

Appendix on data analysis in chapter 7

Data analysis on the bandwagon effect of centrally initiated ownership change

For the analysis of regional peer influence among SOEs, two separate regional units of analysis are examined: local units (cities and counties) within the same prefecture and local units (prefectures) within the same province. A number of control variables, all lagged for one year, are included to account for variations in local economic structure and condition (GDP per capita, share of primary sector in GDP, and arable land per capita), public finance (ratio of spending to revenue), degree of internationalization (percentage of foreign-invested enterprises in industrial sales), and characteristics of industrial SOEs in the locale (average debt-equity ratio, percentage of centrally controlled enterprises in sales, size of SOE workforce, percentage of SOEs in industrial sales, and average firm age of SOEs). Fixed locale and time (year) effects are also included.

A pooled regression and a regression with system GMM estimates using panel data are run. The system GMM regression has the same basic model specified for the analysis in chapter 6. For the pooled regression, I include an instrumental variable (IV) to tackle potential endogeneity problems. The IV is constructed as the ratio between two percentages. The first one (the numerator) is the share of industrial SOEs established after 1985 in the total industrial SOE workforce of the local unit (city/county or prefecture). The second percentage (the denominator) is the corresponding share of the regional unit (prefecture or province). What the variable measures is the strength of the redundant personnel constraint on ownership restructuring faced by the local unit relative to the regional average.³ The stronger such constraint, the greater the likelihood of the local unit's attrition rate falling below the regional average, and vice versa. For the system GMM regression, aside from estimating the effects of the variables listed above I also extend the estimation by adding an interaction term between time trend and the main explanatory variable. The purpose is to examine whether the main effect

³ Such constraint tended to be stronger for SOEs established before 1986, when the State Council issued a directive that required all new hires in urban public enterprises be governed by employment contracts with fixed time durations. That policy marked the beginning of the end of the *de facto* life-time employment system that had originated in the 1950s and encompassed all employees in the urban public sector. As a result, public enterprises established after 1985 (with generally younger workforce) tended to have more flexibility in severing employment ties with their employees than older enterprises and at the same time did not have to tackle the need to settle the financial arrangements for the retirees on their payroll before privatization.

weakened with the deepening of privatization. The results are summarized in Table A7.1.⁴

The regression analysis for the pace of ownership change among TVEs (also using NBS annual industry survey data) requires measuring the differences in initial local policy stance, which is a challenging task. Each of the three major possibilities was a multi-dimensional phenomenon and thus cannot be meaningfully proxied with any single variable. In view of this I run a factor analysis of four relevant variables that capture the strength of TVE-led sales growth and the strength of the private sector in each county unit prior to the tipping point in 1997. They include: the average sales growth rate of industrial TVEs in the county from 1992 to 1995,⁵ the ratio of larger enterprises (with annual sales of at least 5 million yuan) to industrial TVEs of all sizes in the county, the average growth rate of private industrial enterprises under the purview of township authorities in the county from 1992 to 1995, and the percentage accounted for by these enterprises in the total industrial sales of the rural non-farm sector of the county in 1995. The result reveals significant correlations with a latent factor. I then take the absolute value of the factor score and use it as the explanatory variable.⁶

To tackle potential endogeneity problems associated with this variable, I include two instrumental variables in a first-stage regression: the initial strength of commune and brigade enterprises (CBEs) and the initial strength of re-emerging private economic activities at the start of reforms.⁷ As I have discussed in chapters 4-5, these factors contributed to the variations in the growth and balance of public and private economic elements before massive privatization in the late 1990s. In addition, a number of control

⁴ More details of the analysis are reported in the Appendix.

⁵ 1992 was the year when Deng Xiaoping jump-started economic reforms after a three-year hiatus resulting from the June Fourth Incident in 1989 (Fewsmith 2008). 1995 was the year after which the decline of TVEs began to accelerate.

⁶ The rationale for taking the absolute value of the factor scores is that the distribution of the (standardized) factor scores has a mean of 0 and a standard deviation of 1. The mean approximates the situation of the typical laggard, whereas different positive and negative values indicate the numerical distances to the scores that represent the typical TVE stronghold and early movers of privatization respectively. Since the focus of analysis here is to gauge the differences between laggards and the other two types of locales rather than the specific directions of the differences, taking the absolute value does not affect the interpretation of the results.

⁷ These IVs are proxied with the percentage of CBEs in rural economic output in 1978 and the percentage of “specialized households” (*zhuan ye hu*) and “joint operations of new economic activities” (*xin jing ji lian he ti*) in non-farm output in 1984 (the first year after the dismantling of the people’s commune system) respectively. CBEs were predecessors of TVEs, whereas the latter represented a prototype of non-farm private businesses in rural Jiangsu.

variables,⁸ all lagged by one-year, plus fixed time and locale effects, are included in the regression.

For the second regression with TVE data the same control variables used in the foregoing analysis of the initial rush toward privatization, plus fixed time and locale effects, are included in the system GMM regression. To explore whether convergence among different counties occurred over time, I extend the analysis by including in a separate estimation an interaction term between time trend and TVE attrition rate.

The key results of these two regressions are reported in Table A7.2.

Data analysis on centrally located SOEs and privatization

To explore whether urban development had any accelerating effect on the pace of privatization, I perform a data analysis on industrial SOEs.⁹ Using NBS annual industrial enterprise surveys, it examines firm-level information on SOEs located in prefectural cities.¹⁰ The dependent variable is the period (number of years) at risk of elimination for each SOE in the data set during 1997-2005. The main explanatory variable is the distance of the enterprise to the center of the prefectural city where it was located.¹¹ In this study I use the postal code area of the local government as the proxy for identifying city center, as it is normally where the earliest urban buildup took place and where commercial and cultural establishments clustered. The postal code information for each prefectural government is from 中国政府机构名录 (Directories of Chinese Government Institutions) published by the Xinhua News Agency in 1996 and 2002.

⁸ These include: GDP per capita, share of primary sector in GDP, arable land per capita, ratio of fiscal spending to revenue, total bank lending in the county, average firm age of local TVEs, average debt-equity ratio among local TVEs, size of local TVE workforce, total sales volume of local TVEs, and percentages of SOEs, FDI enterprises, and private enterprises in industrial sales.

⁹ It would be useful to investigate urban collective enterprises and even TVEs as well. But the necessary data are unavailable.

¹⁰ Industrial SOEs located in counties and county-rank cities are not included due to the lack of detailed information on the locations of county governments. Also, it should be noted that because of their greater importance and resourcefulness prefectural cities were more likely to be developed earlier than counties and count-rank cities in the first wave of urbanization during the 1990s and early 20th century, when ownership restructuring of SOEs was in full force.

¹¹ Since there is no detailed information on the precise location of each enterprise within a particular postal code area, I proxy the distance to city center with the number of postal code area(s) separating the location of the prefectural government headquarters and that of the location of the enterprise.

The hypothesis I seek to test is that, other things being equal, the shorter the distance to the city center the lower the survival probability during privatization. To control for firm-level characteristics, I include a number of covariates to control for firm-level characteristics. They are: firm age, workforce size, total assets, sales, capital-labor ratio, average wage, average fringe benefit expenditure, level of supervising authority, debt-equity ratio, profit rate, sector, and average sales growth rate during 1995-1997. Prefectural fixed effect is also included to account for variations in the local environment.

I use a proportional hazards model for the analysis. The pertinent regression model follows the standard specification in survival analysis (e.g., Allison 2010). Table A7.3 summarize the main statistical finding of the regression. What it shows is that distance to city center had a significantly positive effect on the survival of SOEs. Those that were located farther away from city centers had a much lower likelihood of elimination than those closer to city centers during the period of massive privatization. This suggests that the desideratum of vacating prime sites occupied by industrial SOEs for urban development probably hastened the demise of many of these enterprises.

Data analysis on insider control

To explore whether insider control was indeed consequential to the acceleration of the pace of privatization, I re-run the regression on the attrition rate of SOEs, which has been presented in section 2 of chapter 7. To the variables already included in the model I add the percentage of insider-controlled SOEs in each prefecture and lag it by one year. This percentage provides a proxy for the degree to which the local regulatory environment and recent history were conducive to the pursuit of insider control during the process of ownership restructuring. The estimation results, reported in Table A7.4, show a consistent (across different models) and significantly positive effect. Moreover, the extended estimation does not change the results of the regression without this variable. The evidence therefore appears to be in line with the conjecture stated above, though it remains provisional in that insider control is not instrumented in the pooled regression model and thus may be subject to omitted variable bias.¹²

To account for the influence of selection bias in the regression analysis of insider control, I run a variant version of the Heckman model (Heckman 1978) using data from the

¹² This is due to the lack of a good instrumental variable for insider control and, more generally, because of the technical difficulty and complications of simultaneously instrumenting two independent variables even with good IVs (Angrist and Pischke 2009).

sources described above.¹³ The dependent variable in the first-stage regression is whether an industrial SOE was privatized and the dependent variable in the second-stage regression is whether a privatized industrial SOE was insider-controlled. The unique (instrumental) variable in the first-stage regression is whether the enterprise concerned was established before 1986, which proxies the difficulty of tackling the constraint of personnel placement in ownership restructuring, as explained in note 14 in chapter 7.

Other than debt-equity ratio, I include in both stages of regression profit rate, size of workforce, total assets, capital-labor ratio, three-year average of sales growth rate before the year of interest, firm age, level of immediate supervising authority, sector dummies based on 4-digit industry classification, and year dummies. Since both privatization and the reassignment of property rights to new owners were subject to the impact of the local economic and policy environment, I include the same prefecture-level control variables used in the analysis of industrial SOEs' attrition rate in section 2 of this chapter. All time-variant independent variables are lagged by one year. The main results of the estimations are reported in Table A7.5.

¹³ The standard Heckman model has a binary response variable in the first-stage regression and a continuous variable in the second-stage regression (Greene 2004), whereas the analysis here uses binary response variables in both stages of regression. The estimation of the variant Heckman model used in the analysis of debt-equity ratio is deployed by using the PROC QLIM procedure developed by the SAS Institute (http://support.sas.com/documentation/cdl/en/etsug/60372/HTML/default/viewer.htm#qlim_toc.htm).

Table A7.1 Regression of regional peer influence on SOE attrition rate

	Pooled regression	System GMM
(1) Cities/counties within same prefecture		
Main effect	-0.168** [.076]	-.092** [.038]
Interaction with time trend		-0.177*** [.042]
(2) Prefectures within same province		
Main effect	-0.224** [.092]	-0.032** [.014]
Interaction with time trend		-0.119** [.048]
Controls (not shown)		
Observations	1,992	1,992
AR1		.000
AR2		.534
Hansen J		.468
R ²	.277	

Note: * p < 0.10; ** p < 0.05; *** p < 0.01; standard errors are in parentheses.

Table A7.2 Regression of forces influencing TVE attrition rate in Jiangsu

	Pooled regression	System GMM
(1) Laggards' leading role in initial decline	0.568*** [.172]	
(2) Prefectural peer influence on counties		
Main effect		-0.783*** [.231]
Interaction effect		-0.489** [.204]
Controls (not shown)		
Observations	299	768
AR1		.000
AR2		.177
Hansen J		.326
R ²	.222	

Note: * p < 0.10; ** p < 0.05; *** p < 0.01; standard errors are in parentheses.

Table A7.3 Regressions of impact of urban development on SOE survival rate

	Estimate
Distance to urban center	0.868*** [.172]
Controls (not shown)	
Pseudo R ²	.328

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; standard errors are in parentheses.

Table A7.4 Regression (extended) of regional peer influence on SOE attrition rate

	Pooled regression	System GMM
(1) Cities/counties within same prefecture		
Main effect	-0.159** [.077]	-.094** [.041]
Interaction with time trend		-0.168*** [.039]
(2) Prefectures within same province		
Main effect	-0.231** [.089]	-0.034** [.015]
Interaction with time trend		-0.107** [.042]
(3) Insider control	.117** [.092]	.121** [.116]
Controls (not shown)		
Observations	1,992	1,992
AR1		.000
AR2		.529
Hansen J		.472
R ²	.281	

Note: * p < 0.10; ** p < 0.05; *** p < 0.01; standard errors are in parentheses.

Table A7.5 Regression of the effects of debt-equity ratio on privatization and insider control

	Stage one	Stage two
Debt-equity ratio	-0.087* [.046]	0.332*** [0.081]
Interaction with early sales growth	-0.063 [.048]	.078*** [0.021]
Formation before 1986 (IV)	-0.272** [.322]	
Controls (not shown)		
Rho	.428	

Note: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$; standard errors are in parentheses.