INCOME INEQUALITY IN URBAN CHINA AND THE ROLE OF STATE SECTOR[*]

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Abstract

We tried to develop a two sector model to investigate the role of state sector on the urban income inequality in China. We showed that the state sector in the coastal provinces rather than the state sector in the interior provinces plays an important role in the income inequality in urban China. The findings of empirical analysis imply that the income inequality for urban households in China is mainly related to the coastal provinces with relatively higher return to capital, capital intensity, and thus capital income in the state sector. The Chinese government should redirect their policy that emphasizes the role of large enterprises in the state sector and subsidizes the capital in the capital-intensive state sector. The main reason for shifting from emphasizing the capital-intensive state sector to the labor-intensive private sector is to reduce inequality in the urban China.

Keywords: capital income, capital intensity, return to capital, urban income inequality
JEL Classification Codes: O56, O18

I. *Introduction*

There are growing concerns that income inequality in China has increased under its capital-heavy model of growth. The extent of China's income inequality poses fundamental challenges to the legitimacy of the Communist Party, which has emphasized harmonious society. The most recent estimates from the World Bank for income inequality in China show that the Gini coefficient has jumped from 0.28 in the mid-1980s to 0.43 in 2005 (see Table 1). The World Bank estimates reveal that income shares in the highest 10% is 18 times greater than the income shares in the lowest 10%. According to the *Economist* (March 10th, 2012), the last year the Chinese government officially released the Gini coefficient was in 2000, then the coefficient was 0.412. It is believed that China's is now higher than 0.5, and China is among the most unequal countries in Asia (*Economist*, March 10th, 2012). In fact, countries with a

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TABLE 1.   TREND IN INCOME INEQUALITY IN CHINA

year	China				Rural sector				Urban sector			
	Data[1]	Gini index	Theil index	H/L[2]	data	Gini index	Theil index	H/L	data	Gini index	Theil index	H/L
1981	I	29.11	0.1386	6.15	I	24.73	0.102	4.97	I	18.46	0.059	3.28
1984	I	27.69	0.1263	5.74	I	26.69	0.1181	5.49	I	17.79	0.0536	3.09
1987	I	29.85	0.1502	6.93	I	29.45	0.1456	6.73	I	20.2	0.0695	3.76
1990	c	32.43	0.171	7.24	C	30.57	0.161	6.73	C	25.59	0.1081	5.13
1992					I	32.03	0.1727	7.85	I	24.17	0.0976	4.76
1993	c	35.5	0.2058	8.63	C	32.13	0.1898	7.42	C	28.47	0.1341	6.08
1994					I	33.84	0.2001	9.68	I	29.22	0.1415	6.44
1995					I	33.98	0.1964	9.20	I	28.27	0.1321	6.03
1996	c	35.7	0.2089	8.86	C	33.62	0.1866	7.72	C	29.09	0.139	6.20
1997					I	33.12	0.1889	9.05	I	29.35	0.1424	6.43
1998					I	33.07	0.1857	8.67	C	29.94	0.1504	6.94
1999	c	39.23	0.2543	10.89	C	35.39	0.2073	8.52	C	31.55	0.165	7.36
2002	c	42.59	0.306	13.89	C	38.02	0.2403	9.89	C	33.46	0.1919	8.40
2005	c	42.48	0.3229	17.86	C	35.85	0.2133	9.09	C	34.8	0.209	9.21
2008					C	39.4	0.2593	11.08	C	35.15	0.2077	9.25

Source: World Bank, http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp
Note: 1) c and I represent consumption and income, respectively.
         2) H/L is the ratio of the income share in the highest 10% to the lowest 10%.

Gini coefficient over 0.5 are mostly in Latin America, i.e., Brazil.

Income inequality in urban China is relatively smaller than the inequality in rural China. However, inequality in urban China has been steadily increasing since the mid-1990s. The World Bank estimates show that the Gini coefficient in urban China increased from 0.299 in 1998 to 0.352 in 2008, and converged almost to the inequality in rural China. The rise in income inequality in China has been widely documented. Previous studies on income inequality in China are mainly based on the data from the China Household Income Project (CHIP) survey because the National Bureau of Statistics (NBS) data leave out important elements of income such as rental value of owner-occupied housing and various kind of subsides. But, the CHIP survey includes a relatively smaller number of provinces than the NBS survey. There were four waves of CHIP surveys in 1988, 1995, 2002, and 2007. Analyses based on the 1988, 1995 and 2002 CHIP surveys report that income inequality in China remained more or less unchanged or declined between 1995 and 2002, after sharp increases between 1998 and 1995 (e.g., Démurger et al., 2006; Gao et al., 2006; Gustafsson et al., 2008a, 2008b; Khan et al., 1998, 2005, 2008). Khan et al. (2005, 2008) shows that the major sources for the slight decreasing inequality between 1995 and 2002 are the decrease in interprovincial inequality and changes in the distribution of subsidies. Gustafsson et al. (2008a) find that the equalizing causes that emerged in the late 1990s include a large increase in wage-earning jobs in poorer regions of rural areas, and the broader implementation of the urban housing reform.

Empirical studies based on the recent 2007 CHIP survey show that inequality in China increased between 2002 and 2007 (e.g., Deng and Gustafsson, 2011; Ding et al., 2011; Gustafsson et al., 2011; Knight et al., 2011; Li et al., 2011; Liu et al., 2011; Sato et al., 2011; Yang et al., 2011).[1] These studies examine various aspects of inequality in China. Li et al. (2011) and Liu et al. (2011) focus their analysis on income and consumption inequality,

respectively. Interestingly, Li et al. (2011) also analyze income inequality among migrants and show that between 2002 and 2007 incomes of long-term, stable migrants grew rapidly and inequality among these migrants declined. Knight et al. (2011) investigate the educational inequality to show that the contribution of parental education to inequality in education increased. Sato et al. (2011) examine changes in private ownership of housing and the implications for distribution of housing wealth. They find that the inequality of housing wealth increased between 2002 and 2007 mainly due to the increased inequality within the rural areas and the widening gap between the urban and rural areas, whereas the inequality of housing wealth within the urban areas declined due to a rise in the rate of home ownership.

Among the studies based on the 2007 CHIP survey, Deng and Gustafsson (2011), Gustafsson et al. (2011), and Yang et al. (2011) focus their analyses on urban inequality in China. Gustafsson et al. (2011) examine the unemployment in urban China and argue that the unemployed persons contributed to a more unequal distribution. Deng and Gustafsson (2011) report that income inequality in urban China increased through two major channels: the most important channel was the rapid increase of imputed rents from owner-occupied housing; the other channel was the rapid increase in income from business. Especially, Yang et al. (2011) investigate trends and determinants of the earnings gap across ownership types. They find that average earnings gaps decreased between 2002 and 2007, and earnings are fairly equally distributed within the public sector, whereas most of the gap for the private domestic sector came from the bottom of the distribution.

The widening gap between urban and rural incomes is also consistently cited as an important factor underlying inequality in China (e.g., Kanbur et al., 1999, 2009; Lee, 2006; Ravallion et al., 2007; Sicular et al., 2010). Regional income differences between the coastal and interior regions have also received attention. Recent studies conclude that regional income differences contribute a relatively small share of total income inequality. The majority of total income inequality is related to the inequality within-region and rural-urban inequality (Fan et al., 2010; Kanbur et al., 1999; Lee, 2006; Wan, 2007; Yao, 2009). Lee (2006) shows that increase in the income differentials within the coastal provinces as well as rural-urban inequality was the major cause behind the rising regional inequality between 19997 and 2003.

Previous studies, however, do not investigate the role of the state sector in income inequality in urban China. The state sector is heavily dependent on capital compared to the private sector, and there are growing concerns that China's capital-heavy model of growth emphasizing the role of large state enterprises has aggravated income inequality. The objective of this paper is to investigate the role of the state sector in the income inequality in urban China. The capital intensity in the state sector is much higher than the capital intensity in the private sector because the state sector can easily access to low-cost capital in varieties of preferential ways. In addition, the return to capital in the state sector is relatively high, even though the state sector has high capital intensity. As a result, capital income in the state sector is much larger and moreover, increases faster than the capital income in the private sector.

It is well documented that state-owned enterprises(SOEs) in China are subsidized through

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[1] For the empirical studies based on the recent 2007 CHIP survey, see CIBC Centre for Human Capital & Productivity Working Papers 2011-10 to 2011-21. ― Chapters from: Rising Inequality in China: Challenge to a Harmonious Society, by Shi Li, Hiroshi Sato and Terry Sicular, eds., submitted to Cambridge University Press. http: //economics.uwo.ca/centres/cibc/workingpapers.asp

easy access to low-cost capital in varieties of preferential ways, such as lower interest rates applied to the SOEs by the state-owned large commercial banks (SOCBs) (e.g., Cull et al., 2003; Deng et al., 2011; Dollar et al., 2007; Ferri et al., 2009; Fungačova, 2011; Martin, 2012; Podpiera, 2006; Szamosszegi et al., 2011; Walter et al., 2012; Wei et al., 1997, 2005). For example, the average borrowing interest rate applied to the SOEs by the SOCBs was 1.6%, whereas it was 4.7% applied to the private enterprises (*Economist*, January 21th, 2012). In 2009, private firms accounted for only 2% of China's official outstanding loans. According to Szamosszegi et al., the average of monthly prime lending rates in China from December 2009 to December 2010 was 5.36%. However, Sinopec's average interest rate on short term loans was 2.7% in 2010. Walter et al. (2012) also argue that the main reason for the Chinese government to fix the borrowing cost of the banks at the lowest rate is to make the cost of capital to the state sector as cheap as possible.

As a consequence of the artificial subsidy to the state sector, profits in the state sector have increased despite the increase in the capital-labor ratio in the state sector. In 2009, just two SOEs -China Mobile and China National Petroleum Corporation (CNPC) - made more profits ($33 billion) than China's 500 most profitable private companies combined (*Economist*, January 21th, 2012). In 2010, the top 129 Chinese SOEs made an estimated net profit of $151 billion, 50% more than the year before. In contrast, SOEs have successfully resisted the payment of significant dividends. From 2008, SOEs have only paid 5-20% of after-tax profits to the government after years of wrangling (Naughton, 2008; *Economist*, April 28th, 2012). SOEs are taking their money from high profits to varieties of "wealth-management products", short-term investments that offer better returns than regulated deposits, or even shifting it overseas (*Economist*, May 19th, 2012). The rapid growth in the capital income of the capital abundant state sector has left owners of capital with a relatively larger slice of the urban income. Our findings shed light on the growing concerns over China's capital-intensive growth model, which has aggravated inequality in China *(Economist*, March 3th, 2012; *Economist*, April 14th, 2012). Our findings also suggest that it is necessary to shift the economic policy from a capital-intensive growth to a more labor-intensive sort to reduce the income inequality in urban China.

In the next section, we divide urban China into the state and private sectors to illustrate the differences in the capital-labor ratio and the return to capital between the state and private sector. In section III, we assume that the state sector is relatively capital abundant and has a comparative advantage in producing capital-intensive goods, while the private sector is relatively labor abundant and has a comparative advantage in producing labor-intensive goods. We use a two sector model to show that a subsidy to the capital in the capital-intensive industry increases the return to capital in the capital-intensive state sector, even if the rate of the increase is much higher in the labor-intensive private sector. We argue that an increase in the return to capital, with a rapid rise in the capital intensity in the state sector, caused an increase in income inequality in urban China. Empirical analyses supporting our arguments are presented in section IV. We estimate provincial Gini coefficients for urban households by using grouped data from 2005 to 2010 to check the robustness of the empirical results. Section V concludes and suggests policy implications.

TABLE 2.   CAPITAL/LABOR RATIO IN SOE AND DPE

year	$(K/N)^S$ (million yuan)	$(K/N)^P$ (million yuan)	SOE/ DPE	K/N^S (million yuan)	K/N^P (million yuan)	SOE/ DPE	K^S/K	K^P/K	SOE/ DPE
1998	6.28	3.31	1.90	6.42	149.74	0.04	0.98	0.02	44.18
1999	10.53	3.53	2.98	10.77	159.54	0.07	0.98	0.02	44.16
2000	12.57	3.66	3.44	12.99	112.31	0.12	0.97	0.03	29.72
2001	14.80	3.82	3.88	15.57	76.92	0.20	0.95	0.05	19.16
2002	16.82	4.08	4.13	18.05	59.70	0.30	0.93	0.07	13.64
2003	20.19	4.57	4.42	22.36	47.06	0.48	0.90	0.10	9.30
2004	24.15	5.04	4.79	28.02	36.48	0.77	0.86	0.14	6.24
2005	27.36	5.76	4.75	32.56	36.08	0.90	0.84	0.16	5.27
2006	33.00	6.51	5.07	40.10	36.71	1.09	0.82	0.18	4.64
2007	39.05	7.26	5.38	48.44	37.47	1.29	0.81	0.19	4.16
2008	44.64	8.59	5.19	58.40	36.48	1.60	0.76	0.24	3.25
2009	50.38	10.10	4.99	67.04	40.65	1.65	0.75	0.25	3.02
2010	55.55	11.55	4.81	76.38	42.35	1.80	0.73	0.27	2.67

Source: calculated from *Zhongguo tongji nianjian* (*Statistical Yearbook of China*), 2011.

Note: 1) The capital-labor ratio (K/N) is the ratio of the net value of fixed assets to the labor employed.

2) S is denoted for the state sector. P is denoted for the private sector.

II. *Empirical Evidences*

1. **Differences in the Capital-labor Ratios between SOE and DPE**

We divide the urban sector in China into the state and private sectors. The state sector includes the state-owned industrial enterprises (SOE).[2] The private sector includes domestic private industrial enterprises (DPE). We first note the empirical evidence on the differences of the capital-labor ratios (K/N) between SOE and DPE. Table 2 illustrates that the capital intensity is much higher in SOE. In 1998, the capital-labor ratio was 2 times higher in SOE than the capital-labor ratio in DPE. The differences in the capital-labor ratios between the two sectors have jumped to 5 times in 2010.

The capital-labor ratio in the state sector increased at a much higher rate because K/N^S increased much rapidly than the rate of increase in K/N^P, although the fraction of the capital in the state sector, (K^S/K), decreased since the end of the 1990s. Song et al. (2011) depict that the state sector is significantly more represented in those industries that are more capital-intensive. In addition, the employment share in the state sector in the ten most capital-intensive industries is 57%, whereas in the ten least capital-intensive industries, the share is 26%. In December 2006, China's government officially identified seven "strategic industries" in which the state must maintain absolute control through dominant state-owned enterprises; five heavy weight industries were also noted in which the state will remain heavily involved (US-China Economic and Security Review Committee, 2011; see Table 3). Although the state's share of the economy

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[2] The state sector also includes the state-holding or controlling enterprises. The state-holding or controlling enterprises are enterprises where majority of the assets or shares are owned by the state or state-related firms or agencies, whereas all assets are owned by the state in the state-owned enterprises.

TABLE 3.   CHINA'S STRATEGIC AND HEAVY WEIGHT INDUSTRIES

Strategic Industries	Heavy Weight Industries
Defense	Machinery
Power Generation and Distribution	Automobiles
Petroleum and Petrochemical	Information Technology
Telecommunication	Construction
Coal	Iron, Steel, and Nonferrous Metals
Civil Aviation	
Shipping	

Source: US-China Economic and Security Review Committee, 2011.

has decreased since the start of the reforms, the government has kept these key industries for the state sector. The strategic or heavy weight industries, such as petroleum and petrochemicals, energy, coal, defense, power generation, telecommunication equipment, machinery, and nonferrous metals etc., all have much higher capital-intensity.

Most researches on the pattern of China's growth pointed out that China was too heavily dependent on capital to sustain its rapid growth, and China will continue utilizing the capital heavy dependent model to attain potential GDP growth. Perkins et al. (2008) examined the sources of China's rapid growth of GDP through growth accounting and found that the contribution of fixed capital to GDP growth, as a percentage share of GDP growth, was 33.3% during 1990-1995. However, it increased rapidly to 52.7% during 19995-2000, and 57.1% during 2000-2005. The World Bank (2010) predicts that the contribution of capital-labor ratio will be about 65% in attaining China's potential GDP growth rate, 7%-8.4% during 2010-2020. We can affirm that the state sector is heavily dependent on capital compared to the private sector.

2.   Differences in the Returns to Capital between SOE and DPE

Table 4 shows the differences in the returns to capital and labor between the two sectors. The return to capital (R) is much higher in the private sector. However, the return to capital in the state sector has also increased rapidly since 1998, although it has started to diminish since 2007. The return to capital in the state sector has risen from 2.2% in 1998 to 15.9% in 2007; it was 14.5% in 2010. The return to capital in the private sector has increased from 12.6% in 1998 to 30.9% in 2007; it jumped significantly to 39.5% in 2010.[3] Table 4 also portrays the disparities in real wages between the two sectors. We can see that the gaps in real wages between the two sectors are not large and remain constant. Thus, we assume real wage rates in both sectors are same.[4]

Given the high capital-labor ratios, the high return to capital in the state sector is attributed

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[3] It is noted that the return to capital in the state sector fell from 16% in 2007 to 10% in 2009, in which the banking sector, especially the big four state-owned commercial banks in China, heavily increased loans. The loans mostly went to the state sector to sustain the speed of economic growth amid the global financial crisis (Deng et al., 2011). As a result, the real GDP growth jumped from 6.2% in the first quarter of 2009 to 11.9% in the first quarter of 2010.

[4] The differentials in the wages between the two sectors will be higher than the statistical data, if extravagant perks the workers employed in the state enterprises can be benefited are considered. Today, most job seekers prefer jobs in the state sector because state-owned companies pay more than private ones, which is as much as multinational ones, and offer shorter hours and cast-iron job security (*Economist*, January 21th, 2012).

TABLE 4.   RETURN TO CAPITAL AND WAGE RATE IN SOE AND DPE

year	R^S(%)	R^P(%)	SOE/DPE	W^S(yuan)	W^P(yuan)	SOE/DPE
1998	2.23	12.62	0.18	5553	7728	0.72
1999	2.79	15.02	0.19	6348	8413	0.75
2000	6.40	14.98	0.43	6940	9167	0.76
2001	6.03	15.12	0.40	8613	9206	0.94
2002	6.46	16.41	0.39	9487	10987	0.86
2003	8.79	18.30	0.48	10426	12035	0.87
2004	11.44	18.73	0.61	12774	13316	0.96
2005	12.71	21.77	0.58	14687	14391	1.02
2006	14.26	24.88	0.57	16014	15774	1.02
2007	15.86	30.90	0.51	18152	17339	1.05
2008	11.32	33.64	0.34	21460	19572	1.10
2009	10.22	32.21	0.32	24350	23061	1.06
2010	14.45	39.49	0.37	29887	26157	1.14

Source: calculated from *Zhongguo tongji nianjian* (*Statistical Yearbook of China*), 2011.

Note: 1) The return to capital(R) is the ratio of total profit to the net value of fixed assets.

2) The wage rate is the annual average real wage with 1995=100. The wage rate in the private sector is the wage rate in the non-state sector, including the wage in the foreign enterprises, because the wage rate is available for the non-state sector instead of the domestic private sector.

3) S is denoted for the state sector. P is denoted for the private sector.

to the subsidized bank credit. Ferri et al. (2009) find that the profits for state owned enterprises are overstated because the interest costs of state owned enterprises are significantly lower than the private enterprises. The subsidized loans to state-owned enterprises contributed, to a large extent, to keep the high profitability in the state sector. They argue that if state-owned enterprises benefitting from credit subsidies were to pay a market interest rate, their existing profits would be entirely wiped out. Prior to 2007, the state-owned enterprises paid tax, yet, they did not pay dividends to the owner (government). They began to pay 5-20% of dividends starting from 2008, which is still a low rate. Most of the high profits in the state sector, due to the subsidized capital and low payment of after-tax profit to the owner, are not appropriately invested. The state-owned enterprises that are not controlled in the quantity of deposits they must provide, transfer their money from high profits to elsewhere, such as "wealth management products" that offer better returns than regulated deposits or even shifting it overseas (*Economist*, May 19th, 2012). Deng et al. (2011) also found that state-owned enterprises invested heavily in real estate and elevated real estate prices, which leads to misallocation of the economy's resources. As a result, high returns to capital in the inefficient state sector engender a bigger slice of the pie for the owners as well as increase the urban income inequality. In the next section, we show that a subsidy to the capital employed in the capital-intensive state sector increases the returns to capital in both sectors.

III.   *Model*

1.   **Comparative Advantages in Two Sectors**

We assume that the state sector (S) is relatively capital abundant and has a comparative

advantage in producing capital intensive goods (X) (see also Lee, 2012b). The private sector (P) is relatively labor abundant and has a comparative advantage in producing labor-intensive goods (Z). Thus, the relative supply of X (X/Z) is larger in the state sector than that of the private sector in the initial year. This implies that the relative price of X (P_X/P_Z) is lower in the state sector than that of the private sector. The ratio of return to capital-labor (R/W) is lower in the state sector than that of the private sector because the state sector is relatively capital abundant and the private sector is relatively labor abundant. In the initial year:

$$\left(\frac{K}{N}\right)^S > \left(\frac{K}{N}\right)^P \tag{1}$$

$$\left(\frac{K}{N}\right)_X > \left(\frac{K}{N}\right)_Z \tag{2}$$

$$\left(\frac{X}{Z}\right)^S > \left(\frac{X}{Z}\right)^P \tag{3}$$

$$\left(\frac{P_X}{P_Z}\right)^S < \left(\frac{P_X}{P_Z}\right)^P \tag{4}$$

$$\left(\frac{R}{W}\right)^S < \left(\frac{R}{W}\right)^P \tag{5}$$

The state sector can sell comparative advantage goods X more expensively and the private sector can sell comparative advantage goods Z more expensively through trading between the two sectors. The relative price of X and the relative price of Z will rise through trading the comparative advantage goods between the two sectors. The rise in the relative price of X will increase the return to capital and reduce the wage rate in the state sector, according to the Stolper-Samuelson Theorem. The rise in the relative price of Z will increase the wage rate and reduce the return to capital in the private sector. Thus, the ratio of R/W between the two sectors will be converged and become same in the equilibrium. The ratio of K/N between the two sectors will also be converged and become same in the equilibrium. The model implies that urban income inequality will not be widened if the two sectors trade in accordance with their comparative advantages.

2.   A Subsidy to the Capital in Capital-intensive State Sector

We use the two sector model in Mussa (1979) to develop a model that can show a subsidy on the capital employed in the capital-intensive goods increases the return to capital in both the state and private sectors, even if the rate of increase in the return to capital is higher in the labor-intensive sector. The dual of the production function for commodity X, $\tilde{P}_X(W, R)$ determines the iso-price curve $\tilde{P}_X = P_X^0$, which indicates the combinations of W and R (Fig 1). A higher price of X shifts this curve proportionately outward along every layer through the origin. The dual of the production function for commodity Z, $\tilde{P}_Z(W, R)$ determines the iso-price curve $\tilde{P}_Z = P_Z^0$, which indicates the combinations of W and R. The absolute values of the slopes of the iso-price curves indicate the ratios of labor to capital, which will be used in the X and Z industry. Provided that the initial points are X_0 and Z_0 in the state and private sectors,

FIG. 1.   ECONOMY WITHOUT SUBSIDY
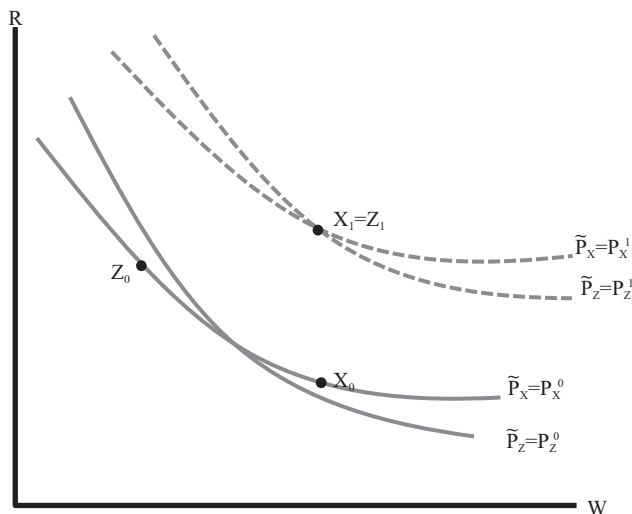
Source: Mussa (1979)

respectively in Fig 1, the equations in (1) to (5) hold in the initial stage. Suppose that the prices of X and Y increased through trading the comparative advantage goods between the two sectors. The increase in the price of X shifts $\tilde{P}_X = P_X^0$ to $\tilde{P}_X = P_X^1$. The increase in the price of Z shifts $\tilde{P}_Z = P_Z^0$ to $\tilde{P}_Z = P_Z^1$. The equilibrium point will be $X_1 = Z_1$.

Now assume that a subsidy is paid to the state companies as a form of lower interest rates applied to the capital used in the production of X. If the output prices is given, the equilibrium of economy lies at a pair of points, like A and B in Fig 2, for which the wage rate paid by firms is the same in both sectors, and for which the return to capital in the firms in X is below the return to capital in firms in Z. We see the 'somewhat paradoxical results', as expressed in Mussa (1979), that a subsidy to the capital used in the capital-intensive X reduces the capital-labor ratios, reduces the wage rate, and increases the return to capital in both sectors. At a given point in time, the capital-labor ratio will still be higher in the capital-intensive sector; the return to capital in the labor-intensive sector will be above the return to capital in the capital-intensive sector.

The ratio of capital-labor could be increased in both sectors if the total amount of capital available to both sectors rapidly increases, such as in China due to the high savings rate in urban China. The ratio of capital-labor in each sector can be expressed as:

$$\left(\frac{K}{N}\right)^S = \frac{K}{N^S} \frac{K^S}{K}$$

$$\left(\frac{K}{N}\right)^P = \frac{K}{N^P} \frac{K^P}{K}$$

The ratios of capital-labor rise in both sectors if both of the capital per worker and fractions of the capital used in both sectors increase. The share of the capital in the state sector (K^S/K)

FIG. 2.   ECONOMY WITH SUBSIDY
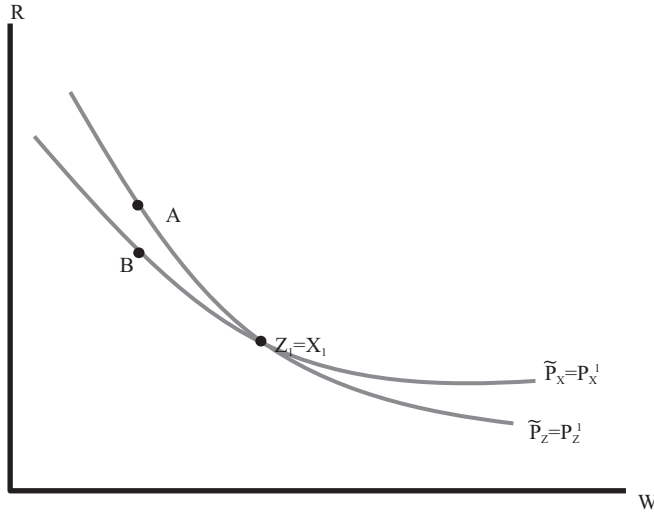
decreases, while it increases in the private sector, although the ratios of capital-labor rise in both sectors, as seen in the previous section. This implies that the increase in capital per worker in the state sector $(K/N^{S)})$ is much faster than the increase in capital per worker in the private sector (K/N^{P}).

In the following section, we show the increase in income inequality in urban China is related to the increase in the relative return to capital, relative capital intensity and relative share of capital income in the state sector (see also Lee, 2012b). Suppose that urban income inequality (UI) is measured by the share of capital to labor income:

$$UI = \frac{RK}{WN} = \frac{R\frac{K}{N}}{W}$$

If we assume the wage rate between two sectors is equal, the UI is expressed:

$$UI = R^{S}(\frac{K}{N})^{S} + R^{P}(\frac{K}{N})^{P}$$

This can be rewritten:

$$UI = f(RKI^{S})$$

where

$$(RKI)^{S} = \frac{R^{S}(\frac{K}{N})^{S}}{R^{P}(\frac{K}{N})^{P}}$$

$(RKI)^{S}$ is the relative share of the capital income per worker in the state sector. This implies

that urban income inequality is an increasing function of the relative ratio of return to capital (R^S/R^P), capital intensity $[\frac{(K/N)^S}{(K/N)^P}]$, and relative share of the capital income per worker $[(RKI)^S]$ in the state sector.

IV.   *Analysis Results*

In this section we try to show that income inequality in urban China is related to the rise in the relative share of capital income per worker in the capital-intensive state sector. The relative increase in the share of capital income in the state sector mainly results from a much higher increase in the ratio of capital intensity in the state sector due to easy access to subsidized capital in the state sector. To test these implications we employ a data set covering all but Hunan provinces in China from 2005 to 2010. Hunan is excluded because the grouped data for urban households to estimate the Gini coefficient is not available. The dataset yields a panel of 30 provinces with observations within the timeframe. The returns to capital in each sector are the ratio of the total profit to the net value of fixed assets in each sector in a province. The capital intensity in each sector is the provincial ratio of capital-labor in each sector.

We use the relative share of property and business income to labor income as a proxy for urban inequality measure. The income from business and properties, and the income from wages and salaries of the urban households are appeared in the *Zhongguo Jiage ji chengzhen juminjiating shouzhi diaocha tongji nianjian* (*Statistical Yearbook of China's Prices, Income and Expenditure Survey in the Urban Households*). The urban household income from the properties includes revenues from interests, stock investments, dividends, and rents. We test the robustness of our empirical results by employing alternative measure of inequality. We use the Gini coefficients for urban households at provincial level to check the robustness of our empirical results. We estimate the provincial Gini coefficients for urban households by using grouped data appeared in the *Provincial Statistical Yearbooks* at each province.[5] The grouped data for urban household disposable income is available for all but Hunan provinces in China from 2005 to 2010. The *Provincial Statistical Yearbooks* report the mean income of income quintiles for urban households in four provinces (Beijing, Shanghai, Sichuan, and Shaanxi). For the other 26 provinces it reports the 0-10th (lowest income households), 10-20th (low income households)), 20-40th (lower middle income households), 40-60th (middle income households), 60-80th (upper middle income households), 80-90th (higher income households), and 90-100th (highest income households) percentiles of the income distribution for urban households.

Table 5 presents the mean of the data included in the analysis. It shows that the mean of

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[5] We use POVCAL to estimate the Gini coefficients for urban household in China at provincial level with grouped data. POVCAL is developed by the World Bank to estimate poverty index and Gini coefficient with grouped data. POVCAL uses both General Quadratic (GQ) Lorenz Curve and Beta Lorenz Curve in estimating the Gini index. POVCAL is explained in detail at http://iresearch.worldbank.org/PovcalNet/jsp/index.jsp. The theoretical background to estimate the Gini coefficient with grouped data is explained in Chotikapanich et al. (2007), Datt (1998), Kakwani et al. (1976), Wu (2003), Wu et al. (2004), Wu et al. (2005), and Minoiu et al. (2008). Datt (1998) and Minoiu et al. (2008) are helpful to understand how to estimate the Gini coefficient with POVCAL. Chotikapanich et al. (2007) and Wu et al. (2004) employed grouped data for China to show how to estimate the Gini coefficient with grouped data.

TABLE 5.   MEAN OF DATA BY REGION, 2005-2010

	China	Coast	Interior
Mean of return to capital			
state sector	0.1302	0.1307	0.1298
private sector	0.2713	0.3022	0.2533
mean of relative return to capital in state sector	0.4798	0.4325	0.5125
Mean of capital intensity			
state sector (mil.yuan)	46.1877	55.1017	41.0270
private sector (mil.yuan)	10.1307	8.0946	11.3094
mean of relative capital intensity in state sector	4.5592	6.8072	3.6277
Mean of capital income per worker			
state sector (mil.yuan)	5.9855	7.2945	5.2276
private sector (mil.yuan)	2.6591	2.4925	2.7556
mean of relative share of capital income in state sector	2.6753	3.5570	2.1649
Inequality measurements			
mean of share of property and business income to wage income	0.1302	0.1416	0.1236
mean of GINI coefficients(Gini*100)	30.6522	31.3895	30.2253

Source: calculated from *Zhongguo tongji nianjian* (*Statistical Yearbook of China*), 2006, 2007, 2008, 2009, 2010, 2011; *Zhongguo Jiage ji chengzhenjumin jiating shouzhi diaocha tongji nianjian* (*Statistical Yearbook of China's Prices, Income and Expenditure Survey in the Urban Households*), 2006, 2007, 2008, 2009, 2010, 2011; *Provincial Statistical Yearbooks* for all but Hunan provinces, 2006, 2007, 2008, 2009, 2010, 2011; for China's provincial Gini coefficients, see also Lee (2012a).

Note: Hunan province is excluded because the grouped data for urban households to estimate the Gini coefficients from 2005 to 2010 is not available for Hunan.

capital intensity in the state sector is much larger in the coastal region. On the contrary, the capital intensity in the private sector is relatively larger in the interior region. As a result, the relative capital intensity in the state sector is much larger in the coastal region. In addition, we see the mean of capital income per worker in the state sector is much larger in the coastal because the coastal provinces have much larger capital intensity in the state sector, whereas the return to capital is almost identical between the two regions in the state sector. In contrast, within the private sector, the difference between the coastal and interior provinces in the mean of capital income per worker is not large. As a result, the difference between the two regions in the capital income per worker is dominated by the state sector, not by the private sector. Thus, the relative share of capital income per worker is much larger in the coastal region which has a much larger capital income per worker in the state sector. We also see in Table 5 that both of the measures of income inequality for urban China, the share of business and property income to wage income and the Gini coefficients for the urban households, are higher in the coastal region.[6]

To see whether urban income inequality in China is increased with the relative return to capital, relative capital intensity, and relative share of capital income per worker in the state

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[6] The provinces such as Liaoning, Jiangsu, Zhejiang, Hainan, and Guangdong in the coastal have higher Gini coefficients than the mean of Gini coefficients at all provinces. In contrast, only two provinces in the interior region, Heilongjiang and Qinghai, have higher Gini coefficients than the mean of Gini coefficients at all provinces. The mean of Gini coefficients at all provinces for the periods of 2005 to 2010 is 30.65216. The income inequality for urban households is the highest in Guangdong among all provinces in China. The mean of Gini coefficient for Guangdong for the periods from 2005 to 2010 is 35.58434.

TABLE 6.   URBAN INCOME INEQUALITY AND ROLE OF STATE SECTOR

Dep. Variable	PBI/WI			Gini coefficient			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
R^S/R^P	0.0115*** (3.904)				−0.0011 (−0.489)		
$\dfrac{(K/N)^S}{(K/N)^P}$		0.0006 (0.360)				−0.00155 (−1.249)	
$(RKI)^S$			0.0021*** (2.745)				−0.00092 (−1.621)
PBI/WI				0.1298** (2.191)			
coastal dummy	0.0239*** (2.986)	0.0303** (1.974)	0.0226** (2.534)	0.2676*** (44.983)	0.2732*** (45.074)	0.2841*** (25.805)	0.2776*** (42.520)
province dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.8981	0.8873	0.8929	0.7884	0.7817	0.7837	0.7853

Note: t-statistics are in brackets. *** and ** denote statistically significant at 1% and 5%, respectively.
PBI/WI = share of property and business income to wage income; R^S/R^P = relative ratio of return to capital in the state sector; $\dfrac{(K/N)^S}{(K/N)^P}$ = relative capital intensity in the state sector; $(RKI)^S$ = relative share of capital income per worker in the state sector.

sector, in the first place we estimate the effects of the relative ratio of return to capital in the state sector on the urban income inequality in China.

$$(UI)_{dt} = \alpha_t + \alpha_d + c_d + \beta(R^S/R^P)_{dt} + \varepsilon_{dt}$$

where UI is the measures of urban income inequality. R^S/R^P is the relative ratios of return to capital in the state sector. α_t and α_d are time and provincial dummies, respectively. c_d is a dummy for the provinces in the coastal to see whether the effect of relative return to capital in the state sector is different between the coastal and interior regions. We also run the regression to see the effects of the relative capital intensity in the state sector on the urban income inequality.

$$(UI)_{dt} = \alpha_t + \alpha_d + c_d + \beta(RKN)_{dt}^S + \varepsilon_{dt}$$

where $(RKN)^S$ is the relative capital intensity in the state sector ($\dfrac{(K/N)^S}{(K/N)^P}$). We finally estimate the regression to observe the effects of the relative share of the capital income in the state sector on the urban income inequality.

$$(UI)_{dt} = \alpha_t + \alpha_d + c_d + \beta(RKI)_{dt}^S + \varepsilon_{dt}$$

where $(RKI)^S$ is the relative share of capital income per worker in the state sector.

　　We report the estimation results in Table 6. The results with the proxy for urban inequality, relative share of property and business income to wage income for urban households, are presented in the estimations (1), (2), and (3). It shows that the relative return to

capital and relative share of capital income in the state sector have positive effects on the proxy for urban inequality. The impact of relative capital intensity in the state sector is positive, but negligible and not statistically significant because the effect of relative capital intensity in the state sector is dominated by the effect in the provinces located in the coastal. The results show that the estimated coefficients on the costal dummy in the estimations (1), (2), and (3) are all positive and statistically significant. The empirical results imply that the effects of increases in the relative return to capital, relative capital intensity, and the relative capital income in the state sector on the proxy for urban inequality are much bigger in the coastal provinces than the effects in the provinces in the interior.

The results with the Gini coefficients for urban households are reported in the estimations (4), (5), (6), and (7). We firstly see whether the proxy for urban income inequality is appropriately related to the Gini coefficients for urban households. The estimation (4) shows that the proxy for urban income inequality is positively and significantly correlated with the Gini coefficients. Deng and Gustafsson (2011) also identify that the rapid increase in income from business was an important channel for the increase in income inequality in urban China between 2002 and 2007. The estimation (4) also shows that the positive relationship between the proxy for urban income inequality and the Gini for urban households is much stronger in the provinces located in the coastal than the relationship in the interior provinces. The estimations (5), (6), and (7) show the effects of relative return to capital, relative capital intensity, and relative share of capital income per worker in the state sector on the Gini coefficients for urban households. The estimation results indicate that the effects of the state sector in the coastal provinces are different from the interior provinces. According to the estimations (5), (6), (7), the estimated coefficients of relative return to capital, capital intensity, and share of capital income in the state sector are all negligible, whereas the coefficients of dummy for the coastal provinces are all positive and statistically significant. The findings of the empirical analysis imply that the overwhelming majority of income inequality in urban China is associated with the state sector in the coastal provinces rather than in the interior provinces. The return to capital and capital intensity is relatively higher in state firms located in the coastal provinces such as Jiangsu, Zhejiang, and Guangdong. As a result, relative share of capital income in the state sector is much higher in the coastal provinces, and thus income inequality for urban households is higher in the coastal provinces than income inequality in the interior provinces.

V.   Conclusions

We tried to develop a two sector model to investigate the role of the state sector on the urban income inequality in China. We showed that the state sector in the coastal provinces rather than the state sector in the interior provinces has a statistically significant role in the aggravation of income inequality in urban China since mid-2005. The findings of empirical analysis imply that the income inequality for urban households in China is mainly related to the coastal provinces with relatively higher return to capital, capital intensity, and thus capital income in the state sector. The Chinese government should redirect their policy that emphasizes the role of large enterprises in the state sector and subsidizes the capital in the capital-intensive state sector. The findings of the paper shed light on the concerns over China's capital-heavy

model of growth, in which owners of capital are becoming wealthier than workers. The main reason for shifting the policy from emphasizing the capital-intensive state sector to the labor-intensive private sector is to reduce inequality in urban China.

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