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Chinese Job Growth and Workers' Injury Compensation in China

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Chinese Job Growth and Workers' Injury Compensation in China

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Abstract

Over the past decade, the PRC has made dramatic changes to its labor contract laws, corporate laws, and social welfare system in an effort to improve workers' wellbeing and decrease the impact of rights violations on the public healthcare system and national budget. This paper seeks to determine the effect of changes in social welfare policy made in 2003 on workplace injuries and illness in light of the domestic job growth that took place at that time. In 2003, changes in marketplace behavior, corporate law, and enterprise management policy led to a trend break in employment, wages, and insurance coverage (Kato). The econometric model described in this paper measures whether workers' compensation for injuries and diseases incurred at work increased overall due to this policy change. To accomplish this, I first determined how each industry is experiencing changes in employment and wages. Second, I used province level data to determine which industries have experienced changes in work-related injury and disease insurance coverage since the policy changes. Using this information, I found evidence that suggests that the workers' insurance coverage improved overall, and that a greater number of workers are being compensated for injuries and illnesses incurred at work. Though a smaller proportion of workers are insured, more workers are receiving compensation. The study also analyzes changes in wages by industry with respect to injury and disease rates, showing that workers in the mining industry are paid disproportionately considering their risk of disease. The results also show that government workers received a significant pay raise due to the policy changes.

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Introduction and Background

Chinese labor law enforcement is a topic of growing importance in today's international economic arena. Recent studies have revealed that many of China's firms are not compensating workers for injuries and illnesses that they acquire at work, while others pay unfair wages that fall well below the legal limit. The Chinese government has publicly recognized the potential societal costs of relaxed law enforcement, including public health problems and stifled economic growth. Yang Zhiming, a representative from the Chinese Ministry of Public Health, noted that "working health and safety is very problematic [in some highly-dangerous and heavily-polluting industries]"(Wang). According to Yang, the Chinese government recognizes the need to improve enterprise supervision and lower the risk of work-related lung disease for workers in factories and mines (Wang).

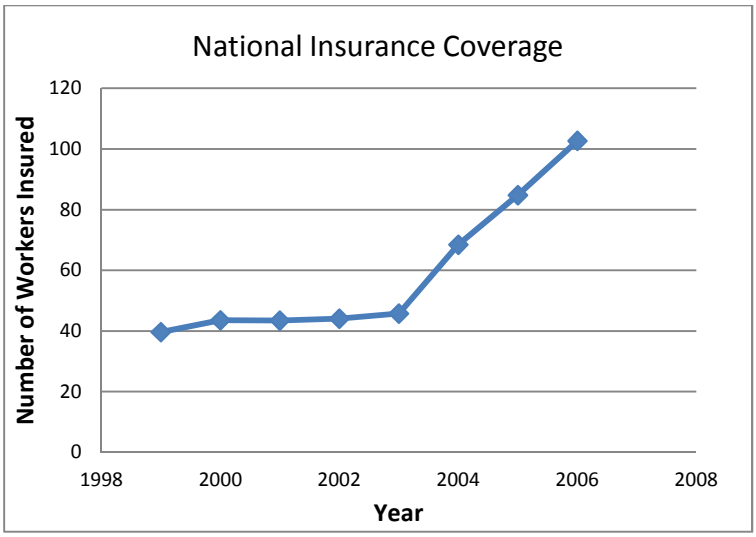
Though labor rights organizations advocate for immediate change, it may not be economically or culturally practicable to revamp the current law enforcement structure. As a developing country, it may be too costly and structurally prohibitive to adjust the system through force or economic incentive in the short run. Some experts (Vuylsteke, Kissel, etc.) argue that labor law enforcement will inevitably improve as China's legal infrastructure improves over time and as its economy becomes more advanced. Some of these experts also suggest that premature efforts to restructure the labor law enforcement system would be faced with deeply rooted corruption and might cause economic decline. The success of such a project would hinge on economic conditions, workers' participation, firms' abilities to retaliate, and the public's desire to change.

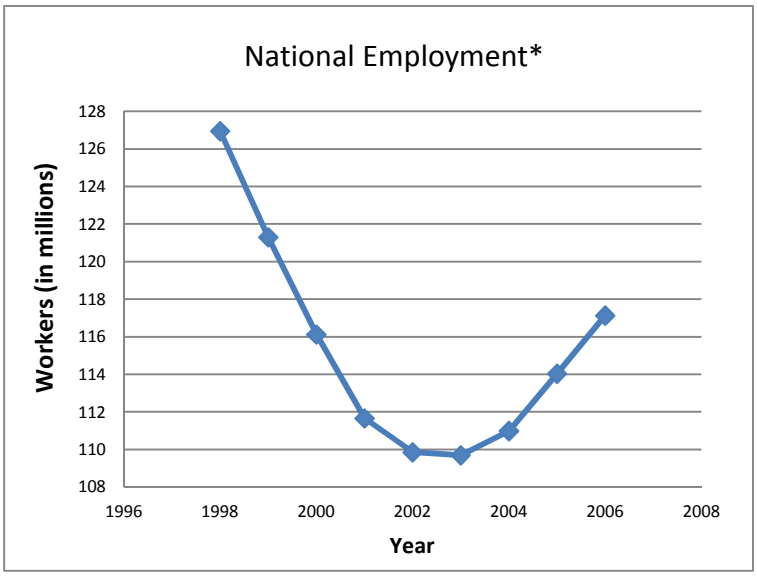
Given the limitations on our ability to measure cultural receptivity to a change in China's labor law enforcement strategy, it may be beneficial to measure the need for greater enforcement in the short run. Of course, the Chinese government's ability and need to enforce its current labor laws depends on how job and labor force composition and workers' compensation changes over time. With this in mind, I will compare job growth, wages, and work-related injury and disease rates across industries to compare the negative and positive effects of increasing employment in risk-intensive versus non-risk-intensive industries. In particular, I will examine the need for increased enforcement of worker-safety codes and compensation.

This study also seeks to find the effect of the increased insurance coverage that resulted from the policy changes implemented in 2003. Though the total insurance coverage of workers in this sample increased by 57 million between 2003 and 2006 (see Figure 1), employment increased by 63 million. This paper seeks to find whether the newly insured workers received benefits at a significantly lower rate than workers who were covered before the policy change. This will give us insight into whether workers are being adequately compensated for injuries and diseases incurred at work.

This study will look at the effects of these changes in workforce composition on work-related injuries/diseases per worker. To determine whether Chinese jobs are becoming safer, I will compare the injury rates of marginal jobs that are being subtracted from those industries to marginal jobs that are being added to growing industries. As the country's labor force grows in the coming years, it is important to observe the composition of jobs, wages, and worker

Figures 1 & 2: Increases in insurance coverage and employment after 2003





compensation as new jobs are created in China and its workforce takes on new risks.

Work-related injuries and diseases are estimated using the number of insurance beneficiaries by province and year, respectively. Unfortunately the insurance data is not sorted by industry, which makes it more difficult to assess the effect of an increase in employment or production on injuries/disease in a

given industry. Instead, I will use an estimation procedure to determine which provinces are dominated by what industries (which is outlined in the "econometrics" section below). In effect, the injury and disease data for these provinces will represent industry specific data by province and year.

Because the model uses insurance data to predict work place injuries and diseases, it is difficult to determine whether a rise or fall in injury/disease rate was caused by a change in insurance coverage or by an actual change in the number of diseases or injuries reported. Therefore, the results of this study are suggestive. However, I believe that gaining insight into either injury/disease rates or insurance coverage will be valuable in measuring how China's workforce is being accommodated.

The province and industry-level data used in this study was collected by the Chinese Bureau of Statistics, and provides information on employment, wages, and insurance from 30 provinces between 1998 and 2007. The results exclude Chinese territories, including Macau and Hong Kong, and do not encompass the effects of the current economic crisis.

A Review of Previous Literature

Most existing empirical studies on Chinese labor focus on the factory- or state-level effects of workplace safety, productivity, and safety (Tsui, China Labor Watch, China Labor Bulletin). Other papers give us a comprehensive look at how Chinese labor laws and practices are changing in modern China, but rely on qualitative analysis (Brown, Brambilla). However, several authors have published meaningful and informative qualitative works which have paved the way for today's researchers. China Labour Bulletin, a prolific Hong Kong-based NGO, publishes some of the most highly consulted and referenced reports in the industry. CLB's findings tell us that the Chinese government has agreed to follow basic ILO labor mandates, and has passed adequate legislature in order to protect its workers at a minimal level. However, their work goes on to say that the enforcement of these laws continues to fall short, and hundreds of thousands of Chinese laborers remain without adequate pay, health benefits, and working conditions (Hard Road). Bao Hua, a factory auditor, tells us that brand auditing, police services, and other labor law enforcement mechanisms are often rendered useless by corruption. Alexandra Harney and Leslie Chang's field work supports these findings, adding knowledge backed by firsthand experience that demonstrates the inability of Chinese laborers to bargain effectively, and the nature of the dangerous working conditions which can result. The Asia Monitor Resource Center, IHLO, and other advocacy groups have made progress in determining that migrant workers are affected the most by labor law enforcement, while Peerenboom has laid out the economic benefits of labor rights. Given these findings, it is reasonable to assume that a natural study can be conducted to

determine the increased welfare (measured by increased wages and heightened employment) in a province when the number of factories increases due to an outside causal mechanism (the 2003 policy change).

My methodology will rely on the use of an econometric model, which will estimate the reduced-form effects of the bundle of 2003 policies as they vary across different industries.

Data

This study uses statistics gathered from the China Labour Statistical Yearbooks and Provincial Yearbooks over the past 12 years, comparing the effects of increased product demand on economic indicators at the provincial level. These statistics include regional data for employment, wages, and the total number of accepted insurance claims for workplace injuries/diseases by year. The data was complied by China's Department of Population and Employment Statistics, Department of Planning and Finance, and the Ministry of Labor and Social Security. China's National Bureau of Statistics gathered industry specific data at the monthly and yearly level.

Though the China Labor Statistical Yearbook is considered to be one of the best sources of data on China, it is also thought to be flawed. Some of the figures in this data set are either missing or presumed to be inaccurate. For example, experts believe that estimates for work-related injuries are low due to underreporting by both workers and the by government itself (Crandall). However, this is also the most accurate source of data that is available and is widely used among social scientists who are studying economic growth and labor in China. Though the data set may under-report some statistics, I do not believe that the inaccuracies within the data set will have a significant impact on my results.

Limitations of this Study

Ideally, I would have had industry – and province- level data on employment, wages, insurance, and injury/disease rates. However, the industry-level employment, injury and disease rates were not available in the China Labor Statistical Yearbook. Instead, I used province level employment data to generate industry shares of employment, and province level insurance data to generate industry shares of work-related injury and disease beneficiaries[1]. This method is described in greater detail under "Econometrics" below.

The insurance data tells us how many total workers are ensured by year, and how many of those workers had their claims for work-related injury or disease compensation accepted. Because I am using insurance data to predict changes in diseases and injury, it is impossible to determine whether a change in the injury or disease rate is due to changes in insurance policy (i.e. changes in the rate at which the insurance companies are accepting claims), or to changes in actual injury and disease rate. Therefore, the result of this study is suggestive.

Key Factors

The use of provincial statistics in this study relies on the fact that industries, including those used in this regression, are clustered by geography and culture, which in this case is best represented by province. The top producers in each industry can be separated by industry type (mining, manufacturing, financial services etc).I found that firms that produce a certain product tend to cluster within provinces that have the resources, workers, entrepreneurs, and favorable tax and legal structure to accommodate the industry. Therefore, when examining

the effect of increased product and labor demand in a given industry, it is appropriate to seek their outcomes at the provincial level.

Some industries are especially useful in determining the effects of workplace injury and disease, as their jobs are high-risk by nature. Assuming that workers are compensated for this risk with higher wages, these sectors are also a good indicator of the positive impacts of risky jobs in a given province.

It is also essential to understand the role of worker behavior in the enforcement of labor laws in Mainland China. Workers are often uninformed about the true hazards involved in their jobs, such as potential illness and injury. Due to these influences, workers may be acting irrationally. Essentially, they will take jobs at a lower pay rate than they otherwise would if they were aware of the risks. This could potentially have an effect on their likelihood to become injured, file a lawsuit, or make a work-related health insurance claim.

Empirically, labor unions do not make a significant impact on law enforcement (Tsui). This is a socially accepted view in China (Cheng, Poon), meaning that Chinese citizens and workers are relatively aware that Unions do not push legislation or enforcement one way or another. Many believe that unions act as the eyes and ears of the government, persuading workers and employers to resolve problems in the way that best suits the PRC (Vik, Poon). Therefore, the strong presence of unions in all of the sectors being studied (coal, gas, steel, apparel, textiles) can influence workers' behavior. However, it seems as though unions are fairly even handed when granting benefits to workers or employers overall. For the purpose of this study, it can be assumed that workers are

relatively aware of the risks involved in their jobs, and a worker's ability to claim and receive insurance benefits is unrelated to their contact with unions or their knowledge of hazards in the workplace.

Work place injuries and illness vary by profession and industry, as does the regulation of safety procedures and codes. However, in spite the array of probabilities associated with a worker's potential injury, it has been demonstrated that many of these ailments are financially efficient to prevent. For the most part, there are high returns on investment on accident and disease prevention in the workplace regardless of factors such as factory size, workforce composition, and product type. Foreign, joint-, and state-owned enterprises tend to go above and beyond the minimum legal work safety requirements, and often report that precautionary measures are well worth initial investment costs (Gustad). The overall lack of investment is attributed to poor enforcement and undereducated factory owners/managers (TAL Group). In this paper, we will assume that proper investment in preventative action against injuries/illness would reduce costs for firms, workers, and the government.

Description of Econometrics

This analysis uses a 2003 exogenous shock to measure the effect of industrial growth on work related injuries/diseases, gross value added, employment, and wages. The first stage regression equations are as follows:

(1) $Emp_t = \alpha_0^{Emp} + \alpha_1^{Emp} \bullet Year_t + \alpha_2^{Emp} \bullet Year_t \bullet \{ \text{Year}_t \geq 2003 \} + \varepsilon_t^{Emp}$

(2) $Output_t = \alpha_0^{Output} + \alpha_1^{Output} \bullet Year_t + \alpha_2^{Output} \bullet Year_t \bullet \{ \text{Year}_t \geq 2003 \} + \varepsilon_t^{Output}$

(3) $Injuries_t = \alpha_0^{Injuries} + \alpha_1^{Injuries} \bullet Year_t + \alpha_2^{Injuries} \bullet Year_t \bullet \{ \text{Year}_t \geq 2003 \} + \varepsilon_t^{Injuries}$

(4) $Wages_t = \alpha_0^{Wages} + \alpha_1^{Wages} \bullet Year_t + \alpha_2^{Wages} \bullet Year_t \bullet \{ \text{Year}_t \geq 2003 \} + \varepsilon_t^{Wages}$

with Emp representing employees, Output representing gross industrial value added, Wages representing the average wage, and Injuries representing the number of work-related illness/injury beneficiaries in a given year t, province j, and industry i. Because industry-level data is not available for injury and disease rates, we will use the percentage of employees in each industry for a given province j, to identify weighted sums of $\alpha_{i0}^{Injuries}$ for each industry i. These will allow us to examine the marginal jobs that resulted from the exogenous shock in 2003. I will compare work-related injury/disease rates and wages among workers who were added as a result of the shock with the average worker.

Next, I will try to determine the tradeoffs between wages/growth and injuries/disease by looking at differences across industries. Since the injury data is available by province but not by industry, I will use provinces that have high concentrations of workers from specific industries to estimate the effect of working in a particular industry on a worker's wage or productivity on their risk of being injured at work. For example, the agriculture industry is growing at a slower rate than electronics manufacturing. This strategy would estimate the relative injury rates for marginal workers between these two industries. The underlying model is as follows:

(5) $Injuries_{ijt} = \alpha_{i0}^{Injuries} + \alpha_{i1}^{Injuries} \bullet Year_t + \alpha_{i2}^{Injuries} \bullet Year_t \bullet [\![\{ \text{Year}_t \geq 2003 \} + \varepsilon_{ijt}^{Injuries}$

where coefficients vary by industry and not by province.

(6). $\Phi_{ij} = \frac{Emp_{ij}}{\sum_{i=1}^{i} Emp_{ij}}$

Where Φ_{ij} represents the industry shares, which are calculated using a separate data set. These shares were interacted with the regressors in models (1)-(4) to measure the effects for each industry.

The coefficients on the injury shares represent the industry specific effects on α_{0i}, α_{1i}, and α_{2i}. Then, we will regress α_{ij}^{injury} on industry group concentrations (i.e. the percentage of workers in a certain industry within a given province) to find the injury rate of the marginal worker for each industry.

Hence, the constant, the time trend, and the trend break in 2003 vary across industries, but remain constant across provinces. Since industry-specific data was not available for occupational injuries and disease, equations (1)-(4) estimate the alpha coefficients for employment and injuries separately for each province. Each of these coefficients represents a weighted sum of the industry-specific coefficient, where the weights are determined by the percent of workers who work in a particular industry within that province (i.e. the industry share). To recover the industry-specific injury coefficients, the second regression uses a province level data set of alpha coefficients ($\alpha_{0i}, \alpha_{1i}, \alpha_{2i}$ by province) and regresses them on the industry shares (equation (6)).

Results

The results of this study showed the impact of the 2003 policy changes across industries in employment, average wages, insurance coverage, the total

number of insurance beneficiaries, and the rate at which insured workers had injury and disease claims accepted.

Overall, I found that there was an increase in employment in all industries after 2003 except in farming, which was already following a steady downward trend before the policy change. Also, in spite of an upward trend in employment after the 2003 policy changes were implemented, the mining industry still had 1.7 million fewer workers in 2006 than in 1998. See Panel A below for regression results:

We can see from Table 1 that the farming and mining industries both experienced an overall decrease in employees. The coefficients in column (2), which represent a loss of employment in these industries weighted against other industries, show that while both industries sustained a decrease in employment, mining experienced a far more dramatic decline in employees. Each of these changes is likely the result of an improvement in mining and farming technology (Yuan), and the movement of Chinese workers away from farm work in Western China into higher value-added jobs in eastern China (Chan).

Among the industries that experienced increased employment after the policy change, construction, government, manufacturing, social services, trade, and transportation had higher rates of growth compared to other industries. The social services sector had an especially large increase in employees relative to other industries (see Panel A, Table 2) which can be attributed to the increase in social welfare services that was a part of the 2003 policy change. In fact, social services had the largest increase in employees of all 22 industries Employment in

construction and transportation was also higher than in other industries (see Panel A, Table 2), which is likely the result of mass migration from western to central and central to eastern China that occurred during and after that time (Chan, Fang).

Panel A: Industry Regression Results; Year 2003 interacted with Industry Data

Table 1: Selected Industries (Employment Decrease)

(1) Industry	(2) Employees	(3) Earnings‡	(4) Average Earnings‡
Farming	-150738	-25300000	-10731
	(12400000)	(222000000)	(10859)
Mining	-3033669	-115000000	4017
	(11800000)	(213000000)	(5229)
R^2	0.0375	0.0671	0.8028

Table 2: Selected Industries (Employment Increase)

(1) Industry	(2) Employees	(3) Earnings‡	(4) Average Earnings‡
Construction	10700000	404000000	-1711
	(29200000)	(529000000)	(12183)
Social Services	33200000	1490000000	-11960
	(123000000)	(2250000000)	(34253)
Transportation	5848515	182000000	580
	(33200000)	(609000000)	(14418)
R^2	0.0375	0.0671	0.8028

Notes: 5 of 22 industries shown, R^2 was calculated using all 22 industries
Constant term omitted
Year interacted with industry shares omitted, Female Employees omitted
‡ Earnings and Average Earnings are in Yuan; 1 Yuan ≈ 8 USD

To interpret Panel A: coefficients in column (2) represent the total number of people who have been added to the workforce in a specific industry each year after 2003 due to the policy changes, where the industry in column (1) is always weighted as 1 (i.e. is the only industry in China). Columns (3) and (4) can be interpreted in the same way, where the coefficients represent the earnings and average earnings for workers in the industries in column (1), were each industry is separately weighted as 1. The coefficients only include insurance coverage that existed because of the policy change, and does not include the values for predicted coverage without the policy

change, which are associated with the variable Year interacted with provincial data. For these values, see Appendix B, Panel C.

Most industries showed an overall increase in earnings (see Figure 5), though some industries were affected by the policy change more than others. Mining, real estate, and research all brought in significantly less income after 2003, but experienced higher average earnings per worker. Construction, manufacturing, and social services showed the opposite effect: an increase in employment and earnings overall, but a decrease in average wages. These results were more or less expected, as greater competition for work in some industries let to lower wages and vice versa. However, a few industries did not follow this pattern. In addition to decreased employment, the farming industry also incurred decreased average wages, pointing to workers' movements away from farming into more lucrative industries. The government, trade, and transportation industries showed an increase in employment as well as an increase in average wages. Government employees had by far the highest increase in average wages of all the industries experiencing job growth as a direct result of the 2003 policy changes. Mining employees also earned unusually high average wages after 2003, especially when compared to other "high risk", labor intensive industries such as construction and farming (see Panel A tables 1 and 2).

In addition to showing changes in employment and wages across industries, this study shows changes in insurance coverage and benefits before and after the policy change. Panel B shows the regression results from interacting Year2003 with industry shares for three key "high risk" industries: construction, mining, and manufacturing. It is clear from the regression results that insurance coverage increased considerably for construction workers and workers in

manufacturing. In fact, all of the industries that yielded job growth also exhibited substantial increases in insurance coverage for workers in those industries. Industries that experienced job loss exhibited comparable losses (if not gains) in insurance coverage per worker. The only exception to this pattern is farming, which showed a 40% decline in insurance coverage for the remaining workers in the industry.

The remaining results of this regression are suggestive. Recall from the "Data and Limitations" section of this paper that work-related injuries and diseases are measured using "insurance claims accepted" data gathered by the Chinese government. Therefore, it is difficult to determine whether a change in the rate of claims acceptance is due to a change in insurance policy or to a change in the actual worker disease or injury rate. These results are especially muddled when taking the 2003 trend break in employment into consideration, as we know that insurance policies were changing during that time. However, some of the regression results seem to substantiate qualitative studies that have been conducted on work-related disease. These findings may substantiate some qualitative research conducted by China Labour Bulletin, which recently published an in-depth report on pneumoconiosis (lung disease) in Chinese mining and manufacturing (The Hard Road). Panel B, on page 21, shows that the insurance claims acceptance rates for work related diseases in mining and manufacturing have increased by .2% and .03% each year due to the effects of the 2003 policy change. We can see in column (7) that the mining industry has had a statistically significant increase in claims acceptance for work related disease. In spite of the considerable drop in employment and insurance coverage for the

mining industry after 2003, miners continue to have their insurance claims accepted. These results were relatively surprising, as China's largest insurers, such as China Life, usually require thorough medical documentation and proof of

Panel B: Provincial Regression Results; Year 2003 interacted with Industry Shares

Table 1: Selected Industries (High Risk)

(1) Industry	(2) Total Workers Insured	(3) Insurance per Worker	(4) Total Injury Beneficiaries	(5) Injuries per Worker	(6) Total Disease Beneficiaries	(7) Diseases per Worker
Construction	27200000 (-23000000)	-0.426 (-0.668)	241348 (147123)*	0.0174 (0.008)**	2444 (10086)	-0.0001137 (-0.002)
Manufacturing	4788422 (-14700000)	-0.3010201 (-0.358)	20409 (-92027)	-0.0048 (-0.004)	4482 (6764)	0.0002535 (-0.001)
Mining	-6424960 (-9698050)	0.2847294 (-0.401)	-38551 (-55109)	0.0041 (-0.003)	3091 (3949)	0.0021054 (0.001)***
R^2	0.1029	0.5216	0.1151	0.4311	0.0674	0.2969

Notes: 3 of 22 industries shown, R^2 was calculated using all 22 industries
Constant term omitted
Year interacted with industry shares omitted
A "beneficiary" is someone who submitted a work-related injury or disease insurance claim and had their claim accepted. It does not include workers who did not report their accident or who had their claims request denied.

To interpret Panel B: coefficients in column (2) represent the total number of people who have gained insurance coverage in a specific industry each year after 2003 due to the policy changes, where the industry in column (1) is always weighted as 1 (i.e. is the only industry in China). Columns (4) and (6) can be interpreted in the same way, where the coefficients represent the number of insurance claims that would be accepted for workers in construction, manufacturing, and mining if those industries were weighted as 1, respectively. The coefficients only include insurance coverage that existed because of the policy change, and does not include the values for predicted coverage without the policy change, which are associated with Year interacted with provincial data. For these values, see Appendix B, Panel D.

long-term employment before a worker will be compensated for medical treatment (Poon, LaMoshi). Pneumoconiosis cases are especially difficult to claim on insurance or in court because lung disease can also be caused by smoking or pollution (China Insurance Regulatory Commission).

Taking this information into consideration, it seems plausible that China Labour Bulletin is correct in saying that work-related diseases in mining may still be a growing problem in China, and that today's miners are still in danger of acquiring pneumoconiosis.

Similarly, insurance claims acceptance rates for work-related disease in manufacturing and work-related injuries in construction also increased each year after 2003.The injury and disease compensation rates for construction and manufacturing workers increased by an additional 2% and .002% (respectively) per year after 2003 due to the effects of the policy change. These results are fairly representative of the other provincial regression results. For example, there is evidence to support that the rising disease rate in manufacturing could be the result of the rising number of pneumoconiosis claims in the gemstone grinding industry (CLB), but it is also possible that more cases were accommodated by the increase in insurance coverage for manufacturing due to the 2003 policy changes.

Conclusions:

The bundle of policy changes enacted in 2003 seemed to have a significant impact on employment and average wages, while their impact on work-related injuries and disease is difficult to determine using the available data.

The policy changes included significant Chinese market reform, which boosted employment and value added after 2003 (see Figure 4). The regression results reflected this overall increase in employment across most industries, with two notable exceptions in farming and mining. New technology in both mining and farming has replaced workers, though the result has been different for each industry. In mining, the remaining workers have taken on jobs that have higher value-added, resulting in higher wages. In farming, the reduction in both employees and wages lends evidence to other studies that confirm internal migration from western farmlands to eastern and central manufacturing and service jobs. The transportation and construction industries also experienced growth due to the 2003 policy change, which was likely a side effect of increased economic activity in other sectors (which may include accommodating migrants from the west). The policy changes had the largest effect on social services employment, which grew more than any other industry. Though wages degreased for social services providers, this change was unmistakably the result of the 2003 social welfare reform. Coincidentally, government workers received by far the highest increase in average wages due to the policy changes.

Given the limitations of this study, it is difficult to interpret the impact of the policy changes on work-related injuries and illness without additional

information. However, there does seem to be some evidence (from both the regression results in this paper as well as others' qualitative research) that mining seems to be growing more dangerous. Pneumoconiosis, the leading work-related disease in China, is predicted to cost the country over 10 billion Yuan by 2020 (Crandall). The disease is easily prevented using means that are required under China's current legal structure, which lends credence to an increase in workplace safety enforcement in mines across provinces.

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Index A: Figures

Figure 1: National Insurance Coverage

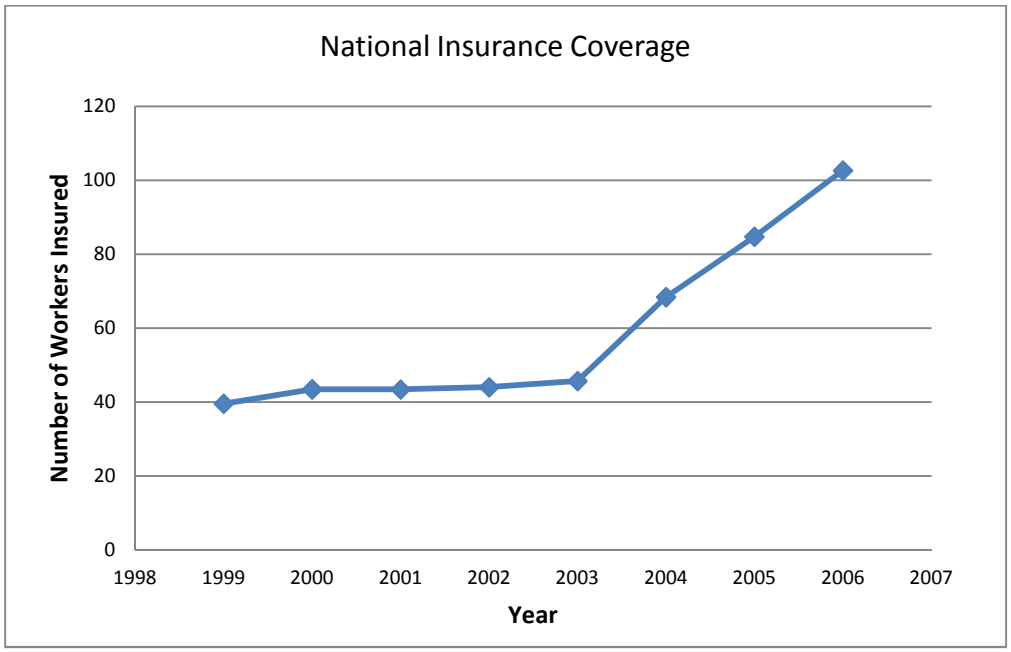
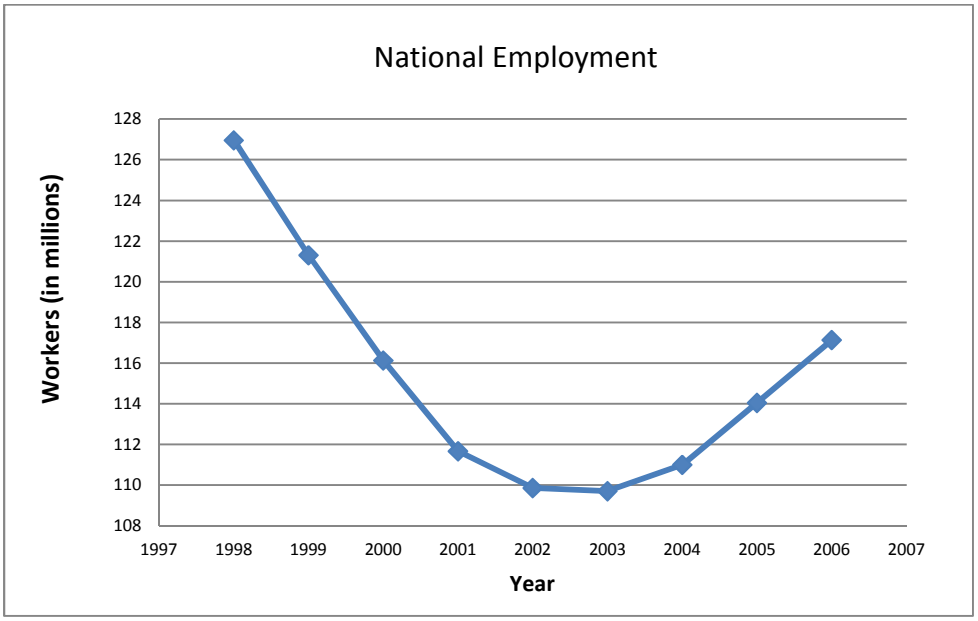


Figure 2: National Employment (from sample data*)



Appendix A continued

Figure 3: China's national gross industrial output (in 1000 Yuan)

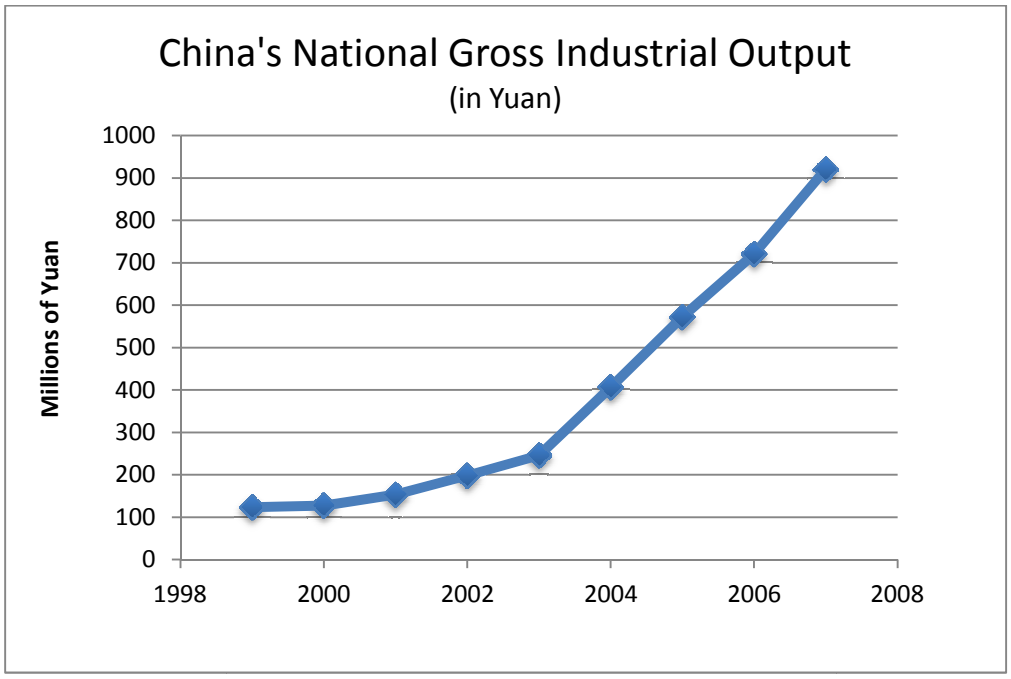
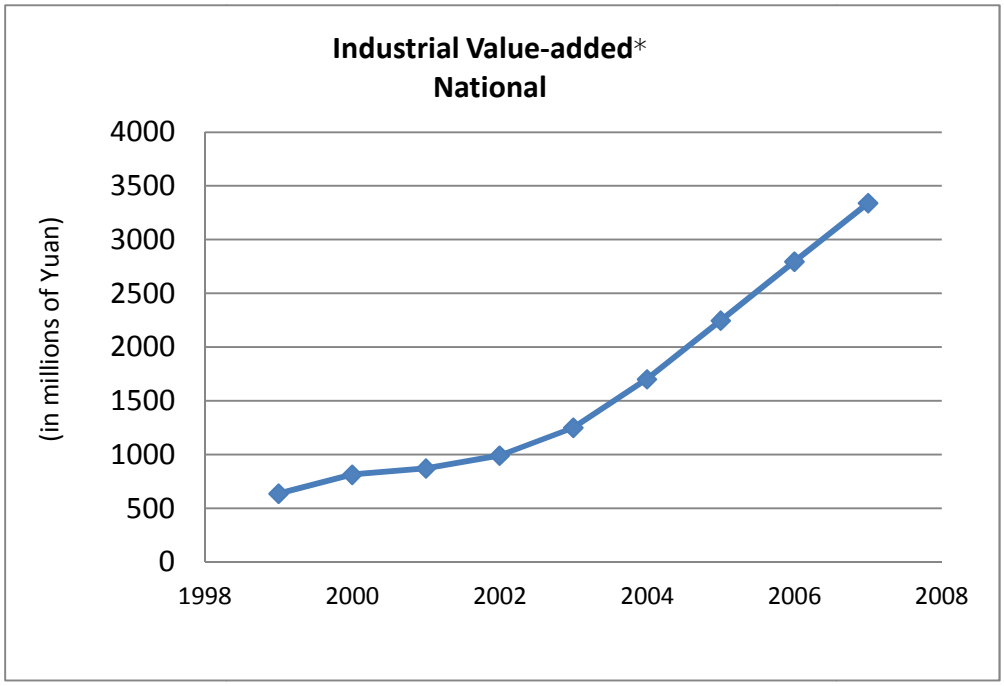
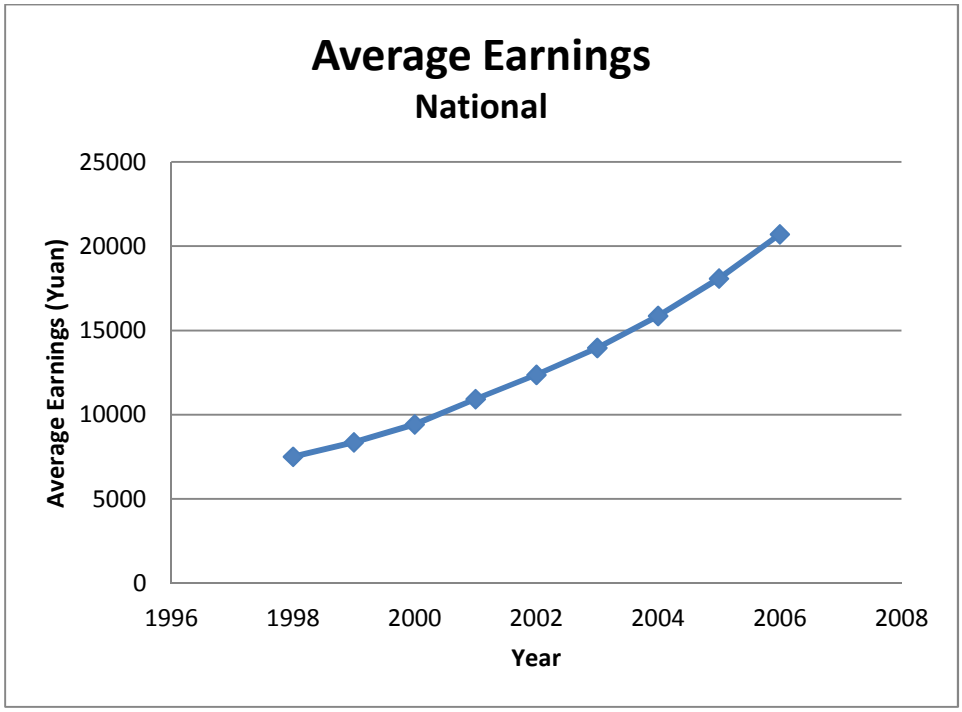


Figure 4: Chinese National Industrial Value Added



Appendix A continued

Figure 5: National Average Wages



Appendix B: Tables

Panel A: Industry Regression Results; Year 2003 interacted with Industry Data

Table 1: Selected Industries (Employment Decrease)

(1) Industry	(2) Employees	(3) Earnings‡	(4) Average Earnings‡
Farming	-150738	-25300000	-10731
	(12400000)	(222000000)	(10859)
Mining	-3033669	-115000000	4017
	(11800000)	(213000000)	(5229)
R^2	0.0375	0.0671	0.8028

Table 2: Selected Industries (Employment Increase)

(1) Industry	(2) Employees	(3) Earnings‡	(4) Average Earnings‡
Construction	10700000	404000000	-1711
	(29200000)	(529000000)	(12183)
Social Services	33200000	1490000000	-11960
	(123000000)	(2250000000)	(34253)
Transportation	5848515	182000000	580
	(33200000)	(609000000)	(14418)
R^2	0.0375	0.0671	0.8028

Notes: 5 of 22 industries shown, R^2 was calculated using all 22 industries
Constant term omitted
Year interacted with industry shares omitted, Female Employees omitted
‡ Earnings and Average Earnings are in Yuan; 1 Yuan ≈ 8 USD

To interpret Panel A: coefficients in column (2) represent the total number of people who have been added to the workforce in a specific industry each year after 2003 due to the policy changes, where the industry in column (1) is always weighted as 1 (i.e. is the only industry in China). Columns (3) and (4) can be interpreted in the same way, where the coefficients represent the earnings and average earnings for workers in the industries in column (1), were each industry is separately weighted as 1. The coefficients only include insurance coverage that existed because of the policy change, and does not include the values for predicted coverage without the policy change, which are associated with the variable Year interacted with provincial data. For these values, see Appendix B, Panel C.

Appendix B continued

Panel B: Provincial Regression Results; Year 2003 interacted with Industry Shares

Table 1: Selected Industries (High Risk)

(1) Industry	(2) Total Workers Insured	(3) Insurance per Worker	(4) Total Injury Beneficiaries	(5) Injuries per Worker	(6) Total Disease Beneficiaries	(7) Diseases per Worker
Construction	27200000	-0.426	241348	0.0174	2444	-0.0001137
	(-23000000)	(-0.668)	(147123)*	(0.008)**	(10086)	(-0.002)
Manufacturing	4788422	-0.3010201	20409	-0.0048	4482	0.0002535
	(-14700000)	(-0.358)	(-92027)	(-0.004)	(6764)	(-0.001)
Mining	-6424960	0.2847294	-38551	0.0041	3091	0.0021054
	(-9698050)	(-0.401)	(-55109)	(-0.003)	(3949)	(0.001)***
R^2	0.1029	0.5216	0.1151	0.4311	0.0674	0.2969

Notes: 3 of 22 industries shown, R^2 was calculated using all 22 industries
Constant term omitted
Year interacted with industry shares omitted
A "beneficiary" is someone who submitted a work-related injury or disease insurance claim and had their claim accepted. It does not include workers who did not report their accident or who had their claims request denied.
*** Significant at 1% Level ** Significant at 5% Level * Significant at 10% Level

To interpret Panel B: coefficients in column (2) represent the total number of people who have gained insurance coverage in a specific industry each year after 2003 due to the policy changes, where the industry in column (1) is always weighted as 1 (i.e. is the only industry in China). Columns (4) and (6) can be interpreted in the same way, where the coefficients represent the number of insurance claims that would be accepted for workers in construction, manufacturing, and mining if those industries were weighted as 1, respectively. The coefficients only include insurance coverage that existed because of the policy change, and does not include the values for predicted coverage without the policy change, which are associated with Year interacted with provincial data. For these values, see Appendix B, Panel D.

Appendix B continued

Panel C: Industry Regression Results

Table 1: All Industries; Year 2003 interacted with Industry Data

(1)	(2)	(3)	(4)	(5)
	Employees	Female Employees	Earnings‡	Average Earnings
Agencies	-4454737 (31100000)	-3325537 (11600000)	-446000 (568000)	-3806 (8465)
Construction	10700000 (29200000)	3206773 (11000000)	404000 (529000)	-1711 (12183)
Farming	-150737.5 (12400000)	-929183 (4606003)	-25300 (222000)	-10731 (10859)
Government	8167963 (41400000)	3221890 (15700000)	582000 (764000)	9967 (12389)
Institutions	-5766017 (39100000)	-3553792 (14600000)	-455000 (704000000)	-2869 (9592)
Manufacturing	3890472 (17200000)	1203146 (6498276)	180000 (320000)	-4988 (4846)
Mining	-3033669 (11800000)	-1865297 (4354442)	-115000 (213000)	4017 (5229)
Real Estate	-119000000 (560000000)	-51000000 (208000000)	-5680000 (10200000)	174943 (139081)
Research	-25600000 (75900000)	-14100000 (27600000)	-1150000 (1370000)	24531 (24219)
Social Services	33200000 (123000000)	14200000 (45400000)	1490000 (2250000)	-11960 (34253)
Trade	655752.3 (36200000)	322555.4 (13500000)	329000 (679000)	6374 (16595)
Transportation	5848515 (33200000)	89505.58 (12700000)	182000 (609000)	580 (14418)
Constant	8.61E+08 (1570000000)	-6.27E+08 (482000000)	-9780000 (17200)	-2692999 (199377)****
R^2	0.0375	0.0415	0.0671	0.8028

‡ Earnings and Standard Errors are in 1000 Yuan

*** Significant at 1% Level ** Significant at 5% Level * Significant at 10% Level

Appendix B continued

Panel C: Industry Regression Results

Table 2: All Industries; Year interacted with Industry Data

(1)	(2)	(3)	(4)	(5)
	Employees	Female Employees	Earnings‡	Average Earnings
Agencies	-473965.3	297980.9	4443	1347
	(786787)	(239823)	(8564)	(99)****
Construction	-403117.5	323549.1	5222	1358
	(780105)	(242178)	(8657)	(100)****
Farming	-422468	316616.5	4933	1340
	(781933)	(241472)	(8630)	(100)****
Government	-369326.9	335034	5536	1374
	(778086)	(243088)	(8692)	(102)****
Institutions	-475442.7	296493.1	4384	1331
	(787850)	(239506)	(8551)	(98)****
Manufacturing	-408234.1	321666.7	5116	1350
	(781234)	(241719)	(8641)	(100)****
Mining	-432994.8	311611	4805	1342
	(784036)	(240668)	(8599)	(99)****
Real Estate	-972809.7	105441.3	-64814	1494
	(899249)	(248912)	(8482)	(117)****
Research	-515554.5	280117.6	3902	1349
	(789963)	(239637)	(8543)	(100)****
Social Services	-315101.3	358658.4	6151	1357
	(774405)	(246489)	(8811)	(101)****
Trade	-383774.8	328148.4	5359	1356
	(780634)	(242055)	(8653)	(101)****
Transportation	-417520	319088.4	5058	1358
	(779814)	(242354)	(8664)	(101)****
Constant	8.61E+08	-6.27E+08	-9780000	-2692999
	(1570000000)	(482000000)	(17200)	(199377)****
R^2	0.0375	0.0415	0.0671	0.8028

‡ Earnings and Standard Errors are in 1000 Yuan

*** Significant at 1% Level ** Significant at 5% Level * Significant at 10% Level

Appendix B continued

Panel B: Provincial Regression Results; Year 2003 interacted with Industry Shares

Table 1: Selected Industries (High Risk)

(1)	(2) Total Workers Insured	(3) Insurance per Worker	(4) Total Injury Beneficiaries	(5) Injuries per Worker	(6) Total Disease Beneficiaries	(7) Diseases per Worker
Agencies	-1.04E+07	0.80	-28325	0.0189	856	0.0028192
	(24900000)	(.677)	(146954)	(0.009)**	12119	(0.001)*
Construction	2.72E+07	-4.26E-01	241348	0.0174	2444	-0.0001137
	(23000000)	(.668)	(147123)*	(0.008)**	10086	(.002)
Farming	-2445395	-0.4014718	-65731	-0.0145	3122	-0.0000847
	(10700000)	(.52)	(62809)	(0.004)****	5764	(.001)
Government	-1723871	-1.547196	-8517	-0.0134	4899	-0.0010692
	(36000000)	(1.053)	(215679)	(.011)	23562	(.003)
Institutions	-695441.7	0.4010938	-5491	0.0091	-3394	-0.0003908
	(33200000)	(.884)	(196355)	(.007)	18595	(.002)
Manufacturing	4788422	-0.3010201	20409	-0.0048	4482	0.0002535
	(14700000)	(.358)	(92027)	(.004)	6764	(.001)
Mining	-6424960	0.2847294	-38551	0.0041	3091	0.0021054
	(9698050)	(.401)	(55109)	(.003)	3949	(0.001)***
Real Estate	-2.51E+08	24.86	-1232767	0.184	-11295	0.0363514
	(442000000)	(11.5)**	(2849451)	(.128)	201346	(.027)
Research	-8.16E+07	3.47	-789131	-0.0389	1584	0.0083747
	(61500000)	(1.94)	(401845)*	(.026)	31584	(.005)
Social Services	6.85E+07	-6.57	494759	-0.0107	3050	-0.0086826
	(97800000)	(2.5)***	(646892)	(.029)	44587	(.006)
Trade	6305116	1.488779	-25675	-0.0205	-5329	-0.0031245
	(31300000)	(1.191)	(206708)	(.016)	15155	-(.003)
Transportation	4243578	0.6255502	-3414	-0.0067	-13785	-0.0016419
	(28500000)	(1.121)	(172657)	(.009)	13572	(.002)
Constant	-1.60E+08	-54.3891	-4993253	-0.639039	-637329.4	-0.1009372
	9.47E+08	28.45747	5293759	0.2610069	539192.4	0.0354863
R^2	0.1029	0.5216	0.1151	0.4311	0.0674	0.2969

*** Significant at 1% Level ** Significant at 5% Level * Significant at 10% Level

Appendix B continued

Panel B: Provincial Regression Results; Year 2003 interacted with Industry Shares

Table 1: Selected Industries (High Risk)

(1)	(2) Total Workers Insured	(3) Insurance per Worker	(4) Total Injury Beneficiaries	(5) Injuries per Worker	(6) Total Disease Beneficiaries	(7) Diseases per Worker
Agencies	63396.41	0.027188	2512.586	0.0003	318	0.0000524
	(471624)	(.014)	(2621)	(0.0001)**	267	(0.0000)***
Construction	76809.26	0.0265989	2476.722	0.0003	322	0.0000505
	(473924)	(0.014)*	(2649)	(0.0001)**	270	(0.0001)***
Farming	82657.42	0.0281115	2497.657	0.0003	326	0.0000521
	(474204)	(0.014)**	(2654)	(0.0001)**	270	(0.0000)***
Government	134071.5	0.0284402	2679.298	0.0003	325	0.0000487
	(477915)	(0.015)*	(2702)	(0.0001)**	278	(0.0000)***
Institutions	30900.98	0.0258064	2234.72	0.0003	304	0.0000507
	(469993)	(.014)	(2599)	(0.0001)**	262	(0.0000)***
Manufacturing	93650.39	0.0280536	2579.653	0.0003	330	0.0000517
	(474641)	(0.014)*	(2660)	(0.0001)**	271	(0.0000)***
Mining	75123.73	0.025889	2477.802	0.0003	318	0.0000503
	(473001)	(.014)	(2641)	(0.0001)**	269	(0.0000)***
Real Estate	74496.9	0.0319059	3260.408	0.0005	230	0.0000536
	(474233)	(0.015)**	(2549)	(0.0002)***	252	(0.0000)**
Research	59446.26	0.0200502	2408.276	0.0003	316	0.0000507
	(473223)	(.014)	(2653)	(0.0001)**	272	(0.0000)***
Social Services	90256.3	0.0307421	2476.947	0.0003	342	0.000052
	(477771)	(0.014)**	(2692)	(0.0001)**	274	(0.0000)***
Trade	111665	0.0277701	2514.399	0.0003	309	0.0000465
	(475849)	(0.015)*	(2673)	(0.0001)**	272	(0.0000)***
Transportation	102688	2.86E-02	2667.895	0.0003	322	0.0000491
	(476219)	(0.014)**	(2675)	(0.0001)**	274	(0.0000)***
Constant	-1.60E+08	-54.389	-4993253	-0.639	-637329	-0.101
	(947000000)	(28)	(5293759)	(0.0001)**	539192	(0.0355)***
R^2	0.1029	0.5216	0.1151	0.4311	0.0674	0.2969

*** Significant at 1% Level ** Significant at 5% Level * Significant at 10% Level

Summary

This paper seeks to determine the effect of domestic job growth on work-related injuries and diseases in Mainland China. Some experts argue that China as a whole suffers from the health hazards and work-related injuries that have become prevalent where labor law enforcement is uneven or even non-existent (Crandall). NGOs and labor rights activists suggest that heightened labor law enforcement will increase both workplace safety and private insurance coverage for workers, which are mandated by law in most provinces. Over the past decade, the PRC has made dramatic changes to its labor contract laws, corporate laws, and social welfare system in an effort to improve workers' wellbeing and decrease the impact of rights violations on the public healthcare system and national budget.

In 2003, changes in marketplace behavior, corporate law, and enterprise management policy led to rapid growth in employment, wages, and insurance coverage (see Figures 1-5). The econometric model described in this paper measures whether workers' compensation for injuries and diseases incurred at work increased overall due to this policy change. More specifically, it measures the exact effect of the policy changes on employment, wages, insurance coverage, and work related injury/disease rates between 2003 and 2006. In other words, the model predicts what would have happened to employment, wages, and injuries if there hadn't been a policy change, and reports them as the variable Year. Then the model measures the difference between Year and what really happened, which is reported as Year2003. The regression results for Year 2003 represent the exact statistical effect of the policy changes.

The policy changes included significant Chinese market reform, which boosted employment and value added after 2003 (see Figure 4). The regression results reflected this overall increase in employment across most industries, with two notable exceptions in farming and mining. New technology in both mining and farming has replaced workers, though the result has been different for each industry. In mining, the remaining workers have taken on jobs that have higher value-added, resulting in higher wages. In farming, the reduction in both employees and wages lends evidence to other studies that confirm internal migration from western farmlands to eastern and central manufacturing and service jobs. The transportation and construction industries also experienced growth due to the 2003 policy change, which was likely a side effect of increased economic activity in other sectors (which may include accommodating migrants from the west). The policy changes had the largest effect on social services employment, which grew more than any other industry. Though wages degreased for social services providers, this change was unmistakably the result of the 2003 social welfare reform. Coincidentally, government workers received by far the highest increase in average wages due to the policy changes while non-government social services employees suffered from pay cuts.

I found evidence that suggests that the workers' insurance coverage improved overall due to the policy changes, and that a greater number of workers are being compensated for injuries and illnesses incurred at work. Though a smaller proportion of workers are insured, more workers are receiving compensation. I also found that workers in the mining industry are paid

disproportionately low wages considering their risk of disease. This points to either dishonest firms or undereducated employees.

One of my most interesting findings concerns the mining industry, and concerns labor law enforcement directly. Some of the regression results seem to substantiate qualitative studies that have been conducted on work-related disease. These findings may substantiate some qualitative research conducted by China Labour Bulletin, which recently published an in-depth report on pneumoconiosis (lung disease) in Chinese mining and manufacturing (The Hard Road). Panel B, on page 21, shows that the insurance claims acceptance rates for work related diseases in mining and manufacturing have increased by .2% and .03% each year due to the effects of the 2003 policy change. We can see in column (7) that the mining industry has had a statistically significant increase in claims acceptance for work related disease. In spite of the considerable drop in employment and insurance coverage for the mining industry after 2003, miners continue to have their insurance claims accepted. These results were relatively surprising, as China's largest insurers, such as China Life, usually require thorough medical documentation and proof of long-term employment before a worker will be compensated for medical treatment (Poon, LaMoshi). Pneumoconiosis cases are especially difficult to claim on insurance or in court because lung disease can also be caused by smoking or pollution (China Insurance Regulatory Commission).

Taking this information into consideration, it seems plausible that China Labour Bulletin is correct in saying that work-related diseases in mining may still be a growing problem in China, and that today's miners are still in danger of acquiring pneumoconiosis.

Given the limitations of this study, it is difficult to interpret the remainder of my work-related illness and disease results. However, there does seem to be some evidence (from both the regression results in this paper as well as others' qualitative research) that mining seems to be growing more dangerous. Pneumoconiosis, the leading work-related disease in China, is predicted to cost the country over 10 billion Yuan by 2020 (Crandall). The disease is easily prevented using means that are required under China's current legal structure, which lends credence to an increase in workplace safety enforcement in mines across provinces.

The Chinese government has made exceptional progress over the last 30 years. The Chinese have agreed to follow basic ILO labor mandates, and the legislature has passed adequate legislature in order to protect its workers at a minimal level. Unfortunately, the enforcement of these laws continues to fall short, and hundreds of thousands of Chinese laborers remain without adequate pay, health benefits, and working conditions (Hard Road). Bao Hua, a factory auditor, tells us that brand auditing, police services, and other labor law enforcement mechanisms are often rendered useless by corruption. Conducting quantitative studies (such as this one) is important in helping to track the progress and success of Chinese efforts to improve labor conditions, and to measure the economic costs of allowing laws to continue to go unenforced.

The province and industry-level data used in this experiment was collected by the Chinese Bureau of Statistics, and provides information on employment, wages, and insurance from 30 provinces between 1998 and 2007. The results

exclude Chinese territories, including Macau and Hong Kong, and do not encompass the effects of the current economic crisis.