	(0.65)	(0.99)	(0.12)
%Manufacturing*Urban	-0.001	-0.004	-0.031
	(0.06)	(0.17)	(0.82)
Average 1990 & 2000 county %mfg	-0.123	-0.123	-0.088
(capture county fixed effect)	(7.04)**	(7.07)**	(3.60)**
%Manufacturing 1990*year 2000	0.028	0.029	0.018
	(1.50)	(1.58)	(0.54)
County child mortality rate in 1990*year 2000	0.234	0.233	0.217
	(5.68)**	(5.64)**	(4.52)**
Urban	0.007	0.007	0.01
	(1.12)	(1.12)	(1.10)
Year 2000	-0.025	-0.025	-0.017
	(10.29)**	(10.13)**	(3.15)**
Female	-0.002	-0.002	-0.002
	(3.15)**	(3.14)**	(3.32)**
Mother's age	0.001	0.001	0.001
	(2.02)*	(2.05)*	(2.71)**
No male spouse	0.114	0.114	0.108
	(12.24)**	(12.20)**	(10.31)**
Mom's age 16 or less	0.381	0.382	0.379
	(12.49)**	(12.54)**	(10.95)**
Mother's education in years	-0.003	-0.003	-0.002
	(18.64)**	(18.49)**	(15.70)**
Household adult share	0.142	0.142	0.152
	(33.58)**	(33.66)**	(31.18)**

Household adult male share	-0.003	-0.002	-0.004
	(0.80)	(0.74)	(1.12)
Household size	-0.004	-0.004	-0.005
	(16.56)**	(16.36)**	(15.35)**
Manufacturing in household		-0.004	-0.005
		(3.12)**	(3.22)**
Manufacturing in household*year2000		-0.004	-0.002
		(0.64)	(0.34)
Manufacturing in household*Urban		0.001	0.008
		(0.27)	(0.88)
County-level controls			
Log of real GDP per capita			-0.013
			(1.83)
Average 1990 & 2000 Log of real GDP per capita			0.005
(capture county fixed effect)			(0.72)
Log of numbers of beds in hospital per 10000			0.006
			(3.99)**
Average 1990 & 2000 Log of numbers of beds in hospital per 10000			-0.002
(capture county fixed effect)			(1.25)
Log of real local fiscal revenue			-0.003
			(0.90)
Average 1990 & 2000 Log of real local fiscal revenue			0.004
(capture county fixed effect)			(1.03)
Observations	432274	432274	350352

Robust z statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level

* significant at 5%; ** significant at 1%

Note: This regression uses the within-county correction for sampling error on %manufacturing.

Table VII: The Effect of %Manufacturing on Enrollment in Coastal vs. Inland Areas. (Unit: Percentage point)

Probit regression using data for 1990 and 2000 and adjustment for county fixed effects

	Coastal			Inland		
Child mortality	**1**	**2**	**3**	**4**	**5**	**6**
% Manufacturing employment of adults	**-0.045**	**-0.044**	**-0.051**	**0.015**	**0.021**	**0.001**
	(3.74)**	**(3.52)****	**(2.04)***	**(0.86)**	**(1.14)**	**(0.03)**
%Manufacturing*Urban	**-0.023**	**-0.02**		**-0.005**	**-0.008**	**-0.032**
	(0.69)	**(0.59)**		**(0.24)**	**(0.34)**	**(0.80)**
Average 1990 & 2000 county %mfg(capture county fixed effect)	**0.014**	**0.014**	**0.024**	**-0.134**	**-0.133**	**-0.086**
	(0.98)	**(0.97)**	**(0.92)**	**(6.10)****	**(6.09)****	**(2.75)****
%Manufacturing 1990*year 2000	**0.016**	**0.017**	**0.03**	**0.016**	**0.017**	**-0.006**
	(0.91)	**(0.98)**	**(1.05)**	**(0.72)**	**(0.74)**	**(0.15)**
County child mortality rate in 1990*year 2000	**-0.004**	**-0.004**	**-0.015**	**0.243**	**0.243**	**0.229**
	(0.03)	**(0.04)**	**(0.07)**	**(5.40)****	**(5.38)****	**(4.49)****
Urban	**0.002**	**0.001**		**0.01**	**0.01**	**0.012**
	(0.18)	**(0.17)**		**(1.39)**	**(1.39)**	**(1.18)**

Year 2000	-0.008	-0.008	0.002	-0.026	-0.026	-0.018
	(2.71)**	(2.54)*	(0.26)	(9.46)**	(9.34)**	(3.04)**
Female	-0.001	-0.001	0	-0.002	-0.002	-0.003
	(0.72)	(0.69)	(0.20)	(3.23)**	(3.23)**	(3.62)**
Mother's age	0.001	0.001	0.001	0.001	0.001	0.001
	(2.20)*	(2.22)*	(2.16)*	(1.64)	(1.67)	(2.31)*
No male spouse	0.054	0.055	0.079	0.119	0.119	0.109
	(3.71)**	(3.70)**	(3.58)**	(11.65)**	(11.63)**	(9.85)**
Mom's age 16 or less	0.369	0.369	0.174	0.384	0.386	0.393
	(5.39)**	(5.41)**	(3.83)**	(11.64)**	(11.69)**	(10.55)**
Mother's education in years	-0.001	-0.001	-0.001	-0.003	-0.003	-0.003
	(5.15)**	(5.09)**	(2.56)*	(17.88)**	(17.78)**	(15.37)**
Household adult share	0.071	0.071	0.074	0.149	0.15	0.158
	(12.84)**	(12.95)**	(11.34)**	(30.94)**	(30.98)**	(28.90)**
Household adult male share	0.003	0.003	0.007	-0.002	-0.002	-0.004
	(0.50)	(0.51)	(1.16)	(0.55)	(0.51)	(0.93)

Household size	**-0.002**	**-0.002**	**-0.003**	**-0.005**	**-0.005**	**-0.005**
	(6.56)**	**(6.24)****	**(5.55)****	**(15.02)****	**(14.87)****	**(14.03)****
Manufacturing in household		**-0.001**	**0**		**-0.004**	**-0.006**
		(0.70)	**(0.27)**		**(2.83)****	**(3.09)****
Manufacturing in household*year2000		**-0.001**	**-0.001**		**-0.002**	**-0.001**
		(0.17)	**(0.06)**		**(0.26)**	**(0.09)**
Manufacturing in household*Urban		**-0.002**			**0.002**	**0.011**
		(0.57)			**(0.34)**	**(1.06)**
County-level controls						
Log of real GDP per capita			**-0.013**			**-0.012**
			(1.68)			**(1.58)**
Average 1990 & 2000 Log of real GDP per capita			**0.008**			**0.005**
			(1.04)			**(0.61)**
Log of numbers of beds in hospital per 10000			**0.01**			**0.006**

			(0.66)			**(3.82)****
Average 1990 & 2000 Log of numbers of beds in hospital per 10000			**-0.009**			**-0.002**
			(0.58)			**(1.28)**
Log of real local fiscal revenue			**0.007**			**-0.004**
			(1.27)			**(1.08)**
Average 1990 & 2000 Log of real local fiscal revenue			**-0.005**			**0.004**
			(0.89)			**(1.10)**
Observations	**40739**	**40739**	**25876**	**368904**	**368904**	**304759**

Robust z statistics in parentheses, adjusted for heteroskedasticity and clustering at the county level

*** significant at 5%; ** significant at 1%**

Note: This regression uses the within-county correction for sampling error on %manufacturing. In the third column the urban dummy is dropped due to the smaller sample size from missing values of county-level variables.