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Abstract

Recent years have seen a surge in the evidence on the impacts of active labor market programs for numerous countries. However, little evidence has been presented on the effectiveness of such programs in China. Recent economic reforms, associated massive lay-offs, and accompanying public retraining programs make China fertile ground for rigorous impact evaluations. This study evaluates retraining programs for laid-off workers in the cities of Shenyang and Wuhan using a comparison group design. To our knowledge, this is the first evaluation of its kind in China. The evidence suggests that retraining helped workers find jobs in Wuhan, but had little effect in Shenyang. However, in terms of earnings impacts, retraining appears to have increased earnings in Shenyang but not in Wuhan. The study raises questions about the overall effectiveness of retraining expenditures, and it offers some directions for policymakers about future interventions to help laid-off workers.

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1. INTRODUCTION

Over the past decade, traditional job guarantees and economic security provided by urban state-owned enterprises (SOEs) in China have been reduced as part of a nationwide economic reform effort. To help workers transition to the free labor market, China instituted what was called the *xiagang* system. Xiagang were redundant workers who remained attached to the SOE and were provided subsistence income payments along with contributions to public health insurance and pension funds, and often times housing. While the aim was to smooth labor adjustment, many redundant workers have experienced significant income losses and had difficulty finding new jobs. The xiagang system has been dismantled, and much restructuring has already occurred. Still, even the most optimistic observers recognize that China faces more labor adjustment challenges, especially with reforms called for by China's accession to the World Trade Organization (WTO). China, like virtually all countries—especially transition countries—is increasingly facing difficult policy questions about how to address the problem of laid-off workers in order to provide effective social protection and maintain social stability.

How well publicly provided training works can influence policy decisions in a range of programs, including social security, unemployment insurance, and public employment services designed to help workers find new jobs and restore their incomes. These latter interventions are collectively known as active labor market programs (ALMPs) and include retraining programs, employment services (e.g., labor exchange, counseling, etc.), job creation through loans or subsidies, public service employment, public works, and self-employment assistance. Active labor market programs such as these have been used extensively in developed and transition economies for many years. They represent an attractive policy approach because they are

intended to provide jobless workers a "trampoline" for getting back into productive employment, as opposed to simply providing them a financial "safety net."

However, as international experience has clearly demonstrated, implementing an effective active labor market policy poses many challenges. The immediate challenge is to design and implement retraining and other ALMPs that actually benefit participants in a cost-effective manner. Indeed, it is apparent from many studies in developed and transition countries that this is very often not the case. For this reason, there is growing emphasis on scientifically evaluating the effects and cost efficiency of these programs and basing future program expenditures on such results.

In turn, this has led to a surge in the academic literature on impact evaluation of training programs. While a large literature has now been established for developed countries, the evidence for developing and transition economies is scarce.[1] For China in particular, no evidence is presently available. Given the extent of economic reforms in China over the past few decades, combined with associated massive layoffs and accompanying public retraining programs, this is paradoxical, as these events virtually cry out for rigorous evaluation of the impact of job training.

This study evaluates retraining programs for laid-off workers in the Chinese cities of Shenyang and Wuhan using a carefully designed comparison group methodology. To our knowledge, this is the first evaluation of its kind in China. The results suggest that retraining

[1]See Heckman, Lalonde and Smith (1999) for a comprehensive review of impact evaluations in OECD countries; Dar and Gill (1998) for a review of 11 studies covering the United States, Sweden, Australia, Canada, and France; Galasso, Ravallion, and Salvia (2001) for a study on the Argentinian Proemplio experiment; Jimenez and Kugler (1987) for a study on Columbia's national in-service training systems; Fretwell, Benus, and O'Leary (1999) for an evaluation of training programs in Hungary, Poland and the Czech Republic; and NEI (2001) for an evaluation of training programs in Bulgaria.

helped workers find jobs in Wuhan but had little effect in Shenyang. When it comes to earnings, on the other hand, retraining appears to increase earnings in Shenyang but not in Wuhan. The study raises questions about the overall effectiveness of retraining expenditures and it offers some directions for policymakers about future interventions to help laid-off workers. The structure of the paper is as follows. The next section presents the institutional context and labor market context of training for laid-off workers in China, focusing on the experiences of workers in Shenyang and Wuhan. Section 3 provides a literature review, which is followed in section 4 by a discussion of the methodology underlying the analyses in this paper. Section 5 presents the data and discusses the quasi-experimental design in detail. Results follow in section 6, while section 7 concludes and provides suggestions for future research on the possible impact of active labor market programs in China.

2. INSTITUTIONAL AND LABOR MARKET CONTEXT OF TRAINING

To understand the potential for job training, it is important to know the institutional framework and labor market context of training for laid-off workers in China. We first discuss national government policies promoting reemployment of laid-off workers, and then review the economic conditions at the national and provincial levels. This is followed by a brief examination of the economic conditions in the cities of Shenyang and Wuhan around the time retraining programs there were evaluated.

2.1 Government Policies Promoting the Reemployment of Laid-Off Workers[2]

In May 1998, the Central Party Committee and the State Council jointly organized a conference titled "Safeguarding the Basic Living Standards of Laid-off Workers in SOEs and Their Reemployment." After the conference, the Central Party Committee and the State Council jointly issued an outline of various policy measures adopted. These included setting up reemployment service centers (RSCs) and establishment of programs to promote the reemployment of laid-off workers (see sidebar on p. 6, "Policies to Establish Reemployment Centers in 1998"). Registration with an RSC established an institutional membership for the jobless distinct from being either xiagang or openly unemployed.

Beginning in 2001, programs for laid-off workers started to change in Liaoning province, of which Shenyang is the capital city, and in some other provinces piloting social security reform. Wuhan, capital of Hubei province, was not among the cities where social security reforms were tried. In the pilot cities, including Shenyang, no additional RSCs were created starting in 2001, and newly laid-off workers unable to find new jobs joined the ranks of the unemployed as soon as they were separated from their prior employers. Current RSC registrants, retained their institutional affiliations during the pilot test period. In Wuhan, newly laid-off workers were required to register with an RSC between 2001 and 2003, right up until the final closure of all RSCs in 2003. By 2003, all workers who were registered with RSCs terminated their membership and became unemployed unless they had found new jobs.

When RSCs were closed, a range of new active labor market policies (e.g., training, job information, job referrals, career information, etc.) were adopted to strengthen labor market

[2]This section draws heavily on Rong (2002).

TABLE 2.1 JOB RECOMMENDATION ACTIVITIES FOR LAID-OFF WORKERS

	1998	1999	2000
Shenyang City			
Persons receiving job recommendations	70,000	81,000	89,000
Successful rate of job recommendation	40.2	40.8	40.8
Regular job fair (month)	12	23	30
Participants in regular job fairs (month)	800	800	1,200
Wuhan City			
Persons receiving job recommendations	130,300	146,517	146,800
Successful rate of job recommendation	51.6	53.1	51.0
Regular job fair (month)	21	28	35
Participants in regular job fairs (month)	314	414	465

SOURCE: *Shenyang Municipal Labor Bureau* and *Wuhan Municipal Labor Bureau.*

development. These were available at public labor bureaus not requiring compulsory registration by the jobless. Table 2.1 shows the volume of job referrals for laid-off workers in Shenyang and Wuhan. For example, in both cities, the government required that the labor bureau offer at least three opportunities for employment for laid-off workers who demonstrated a great need. Special services in Wuhan were also targeted to households in which both husband and wife were laid off and unemployed. Arrangements for publicly funded job training were handled differently.

Other policy measures included development of tertiary industries, particularly community services; encouraging the development of small and medium enterprises; facilitating self-employment, including credit support; and expediting social security reform particularly in the areas of pensions, health care, and unemployment insurance. The contribution rate for unemployment insurance was increased to 3 percent from 1 percent beginning in the latter half of 1999, with the 2-percentage-point increase shared equally between employers and employees.

In Wuhan, 40,000 laid-off workers were employed in community services by the end of June 1998. By May 2001, in Shenyang there were over 600 grass-roots-level organizations providing employment to about 90,800 laid-off workers. During the same period, the Shenyang

municipal government set up various markets employing over 170,000 workers. Additional local efforts were also undertaken to encourage workers to set up businesses. These included tax reductions and exemptions, a temporary reduction in municipal administrative fees, and credit support.

2.2 Economic Conditions—National and Provincial

China's GDP growth rates over the past few years have been enviable, but employment growth rates were more modest. Urban employment has been growing, albeit at a slower rate in recent years, while rural employment has declined significantly. However, provinces differ from the national averages in GDP and employment growth rates, unemployment rates, and the number of xiagang. Unemployment rates in both Liaoning and Hubei provinces have been higher than the national average since 1996, even though their provincial GPD growth rates have exceeded the national average since 1997 (Table 2.2). Despite the relatively high output growth, employment has been falling in Liaoning and Hubei, with even larger reductions in their urban areas in 1998 and 1999.

TABLE 2.2 GDP, EMPLOYMENT GROWTH RATES AND UNEMPLOYMENT RATES

	Year	1996	1997	1998	1999
GDP growth rate	National	9.6	8.8	7.8	7.1
	Liaoning	8.6	8.9	8.3	8.2
	Shenyang	11.0	10.0	10.9	10.3
	Hubei	13.2	13.0	10.3	8.3
	Wuhan	16.0	14.6	11.2	11.0
Employment growth rate	National	1.3	1.1	0.5	0.9
	Liaoning	−0.2	1.6	−11.9	−1.2
	Hubei	−0.5	0.6	−3.4	−1.7
Urban employment growth rate	National	3.8	2.0	2.3	1.6
	Liaoning	−0.7	−1.5	−22.5	−3.1
	Hubei	0.3	11.4	−15.6	−5.1
Unemployment rate	National	3.0	3.1	3.1	3.1
	Liaoning	3.6	3.9	3.4	3.5
	Hubei	3.5	3.5	3.3	3.3

Source: National Bureau of Statistics of the People's Republic of China (2000a,b).

Nationwide SOEs continued to be the dominant employer in 1999, with a 55 percent share of all urban employment in 1999, with another 11 percent of the workforce was employed in collective owned enterprises. By 1999 the private sector share of all urban employment nationwide had risen to 22 percent. In the provinces of Liaoning and Hubei, a somewhat larger share of total employment was in the private sector (see Table 2.3).

TABLE 2.3 URBAN EMPLOYMENT BY OWNERSHIP

Urban employment 1999	Total employment (millions)	Percentage employed in			
		SOE	Collective	Other ownership	Private
National	210.14	55.0	11.0	11.8	22.2
Liaoning	8.575	52.2	13.3	9.9	24.6
Hubei	8.025	55.4	9.6	7.6	27.5

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b).

Regions vary in the share of the workforce who are xiagang, with the magnitude dependent on the extent of the SOE reform and the industrial composition of employment. By end-1999, laid-off workers in Liaoning, Heilongjiang, Hubei, and Hunan constituted 41 percent of all layoffs nationwide, with Liaoning and Hubei accounting for 13 and 7 percent, respectively (Table 2.4). As shares of the total employed nationwide, Liaoning and Hubei account for 3 and 4 percent, respectively, so these two provinces have disproportionately high shares of the nation's laid-off workers. In Liaoning and Hubei provinces, 57 and 59 percent of xiagang, respectively, were from SOE, while 38 and 29 percent, respectively, were from the urban collective-owned enterprises. Nationally, 70 percent of xiagang workers were from the SOE, and 28 percent from collectively-owned enterprises.

TABLE 2.4 LAID-OFF WORKERS BY REGIONS, 1999

Province	Total number of laid-off workers	Percent of national total	Total number of laid-off workers in SOEs	Percent of national total (in SOEs)
Northern Region				
Beijing	31,800	0.3	29,000	0.5
Tianjin	201,341	2	144,763	2
Hebei	264,961	3	196,799	3
Shanxi	260,035	3	200,554	3
Inner Mongolia	131,289	1	129,189	2
Northeast Region				
Liaoning	1,189,913	13	678,000	11
Jilin	466,455	5	339,685	5
Heilonjiang	1,217,700	13	740,500	12
Eastern Region				
Shanghai	146,948	2	98,513	2
Jiangsu	287,602	3	170,550	3
Zhejiang	113,378	1	56,348	1
Anhui	447,250	5	287,573	5
Fujian	29,323	0.3	29,323	0.5
Jiangxi	326,253	3	261,930	4
Shandong	234,855	3	143,109	2
Central Region				
Henan	422,725	5	262,657	4
Hubei	700,301	7	414,514	7
Hunan	758,320	8	524,522	8
Guandong	298,680	3	135,184	2
Guangxi	134,815	1	127,616	2
Hainan	43,497	0.5	38,933	1
Southwest Region				
Chongqing	192,943	2	135,136	2
Sichuan	432,952	5	296,383	5
Guizhou	130,172	1	109,559	2
Yunnan	64,346	1	58,844	1
Northwest Region				
Shannxi	435,983	5	324,946	5
Gansu	173,994	2	156,917	2
Qinghai	61,958	1	61,090	1
Ningxia	43,475	0.5	39,526	1
Xinjiang	94,063	1	87,485	1

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b).

Job layoffs are also concentrated in certain industries. Textiles, coal mining, armaments,

and machinery are the harder hit industries.[3] Table 2.5 shows the industrial distribution of laid-off workers in SOEs in 1998 and 1999. The industrial classification is broad and shows that over half the laid-off workers are from the manufacturing industry in Wuhan. Supplemental information indicates that the manufacturing sectors impacted greatest by layoffs were textiles and general machinery manufacturing. In certain categories of manufacturing—for example, cultural, educational and sports products, leather, fur, and rubber manufacturing—the ratio of laid-off workers to total workers was between 40 and 50 percent.[4] Evidence for Shenyang identifies four sectors with relatively high redundancies: light industry, textiles, petroleum, and chemical and agricultural machinery.[5]

TABLE 2.5 DISTRIBUTION OF LAID-OFF WORKERS IN SOES, BY INDUSTRY, 1998–1999 (%)

	National		Liaoning		Hubei	
	1998	**1999**	**1998**	**1999**	**1998**	**1999**
Coal enterprises	4.85	4.96	3.53	2.97	0.00	0.00
Metallurgical enterprises	1.34	1.26	1.02	0.98	1.06	1.15
Nonferrous enterprises	1.27	1.17	1.47	1.64	0.44	0.02
Mining and Quarrying	11.65	11.96	7.54	9.12	4.99	5.00
Manufacturing enterprises	43.00	42.59	41.02	45.07	53.05	53.23
Electricity, gas, and water	1.98	2.03	0.64	0.58	1.84	1.84
Construction	7.49	8.38	5.46	6.17	7.66	7.69
Transportation, storage, postal and telecom.	4.70	4.35	1.31	1.89	6.02	6.04
Wholesale and retail trade, catering	16.21	15.14	36.13	28.59	14.60	14.66
Other enterprises	7.51	8.17	1.87	3.00	10.34	10.37

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b).

[3]In 1999, laid-off workers in textile enterprises directly affiliated to the central government was 600,000, 400,000 in coal mining, 200,000 in armaments, and 200,000 in machinery enterprises. These figures are taken from the presentation entitled "Situation of Laid-Off Workers in State Enterprise and Policies on Securing their Basic Living Standards and Promoting their Re-employment," by the Labor Bureau at the Labor Market Policies Seminar in Beijing in May 1999.

[4]Survey Report on Employment Situation in Wuhan, 1997, mimeo. The statistics refer to 1996.

[5]Presentation by the Shenyang Municipal Labor Bureau on "Forcefully Implementing Re-employment Project—Organizing and Facilitating Redundant Workers for Reemployment" at Labor Market Policies Seminar in May 1999.

When we examine employment growth rates across sectors (Table 2.6), we find that between 1996 and 1999, while employment in the manufacturing and mining/quarrying sectors declined significantly, employment in the financial services, real estate activities, and social services rose. Employment in wholesale and retail trade grew between 1996 and 1998 but contracted between 1998 and 1999.

TABLE 2.6 EMPLOYMENT GROWTH RATES OF VARIOUS SECTORS, 1996–1998

	Percentage 1996–1997	Percentage 1997–1998	Percentage 1998–1999
Agriculture/fishery	1	1	0
Mining/quarrying	−4	−7	−17
Manufacturing	−2	−3	−13
Utilities (electricity, gas, water)	4	1	0
Construction	1	3	−4
Geological prospecting, water conservancy	0	−4	−10
Transportation, storage, communications	2	1	−3
Wholesale and retail trade, restaurant	6	2	−3
Financial intermediation and insurances	5	4	2
Real estate activities	4	2	8
Social services	8	6	7
Healthcare, social welfare, and sporting	3	1	1
Education, culture and arts, radio, film, TV	3	0	1
Scientific research and polytechnical services	2	−3	−4
Government agencies, social organizations	0	0	0
Others	7	−3	5

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b).

Among laid-off workers registered with RSCs in 1999, about 47 percent were female in both Wuhan and Shenyang, while the proportion female in the urban labor force was only 28 and 29 percent, respectively, in Hubei and Liaoning provinces. The vast majority of workers were less than 46 years old and among the less educated, with most having attained no higher than a junior middle school level (Table 2.7).

TABLE 2.7 CHARACTERISTICS OF LAID-OFF WORKERS IN REEMPLOYMENT SERVICE CENTERS, 1999

Province	Total workers in reemployment center	Percentage distribution, by educational attainment			Percentage female	Percentage distribution, by age		
		Junior middle	Secondary/ technical	College or higher		≤ 35 years	35–45 years	≥ 46 years
Liaoning	727,365	62.8	28.6	8.7	47.3	35.4	44.2	20.4
Hubei	587,950	54.5	40.5	5.0	47.3	33.5	48.1	18.4

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b).

Table 2.8 indicates that laid-off workers in the Hubei RSCs are much more likely to be paid all basic living expenses (88 percent) than those in Liaoning (59 percent). Nearly 16 percent of Liaoning workers in the RSCs do not receive any basic living expenses, while only 4 percent in Hubei go without basic support. About half of the laid-off workers in Hubei belonged to an RSC for less than a year, with none staying more than two years. In Liaoning, about 37 percent of the laidoff stayed with an RSC for less than a year, while 12 percent stayed for over two years.

TABLE 2.8 LAID-OFF WORKERS IN REEMPLOYMENT SERVICE CENTER — RECEIPT OF LIVING SUBSIDY AND DURATION IN CENTER, 1999

Province	Total workers in reemployment service center	Percentage distribution, by status of basic living expenses			Percentage distribution, by duration in the reemployment service center		
		All living expenses paid	Not all living expenses paid	No living expenses paid	< 1 year	1–2 years	2–3 years
Liaoning	727,365	58.5	25.6	15.9	36.7	50.9	12.4
Hubei	587,950	87.7	8.3	4.0	52.5	47.5	0.0

SOURCE: National Bureau of Statistics of the People's Republic of China (2000b)

2.3 Economic Conditions in Shenyang and Wuhan

Were economic conditions in Shenyang and Wuhan different? Wuhan had a more dynamic economy than Shenyang. GDP per capita in 2000 in both cities was about the same—16,111 yuan in Wuhan and 16,333 yuan in Shenyang. GDP growth rates have exceeded

10 percent annually in both cities over the period 1996–2000, though growth rates in Wuhan have been higher. Wuhan's growth exceeded that in Shenyang by 5–6 percent higher in 1996–1997 and 1–2 percent higher in 1998–2000 (Table 2.9). Higher growth rates provide greater opportunities for creating jobs, but did the jobs actually materialize? Employment elasticities show the responsiveness of employment to economic growth and are calculated by dividing the net new job growth rate by the economic growth rate. The employment elasticity

TABLE 2.9 SHENYANG, WUHAN AND NATIONAL ECONOMY AND EMPLOYMENT CONDITION DATA

GDP (100 million yuan)	**1996**	**1997**	**1998**	**1999**	**2000**	**Average**
Shenyang	764.4	851.1	938.8	1,013.2	1,119.1	1,066.15
Wuhan	782.1	912.3	1,001.9	1,085.7	1,206.8	1,146.25
Whole country	66,850.5	73,142.7	76,967.2	80,579.4	88,189.6	84,384.5
GDP growth rate (%)						
Shenyang	11	10	10.9	10	10.3	10.44
Wuhan	16	14.6	11.2	11	12	12.96
Whole country	9.8	8.6	7.8	7.2	8.3	8.34
Total revenue (100 million yuan)						**Total**
Shenyang	39.93	47.9	54.2	56.79	61.12	259.94
Wuhan	36.21	41.67	50.77	60.47	69.77	258.89
Whole country	7,407.99	8,651.14	9,875.95	11,444.08	13,395.23	50,774.39
Total revenue growth rate (%)						**Average**
Shenyang	12.26	19.96	13.15	4.78	7.62	11.55
Wuhan	21.38	18.08	17.14	12.16	12.39	16.23
Whole country	18.7	16.8	14.2	15.9	17	16.52
Total exports (US$ 100 million)						**Total**
Shenyang	8.67	8.53	7.75	7.99	12.97	45.91
Wuhan	8.04	9.41	10.82	4.83	6.49	39.59
Whole country	1,510.5	1,827.9	1,837.1	1,949.3	2,492	9,616.8
Total amount of foreign capital actually used (US$ 100 million)						**Total**
Shenyang	7.87	8.68	10.21	10.35	10.44	47.55
Wuhan	9.2	9.31	10.56	11.66	13.03	53.76
Whole country	548.04	644.08	585.57	526.59	593.56	2,897.84
General retail price index (preceding year = 100)						
Shenyang	106	101.7	96.5	95.4	98	
Wuhan	106	100.7	96.2	93.7	97.4	
Whole country	106.1	100.8	97.4	97	98.5	
General consumer price index (preceding year = 100)						
Shenyang	107.9	105.1	99	97.6	100.1	
Wuhan	112.2	103.1	97.4	96.1	100.6	
Whole country	108.3	102.8	99.2	98.6	100.4	
Primary industry employed persons (10,000 persons)						**Average rate (%)**
Shenyang	74.2	78.2	82.7	87.7	88.7	5.71
Wuhan	91.4	93	92.8	92.9	91.4	−0.47
Whole country	34,769	34,730	34,838	35,364	35.575	0.06
Second industry employed persons (10,000 persons)						**Average growth rate (%)**
Shenyang	161.6	152.1	144.3	136.3	133.5	−4.11
Wuhan	154.6	154.2	152.3	151.9	148.9	−0.27
Whole country	16,180	16,459	16,440	16,235	16,009	0.49

Table 2.9 (Continued)

GDP (100 million yuan)	1996	1997	1998	1999	2000	Average
Tertiary industry employed persons (10,000 persons)						**Average growth rate (%)**
Shenyang	148	155.6	152.6	154.6	156	2.07
Wuhan	16.4	164.6	170.1	172.9	177.4	3.03
Whole country	17,901	18,375	18,679	18,987	19,566	3.22
Total number of employment persons (10,000 persons)						**Average growth rate (%)**
Shenyang	383.7	385.7	379.5	377.3	378.2	0.46
Wuhan	406.4	411.8	415.2	417.8	417.8	0.96
Whole country	68,850	69,600	69,957	70,586	71,150	0.94
Total population (10,000 persons)						**Average growth rate (%)**
Shenyang	671	937.8	674.8	677	685.1	0.55
Wuhan	715.9	723.9	931.8	740.2	749.2	1.1
Whole country	122,389	123,626	124,810	125,909	126,583	0.9
Taxes (100 million yuan)						**Average growth rate (%)**
Shenyang	35.07	39.95	40.99	51.61	56.33	12.9
Wuhan	28.43	32.58	37.71	39.84	44.77	17.8
Whole country	6,909.82	8,234.04	9,262.8	10,682.58	12,581.51	21.7
Self-employment Individual (10,000 persons)						**Average growth rate (%)**
Shenyang	21	23	30.6	52.7	56.4	16.39
Wuhan	40.48	45.76	51.49	54.15	63.61	13,94
Whole country	1,709	1,919	2,259	2,414	2,136	7.38
Employment elasticity						**Average**
Shenyang	0.125	0.052	−0.147	−0.058	0.023	−0.001
Wuhan	0.122	0.091	0.074	0.057	0	0.069
Whole country	0.136	0.127	0.066	0.125	0.096	0.11

SOURCE: National Bureau of Statistics of the People's Republic of China (2001), *Shenyang Yearbook* (2001), and *Wuhan Statistical Yearbook* (2001).

was higher in Wuhan than in Shenyang. Between 1996 and 2000, Shenyang's employment elasticity was −0.001, while Wuhan's employment elasticity was 0.069. Thus, despite growth rates exceeding 10 percent annually over this period, Shenyang did not experience net new job creation. Over this five-year period, while growth rates were high in both cities, Wuhan succeeded in creating significantly more jobs than Shenyang.

The employment structure across primary, secondary, and tertiary industries in both cities was similar in 1999, with about 36 percent employed in the secondary industry, around 41 percent in the tertiary sector, and the remainder in the primary sector. However, the pattern of employment growth differed by city over the period 1996–2000. From 1996 to 2000, the growth rate of employment in the primary industry was negative in Wuhan while it was positive (5.7 percent) in Shenyang. In both Shenyang and Wuhan, employment in the secondary industry declined—it declined by an average of 0.27 percent annually in Wuhan between 1996 and 2000, while in Shenyang the decline was more substantial, at 4.1 percent annually. The tertiary industry was the engine of employment growth in both cities. Employment growth over the 1996–2000 period averaged 3.03 percent annually in Wuhan and 2.07 percent in Shenyang. The higher growth rate in the tertiary industry provided better employment opportunities in Wuhan.

Wuhan also enjoys better connections to the rest of China, with better developed rail and communications systems that offer more opportunities for developing trade and commerce. The tourism sector is also better developed in Wuhan, providing an important impetus for self-employment. Wuhan has also invested significantly more than Shenyang in fixed assets. In 2000, Wuhan spent 46.2 billion yuan (or 6,166 yuan per capita) on investments in fixed assets, compared to 26.2 billion yuan (or 3,824 yuan per capita) in Shenyang. Foreign investment in 2000 in Wuhan (US$ 1.3 billion) also exceeded that in Shenyang (US$ 1.04 billion).

The average annual disposable income of urban residents in 2000 in Wuhan was 6,763 yuan, while it was only 5,850 yuan in Shenyang. However, despite lower incomes, Shenyang residents saved more in the aggregate than Wuhan residents. The differences in savings rates indicate either a scarcity of investment opportunities or reduced consumer confidence leading to

lower spending. These savings represent a resource that could help create jobs given the right incentives. Individually owned businesses saw strong growth in both Wuhan and Shenyang over this period, though overall development was stronger in Wuhan.

3. METHODOLOGY

This section presents our methodology. First we discuss the economic theory underlying the analyses, and then we discuss the empirical strategy.

3.1 Economic Model

The theoretical framework for this paper is standard human capital theory, according to which an individual builds up knowledge and skills through education, experience and training (formal and/or on-the-job) and subsequently gets rewarded in the labor market in terms of wages (Becker 1964; Mincer 1974). This leads to the following simple model:

$$\boldsymbol{Y_i = Y\left(S_i, E_i, T_i, O_i\right),} \tag{3.1}$$

where *Y* is the outcome for individual *i* (employment or wages), *S* is schooling, *E* is experience, *T* is training, and *O* is other individual characteristics, for example gender, for individual *i*. Schooling and experience are thought to affect employment prospects and wages positively, since these factors positively affect the marginal product of an individual's labor services. Training may or may not affect employment prospects and/or wages positively. This depends on, for example, whether the training in question is perceived by prospective employers to affect workers' productivity positively. If the training is thought to be of low quality or to be given to workers of low quality, thereby acting as a negative "signal" to prospective employers (Spence

1973), training might have no effect on employment and/or earnings and may even stigmatize trainees.

3.2 Estimation Strategy

Rigorous evaluations of social programs, such as training, are necessary to determine whether a program achieves its intended objectives. The central design issue in the evaluation is constructing a proper counterfactual. That is, what would have happened in the absence of the program? In the case of a training program, the evaluation must attempt to assess the employment outcomes of participants against what would have been the outcomes if they had not participated in the programs. The counterfactual is approximated by the experiences of a "comparison group" of workers who are similar in all respects except program participation. Programs that are evaluated on the basis of techniques that do not use a comparison group, relying only on statistics of program participants alone (e.g., employment rate of graduates), are of little use in determining whether programs are achieving their intended impacts.

Lacking a field experiment involving random assignment, our approach is based on a quasi-experimental design, whereby participant and comparison groups are selected after the program has commenced (we discuss this process in detail in the next section). Differences in the characteristics of the participant and comparison groups are controlled for through statistical techniques. To learn if results are robust to the choice of estimator, several techniques are used to adjust for differences in observable characteristics of workers when estimating the empirical counterpart of equation (3.1). First, we estimate the effect of training as simply the coefficient for β_1 in the regression

(3.2) $$\boldsymbol{y_1} = \beta_0 + \beta_1 \boldsymbol{T_i} + \boldsymbol{other\ controls} + \varepsilon_i \boldsymbol{,}$$

where y_1 is the outcome for individual *i* (employment or earnings), T_i is a binary indicator for whether individual *i* received training or not, "other controls" include additional controls—such as age (to proxy potential general experience), gender, and education—to ensure that the impact estimate (i.e., the estimate of β_1) is valid. ε_i is an error term that takes into account measurement error on the dependent variable y_i and other (unobserved) factors that may affect the dependent variable y_i. Equation (3.2), therefore, effectively is the empirical counterpart of equation (3.1). We estimate (3.2) by ordinary least squares for the earnings outcome and as a probit for the employment outcome. Additionally, to provide a robust alternative to the probit estimation, we estimate the employment regression by ordinary least squares, as well, thereby effectively estimating (3.2) as a linear probability model.

As yet another alternative, we apply propensity score matching methods. The intuition behind this method is to compare the mean values of outcomes across the participant and comparison groups. The comparison group is constructed in this case by a two-stage approach, where participants and nonparticipants first are pooled and a regression of the determinants of participation is performed. Based on this, the individuals are ranked across to their predicted probability of participation in the program, i.e., their (predicted) "propensity score." When a participant and a nonparticipant are "close" in terms of their propensity score, we have a match. This procedure is carried out for the entire sample, and the impact estimate—which corresponds to the estimate of β_1 in (3.2) from the regression case—is then calculated as the difference in means on outcomes between matched participants and nonparticipants. There are several different ways to do the matching, such as "nearest neighbor," where the match is based on only the closest nonparticipant, "*k*-nearest neighbors" matching, where the match is based on a

weighted average of the *k*-nearest matches of nonparticipants in terms of their propensity scores, as well as kernel-based and other methods (for details on propensity score matching see Rosenbaum and Rubin 1983, 1984, 1985; Heckman, Ichimura, and Todd 1997, 1998; Dehejia and Wahba 1999, 2002).

A potential issue that may affect all of the estimation methods is selection bias due to unobservables. For example, training participation may be associated with a negative signal, which could lead to omitted variables bias even in the case where participation in training is not influenced by unobservables. This would be the case, for example, if employers think that training participants are mostly the less able and unmotivated workers. A widely used method to address this issue is to use instrumental variable techniques (IV, or two-stage least squares). However, since we do not have an instrument in our dataset readily available, which affects selection into programs without at the same time affecting the outcome(s) of interest (employment and/or earnings), we cannot apply these methods. As a result, we must treat all observables, including training, as predetermined.

4. DATA AND DESCRIPTIVE ANALYSES

This section discusses the data and survey methodology, and also provides descriptive statistics on the samples for analysis. Tests for homogeneity in observable characteristics between the participant and comparison groups are presented. Additionally, the nature of training is discussed.

4.1 Selection of Comparison and Training-Participant Groups

The objective was to do a rigorous evaluation of training provided to xiagang. Since there was no intent to evaluate training when the program began, the evaluation was designed expost and had to rely on the available information. The next several paragraphs summarize how our data was gathered; details of our sampling are in Bidani et al. (2004, section 1 of Annex 1).

We received a list from the Shenyang Labor Bureau of 120,000 laid-off workers. This list was derived from a census of SOEs and a list of workers who were laid off in the weeks and months before July 1998. Both sources were regarded as reliable and complete. The SOE census sampling procedure stratified city districts and then enterprises. We confined our sampling to the Shenyang districts Dadong, Tiexi, and Heping to facilitate survey work for our counterparts. Dadong and Tiexi have the largest concentration of laid-off workers from SOEs. Five enterprises from each of six industries—textile, construction, metallurgy, petrol and chemical, light industry, and machinery—were selected with probability proportional to size (i.e., each enterprise selection was linked to the number of laid-off workers and was drawn without replacement). Then a sample of 3,461 workers was randomly selected from the list. The number drawn was set to compensate for the expectation that contact information would not be complete for a sizeable share of persons.

The training sample in Shenyang was selected from the training registers of the Dadong District Skilled Workers School, the Tiexi District Skilled Workers School, and the Heping District Skilled Workers School. The training conducted in Shenyang was almost uniformly one month in duration (132 hours of classroom training). All those who completed their training during August–September 1998 were included in the master training list from which our

participant sample was drawn. Only workers with complete addresses were included, and workers with multiple training were included only once. Thus, the final participant sample included 1,652 workers.

The comparison group in Wuhan was based on a similar census to the one in Shenyang, but it was believed to be less complete. The census was done in July, August, and September of 1998 and represented the stock of workers who were laid off by that time. The list of laid-off workers was computerized, and 2,118 were randomly selected from these files.

Instead of compiling the training sample from the training institutions directly as in Shenyang, we received the master list of trainees from the Wuhan Labor Bureau. The training sample in Wuhan was more diverse. The location or sponsors of training programs included the Labor Bureau, employment and training centers at the city and district levels, skilled workers schools, sector training centers, and other training institutions. The duration of training ranged from one to six months. To get an adequate sample, we included those trained between July and December 1998. A final sample of 1,666 workers was randomly selected after deleting those who participated in multiple training and keeping only those with contact information.

4.2 The Final Sample

The World Bank evaluation project team prepared a draft questionnaire which was revised by our counterparts in the Institute of Labor Studies (final questionnaire is provided in Annex 4 of Bidani et al., 2004). The team from the Institute of Labor Studies was responsible for implementing the data collection. Fielding of the survey began toward the end of May 2000 and was completed the following month. Successful interview rates were highest for the Shenyang participant group (61 percent), and lowest for the Shenyang comparison group (48 percent).

Wuhan's response rates were 51 percent for the participant group and 55 percent for the comparison group. The survey teams indicated that inaccurate contact information was the primary cause of nonresponse. The addresses on the identity cards of workers differed from their actual residences in many cases.

The original lists have some basic demographic information (age, gender, and education) for the comparison group and the training samples. We compared the samples of those interviewed with those who were not interviewed to check for evidence of a significant bias due to nonresponse and noncontact.

The sample in Shenyang that was actually interviewed was statistically significantly different on the basis of age, gender, and education from the sample that could not be contacted. The interviewed sample was a year older, significantly more female, and better educated. The interviewed sample in Wuhan differed significantly from the noninterviewed only in terms of age. The interviewed sample was a year older than the noninterviewed sample.

4.3 Generating Samples for Analysis

Betcherman, Dar, and Blunch (2002) discovered and discussed two anomalies related to this dataset. First, a substantial fraction of workers report working in July 1998, when then were assumed to have been xiagang. This is addressed by deleting these workers to yield a "true" xiagang only sample. Second, the dataset contain "late xiagangers," that is, individuals reporting having become xiagang after July 1998. These persons therefore were employed immediately prior to the intervention and were still in their old firms. This second group was also deleted from the sample for analysis since they too were not "true" xiagang. Another contamination issue was that some individuals in the comparison group reported having received training. Since

these more appropriately belong in the participant group, they were reassigned (see Bidani et al. 2004 for details).

4.4 Are the Comparison and Participant Groups Different?

In assessing whether the comparison and participant groups are different, we will focus on the means from the employment regression samples (see Table A.1). We find that significant differences between the comparison and participant groups exist in terms of the demographic variables occupation, industry, and other firm characteristics (firm type, firm size) from which the workers were laidoff in both cities. The differences are more pronounced in Shenyang than in Wuhan. Training participants in both cities were more likely to be female and younger. Participants in Shenyang were less likely to be married but more likely to have a high educational attainment than the comparison group members. Such differences were not observed to the same extent in the Wuhan sample. The occupational structure of the participant and comparison groups was more similar in Wuhan. In Shenyang, the occupational structure differed more significantly, with a higher share of the participant group in the professional, clerical, and services categories, and a lower percentage of tem in the craft and machine operators. Thus, it would be misleading to use unadjusted means to compute impacts of the training program. We will therefore adopt methodologies that would allow us to control for observable differences when computing the program impacts.

4.5 Nature of Training

In 1998, there were 113 schools to train skilled workers and 199 enterprise-based training units in Shenyang. The municipal government launched an ambitious training plan that year, allocating 10 million yuan to provide free training to all laid-off workers. The city's

reemployment training center administered the program, which was implemented by training organizations under the district labor bureaus. In Shenyang, the allocation of funding prior to training had recently been replaced by an after-training expense reimbursement contingent on training results. Training expenses were reimbursed in full for training programs with attendance rates over 80 percent, a passing rate over 90 percent, and a reemployment rate over 70 percent. When the reemployment rate fell below the required level, a 10 percent deduction was made in the reimbursement for every 10 percent difference. Training institutions could be disqualified if they did not meet the performance standards set.

In Wuhan, the government's role in retraining of laid-off workers was less active. In 1998, there were 32 job skills schools and employment training centers within the labor system. The city's labor bureau administered the city's reemployment training program for laid-off workers and unemployed persons. The training was conducted by the labor bureau training organizations (such as the city employment training center and district employment training centers). Other organizations that satisfied the qualification requirements also undertook this training for which they were compensated to cover part of their expenses.

Training programs in Shenyang were conducted on a significantly larger scale (Table 4.1). Between 1998 and 2000, 279,000 workers trained in contrast to around 64,000 workers in Wuhan. Shenyang offered its workers a larger menu of training courses: 59 courses in 1999 compared to 34 different courses in Wuhan. The gross reemployment rates according to administrative data, were in the 60–70 percent range for both cities, increasing steadily in Wuhan over the three-year period.

TABLE 4.1 TRAINING ACTIVITIES FOR LAID-OFF WORKERS IN SHENYANG AND WUHAN

	1998	1999	2000
Shenyang:			
Number of persons trained	82,000	132,000	65,000
Number of training courses	59	59	51
Reemployment rate after training	61	70	65
Wuhan:			
Number of persons trained	13,304	23,317	27,343
Number of training courses	32	34	36
Reemployment rate after training	60	65	70

SOURCE: Shenyang Municipal Labor Bureau and Wuhan Municipal Labor Bureau.

Nearly all training in Shenyang was one-month duration with 132 hours of study. In Wuhan, training lasted between one and six months, with the usual duration 2–3 months of full time study. Between July and December, 1998, the average number of course hours was 255 hours, of which 55 percent were practical. In Shenyang, training courses with a minimum duration of one month were eligible for the government subsidy of 100 yuan per trainee. Laid-off workers did not contribute to the training courses. However, in Wuhan, only courses of two to three months were eligible for the government subsidy, and government policy was to provide 50–100 yuan from the reemployment fund for every laid-off worker trained and 300–400 yuan for every unemployed worker trained. Trainees in Wuhan were charged part of the training costs—they were exempt from paying the training fees but were expected to purchase textbooks and practice materials. Most trainees contributed about 200 yuan to the cost of their training.

Despite the more ambitious xiagang training program by the Shenyang government, the quality of programs varied widely across training institutions. Training institutions differed greatly in capacity, space, classroom setup, workshop facilities, and laboratory and mechanical equipment. A number of training institutions only provided theoretical instruction without any

practical training in their vocational courses. Some of the training courses did not provide skills demanded in the local labor market, and there were not even minimal standards governing the content of curricula and the qualifications of instructors.

The survey also asks about the nature of training. Table 4.2 shows information on the training provider, the duration of training, the type of training, and whether individuals paid for training. Training was different across the two cities. As indicated, we restricted our list to three district training schools run by the labor bureau in Shenyang. So, the training there was almost exclusively provided by the labor bureau. In contrast, training in Wuhan was more varied. About three quarters was provided by the labor bureau, with the rest provided by other organizations. The training in Shenyang was substantially shorter than that in Wuhan, averaging about one per month, while the average duration of training in Wuhan is two to three months. Only about 3 percent of the participants in Shenyang paid all or part of the costs of training, whereas about 21 percent of participants paid at least part of the cost in Wuhan. The training organizations in

TABLE 4.2 CHARACTERISTICS OF TRAINING (%)

	Shenyang	Wuhan
Training location		
Labor bureau	0.956	0.716
Other	0.044	0.284
Duration (months)	1.074	1.892
Type of training		
Computers	0.363	0.325
Driving	0.015	0.105
Repair	0.057	0.086
Management, accounting, etc.	0.069	0.284
Cooking	0.293	0.088
Sewing and toymaking	0.1658	0.014
Beauty, massage, and haircutting	0.193	0.023
Other	0.051	0.133
Financing of training		
Paid for training	0.028	0.212
Did not pay for training	0.972	0.788

Wuhan included colleges, universities, and secondary technical schools, with presumably better ability to deliver quality training.

There were also variations in the types of courses that the participants attended. In Shenyang, about 37 percent of the sample took computer courses, 29 percent cooking, 19 percent beauty, massage, and hair cutting, and another 17 percent sewing and toymaking. In Wuhan about 33 percent took computer courses, 28 percent took management courses, 9 percent cooking, 9 percent repairs, and 11 percent driving. There is some evidence that the types of training courses conducted in Wuhan, especially those run by the private sector, were selected by the organizers to accommodate the labor market demand for certain skills.

5. RESULTS

Our analyses focus on two key outcomes: current employment and earnings. We use various estimators in this study to examine impacts of training on reemployment prospects and earnings in the new employment among xiagang workers. Additionally, we also examine more closely the determinants of training, as well as provide sensitivity analyses for different specifications of explanatory variables.

5.1 Impact of Training on Employment and Earnings

Table 5.1 presents impact estimates for training computed by several different estimators: OLS/linear probability model, probit, and four different propensity score matching estimators. Training has a significantly positive impact on the likelihood of finding employment in Wuhan, but no significant effect on employment in Shenyang. Specifically, the numerical estimate for Shenyang is nil, but an employment rate gain of 9 to 12 percentage points was estimated for

TABLE 5.1 TRAINING IMPACT ESTIMATE FROM A SERIES OF ALTERNATIVE ESTIMATORS
(Standard Errors[a] in Parentheses)

	Employment		Earnings	
Estimator	**Shenyang**	**Wuhan**	**Shenyang**	**Wuhan**
Ordinary Least Squares (OLS)	0.013	0.090***	0.095*	−0.078
	[0.022]	[0.027]	[0.049]	[0.062]
Probit, marginal effect	0.019	0.119***	NA	NA
	[0.032]	[0.034]		
Propensity score matching				
(1) Nearest neighbor matching	0.032	0.087*	0.207*	−0.017
	[0.047]	[0.049]	[0.109]	[0.076]
(2) Five nearest neighbors matching	−0.001	0.066*	0.160*	−0.057
	[0.040]	[0.037]	[0.085]	[0.069]
(3) Kernel matching	−0.005	0.080**	0.162**	−0.032
	[0.032]	[0.032]	[0.077]	[0.061]
(4) Local Linear Regression matching	−0.001	0.084**	0.159**	−0.028
	[0.034]	[0.033]	[0.071]	[0.063]
(Max) Observations[b]	1,821	1,278	929	592

NOTE: The first figure in the table is the coefficient, the second (in brackets) is the standard error. * Statistically significant at 10%; ** Statistically significant at 5%; *** Statistically significant at 1%. Kernels used are as follows: (3) epanechnikov kernel, (4) tricube kernel. For the propensity score matching estimators common support is imposed by excluding participant observations whose propensity score is higher than the maximum or less than the minimum propensity score of the comparison group. For the probit regression for Wuhan, one observation is dropped from the estimation due to "Firmtype, other" being a perfect predictor for employment. For the propensity score matching estimations, to impose common support,observations outside the region of common support are dropped from the estimations in amounts as follows: Employment: 39 (Shenyang), 9 (Wuhan); Earnings: 36 (Shenyang), 11 (Wuhan).

[a] Standard errors for the OLS and probit training impact estimates are robust, i.e. allowing for heteroscedasticity of unknown form (Huber 1967; White 1980), while the standard errors for the propensity score impact estimates are bootstrapped, using 200 replications.

[b] To impose common support, the propensity score methods exclude extreme (in terms of their propensity score) observations. See the note to Table 5.1 for details.

training in Wuhan by OLS and probit, respectively. When we examine earnings at current jobs, training appears to play only a positive role in Shenyang with estimates of the impact ranging from 10 to 20 percent, but to have no effect in Wuhan. The impact estimates are robust across the different estimators in both cities.

One problem with the propensity score matching methods is that they use markedly fewer observations than the regression approaches (see bottom of Table 5.1). This reflects the fact that the overlapping areas between the distributions of participants and comparison group

observations, the so-called "region of common support," is limited. This problem enhances the appeal of the more traditional regression based methods (OLS and probit), where all observations are retained in the calculation of the training impact estimates.

Since the regression estimates are similar across the different estimators, and more completely use our sample information, OLS is our preferred estimator. Our sensitivity analysis therefore relies on the OLS estimates.

5.2 Determinants of Participation in Training

While the impact estimates and their magnitudes clearly are of interest to policymakers, there are other aspects of the programs that would potentially be relevant for policy regarding the design of future training programs in China. In particular, it would be interesting to examine a bit more closely who actually participates in the training, in other words, "who actually picks up the training offered to prospective participants?"[6] This amounts to examining the results from the "first stage" of the propensity score matching estimations.

Among the main findings are that training program participants are predominantly younger females who have visited an employment service center at some point. Also, workers in industries other than manufacturing (the reference category) are more likely to participate in training. For workers' occupation prior to becoming xiagang there are no strong results. However, workers who previously worked in SOEs (the reference category) are less likely to have participated in training. Workers who currently receive unemployment benefits are more likely to participate in training than are workers who do not receive unemployment benefits. In Shenyang, workers from households with more employed workers are more likely to receive

[6]To conserve space, the results discussed here and in the remainder of this section are not reported here. The full set of results are included in an extended version of this paper than can be downloaded from www.niels-hugo.dk.

training than other workers. For all samples except the employment sample for Wuhan, workers who were working in July 1998 are less likely to have participated in training than those who did not work in July 1998.

Based on the previous discussion, there appears to be mixed evidence on the targeting of the training programs in Shenyang and Wuhan. Workers who were working in July 1998, that is, immediately prior to the intervention, are less likely to participate in training, while workers collecting unemployment benefits are more likely to participate in training, indicating effective targeting of the training programs in Shenyang and Wuhan in terms of labor market status. However, in Shenyang, workers from households with more working members are more likely to participate in the training program, which seems to indicate poor targeting toward those most in need.

5.3 Determinants of Employability and Earnings beyond Training

It will also be interesting to shed additional light on determinants of employment and earnings other than training. In evaluating the effectiveness of the program—which is the primary objective of this paper—explanatory variables other than the training (participant) indicator were included mainly to reduce the overall variance of the estimator and increase the reliability of the inferences from estimated coefficients. In particular, to the extent that impacts from other factors are confounded within the training indicator variable, those factors should be controlled for in estimation. For example, it is possible that the participation in the program is related to gender, education, or other factors. However, even if the primary role of explanatory variables other than the training (participant) variable are to serve as controls, the results for the estimated parameters of these variables are interesting in their own right. In particular, it will be

instructive for policy to know how other factors, such as gender, education, previous occupation, and so on affect the labor market prospects of laid-off workers in China. After having completed a review of the core evaluation results, we now examine results on the secondary variables.

First, females and disabled workers are both consistently much less likely to be employed in both Wuhan and Shenyang. This should be an issue of concern for policymakers, particularly if equity is considered important, but also since these two groups could potentially contribute significantly to their households' livelihoods. Second, there are strong positive education effects from tertiary education for both employment and earnings in Wuhan, and for earnings in Shenyang. Since job training works for those more prepared to benefit from it, more effort should focus on identifying ways to help those with less formal education prepare for success in the job market. In Shenyang, workers from households with more employed household members are also more likely to be employed themselves, which might be due to spill-over effects or social networks. In Wuhan, the time since becoming xiagang has a negative impact on being employed; that is, the longer one is unemployed, the less likely he will find employment.

5.4 Robustness Checks

One possible concern with the previous results is that some of the explanatory variables are potentially endogenous. To examine this issue a bit more, we estimate some disaggregated specifications for the employment and earnings equations—for a total of five models. Starting off with a core specification, which includes variables for training and employment status in July 1998[7] and the minimum set of variables, which can be justified as being exogenous: age and age squared (to capture potential general experience), gender and disability status, we include

[7]This is arguably endogenous but needs to be controlled for, since such a relatively large fraction of the sample was employed at the time of the intervention, although the entire sample was supposed to be xiagang at the time of the intervention (Betcherman, Dar, and Blunch 2002).

additional (potentially endogenous) variables, until we end up with the final models, where the full set of explanatory variables has been included. Model two adds education, while model three additionally adds whether training was paid for, and whether the worker receives unemployment insurance and benefits from the (xiagang) enterprise. Model four adds the characteristics of the xiagang enterprise and occupation, including industry, usual earnings, and tenure in the xiagang enterprise, while model five contains the full set of covariates, additionally including marital status, houseownership status, and family composition variables.

While we have tried building up the models so that we start with a minimal, core specification, which may be justified as being exogenous, and adding more and more potentially endogenous variables to end up with the final, potentially "most endogenous" model, the choice of which variables to include in the different specifications is somewhat arbitrary. The main point, however, and the main result for this exercise, is that the impact estimate on the training variables essentially is robust across the different specifications, especially for the training regressions. For the earnings regressions, there are some differences between the different specifications. For example, the earnings impact estimate becomes statistically significant (negative) for specifications four and five for Wuhan, while the disaggregated analyses reveal that only the impact estimate for the fifth model for Shenyang is statistically significant (positive). For the other specifications, the impact estimates are still of the same magnitude—it is just that the estimates are imprecisely measured.

Does the potential endogeniety of some regressors raise concerns about our results? Insofar as we are interested in the impact on employment and earnings outcomes of the other explanatory variables besides training, the answer appears to be "yes." As far as the results from

the propensity score matching methods regarding the training impact estimate are concerned, however, this should pose much less of a problem. This is because the main guiding principle of selecting the explanatory variables for the first stage (training determinants) regression is to choose variables that are considered to be important determinants of the training decision—that is, variables that are useful in predicting participant status, conditional on the "ignorability of treatment" condition (Rubin 1978). This states that conditional on the observed covariates, the selection into participant status should be independent of unobservables, which affect the outcome variable(s) of interest (here, employment and earnings). While this condition clearly is restrictive, propensity score matching still is quite useful, since it helps mitigate bias related to observables: "In the matching approach, the influence of confounding variables is reduced by the method of covariate balance, i.e., by matching the potentially confounding covariates of the cases that participated with cases that did not. A perfect matching (whether on the individual covariates or on the propensity score) eliminates any relationship between the covariates and assignment to participation, and hence eliminates the possibility of bias from these variables" (DiPrete and Gangl 2004, p. 4).

6. CONCLUSION

This paper presents results of an evaluation of retraining programs for laid-off workers in Shenyang and Wuhan. To our knowledge, this is the first evaluation of its kind in China. Training programs were estimated to have opposite employment and earnings impacts in the two cities. In Shenyang, workers who had taken training in 1998 are no more likely to be employed in mid-2000 than workers who had not participated in training programs. While in Wuhan,

participation in training was estimated to have raised the probability of employment relative to the comparison group. The pattern of impacts on earnings was the reverse. In Shenyang, training has a substantial positive effect on the earnings of those employed at the time of the survey, while in Wuhan there is no effect. These results are robust across alternative estimation methods.

Analyses of training determinants indicate mixed evidence on the targeting of the training programs in Shenyang and Wuhan. On one hand, workers who were working in July 1998—that is, immediately prior to the intervention—were less likely to participate in training, while workers collecting unemployment benefits (and therefore, presumably are unemployed) were more likely to participate in training, indicating effective targeting of the training programs in terms of labor market status (presumably it would be difficult to both work and participate in the program). On the other hand, at least in Shenyang, workers from households with more working household members are more likely to participate in the training program, which suggests poor targeting, at least as measured by the presence of other earners in the household.

While this evaluation must be supported by further research, it does raise a number of issues regarding training policies for laid-off workers. Most obviously, the study suggests that policymakers must adopt a critical approach to retraining and recognize that expectations hould be moderate. Unless training programs are carefully designed and targeted, there are no guarantees that impacts will be positive. This finding is consistent with the international experience.

The different results for the two cities should be of interest for policymakers. Why did this occur? It may be due to factors that have nothing to do with training—for example, the stronger economy in Wuhan may explain the more positive outcomes for employment in that

city. However, the different results may well be due to differences in the retraining offered in the two cities. The quality and the relevance of the training programs being offered probably contributed to the different outcomes. Training that is more responsive to market conditions and equips workers for jobs that are being created has a greater likelihood of having a positive impact. Compared to Shenyang, Wuhan's training programs had certain features that have been associated with positive training outcomes in international evaluations. These include longer programs with more practical content and stronger supporting employment services (as indicated by the much higher proportion of workers going through Reemployment Service Centers).

This evaluation, in combination with the international literature, therefore suggests the following lessons for retraining policy. First, moderate expectations are in order about the capacity of retraining programs to reintegrate laid-off workers back into the labor market. Second, diversification of the sources of training appears fruitful; public, nonprofit, and commercial providers may have comparative advantages in providing different types of training. Third, the focus should be on providing training that is responsive to labor demand. The best way of doing this is to involve employers in planning training. Fourth, the most important supporting services are job search, counseling, and good labor market information. These not only can increase the returns to training but they tend to be the most cost efficient of all active labor market programs. For some workers, particularly those who are job-ready, these employment services should be the priority. Fifth, programs should be carefully targeted to groups that are most likely to have a net positive benefit. Lastly, it seems fruitful to experiment with different financing schemes, including those that require some financial contribution from trainees.

These results should be compared to findings from future evaluations. The experience of other countries with long experience in labor adjustment programs can help inform Chinese training strategies. But national characteristics do matter a lot. Program evaluation should become an intrinsic part of the active labor market strategy in China. Such evaluations need to be carried out in a range of municipalities with varying characteristics and on diverse program designs. They must also take into account the costs of programs, something that has not been analyzed in this study. Only through such rigorous evaluations can policymakers determine what works and for whom in supporting laid-off workers. In addition, it is important to compare training to other active labor market alternatives (such as employment services) and to highlight the costs and benefits of alternate interventions to support laid-off workers. It would also be useful to complement the quantitative survey information with qualitative information on the quality and relevance of training programs from trainees, training institutes, and employers. This would enrich the understanding of which training programs work and why.

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APPENDIX: Sample Means for Participant and Comparison Groups

Table A1 Sample Means for Participant and Comparison Groups

Variable	*Employment regression*						*Earnings regression*					
	Shenyang			Wuhan			Shenyang			Wuhan		
	Partic.	Comp.	Diff.(%)	Partic.	Comp.	Diff.(%)	Partic.	Comp.	Diff.(%)	Partic.	Comp.	Diff.(%)
Employed	0.457	0.560	-18.4	0.447	0.410	9.2						
Earnings							6.059	6.120	-1.0	6.135	6.248	-1.8
Age	36.76	40.05	-8.2	36.98	38.28	-3.4	36.16	40.08	-9.8	36.74	37.80	-2.8
Age squared	1,406.51	1,646.18	-14.6	1,402.69	1,508.40	-7.0	1,360.06	1,646.99	-17.4	1,387.25	1,467.57	-5.5
Female	0.780	0.473	65.0	0.620	0.422	46.8	0.715	0.378	88.9	0.505	0.338	49.5
Disabled	0.048	0.051	-6.8	0.043	0.045	-4.3	0.047	0.027	77.1	0.038	0.023	60.4
Married	0.834	0.888	-6.0	0.855	0.867	-1.5	0.809	0.901	-10.2	0.833	0.866	-3.9
Time since becoming xiag.	4.465	4.815	-7.3	5.741	5.057	13.5	4.341	4.767	-8.9	5.374	5.215	3.0
Ever visited empl. center	0.387	0.138	179.3	0.440	0.291	50.9	0.395	0.139	184.3	0.372	0.207	79.4
Primary education	0.015	0.015	-1.1	0.005	0.016	-71.3	0.017	0.013	30.5	0.003	0.013	-74.5
Junior education	0.443	0.662	-33.1	0.342	0.347	-1.6	0.432	0.673	-35.8	0.338	0.311	8.6
Senior education	0.272	0.160	70.3	0.455	0.421	8.1	0.270	0.135	100.4	0.433	0.425	2.0
Vocational education	0.125	0.098	27.3	0.135	0.123	9.4	0.114	0.106	7.2	0.140	0.134	4.6
Tertiary education	0.145	0.065	123.4	0.064	0.093	-30.7	0.166	0.072	130.1	0.085	0.117	-27.1
Industry, low-skilled	0.100	0.036	175.6	0.150	0.134	11.7	0.104	0.044	138.3	0.212	0.140	50.6
Industry, manufacturing	0.766	0.942	-18.7	0.758	0.808	-6.2	0.774	0.939	-17.6	0.703	0.799	-12.0
Industry, services	0.083	0.015	455.1	0.069	0.038	79.5	0.065	0.011	465.6	0.078	0.040	95.6
Industry, pub. adm./education	0.049	0.006	663.0	0.023	0.019	19.6	0.057	0.006	900.7	0.007	0.020	-66.0
Occupation, manager	0.044	0.043	3.8	0.046	0.056	-18.0	0.045	0.051	-13.0	0.075	0.087	-13.7
Occupation, professional	0.062	0.035	77.4	0.031	0.027	12.6	0.055	0.034	59.5	0.031	0.030	2.0
Occupation, technician	0.132	0.095	38.8	0.096	0.136	-29.1	0.149	0.089	66.6	0.075	0.171	-56.0
Occupation, clerk	0.124	0.076	63.4	0.138	0.117	18.0	0.132	0.070	87.0	0.123	0.120	2.0
Occupation, service worker	0.088	0.042	112.9	0.067	0.051	31.6	0.077	0.046	68.6	0.078	0.033	134.7
Occupation, agric./fishery	0.000	0.000	0.0	0.003	0.008	-61.7	0.000	0.000	0.0	0.000	0.007	NA
Occupation, craft worker	0.185	0.263	-29.7	0.165	0.200	-17.3	0.164	0.241	-32.2	0.171	0.197	-13.5
Occupation, machine op.	0.278	0.337	-17.5	0.395	0.333	18.7	0.278	0.356	-21.8	0.389	0.304	27.8
Occupation, unskilled labor	0.087	0.111	-21.2	0.058	0.072	-19.2	0.102	0.112	-9.3	0.058	0.050	15.7
Tenure in xiagang ent. (mos.)	134.47	165.62	-18.8	140.48	156.22	-10.1	129.37	166.57	-22.3	138.25	150.99	-8.4
Usual earnings, xiagang ent.	297.99	306.64	-2.8	263.04	283.94	-7.4	300.56	319.93	-6.1	274.47	287.79	-4.6
Firmtype, state enterprise	0.680	0.881	-22.8	0.876	0.966	-9.4	0.702	0.873	-19.5	0.870	0.953	-8.7
Firmtype, collective ent.	0.262	0.112	134.2	0.116	0.032	263.7	0.243	0.120	103.0	0.119	0.043	174.7
Firmtype, private enterprise	0.024	0.003	645.2	0.003	0.000	NA	0.022	0.002	1,074.7	0.003	0.000	NA
Firmtype, joint venture	0.024	0.002	1,017.9	0.003	0.002	91.4	0.022	0.002	1,074.7	0.003	0.003	2.0
Firmtype, other	0.010	0.002	379.1	0.002	0.000	NA	0.010	0.004	161.0	0.003	0.000	NA
Benefits, medical	0.380	0.446	-14.9	0.646	0.707	-8.6	0.397	0.473	-16.1	0.648	0.716	-9.4
Benefits, pension	0.398	0.423	-5.9	0.619	0.624	-0.9	0.434	0.449	-3.2	0.618	0.625	-1.2
Receives unemp. benefits	0.057	0.010	491.5	0.089	0.034	164.3	0.065	0.004	1,596.8	0.055	0.030	81.4
Working in July 1998	0.365	0.557	-34.5	0.369	0.381	-3.1	0.638	0.856	-25.5	0.580	0.676	-14.1
House owned by individual	0.287	0.296	-3.1	0.175	0.186	-5.9	0.293	0.319	-8.3	0.160	0.154	4.3
House owned by enterprise	0.102	0.163	-37.4	0.168	0.277	-39.1	0.089	0.184	-51.6	0.195	0.274	-29.1
House owned by parents	0.523	0.444	17.7	0.418	0.357	17.2	0.536	0.422	27.0	0.420	0.391	7.3
House owned by other	0.088	0.097	-8.7	0.239	0.181	32.1	0.082	0.074	10.4	0.225	0.181	24.7
Household size	3.201	3.184	0.5	3.351	3.286	2.0	3.199	3.169	0.9	3.352	3.314	1.1
Number of employed in HH	0.703	0.536	31.2	0.495	0.486	1.7	0.762	0.517	47.3	0.495	0.458	8.0
Children age 6 or older	0.652	0.855	-23.8	0.732	0.736	-0.5	0.648	0.884	-26.7	0.710	0.753	-5.7
Children below age 6	0.102	0.043	139.5	0.098	0.094	3.8	0.092	0.044	110.0	0.113	0.097	16.1
Number of observations	882	939		653	625		403	526		293	299	