

Is China a Leviathan?

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Is China a Leviathan?

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Abstract. To address the problem why China, as a communist country, moves in the opposite direction when the public sector has undergoing a continuous growth in most Western economies since the World War II, we offer a new approach that the *de facto* fiscal decentralization curtails government size in transition China in addition to conventional explanations. Meanwhile, by analyzing panel data and various variables used by previous empirical studies, this paper tests the Leviathan hypothesis for vertical decentralization, horizontal fragmentation and intergovernmental collusion at central-provincial and provincial-local level. Our empirical results not only explain Chinese shrinking government size, but also lend support to Leviathan hypothesis, especially, under the condition of the absence of traditional democratic electoral constraint.

Keywords: Leviathan, Fiscal decentralization, China, Transition Economy

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1. Introduction

Since the inception of transition in 1978, China has achieved a stirring economic success with average GDP growth rate of 8.3 percent (World Bank, 2000) and accounting for 25 percent share of global economic growth in 1995-2002 (Economist, 2003). Remarkable economic performance boosted the per capita GDP by about 22 times of 379 RMB in 1978 to 8,184 RMB in 2002 (CSY, 2003). Contrary to Wagner's Law, which suggests that public sector augment in accordance with increasing economic growth and per capita income, government expenditure relative to total GDP in China is, yet, shrinking. As shown in Figure 1, the ratio of government expenditure¹ to GDP dropped from 31% in 1978 to the rock bottom of 12% in 1995 and 1996 despite recent recovery of 21% in 2002. It remains, yet, strikingly lower compared to the average level of 28 OECD countries, 41%, and even the lowest member, Korea, of 25% (OECD, 2002). An interesting question arises, especially, when the public sector has undergoing a continuous growth in most Western economies since World War II, why does China, a communist country, moves in the opposite direction?

[insert figure 1 about here]

Following Adolph Wagner, volumes of works exist to deal with the trends, causes, and effects of expanding public sector in Western economies, such as Peacock and Wiseman (1961), Musgrave (1959; 1969), Bird (1970), Meltzer and Richard (1981), Krusell and Rios-Rull (1999) and Dudley and Witt (2004), etc. However, few researches pay particular attention to China's odd trend of shrinkage of government size except that some only touches upon this point. Based on our related literatures review, several possible explanations might be raised. Firstly, the demand side

¹ Chinese public budget system includes extrabudgetary revenue and expenditure, originated in 1950 as a supplementary to the budgetary part. The data of the extrabudgetary revenue and expenditure only started in 1982 since the statistic reporting scheme was established then. Hereafter the government revenue and expenditure refers to the budgetary one.

approach attributes to the transition process of China from a central-planned to a market economy resulting in the fade out of excessive government intervention. Naturally, the government expenditure is cut down thanks to massive private saving and investment in various economic fields. Secondly, from the supply side, the reform of budget system changes the structure of government revenue source and then constrains government financial capacity. Unlike pre-reform budget system mainly relies on profit remittance from state-owned enterprises (SOEs), tax collection now is the major means to finance government activities. While an undeveloped tax administration and lack of voluntary tax compliance severely hamper levies of government revenue. A third argument might be the problem of statistic technique in that a large size of extrabudgetary, even off-budgetary, expenditure is not shown up in official statistic data². Thus, the *de facto* government size should be larger than that in the Figure 1.

In addition to preceding three plausible explanations, we argue that fiscal decentralization also induces a smaller government in transition China. In contrast with traditional public finance theory modeling government as a benevolent despotic agency subject to public interests, Brennan and Buchanan (1980) depict the government as a monolithic Leviathan to maximize its revenue by exploiting tax base to the maximum extent. From such perspective, they claim that the fiscal decentralization is a powerful institutional constraint on the reach of the state. Thus, an implication is that “total government intrusion into the economy should be smaller, *ceteris paribus*, the greater the extent to which taxes and expenditures are decentralized...” (p.185).

Considering numerous empirical tests on Leviathan hypothesis have been conducted but with conflicting results, we intend not only to address the problem why government size is curtailed in China, but also to offer a new window to examine the Leviathan hypothesis by analyzing panel data of China due to following reasons: i) a

² See footnote 1.

de facto fiscal decentralization in China is accredited by numerous scholars and researchers (see e.g. Montinola *et al*, 1995; Qian and Weingast, 1996,1997; Weingast, 1995); ii) the absence of representative democracy lends a great opportunity for testing whether fiscal decentralization is another effective institutional arrangement to curb government expansion; and iii) China's sheer size permits a panel data analysis on subnational level. Particularly, in addition to several literature (see e.g. Zhang and Zou, 1998; Ma, 1997; Lin and Liu, 2000) that only investigate the influence of fiscal decentralization on China's economic growth, we intend to address the empirical issue of fiscal decentralization and government size in China.

The paper will proceed as follows. Next section sets out three possible explanations of a shrinking Chinese government. Section 3 presents a survey of empirical literature on Leviathan hypothesis and our approach to China case, followed by the section of methodology and data. Section 5 provides the empirical results. The final section draws the conclusion.

2. Changing public sector in transition China

2.1 The demand side

Given the transition nature, the developing market economy forces government to retreat from most economic fields (see e.g. Walder, 1996; Naughton, 1995). Price liberation and privatization have toppled traditional dominance of government in economy and unleashed dramatic growth of non-state sector. In 1999, the non-state share of gross output industrial value (GOIV) increased more than 3 times of the 1980 level from 24% to 74%. And the non-state percentage of fixed investment also expanded from only 18% in 1980 to 47% in 1999 (Figure 2). As a result, to meet the shrinking demand for government intervention in economy, the government expenditure on economic construction scaled to GDP has steadily declined since the transition. Dropped from 20% in 1978, it hit the bottom of 5% in 1996, which mainly contributed to the descent of government outlay in GDP. Meanwhile, the successive cut of expenditure on national defense from 5% in 1978 to 1% in 1996 was also

responsible for that. Recently, a slight rise of expenditure on all functions, such as economic, social, cultural and education, administration and miscellaneous, pulled the government share back from the bottom of 12% in 1995 and 1996 to 21% of GDP in 2002 (Figure 3).

[insert figure 2 and 3 about here]

2.2 The supply side

A series of fiscal reforms have rebuilt revenue structure of government indicating the transformation from a socialist “owner-state” (Campbell, 1996) surviving upon controlled resources to a modern “tax-state” (Schumpeter, 1918) subject to its tax capability to extract surplus from economic sectors. Before the transition, Chinese government revenue largely relied on SOEs that not only remitted their profits, but also paid taxes according to a simple socialist tax system. As shown in Figure 4, revenue remitted from SOEs made up of 51% of total government revenue in 1978. Yet, the booming non-state enterprises eroded the previous dominance of SOEs in economy and forced them to become loss-making during market competition. In 1985, the subsidy to those loss-making SOEs held 25% of total government revenue, about 13 times more than the revenue from those profitable. SOEs turned out to be a heavy financial burden of the government.

[insert figure 4 about here]

On the other hand, the new tax system introduced western taxes, broadened tax base to non-state sector, shifted the focus of tax collection and administration to a large number of small-size enterprises and individuals and made taxes principal revenue source (nearly 100% or more since 1985), which extremely challenged government’s tax capability (see e.g. Wong, 1997; World Bank, 2002). Moreover, the lack of traditional tax compliance of private sector and individuals exacerbated such problems. Consequently, The financial capability of government was severely

constrained by the inadaptable tax system. The ratio of total fiscal revenue to GDP plummeted from 31% in 1978 to 11% in 1995 and 1996 and recently recovered to 18% in 2002. And the fiscal deficit peaked in 1979 at 3.4% of GDP and controlled around 1% for several years but was enlarging again since 1998. The fiscal deficit was 3% of GDP in 2002 (Figure 5).

[insert figure 5 about here]

2.3 The hidden figures

The existence of extensive extrabudgetary or even off-budgetary activities implies that the actual amount of government revenue and expenditure is much larger than those budgetary figures (see e.g. Wong, 1998; Fan, 1998; Eckaus, 2003; Krug *et al*, 2005). Originated in 1950 to mitigate the scarcity of local financial resource, extrabudgetary revenue consists of administrative service charges, funds, and surcharges on taxes levied by the State Council, the provincial government or corresponding financial and price regulation departments. It remained a minor part before 1980s but experienced a vicious spiral after that. In 1978, the extrabudgetary revenue possessed 10% of GDP and escalated to 17% and accounted for half of total actual government revenue during 1980s (Figure 6). In addition, volumes of off-budgetary revenues and expenditures escaped from the public budget system and excluded from the budgetary figures. Thus, the actual government size of China is, to a large extent, underestimated.

[insert figure 6 about here]

3. Leviathan and decentralized China

3.1 Leviathan theory

In addition to preceding three explanations, we approach the shrinking Chinese government size by Leviathan theory. In Brennan and Buchanan's model (1980), the government consists of self-interest politicians and bureaucrats who maximize their

discretionary resources and powers by all means so as to create the revenue-maximizing nature of a Leviathan government. Moreover, akin to a monopoly firm in the market, government monopolizes the provision of public goods and service, thereby exploits its citizenry-consumers to the extreme extent through maximized taxation. The democratic electoral process is, therefore, designed to hold back government's latent "grabbing hand" at the post-constitutional level. Indeed, underpinning the democracy, the commonly believed majority rule "embodies *no effective constraint on the exercise of government powers at all*" (1980:7, *italic in original*; see also Downs, 1957). Thus, as an alternative institutional arrangement, fiscal federalism may actually constrain government's insatiable appetite for fiscal expansion thanks to its two major merits: information revelation and competition (e.g. Musgrave, 1959; 1969; Oates, 1972). On the one hand, along the vertical government hierarchy, decentralized decision-making (Hayek, 1945) enables citizens more effectively check and balance on government coercive powers to tax in that the principal-agent problem might be better addressed by sufficient information revelation under closer distance between lower level government and its constituencies. Thus, the share of lower-level government in total government revenues and expenditures captures the degree of decentralized authority from upper-level. On the other hand, Tieboutian mobility (1956) of individuals and factors introduces horizontal interjurisdictional competition for fiscal resources and such "voting by feet" forces government to be a rational public goods provider economizing on relative tax cost. Any excessive tax burden would, obviously, induce massive migrations of tax bases to other regions with less tax levies. The number of rival jurisdictions, hence, determines the degree of intergovernmental competition. Consequently, two hypothesis are developed:

Decentralization hypothesis: The more decentralized fiscal authority to lower-level government, the smaller is the total government size.

Fragmentation hypothesis: The more rival jurisdictions, the smaller is the total

government size.

Furthermore, due to the mobility of tax base, economies of scale and scope, fiscal equity ground and spillover effect, the vertical tax structure is known as the tax-assignment problem (see e.g. McLure, 1983; Musgrave, 1997; Oates, 1999) in which central government levies most taxes and transfers to local government according to certain criteria or object. Yet, Brennan and Buchanan (1980) acknowledge that such intergovernmental collusion would moderate the interjurisdictional competitive pressures and lessen the effective constraint of fiscal decentralization on government size “because it subverts the primary purpose of federalism, which is to create competition between jurisdictions (p.183)”. Measured by intergovernmental grants, collusion hypothesis implies a larger government extraction.

Collusion hypothesis: The more intergovernmental grants, the larger is the total government size.

3.2 A survey of empirical literature

Although Leviathan theory has the sound theoretical ground, numerous empirical studies headed by Oates have shown inconsistent evidences at national, subnational and/or local level (Table 1)³. Based on a cross-section sample of 57 countries, Oates (1972) conducted a simple regression of government size (share of tax revenues in national income) on decentralization (central government tax revenue as a fraction of total tax revenues) and found a significant inverse relation that increased decentralization resulted in a larger government sector. After controlling variable of income level for Wagner’s Law, the coefficient remained negative but statistically insignificant, which lent no support to the decentralization hypothesis. In 1985, Oates used 43 IMF countries sample and again found no statistically significant association

³ The survey of previous empirical literatures is based on Shadbegian (1999) and Feld (2003).

between fiscal decentralization and government size. Yet, the empirical result verified the collusion hypothesis that relatively heavy intergovernmental grants induce larger public sectors. To address the latent unreliability of IMF data, Heil (1991) used two comparison samples of 22 OECD and 39 IMF countries. In addition to Ordinary Least Squares technique, he also ran the Two-stage Least Squares regression by constructing federal structure, literacy rate and gross exports as percentage of GDP as instrumental variables. In all cases, no significant impact of fiscal decentralization on government size was obtained at the national level. Moreover, Stein (1999) observed relatively larger governments in fiscal decentralized Latin America, particularly, when subnational governments enjoyed extensive vertical imbalance, discretionary transfer and borrowing autonomy. Yet, in Moesen and van Cauwenberge (2000), decentralization variable was matched by local tax autonomy, thereby excluded intergovernmental grants and local borrowing, i.e., subnational government taxes as a percentage of total government expenditures. The estimation result of 19 OECD countries supported Leviathan hypothesis that a decentralized tax authority tended to reduce overall government size. Rodden (2003) and Anderson and van Den Berg (1998) confirmed this point as well. Furthermore, Rodden provided empirical evidence that decentralization accompanied by intergovernmental transfers produced a larger government. Different from aggregate government size as dependent variable in customarily analyses, Jin and Zou (2002) explored how government size at different level was influenced by different fiscal decentralization measures. Using panel data of 17 industrial and 15 developing countries from 1980-1994, they found that: i) expenditure decentralization resulted in smaller national governments, larger subnational governments and larger overall government size; ii) revenue decentralization increased subnational government size but much more reduced national one, thereby cut down aggregate government size; and iii) intergovernmental grants enlarged government size at all levels. Marlow (1988) initially performed a time-series regression on 1946-1985 data of the United State and found strong supporting evidence for the decentralization hypothesis. Later, Grossman (1989a; 1989b), using the same data set, verified that decentralization (share of subnational

expenditure in total government expenditure) curtailed government spending (total government expenditure relative to GNP) while federal-to-state grants encouraged government expansion. Similarly, Australia (1950-1984) and Canada (1958-1987) data were tested in Grossman (1992) and Grossman and West (1994), respectively. In the former case, the collusion hypothesis was demonstrated but not the decentralization one; while in the latter case, both hypotheses were supported. Kwon (2003) analyzed time-series data of Korea from 1979 to 2001 and obtained supporting findings as well.

[insert table 1 about here]

At the subnational level, Oates (1985) regressed cross-section data (1977) of 48 contiguous US states. In his estimated specification, the dependent variable was the state government size measured by aggregate state-local tax receipts as a fraction of personal income and his aimed explanatory variables included the state share of state-local revenues and expenditures (decentralization hypothesis) and number of local government units (fragmentation hypothesis) while intergovernmental grants as a percentage of state-local general revenues (collusion hypothesis), together with per capita personal income, population and urbanization ratio, was constructed as a control variable. Neither of the regression results showed statistically significant association between explanatory variable and dependent variable. Nonetheless, collusion hypothesis was partially supported by one of three equations in which a positive and statistically significant coefficient was resulted. While in the following empirical studies based on the same level, the decentralization hypothesis was supported by Wallis and Oates (1988), Joulfain and Marlow (1990; 1991), and Shadbegian (1999) and the collusion hypothesis was supported by Raimondo (1989), Grossman (1989) and Shadbegian (1999). With regard to fragmentation hypothesis, Nelson (1986; 1987) found general-purpose local government units increased intergovernmental competition and then restricted the state-local government size. In addition to US states data, de Mello (2001) used 38 rayons (subnational) data in Moldova that provided supporting evidence for above three hypotheses. Feld et al

(2003) also lent support to decentralization and collusion hypothesis except fragmentation one based evidence from 26 Swiss cantons (subnational).

Empirical studies at local level mainly concentrate on counties and municipalities in SMSAs of the United States. Forbes and Zampelli (1989) reject fragmentation hypothesis with a positive and significant effect of the number of counties on county government size, using sample of 345 counties in 157 SMSAs. Zax (1989) expanded sample to 3022 counties and Eberts and Gronberg (1988) used 2900 counties, both observing that increased general-purpose local government units were likely to reduce government size. Sjoquist (1982), Schneider (1986), and Eberts and Gronberg (1990) also found supporting evidence for fragmentation hypothesis at municipalities or SMSAs level. A more recent investigation undertaken by Campbell (2004) suggested different government levels matter how decentralization impact on government size: i) increased decentralization of expenditures tends to decrease municipal expenditures while have no influence on county expenditures; ii) increased fragmentation reduced county expenditures but has no effect on municipal expenditures.

3.3 Decentralized China

Considering the mixed empirical results, further study based on new data set is warranted to unravel the contradiction in the existing literature. China may be the right case. Firstly, a *de facto* fiscal decentralization has been resulted during last two decades. Local interests for development, together with the policy legacy of rural autarky in Mao era, accelerate the formation of a Chinese style of fiscal federalism (see e.g. Montinola *et al*, 1995; Qian and Weingast, 1996,1997; Weingast, 1995). Since transition in 1978, China has undertaken decentralization through a series of tax and fiscal reforms: tax-for-profit reform (1983-84), fiscal contracting system (1985-93) and 1994 tax-sharing system, etc (see e.g. World Bank, 1990; 1995; 2002; Wong, 1995; 1997; 1998). Under the fiscal contracting system, central government assigned fixed revenue-remittance contract and made local government *de facto* residual claimant intensively pursuing revenue surplus. As shown in Figure 7, central share of

budgetary revenue went on diminishing during 1985-93, which dropped 16 percent from 38% to 22%. The ratio of central to total budgetary expenditure fell from 40% to 28%. The continuous shrinkage of central revenue and expenditure provoked a tax reform in 1994, aimed to arrest the declining trend and recentralize the fiscal capacity. The result was dramatic that central share of budgetary revenue boosted into 56% of total in 1994 and kept average 51% recent years. Yet, on the extrabudgetary revenue and expenditure side, remarkable decentralization was undergoing, particularly after 1992, that local share of extrabudgetary revenue and expenditure rocketed from 56% in 1992 to highest 95% in 1998 and remained average 92% in 2001 (Figure 8).

[insert figure 7 and 8 about here]

Secondly, as Brennan and Buchanan point out, the fiscal decentralization may effectively constrain government's power to tax even when the democratic monitor fails. From this point of view, the absence of representative democracy in China offers a great opportunity for testing such hypothesis. Thirdly, China's sheer size allows a panel data analysis on subnational level. Its subnational government hierarchy consists of 31 provincial level government units, 333 prefectures, 2,074 counties, and 44,741 townships in 2000.⁴

4. Methodology and data

We intend to test the impact of decentralization, fragmentation, and collusion on government size and thereby address the problem of shrinking public sectors and inconsistency of Wagner's Law in China. Since tax reform in 1994 dramatically changed Chinese tax and fiscal system, we choose annual data from 1995 to 2002 across 31 provinces as our panel data set.

⁴ Provincial level government units refer to 22 provinces (*sheng*), 5 autonomous regions (*zizhiqu*), and 4 autonomous municipalities (*zhixiashi*, *Beijing*, *Shanghai*, *Tianjin*, and *Chongqing*). Taiwan province and two special administrative regions, Hong Kong and Macao are excluded.

4.1 Variables and model

The empirical model is as follows:

$$GOV_{it} = \beta_0 + \beta_x X_{it} + \beta_c C_{it} + \beta_s S_{it} + u_{it} \quad (1)$$

where i and t denotes province and year, respectively. GOV_{it} stands for government size, X_{it} denotes set of independent variables which we are interested in, C_{it} denotes conventional control variables used in previous empirical studies, S_{it} is specific control variables to capture Chinese transition situation, and u_{it} denotes the error term.

Following previous empirical literature, the dependent variable (GOV_{BE}) is measured by the aggregate provincial budgetary expenditure as share of provincial GDP. Considering Chinese specific extrabudgetary spending, we also have GOV_{CE} as the ratio of consolidated provincial expenditure including budgetary and extrabudgetary expenditure to provincial GDP. Suggested by Zhang and Zou (1998) that revenue is not a good indicator of decentralization in China, we construct three fiscal decentralization variables based on expenditure at two different levels: central-provincial and provincial-local level. $DEC_{CP_{BE}}$ is the ratio of provincial to central budgetary expenditure per capita; $DEC_{CP_{CE}}$ is the ratio of provincial to central consolidated budgetary and extrabudgetary expenditure per capita; DEC_{PL} is the share of subprovincial in aggregate provincial-subprovincial consolidated budgetary and extrabudgetary expenditure. In addition to vertical dimension of fiscal decentralization, numbers of local government units, such as prefecture, county and township, of each province ($NUMLG$) reflects the degree of interjurisdictional competition at horizontal fragmentation dimension. In line with Grossman (1989) to test the influence of intergovernmental collusion on the dependent variable, the $GRANTS_{BE}$ and $GRANTS_{CE}$ is the share of total central grants to province in aggregate provincial-subprovincial budgetary and consolidated expenditure, respectively. Population (POP), urbanization (URB) and per capita income (INC) are conventional control variables that are always include in the regression. Two specific control variables— SOE , the share of SOEs in total gross industrial output value of each province and $OPENNESS$, the share of total volume of foreign trade (the sum of

exports and imports) in provincial GDP—capture the change of economic structure of each province. Table 2 shows the description of variables.

[insert table 2 about here]

4.2 Data

Data of GOV_{BE} , GOV_{CE} , $NUMLG$, $GRANTS_{BE}$, $GRANTS_{CE}$, POP , INC , URB , SOE and $OPENNESS$ are from various year China Statistical Yearbooks; DEC_{PL} are from various year Provincial Finance Yearbooks and Provincial Budget Reports; $DEC_{CP_{BE}}$ and $DEC_{CP_{CE}}$ are from various year China Finance Yearbooks.

[insert table 3 about here]

Table 3 reports the mean of variables from 1995 to 2002 across 31 provinces. An astonishing diversity exists among different localities. Average GOV_{BE} reaches as high as 60.1% of total GDP in Tibet and low as 6.3% in Jiangsu. As for the consolidated government size GOV_{CE} , Tibet is still the highest one with 61.7% and Shandong becomes the lowest one with 10%. The decentralization degree at central-provincial level $DEC_{CP_{BE}}$ and $DEC_{CP_{CE}}$ ranges from 11.59 in Shanghai and 1.33 in Henan as well as 12.58 in Shanghai and 1.66 in Guizhou, respectively. Obviously, Shanghai gain much more fiscal autonomy from the central compared with other province during 1995-2002. Zhejiang seems the most decentralized with its subordinate agencies whose average DEC_{PL} (83.4%) is about 2 times more than that of Tibet (42.2%) and exceeds the average level across regions by 14.8%. The average central grants-in-aid Tibet received hold remarkable 92.8% ($GRANTS_{BE}$) of its total budgetary expenditure and 89.8% ($GRANTS_{CE}$) of its total consolidated expenditure while in Guangdong these two variables are only 20% and 12.7%, respectively. Tibet has the most local government units measured in per million populations, 32.55, and the least province is Chongqing with only 1.3. The maximum population is 93.3 million in Henan and the minimum 2.5 million in Tibet. Per capita annual income shows a large inequality

among different regions by highest 7,765 RMB in Shanghai and lowest 2,842 RMB in Gansu with an average of 4,052 RMB. The *URB* ranges from 11% in Tibet to 63% in Shanghai. Unsurprisingly, the development of private economy in costal regions is ahead of those inland regions. In contrast with Zhejiang in which SOEs only retain 21% of total gross industrial output value, Qinghai, as one of the most underdeveloped inland provinces, is dominated by SOEs (86%). The degree of economic openness ranges widely from 1.47 in Guangdong to only 0.05 in Henan with average level of 0.2.

5. Empirical results

5.1 Central-provincial decentralization

Based on following specifications, we firstly regress two different dependent variables (GOV_{BE} and GOV_{CE}) on relevant decentralization variables and conventional control variables:

$$GOV_{BE,it} = \beta_0 + \beta_1 DEC_CP_{BE,it} + \beta_2 GRANTS_{BE,it} + \beta_3 NUMLG_{it} + \beta_4 POP_{it} + \beta_5 INC_{it} + \beta_6 URB_{it} + u_{it} \quad (2)$$

$$GOV_{CE,it} = \beta_0 + \beta_1 DEC_CP_{CE,it} + \beta_2 GRANTS_{CE,it} + \beta_3 NUMLG_{it} + \beta_4 POP_{it} + \beta_5 INC_{it} + \beta_6 URB_{it} + u_{it} \quad (3)$$

As in Oates (1985), a logistic transformation of GOV_{BE} and GOV_{CE} is used to allow the value of dependent variable to range over the entire real line. The results of the LSDV (least squares dummy variables) regression of these two specifications are reported in Model 1 and 3 in Table 5, respectively. In both case, DEC_CP and $GRANTS$ show a strongly statistically significant at 1% level and positive relation with provincial government size, GOV , while $NUMLG$ holds negative relation but statistically significant at 1% level in Model 1 and at 10% in Model 3. Our findings converge with Jin and Zou (2002) that federal-state (central-provincial) fiscal decentralization may induce a larger subnational government size. A possible explanation proposed by John Wallis (Wallis's hypothesis) is that since individuals may have more effective checks and balances as well as control or influence on state

(provincial) level government agencies than those of federal (national) level and thus are more willing to empower them with a wider range of public functions and responsibilities (Oates, 1985). Therefore, our empirical results confirm that, the more is the central-provincial fiscal decentralization, *ceteris paribus*, the larger is provincial government size. We also find the flypaper effect in Chinese central grants-in-aid to province which obviously stimulate the expansion of provincial spending. The negative association between local government units and provincial spending confirms that interjurisdictional competition somehow constrains government revenue extraction.

Consistent with Wagner's Law, the per capita income has a strongly significantly positive association with provincial government size in Model 1 and 3. Statistically significant at 5%, urbanization exerts a positive influence on government size suggesting the large-scale government expenditure for investment in public infrastructure, city maintenance, compensation for peasants, etc., in China. By contrast, the coefficients of population in both specifications are insignificant.

To test the robustness of estimators in Model 1 and 3, we conduct a sensitivity analysis by employing two additional control variables, *SOE* and *OPENESS*, into the specification. According to three combinations of these two variables, we have three test regressions in addition to Model 1 and 3, respectively. Table 4 reports the sensitivity results.

[insert table 4 about here]

For the model using budgetary spending as dependent variable, all coefficients of regressors remain the same sign as in the basic Model 1. $DEC_{CP_{BE}}$ becomes more significant with high bound coefficient of 0.1757 and t-ratio of 6.4053 after adding *SOE* and *OPENNESS* as control variables. The coefficient of $GRANT_{BE}$ ranges from 1.6092 to 1.7329 at strongly statistical significance level of 1%. *NUMLG* keeps strongly significantly negative association with dependent variable. Population stays

statistical insignificance whereas income and urbanization are both positive with government size in any case. Similarly, in the case of consolidated expenditure as measurement of government size, any new added variable does not change the sign and significance level of all coefficients in the Model 3, especially for our primary concerned variables. The coefficient of DEC_CP_{CE} ranges from 0.0839 to 0.0999 and $GRANTS_{CE}$ from 1.2409 to 1.3351 at 1% significance level while slight change of $NUMLG$ from -0.1209 to -0.1296 at 10% significance level.

[insert table 5 about here]

Thus, we add SOE and $OPENNESS$ as specific control variable to specification 2 and 3. The similar regression results are reported in Model 2 and 4 in Table 5. DEC_CP_{BE} , DEC_CP_{CE} , $GRANTS_{BE}$ and $GRANTS_{CE}$ are strongly statistically significant at 1% level and positive with the dependent variable. $NUMLG$ shows negative association with government size but statistically significant at 1% level in Model 2 and 10% in Model 4. Both income and urbanization have positive influence on government spending and population remains insignificant. Moreover, SOE is positive related with budgetary government size at 1% significance level indicating budgetary spending on subsidies to loss-making SOEs induce expansion of total government size. Including extrabudgetary expenditure into consolidated expenditure, the sign of SOE changes into negative but statistically insignificant. Possible interpretation is that extrabudgetary expenditure is not close linked to SOEs and usually spends on infrastructure, urban construction, education, pension, medical insurance and so on. The coefficients of $OPENNESS$ in both cases are positive and strongly statistically significant at 1% level which suggests an open local economy in China needs government support and development in terms of investment in infrastructure to improve local investment environment.

5.2 Provincial-local decentralization

The procedure is similar with that in earlier section where we firstly regress two

basic specifications with conventional control variables and then conduct the sensitivity analysis. Finally, regression results including specific control variables are reported.

$$GOV_{BE,it} = \beta_0 + \beta_1 DEC_{PL,it} + \beta_2 GRANTS_{BE,it} + \beta_3 NUMLG_{it} + \beta_4 POP_{it} + \beta_5 INC_{it} + \beta_6 URB_{it} + u_{it} \quad (4)$$

$$GOV_{CE,it} = \beta_0 + \beta_1 DEC_{PL,it} + \beta_2 GRANTS_{CE,it} + \beta_3 NUMLG_{it} + \beta_4 POP_{it} + \beta_5 INC_{it} + \beta_6 URB_{it} + u_{it} \quad (5)$$

Model 5 and 7 in Table 7 show the regression results of specification 4 and 5. The strongly significant negative relation between *DEC_PL* and dependent variable in both cases indicates provincial-local decentralization curtails aggregate provincial government size which lends strong support to Leviathan hypothesis that fiscal decentralization may constrain overall reach of the state. Central grants-in-aid to province still strongly stimulate expansion of provincial budgetary and extrabudgetary spending suggested by the positive coefficients at 1% significance level. Number of local government unit holds negative sign but at 10% significance level which implies current division of administration area may be, to a large extent, based on geographical principle and not for the sake of introducing interjurisdictional competition. For the conventional control variables, income and urbanization boost government spending while population exhibits a negative but statistically insignificant association with government size which may suggest an insufficient local public good and service is provided relative to a huge population base in China.

[insert table 6 about here]

Table 6 reports the sensitivity results. For specification 4, *DEC_PL* reaches its low bound of -0.522817 and *GRANTS_{BE}* reaches its high bound of 1.608128 at 1% significance level after adding *SOE* and *OPENNESS*. The coefficient of *NUMLG* ranges from -0.134124 to -0.131556 at 10% significance level. *POP* stays

insignificant and *INC* and *URB* remain significant positive. Similar results are obtained for consolidated expenditure as dependent variable. The coefficient of *DEC_PL* is consistently negative at low bound of -0.447505 but significant at 5% level and *GRANTS_{CE}* strongly significantly positive at its high bound of 1.243635. The *NUMLG* shows consistently negative sign at its low and high bound and significant at 10% level. *POP* is insignificant and *INC* and *URB* significant positive in any case.

[insert table 7 about here]

Therefore, we include the *SOE* and *OPENNESS* as specific control variables and regression results are reported in Model 6 and 8 in Table 7. The coefficients of our primary concerned variables are not changed by adding *SOE* and *OPENNESS*. *DEC_PL* and *NUMLG* remain negative against dependent variable but at 1% and 10% significance level, respectively. *GRANTS_{BE}* and *GRANTS_{CE}* keep strong positive effect on provincial government size. Population stays negative but statistically insignificant and income and urbanization is positive. *SOE* and *OPENNESS* are insignificant in both cases except *SOE* shows strong negative sign at 1% significance level in Model 8. The interpretation has been proposed in preceding section.

6. Conclusion

This paper offers a new data set and window to empirically test Leviathan theory in the sense of China's transition economy and also explain the superficial contradiction of China's empirical fact with Wagner's Law. Analyzing provincial panel data and various variables used by previous empirical studies, we test the Leviathan hypothesis for vertical decentralization, horizontal fragmentation and intergovernmental collusion at central-provincial and provincial-local level, respectively. The results demonstrate that fiscal decentralization in terms of vertical expenditure decentralization at different level exerts effects on government size poles apart. The central-provincial decentralization stimulates expansion of provincial government

spending (Wallis's hypothesis) whereas provincial-local decentralization imposes constraints on it (Leviathan hypothesis). Without a traditional democratic monitoring process in China, fiscal decentralization may assume as a powerful institutional restriction to curtail the government size and foster the market development. Moreover, the intergovernmental collusion hypothesis is empirically verified that such institutional rearrangement of tax power would weaken interjurisdictional competition and, ultimately, the effect of fiscal decentralization on the reach of the state. Yet, we find a relative weak empirical support of the fragmentation dimension of fiscal decentralization curbing growth of provincial government spending. Furthermore, in addition to three plausible explanations for a shrinking public sector in China, we offer an alternative approach that fiscal decentralization contributes to restrict government size as well.

Additionally, some interesting findings present helpful policy implications. From increasing population perspective, the supply of public goods and services is insufficient at provincial level in China. If government failed to address such problem, it would endanger sustainable development of future China. The loss-making SOEs are major financial burden of provincial budgetary budget while extrabudgetary expenditure seems less linked to SOEs. An open local economy needs government support and development in terms of more expenditure on improving local investment environment.

Overall, we find empirical support for Leviathan theory although it is still not conclusive. With regard to almost two decades searching for Leviathan, our contribution only provides an empirical result based on a new but particular case of transition China. Further empirical studies should be done to measure government size, fiscal decentralization and interjurisdictional competition more precisely. And new data set is also helpful to address such "fussy issue".

Appendix*Sample of provinces, China:*

East	Middle	West
Beijing	Jilin	Guangxi
Tianjin	Heilongjiang	Guizhou
Hebei	Shanxi	Yunnan
Liaoning	Inner Mongolia	Tibet
Shandong	Jiangxi	Shaanxi
Shanghai	Anhui	Gansu
Jiangsu	Henan	Qinghai
Zhejiang	Hubei	Ningxia
Fujian	Hunan	Xinjiang
Guangdong	Chongqing	
Hainan	Sichuan	

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Table 2 Variable descriptions

Variable	Descriptions
$GOV_{BE,it}$	Ratio of aggregate provincial budgetary expenditure to provincial GDP in province i and year t
$GOV_{CE,it}$	Ratio of aggregate consolidated expenditure to provincial GDP in province i and year t
$DEC_{CP_{BE,it}}$	Ratio of aggregate provincial budgetary expenditure to central budgetary expenditure in province i and year t , expressed in per capita term
$DEC_{CP_{CE,it}}$	Ratio of aggregate provincial consolidated expenditure to central consolidated expenditure in province i and year t , expressed in per capita term
$DEC_{PL_{it}}$	Ratio of subprovincial consolidated expenditure to aggregate provincial consolidated expenditure in province i and year t
$GRANTS_{BE,it}$	Ratio of central grants to aggregate provincial budgetary expenditure in province i and year t
$GRANTS_{CE,it}$	Ratio of central grants to aggregate provincial consolidated expenditure in province i and year t
$NUMLG_{it}$	Number of local government units per million population
POP_{it}	Population in province i and year t (in millions)
INC_{it}	Average of per capita income in urban and rural region in province i and year t (in RMB)
URB_{it}	Percentage of population residing within urban area in province i and year t
SOE_{it}	Ratio of state-owned enterprises (SOEs) in total provincial gross industrial output value in province i and year t
$OPENNESS_{it}$	Ratio of total volume of foreign trade (the sum of exports and imports) in provincial GDP in province i and year t

Table 4 Sensitivity results for central-provincial decentralization

		Coefficient	Std. Error	t-Statistic	Adjusted R-squared	S.E. of regression	Other variables
<u>Dependent variable: GOV_{BE}</u>							
$DEC_{CP_{BE}}$	high	0.1757	0.0274	6.4053	0.9727	0.0989	SOE, OPENNESS
	base	0.1372	0.028	4.8996	0.9675	0.1077	
	low						
$GRANT_{BE}$	high	1.7329	0.1141	15.1893	0.9689	0.1054	OPENNESS
	base	1.6957	0.1226	13.8327	0.9675	0.1077	
	low	1.6092	0.1265	12.7172	0.9694	0.1046	SOE
$NUMLG$	high						
	base	-0.1698	0.0564	-3.0091	0.9675	0.1077	
	low	-0.1906	0.0499	-3.8193	0.9727	0.0989	SOE, OPENNESS
POP	high	0.0016	0.0023	0.6865	0.9727	0.0989	SOE, OPENNESS
	base	0.0005	0.0027	0.1864	0.9675	0.1077	
	low	0.0002	0.0026	0.094	0.9689	0.1054	OPENNESS
INC	high	0.0002	0	14.4421	0.9694	0.1046	SOE
	base	0.0002	0	14.7532	0.9675	0.1077	
	low	0.0002	0	15.5328	0.9689	0.1054	OPENNESS
URB	high						
	base	0.2238	0.1067	2.0975	0.9675	0.1077	
	low	0.1985	0.0971	2.0437	0.9727	0.0989	SOE, OPENNESS
<u>Dependent variable: GOV_{CE}</u>							
$DEC_{CP_{CE}}$	high	0.0999	0.0204	4.9061	0.9518	0.1118	OPENNESS
	base	0.0883	0.0202	4.3752	0.9493	0.1147	
	low	0.0839	0.0202	4.163	0.9501	0.1138	SOE
$GRANT_{CE}$	high	1.3351	0.1245	10.7276	0.9519	0.1117	SOE, OPENNESS
	base	1.2409	0.1167	10.6319	0.9493	0.1147	
	low						
$NUMLG$	high						
	base	-0.1209	0.0736	-1.6435	0.9493	0.1147	
	low	-0.1296	0.0713	-1.8181	0.9518	0.1118	OPENNESS
POP	high						
	base	-0.0001	0.0025	-0.0207	0.9493	0.1147	
	low	-0.0005	0.0025	-0.2093	0.9501	0.1138	SOE
INC	high						
	base	0.0001	0	10.7996	0.9493	0.1147	
	low	0.0001	0	9.5183	0.9519	0.1117	SOE, OPENNESS
URB	high						
	base	0.2474	0.0966	2.5602	0.9493	0.1147	
	low	0.2294	0.0924	2.4829	0.9519	0.1117	SOE, OPENNESS

Table 5 LSDV estimates for central-provincial decentralization: 1995-2002

Variables	Dependent Variable: GOV_{BE}		Dependent Variable: GOV_{CE}	
	Model(1)	Model(2)	Model(3)	Model(4)
Constant	-3.5250 (-11.5310)	-4.1790 (-14.4407)	-2.5287 (-6.4152)	-2.5334 (-6.5694)
$DEC_{CP_{BE}}$	0.1372*** (4.8996)	0.1757*** (6.4053)		
$DEC_{CP_{CE}}$			0.0883*** (4.3752)	0.0962*** (4.6085)
$GRANT_{BE}$	1.6957*** (13.8327)	1.6269*** (14.4661)		
$GRANT_{CE}$			1.2409*** (10.6319)	1.3351*** (10.7276)
$NUMLG$	-0.1698*** (-3.0091)	-0.1906*** (-3.8193)	-0.1209* (-1.6435)	-0.1294* (-1.8135)
POP	0.0005 (0.1864)	0.0016 (0.6865)	-0.0001 (-0.0207)	-0.0003 (-0.1392)
INC	0.0002*** (14.7532)	0.0002*** (15.6926)	0.0001*** (10.7996)	0.0001*** (9.5183)
URB	0.2238** (2.0975)	0.1985** (2.0437)	0.2474** (2.5602)	0.2294** (2.4829)
SOE		0.7265*** (6.1216)		-0.1660 (-1.4320)
$OPENNESS$		0.6823*** (5.0653)		0.4538*** (3.0619)
Provincial effect	Yes	Yes	Yes	Yes
Adjusted R-squared	0.9675	0.9727	0.9493	0.9519
Observations	243	243	243	243

Notes:

- t-statistics in parentheses.
- * Statistically significant at 10% level; ** statistically significant at 5% level; *** statistically significant at 1% level.
- White diagonal standard errors & covariance (no d.f. correction).

Table 6 Sensitivity results for provincial-local decentralization

		Coefficient	Std. Error	t-Statistic	Adjusted R-squared	S.E. of regression	Other variables
<u>Dependent variable: GOV_{BE}</u>							
DEC_PL	high						
	base	-0.5118	0.1831	-2.7957	0.9533	0.1310	
	low	-0.5228	0.1915	-2.7295	0.9529	0.1316	SOE, OPENNESS
GRANT _{BE}	high	1.6081	0.1505	10.6871	0.9529	0.1316	SOE, OPENNESS
	base	1.5963	0.1517	10.5225	0.9533	0.1310	
	low						
NUMLG	high	-0.1316	0.0841	-1.5639	0.9531	0.1313	SOE
	base	-0.1320	0.0843	-1.5666	0.9533	0.1310	
	low	-0.1341	0.0840	-1.5959	0.9531	0.1313	OPENNESS
POP	high						
	base	-0.0022	0.0029	-0.7697	0.9533	0.1310	
	low	-0.0024	0.0029	-0.8115	0.9529	0.1316	SOE, OPENNESS
INC	high						
	base	0.0002	0.0000	13.9710	0.9533	0.1310	
	low	0.0002	0.0000	13.9534	0.9531	0.1313	OPENNESS
URB	high						
	base	0.2342	0.1471	1.5920	0.9533	0.1310	
	low	0.2312	0.1468	1.5751	0.9529	0.1316	SOE, OPENNESS
<u>Dependent variable: GOV_{CE}</u>							
DEC_PL	high						
	base	-0.3763	0.1792	-2.1004	0.9363	0.1306	
	low	-0.4475	0.1803	-2.4824	0.9391	0.1276	SOE
GRANT _{CE}	high	1.2436	0.1429	8.7007	0.9391	0.1276	SOE
	base	1.1463	0.1415	8.0986	0.9363	0.1306	
	low						
NUMLG	high	-0.1302	0.0857	-1.5203	0.9389	0.1279	SOE, OPENNESS
	base	-0.1356	0.0880	-1.5416	0.9363	0.1306	
	low	-0.1373	0.0877	-1.5650	0.9360	0.1309	OPENNESS
POP	high						
	base	-0.0030	0.0026	-1.1682	0.9363	0.1306	
	low	-0.0034	0.0026	-1.3151	0.9391	0.1276	SOE
INC	high						
	base	0.0001	0.0000	8.5161	0.9363	0.1306	
	low	0.0001	0.0000	7.9517	0.9391	0.1276	SOE
URB	high						
	base	0.2351	0.1229	1.9124	0.9363	0.1306	
	low	0.2164	0.1174	1.8437	0.9391	0.1276	SOE

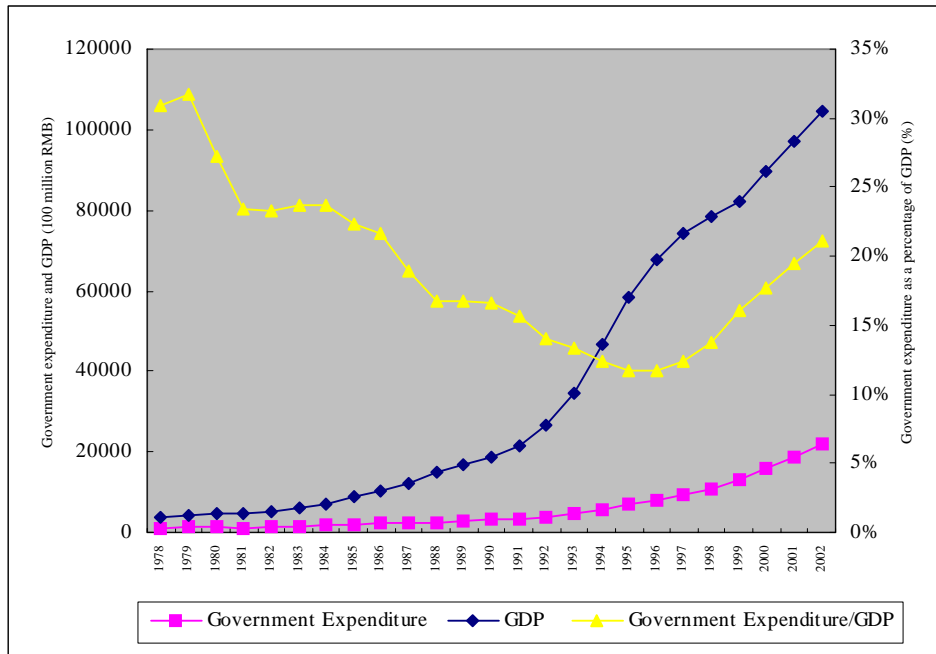
Table 7 LSDV estimates for provincial-local decentralization: 1995-2002

Variables	Dependent Variable: GOV_{BE}		Dependent Variable: GOV_{CE}	
	Model(5)	Model(6)	Model(7)	Model(8)
Constant	-2.6030 (-5.8501)	-2.5765 (-5.6973)	-1.6657 (-3.7331)	-1.3128 (-3.0045)
DEC_{PL}	-0.5118*** (-2.7957)	-0.5228*** (-2.7295)	-0.3763** (-2.1004)	-0.4471*** (-2.4842)
$GRANT_{BE}$	1.5963*** (10.5225)	1.6081*** (10.6871)		
$GRANT_{CE}$			1.1463*** (8.0986)	1.2394*** (8.4568)
$NUMLG$	-0.1320* (-1.5666)	-0.1335* (-1.5882)	-0.1356* (-1.5416)	-0.1302* (-1.5203)
POP	-0.0022 (-0.7697)	-0.0024 (-0.8115)	-0.0030 (-1.1682)	-0.0034 (-1.3033)
INC	0.0002*** (13.9710)	0.0002*** (13.8906)	0.0001*** (8.5161)	0.0001*** (7.1203)
URB	0.2342* (1.5920)	0.2312* (1.5751)	0.2351* (1.9124)	0.2177* (1.8542)
SOE		-0.0446 (-0.3539)		-0.5278*** (-4.3666)
$OPENNESS$		0.0737 (0.4848)		-0.0557 (-0.3055)
Provincial effect	Yes	Yes	Yes	Yes
Adjusted R-squared	0.9533	0.9529	0.9363	0.9389
Observations	234	234	234	234

Notes:

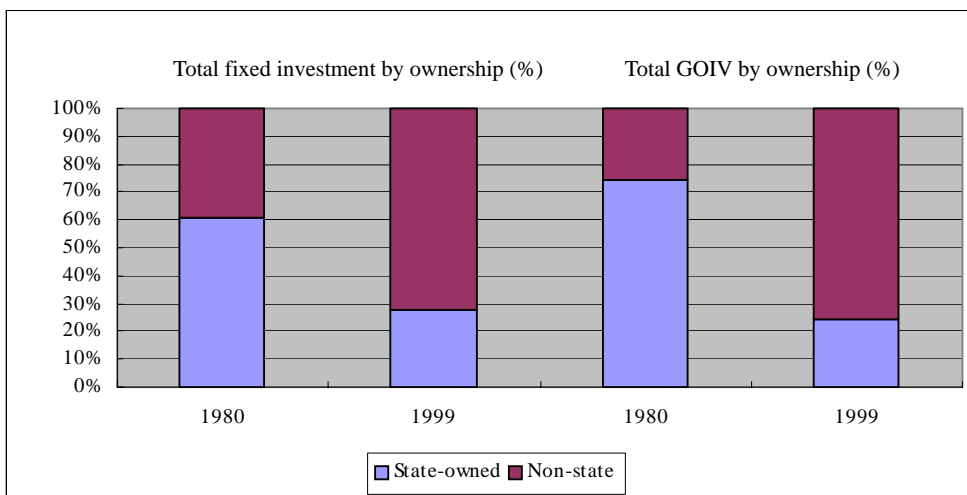
- t-statistics in parentheses.
- * Statistically significant at 10% level; ** statistically significant at 5% level; *** statistically significant at 1% level.
- White diagonal standard errors & covariance (no d.f. correction).

Figure 1 Government expenditure and as a percentage of GDP: 1978-2002



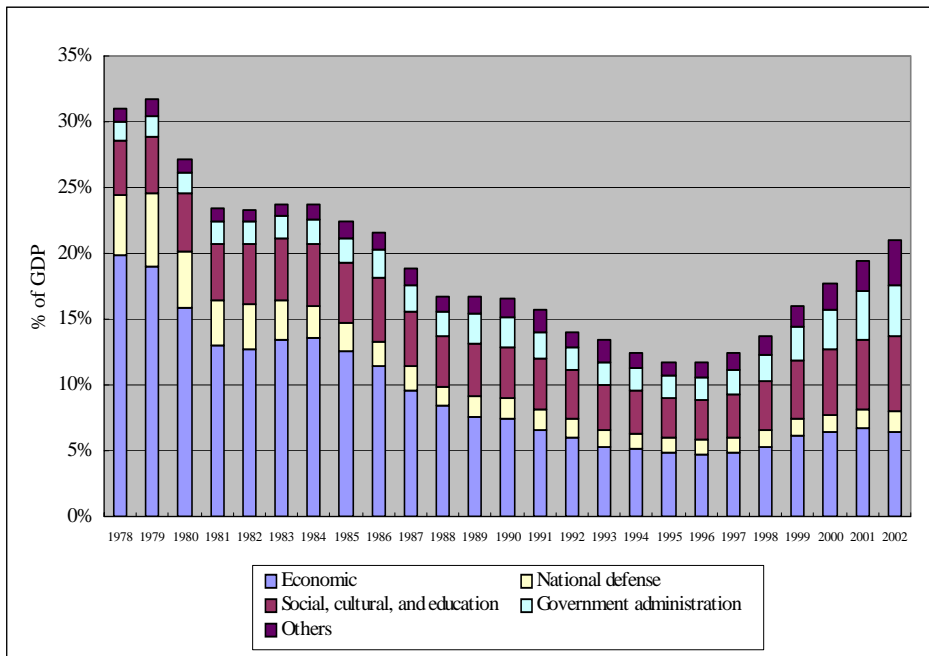
Source: China Statistic Yearbook, 1996-2003

Figure 2 Development of non-state sector



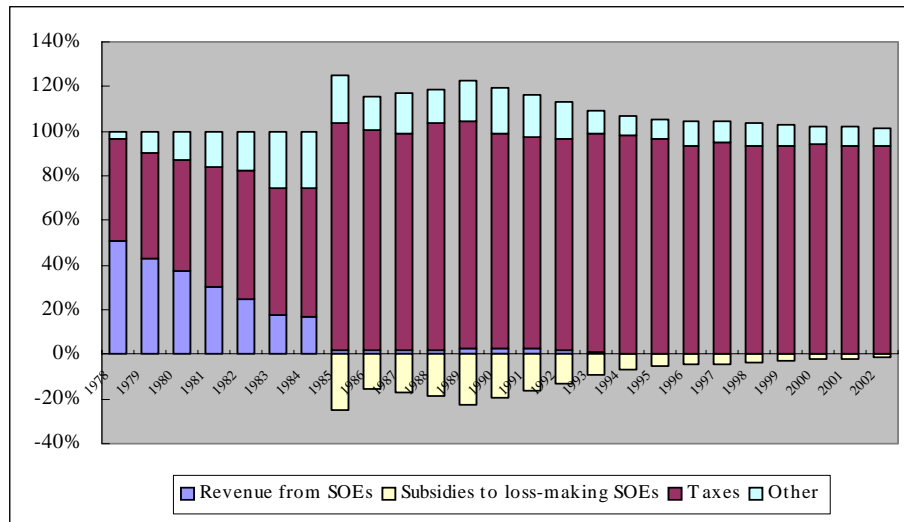
Source: China Statistic Yearbook, 1996-2000

Figure 3 Government expenditure by function (% of GDP)



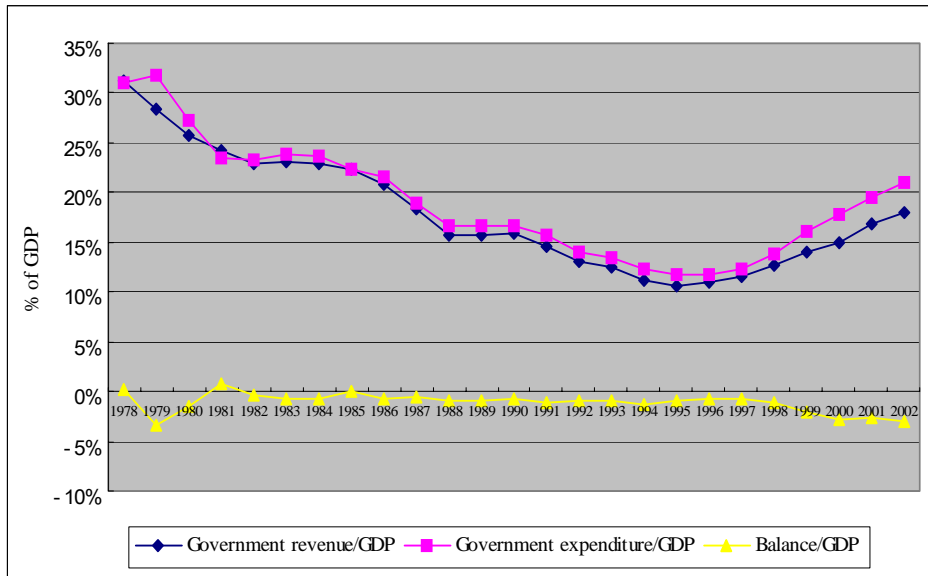
Source: China Statistic Yearbook, 1996-2003

Figure 4 Government revenue by source (%)



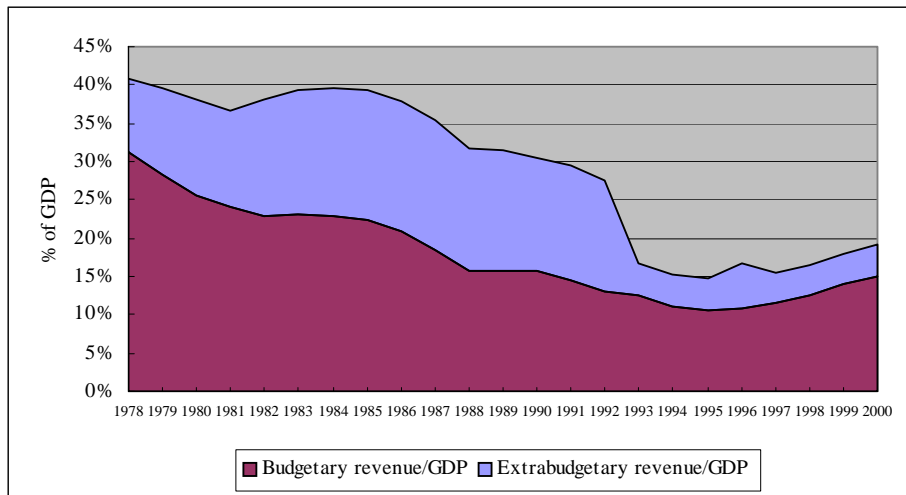
Source: China Statistic Yearbook, 1996-2003

Figure 5 Government revenue, expenditure and balance as a percentage of GDP



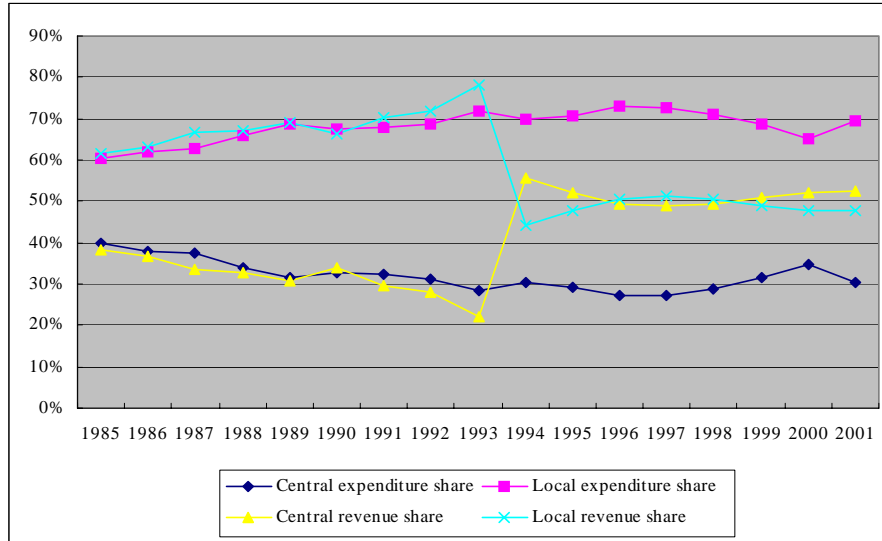
Source: China Statistic Yearbook, 1996-2003

Figure 6 Government budgetary and extrabudgetary revenue as a percentage of GDP



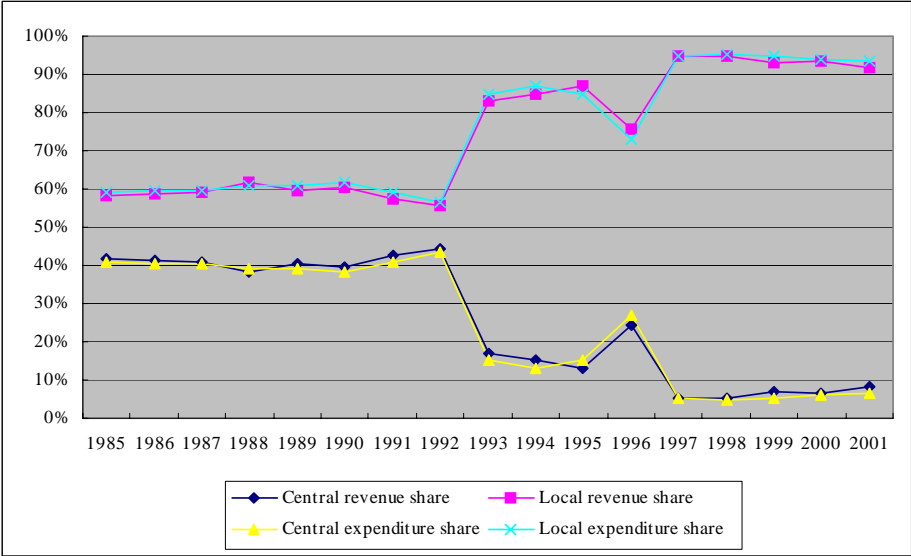
Source: China Statistic Yearbook, 1996-2003

Figure 7 Central and local share of budgetary government revenue and expenditure



Source: China Statistic Yearbook, 1996-2003

Figure 8 Central and local share of extrabudgetary government revenue and expenditure



Source: China Statistic Yearbook, 1996-2003

Table 1 Empirical literature of Leviathan hypotheses

Author(s)	Size of government	Leviathan hypotheses	Measurement	Level of observation units	Time	Result
Oates (1972)	Taxes/national income	Decentralization	Central taxes/total taxes	57 countries	1972	No
Sjoquist (1982)	GOVE per capita	Fragmentation	Number of jurisdiction in an SMSA	48 southern SMSAs, US	1972	Yes
	Subnational taxes/personal income	Decentralization	State GOVR (GOVE)/subnational GOVR(GOVE)			No
		Fragmentation	Number of local government units	48 states, US	1977	No
Oates (1985)		Collusion	Intergovernmental grants/subnational GOVR			Yes
	GOVR/GDP	Decentralization	Central GOVR (GOVE)/total GOVR (GOVE)	43 countries	1982	No
		Collusion	Intergovernmental grants/total GOVR			Yes
Schneider (1986)	GOVE per capita	Fragmentation	Number of suburban municipalities in an SMSA per 100,000 capita	757 suburban municipalities in 46 SMSAs, US	1972-77	Yes
	Subnational tax per capita	Decentralization	State taxes/total subnational taxes			No
Nelson (1986)	Subnational tax/personal income	Fragmentation	Population per county (special district)	49 states, US	1976	Yes(No)
	Subnational taxes (GOVE)/personal income	Fragmentation	Number of general-purpose (single-) units per capita	50 states, US	1977	Yes (No)

Wallis&Oates (1988)	Subnational GOVR (GOVE)/per capita income	Decentralization	State GOVR (GOVE)/subnational GOVR (GOVE)	48 states, US	1902-1982	Yes (Yes)
Eberts&Gronberg (1988)	GOVE/personal income	Fragmentation	Number of general-purpose (single-) units, per capita, per square mile	2900 counties, US 280 SMSAs, US	1977	Yes (No) Yes (No)
Marlow (1988)	GOVE/GNP	Decentralization	Subnational GOVE/total GOVE	US	1946-1985	Yes
Zax (1989)	County GOVR/personal income	Decentralization Fragmentation	County GOVR/total local GOVR Number of general-purpose (single-) governments per 1000 capita	3022 counties	1982	Yes Yes (No)
Forbes&Zampelli (1989)	County taxes/income, county taxes per capita, county GOVR/income, county GOVR per capita	Fragmentation	Number of counties in an SMSA	345 counties in 157 SMSAs, US	1977	No
Raimondo (1989)	GOVE/personal income (e.g. six forms)	Collusion	Federal-funded GOVE/state-local GOVE Local-funded GOVE/state-local GOVE	50 states, US	1960, 1970, 1980	Yes
Grossman (1989a)	GOVE/GNP	Decentralization Collusion	Subnational GOVE/total GOVE Federal grants/subnational GOVR	US	1946-1986	Yes Yes

	Subnational	Collusion	Per capita state-to-local transfers			Yes
Grossman (1989b)	GOVR/personal income	Fragmentation	Population per multiple function government	48 states, US	1976-77	No
	GOVR/GNP	Collusion	Per capita federal grants	US	1948-1984	Yes
Joulfaian&Marlow		Decentralization	Subnational GOVE/total GOVE			Yes
(1990)	GOVE/GSP	Fragmentation	Number of local governments	50 states, US	1981, 1984	Yes
		Collusion	Federal grants/subnational GOVE			No
Eberts&Gronberg	Own-source GOVR	Fragmentation	Number of local jurisdictions	218 SMSAs, US	1977	Yes
(1990)	(GOVE)/personal income					
Joulfaian&Marlow		Decentralization	Subnational GOVE/total GOVE(Local			Yes
(1991)	GOVE/GSP	Fragmentation	GOVE/subnational GOVE)	48 states, US	1983-1985	Yes
	Per capita GOVE	Collusion	Number of local governments			No
			Federal grants/subnational GOVE			
Heil (1991)	GOVE (GOVR)/GDP	Decentralization	Central GOVR (GOVE)/total GOVR (GOVE)	22 OECD and 39 IMF	1985	No (No)
			Dummy variable for federal structure	countries		No
Grossman (1992)	GOVE/GDP	Decentralization	Central (state/local) GOVE/total GOVE	Australia	1950-1984	No (No)
		Collusion	Grants/total state-local GOVR			Yes
Grossman&West	GOVE/GNP	Decentralization	Central (province/local) GOVE/total GOVE	Canada	1958-1987	Yes

(1994)		Collusion	Grants/total provincial-local GOVR			Yes
Anderson&van Den Berg (1998)	GOVR/GDP	Decentralization	Central GOVR (GOVE)/total GOVR (GOVE)	45 countries	1990	Yes (Yes)
Stein (1999)	GOVE/GDP	Decentralization	Subnational GOVE/total GOVE	19 Latin American and some	Average	No
		Collusion	Local program financed by central funds	OECD countries	1990-1995	Yes
Shadbegian (1999)	GOVE/GSP	Decentralization	State and local own-purpose GOVE/total GOVE			Yes
		Collusion	Central-state and state-local grants/total state-local GOVR	48 states, US	1979-1992	Yes
Moesen&van Cauwenberge (2000)	GOVE/GDP	Decentralization	Local taxes/total GOVE	19 OECD countries	1990-1992	Yes
de Mello (2001)	Per capita GOVE	Decentralization	Rayon's GOVR (GOVE)/total GOVR (GOVE)			Yes (Yes)
		Fragmentation	Number of cities and communes in rayon	38 rayons, Moldova	1998	Yes
		Collusion	Per capita grants			Yes
Jin&Zou (2002)	GOVE/GDP	Decentralization	Subnational GOVR (GOVE)/total GOVR (GOVE)	17 industrial and 15		Yes (No)
		Collusion	Central grants/subnational GOVE	developing countries	1980-1994	Yes

		Decentralization	Own-source subnational revenue/total revenue			No
		Collusion	Grants/total GOVR	44 countries	1978-1997	Yes
Rodden (2003)	GOVE/GDP	Decentralization	Own-source subnational revenue/total revenue			No
		Collusion	Grants/total GOVR	25 countries	1980-1993	Yes
		Decentralization	subnational revenue/total revenue		Average	Yes
		Collusion	Grants/total GOVR	18 OECD countries	1985-95	Yes
Kwon (2003)	GOVE/GDP	Decentralization	Local GOVE/total GOVE			Yes
		Collusion	Central-to-local grants	Korea	1979-2001	Yes
		Decentralization	Communal GOVR/ subnational GOVR per capita			Yes
Feld et al (2003)	Per capita GOVR	Fragmentation	Number of communes per capita	26 Swiss cantons	1980-1998	No
		Collusion	Net central-to-canton grants per capita			Yes
		Decentralization	Own GOVE/ municipalities and counties GOVE	205 counties, US		No
Campbell (2004)	Per capita GOVE	Fragmentation	Number of units per 100,000 capita		1982	Yes
				665 municipalities, US		Yes
						No

Note:

GOVE: Government expenditure, GOVR: Government revenue, GSP: Gross state product, GDP: Gross domestic product, GNP: Gross national product.

Table 3 Mean of variables: 1995-2002

REGION	GOV_{BE}	GOV_{CE}	$DEC_{CP_{BE}}$	$DEC_{CP_{CE}}$	DEC_{PL}	$GRANT_{BE}$	$GRANT_{CE}$	$NUMLG$	POP	INC	URB	SOE	$OPENNESS$
Beijing	0.154	0.204	8.438	10.298	0.500	0.203	0.123	1.383	0.131	6692.569	0.568	0.633	0.767
Tianjin	0.111	0.142	5.535	6.479	0.479	0.299	0.224	1.854	0.097	5375.510	0.537	0.349	0.795
Hebei	0.077	0.104	1.755	2.145	0.748	0.384	0.275	2.781	0.660	3795.148	0.183	0.511	0.094
Shanxi	0.125	0.183	2.021	2.686	0.732	0.430	0.264	4.062	0.320	3120.997	0.251	0.666	0.141
Inner													
Mongolia	0.161	0.189	2.849	3.050	0.743	0.598	0.500	4.815	0.234	3171.994	0.321	0.762	0.103
Liaoning	0.108	0.145	3.598	4.373	0.801	0.370	0.260	2.738	0.416	3661.288	0.444	0.627	0.342
Jilin	0.133	0.168	2.761	3.206	0.652	0.550	0.424	2.598	0.266	3333.726	0.420	0.769	0.148
Heilongjiang	0.107	0.133	2.772	3.185	0.664	0.465	0.369	3.820	0.376	3377.899	0.420	0.785	0.119
Shanghai	0.133	0.160	11.586	12.575	0.544	0.200	0.136	1.300	0.152	7765.047	0.631	0.456	0.878
Jiangsu	0.063	0.101	2.223	3.250	0.802	0.275	0.150	1.662	0.724	4842.614	0.272	0.283	0.390
Zhejiang	0.067	0.109	2.615	3.967	0.834	0.281	0.135	2.201	0.450	6244.551	0.206	0.213	0.356
Anhui	0.096	0.130	1.465	1.830	0.705	0.419	0.303	1.971	0.616	3393.259	0.184	0.542	0.087
Fujian	0.080	0.126	2.801	3.978	0.765	0.281	0.156	2.776	0.335	4851.144	0.206	0.289	0.501
Jiangxi	0.106	0.148	1.584	2.007	0.749	0.476	0.322	2.644	0.416	3344.404	0.204	0.727	0.072
Shandong	0.069	0.100	1.975	2.611	0.828	0.285	0.177	1.754	0.889	4140.431	0.245	0.409	0.259
Henan	0.081	0.114	1.327	1.700	0.781	0.417	0.286	1.874	0.933	3177.274	0.170	0.536	0.052
Hubei	0.082	0.107	1.740	2.087	0.745	0.427	0.317	1.922	0.591	3637.828	0.268	0.569	0.082
Hunan	0.093	0.139	1.583	2.164	0.715	0.458	0.302	2.093	0.650	3906.886	0.186	0.615	0.064
Guangdong	0.108	0.137	4.153	4.790	0.830	0.200	0.127	1.930	0.745	6330.030	0.313	0.233	1.472
Guangxi	0.119	0.162	1.671	2.111	0.727	0.445	0.300	2.657	0.466	3790.553	0.165	0.613	0.106
Hainan	0.127	0.165	2.701	3.195	0.663	0.386	0.290	2.888	0.076	3679.896	0.233	0.592	0.298

Chongqing	0.112	0.152	1.616	2.134	0.630	0.454	0.359	1.299	0.308	3998.483	0.210	0.652	0.085
Sichuan	0.100	0.142	1.426	1.882	0.772	0.417	0.276	2.306	0.923	3540.168	0.172	0.575	0.067
Guizhou	0.186	0.225	1.489	1.655	0.717	0.562	0.445	2.616	0.365	3077.964	0.137	0.771	0.072
Yunnan	0.205	0.243	3.012	3.220	0.713	0.555	0.459	3.461	0.417	3641.708	0.131	0.796	0.096
Tibet	0.601	0.617	7.782	7.231	0.422	0.928	0.898	32.553	0.025	4369.945	0.106	0.747	0.137
Shaanxi	0.141	0.178	1.783	2.052	0.639	0.516	0.392	3.066	0.397	2982.971	0.260	0.748	0.125
Gansu	0.170	0.208	1.953	2.185	0.563	0.616	0.493	3.959	0.252	2842.396	0.214	0.760	0.068
Qinghai	0.239	0.267	3.677	3.756	0.547	0.744	0.659	10.089	0.051	3026.474	0.252	0.861	0.093
Ningxia	0.218	0.261	3.140	3.451	0.557	0.640	0.520	5.192	0.054	3049.381	0.302	0.728	0.129
Xinjiang	0.147	0.185	3.257	3.735	0.706	0.596	0.452	6.236	0.179	3444.632	0.337	0.845	0.134
Mean	0.156	0.193	2.939	3.436	0.698	0.483	0.367	5.446	0.348	3800.777	0.285	0.628	0.199

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